Atlantic
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Final

# Site Inspection for Per- and Polyfluoroalkyl Substances

## Atlantic Fleet Weapons Training Area – Vieques
## Former Naval Ammunition Support Detachment and
## Former Vieques Naval Training Range
## Vieques, Puerto Rico

December 2023

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Prepared for NAVFAC Atlantic
by CH2M HILL, Inc.
Virginia Beach, Virginia
Contract N62470-16-D-9000
CTO 0003

# Executive Summary

This report presents the Site Inspection (SI) results for per- and polyfluoroalkyl substances (PFAS) at the former Atlantic Fleet Weapons Training Area – Vieques, which includes the former Naval Ammunition Support Detachment (NASD) and former Vieques Naval Training Range (VNTR) in Vieques, Puerto Rico. Vieques is an island in the Caribbean Sea located approximately 7 miles southeast across the Vieques Passage from the eastern tip of the main island of Puerto Rico (Figure ES-1). The island is located on the Antillean Island Arc separating the Caribbean Sea from the Atlantic Ocean and is approximately 21 miles long, 4.5 miles wide, and has an area of approximately 33,100 acres (51 square miles). Early in the 1940s, the Department of the Navy (Navy) purchased large portions of Vieques to conduct activities related to military training. The western side of the island is known as the former NASD (Figure ES-2), which was used mainly for ammunition loading and storage, vehicle and facility maintenance, and open burn/open detonation activities at the far western end of the island. The eastern side of Vieques is the former VNTR (Figure ES-3), which was used for various aspects of naval gunfire training, including air-to-ground ordnance delivery, amphibious landings, and housed the main base of operations at Camp Garcia for military training and support activities.

On February 11, 2005, Vieques was placed on the National Priority List (NPL) as the former Atlantic Fleet Weapons Training Area – Vieques, which required all subsequent environmental restoration activities for Navy Installation Restoration sites on Vieques to be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) until removed from CERCLA authority. The Navy, Department of the Interior (DOI), United States Environmental Protection Agency (EPA), and Puerto Rico Environmental Quality Board (PREQB) executed a Federal Facility Agreement on September 7, 2007, that established the procedural framework and schedule for implementing the CERCLA response actions for Vieques.

PFAS were identified as "emerging chemicals"[1] with Navy policies issued beginning in 2014 requiring assessment of possible impacts from PFAS (DON, 2014, 2015). A Preliminary Assessment (PA) was completed that evaluated the potential for PFAS to be present based on certain historical practices conducted at the Vieques former NASD and/or former VNTR (CH2M, 2020). Based on the findings in the PA, 13 potential PFAS release areas were identified; six areas within the former NASD and seven areas within the former VNTR, listed as follows:

- NASD Area of Concern (AOC) B: Former Wastewater Treatment Plant at the Public Works Area
- NASD Former Fire Station Building 2046 at the Public Works Area
- Potential Former NASD Motor Pool Area
- NASD AOC H: Abandoned Power Plant/Former Fire Training Area
- NASD Solid Waste Management Unit (SWMU) 6: Former Mangrove Disposal Site
- NASD SWMU 7: Former Quebrada Disposal Site
- VNTR Former Camp Garcia Runway
- VNTR Photo Identified (PI) 5: Surface Water Drainage Area from Former Camp Garcia Runway
- VNTR SWMU 20: Former Helicopter Maintenance Area
- Potential Former VNTR Motor Pool Area (Including Building 340) and Former Fire Department Building 330

[1] The most current version of DoDI 4715.18 (4 SEPT 2019) defines emerging chemicals as "Chemicals relevant to the DoD that are characterized by a perceived or real threat to human health or the environment and that have new or changing toxicity values or new or changing human health or environmental regulatory standards. Changes may be due to new science discoveries, detection capabilities, or exposure pathways."

NOTE: THIS SUMMARY IS PRESENTED IN ENGLISH AND SPANISH FOR THE CONVENIENCE OF THE READER. EVERY EFFORT HAS BEEN MADE FOR THE TRANSLATIONS TO BE AS ACCURATE AS REASONABLY POSSIBLE. HOWEVER, READERS SHOULD BE AWARE THAT THE ENGLISH VERSION OF THE TEXT IS THE OFFICIAL VERSION.

- VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building; SWMU 10 and AOC G are counted as separate potential release areas but were included as a single entity for investigation due to their close proximity and association with each other
- VNTR SWMU 1: Former Camp Garcia Municipal Waste Management Unit (Landfill)

The objective of the SI is to evaluate if a release of PFAS has occurred from past activities at 13 potential PFAS release areas, and if a release is confirmed, evaluate whether further investigation or action is warranted as described in the Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances (SAP; CH2M, 2021). Surface soil, subsurface soil, groundwater, surface water, and sediment samples were collected in accordance with the SAP (CH2M, 2021). Samples were analyzed at Battelle Laboratories for 18 PFAS listed in EPA Method 537.1 via liquid chromatography tandem mass spectrometry compliant with Quality Systems Manual 5.3 Table B-15, in accordance with the laboratory's Environmental Laboratory Accreditation Program Accreditation letters.

Analytical results were screened against EPA November 2022 residential tap water and/or residential soil Regional Screening Levels (RSLs) (hazard quotient [HQ] = 0.1) for perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), perfluorobutanesulfonic acid (PFBS), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA), and hexafluoropropylene oxide dimer acid (HFPO-DA). In accordance with the SAP, the recommendation for no further investigation/action at this time versus remedial investigation (RI) for each of the 13 areas was based on comparison of PFAS data to RSLs. Additionally, for informational purposes a Human Health Risk Screening (HHRS) was performed for each area with RSL(s) exceedance(s) to provide additional perspective regarding those exceedances.

Based on comparison of PFAS data to RSLs, no further investigation or action at this time is recommended for 5 of the 13 potential PFAS release areas and an RI is recommended for the remaining 8 areas (Table ES-1) as detailed below:

- 5 areas are recommended for no further investigation/action at this time because PFAS concentrations in all associated media are below RSLs. If new information and/or updated screening criteria are later identified, these areas will be re-evaluated to determine if further investigation/action is warranted.
- 8 areas are recommended for an RI because PFAS are present at concentrations above RSLs, the criterion established in the SAP for making this determination. The results of the HHRSs performed for these eight areas indicated potentially unacceptable risk from exposure to the associated medium or media for five of the eight areas with RSL exceedances and no potentially unacceptable risk for three of the eight areas.

The conclusions and recommendations from the SI are summarized on Table ES-1. Figures ES-2 and ES-3 depict the areas recommended for no additional investigation or action at this time and the areas recommended for an RI.

# Resumen Ejecutivo

Este informe presenta los resultados de la Inspección del Sitio (SI, por sus siglas en inglés) para sustancias perfluoroalquiladas (PFAS, por sus siglas en inglés) en la antigua Área de Adiestramiento de Armas de la Flota del Atlántico - Vieques, que incluye el antiguo Destacamento de Apoyo de Municiones Navales (NASD, por sus siglas en inglés) y el antiguo Campo de Adiestramiento Naval de Vieques (VNTR, por sus siglas en inglés) en Vieques, Puerto Rico. Vieques es una isla en el Mar Caribe ubicada aproximadamente a 7 millas al sureste a través del Pasaje de Vieques desde el extremo este de la isla principal de Puerto Rico (Figura ES-1). La isla está ubicada en el Arco de las Islas Antillanas que separa el Mar Caribe del Océano Atlántico y tiene aproximadamente 21 millas de largo, 4,5 millas de ancho y un área de aproximadamente 33,100 acres (51 millas cuadradas). A principios de la década de 1940, el Departamento de Marina (Marina) compró grandes porciones de Vieques para realizar actividades relacionadas con el adiestramiento militar. El lado oeste de la isla se conoce como el antiguo NASD (Figura ES-2), que se utilizaba principalmente para carga y almacenamiento de municiones, mantenimiento de vehículos e instalaciones, y actividades de quema y detonación abierta en el extremo oeste de la isla. El lado este de Vieques es el antiguo VNTR (Figura ES-3), que se utilizó para diversos aspectos del entrenamiento de tiro naval, incluido el lanzamiento de municiones aire-tierra, desembarcos anfibios y albergó la base principal de operaciones en el Campamento García durante actividades de entrenamiento y apoyo militar.

El 11 de febrero de 2005, Vieques fue incluido en la Lista de Prioridades Nacionales (NPL, por sus siglas en inglés) como la antigua Área de Adiestramiento de Armas de la Flota del Atlántico - Vieques, lo que requirió que todas las actividades de restauración ambiental posteriores para los sitios de restauración de instalaciones de la Marina en Vieques se llevaran a cabo bajo la Ley Abarcadora de Respuesta, Compensación y Responsabilidad Ambiental (CERCLA, por sus siglas en inglés) hasta que sea removido de la autoridad de CERCLA. La Marina, el Departamento del Interior (DOI, por sus siglas en inglés), la Agencia de Protección Ambiental de los Estados Unidos (EPA, por sus siglas en inglés) y la Junta de Calidad Ambiental de Puerto Rico (PREQB, por sus siglas en inglés) firmaron un Acuerdo de Instalación Federal el 7 de septiembre de 2007, que estableció el marco procesal y el cronograma para implementar el Acciones de respuesta de CERCLA para Vieques.

Las PFAS fueron identificadas como “sustancias químicas emergentes”[2] y las políticas de la Marina emitidas a partir de 2014 exigían una evaluación de los posibles impactos de las PFAS (DON, 2014, 2015). Se completó una Evaluación Preliminar (PA, por sus siglas en inglés) que evaluó el potencial de que PFAS esté presente con base en ciertas prácticas históricas realizadas en el antiguo NASD y/o antiguo VNTR de Vieques (CH2M, 2020). De acuerdo con los hallazgos en el PA, se identificaron 13 áreas potenciales de liberación de PFAS; seis áreas dentro del antiguo NASD y siete áreas dentro del antiguo VNTR, enumeradas a continuación:

- Área de Preocupación (AOC, por sus siglas en inglés) B de NASD: Antigua Planta de Tratamiento de Aguas Residuales en el Área de Obras Públicas
- Edificio 2046 de la antigua estación de bomberos de NASD en el Área de Obras Públicas
- Área Posible Área de Parque Para Motores de la Antigua NASD
- NASD AOC H: Planta de energía abandonada/Antigua área de entrenamiento contra incendios
- Unidad de Manejo de Residuos Sólidos (SWMU, por sus siglas en inglés) 6 de NASD: Antiguo Sitio de Eliminación de Manglares

[2] " La versión más actual de DoDI 4715.18 (4 de septiembre de 2019) define las sustancias químicas emergentes como "sustancias químicas relevantes para el Departamento de Defensa que se caracterizan por una amenaza percibida o real para la salud humana o el medio ambiente y que tienen valores de toxicidad nuevos o cambiantes o valores humanos nuevos o cambiantes. "Estándares regulatorios de salud o ambientales. Los cambios pueden deberse a nuevos descubrimientos científicos, capacidades de detección o vías de exposición".

NOTA: ESTE RESUMEN SE PRESENTA EN INGLÉS Y EN ESPAÑOL PARA LA CONVENIENCIA DEL LECTOR. SE HAN HECHO TODOS LOS ESFUERZOS PARA QUE LA TRADUCCIÓN SEA PRECISA EN LO MÁS RAZONABLEMENTE POSIBLE. SIN EMBARGO, LOS LECTORES DEBEN ESTAR AL TANTO QUE EL TEXTO EN INGLÉS ES LA VERSIÓN OFICIAL.

- NASD SWMU 7: Antiguo Sitio de Disposición final de Quebrada
- VNTR Antigua pista de aterrizaje del Campamento García
- Foto identificada (PI, por sus siglas en inglés) 5 del VNTR: Área de drenaje de agua superficial de la antigua pista de aterrizaje del Campamento García
- VNTR SWMU 20: Antigua zona de mantenimiento de helicópteros
- Posible área del antiguo parque de vehículos de VNTR (incluido el edificio 340) y antiguo edificio 330 del Departamento de Bomberos
- VNTR SWMU 10 y VNTR AOC G: Antiguas lagunas de tratamiento de aguas residuales y edificio de cloración; SWMU 10 y AOC G se cuentan como áreas de posible liberación separadas, pero se incluyeron como una sola entidad para la investigación debido a su estrecha proximidad y asociación entre sí.
- VNTR SWMU 1: Antigua Unidad de Manejo de Residuos Municipales del Campamento García (Relleno Sanitario)

El objetivo del SI es evaluar si se ha producido una liberación de PFAS a partir de actividades pasadas en 13 áreas potenciales de liberación de PFAS y, si se confirma una liberación, evaluar si se justifica una investigación o acción adicional como se describe en el Plan de Análisis y Muestreo de Inspección del Sitio para sustancias Per y Polifluoroalquilos (SAP; CH2M, 2021). Se recolectaron muestras de suelo superficial, suelo subsuperficial, agua subterránea, agua superficial y sedimentos de acuerdo con el SAP (CH2M, 2021). Las muestras se analizaron en los Laboratorios Battelle para detectar 18 PFAS enumerados en el Método 537.1 de la EPA mediante espectrometría de masas en tándem de cromatografía líquida que cumple con el Manual de Sistemas de Calidad 5.3, Tabla B-15, de acuerdo con las cartas de Acreditación del Programa de Acreditación de Laboratorios Ambientales del Laboratorio.

Los resultados analíticos se compararon con los Niveles de Detección Regionales (RSLs, por sus siglas en inglés) del agua del grifo residencial y/o del suelo residencial de la EPA de noviembre de 2022 (cociente de peligro [HQ] = 0,1) para ácido perfluorooctanoico (PFOA, por sus siglas en inglés), ácido perfluorooctano sulfónico (PFOS, por sus siglas en inglés) y ácido perfluorobutanosulfónico (PFBS, por sus en inglés). , ácido perfluorohexanosulfónico (PFHxS, por sus siglas en inglés), ácido perfluorononanoico (PFNA, por sus siglas en inglés) y ácido dímero de óxido de hexafluoropropileno (HFPO-DA, por sus siglas en inglés). De acuerdo con el SAP, la recomendación de no realizar más investigaciones/medidas en este momento contra una investigación de remediación (RI, por sus siglas en inglés) para cada una de las 13 áreas se basó en la comparación de los datos de PFAS con los RSL(s). Además, con fines informativos, se realizó una Evaluación de Riesgos para la Salud Humana (HHRS, por sus siglas en inglés) para cada área con excedentes de RSL para brindar una perspectiva adicional con respecto a esos excesos.

Según la comparación de los datos de PFAS con los RSLs, no se recomienda ninguna investigación o acción adicional en este momento para 5 de las 13 áreas potenciales de liberación de PFAS y se recomienda un RI para las 8 áreas restantes (Tabla ES-1), como se detalla a continuación:

- Se recomienda que 5 áreas no realicen más investigaciones/medidas en este momento porque las concentraciones de PFAS en todos los medios asociados están por debajo de los RSLs. Si posteriormente se identifica nueva información y/o criterios de evaluación actualizados, estas áreas se reevaluarán para determinar si se justifica una investigación/acción adicional.
- Se recomiendan 8 áreas para un RI porque las PFAS están presentes en concentraciones superiores a los RSLs, el criterio establecido en el SAP para realizar esta determinación. Los resultados de las HHRSs realizadas para estas ocho áreas indicaron un riesgo potencialmente inaceptable por exposición al medio o medios asociados para cinco de las ocho áreas con excedentes de RSL y ningún riesgo potencialmente inaceptable para tres de las ocho áreas.

Las conclusiones y recomendaciones del SI se resumen en la Tabla ES-1. Las Figuras ES-2 y ES-3 representan las áreas recomendadas para no realizar ninguna investigación o acción adicional en este momento y las áreas recomendadas para una RI.

**TABLE ES-1**
**Summary of Basewide PFAS Site Inspection Findings and Recommendations**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| |
|---|
| **No Additonal Investigation/Action Recommendation at this time - PFOA, PFOS, PFBS, PFHxS, and/or PFNA concentrations in media are below RSLs** |
| NASD AOC H |
| NASD SWMU 6 |
| NASD SWMU 7 |
| VNTR PI 5 |
| VNTR SWMU 1 |
| **Remedial Investigation Recommendation - PFOA, PFOS, PFBS, PFHxS, and/or PFNA concentrations are present at concentrations above RSLs in media** |
| NASD AOC B[1] |
| NASD Former Fire Station Building 2046 at the Public Works Area[1] |
| VNTR AOC G[2] |
| VNTR Former Camp Garcia Runway[2] |
| VNTR SWMU 10[2] |
| Potential Former NASD Motor Pool Area[1] |
| VNTR SWMU 20[1] |
| Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330[1] |

Notes:
For informational purposes a PFAS Human Health Risk Screening (HHRS) was performed for areas where PFAS concentration(s) exceeded RSL(s) to provide additional perspective regarding those exceedances.

[1]HHRS indicated potentially unacceptable risk

[2]HHRS indicated no potentially unacceptable risk

\\dc1vs01\GISNavyClean\LANT\Vieques\MapFiles\PFAS_SI\Fig01-01_PFAS-SI_RegionalLocationMap.mxd 1/19/2023 mcotterb

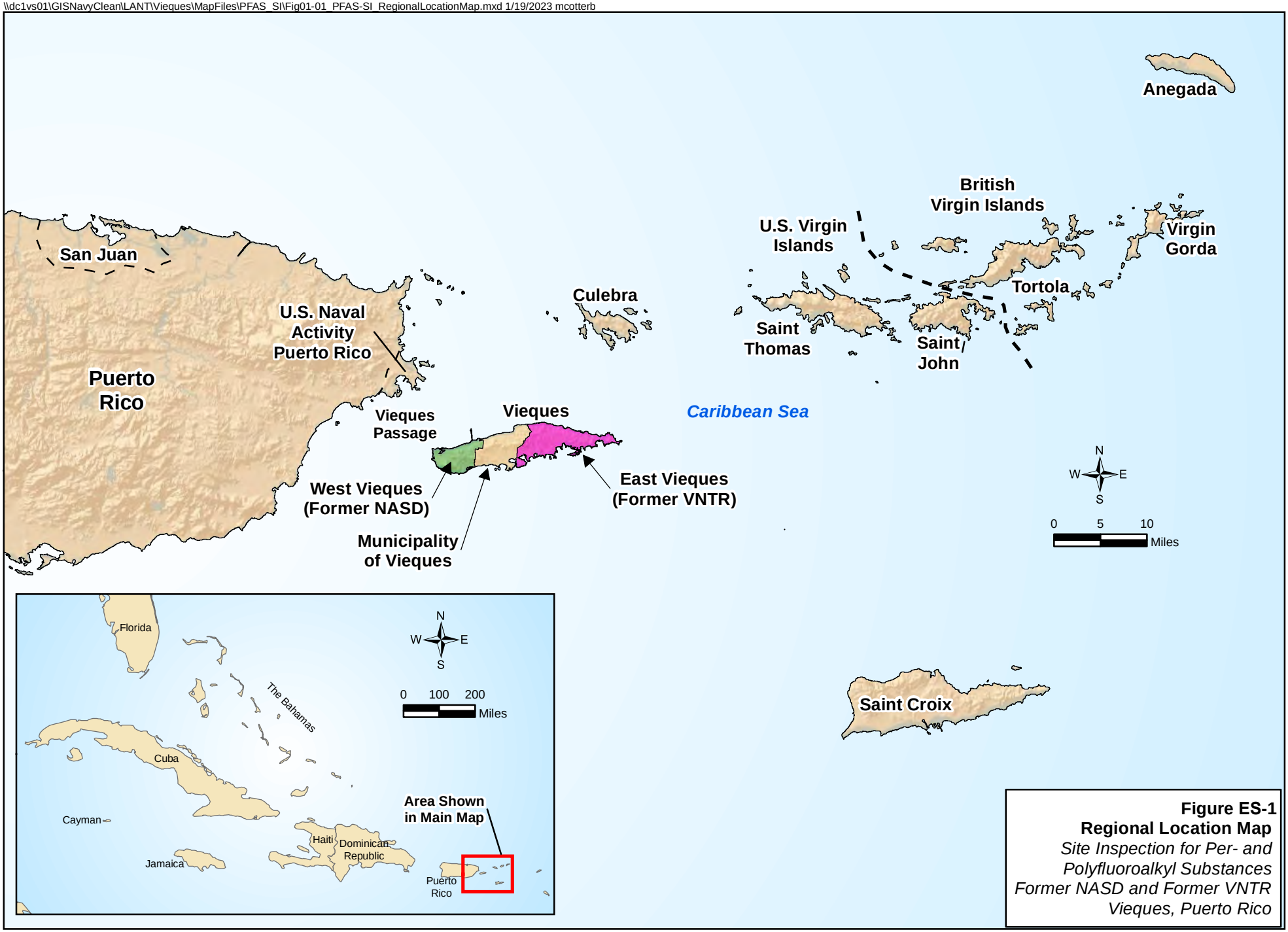


**Figure ES-1**
**Regional Location Map**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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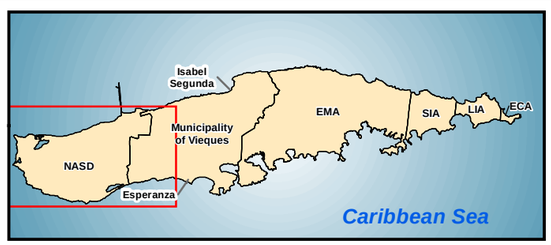
Mosquito Pier
Vieques Airport
PR-200
Vieques Passage
AOC H
Possible Former NASD Motor Pool
AOC B
SWMU 7
Former NASD Fire Station (Building 2046)
Punta Arenas / Green Beach
SWMU 6
Laguna Arenas
Navy's Former Main Support Compound
Municipality of Vieques
Puerto Rico Conservation Trust
Former Naval Ammunition Support Detachment (NASD)
Esperanza
Navy Property Relocatable Over-The-Horizon Radar Site
Department of Interior
Mount Pirata
Puerto Rico Conservation Trust
Caribbean Sea

**Legend**
- Area Recommended for an RI
- Area Recommended for No Additional Investigation at this time

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Feet

1994 Aerial Photograph

**Figure ES-2**
**PFAS Investigation Areas at the Former NASD**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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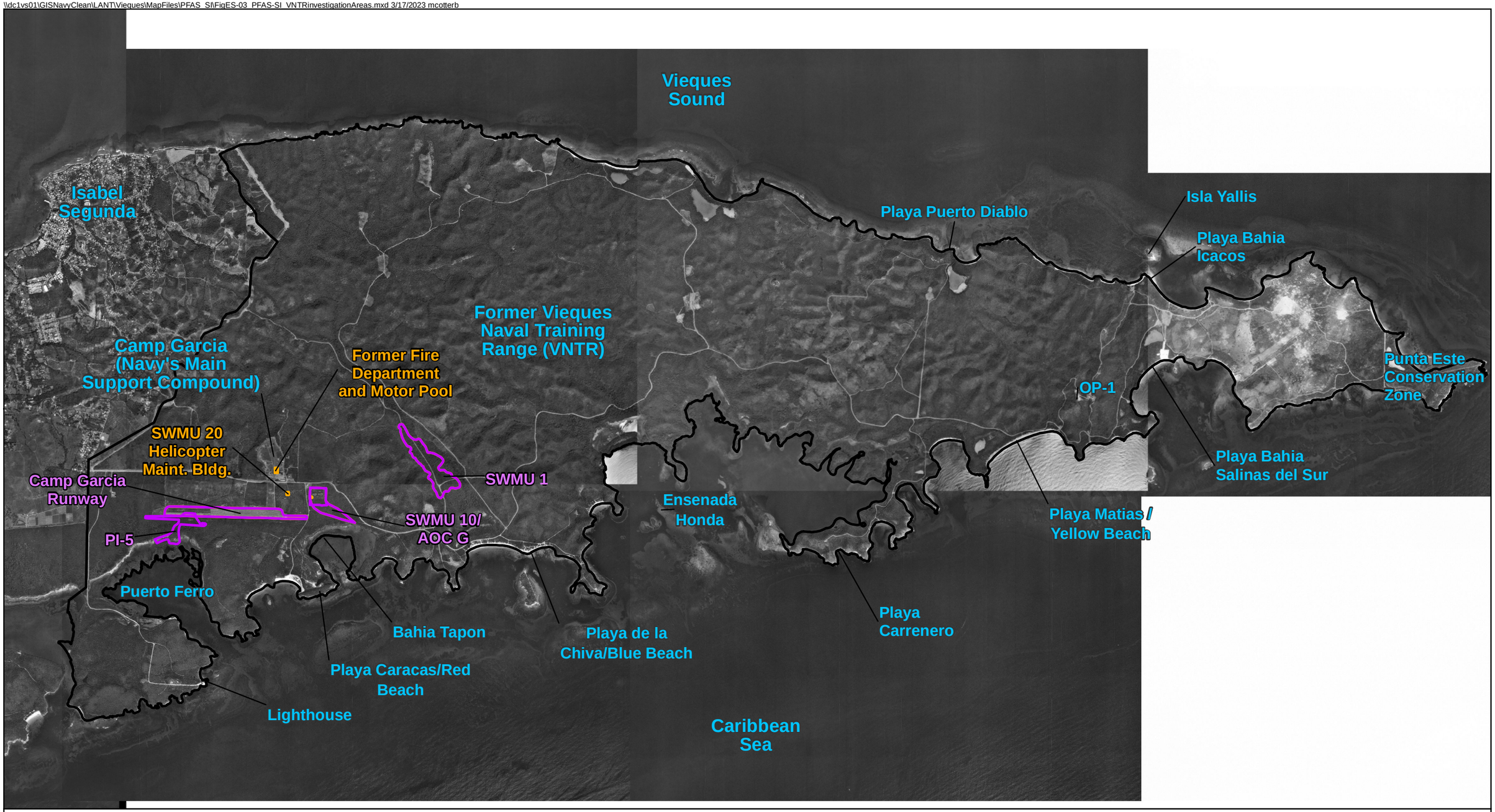
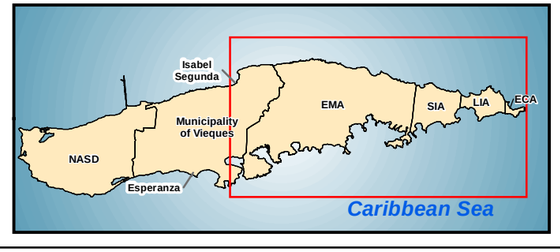



**Legend**

- Area Recommended for an RI
- Area Recommended for No Additional Investigation at this time

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Imagery Date: 1994

**Figure ES-3**
**PFAS Investigation Areas at the Former VNTR**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
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# Acronyms and Abbreviations

| | |
|---|---|
| 11Cl-PF3OUdS | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid |
| 9Cl-PF3ONS | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid |
| ADONA | 4,8-dioxa-3H-perfluorononanoic acid |
| AFFF | aqueous film-forming foam |
| amsl | above mean sea level |
| AOC | Area of Concern |
| bgs | below ground surface |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CLEAN | Comprehensive Long-term Environmental Action, Navy |
| CSM | Conceptual Site Model |
| DO | dissolved oxygen |
| DoD | Department of Defense |
| DOI | Department of the Interior |
| DOT | Department of Transportation |
| DQE | Data Quality Evaluation |
| EBS | Environmental Baseline Survey |
| ECA | Eastern Conservation Area |
| EMA | Eastern Maneuver Area |
| EPA | Environmental Protection Agency |
| ERI | Environmental Research, Inc. |
| ESI | Expanded Site Inspection |
| GPS | global positioning system |
| HDPE | high-density polyethylene |
| HFPO-DA | Hexafluoropropylene oxide dimer acid |
| HHRS | Human Health Risk Screening |
| HQ | hazard quotient |
| IDW | investigation-derived waste |
| LIA | Live Impact Area |
| MOV | Municipality of Vieques |
| NAF | Naval Ammunition Facility |
| NAPR | Naval Activity Puerto Rico |
| NASD | Naval Ammunition Support Detachment |
| NAVFAC | Naval Facilities Engineering Systems Command Atlantic |
| Navy | Department of the Navy |
| NEtFOSAA | N-ethyl perfluorooctanesulfonamidoacetic acid |
| ng/g | nanograms per gram |
| ng/L | nanograms per liter |
| NMeFOSAA | N-methyl perfluorooctanesulfonamidoacetic acid |
| NPL | National Priorities List |
| NSRR | Naval Station Roosevelt Roads |
| NTU | nephelometric turbidity unit |
| OB/OD | open burn/open detonation |
| ORP | oxidation-reduction potential |

| | |
|---|---|
| PA | Preliminary Assessment |
| PAL | project action limit |
| PFAS | per- and polyfluoroalkyl substances |
| PFBS | Perfluorobutanesulfonic acid |
| PFDA | Perfluorodecanoic acid |
| PFDoA | Perfluorododecanoic acid |
| PFHpA | Perfluoroheptanoic acid |
| PFHxA | Perfluorohexanoic acid |
| PFHxS | Perfluorohexanesulfonic acid |
| PFNA | Perfluorononanoic acid |
| PFOA | Perfluorooctanoic acid |
| PFOS | Perfluorooctanesulfonic acid |
| PFTeDA | Perfluorotetradecanoic acid |
| PFTrDA | Perfluorotridecanoic acid |
| PFUnA | Perfluoroundecanoic acid |
| pH | potential hydrogen |
| PI | Photo-Identified (site) |
| PRASA | Puerto Rico Aqueduct and Sewer Authority |
| PRCT | Puerto Rico Conservation Trust |
| PRDNER | Puerto Rico Department of Natural and Environmental Resources |
| PREQB | Puerto Rico Environmental Quality Board |
| PVC | polyvinyl chloride |
| RCRA | Resource Conservation and Recovery Act |
| RFA | RCRA Facility Assessment |
| RFI | RCRA Facility Investigation |
| RI | Remedial Investigation |
| ROD | Record of Decision |
| RSL | Regional Screening Level |
| SAP | Sampling and Analysis Plan |
| SI | Site Inspection |
| SIA | Surface Impact Area |
| SWMU | Solid Waste Management Unit |
| TAC | Terminal Area Chart |
| TCE | trichloroethene |
| TCLP | Toxicity Characteristic Leaching Procedure |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |
| VNTR | Vieques Naval Training Range |
| VNWR | Vieques National Wildlife Refuge |
| WQP | water quality parameter |
| WWTP | wastewater treatment plant |

SECTION 1

# Introduction

This document presents the findings and conclusions of the Site Inspection (SI) for Per- and Polyfluoroalkyl Substances (PFAS) conducted at the former Atlantic Fleet Weapons Training Area – Vieques, which includes the former Naval Ammunition Support Detachment (NASD) and former Vieques Naval Training Range (VNTR), in Vieques, Puerto Rico (Figure 1-1).

The SI was conducted under the Department of the Navy (Navy) Comprehensive Long-term Environmental Action – Navy (CLEAN) Contract N62470-16-D-9000, Contract Task Order 0003. Field investigations were conducted in accordance with the Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances (hereafter referred to as the SAP) (CH2M, 2021).

## 1.1 Objectives and Approach

In 2019, a Preliminary Assessment (PA) for potential PFAS releases to the environment was performed based on certain historical practices conducted at the Vieques former NASD and/or former VNTR. For the PA, 56 potential areas were evaluated based on historical activities associated with potential releases of PFAS-containing substances (CH2M, 2020). A total of 13 of the 56 locations were recommended for additional investigation based on known or suspected releases during historical operations, 6 within the former NASD and 7 within the former VNTR, as shown below. Information from the PA Report that describes how each site was selected for inclusion in the SI, including potential PFAS sources considered, is summarized in Section 2.

- NASD Area of Concern (AOC) B: Former Wastewater Treatment Plant at the Public Works Area
- NASD Former Fire Station Building 2046 at the Public Works Area
- Potential Former NASD Motor Pool Area
- NASD AOC H: Abandoned Power Plant/Former Fire Training Area
- NASD Solid Waste Management Unit (SWMU) 6: Former Mangrove Disposal Site
- NASD SWMU 7: Former Quebrada Disposal Site
- VNTR Former Camp Garcia Runway
- VNTR Photo Identified (PI) 5: Surface Water Drainage Area from Former Camp Garcia Runway
- VNTR SWMU 20: Former Helicopter Maintenance Area
- Potential Former VNTR Motor Pool Area (Including Building 340) and Former Fire Department Building 330
- VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building; SWMU 10 and AOC G are counted as separate potential release areas but were included as a single entity for investigation due to their close proximity and association with each other
- VNTR SWMU 1: Former Camp Garcia Municipal Waste Management Unit (Landfill)

The objective of this SI is to evaluate if a release of PFAS has occurred from past activities at the 13 potential PFAS release areas, and if a release is confirmed, evaluate whether further investigation or action is warranted. The approach for accomplishing the objective comprised collection of samples from various media associated with each of the 13 potential PFAS release areas. Analytical results for the samples were then compared to EPA November 2022 residential tap water and/or residential soil Regional Screening Levels (RSLs, hazard quotient [HQ] = 0.1) for perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), perfluorobutanesulfonic acid (PFBS), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA), and hexafluoropropylene oxide dimer acid (HFPO-DA). In accordance with the SAP, the recommendation for no further investigation/action at this time versus remedial investigation (RI) for each of the 13 areas was based on comparison of PFAS data to RSLs.

Additionally, for informational purposes a Human Health Risk Screening (HHRS) was performed for each area with RSL(s) exceedance(s) to provide additional perspective regarding those exceedances. In addition, the data collected during the SI were used to update the conceptual site model (CSM) for each area investigated.

## 1.2 Report Organization

The SI Report is organized as follows:

- Section 1 – Introduction
- Section 2 – Background
- Section 3 – Field Activities
- Section 4 – Investigation Results and Evaluation
- Section 5 – Conclusions and Recommendations
- Section 6 – References

Tables and figures are provided at the end of each section, as applicable.

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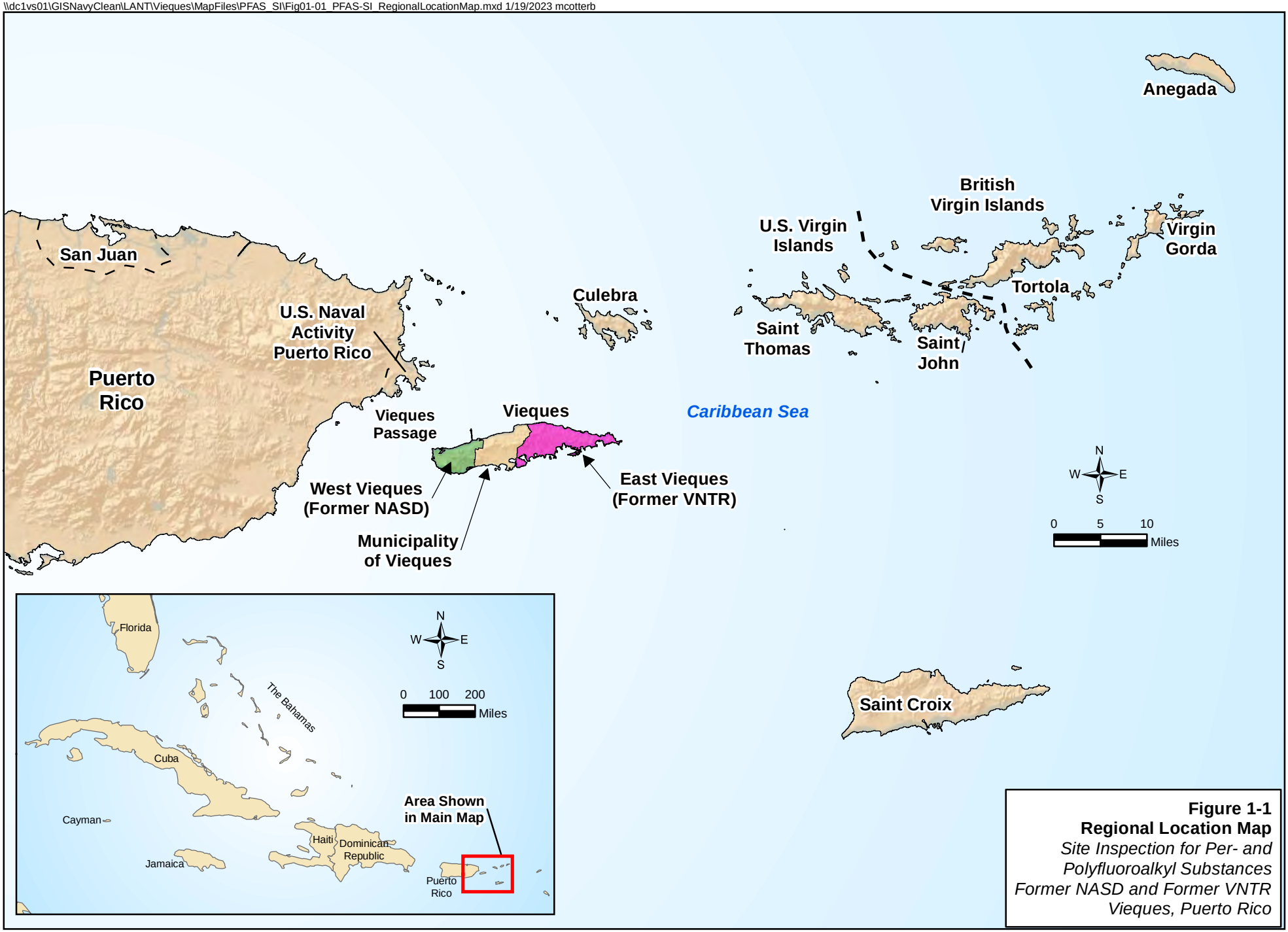


**Figure 1-1**
**Regional Location Map**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

SECTION 2
# Background

This section presents the historical information relevant to this PFAS SI including background and description, environmental setting, and a drinking water exposure evaluation.

## 2.1 Background and Description

Vieques is located in the Caribbean Sea approximately 7 miles southeast of the eastern tip of the main island of Puerto Rico and 20 miles southwest of St. Thomas, United States Virgin Islands (Figure 1-1). Vieques is approximately 20 miles long and 4.5 miles wide and has an area of approximately 33,088 acres (51 square miles).

The Navy purchased large portions of Vieques in the early 1940s to conduct activities related to military training. The former Atlantic Fleet Weapons Training Area - Vieques was historically divided into two portions – the NASD and VNTR. Site operations on the western end of Vieques (former NASD) consisted mainly of ammunition loading and storage, vehicle and facility maintenance, and open burn/open detonation (OB/OD). The eastern end of Vieques (former VNTR) was used for various aspects of naval gunfire training, including air-to-ground ordnance delivery and amphibious landings, as well as housing the main base of operations for these activities, Camp Garcia.

On February 11, 2005, Vieques was placed on the National Priority List (NPL) as the former AFWTA - Vieques, which required all subsequent environmental restoration activities for Navy Installation Restoration sites on Vieques to be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) unless and until removed from CERCLA authority. The Navy, Department of the Interior (DOI), United States Environmental Protection Agency (EPA), and Puerto Rico Environmental Quality Board (PREQB) executed a Federal Facility Agreement on September 7, 2007, that established the procedural framework and schedule for implementing the CERCLA response actions for Vieques.

### 2.1.1 Former Naval Ammunition Support Detachment

The former NASD consists of approximately 8,100 acres and was apportioned and transferred to the DOI, the Municipality of Vieques (MOV), and the Puerto Rico Conservation Trust (PRCT) in 2001, in accordance with Public Law 106-398 (Figure 1-1). The property owned by DOI is managed by United States Fish and Wildlife Service (USFWS) as part of the Vieques National Wildlife Refuge (VNWR). The former VNTR was transferred to DOI to be operated by USFWS as part of the VNWR in 2003, in accordance with Public Law 107-107.

The Navy began using the former NASD in 1941 as a base for Allied fleets during World War II. Construction of Mosquito Pier and the building of facilities and magazines for an ammunition storage depot were mostly completed by 1943. The Naval Ammunition Facility (NAF) on Vieques (the former name of the former NASD) operated until 1948, when ammunition was removed, and the facility closed. The former NASD was reactivated in 1962 and in 1971 the main compound was completed, and all support operations were relocated to that area (PMC, 2000).

The Navy ceased facility-wide operations on the former NASD in April 2001, in accordance with the January 30, 2000, Presidential Directive to the Secretary of Defense associated with the transfer of lands by quitclaim deed dated April 30, 2001, of the Navy-owned western portion of Vieques. The land transfer was completed on May 1, 2001, and the Navy has had no military presence at the main operational area since. Currently, the Navy's involvement at the former NASD comprises the environmental restoration program activities.

### 2.1.2 Former Vieques Naval Training Range

The former VNTR was transferred to DOI to be operated by USFWS as part of the VNWR in 2003, in accordance with Public Law 107-107 (Figure 1-1). The former VNTR consists of approximately 14,600 acres and is divided into four separate operational areas that from west to east comprise the 11,000-acre Eastern Maneuver Area (EMA), the 2,500-acre Surface Impact Area (SIA), the 900-acre Live Impact Area (LIA), and the 200-acre Eastern

Conservation Area (ECA). Military operations at the former VNTR included ground warfare and amphibious training for Marines, naval gunfire support training, and air to ground bombing.

Camp Garcia, the largest single developed area within the former VNTR, occupied 240 acres, and provided support for training exercises, including food service, dormitories, security, facility maintenance, and fire protection. Camp Garcia and the airfield immediately south of the camp were constructed in 1947 to provide mission support services to the marine regiment stationed at Naval Station Roosevelt Roads (NSRR) who trained on the former VNTR. Tents were erected at Camp Garcia in 1954 and 1955 and were later replaced by Quonset huts and Butler buildings from 1960 through 1965. At the height of activity at Camp Garcia from the late 1950s to the early 1960s, Camp Garcia consisted of 171 buildings with 300 military personnel and 60 civilians stationed at the camp. In the 1970s, activity and employment at Camp Garcia declined steadily until it was officially decommissioned in 1978. However, Camp Garcia continued to maintain a cafeteria, motor pool, general store, facility maintenance buildings, a landing area, and office space. Temporary barracks were also located at Camp Garcia and were occasionally utilized by troops engaged in training exercises (NAVFAC, 2003).

On April 30, 2003, the former VNTR was transferred to the DOI to be operated and managed by the USFWS as a National Wildlife Refuge and, in some places, a Wilderness Area, pursuant to Section 1049 of the National Defense Authorization Act for Fiscal Year 2002 (Public Law 107-107). Although the DOI is directed to protect and conserve the transferred land as a wildlife refuge, the Navy retains the responsibility for conducting the environmental investigations and cleanup of the property, as warranted.

## 2.2 Potential PFAS Release Areas

As stated in Section 1.1, 13 potential PFAS release areas were identified in the PA as warranting an SI. Historical information associated with each potential PFAS release area is provided in the following subsections.

### 2.2.1 NASD AOC B: Former Wastewater Treatment Plant at the Public Works Area

AOC B, the Former Wastewater Treatment Plant (WWTP), is located 330 feet northwest of the former fire station within the former main support compound (Figure 2-1). The WWTP is no longer operational, and the area is now overgrown with a mixture of dense vegetation and open grassy field with sparse trees. AOC B is approximately 0.68 acre in size.

AOC B was a prefabricated WWTP measuring approximately 230 feet by 230 feet with four shallow no-discharge basins located just northwest of Building 2030. It served the officers' quarters and other administrative buildings for municipal-type sewage discharges at the former NASD from 1983 until 2000. The former clarifier within Building 2030 consisted of one aeration tank and one separation tank with two blowers to supply the air for the biological treatment. Discharge from the WWTP drained into the four unlined, no-discharge lagoons. No wastewater leaks were observed from the lagoon dikes during the Environmental Baseline Survey (EBS; PMC, 2000). Sludge from the WWTP was pumped to a vacuum truck for offsite disposal (A.T. Kearney et al., 1988). The SI/Expanded Site Inspection (ESI) Report (CH2M, 2010a) indicates solids from a similar WWTP configuration at the former VNTR (i.e., SWMU 10) were pumped out and transported to drying beds at the former NSRR (currently Naval Activity Puerto Rico [NAPR]). It is reasonable to assume the same was done for the solids removed from AOC B. AOC B was investigated in an Expanded Preliminary Assessment/Site Investigation and results indicated the site warranted no further investigation/action (CH2M, 2002). Following the 2002 report a no further action report was produced that included the AOC B site (CH2M, 2006). However, no historical evaluation/investigation included the potential for PFAS release at the site prior to the PFAS PA Report (CH2M, 2020). Since AOC B became operational in 1983, during the time when Navy use of aqueous film-forming foam (AFFF) and other PFAS-containing materials was occurring (though not necessarily on Vieques) and because PFAS have the potential to accumulate in wastewater sludge and liquid waste, PFAS may have been released to the WWTP if AFFF or other PFAS-containing materials were used at the facility.

### 2.2.2 NASD Former Fire Station Building 2046 at the Public Works Area

The NASD Former Fire Station (Building 2046) is located within the southwestern portion of the MOV Public Works Compound (Figure 2-2). The building is now used as a rum distillery with an adjacent concession stand. The footprint of Building 2046 and associated ramp is approximately 0.07 acre in size. The surrounding area is uninhabited and is an open grassland with sparse tree presence.

Construction of Building 2046 was completed in 1972 and it was utilized as a fire station until the former NASD was decommissioned in 2000. The building included living quarters, bathrooms, laundry, and vehicle storage. The bathrooms were plumbed directly into the WWTP (AOC B) (PMC, 2000). The EBS (PMC, 2000) reported that no maintenance was performed within the building and no floor drains within the building were observed during the EBS. Storage sheds southwest of the building contained hoses and fire extinguishers, but no hazardous materials were observed. Storage sheds, although described in the EBS Report as being located southwest of the building and containing hoses and fire extinguishers, have not been located or observed on historical imagery or site visits conducted during the PA.

The document review and interview portions of the PA provided no definitive evidence of a release of AFFF or other PFAS-containing substances at the former fire station. However, information obtained during an interview suggest there is the potential AFFF was released to the environment in this area. Information obtained during an interview indicated that approximately 50 gallons of AFFF had been stored on each of two fire trucks. According to the interviewee, the AFFF concentrate was stored in 5-gallon containers in an onsite conex container located about 100 feet west of the fire station (Figure 2-2). AFFF was put into the fire trucks by pumping, pouring, or by induction pump on the ramp of the fire station; fire trucks were also washed on this ramp. Once a month the fire trucks tanks containing AFFF were cleaned, and the pump tests were performed once a year; however, the interviewee indicated that no foam (AFFF) was used for pump testing. Additional interviews were conducted verifying AFFF was used in the fire trucks based at the NASD fire station (CH2M, 2020). No disposal records for the AFFF were identified. Given likely truck cleaning procedures and that no disposal records for AFFF were identified, it is likely flushing occurred onto the ramp during cleaning. Additionally, spillage could have occurred during transfer of AFFF.

### 2.2.3 Potential Former NASD Motor Pool Area

The potential former NASD Motor Pool Area is located within the former main support compound, now within the eastern-most area of the MOV Public Works Compound (Figure 2-3). The area is currently used as a motor pool operated by the MOV for its government vehicles. The area is approximately 2.6 acres in size.

A former firefighter at NASD identified the former NASD Motor Pool Area as being in the eastern-most area of the MOV Public Works compound, where a current motor pool is being operated by the MOV for its government vehicles (Figure 2-3). The EBS identifies the building at this location as Building 2022, an electrical plumbing and carpentry shop, not a motor pool (PMC, 2000). The building was constructed in 1966 and has been in continuous operation since Navy transfer of the property to the MOV. Vehicles are not present in 1985 aerial imagery but are present in the area beginning in 1994 aerial imagery (CH2M, 2020). Since the area may have been used as a motor pool that may have serviced fire trucks carrying AFFF, there is potential for AFFF to have been released at this location.

The surrounding area consists of six buildings (Buildings 4021, 2022, 2023, 4001, 4010, and 4011) which are actively utilized and a former wash rack pad (Figure 2-3). Historical records do not provide information regarding which, if any, of the buildings were used for vehicle maintenance. SWMU 10 (a historical site located within this area) was closed out in a no further action report in 2006 (CH2M, 2006). However, no historical evaluation/ investigation of SWMU 10 included the potential for a PFAS release(s) at this location prior to the PFAS PA Report (CH2M, 2020).

### 2.2.4 NASD AOC H: Abandoned Power Plant/Former Fire Training Area

AOC H, the Abandoned Power Plant, is located approximately 200 feet east of the entrance to the MOV Public Works Area, just north of Highway 200 and south of the Vieques Passage (Figure 2-4). The former power plant building has a footprint of approximately 2,000 square feet. The area is approximately 2 acres.

From 1941 to 1943 power generation equipment was stored in and around Building 13, including large diesel generators used to provide electricity to a nearby community. After 1943, the building was vacant until the 1960s when its use for fire training operations began. Fire training operations consisted of the use of diesel fuel, which was poured over rubber tires inside the building and ignited to simulate structural fires and extinguished during training operations. The fire training activities ceased in the 1980s. Based on information obtained from an interviewee during the PA, AFFF was utilized on fire trucks during at least part of the time this area was used for fire training (CH2M, 2020). The power generation equipment is no longer present at the site. The site was investigated during the EBS (PMC, 2000), the Expanded PA/SI (CH2M, 2002), and an RI (CH2M, 2007b). The results indicated the site warranted no further investigation/action and a No Action Record of Decision (ROD) was approved for the site in 2008 (NAVFAC, 2008). However, no historical evaluation/investigations included the potential for PFAS release at this location prior to the PFAS PA Report (CH2M, 2020).

### 2.2.5 NASD SWMU 6: Former Mangrove Disposal Site

SWMU 6, the Former Mangrove Disposal Site, is located in a mangrove swamp in Laguna Arenas, part of the Laguna El Pobre and Kiani Lagoon system, along Highway 200 on the former NASD (Figure 2-5). The area is approximately 2.8 acres in size, bounded to the south by Highway 200, to the north and east by Laguna El Pobre mangroves and trees, and to the west by a channel from North Kiani Lagoon to South Kiani Lagoon. SWMU 6 is on DOI property managed by the USFWS that has been designated part of the Vieques National Wildlife Refuge.

The site was used for the disposal of solid waste from Navy operations within the former NASD during the 1960s and 1970s. Waste discarded at the site included empty containers of lubricants, oil, solvents, and paints; glass; wood; tires; scrap metal; and rubble (PMC, 2000). The waste stream potentially may have also included PFAS or PFAS-containing materials. This material, as well as the general solid waste and impacted soil, was removed during a removal action in 2009. Approximately 1,423 tons of soil and debris was removed with an average depth of 1 to 2 feet during the removal action (FSS, 2010). Due to the removal action, and the fact that no fill was brought into the site, the environmental setting was altered from a predominantly terrestrial habitat to a shallow estuarine lagoon, marine habitat that is hydraulically (at least partially) connected to and tidally influenced by the adjacent Laguna Kiani complex. The site now supports a relatively diverse community of marine fish and invertebrates, along with foraging wildlife such as wading birds. Previous site investigation reports include an Initial Assessment Study (Greenleaf, 1984), Confirmation Study (ESE, 1986), EBS (PMC, 2000), Expanded PA/SI (CH2M, 2000), RI (CH2M, 2007a), Non-Time-Critical Removal Action (Shaw, 2010), Post-Removal Supplemental Confirmatory Sampling (CH2M, 2010a), Feasibility Study (CH2M, 2013), and Supplemental RI (CH2M, 2016a). Final results indicated the site warranted no further investigation/action and a No Action ROD was approved for the site in 2018 (NAVFAC, 2018). However, no historical evaluation/investigations included the potential for PFAS release at this location prior to the PFAS PA Report (CH2M, 2020).

### 2.2.6 NASD SWMU 7: Former Quebrada Disposal Site

SWMU 7, the Former Quebrada Disposal Site, is located along Highway 200 and 1,100 feet south of the Vieques Passage (Figure 2-6). The former site area is approximately 10 acres, but the former waste disposal area comprised less than about 2 acres. Currently, the area is uninhabited and is heavily vegetated.

SWMU 7 was a Navy disposal site from the early 1960s until the late 1970s. Material discarded at the site included construction rubble, empty containers (drums, cans, and bottles), used batteries, old tires, and sheet metal (PMC, 2000). The waste stream potentially may have also included PFAS or PFAS-containing materials. Investigations completed at SWMU 7 included a Confirmation Study (ESE, 1986), an EBS (PMC, 2000), a Phase I PA/SI (CH2M, 2000), and an RI (CH2M, 2008a). Approximately 5,366 tons of soil and debris were removed from the site as documented in a Completion Report (FSS, 2010). Following the removal action, the site was closed with a No

Further Action ROD in 2011 (NAVFAC, 2011a). However, no historical evaluation/investigation included the potential for PFAS release at this location prior to the PFAS PA Report (CH2M, 2020).

### 2.2.7 VNTR Former Camp Garcia Runway

The VNTR Camp Garcia Runway is an abandoned 5,016-foot east-west trending runway located one quarter mile south of Camp Garcia within the Vieques National Wildlife Refuge (Figure 2-7). The Camp Garcia Runway is approximately 48.8 acres in size with approximately 1.5 acres overlapping Photo-Identified (site) (PI) 5 on the western end of the runway. SWMU 20, the Former Helicopter Maintenance Area, is located north of the eastern end of the runway.

The 2003 EBS (NAVFAC, 2003) describes the Camp Garcia Runway as being active from 1959 to 1964. However, documented air operations occurred at the airfield annually with the last noted flights recorded in 1975. The 1977 Federal Aviation Administration Terminal Area Charts (TACs) show the runway as an east-west, 5,000-foot paved runway with no permanent structures. The TAC for Puerto Rico from October 10, 2019, shows the airfield as permanently closed. One interviewee interviewed during the PFAS PA indicated that "fire trucks were used to support operations at the two Vieques helicopter pads, but not at the airfield." The southern perimeter of the former runway is currently used by USFWS to stage piles of road base gravel. However, no historical evaluation/ investigation included the potential for PFAS release at this location prior to the PFAS PA (CH2M, 2020). Although there are no known records of AFFF use or demonstration at the Camp Garcia Runway, the runway was reportedly still in periodic use during a time when AFFF containing PFAS was reportedly in used by the Navy (CH2M, 2020).

### 2.2.8 VNTR PI 5: Surface Water Drainage Area from Former Camp Garcia Runway

PI 5 is located adjacent to the western end of the former Camp Garcia Runway (Figure 2-7). It is bounded to the north by the former Camp Garcia Runway, to the south by Puerto Ferro, to the west by undeveloped land, and to the east by other areas of the runway drainage ditch system that only contain water during significant storm events. Approximately 1.5 acres of the PI 5 drainage area, located on the downgradient side of the former Camp Garcia Runway, overlaps the former runway.

The operational history of PI 5 is directly associated with the operations of the former Camp Garcia Runway, as described in that subsection. Past investigations of the site comprise the EBS (NAVFAC, 2003) and the SI/ESI (CH2M, 2010a). The results indicated the site warranted no further investigation/action and a No Action/No Further Action Decision Document was produced in September 2010 (CH2M, 2010b). However, no historic evaluation/investigations included the potential for PFAS release at this location prior to the PFAS PA Report (CH2M, 2020).

### 2.2.9 VNTR SWMU 20: Former Helicopter Maintenance Area

SWMU 20 (formerly PI 4) is located south of Camp Garcia and just north of the eastern end of the Camp Garcia Runway (Figure 2-7). With respect to the PFAS SI, the most significant feature of SWMU 20 is the former 5,000-square-foot helicopter maintenance building. The site also includes over 30 wells that have been used to delineate an 18-acre groundwater plume (primarily trichloroethene [TCE]).

Historical information suggests the helicopter maintenance building was used from 1959 to 1975 for helicopter maintenance and as a helicopter hangar. Information obtained during a PA interview indicated that fire trucks that historically stored and used AFFF supported operations at the two Vieques helicopter pads. In addition, since hangars commonly have fire suppression systems, AFFF may have been present at the site for at least a portion of the time the helicopter maintenance area/hangar was operational, although no historical records were found indicating a fire suppression system was present in the helicopter maintenance building or that AFFF was stored/ used there.

Investigations performed for SWMU 20 comprised a PA/SI (CH2M, 2008b), an SI/ESI (CH2M, 2010a), a Supplemental ESI (CH2M, 2011b), and an RI (CH2M, 2016b). However, no historical evaluation/investigations included the potential for PFAS release at this location prior to the PFAS PA Report (CH2M, 2020).

### 2.2.10 Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330

The potential former VNTR Motor Pool Area, which included Building 340, and former Fire Department Building 330 are located at historic Camp Garcia, the base of operations supporting military training activities at the former VNTR. Buildings 330 and 340 are no longer present at Camp Garcia; however, the locations are identified in Figure 2-8. The area that includes these features encompasses approximately 0.5 acre and is located in the new base of operations for the Navy's cleanup program on Vieques (Figure 2-8).

Building 330 and 340 were identified on a hand-drawn map of unknown origin (CH2M, 2008b); on that map Building 330 was identified as the Camp Garcia Fire Department building. A PA interviewee indicated the area also included a potential motor pool where fire trucks, equipped with AFFF, were serviced. The EBS (NAVFAC, 2003) identifies no building or parking area (past or present) at the location indicated by the interviewee. Building 340 was located adjacent (to the north) to where the interviewee marked the location of the motor pool area, but no historical information has been found regarding the use of the building. Given its close proximity to the area referred to by the interviewee, it is possible the former Building 340 was associated with the motor pool. No historical information has been found that identifies where specifically fire truck maintenance/washing occurred and no historical evaluation/investigation included the potential for PFAS release at this location prior to the PFAS PA (CH2M, 2020). Both buildings are no longer present and no investigations have been performed at this location to date.

### 2.2.11 VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building

SWMU 10 and AOC G are located approximately 0.5 mile southeast of Camp Garcia (Figure 2-9) and 0.3 mile north of the Caribbean Sea. The former wastewater treatment system is no longer operational, and the area is now overgrown with dense vegetation. The former lagoons and chlorination building occupy an area of about 1.5 acres. The AOC G building is a dilapidated concrete structure measuring approximately 10 feet by 10 feet.

The original domestic sewage treatment lagoons for Camp Garcia went into service in the early 1950s. The facility consisted of four unlined lagoons, two of them serving as receiving/equalization lagoons, and the other two providing polishing treatment. Historically, the raw wastewater discharge to the lagoon system originated from the Camp Garcia area (NAVFAC, 2003). Effluent from the final two polishing lagoons was chlorinated in a chlorine contact chamber (AOC G). The 1988 and 1995 Resource Conservation and Recovery Act (RCRA) Facility Assessments (RFAs) indicated that the effluent from the final lagoons was discharged to the land (A.T. Kearney et al., 1988; PREQB, 1995). A historical report (ERI, 2000) noted probable piping leading from the chlorination building to a series of linear ground scars and ditches. Although it is possible that wastewater was discharged to the land following chlorination, the Current Conditions Report indicated the effluent from the final polishing lagoons was chlorinated in the chlorine contact chamber and then discharged to the sea (CH2M, 2001). This information was corroborated by an interview with the former Water Program Manager, NAPR Environmental Division (CH2M, 2010a).

In 1974, after the level of activity and associated domestic wastewater generation rate significantly decreased at Camp Garcia, the treatment lagoons were lined using a 2-foot compacted clay and plastic liner to create a no-discharge system. The lagoons were then utilized as evaporation lagoons until a new no-discharge lagoon was constructed in September 2000 immediately northwest from the old lagoons. AOC G was the chlorination building at the sewage lagoons for Camp Garcia, located directly south of the old sewage treatment lagoons of SWMU 10. The area consists of a single structure that housed a pump station and chlorination equipment used in the past for the chlorination of the lagoon system effluent. These facilities were placed into operation in the 1950s and were decommissioned by 2000. Past investigation reports of the SWMU 10 and AOC G sites include the 1988 and 1995 RFAs (A.T. Kearney et al., 1988; PREQB, 1995), 2000 Environmental Research, Inc. (ERI) aerial photography in the Current Conditions Report (CH2M, 2001), EBS (NAVFAC, 2003), a field effort completed as part of the 2004 Phase I RCRA Facility Investigation (RFI) (CH2M, 2004), PA/SI (CH2M, 2008b), and SI/ESI (CH2M, 2010a). The results indicated the site warranted no further investigation/action and a No Action/No Further Action Decision

Document was produced in September 2010 (CH2M, 2010b). However, no historic evaluation/investigations included the potential for PFAS release at this location prior to the PFAS PA Report (CH2M, 2020). Although there is no evidence of AFFF or other PFAS-containing materials were disposed of through the treatment system, because no records were found regarding disposal of industrial wastewater at Camp Garcia, and because of the types of activities that took place at Camp Garcia, industrial-type wastewater could have been processed through this WWTP (CH2M, 202).

### 2.2.12 VNTR SWMU 1: Former Camp Garcia Municipal Waste Management Unit (Landfill)

SWMU 1 is located approximately 4,000 feet northwest of Playa La Chiva (Blue Beach), roughly a mile east of the Camp Garcia Compound Area (Figure 2-10). The landfill covers an area of approximately 51 acres.

SWMU 1 was an active landfill from 1954 to 1978 for the disposal of municipal waste from Camp Garcia. Up to about 3,120 tons of waste was disposed in the landfill, but no hazardous materials reportedly were placed in the disposal area. Since AFFF was reportedly used at the former training facility, it is possible AFFF or other PFAS-containing materials were part of the waste stream disposed of in the landfill. During operation, materials were deposited in trenches, which were then covered with about 6 inches of soil to control blowing of litter. When operation of the SWMU 1 landfill ceased in 1978, a final 2-foot thick soil cover, consisting of compacted native soils, was placed over the trenches. Between 2013 and 2014, the SWMU 1 remedial action was implemented during which surficial debris was removed from across the landfill surface. Approximately 6 tons of debris were removed, and the landfill surface has been allowed to naturally revegetate since that time. Additional surface removal was conducted in 2015, and all removal action activities are detailed in the SWMU 1 After Action Report (CH2M, 2022).

Past site investigation reports include the Environmental Impact Statement (Tippetts et al., 1979), Initial Assessment Study (Greenleaf et al., 1984), Phase II RFA (A.T. Kearney et al., 1988), Revised RFA (PREQB, 1995), Current Conditions Evaluation (CH2M, 2001) which included the ERI 2000 aerial photographic analysis, EBS (NAVFAC, 2003), Phase I RFI (CH2M, 2004), SI/ESI (CH2M, 2010a), and Streamlined RI/FS (CH2M, 2011a). A ROD was signed which presented the remedial action consisting of enhanced native soil cover and institutional controls (NAVFAC, 2011b). However, no historic evaluation/investigations included the potential for PFAS release at this location prior to the PFAS PA Report (CH2M, 2020).

## 2.3 Environmental Setting

This section describes the environmental setting including climate, topography and hydrologic setting, geology/ hydrogeology, and drinking water exposure evaluation.

### 2.3.1 Climate

The climate of Vieques is characterized as warm and humid (tropical-marine), with frequent showers occurring throughout the year. The easterly trade winds blowing across the island year-round moderate the temperature on Vieques, resulting in an annual mean temperature of 79 to 80 degrees Fahrenheit. The island's average annual rainfall is approximately 36 inches, with maximum extremes of 25 inches in the east part of the island and 45 to 50 inches in the west (PREQB, 1995).

### 2.3.2 Topography and Hydrologic Setting

The topography of Vieques consists generally of hills and valleys throughout the entire island. The western side of the island consists of gently rolling hills with a deeper soil profile than the eastern side, which consists of more exposed, rugged terrain. The highest point on the western side is 987 feet above mean sea level (amsl) at Monte Pirata. The highest point on the eastern side is approximately 420 feet amsl at Cerro Matias. The coastal areas contain generally level terrain made up of primarily beaches, lagoons, and mangrove swamps.

The streambeds found on Vieques are generally oriented to the north or to the south toward the coasts from higher areas in the central part of the island. Vieques does not have any perennial surface drainage; stream flow

on Vieques is ephemeral (intermittent), controlled by surface runoff from rainfall. Approximately 90 percent of the rainfall is lost to evaporation, based on statistical data from the United States Virgin Islands. Of the remaining 10 percent, approximately 5 percent infiltrates into the ground to recharge groundwater, and 5 percent becomes surface runoff. Based on their geographic and topographic locations relative to the ocean, surface runoff and groundwater at PFAS AOCs within the NASD are anticipated to flow generally north into the Vieques Passage, surface runoff and groundwater at PFAS AOCs of the VNTR are anticipated to generally flow south toward the Caribbean Sea.

### 2.3.3 Geologic and Hydrogeologic Setting

Vieques geology is characterized by plutonic and volcanic rocks generally overlain by alluvial deposits and sedimentary rocks. The volcanic rocks, of Late Cretaceous age, were deposited in a marine environment. Later in the Cretaceous Period, a quartz-diorite/granodiorite plutonic complex intruded the volcanic andesite and is exposed over a large part of the island (USGS, 1989).

Much of the igneous bedrock is exposed over the island with exceptions where it is overlain by limestone of Tertiary age and alluvial, beach, and swamp deposits of Quaternary age. Limestone only occurs within portions of the north, south, and eastern parts of the island. Alluvial sedimentary deposits generally consist of sand with percentages of silt, clay, and gravel, generated from the weathering of bedrock. These deposits generally occur in valleys and near the ocean. Geophysical surveys show that the alluvial deposits average about 30 feet in thickness and overlie bedrock composed of granodiorite and quartz diorite (USGS, 1989). Five general categories are present in eastern Vieques, (1) alluvial deposits (sand, silt, and clay), (2) beach and dune deposits, (3) marine sedimentary rocks, (4) sandstone, siltstone, conglomerate, lava, tuff, and *tuffaceous breccia*, and (5) plutonic rock made up largely of granodiorite and quartz diorite (USGS, 1989).

There are two named aquifers on Vieques from which groundwater was historically withdrawn for public potable use (CH2M, 2020), the Valle de Resolución, located beneath the western portion of the island, and the Valle de Esperanza, located beneath the southern portion of the island near Camp Garcia, covering a total of 16 square kilometers. Each aquifer is an alluvial deposit originating from the saprolitic and erosional weathering of the granodiorite pluton that makes up the basement rock of the island. Each aquifer thickens seaward from its respective origin and is overlain by impermeable biogenic clay deposits near the shores (Gomez-Gomez et. al., 2014). The aquifers are supplied by meteoric water, but infiltration into the aquifers only accounts for 5 percent of the total water budget precipitated onto the island annually.

The Valle de Esperanza is the more productive of the two aquifers and was managed by the Puerto Rico Aqueduct and Sewer Authority (PRASA). Groundwater is not used as a source of public drinking water on the island and there are no known private wells used for drinking water purposes. Groundwater withdrawal on Vieques for public potable use was formerly conducted via 14 public water supply wells located in the Valle de Esperanza aquifer near Esperanza and potentially via 6 “fresh water wells” located in the Valle de Resolución aquifer (use of the six “fresh water wells” as public water supply wells is assumed but not confirmed), withdrawing groundwater at a rate of about 600,000 gallons per day (CH2M, 2020). These public water supply wells were discontinued by 1978. Since that time, potable water for the island population has been supplied via a pipeline from the Rio Blanco filtration plant in eastern Puerto Rico (USGS, 1989). Camp Garcia was connected to the water line in the summer of 2000 (CH2M, 2008b).

The United States Geological Survey (USGS) has performed a groundwater study on Vieques. The results indicate that the groundwater contains high concentrations of sodium bicarbonate (USGS, 1989). Because of its high sodium content, the groundwater on Vieques is not suitable for irrigation over extended periods. Saltwater intrusion brought on by excessive groundwater withdrawals and accumulation of salts from sea spray has been blamed for high chloride concentrations in Vieques’ groundwater observed in the 1970s. Chloride levels in groundwater on Vieques declined significantly following the reduction of withdrawals from the Esperanza Valley aquifer in the 1980s, supporting the claim of a relationship between withdrawal rates and chloride concentrations in groundwater (Baker, 1999).

## 2.4 Drinking Water Exposure Evaluation

Groundwater is not currently used as a potable water source at the former NASD or former VNTR and there are no known private wells used for drinking water purposes. Groundwater withdrawal on Vieques for public potable use (formerly conducted via 14 public water supply wells located in the alluvial coastal plain near Esperanza and potentially 6 additional wells in the northwestern portion of Vieques) was discontinued in 1978. Since that time, potable water for the island population has been supplied via a pipeline from the Rio Blanco filtration plant in eastern Puerto Rico. Additionally, groundwater on Vieques is generally considered not suitable for use as a potable water source due to its general poor quality (high total dissolved solids/salinity) as a result of natural saltwater intrusion and saltwater intrusion induced by historic pumping of water supply wells when the island's aquifers were used as a potable water source. Therefore, there is no current exposure pathway for groundwater to residents or workers through drinking water (CH2M, 2008b).

Nevertheless, potential groundwater use is evaluated on a site-specific basis in accordance with Puerto Rico's Water Quality Standards Regulation that classifies all groundwater in Puerto Rico as groundwater intended for use as a source of drinking water supply and for agricultural uses (PREQB, 2016).

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**Legend**

- Planned Monitoring Well
- Planned Soil Boring
- Potential PFAS Release Area
- Ephemeral Stream
- Road




N
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0 75 150
Feet

Imagery Date: 1994

**Figure 2-1**
**NASD AOC B: Former Wastewater Treatment Plant**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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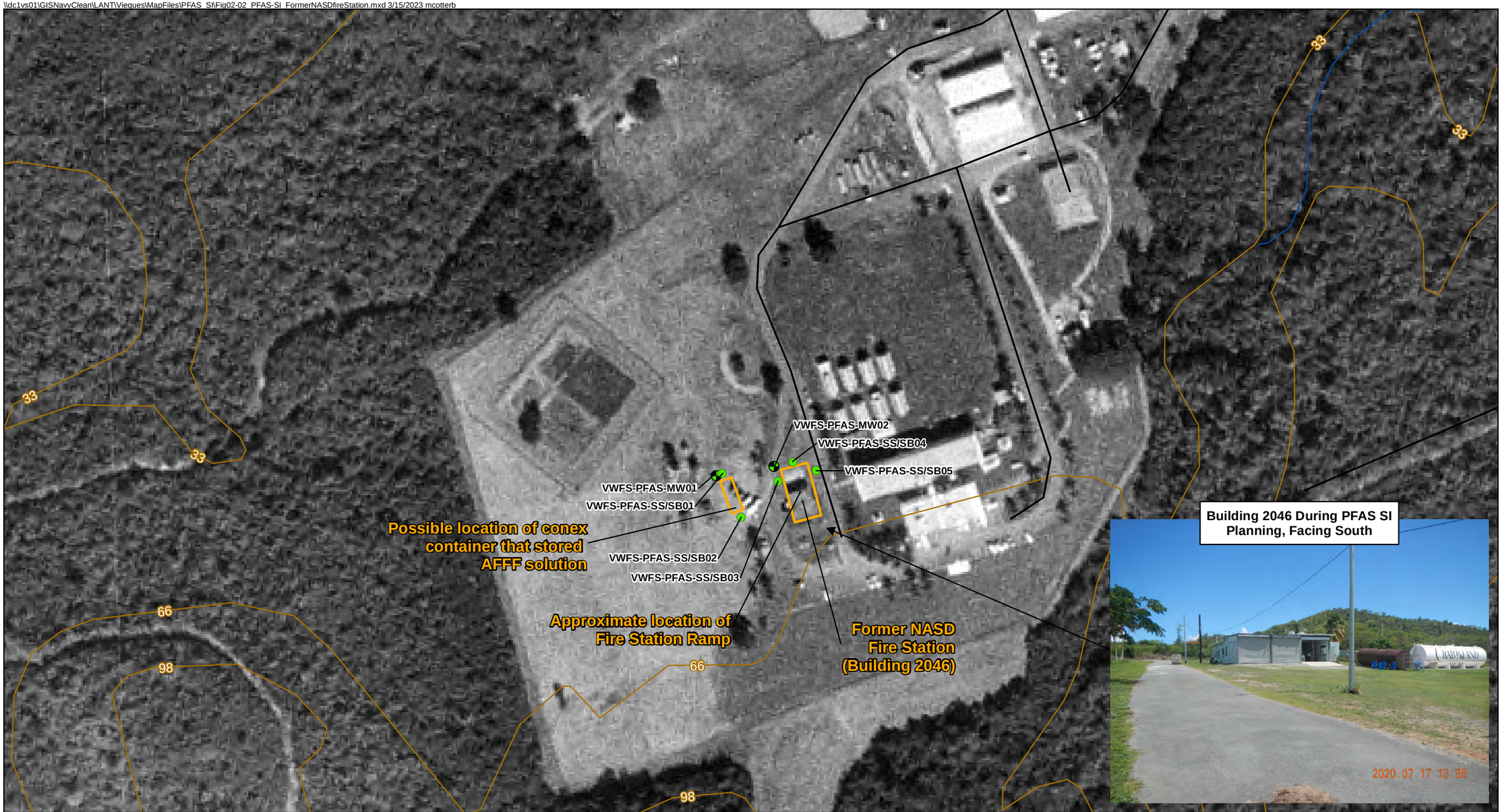
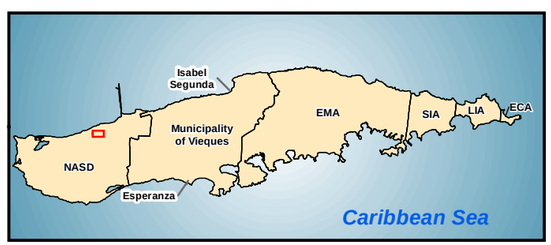



**Legend**

- Potential PFAS Release Area
- Planned Monitoring Well
- Planned Soil Boring
- Elevation Contour (feet)
- Ephemeral Stream
- Road

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Imagery Date: 1994

**Figure 2-2**
**NASD Former Fire Station Building 2046 at the Public Works Area and NASD AOC B: Former Wastewater Treatment Plant**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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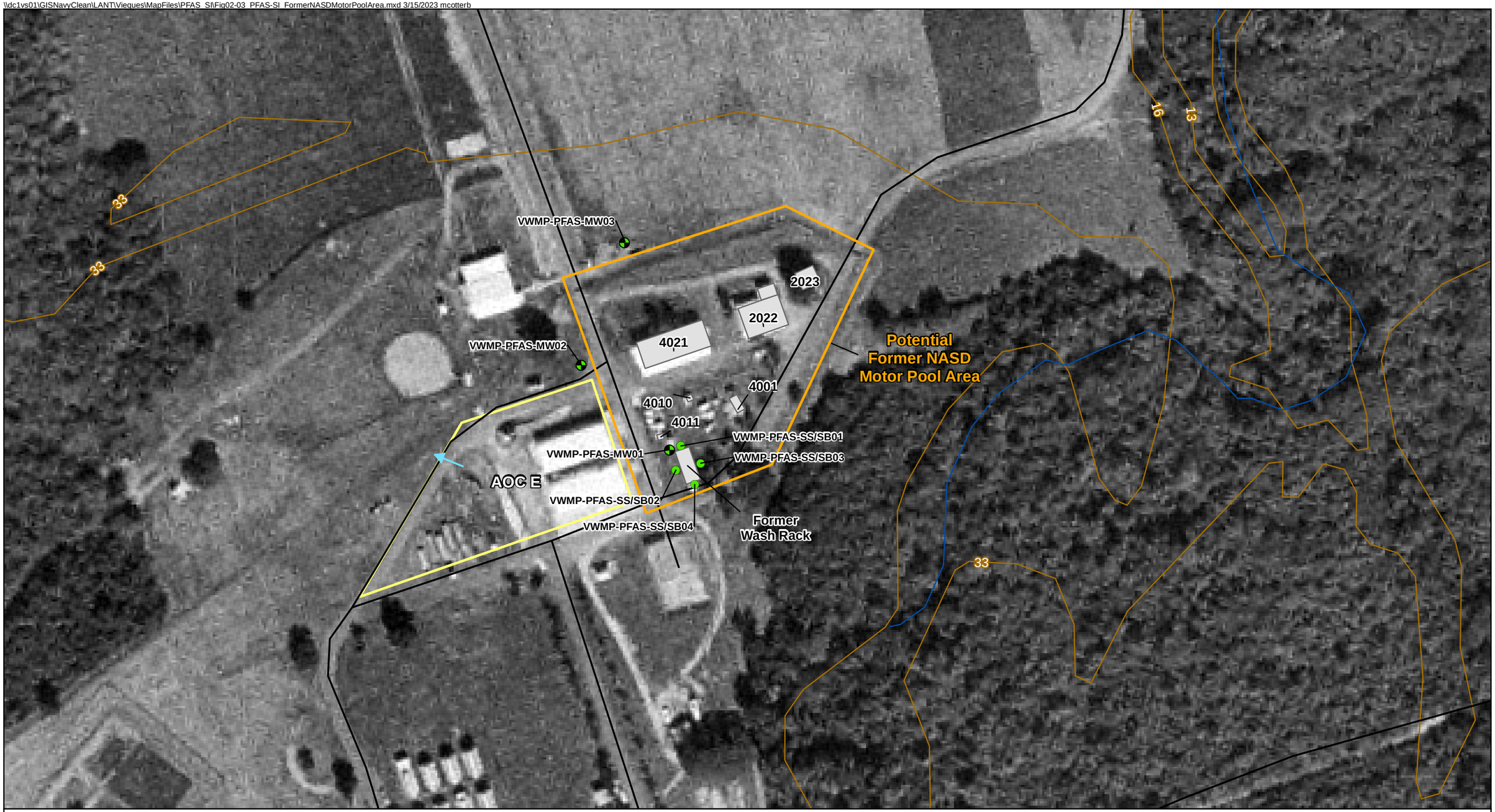
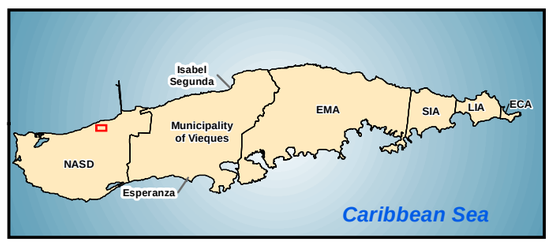



**Legend**

- Potential PFAS Release Area
- Approximate Building Location
- AOC E Land Use Control Boundary
- Planned Monitoring Well
- Planned Soil Boring
- Groundwater Flow Direction (AOC E Annual Report [2019])
- Ephemeral Stream
- Elevation Contour (feet)
- Road

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Imagery Date: 1994

**Figure 2-3**
**Potential Former NASD Motor Pool Area**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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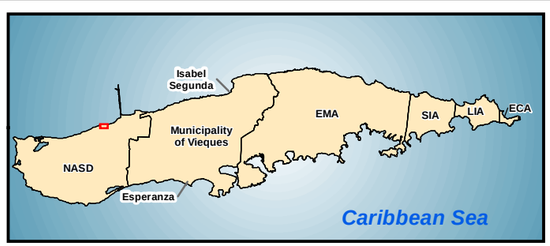
**Legend**

- Potential PFAS Release Area
- Planned Monitoring Well
- Planned Soil Boring
- Planned Surface Water and Sediment Sample
- Groundwater Potentiometric Contour (AOC H RI Report [2007])
- Groundwater Flow Direction (AOC H RI Report [2007])
- Ephemeral Stream
- Elevation Contour (feet)
- Road

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Feet

Imagery Date: 2004

**Figure 2-4**
**NASD AOC H: Abandoned Power Plant**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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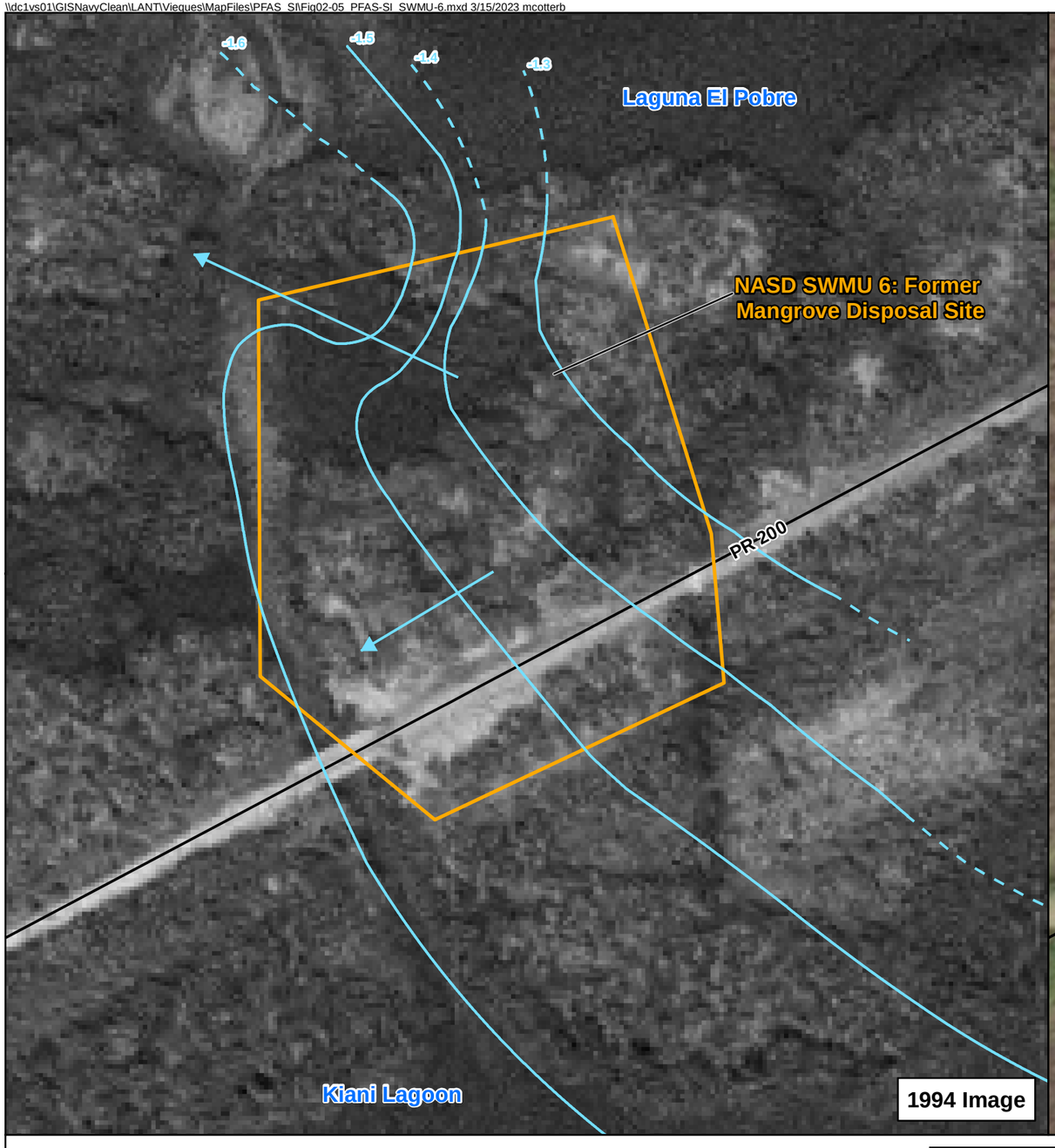
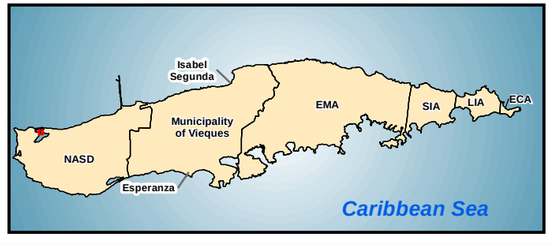






**Legend**

- Potential PFAS Release Area
- Planned Soil Boring
- Planned Surface Water and Sediment Sample
- Potentiometric Contour (SWMU 6 RI Report [2007])
- Inferred Potentiometric Contour (SWMU 6 RI Report [2007])
- Groundwater Flow Direction (SWMU 6 RI Report [2007])
- Road

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Imagery Date: 1994 & 2021

**Figure 2-5**
**NASD SWMU 6: Former Mangrove Disposal Site**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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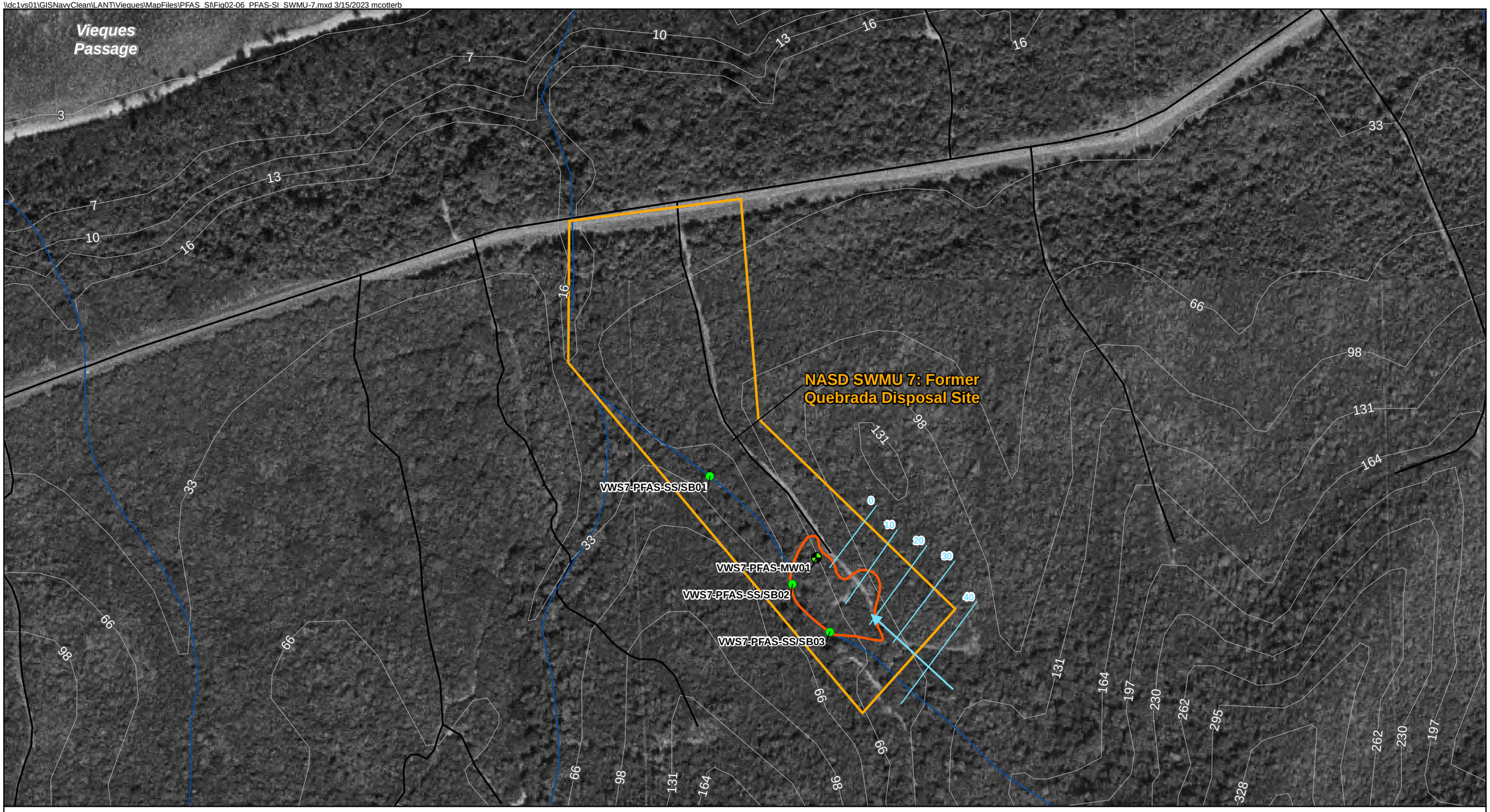
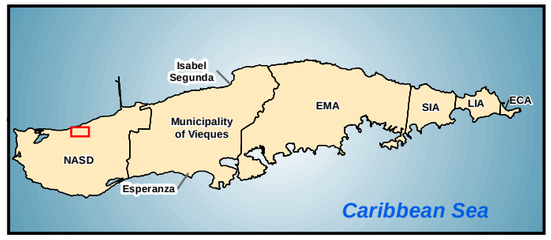



**Legend**

- Potential PFAS Release Area
- Planned Monitoring Well
- Planned Soil Boring
- Potentiometric Groundwater Contour (SWMU 7 RI Report [2008])
- Groundwater Flow Direction (SWMU 7 RI Report [2008])
- Interpreted Waste Boundary
- Road
- Elevation Contour (feet)
- Ephemeral Stream

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Meters

Imagery Date: 1994

**Figure 2-6**
**NASD SWMU 7: Former Quebrada Disposal Site**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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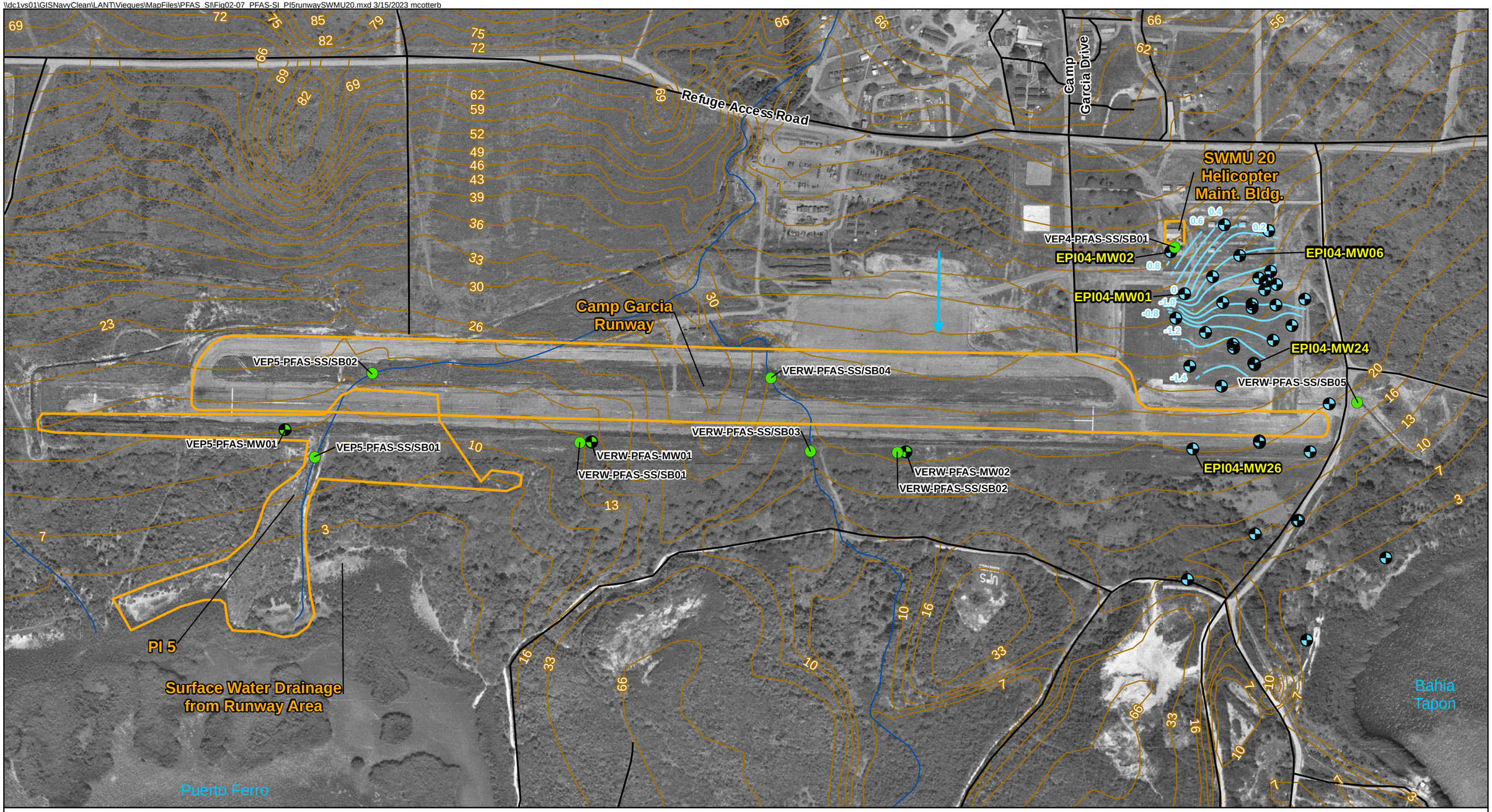
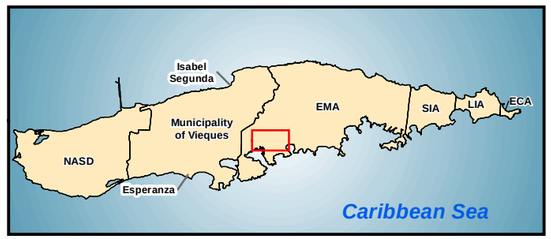



**Legend**

- Potential PFAS Release Area
- Planned Monitoring Well
- Planned Soil Boring
- Existing Well
- Generalized Groundwater Flow Direction
- Groundwater Potentiometric Contour (SWMU 20 RI Report [2016])
- Road
- Elevation Contour (feet)
- Ephemeral Stream

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0 250 500 Feet

Imagery Date: 1964

**Figure 2-7**
**VNTR Camp Garcia Runway, VNTR PI 5: Surface Water Drainage Area from Camp Garcia Runway (Down Gradient), and VNTR SWMU 20: Former Helicopter Maintenance Area**
*Site Inspection for*
*Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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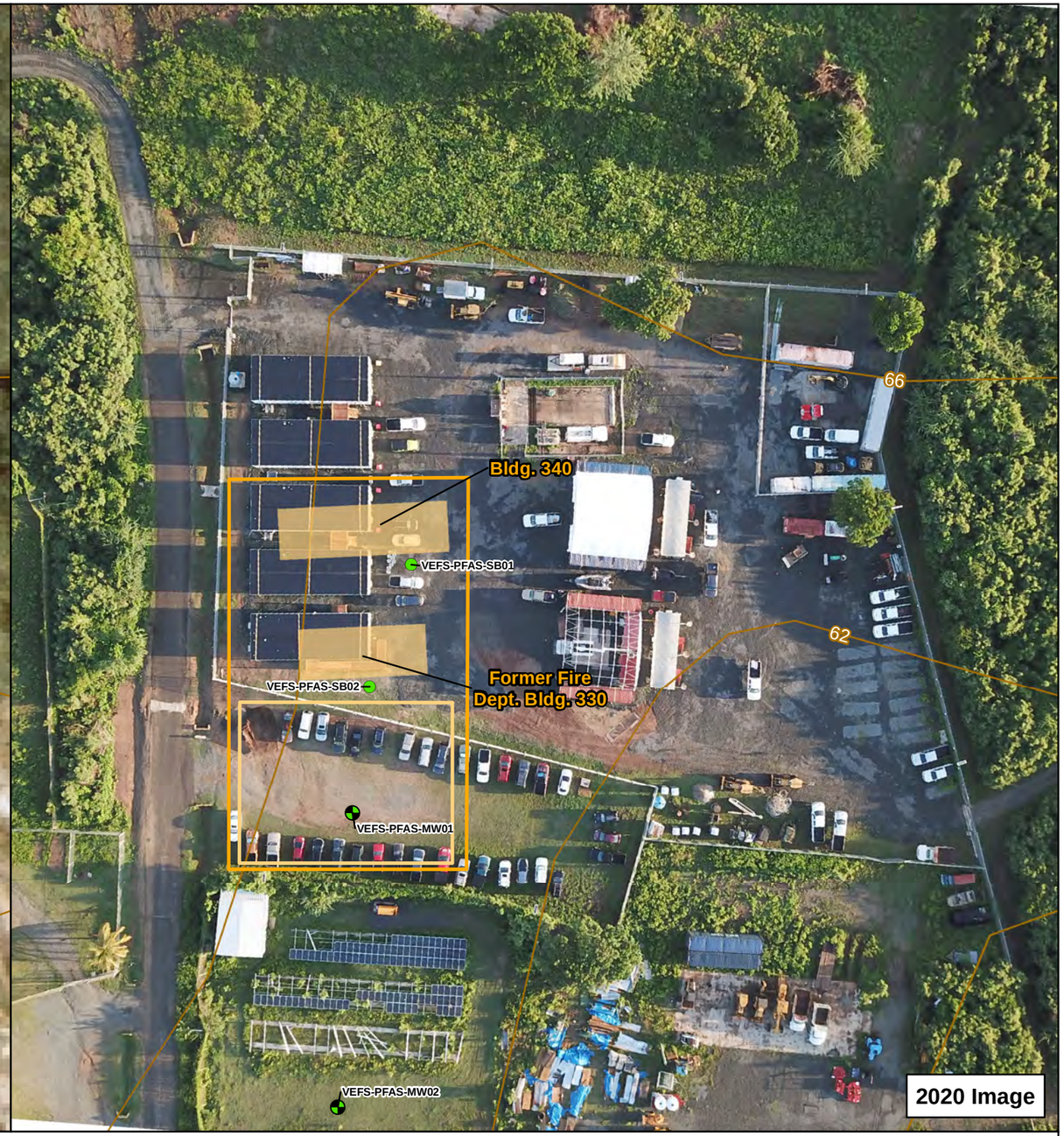


**Legend**

- Potential PFAS Release Area
- Potential Former VNTR Motor Pool Area
- Former Building Area
- Groundwater Potentiometric Contour (SI/ESI Report [2010])
- Inferred Groundwater Potentiometric Contour (SI/ESI Report [2010])
- Groundwater Flow Direction (SI/ESI Report [2010])
- Elevation Contour (feet)
- Planned Monitoring Well
- Planned Soil Boring




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Feet

Imagery Date: 1983 & 2020

**Figure 2-8**
**Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330, 1983 and 2020 Aerial Photographs**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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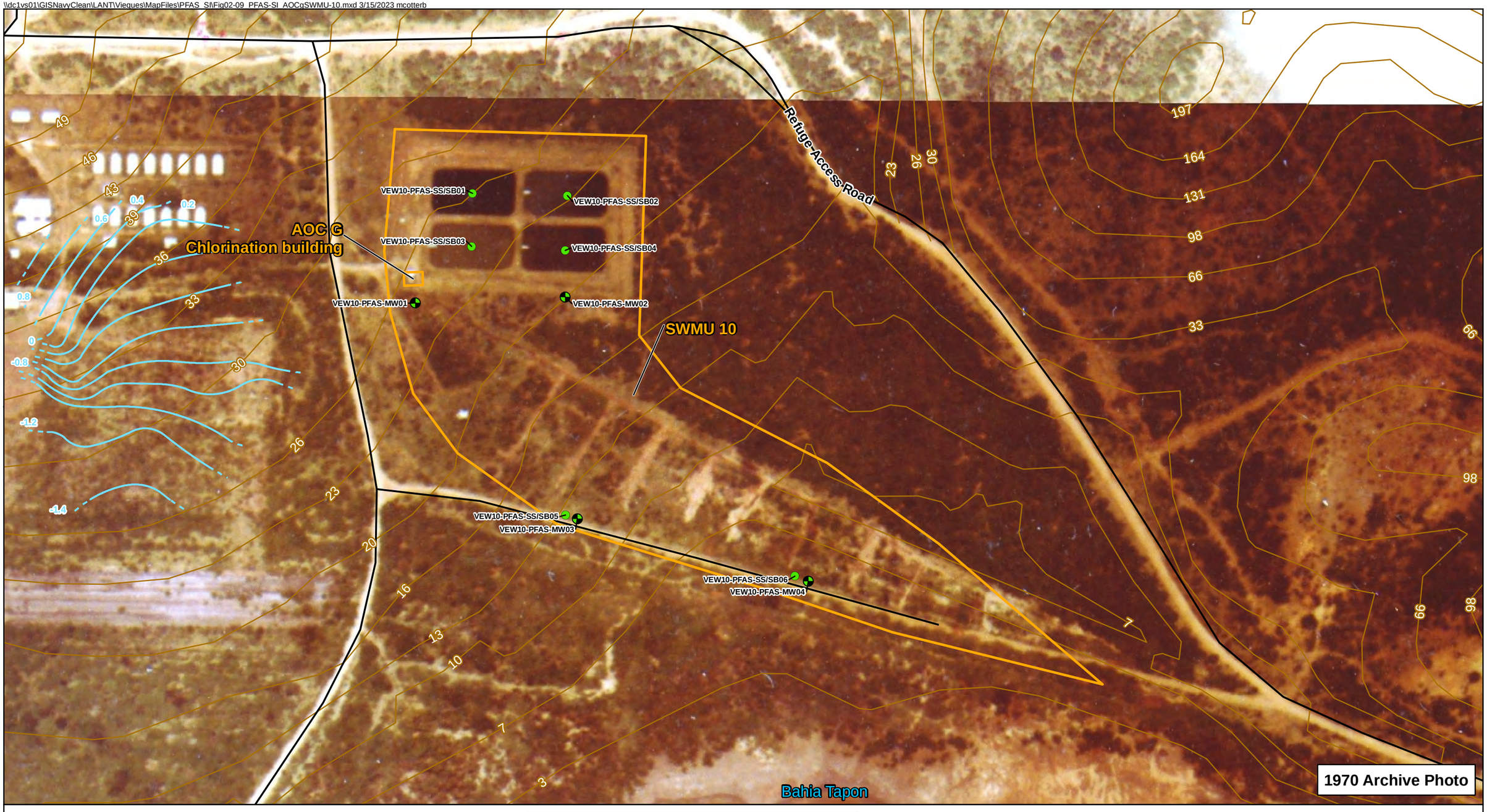
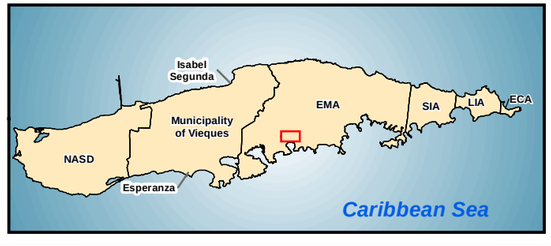



**Legend**

- Potential PFAS Release Area
- Planned Monitoring Well
- Planned Soil Boring
- Groundwater Potentiometric Contour (SWMU 20 RI Report [2016])
- Inferred Groundwater Potentiometric Contour (SWMU 20 RI Report [2016])
- Elevation Contour (feet)
- Road

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Feet

Imagery Date: 1970

**Figure 2-9**
**VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building**
*Site Inspection for*
*Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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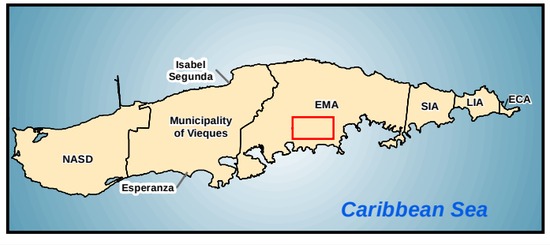
SWMU 1
MW-08
MW-02
MW-06
MW-03
MW-11
MW-10
EMA Range Access Road
Range Access Road
Refuge Access Road
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0

**Legend**

- Potential PFAS Release Area
- Planned Monitoring Well for Sampling
- Monitoring Well (Not Sampled)
- Road
- Elevation Contour (feet)
- Ephemeral Stream
- Potentiometric Groundwater Contour (SMWU 1 LTM Annual Report [2019])
- Inferred Potentiometric Groundwater Contour (SMWU 1 LTM Annual Report [2019])
- Groundwater Flow Direction (SMWU 1 LTM Annual Report [2019])




N
W E
S

0 350 700 Feet

Imagery Date: 1964

**Figure 2-10**
**VNTR SWMU 1: Former Camp Garcia Municipal Waste Management Unit (Landfill)**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

SECTION 3
# Field Activities

This section describes the field activities conducted for the SI at the former NASD and former VNTR between January and July 2022. The field activities detailed herein were performed in accordance with the SAP (CH2M, 2021); deviations from the SI SAP are presented in Section 3.1. Photographs of the SI field activities are provided in Appendix A.

The SI for the 13 potential PFAS release areas at Vieques was conducted over three mobilizations. The following are the activities and time frames performed during the mobilizations of the SI included:

- Mobilization 1 (January through February 2022)
  - Vegetation clearance
  - Utility locating
  - Groundwater sampling of existing monitoring wells at SWMU 1, and an initial round of sampling at SWMU 20
  - Surface water and sediment sampling at SWMU 6 and AOC H
  - Surface and subsurface soil sampling at SWMU 6, PI 5, and Camp Garcia Runway
  - Investigation-derived waste management
- Mobilization 2 (February through May 2022)
  - Installation of new monitoring wells at Former Fire Station Building 2046, Potential Former NASD Motor Pool Area, Camp Garcia Runway, PI 5, Potential Former VNTR Motor Pool Area and Former Fire Department Building 330, and SWMU 10 and AOC G
  - Development of newly installed monitoring wells
  - Groundwater sampling of newly installed monitoring wells at Camp Garcia Runway, PI 5, and SWMU 10 and AOC G
  - Surface and subsurface soil sampling at NASD AOC B, Former Fire Station Building 2046, Potential Former NASD Motor Pool Area, AOC H, SWMU 7, SWMU 20, Potential Former VNTR Motor Pool Area and Former Fire Department Building 330, SWMU 10 and AOC G
  - Investigation-derived waste management
- Mobilization 3 (June through July 2022)
  - Continued development of newly installed and existing monitoring wells not performed during Mobilization 2
  - Groundwater sampling of newly installed and/or existing monitoring wells at AOC B, Former Fire Station Building 2046, Potential Former NASD Motor Pool Area, AOC H, SWMU 7, Potential Former VNTR Motor Pool Area and Former Fire Department Building 330, and a second round of sampling at SWMU 20
  - Surveying of monitoring wells
  - Investigation-derived waste management, including sampling of the investigation-derived waste in December 2022.

## 3.1 Vegetation Clearance

Proposed work locations were cleared of any vegetation using hand tools that obstructed the work area or posed a safety hazard before beginning sampling or well installation activities. At four potential release areas located

within the vicinity of inland or coastal mangrove habitat (NASD AOC H, NASD SWMU 6, VNTR PI 5, and VNTR SWMU 10), a qualified biologist supported the vegetation clearance efforts to avoid mangroves and land crab burrows; no deviations to sample locations were necessary based on this activity.

## 3.2 Site Preparation and Utility Location

Prior to beginning intrusive investigation activities, soil boring and monitoring well locations were marked with pin flags or construction cones and a third-party utility clearance subcontractor marked underground utilities within 10 feet of the proposed locations. Prior to drilling, all locations were cleared of underground utilities via hand auger boring to 5 feet below ground surface (bgs).

## 3.3 Soil Sampling

Soil samples were collected from 12 potential PFAS release areas: NASD AOC B, NASD Former Fire Station Building 2046 at the Public Works Area, Potential Former NASD Motor Pool Area, NASD AOC H, NASD SWMU 6, NASD SWMU 7, VNTR Camp Garcia Runway, PI 5: Surface Water Drainage Area from Camp Garcia Runway, VNTR SWMU 20, Potential Former VNTR Motor Pool Area and Former Fire Department Building 330, and VNTR SWMU 10, and VNTR AOC G. Soil sampling activities are summarized in Table 3-1.

Surface and subsurface soil samples were collected with standard drilling methods (i.e., 48-inch Geoprobe DPT Macro-Core® MC5 Sampler), where possible, and with a hand auger in locations inaccessible to the drill rig. At each location, the onsite geologist logged visual observations of the material. Surface soil was primarily collected from 0 to 1 foot bgs of the soil profile. At NASD AOC H, surface soil samples were collected from 0 to 2 feet bgs as the locations were near a surface water body and land crabs are a potential receptor of concern. At NASD SWMU 6, surface soil samples were also planned from 0 to 2 feet bgs, but were collected from 0 to 1 foot bgs due to the presence of water at approximately 1 foot. At all areas, subsurface soil samples were collected from the 4 to 6 feet bgs interval (unless water was encountered before reaching that depth) and just above the water table/bedrock if encountered within unconsolidated materials.

In total, 35 surface soil and 53 subsurface soil samples (not including QA/QC) were collected. All surface soil sample locations were collected as intended, in accordance with the SAP; additionally, all subsurface soil samples were collected following the subsurface sampling protocols, in accordance of the SAP. Soil was collected in laboratory-supplied high density polyethylene (HDPE) jars using reusable and single-use dedicated equipment. Soil samples were placed into coolers containing enough ice to keep the samples 0 to 10 degrees Celsius (but not frozen) until they were received by the laboratory. To avoid potential introduction of PFAS from a source unrelated to the potential release area during soil sampling/ collection, PFAS containing equipment and components were avoided. Clothing, sunscreen, insect repellant, and other personal hygiene products that may contain PFAS were avoided.

Duplicate soil samples were collected at the rate of 1 for every 10 field samples and matrix spike/matrix spike duplicate samples were collected at the rate of 1 for every 20 field samples. Equipment blanks for soil sampling were collected each day for decontaminated equipment (hand auger). Field blanks were collected once per week for each area when sampling activities were conducted.

## 3.4 Monitoring Well Installation and Development

The following subsections detail the monitoring well installation and development procedures performed during the SI. Monitoring wells were installed at 10 potential PFAS release areas: NASD AOC B, Former Fire Station Building 2046 at the Public Works Area, Potential Former NASD Motor Pool Area, NASD AOC H, NASD SWMU 7, VNTR Camp Garcia Runway, VNTR PI 5, Potential Former VNTR Motor Pool Area and Former Fire Department Building 330, VNTR SWMU 10, and VNTR AOC G.

### 3.4.1 Installation

Eighteen monitoring wells were installed during the SI using air rotary drilling methods (Geoprobe 7822dt) and continuous soil cores were extruded and collected in plastic sleeves and logged for lithology. Monitoring wells were installed at first encountered groundwater using 2-inch-inner diameter Schedule 40 polyvinyl chloride (PVC) and 0.010-inch PVC screens. Each monitoring well was constructed with a 10-foot-long screen, extending to the approximate top of the water table, at depths specified in Table 3-2. The annular space between the borehole wall and well screen was backfilled with a silica filter pack placed around the annular space of the well screen from the bottom of the boring and extending approximately 2 feet above the top of the well screen. A bentonite seal at least 2-foot-thick was placed above the sand pack. After the bentonite had been hydrated, a cement-bentonite grout was placed in the remaining annular space. Boring logs and well construction diagrams are provided in Appendix B. Well heads were completed with either flush-mount covers or above-grade protective casings with steel covers. Flush-mount covers were encased within concrete pads and installed at monitoring wells VWMP-PFAS-MW02 (NASD Motor Pool Area), VWFS-PFAS-MW01 and VWFS-PFAS-MW02 (NASD Former Fire Station Building 2046), and VEFS-PFAS-MW01 and VEFS-PFAS-MW02 (Former VNTR Motor Pool Area).

As a conservative measure to avoid potential introduction of PFAS during the well installation/development process, drill tooling and well development equipment (e.g., surge blocks, submersible pumps) avoided potential PFAS-containing components (such as parts or o-rings containing Teflon, Viton, polytetrafluoroethylene, and all other fluorinated compounds). Additionally, thread lubricant used on the drilling tools and well materials (such as riser, screen, sand, and grout) did not contain polytetrafluoroethylene or any other fluorine-containing substance. Additionally, coated bentonite pellets were not used.

### 3.4.2 Monitoring Well Development

Upon completion of the well installation, each monitoring well was developed using a combination of surging and pumping throughout the well screen. During monitoring well development, the volume of water that was purged during development was recorded and water quality parameters (WQPs) were measured, including potential hydrogen (pH), temperature, conductivity, and turbidity (Appendix C). Development continued until the turbidity of the water removed from the well was as clear as practicable.

## 3.5 Groundwater Sampling

Groundwater samples were collected from 18 newly installed wells across nine areas and 44 existing wells at three areas. Groundwater sampling activities are summarized in Table 3-3. Groundwater samples were collected under low flow/low stress conditions using a peristaltic pump or submersible pump with the intake placed at the middle of the wetted well screen interval. Depth-to-water readings and WQPs were measured and recorded (approximately every 5 minutes) before sampling using a depth-to-water meter and water quality meter, which were calibrated daily. Sampling began when low-flow water level drawdown requirements were met and WQPs had stabilized for three consecutive readings, as follows:

- pH within 0.1 pH units
- Specific conductivity within 3%
- Dissolved oxygen (DO) within 10%
- Oxygen reduction potential (ORP) within 10%
- Turbidity measurements less than 10 nephelometric turbidity units (NTUs) or within 10%

To avoid introduction of PFAS during groundwater sampling, PFAS containing equipment and components were avoided. Clothing, sunscreen, insect repellant, and other personal hygiene products that may contain PFAS were avoided. Sample tubing was HDPE. Depth-to-water, total depth, and WQPs were recorded on groundwater sampling data sheets (Appendix D). WQPs recorded just prior to sample collection are presented in Table 3-3.

Groundwater was collected in laboratory-supplied HDPE bottles and placed into coolers containing enough ice to keep the samples 0 to 10 degrees Celsius (but not frozen) until they were received by the laboratory.

Duplicate groundwater samples were collected at the rate of 1 for every 10 field samples and matrix spike/matrix spike duplicate samples were collected at the rate of 1 for every 20 field samples. Equipment blanks for groundwater samples were collected at the rate of one per day per equipment type on which decontamination procedures were performed and one per event per equipment type when disposable equipment was utilized. Field blanks were collected once per week for each area when sampling activities was conducted there.

## 3.6 Surface Water and Sediment Sampling

In total, five surface water and five sediment samples were collected from two areas, as summarized in Tables 3-4 and 3-5. Surface water samples were co-located with sediment sample locations. All surface water samples were collected from approximately mid-depth in the water column with a peristaltic pump after WQPs had been measured. WQPs recorded just prior to sample collection are presented in Table 3-4. After surface water sampling, sediment samples were collected from 0 to 6 inches bgs below the sediment surface using a disposable PFAS-free plastic scoop. To prevent potential influence on unsampled areas, sediment samples were collected starting at the most downstream location and proceeding in the upstream direction. Surface water and sediment samples were collected in laboratory-supplied HDPE jars/bottles excluding free water to the extent feasible.

Duplicate surface water samples were collected at the rate of 1 for every 10 field samples and matrix spike/matrix spike duplicate samples were collected at the rate of 1 for every 20 field samples. Equipment blanks for surface water samples were collected at the rate of one per day per equipment type on which decontamination procedures were performed and one per event per equipment type when disposable equipment was utilized. Field blanks were collected once per week for each area when sampling activities was conducted there.

## 3.7 Decontamination Procedures

All non-disposable sampling equipment was decontaminated before sampling events and between each sampling location in accordance with the standard operating procedures provided in the SAP (CH2M, 2021). Submersible pumps were decontaminated by recirculating 2.5% Liquinox solution through the pump, followed by recirculating deionized water to rinse. The water level indicator was scrubbed with Liquinox solution, and then rinsed with deionized water. All down-hole drilling equipment was steam cleaned at the designated areas. All decontamination fluids were containerized in 55-gallon drums as investigation-derived waste (IDW) and managed as detailed in Section 3.10.

## 3.8 Surveying

Monitoring well locations were horizontally and vertically located by a land surveyor registered in Puerto Rico. The vertical elevation accuracy was recorded within ± 0.01 foot, and the horizontal location accuracy was recorded within ± 0.1 foot. The elevation for each monitoring well was established at the top of the monitoring well's inner PVC casing (this elevation point was designated by a permanent notch placed on the top of each well's inner casing) and at the ground surface (Appendix E).

Soil, surface water, and sediment sample location coordinates were logged by the field team using a handheld electronic data capture device equipped with a global positioning system (GPS).

## 3.9 Investigation-derived Waste Management

IDW generated during the SI consisted of drill cuttings generated during monitoring well installations, purge water from well development and groundwater sampling, and decontamination fluids. All IDW was containerized in 55-gallon Department of Transportation (DOT)-approved steel drums which were properly sealed, labeled, and staged at one of two central accumulation areas: Camp Garcia Runway (for IDW generated at the former VNTR) and AOC E (for IDW generated at the former NASD). Consistent with normal protocol for past investigations at the former VNTR and former NASD and the Master Waste Management Plan of the Master Protocols (CH2M, 2018),

the liquid IDW was allowed to evaporate. The resultant empty drums will not be reused, but rather crushed and disposed of as non-hazardous metal waste.

The soil cuttings, generated while collecting site investigation subsurface samples, were returned into the respective borehole immediately after each subsurface sample was collected. Soil generated from monitoring well installation was containerized in 66 55-gallon DOT-approved steel drums and staged in the same manner as the liquid IDW drums Additionally, composite soil samples for PFAS and standard disposal characteristics (full Toxicity Characteristic Leaching Procedure [TCLP], reactivity, corrosivity and ignitability) were analyzed in accordance with the SAP (CH2M, 2021) for further waste characterization.

All soil IDW was characterized as non-hazardous and will be disposed of at Peñuelas Valley Landfill, Peñuelas, Puerto Rico, an approved CERCLA Offsite Rule landfill. Drums will be removed and transported for disposal by Right Way Environmental Contractors, Incorporated.

All IDW management activities were conducted in accordance with the Master Waste Management Plan of the Master Protocols (CH2M, 2018) and SAP (CH2M, 2021).

## 3.10 Laboratory Analysis and Data Usability Assessment

Groundwater, soil, sediment, and surface water samples were submitted to Battelle Norwell Operations, Norwell, Massachusetts, a Department of Defense (DoD) Environmental Laboratory Accreditation Program accredited laboratory, in accordance with chain-of-custody procedures. All samples were analyzed for the 18 PFAS compounds listed in Method 537.1 via liquid chromatography tandem mass spectrometry compliant with Quality Systems Manual 5.3 Table B-15:

- Perfluorobutanesulfonic acid (PFBS)
- Perfluorooctanesulfonic acid (PFOS)
- Perfluorooctanoic acid (PFOA)
- Perfluorodecanoic Acid (PFDA)
- Perfluorododecanoic Acid (PFDoA)
- Perfluoroheptanoic acid (PFHpA)
- Perfluorohexanesulfonic acid (PFHxS)
- Perfluorohexanoic Acid (PFHxA)
- Perfluorononanoic acid (PFNA)
- Perfluorotetradecanoic Acid (PFTeDA)
- Perfluorotridecanoic Acid (PFTrDA)
- Perfluoroundecanoic Acid (PFUnA)
- 4,8-dioxa-3H-perfluorononanoic acid (ADONA)
- 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS)
- 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)
- N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)
- N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)
- Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA)

After laboratory analysis of samples was complete, data usability was assessed. Data validation was conducted by an independent third-party data validator, Environmental Data Services, Inc. of Palm Beach Gardens, Florida. Raw validated analytical data are provided in Appendix F. Complete validation findings are presented in the third-party data validation reports included in Appendix G. In addition to data validation of laboratory data, a Data Quality Evaluation (DQE) was performed on all of the analytical data collected; precision, accuracy, representativeness, completeness, and comparability were met for the analytical data (Appendix H). All soil, groundwater, sediment, and surface water data are available for use as qualified by the data validator. Therefore, the SAP project completeness goal of “95% available data” was met. Additionally, the data quality is sufficient for potential later use in ecological risk screenings or risk assessments, in accordance with the SAP.

**TABLE 3-1**
**Summary of Surface and Subsurface Soil Sampling Activities**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Station ID | Northing | Easting | Sample ID | Soil Sample Type | Sample Date | Depth of Sample |
|---|---|---|---|---|---|---|
| **NASD AOC B: Former Wastewater Treatment Plant** | | | | | | |
| VWAB-PFAS-SO01 | 2005516.33690 | 232629.62415 | VWAB-PFAS-SS01-0001 | SS | 5/11/2022 | 0-1 ft bgs |
| | | | VWAB-PFAS-SS01P-0001 | SS - Duplicate | 5/11/2022 | 0-1 ft bgs |
| | | | VWAB-PFAS-SB01-0406 | SB | 5/11/2022 | 4-6 ft bgs |
| | | | VWAB-PFAS-SB01P-0406 | SB - Duplicate | 5/11/2022 | 4-6 ft bgs |
| VWAB-PFAS-SO02 | 2005533.84151 | 232644.32337 | VWAB-PFAS-SS02-0001 | SS | 5/11/2022 | 0-1 ft bgs |
| | | | VWAB-PFAS-SB02-0406 | SB | 5/11/2022 | 4-6 ft bgs |
| VWAB-PFAS-SO03 | 2005547.96760 | 232626.54659 | VWAB-PFAS-SS03-0001 | SS | 5/11/2022 | 0-1 ft bgs |
| | | | VWAB-PFAS-SS03-0001-MS | SS - MS | 5/11/2022 | 0-1 ft bgs |
| | | | VWAB-PFAS-SS03-0001-MSD | SS - MSD | 5/11/2022 | 0-1 ft bgs |
| | | | VWAB-PFAS-SB03-0406 | SB | 5/11/2022 | 4-6 ft bgs |
| | | | VWAB-PFAS-SB03-0406-MSD | SB - MS | 5/11/2022 | 4-6 ft bgs |
| | | | VWAB-PFAS-SB03-0406-MS | SB - MSD | 5/11/2022 | 4-6 ft bgs |
| VWAB-PFAS-SO04 | 2005531.21195 | 232611.67148 | VWAB-PFAS-SS04-0001 | SS | 5/11/2022 | 0-1 ft bgs |
| | | | VWAB-PFAS-SB04-0406 | SB | 5/11/2022 | 4-6 ft bgs |
| **NASD Former Fire Station Building 2046 at the Public Works Area** | | | | | | |
| VWFS-PFAS-SO01 | 2005492.45290 | 232705.74556 | VWFS-PFAS-SS01-0001 | SS | 3/22/2022 | 0-1 ft bgs |
| | | | VWFS-PFAS-SS01P-0001 | SS - Duplicate | 3/22/2022 | 0-1 ft bgs |
| | | | VWFS-PFAS-SB01-0406 | SB | 3/22/2022 | 4-6 ft bgs |
| VWFS-PFAS-SO02 | 2005469.10154 | 232714.56769 | VWFS-PFAS-SS02-0001 | SS | 3/21/2022 | 0-1 ft bgs |
| | | | VWFS-PFAS-SS02P-0001 | SS - Duplicate | 3/21/2022 | 0-1 ft bgs |
| | | | VWFS-PFAS-SB02-0406 | SB | 3/21/2022 | 4-6 ft bgs |
| | | | VWFS-PFAS-SB02P-0406 | SB - Duplicate | 3/21/2022 | 4-6 ft bgs |
| VWFS-PFAS-SO03 | 2005488.32593 | 232732.49591 | VWFS-PFAS-SS03-0001 | SS | 3/22/2022 | 0-1 ft bgs |
| | | | VWFS-PFAS-SS03-0001-MS | SS - MS | 3/22/2022 | 0-1 ft bgs |
| | | | VWFS-PFAS-SS03-0001-MSD | SS - MSD | 3/22/2022 | 0-1 ft bgs |
| | | | VWFS-PFAS-SB03-0406 | SB | 3/22/2022 | 4-6 ft bgs |
| | | | VWFS-PFAS-SB03-0406-MSD | SB - MS | 3/22/2022 | 4-6 ft bgs |
| | | | VWFs-PFAS-SB03-0406-MS | SB - MSD | 3/22/2022 | 4-6 ft bgs |
| VWFS-PFAS-SO04 | 2005497.56409 | 232739.60968 | VWFS-PFAS-SS04-0001 | SS | 3/22/2022 | 0-1 ft bgs |
| | | | VWFS-PFAS-SB04-0406 | SB | 3/22/2022 | 4-6 ft bgs |
| VWFS-PFAS-SO05 | 2005493.41052 | 232749.12827 | VWFS-PFAS-SS05-0001 | SS | 3/23/2022 | 0-1 ft bgs |
| | | | VWFS-PFAS-SB05-0406 | SB | 3/23/2022 | 4-6 ft bgs |
| | | | VWFS-PFAS-SB05D-5860 | DSB | 3/23/2022 | 58-60 ft bgs |
| **Potential Former NASD Motor Pool Area** | | | | | | |
| VWMP-PFAS-SO01 | 2005681.23019 | 232873.73400 | VWMP-PFAS-SS01-0001 | SS | 3/24/2022 | 0-1 ft bgs |
| | | | VWMP-PFAS-SB01-0406 | SB | 3/24/2022 | 4-6 ft bgs |
| | | | VWMP-PFAS-SB01D-4446 | DSB | 3/24/2022 | 44-46 ft bgs |
| VWMP-PFAS-SO02 | 2005670.83235 | 232871.65442 | VWMP-PFAS-SS02-0001 | SS | 3/25/2022 | 0-1 ft bgs |
| | | | VWMP-PFAS-SS02P-0001 | SS - Duplicate | 3/25/2022 | 0-1 ft bgs |
| | | | VWMP-PFAS-SB02-0406 | SB | 3/25/2022 | 4-6 ft bgs |
| | | | VWMP-PFAS-SB02P-0406 | SB - Duplicate | 3/25/2022 | 4-6 ft bgs |
| | | | VWMP-PFAS-SB02D-4850 | DSB | 3/25/2022 | 48-50 ft bgs |
| | | | VWMP-PFAS-SB02DP-4850 | DSB - Duplicate | 3/25/2022 | 48-50 ft bgs |
| VWMP-PFAS-SO03 | 2005673.69182 | 232882.31218 | VWMP-PFAS-SS03-0001 | SS | 3/23/2022 | 0-1 ft bgs |
| | | | VWMP-PFAS-SB03-0406 | SB | 3/23/2022 | 4-6 ft bgs |
| | | | VWMP-PFAS-SB03D-4850 | DSB | 3/23/2022 | 48-50 ft bgs |
| VWMP-PFAS-SO04 | 2005664.59362 | 232879.71260 | VWMP-PFAS-SS04-0001 | SS | 3/24/2022 | 0-1 ft bgs |
| | | | VWMP-PFAS-SB04-0406 | SB | 3/24/2022 | 4-6 ft bgs |
| | | | VWMP-PFAS-SB04D-4749 | DSB | 3/24/2022 | 47-49 ft bgs |
| **NASD AOC H: Abandoned Power Plant** | | | | | | |
| VWAH-PFAS-SO01 | 2006071.21487 | 233091.11223 | VWAH-PFAS-SS01-0002 | SS | 4/21/2022 | 0-2 ft bgs |
| | | | VWAH-PFAS-SS01P-0002 | SS - Duplicate | 4/21/2022 | 0-2 ft bgs |
| | | | VWAH-PFAS-SB01-0406 | SB | 4/21/2022 | 4-6 ft bgs |
| | | | VWAH-PFAS-SB01P-0406 | SB - Duplicate | 4/21/2022 | 4-6 ft bgs |
| VWAH-PFAS-SO02 | 2006052.71508 | 233106.67342 | VWAH-PFAS-SS02-0002 | SS | 4/21/2022 | 0-2 ft bgs |
| | | | VWAH-PFAS-SB02-0406 | SB | 4/21/2022 | 4-6 ft bgs |
| | | | VWAH-PFAS-SB02D-0810 | DSB | 4/21/2022 | 8-10 ft bgs |
| VWAH-PFAS-SO03 | 2006050.13269 | 233088.49487 | VWAH-PFAS-SS03-0002 | SS | 4/21/2022 | 0-2 ft bgs |
| | | | VWAH-PFAS-SB03-0406 | SB | 4/21/2022 | 4-6 ft bgs |
| | | | VWAH-PFAS-SB03D-0709 | DSB | 4/21/2022 | 7-9 ft bgs |
| VWAH-PFAS-SO04 | 2006040.73450 | 233103.32247 | VWAH-PFAS-SS04-0001 | SS | 4/21/2022 | 0-1 ft bgs |
| | | | VWAH-PFAS-SB04-0406 | SB | 4/21/2022 | 4-6 ft bgs |
| | | | VWAH-PFAS-SB04D-0810 | DSB | 4/21/2022 | 8-10 ft bgs |
| **NASD SWMU 6: Former Mangrove Disposal Site** | | | | | | |
| VWS6-PFAS-SO01 | 2005103.50934 | 228962.32826 | VWS6-PFAS-SS01-0001 | SS | 2/7/2022 | 0-1 ft bgs |

**TABLE 3-1**
**Summary of Surface and Subsurface Soil Sampling Activities**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Station ID | Northing | Easting | Sample ID | Soil Sample Type | Sample Date | Depth of Sample |
|---|---|---|---|---|---|---|
| **NASD SWMU 7: Former Quebrada Disposal Site** | | | | | | |
| VWS7-PFAS-SO01 | 2005136.65219 | 231516.44738 | VWS7-PFAS-SS01-0001 | SS | 3/28/2022 | 0-1 ft bgs |
| | | | VWS7-PFAS-SS01P-0001 | SS - Duplicate | 3/28/2022 | 0-1 ft bgs |
| VWS7-PFAS-SO02 | 2005054.90496 | 231578.94641 | VWS7-PFAS-SS02-0001 | SS | 3/28/2022 | 0-1 ft bgs |
| VWS7-PFAS-SO03 | 2005018.17969 | 231607.21930 | VWS7-PFAS-SS03-0001 | SS | 3/29/2022 | 0-1 ft bgs |
| **VNTR Camp Garcia Runway** | | | | | | |
| VERW-PFAS-SO01 | 2004646.76111 | 243638.06848 | VERW-PFAS-SS01-0001 | SS | 2/24/2022 | 0-1 ft bgs |
| | | | VERW-PFAS-SB01-0406 | SB | 2/24/2022 | 4-6 ft bgs |
| | | | VERW-PFAS-SB01D-2728 | DSB | 2/24/2022 | 27-28 ft bgs |
| VERW-PFAS-SO02 | 2004631.70731 | 244152.77393 | VERW-PFAS-SS02-0001 | SS | 2/28/2022 | 0-1 ft bgs |
| | | | VERW-PFAS-SB02-0406 | SB | 2/28/2022 | 4-6 ft bgs |
| | | | VERW-PFAS-SB02D-3132 | DSB | 2/28/2022 | 31-32 ft bgs |
| VERW-PFAS-SO03 | 2004632.45190 | 244011.85492 | VERW-PFAS-SS03-0001 | SS | 2/25/2022 | 0-1 ft bgs |
| | | | VERW-PFAS-SB03-0406 | SB | 2/25/2022 | 4-6 ft bgs |
| | | | VERW-PFAS-SB03D-3132 | DSB | 2/25/2022 | 31-32 ft bgs |
| VERW-PFAS-SO04 | 2004751.74152 | 243947.77148 | VERW-PFAS-SS04-0001 | SS | 2/25/2022 | 0-1 ft bgs |
| | | | VERW-PFAS-SB04-0406 | SB | 2/25/2022 | 4-6 ft bgs |
| | | | VERW-PFAS-SB04D-3233 | DSB | 2/25/2022 | 32-33 ft bgs |
| VERW-PFAS-SO05 | 2004712.06964 | 244899.17794 | VERW-PFAS-SS05-0001 | SS | 3/1/2022 | 0-1 ft bgs |
| | | | VERW-PFAS-SB05-0406 | SB | 3/1/2022 | 4-6 ft bgs |
| | | | VERW-PFAS-SB05D-1920 | DSB | 3/1/2022 | 19-20 ft bgs |
| **PI 5: Surface Water Drainage Area from Camp Garcia Runway** | | | | | | |
| VEP5-PFAS-SO01 | 2004622.76842 | 243207.41150 | VEP5-PFAS-SS01-0001 | SS | 2/23/2022 | 0-1 ft bgs |
| | | | VEP5-PFAS-SB01-0406 | SB | 2/23/2022 | 4-6 ft bgs |
| | | | VEP5-PFAS-SB01D-1516 | DSB | 2/23/2022 | 15-16 ft bgs |
| VEP5-PFAS-SO02 | 2004759.16052 | 243300.87048 | VEP5-PFAS-SS02-0001 | SS | 2/24/2022 | 0-1 ft bgs |
| | | | VEP5-PFAS-SB02-0406 | SB | 2/24/2022 | 4-6 ft bgs |
| | | | VEP5-PFAS-SB02D-2425 | DSB | 2/24/2022 | 24-25 ft bgs |
| **VNTR SWMU 20: Former Helicopter Maintenance Area** | | | | | | |
| EPI04-SO01 | 2004963.43473 | 244603.08030 | VEP4-PFAS-SS01-0001 | SS | 3/3/2022 | 0-1 ft bgs |
| | | | VEP4-PFAS-SB01-0406 | SB | 3/3/2022 | 4-6 ft bgs |
| **Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330** | | | | | | |
| VEFS-SO01 | 2005303.21754 | 244466.16584 | VEFS-PFAS-SB01-0406 | SB | 3/15/2022 | 4-6 ft bgs |
| VEFS-SO02 | 2005283.57278 | 244459.51484 | VEFS-PFAS-SB02-0406 | SB | 3/14/2022 | 4-6 ft bgs |
| **VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building** | | | | | | |
| VEW10-PFAS-SO01 | 2005008.72956 | 244960.51651 | VEW10-PFAS-SS01-0001 | SS | 3/9/2022 | 0-1 ft bgs |
| | | | VEW10-PFAS-SB01-0406 | SB | 3/9/2022 | 4-6 ft bgs |
| | | | VEW10-PFAS-SB01D-2627 | DSB | 3/9/2022 | 26-27 ft bgs |
| VEW10-PFAS-SO02 | 2005006.92672 | 245037.59183 | VEW10-PFAS-SS02-0001 | SS | 3/9/2022 | 0-1 ft bgs |
| | | | VEW10-PFAS-SB02-0406 | SB | 3/9/2022 | 4-6 ft bgs |
| VEW10-PFAS-SO03 | 2004965.45932 | 244959.61520 | VEW10-PFAS-SS03-0001 | SS | 3/9/2022 | 0-1 ft bgs |
| | | | VEW10-PFAS-SB03-0406 | SB | 3/9/2022 | 4-6 ft bgs |
| | | | VEW10-PFAS-SB03D-2324 | DSB | 3/9/2022 | 23-24 ft bgs |
| VEW10-PFAS-SO04 | 2004962.30414 | 245035.78874 | VEW10-PFAS-SS04-0001 | SS | 3/9/2022 | 0-1 ft bgs |
| | | | VEW10-PFAS-SB04-0406 | SB | 3/9/2022 | 4-6 ft bgs |
| | | | VEW10-PFAS-SB04D-2829 | DSB | 3/9/2022 | 28-29 ft bgs |
| VEW10-PFAS-SO05 | 2004746.51270 | 245035.87549 | VEW10-PFAS-SS05-0001 | SS | 3/2/2022 | 0-1 ft bgs |
| | | | VEW10-PFAS-SB05-0406 | SB | 3/2/2022 | 4-6 ft bgs |
| | | | VEW10-PFAS-SB05D-2829 | DSB | 3/2/2022 | 28-29 ft bgs |
| VEW10-PFAS-SO06 | 2004696.62793 | 245222.52808 | VEW10-PFAS-SS06-0001 | SS | 3/1/2022 | 0-1 ft bgs |
| | | | VEW10-PFAS-SB06-0406 | SB | 3/1/2022 | 4-6 ft bgs |
| | | | VEW10-PFAS-SB06D-0708 | DSB | 3/1/2022 | 7-8 ft bgs |

DSB = deep subsurface soil
GPS Coordinates are in NAD83 and UTM 20 N
ft bgs = feet below ground surface
MS = Matrix Spike
MSD = Matrix Spike Duplicate
PFAS = Per- and Polyfluoroalkyl Substances
SS = surface soil
SB = subsurface soil

**TABLE 3-2**
**Summary of Well Construction Details**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Potential PFAS Release Area | Well ID | Northing (Y) | Easting (X) | Date Installed | Top of PVC Casing Elevation (ft amsl) | Ground Surface Elevation (ft amsl) | Boring Depth (ft bgs) | Well Depth (ft bgs) | Depth to Bentonite (ft bgs) | Screen Interval Depth (ft bgs) | Depth to Sand Pack (ft bgs) | Bottom Elevation (ft amsl) | Water Level Measurement Date | Water Level (feet BTOC) | Groundwater Elevation (feet amsl) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NASD AOC B: Former Wastewater Treatment Plant | VWAB-PFAS-MW01 | 232620.6037 | 2005540.494 | 4/14/2022 | 57.241 | 54.28 | 86 | 85 | 71 | 75-85 | 73 | -31.73 | 7/9/2022 | 56.67 | 0.57 |
| NASD Former Fire Station Building 2046 at the Publics Works Area | VWFS-PFAS-MW01 | 232699.4941 | 2005487.602 | 4/20/2022 | 59.964 | 60.15 | 61 | 61 | 47 | 51-61 | 49 | -0.85 | 6/23/2022 | 57.87 | 2.09 |
| | VWFS-PFAS-MW02 | 232726.7585 | 2005513.136 | 4/13/2022 | 59.759 | 59.95 | 68 | 67 | 53 | 57-67 | 55 | -8.05 | 6/22/2022 | 57.75 | 2.01 |
| Potential Former NASD Motor Pool Area | VWMP-PFAS-MW01 | 232869.5503 | 2005682.589 | 3/28/2022 | 48.074 | 45.25 | 53 | 53 | 34.5 | 42-52 | 39.5 | -7.75 | 7/9/2022 | 47.73 | 0.34 |
| | VWMP-PFAS-MW02 | 232827.6948 | 2005717.086 | 4/8/2022 | 41.886 | 42.07 | 50 | 50 | 35 | 39-49 | 37 | -7.93 | 7/9/2022 | 40.58 | 1.31 |
| | VWMP-PFAS-MW03 | 232849.8207 | 2005768.284 | 4/5/2022 | 40.337 | 37.47 | 47 | 47 | 32 | 36-46 | 34 | -9.53 | 7/9/2022 | 39.33 | 1.01 |
| NASD AOC H: Abandoned Powerplant | VWAH-PFAS-MW01 | 233081.8448 | 2006057.086 | 4/21/2022 | 8.864 | 6.31 | 19 | 18 | 4 | 8-18 | 6 | -12.69 | 6/28/2022 | 8.40 | 0.46 |
| | VWAH-PFAS-MW02 | 233081.3883 | 2006074.272 | 4/21/2022 | 7.571 | 4.97 | 16 | 15 | 1 | 5-15 | 3 | -11.03 | 6/28/2022 | 7.12 | 0.45 |
| NASD SWMU 7: Former Quebrada Disposal Site | VWS7-PFAS-MW01 | 231600.9892 | 2005075.812 | 5/19/2022 | 70.970 | 68.30 | 76 | 76 | 61 | 66-76 | 63 | -7.70 | 7/9/2022 | 69.80 | 1.17 |
| VNTR Camp Garcia Runway | VERW-PFAS-MW01 | 243642.7231 | 2004646.134 | 2/24/2022 | 16.552 | 14.17 | 33 | 32 | 18 | 22-32 | 20 | -18.83 | 4/6/2022 | 18.29 | -1.74 |
| | VERW-PFAS-MW02 | 244168.2476 | 2004630.571 | 3/1/2022 | 23.798 | 20.65 | 35 | 35 | 21 | 25-35 | 23 | -14.36 | 4/7/2022 | 23.20 | 0.60 |
| VNTR PI 5: Surface Water Drainage Area from Camp Garcia Runway | VEP5-PFAS-MW01 | 243161.9626 | 2004665.535 | 2/23/2022 | 17.205 | 15.06 | 34 | 34 | 19 | 24-34 | 21 | -18.94 | 4/6/2022 | 19.19 | -1.99 |
| Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330 | VEFS-PFAS-MW01 | 244456.6763 | 2005258.63 | 5/26/2022 | 65.659 | 58.34 | 65 | 65 | 50 | 55-65 | 52.5 | -6.66 | 7/11/2022 | 49.65 | 16.01 |
| | VEFS-PFAS-MW02 | 244455.1732 | 2005214.375 | 5/24/2022 | 62.016 | 62.18 | 67 | 67 | 52 | 57-67 | 54 | -4.82 | 7/11/2022 | 47.92 | 14.10 |
| VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building | VEW10-PFAS-MW01 | 244908.6968 | 2004915.043 | 3/7/2022 | 27.383 | 24.98 | 32 | 32 | 18 | 22-32 | 20 | -7.02 | 4/6/2022 | 26.97 | 0.41 |
| | VEW10-PFAS-MW02 | 245038.5983 | 2004916.476 | 3/9/2022 | 23.589 | 20.46 | 35 | 35 | 21 | 25-35 | 23 | -14.54 | 4/5/2022 | 23.20 | 0.39 |
| | VEW10-PFAS-MW03 | 245043.3138 | 2004736.988 | 3/3/2022 | 15.842 | 12.70 | 35 | 35 | 21 | 25-35 | 23 | -22.30 | 4/5/2022 | 16.39 | -0.55 |
| | VEW10-PFAS-MW04 | 245235.29 | 2004687.524 | 4/2/2022 | 8.746 | 6.14 | 16 | 16 | 2 | 6-16 | 4 | -9.86 | 4/5/2022 | 9.11 | -0.36 |

ft amsl = feet below above mean sea level
ft bgs = feet below ground surface
ft BTOC = feet below top of casing

**TABLE 3-3**
**Summary of Groundwater Sampling Activities**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Monitoring Well ID | Sample ID | Sample Type | Sample Date | Sample Time | Temperature (°C) | DO (mg/L) | Specific Conductance (mS/cm) | pH | ORP (mV) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **NASD AOC B: Former Wastewater Treatment Plant** | | | | | | | | | | | |
| VWAB-PFAS-MW01 | VWAB-PFAS-GW01-0722 | GW | 7/9/2022 | 13:40 | 29.50 | 1.30 | 1.57 | 7.09 | 179.3 | 33.9 | Clear |
| | VWAB-PFAS-GW01P-0722 | GW - Duplicate | 7/9/2022 | 13:45 | | | | | | | |
| | VWAB-PFAS-GW01-0722-MS | GW - MS | 7/9/2022 | 13:40 | | | | | | | |
| | VWAB-PFAS-GW01-0722-MSD | GW - MSD | 7/9/2022 | 13:40 | | | | | | | |
| **NASD Former Fire Station Building 2046 at the Public Works Area** | | | | | | | | | | | |
| VWFS-PFAS-MW01 | VWFS-PFAS-GW01-0622 | GW | 6/23/2022 | 10:30 | 30.20 | 0.83 | 0.91 | 7.14 | 104.80 | 121.00 | Clear |
| | VWFS-PFAS-GW01P-0622 | GW - Duplicate | 6/23/2022 | 10:35 | | | | | | | |
| VWFS-PFAS-MW02 | VWFS-PFAS-GW02-0622 | GW | 6/22/2022 | 16:40 | 29.80 | 2.04 | 1.02 | 6.96 | 157.80 | 63.90 | Clear |
| | VWFS-PFAS-GW02-0622-MS | GW - MS | 6/22/2022 | 16:40 | | | | | | | |
| | VWFS-PFAS-GW02-0622-MSD | GW - MSD | 6/22/2022 | 16:40 | | | | | | | |
| **Potential Former NASD Motor Pool Area** | | | | | | | | | | | |
| VWMP-PFAS-MW01 | VWMP-PFAS-GW01-0722 | GW | 7/9/2022 | 16:35 | 30.30 | 1.38 | 1.23 | 6.54 | 167.10 | 191.00 | Cloudy |
| VWMP-PFAS-MW02 | VWMP-PFAS-GW02-0722 | GW | 7/9/2022 | 18:05 | 30.50 | 0.75 | 1.25 | 6.75 | 197.60 | 1000+ | Brown |
| | VWMP-PFAS-GW02P-0722 | GW - Duplicate | 7/9/2022 | 18:05 | | | | | | | |
| VWMP-PFAS-MW03 | VWMP-PFAS-GW03-0722 | GW | 7/9/2022 | 19:00 | 29.80 | 1.18 | 1.22 | 6.68 | 173.20 | 189.00 | Cloudy |
| | VWMP-PFAS-GW03-0722-MS | GW - MS | 7/9/2022 | 19:00 | | | | | | | |
| | VWMP-PFAS-GW03-0722-MSD | GW - MSD | 7/9/2022 | 19:00 | | | | | | | |
| **NASD AOC H: Abandoned Power Plant** | | | | | | | | | | | |
| VWAH-PFAS-MW01 | VWAH-PFAS-GW01-0622 | GW | 6/28/2022 | 13:20 | 27.40 | 0.10 | 4.37 | 6.91 | 72.70 | 2.46 | Clear |
| | VWAH-PFAS-GW01P-0622 | GW - Duplicate | 6/28/2022 | 13:25 | | | | | | | |
| VWAH-PFAS-MW02 | VWAH-PFAS-GW02-0622 | GW | 6/28/2022 | 14:05 | 27.80 | 0.10 | 10.49 | 6.78 | 111.80 | 5.09 | Clear |
| | VWAH-PFAS-GW02-0622-MS | GW - MS | 6/28/2022 | 14:05 | | | | | | | |
| | VWAH-PFAS-GW02-0622-MSD | GW - MSD | 6/28/2022 | 14:05 | | | | | | | |
| **NASD SWMU 7: Former Quebrada Disposal Site** | | | | | | | | | | | |
| VWS7-PFAS-MW01 | VWS7-PFAS-GW01-0722 | GW | 7/9/2022 | 10:45 | 28.70 | 0.64 | 1.25 | 6.91 | 148.50 | 21.80 | Clear |
| | VWS7-PFAS-GW01-0722-MS | GW - MS | 7/9/2022 | 10:45 | | | | | | | |
| | VWS7-PFAS-GW01-0722-MSD | GW - MSD | 7/9/2022 | 10:45 | | | | | | | |
| | VWS7-PFAS-GW01P-0722 | GW - Duplicate | 7/9/2022 | 10:50 | | | | | | | |
| **VNTR Camp Garcia Runway** | | | | | | | | | | | |
| VERW-PFAS-MW01 | VERW-PFAS-GW01-0422 | GW | 4/6/2022 | 15:25 | 29.90 | 0.20 | 2.99 | 7.09 | 91.90 | 3.20 | Clear |
| VERW-PFAS-MW02 | VERW-PFAS-GW02-0422 | GW | 4/6/2022 | 10:30 | 30.70 | 0.10 | 3.84 | 6.95 | 82.30 | 13.80 | Clear |
| EPI04-MW26 | EPI04-PFAS-GW26-0222 | GW | 2/2/2022 | 10:15 | 30.70 | 1.10 | 26.82 | 6.37 | 88.00 | 1.26 | Clear |
| **PI 5: Surface Water Drainage Area from Camp Garcia Runway** | | | | | | | | | | | |
| VEP5-PFAS-MW01 | VEP5-PFAS-GW01-0422 | GW | 4/6/2022 | 11:45 | 29.20 | 0.10 | 6.75 | 6.92 | 82.50 | 11.00 | Clear |
| **VNTR SWMU 20: Former Helicopter Maintenance Area** | | | | | | | | | | | |
| EPI04-MW01 | VEP4-PFAS-GW01-0222 | GW | 2/8/2022 | 16:40 | 29.00 | 1.20 | 3.46 | 6.74 | 77.30 | 8.10 | Clear |
| | VEP4-PFAS-GW01-0722 | GW Resample | 7/4/2022 | 16:50 | 28.10 | 1.50 | 2.37 | 6.72 | 126.20 | 4.16 | Clear |
| EPI04-MW02 | Well dry not sampled | | | | | | | | | | |
| EPI04-MW03 | VEP4-GW03-0722 | GW | 7/13/2022 | 10:20 | 28.40 | 0.42 | 3.19 | 6.66 | -96.40 | 13.40 | Clear |
| | VEP4-GW03-0722-MS | GW - MS | 7/13/2022 | 10:20 | | | | | | | |
| | VEP4-GW03-0722-MSD | GW - MSD | 7/13/2022 | 10:20 | | | | | | | |
| EPI04-MW04 | VEP4-GW04-0722 | GW | 7/13/2022 | 13:13 | 28.50 | 1.24 | 5.13 | 6.57 | -11.60 | 10.60 | Clear |
| EPI04-MW05 | VEP4-GW05-0722 | GW | 7/12/2022 | 12:12 | 28.80 | 1.57 | 5.74 | 6.65 | 128.60 | 21.60 | Clear |
| EPI04-MW06 | VEP4-PFAS-GW06-0222 | GW | 2/1/2022 | 11:05 | 30.20 | 0.10 | 4.78 | 6.68 | 95.20 | 9.42 | Clear |
| | VEP4-GW06-0722 | GW Resample | 7/12/2022 | 17:55 | 28.80 | 1.57 | 5.74 | 6.65 | 128.60 | 21.60 | Clear |

**TABLE 3-3**
**Summary of Groundwater Sampling Activities**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Monitoring Well ID | Sample ID | Sample Type | Sample Date | Sample Time | Temperature (°C) | DO (mg/L) | Specific Conductance (mS/cm) | pH | ORP (mV) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EPI04-MW07 | VEP4-GW07-0722 | GW | 7/4/2022 | 9:15 | 28.10 | 0.20 | 11.35 | 6.41 | -141.30 | 2.18 | Clear |
| | VEP4-GW07P-0722 | GW - Duplicate | 7/4/2022 | 9:20 | | | | | | | |
| EPI04-MW08 | VEP4-GW08-0722 | GW | 7/11/2022 | 16:45 | 29.00 | 0.26 | 7.20 | 6.58 | 118.30 | 9.01 | Clear |
| EPI04-MW09 | VEP4-GW09-0722 | GW | 7/5/2022 | 16:30 | 28.50 | 0.80 | 3.71 | 6.72 | 147.00 | 2.27 | Clear |
| EPI04-MW10 | VEP4-GW10-0722 | GW | 7/5/2022 | 15:15 | 29.10 | 1.70 | 5.80 | 6.74 | 151.00 | 56.30 | Clear |
| EPI04-MW11 | VEP4-GW11-0722 | GW | 7/12/2022 | 15:20 | 28.50 | 0.88 | 3.87 | 6.60 | 108.60 | 19.10 | Clear |
| EPI04-MW12 | VEP4-GW12-0722 | GW | 7/12/2022 | 16:00 | 28.60 | 0.91 | 7.04 | 6.54 | 15.40 | 6.60 | Clear |
| EPI04-MW13 | VEP4-GW13-0722 | GW | 7/5/2022 | 13:35 | 28.60 | 1.40 | 5.03 | 6.80 | 137.80 | 12.20 | Clear |
| EPI04-MW13D | VEP4-GW13D-0722 | GW | 7/5/2022 | 12:35 | 29.40 | 2.30 | 12.38 | 6.65 | 145.00 | 5.92 | Clear |
| EPI04-MW14 | VEP4-GW14-0722 | GW | 7/5/2022 | 11:16 | 28.70 | 1.00 | 4.10 | 6.77 | 104.60 | 32.90 | Clear |
| | VEP4-GW14P-0722 | GW - Duplicate | 7/5/2022 | 11:18 | | | | | | | |
| EPI04-MW15 | VEP4-PFAS-GW15-0622 | GW | 2/8/2022 | 13:55 | 24.90 | 0.30 | 4.29 | 6.63 | 59.30 | 9.04 | Clear |
| | VEP4-GW15-0622 | GW - Resampled | 6/30/2022 | 14:40 | 28.70 | 0.20 | 3.73 | 6.63 | 75.60 | 1.65 | Clear |
| EPI04-MW16 | VEP4-GW16-0622 | GW | 6/30/2022 | 15:35 | 28.60 | 0.30 | 5.56 | 6.57 | 105.00 | 142.00 | Clear |
| EPI04-MW17 | VEP4-GW17-0622 | GW | 6/30/2022 | 13:30 | 28.30 | 0.40 | 8.49 | 6.54 | -4.30 | 10.00 | Clear |
| EPI04-MW17D | VEP4-GW17D-0622 | GW | 6/30/2022 | 12:15 | 28.80 | 0.40 | 15.13 | 6.35 | 122.60 | 1.38 | Clear |
| EPI04-MW18 | VEP4-GW18-0622 | GW | 6/30/2022 | 10:30 | 28.60 | 0.30 | 9.61 | 6.43 | 112.80 | 77.90 | Cloudy |
| EPI04-MW19 | VEP4-GW19-0722 | GW | 7/4/2022 | 12:30 | 29.90 | 0.80 | 9.47 | 6.39 | 98.30 | 117.00 | Cloudy |
| EPI04-MW20 | VEP4-GW20-0722 | GW | 7/4/2022 | 14:45 | 28.20 | 1.50 | 6.46 | 6.50 | 119.40 | 210.00 | Cloudy |
| EPI04-MW21 | VEP4-GW21-0722 | GW | 7/4/2022 | 15:50 | 28.20 | 0.90 | 3.12 | 6.69 | 117.30 | 4.85 | Clear |
| EPI04-MW22 | VEP4-GW22-0722 | GW | 7/4/2022 | 13:35 | 30.20 | 0.60 | 3.51 | 6.57 | 92.40 | 4.74 | Clear |
| EPI04-MW23 | VEP4-GW23-0722 | GW | 7/1/2022 | 15:05 | 30.60 | 0.20 | 13.00 | 6.47 | 116.40 | 11.80 | Clear |
| EPI04-MW24 | VEP4-GW24-0222 | GW | 2/1/2022 | 13:55 | 31.70 | 0.30 | 12.69 | 6.51 | 100.20 | 8.69 | Clear |
| | VEP4-GW24-0622 | GW - Resampled | 6/29/2022 | 15:05 | 29.50 | 0.70 | 10.27 | 6.69 | 146.60 | 146.00 | Cloudy |
| EPI04-MW24D | VEP4-GW24D-0622 | GW | 6/29/2022 | 13:30 | 29.60 | 0.80 | 11.07 | 6.69 | 123.50 | 12.00 | Clear |
| EPI04-MW25 | VEP4-GW25-0622 | GW | 6/27/2022 | 13:50 | 29.40 | 1.00 | 15.12 | 6.63 | 79.50 | 20.30 | Clear |
| | VEP4-GW25P-0622 | GW - Duplicate | 6/27/2022 | 13:55 | | | | | | | |
| EPI04-MW25D | VEP4-GW25D-0622 | GW | 6/27/2022 | 12:18 | 29.40 | 0.60 | 11.14 | 6.75 | 76.90 | 7.41 | Clear |
| EPI04-MW26 | EPI04-PFAS-GW26-0222 | GW | 2/2/2022 | 10:15 | 30.70 | 1.10 | 26.82 | 6.37 | 88.00 | 1.26 | Clear |
| | VEP4-GW26-0722 | GW | 7/1/2022 | 13:02 | 28.60 | 0.10 | 21.34 | 6.45 | 154.00 | 7.65 | Clear |
| EPI04-MW27 | VEP4-GW27-0722 | GW | 7/1/2022 | 10:52 | 28.20 | 0.10 | 29.15 | 6.47 | 143.70 | 3.99 | Clear |
| EPI04-MW28D | VEP4-GW28D-0622 | GW | 6/29/2022 | 9:10 | 28.70 | 0.10 | 21.67 | 6.75 | 177.50 | 29.50 | Clear |
| EPI04-MW28 | VEP4-GW28-0622 | GW | 6/29/2022 | 10:10 | 28.90 | 0.10 | 17.31 | 6.69 | 188.10 | 0.45 | Clear |
| EPI04-MW29 | VEP4-GW29-0622 | GW | 6/27/2022 | 16:20 | 28.40 | 1.40 | 19.57 | 6.55 | 109.80 | 5.21 | Clear |
| EPI04-MW30 | VEP4-GW30-0722 | GW | 7/1/2022 | 11:55 | 29.10 | 0.40 | 17.07 | 6.41 | 123.20 | 3.83 | Clear |
| | VEP4-GW30P-0722 | GW - Duplicate | 7/1/2022 | 12:00 | | | | | | | |
| EPI04-MW31 | VEP4-GW31-0622 | GW | 6/28/2022 | 16:20 | 29.00 | 1.20 | 16.87 | 6.77 | 536.70 | 9.71 | Clear |
| EPI04-MW32 | VEP4-GW32-0722 | GW | 7/7/2022 | 17:30 | 29.40 | 0.10 | 65.20 | 6.38 | 62.20 | 1.54 | Clear |
| EPI04-MW33 | VEP4-GW33-0722 | GW | 7/7/2022 | 16:30 | 31.10 | 0.10 | 85.50 | 6.06 | -25.80 | 2.58 | Clear |
| **Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330** | | | | | | | | | | | |
| VEFS-PFAS-MW01 | VEFS-PFAS-GW01-0722 | GW | 7/11/2022 | 18:30 | 29.50 | 3.35 | 2.49 | 7.13 | 120.00 | 16.00 | Clear |
| | VEFS-PFAS-GW01P-0722 | GW - Duplicate | 7/11/2022 | 18:35 | | | | | | | |
| VEFS-PFAS-MW02 | VWMP-PFAS-GW02-0722 | GW | 7/11/2022 | 14:55 | 30.20 | 0.82 | 0.84 | 7.08 | 105.20 | 74.50 | Cloudy |
| | VWAB-PFAS-GW02-0722-MS | GW - MS | 7/11/2022 | 14:55 | | | | | | | |
| | VWAB-PFAS-GW02-0722-MSD | GW - MSD | 7/11/2022 | 14:55 | | | | | | | |

**TABLE 3-3**
**Summary of Groundwater Sampling Activities**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Monitoring Well ID | Sample ID | Sample Type | Sample Date | Sample Time | Temperature (°C) | DO (mg/L) | Specific Conductance (mS/cm) | pH | ORP (mV) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building** | | | | | | | | | | | |
| VEW10-PFAS-MW01 | VEW10-PFAS-GW01-0422 | GW | 4/6/2022 | 9:55 | 28.60 | 1.00 | 23.47 | 6.29 | 82.80 | 5.51 | Clear |
| | VEW10-PFAS-GW01P-0422 | GW - Duplicate | 4/6/2022 | 10:00 | | | | | | | |
| VEW10-PFAS-MW02 | VEW10-PFAS-GW02-0422 | GW | 4/5/2022 | 15:15 | 30.40 | 0.10 | 13.65 | 6.94 | -86.50 | 15.90 | Clear |
| | VEW10-PFAS-GW02-0422-MS | GW - MS | 4/5/2022 | 15:15 | | | | | | | |
| | VEW10-PFAS-GW02-0422-MSD | GW - MSD | 4/5/2022 | 15:15 | | | | | | | |
| VEW10-PFAS-MW03 | VEW10-PFAS-GW03-0422 | GW | 4/5/2022 | 11:50 | 30.00 | 0.70 | 12.20 | 7.18 | -39.40 | 1.16 | Clear |
| VEW10-PFAS-MW04 | VEW10-PFAS-GW04-0422 | GW | 4/5/2022 | 9:55 | 29.50 | 0.50 | 32.03 | 6.62 | 79.40 | 6.35 | Clear |
| **VNTR SWMU 1: Former Camp Garcia Municipal Solid Waste Management Unit (Landfill)** | | | | | | | | | | | |
| CGW1MW02 | VEW01-PFAS-MW02-0122 | GW | 1/31/2022 | 12:00 | 28.50 | 0.10 | 5.92 | 6.84 | 64.40 | 4.58 | Clear |
| | VEW01-PFAS-MW02P-0122 | GW - Duplicate | 1/31/2022 | 12:05 | | | | | | | |
| CGW1MW03 | VEW01-PFAS-MW03-0122 | GW | 2/1/2022 | 9:15 | 28.10 | 0.10 | 5.16 | 6.82 | 88.70 | 8.76 | Clear |
| CGW1MW06 | VEW01-PFAS-MW06-0222 | GW | 2/3/2022 | 9:05 | 27.40 | 0.20 | 3.52 | 6.86 | 78.90 | 17.70 | Clear |
| | VEW01-PFAS-MW06-0222-MS | GW - MS | 2/3/2022 | 9:05 | | | | | | | |
| | VEW01-PFAS-MW06-0222-MSD | GW - MSD | 2/3/2022 | 9:05 | | | | | | | |
| CGW1MW08 | VEW01-PFAS-MW08-0122 | GW | 1/31/2022 | 10:30 | 27.70 | 0.10 | 3.81 | 6.86 | -147.10 | 4.78 | Clear |
| CGW1MW10 | VEW01-PFAS-MW10-0122 | GW | 1/31/2022 | 13:40 | 30.40 | 0.10 | 5.85 | 6.80 | 78.20 | 4.12 | Clear |
| CGW1MW11 | VEW01-PFAS-MW11-0122 | GW | 1/31/2022 | 15:05 | 29.60 | 0.10 | 11.51 | 6.67 | 29.80 | 4.80 | Clear |

°C = degrees C
DO = dissolved oxygen
GW = groundwater
mg/L = milligrams per liter
MS = Matrix Spike
MSD = Matrix Spike Duplicate
mS/cm = milliSiemens per centimeter
mV = millivolts
NM = Not Measured
NTU = Nephelometric Turbidity Unit
ORP = oxidation-reduction potential
PFAS = Per- and Polyfluoroalkyl Substances

**TABLE 3-4**
**Summary of Surface Water Sampling Activities**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Monitoring Well ID | Northing | Easting | Sample ID | Sample Type | Sample Date | Sample Time | Temperature (°C) | DO (mg/L) | Specific Conductance (mS/cm) | Salinity (ppt) | pH | ORP (mV) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NASD AOC H: Abandoned Power Plant** | | | | | | | | | | | | | | |
| VWAH-PFAS-SDSW01 | 2006061.22247 | 233075.84009 | VWAH-PFAS-SW01-0222 | SW | 2/3/2022 | 13:10 | 12.53 | 6.14 | 0.17 | 0.10 | 7.02 | 36.00 | 12.30 | Clear |
| | | | VWAH-PFAS-SW01P-0222 | SW - Duplicate | 2/3/2022 | 13:15 | | | | | | | | |
| VWAH-PFAS-SDSW02 | 2006112.04515 | 233069.23932 | VWAH-PFAS-SW02-0222 | SW | 2/3/2022 | 14:55 | 13.05 | 7.03 | 0.32 | 0.20 | 7.06 | 55.00 | 681.00 | Clear |
| | | | VWAH-PFAS-SW02-0222-MS | SW - MS | 2/3/2022 | 14:55 | | | | | | | | |
| | | | VWAH-PFAS-SW02-0222-MSD | SW - MSD | 2/3/2022 | 14:55 | | | | | | | | |
| VWAH-PFAS-SDSW03 | 2006136.53182 | 233055.20331 | VWAH-PFAS-SW03-0222 | SW | 2/3/2022 | 15:20 | 10.72 | 9.72 | 0.37 | 0.20 | 6.16 | 239.00 | 15.50 | Clear |
| **NASD SWMU 6: Former Mangrove Disposal Site** | | | | | | | | | | | | | | |
| VWS6-PFAS-SDSW01 | 2005126.43955 | 228928.92305 | VWS6-PFAS-SW01-0222 | SW | 2/4/2022 | 16:55 | 25.30 | 5.60 | 7.80 | 37.20 | 7.80 | 65.00 | 17.80 | Clear |
| VWS6-PFAS-SDSW02 | 2005089.94351 | 228946.25487 | VWS6-PFAS-SW02-0222 | SW | 2/4/2022 | 9:45 | 25.20 | 3.90 | 7.48 | 38.39 | 7.48 | 138.50 | 31.00 | Cloudy |

°C = degrees C
DO = dissolved oxygen
mg/L = milligrams per liter
MS = Matrix Spike
MSD = Matrix Spike Duplicate
mS/cm = milliSiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Unit
ORP = oxidation-reduction potential
PFAS = Per- and Polyfluoroalkyl Substances
ppt = parts per trillion
SW = surface water

**TABLE 3-5**
**Summary of Sediment Sampling Activities**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Monitoring Well ID | Northing | Easting | Sample ID | Sample Type | Sample Date | Sample Time |
|---|---|---|---|---|---|---|
| **NASD AOC H: Abandoned Power Plant** | | | | | | |
| VWAH-PFAS-SDSW01 | 2006061.22247 | 233075.84009 | VWAH-PFAS-SD01-0006 | SD | 2/3/2022 | 13:20 |
| | | | VWAH-PFAS-SD01P-0006 | SD - Duplicate | 2/3/2022 | 13:25 |
| VWAH-PFAS-SDSW02 | 2006112.04515 | 233069.23932 | VWAH-PFAS-SD02-0006 | SD | 2/3/2022 | 15:00 |
| | | | VWAH-PFAS-SD02-0006-MS | SD - MS | 2/3/2022 | 15:00 |
| | | | VWAH-PFAS-SD02-0006-MSD | SD - MSD | 2/3/2022 | 15:00 |
| VWAH-PFAS-SDSW03 | 2006136.53182 | 233055.20331 | VWAH-PFAS-SW03-0006 | SD | 2/3/2022 | 15:20 |
| **NASD SWMU 6: Former Mangrove Disposal Site** | | | | | | |
| VWS6-PFAS-SDSW01 | 2005126.43955 | 228928.92305 | VWS6-PFAS-SW01-0222 | SD | 2/4/2022 | 16:55 |
| VWS6-PFAS-SDSW02 | 2005089.94351 | 228946.25487 | VWS6-PFAS-SW02-0222 | SD | 2/4/2022 | 9:45 |

GPS Coordinates are in NAD83 and UTM 20 N
MS = Matrix Spike
MSD = Matrix Spike Duplicate
PFAS = Per- and Polyfluoroalkyl Substances
SD = sediment

SECTION 4

# Investigation Results and Evaluation

This section presents the CSMs, sampling results, data evaluation, HHRS results, and recommended paths forward for the 13 potential PFAS release areas; SWMU 10 and AOC G are counted as separate potential release areas but were included as a single entity for investigation due to their close proximity and association with each together. This section is organized into two geographical areas: the former NASD area, and the former VNTR area.

The CSMs were updated with information obtained during this SI and include description and operational history, the SI approach, site-specific lithology, groundwater flow directions (where applicable), data evaluation, the HHRS findings, conclusions, and recommendations.

In accordance with the Final SI SAP and as shown in Section 3.11, all samples were analyzed for 18 PFAS. At the time of the SAP preparation, there were RSLs only for PFOA, PFOS, and PFBS. At the time the Draft SI Report was prepared, the current EPA RSLs were the November 2022 RSLs for PFOA, PFOS, PFBS, PFNA, PFHxS, and HFPO-DA. Therefore, the SI analytical results were screened against EPA November 2022 residential tap water and/or residential soil RSLs (HQ = 0.1) for PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA in the Draft SI Report. Subsequent to preparing the Draft SI Report, EPA established an RSL in May 2023 for one additional PFAS (PFHxA) included in the SI analytical suite and one additional PFAS (PFBA) not included in the SI analytical suite; the RSLs for the six PFAS with RSLs when the draft version was being prepared remained unchanged in the May 2023 RSLs.

As standard practice for Vieques reports, the RSLs current at the time of draft document preparation are those used in the report preparation. If newer RSLs are then released between the draft and draft final preparation and/or between the draft final and final preparation, the newer RSLs are compared to the RSLs used in the report and if newer RSLs differ from the ones used in the report, a discussion is added that summarizes any impact on screening results, data evaluation, conclusions, and recommendations. Therefore, this standard practice was applied to PFHxA.

At an HQ = 0.1, the May 2023 RSLs for PFHxA are 3,200 ng/g (soil) and 990 ng/L (tap water). When site-specific PFHxA concentrations are compared to these RSLs, groundwater concentrations at NASD Former Fire Station Building 2046 at the Public Works Area and the Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330 represent the only exceedances. These two sites were already recommended for a RI in the Draft SI Report based on the concentrations of other PFAS, so the additional information regarding PFHxA RSL exceedances does not alter the recommended path forward for these sites. Because there were no exceedances of the PFHxA RSLs at any of the other sites, there is no impact on the path forward recommendations for those sites. In addition, although PFBA was not included in the SI analytical suite, at the numerous sites where the Navy has collected PFBA data, there have not been instances where the analytical results exceeded the RSL for PFBA but did not exceed for any of the other PFAS. Therefore, PFBA data would have been unlikely to change any of the report conclusions.

## 4.1 Former NASD

### 4.1.1 NASD AOC B: Former Wastewater Treatment Plant at the Public Works Area

Surface (0 to 1 foot bgs) and subsurface soil (4 to 6 feet bgs) samples were collected from the approximate center of each of the four unlined evaporation/percolation cells at the former WWTP lagoon. Since groundwater occurred within bedrock, no deep subsurface soil samples were collected. Groundwater was collected from one newly installed monitoring well located immediately to the northwest (downgradient) of the former WWTP lagoon. Results of the six PFAS with RSLs (HFPO-DA, PFBS, PFHxS, PFNA, PFOS, PFOA) are presented on Figure 4-1 and summarized in Tables 4-1 through 4-3.

#### Conceptual Site Model

Table 4-4 provides the summary of the CSM of NASD AOC B.

**Table 4-4. NASD AOC B: Former Wastewater Treatment Plant at the Public Works Area Conceptual Site Model**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Description and Operational History and Potential for PFAS Release | • AOC B, the Former WWTP, is located 330 feet northwest of the former fire station within the former main support compound. It was a prefabricated WWTP with four shallow no-discharge basins located just northwest of Building 2030. It served the officers' quarters and other administrative buildings for municipal-type sewage discharges at the former NASD from 1983 until 2000. The former clarifier within Building 2030 consisted of one aeration tank and one separation tank with two blowers to supply the air for the biological treatment. The WWTP is no longer operational, and the area is now overgrown with a mixture of dense vegetation and open grassy field with sparse trees.<br>• Discharge from the WWTP drained into the four unlined, no-discharge lagoons, and sludge from the WWTP was pumped to a vacuum truck for offsite disposal. No wastewater leaks were observed from the lagoon dikes during the Environmental Baseline Survey. Investigations were conducted from 2000 to 2002, at which time results indicated the site warranted no further investigation/action.<br>• No historical information has been found regarding a release of AFFF or other PFAS-containing substances into or at the former WWTP. However, because AOC B was operational from 1983 through 2000, a timeframe when Navy use of AFFF and other PFAS-containing materials was occurring (though not necessarily on Vieques), if AFFF and/or other PFAS-containing substances were used, it is possible they may have ultimately been present in the AOC B WWTP influent. | | | | | | | | | |
| SI Approach | • Four surface soil samples were collected at four locations from 0 to 1 foot bgs<br>• Four subsurface soil samples were collected at four locations from 4 to 6 feet bgs<br>• No deep subsurface soil samples were collected since groundwater occurs in bedrock<br>• One groundwater sample was collected from the newly installed monitoring well screened from 75 to 85 feet bgs. | | | | | | | | | |
| Sample Stations (Figure 4-1) | VWAB-PFAS-SO01, VWAB-PFAS-SO02, VWAB-PFAS-SO03, VWAB-PFAS-SO04, VWAB-MW01 | | | | | | | | | |
| Site Lithology | The lithology beneath the area is underlain by a silty sand, transitioning to a lean clay at 28 feet bgs, then bedrock (granodiorite) at 42 feet bgs. | | | | | | | | | |
| Groundwater Flow Direction | Based on water-level data collected in the wells at AOC B and the Former NASD Fire Station, as well as multiple years of water-level data collected at nearby AOC E, groundwater flow is generally north-northwest toward the Caribbean Sea. Groundwater is not currently used as a drinking water source at the former NASD or by the residents of Vieques and there are no known private wells used for drinking water purposes. Potable water for the island population is supplied via a pipeline from the Rio Blanco filtration plant in eastern Puerto Rico. | | | | | | | | | |
| SI Results Compared to Screening Levels | Analyte | SS | | | SB | | | GW | | |
| | | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/L) |
| | PFOA | 4/4 | 0/4 | 1.65 | 0/4 | 0/4 | ND | 1/1 | 1/1 | 93.4 |
| | PFOS | 4/4 | 2/4 | 32.2 | 4/4 | 0/4 | 8.83 | 1/1 | 1/1 | 83.3 |
| | PFBS | 0/4 | 0/4 | ND | 0/4 | 0/4 | ND | 1/1 | 0/1 | 37.2 |
| | PFHxS | 1/4 | 0/4 | 0.182 J | 0/4 | 0/4 | ND | 1/1 | 1/1 | 197 |

**Table 4-4. NASD AOC B: Former Wastewater Treatment Plant at the Public Works Area Conceptual Site Model**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | PFNA | 3/4 | 0/4 | 0.705 J | 0/4 | 0/4 | ND | 1/1 | 0/1 | 1.85 J |
| | HFPO-DA | 0/4 | 0/4 | ND | 0/4 | 0/4 | ND | 0/1 | 0/1 | ND |
| Results Summary, HHRS Findings, Conclusions, and Recommendations | For surface soil, PFOA, PFOS, PFHxS, and PFNA were detected, with only PFOS being detected above the RSL. For subsurface soil, concentrations of PFOS were detected but were below the RSL. For groundwater, PFOA, PFOS, PFBS, PFHxS, and PFNA were detected and concentrations of PFOA, PFOS, and PFHxS were above the RSLs. Based on the RSL exceedances, AOC B is recommended for an RI.<br>For additional perspective regarding the RSL exceedances, an HHRS was conducted. Results of the HHRS indicate the potential for unacceptable risk based on PFOS and PFOA concentrations in groundwater.<br>Based on the conceptual understanding of operational history and potential PFAS release mechanisms associated with AOC B, the particular PFAS detected (and their concentrations) in soil and groundwater at AOC B, other potential PFAS release areas within the Public Works Area, and the likely direction of groundwater flow, it is possible PFAS detected in AOC B groundwater are, at least in part, attributable to historic PFAS releases associated with the Former Fire Station, which is located less than 300 feet in the assumed upgradient direction from AOC B. Because of this potential interrelationship, it is recommended the RI jointly consider both AOC B and the Former Fire Station in developing an approach that provides a comprehensive understanding of PFAS nature and extent in the combined area. | | | | | | | | | |

## Surface and Subsurface Soil Analytical Results

- Surface and subsurface soil samples were collected from the approximate center of each of the four unlined evaporation/percolation cells at the former WWTP lagoon.
- PFOS was detected in the surface (0 to 1 foot bgs) and subsurface soil (4 to 6 feet bgs) at all four locations; only VWAB-PFAS-SO01 and VWAB-PFAS-SO02 contained PFOS concentrations above the RSL (13 nanograms per gram [ng/g]), with concentrations of 32.2 ng/g and 24.8 ng/g, respectively. PFOS concentrations at VWAB-PFAS-SO03 and VWAB-PFAS-SO04 were 5.91 ng/g and 7.85 ng/g, respectively, below the RSL (13 ng/g). PFOS was also detected in subsurface soil (4 to 6 feet bgs) at all four locations with a maximum concentration of 8.83 ng/g, below the RSL (13 ng/g).
- PFOA, PFHxS, and PFNA were detected in four, one, and three surface soil locations (maximum concentrations of 1.65 ng/g, 0.182 J ng/g, and 0.705 J ng/g), respectively, at least an order of magnitude below their respective RSLs (19 ng/g, 130 ng/g, and 19 ng/g); PFOA, PFHxS, and PFNA were not detected in subsurface soil.
- PFBS and HFPO-DA were not detected in soil.

## Groundwater Analytical Results

- One monitoring well (VWAB-PFAS-MW01) was installed at the northwest side (downgradient) of the former lagoon within the first encountered saturated zone within bedrock (75 to 85 feet bgs); bedrock occurred at a depth of 42 feet bgs.
- PFOA, PFOS, and PFHxS were detected in groundwater at VWAB-PFAS-MW01 at concentrations of 93.4 nanograms per liter (ng/L), 83.3 ng/L, and 197 ng/L, respectively, approximately an order of magnitude or more above their respective RSLs (6 ng/L, 4 ng/L, and 39 ng/L).
- PFBS and PFNA were detected in groundwater at concentrations of 37.2 ng/L and 1.85 J ng/L, respectively, below their respective RSLs (600 ng/L and 5.9 ng/L).
- HFPO-DA was not detected in groundwater.

### Human Health Risk Screening

An HHRS was conducted because concentrations of one or more PFAS exceed RSLs. Results of the HHRS indicate the potential for unacceptable risk based on PFOS and PFOA concentrations in groundwater (Appendix I).

### Area Summary and Path Forward

PFAS was detected in groundwater at concentrations above RSLs; therefore, AOC B is recommended for an RI. Further, the HHRS indicates the potential for unacceptable risk. Of note, soil results from the former lagoon suggest that historic discharge from the former WWTP into the lagoons may have been the potential source of PFAS release to groundwater; however, the upgradient NASD Former Fire Station 2046 at the Public Works Area may also have been a potential source, as discussed in Section 4.1.2.

## 4.1.2 NASD Former Fire Station Building 2046 at the Public Works Area

As shown in photographs in Appendix A, Crab Island Distillery constructed a new patio that required sample locations to be adjusted. EPA, Puerto Rico Department of Natural and Environmental Resources (PRDNER), and USFWS concurred on the new locations during a site visit. One soil sample location adjacent to the former location of the conex container (VWFS-PFAS-SO02) was moved approximately 20 feet to the southwest; three soil sample locations adjacent to the fire house were moved approximately 60 feet to the northwest; and one monitoring well (VWFS-PFAS-MW02) was moved approximately 60 feet to the north. Note: the proposed sample locations are shown in Section 2 and the revised sample locations are shown in Section 4.

As modified in accordance with the previous paragraph, two surface (0 to 1 foot bgs) and subsurface (4 to 6 feet bgs) soil samples were collected at the former conex container location (VWFS-PFAS-SO01 and VWFS-PFAS-SO02). One surface (0 to 1 foot bgs) and one subsurface soil (4 to 6 feet bgs) sample were also collected on each of the three sides of the former fire station (VWFS-PFAS-SO03, VWFS-PFAS-SO04, and VWFS-PFAS-SO05). One deeper subsurface soil sample (58 to 60 feet bgs) was also collected at VWFS-PFAS-SO05 at the soil/water interface since the bedrock was highly weathered in this area. Deeper subsurface soil samples were not collected at the other locations as first encountered groundwater occurred within the bedrock. Groundwater was collected from two newly installed monitoring wells, with VWFS-PFAS-MW01 located downgradient from the former conex container and VWFS-PFAS-MW02 located downgradient of the former fire station. Results of the six PFAS with RSLs (HFPO-DA, PFBS, PFHxS, PFNA, PFOS, PFOA) are presented on Figure 4-2 and summarized in Tables 4-5 through 4-7.

### Conceptual Site Model

Table 4-8 provides the summary of the CSM of NASD Former Fire Station Building 2046 at the Public Works Area.

**Table 4-8. NASD Former Fire Station Building 2046 at the Public Works Area Conceptual Site Model**

| | |
|---|---|
| Description and Operational History and Potential for PFAS Release | • The NASD Former Fire Station (Building 2046) is located within the southwestern portion of the MOV Public Works Compound. Construction of Building 2046 was completed in 1972 and it was utilized as a fire station until the former NASD was decommissioned in 2000. The building included living quarters, bathrooms, laundry, and vehicle storage. The bathrooms were plumbed directly into the WWTP (AOC B). The building is now used as a rum distillery with an adjacent concession stand.<br>• Interview indicates that approximately 50 gallons of AFFF had been stored on each of two fire trucks, with AFFF concentrate stored in 5-gallon containers in an onsite conex container located about 100 feet west of the fire station. AFFF was put into the fire trucks by pumping, pouring or by induction pump on the ramp of the fire station; fire trucks were also washed on this ramp. Once a month the fire trucks tanks containing AFFF were cleaned, and the pump tests were performed once a year; however, no foam (AFFF) was used for pump testing.<br>• No historical information has been found that provides definitive evidence of a release of AFFF or other PFAS-containing substances at the former fire station. However, information obtained during an interview suggest there is the potential AFFF was released to the environment in this area, and given likely truck cleaning procedures, and that no disposal records for AFFF were |

**Table 4-8. NASD Former Fire Station Building 2046 at the Public Works Area Conceptual Site Model**

| | |
|---|---|
| | identified, it is likely flushing occurred onto the ramp during cleaning. Additionally, spillage could have occurred during transfer of AFFF. |
| SI Approach | • Five surface soil samples were collected at five locations from 0 to 1 foot bgs.<br>• Six subsurface soil samples were collected; five locations from 4 to 6 feet bgs and one location from 58 to 60 feet bgs (exact depth of competent bedrock was difficult to distinguish at this location due to high amounts of weathering).<br>• Two groundwater samples were collected from two newly installed monitoring wells with screen intervals from 51 to 61 and 57 to 67 feet bgs. |
| Sample Stations (Figure 4-2) | VWFS-PFAS-SO01, VWFS-PFAS-SO02, VWFS-PFAS-SO03, VWFS-PFAS-SO04, VWFS-PFAS-SO05, VWFS-MW01, VWFS-MW02 |
| Site Lithology | The lithology beneath the area is underlain by an unconsolidated clay and sandy clay, with a 5 to 15-foot-thick bed of material ranging from silt to coarse sand; bedrock (granodiorite) generally occurred at ~50 feet bgs. |
| Groundwater Flow Direction | Based on water-level data collected in the wells at AOC B and the Former NASD Fire Station, as well as multiple years of water-level data collected at nearby AOC E, groundwater flow is to the north-northwest toward the Vieques Passage. Groundwater is not currently used as a drinking water source at the former NASD or by the residents of Vieques and there are no known private wells used for drinking water purposes. Potable water for the island population is supplied via a pipeline from the Rio Blanco filtration plant in eastern Puerto Rico. |

SI Results Compared to Screening Levels

| Analyte | SS | | | SB | | | GW | | |
|---|---|---|---|---|---|---|---|---|---|
| | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/L) |
| PFOA | 3/5 | 0/5 | 0.587 J | 2/6 | 0/6 | 0.362 J | 2/2 | 2/2 | 29,700 J |
| PFOS | 5/5 | 3/5 | 69.4 J | 5/6 | 3/6 | 104 | 2/2 | 2/2 | 4,530 |
| PFBS | 0/5 | 0/5 | ND | 0/6 | 0/6 | ND | 2/2 | 2/2 | 68,700 |
| PFHxS | 3/5 | 0/5 | 1.39 | 2/6 | 0/6 | 2.87 | 2/2 | 2/2 | 175,000 |
| PFNA | 3/5 | 0/5 | 0.858 J | 2/6 | 0/6 | 3.55 | 1/2 | 1/2 | 72.8 |
| HFPO-DA | 0/5 | 0/5 | ND | 0/6 | 0/6 | ND | 0/2 | 0/2 | ND |

| | |
|---|---|
| Results Summary, HHRS Findings, Conclusions, and Recommendations | For surface and subsurface soil, PFOA, PFOS, PFHxS, and PFNA were detected, with only PFOS being detected at concentrations above the RSL. For groundwater, PFOA, PFOS, PFBS, PFHxS, and PFNA were detected at concentrations above the RSLs. Based on the RSL exceedances, the NASD Former Fire Station area is recommended for an RI.<br>For additional perspective regarding the RSL exceedances, an HHRS was conducted. Results of the HHRS indicate the potential for unacceptable risk based on PFBS, PFHxS, PFNA, PFOS, and PFOA concentrations in groundwater.<br>The distribution and concentrations of PFAS in soil and groundwater at and around the Former Fire Station building/conex box and the absence of other potential PFAS release areas upgradient of the Former Fire Station (as documented in the PFAS PA Report [CH2M, 2020]), support the conceptual assumption that the Former Fire Station/conex box is the source area for the PFAS detected in the associated media. Further, as noted in Section 4.1.1 and Table 4-1, PFAS release(s) in this area may be responsible, at least in part, for the PFAS detected in groundwater at AOC B and, therefore, it is |

**Table 4-8. NASD Former Fire Station Building 2046 at the Public Works Area Conceptual Site Model**

| | |
|---|---|
| | recommended the RI jointly consider both AOC B and the Former Fire Station in developing an approach that provides a comprehensive understanding of PFAS nature and extent in the combined area. |

## Surface and Subsurface Soil Analytical Results

- Surface and subsurface soil samples were collected at the former conex container location (VWFS-PFAS-SO01 and VWFS-PFAS-SO02) and on each of the three sides of the former fire station (VWFS-PFAS-SO03, VWFS-PFAS-SO04, and VWFS-PFAS-SO05). One deeper subsurface soil (58 to 60 feet bgs) was also collected at VWFS-PFAS-SO05.
- PFOS was detected in the surface and subsurface soil at all five locations with concentrations exceeding the RSL (13 ng/g) at three locations (VWFS-PFAS-SO01, VWFS-PFAS-SO02, and VWFS-PFAS-SO04) at a maximum concentration of 104 ng/g (4 to 6 feet bgs at VWFS-PFAS-SO04). Higher PFOS concentrations in soil were observed near the location of the former conex container that stored AFFF solution and in the grass field further from the former fire station; soil samples nearest to the former fire station had PFOS detections below the RSL.
- PFOA, PFHxS, and PFNA were detected in surface and subsurface soil (maximum concentrations of 0.587 J ng/g, 1.39 ng/g, and 0.858 J ng/g), below their respective RSLs (19 ng/g, 130 ng/g, and 19 ng/g).
- PFBS and HFPO-DA were not detected in soil.

## Groundwater Analytical Results

- Two monitoring wells (VWFS-PFAS-MW01 and VWFS-PFAS-MW02) were installed at the northwest side (downgradient) of the possible location of the conex container that stored AFF solution and the former fire station within the first encountered saturated zone within bedrock (51 to 61 and 57 to 67 feet bgs, respectively); bedrock occurred at ~50 feet bgs.
- Groundwater concentrations exceed the RSLs at both wells (VWFS-MW01 and VWFS-MW02) for PFOA (6 ng/L), PFOS (4 ng/L), PFBS (600 ng/L), and PFHxS (39 ng/L). PFOA was detected at concentrations of 247 ng/L and 29,700 J ng/L; PFOS at 36.9 ng/L and 4,530 ng/L; PFBS at 68,700 ng/L and 6,610 ng/L; and PFHxS at 175,000 ng/L and 104,000 ng/L, respectively. The highest PFOA, PFOS, and PFNA concentrations in groundwater were observed downgradient of the fire station; the highest PFBS and PFHxS concentrations were located downgradient of the former conex container location.
- PFNA was detected only at VWFS-PFAS-MW02; its detected concentration of 72.8 ng/L exceeds the screening level of 5.9 ng/L.
- HFPO-DA was not detected in groundwater.

## Human Health Risk Screening

An HHRS was conducted because concentrations of one or more PFAS exceed RSLs. Results of the HHRS indicate the potential for unacceptable risk based on concentrations of PFBS, PFHxS, PFNA, PFOS, and PFOA in groundwater (Appendix I).

## Area Summary and Path Forward

PFAS was detected in groundwater at concentrations above RSLs; therefore, NASD Former Fire Station Building 2046 at the Public Works Area is recommended for an RI. Further, the HHRS indicates the potential for unacceptable risk. Of note, soil and groundwater results suggest that the area surrounding the former conex container that stored AFFF solution and the former fire station are likely potential source areas for PFAS to groundwater.

### 4.1.3 Potential Former NASD Motor Pool Area

Surface (0 to 1 foot bgs) and subsurface soil (4 to 6 and ranging from 44 to 50 feet bgs) samples were collected from four locations adjacent to the former wash rack where fire trucks may have been washed. Groundwater was collected from three newly installed monitoring wells located immediately downgradient of the former wash rack and at the downgradient edge of the former motor pool area. Results of the six PFAS with RSLs (HFPO-DA, PFBS, PFHxS, PFNA, PFOS, PFOA) are presented on Figure 4-3 and summarized in Tables 4-9 through 4-11.

#### Conceptual Site Model

Table 4-12 provides the summary of the CSM of Potential Former NASD Motor Pool Area.

**Table 4-12. Potential Former NASD Motor Pool Area Conceptual Site Model**

| | |
|---|---|
| Description and Operational History and Potential for PFAS Release | • The potential former NASD Motor Pool Area is located within the former main support compound, now within the eastern-most area of the MOV Public Works compound. The area is currently used as a motor pool operated by the MOV for its government vehicles.<br>• Interview indicates that the site was utilized as a vehicle maintenance area for NASD fire trucks and other vehicles.<br>• No historical information has been found regarding definitive evidence of a release of AFFF or other PFAS-containing substances at the potential former NASD motor pool. However, vehicle maintenance activities, including maintenance on the NASD fire trucks did occur, and since AFFF was stored on each of two fire trucks stationed at the fire station, a release of AFFF could have occurred if AFFF was aboard the fire trucks while maintenance was being performed at the motor pool. Further, if the vehicle wash rack at the potential former motor pool was used to wash the fire trucks, residual AFFF may have been washed off the trucks to the surrounding ground surface. |
| SI Approach | • Four surface soil samples were collected at four locations from 0-1 foot bgs.<br>• Eight subsurface soil samples were collected at four locations with two depth intervals: from 4 to 6 feet bgs and deeper intervals ranging from 44 to 50 feet bgs.<br>• Three groundwater samples were collected from three newly installed monitoring wells screened from 42 to 52, 39 to 49, and 36 to 46 feet bgs. |
| Sample Stations (Figure 4-3) | VWMP-PFAS-SO01, VWMP-PFAS-SO02, VWMP-PFAS-SO03, VWMP-PFAS-SO04, VWMP-PFAS-MW01, VWMP-PFAS-MW02, VWMP-PFAS-MW03 |
| Site Lithology | The lithology beneath the area is underlain by unconsolidated clay and sandy clay, with a 5- to 15-foot-thick bed of material ranging from silt to coarse sand, and a clay-rich saprolite at a depth of ~40 feet bgs. |
| Groundwater Flow Direction | Recognizing some uncertainty due to a suspect water-level measurement in one of the Potential Former NASD Motor Pool Area, based on water-level data collected in the wells at AOC B, the Former NASD Fire Station, the Potential Former NASD Motor Pool Area, as well as multiple years of water-level data collected at nearby AOC E, groundwater flow is to the north-northwest toward the Vieques Passage. Groundwater is not currently used as a drinking water source at the former NASD or by the residents of Vieques and there are no known private wells used for drinking water purposes. Potable water for the island population is supplied via a pipeline from the Rio Blanco filtration plant in eastern Puerto Rico. |

**Table 4-12. Potential Former NASD Motor Pool Area Conceptual Site Model**

| | Analyte | SS | | | SB | | | GW | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/L) |
| SI Results Compared to Screening Levels | PFOA | 1/4 | 0/4 | 1.61 J | 1/8 | 0/8 | 0.302 J | 3/3 | 2/3 | 19.7 |
| | PFOS | 4/4 | 0/4 | 1.01 J | 0/8 | 0/8 | ND | 3/3 | 2/3 | 96.3 |
| | PFBS | 0/4 | 0/4 | ND | 0/8 | 0/8 | ND | 3/3 | 0/3 | 8.06 |
| | PFHxS | 0/4 | 0/4 | ND | 0/8 | 0/8 | ND | 2/3 | 1/3 | 71.5 |
| | PFNA | 0/4 | 0/4 | ND | 0/8 | 0/8 | ND | 0/3 | 0/3 | ND |
| | HFPO-DA | 0/4 | 0/4 | ND | 0/8 | 0/8 | ND | 0/3 | 0/3 | ND |
| Results Summary, HHRS Findings, Conclusions, and Recommendations | For surface soil, PFOA and PFOS were both detected at concentrations below the RSL. For subsurface soil, PFOA was detected at one location, but its concentration was below the RSL. For groundwater, PFOA, PFOS, PFBS, and PFHxS were detected; however, only PFOA, PFOS, and PFHxS were detected at concentrations above the RSLs. Based on the RSL exceedances, the Potential Former NASD Motor Pool Area is recommended for an RI.<br>For additional perspective regarding the RSL exceedances, an HHRS was conducted. Results of the HHRS indicate the potential for unacceptable risk based on PFOS and PFOA concentrations in groundwater.<br>The distribution and concentrations of PFAS in soil and groundwater at and around the Potential Former NASD Motor Pool Area and the absence of other potential PFAS release areas in the assumed upgradient direction from this area (as documented in the PFAS PA Report [CH2M, 2020]), support the conceptual assumption that the Former NASD Motor Pool Area is the source area for the PFAS detected in its associated media. However, groundwater flow direction within this area is based primarily on historical water-level data collected at nearby AOC E, which indicates groundwater flow in this area is toward the northwest. Recognizing there is some uncertainty in assuming this flow direction is applicable to the various PFAS investigation areas within the Public Works compound, it is recommended to evaluate the potential for PFAS release(s) associated with the Former Fire Station to be responsible, at least in part, for the PFAS detected in groundwater at the Potential Former NASD Motor Pool Area when designing the RI groundwater characterization approach. | | | | | | | | | |

## Surface and Subsurface Soil Analytical Results

- Surface and subsurface soil samples were collected from four locations, adjacent to the former wash rack.

Only PFOA and PFOS were detected in surface and/or subsurface soil with maximum concentrations of 1.61 J (VWMP-PFAS-SO02) and 1.01J (VWMP-PFAS-SO04) ng/g, but at concentrations an order of magnitude below their respective RSLs (19 and 13 ng/g).

- PFBS, HFPO-DA, PFHxS, and PFNA were not detected in soil.

## Groundwater Analytical Results

- One monitoring well (VWMP-PFAS-MW01) was installed adjacent to the former wash rack within saprolite (screened from 42 to 52 feet bgs); two monitoring wells (VWMP-PFAS-MW02 and VWMP-PFAS-MW03) were installed downgradient of the former motor pool within saprolite (screened from 39 to 49 and 36 to 46 feet bgs, respectively).

- PFOA, PFOS, and PFHxS were detected in groundwater above their respective RSLs. PFOA and PFOS concentrations exceed their RSLs (6 ng/L and 4 ng/L, respectively) at the two monitoring wells downgradient of the former motor pool area with maximum concentrations of 19.7 and 96.3 ng/L respectively (both at VWMP-PFAS-MW02). The PFHxS concentration exceeds the RSL (39 ng/L) at one monitoring well (VWMP-PFAS-MW03) downgradient of the former motor pool area with a concentration of 71.5 ng/L. At VWMP-PFAS-MW01, located adjacent to the former wash rack, PFOA and PFOS were detected at concentrations (4.8 J ng/L and 1.65 J ng/L, respectively) below their respective RSLs and PFHxS was not detected.
- PFBS was detected at all three monitoring wells, but at concentrations below the RSL (600 ng/L), with a maximum concentration of 8.06 ng/L (VWMP-PFAS-MW03).
- HFPO-DA and PFNA were not detected in groundwater.

### Human Health Risk Screening

An HHRS was conducted because concentrations of one or more PFAS exceed RSLs. Results of the HHRS indicate the potential for unacceptable risk based on groundwater concentrations of PFOS and PFOA (Appendix I).

### Area Summary and Path Forward

PFOA, PFOS, and PFHxS were detected in groundwater at concentrations above the RSLs ; therefore, the Potential Former NASD Motor Pool Area is recommended for an RI. Further, the HHRS indicates the potential for unacceptable risk. Of note, groundwater results suggest the former motor pool area may be a potential source area for release of PFAS. However, because of some uncertainty in the groundwater flow direction in this area, considering the possibility of the Former Fire Station being a potential source area for groundwater PFAS at the Potential Former NASD Motor Pool Area is recommended during development of the RI groundwater characterization approach.

## 4.1.4 NASD AOC H: Abandoned power Plant/Former Fire Training Area

Surface (0 to 2 feet bgs) and subsurface soil (4 to 6 and ranging from 7 to 10 feet bgs) samples were collected from four locations, positioned around the perimeter of the building where potentially water used for fire extinguishing would be expected to exit through the abandoned building openings to the surrounding soil. Surface soil samples were collected from 0 to 2 feet bgs due to the land crab habitat adjacent to the building. Groundwater was collected from two newly installed monitoring wells located immediately downgradient of the building. Sediment and surface water samples were collected from three locations within the ephemeral stream, from locations immediately adjacent to the building and downstream. Results of the six PFAS with RSLs (HFPO-DA, PFBS, PFHxS, PFNA, PFOS, PFOA) are presented on Figure 4-4 and summarized in Tables 4-13 through 4-17.

### Conceptual Site Model

Table 4-18 provides the summary of the CSM of Potential Former NASD AOC H.

**Table 4-18. NASD AOC H: Abandoned Power Plant/Former Fire Training Area Conceptual Site Model**

| | |
|---|---|
| Description and Operational History and Potential for PFAS Release | • AOC H, the Abandoned Power Plant, is located approximately 200 feet east of the entrance to the MOV Public Works Area, just north of Highway 200 and south of the Vieques Passage and consists of an abandoned concrete building (Building 13). From 1941 to 1943 power generation equipment was stored in and around Building 13, including large diesel generators. After 1943, the building was vacant until the 1960s when its use for fire training operations began. Fire training operations consisted of the use of diesel fuel, which was poured over rubber tires inside the building and ignited to simulate structural fires and extinguished during training operations. Fire training activities ceased in the 1980s and the power generation equipment is no longer present at the site.<br>• Site investigations were conducted between 2000 and 2007, resulting in a no further investigation/action designation. A No Action Record of Decision was approved for the site in 2008.<br>• No historical information has been found providing definitive evidence of a release of AFFF or other PFAS-containing substances at AOC H. However, because AFFF was reportedly stored on firetrucks stationed at the former NASD Fire Station and firefighting training was conducted in the abandoned |

**Table 4-18. NASD AOC H: Abandoned Power Plant/Former Fire Training Area Conceptual Site Model**

| | |
|---|---|
| | power plant building during the period when AFFF could have been in use (i.e., 1970s and 1980s), releases of AFFF could have occurred at AOC H during these training activities. |
| SI Approach | • Four surface soil samples were collected at four locations ranging from 0 to 2 feet bgs.<br>• Seven subsurface soil samples were collected at four locations from two depth intervals: 4 to 6 feet bgs at four locations and ranging from 7 to 10 feet bgs from three locations; at one location, groundwater was encountered at approximately 6 feet bgs.<br>• Two groundwater samples were collected from two newly installed monitoring wells screened from 8 to 18 and 5 to 15 feet bgs.<br>• Three co-located sediment and surface water samples were collected from three locations. |
| Sample Stations (Figure 4-4) | VWAH-PFAS-SO01, VWAH-PFAS-SO02, VWAH-PFAS-SO03, VWAH-PFAS-SO04, VWAH-PFAS-SDSW01, VWAH-PFAS-SDSW02, VWAH-PFAS-SDSW03, VWAH-PFAS-MW01, VWAH-PFAS-MW02 |
| Site Lithology | The lithology beneath the area consists of unconsolidated clay, silt, sand, and gravel to a depth of ~20 feet bgs. |
| Groundwater Flow Direction | Based on water-level data collected from monitoring wells during the 2003 RI and supported by water-level data collected during the PFAS SI, groundwater flow is predominantly to the north toward the Vieques Passage. However, at the western part of the site groundwater may flow locally to the west toward the ephemeral stream. Groundwater is not currently used as a drinking water source at the former NASD or by the residents of Vieques and there are no known private wells used for drinking water purposes. Potable water for the island population is supplied via a pipeline from the Rio Blanco filtration plant in eastern Puerto Rico. |

SI Results Compared to Screening Levels

| Analyte | SS | | | SB | | | GW | | | SW | | | SD | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/L) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/L) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) |
| PFOA | 0/4 | 0/4 | ND | 0/7 | 0/7 | ND | 0/2 | 0/2 | ND | 0/3 | 0/3 | ND | 0/3 | 0/3 | ND |
| PFOS | 2/4 | 0/4 | 0.258 J | 0/7 | 0/7 | ND | 0/2 | 0/2 | ND | 0/3 | 0/3 | ND | 0/3 | 0/3 | ND |
| PFBS | 0/4 | 0/4 | ND | 0/7 | 0/7 | ND | 0/2 | 0/2 | ND | 0/3 | 0/3 | ND | 0/3 | 0/3 | ND |
| PFHxS | 0/4 | 0/4 | ND | 0/7 | 0/7 | ND | 0/2 | 0/2 | ND | 2/3 | 0/3 | 1.75 J | 0/3 | 0/3 | ND |
| PFNA | 0/4 | 0/4 | ND | 0/7 | 0/7 | ND | 0/2 | 0/2 | ND | 0/3 | 0/3 | ND | 0/3 | 0/3 | ND |
| HFPO-DA | 0/4 | 0/4 | ND | 0/7 | 0/7 | ND | 0/2 | 0/2 | ND | 0/3 | 0/3 | ND | 0/3 | 0/3 | ND |

| | |
|---|---|
| Results Summary, Conclusions, and Recommenda-tions | For surface soil, only PFOS was detected and at concentrations approximately two orders of magnitude below the RSL. For subsurface soil, groundwater, and sediment, PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected. For surface water, only PFHxS was detected, but at concentrations more than an order of magnitude below the residential tap water RSL. Based on the information contained in the CSM and supported by the data collected during the SI, the area has been sufficiently characterized to conclude no further investigation or action is warranted at this time. |

### Surface and Subsurface Soil Analytical Results

- Surface and subsurface soil samples were collected from four locations positioned around the perimeter of the building.
- Only PFOS was detected in surface soil and only at two locations (VWAH-PFAS-SO01 and VWAH-PFAS-SO04). The detected concentrations are 0.195 J ng/g (VWAH-PFAS-SO01) and 0.258 J ng/g (VWAH-PFAS-SO04), which are approximately two orders of magnitude below the RSL (13 ng/g). PFOS was not detected in subsurface soil.
- PFOA, PFBS, HFPO-DA, PFHxS, and PFNA were not detected in surface or subsurface soil.

### Groundwater Analytical Results

- Two monitoring wells (VWAH-PFAS-MW01 and VWAH-PFAS-MW02) were installed within unconsolidated materials (8 to 18 and 5 to 15 feet bgs, respectively) on the downgradient side of the building.
- PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected in any of the groundwater samples.

### Surface Water Analytical Results

- Only PFHxS was detected in surface water and only at two locations (VWAH-PFAS-SWSW01 and VWAH-PFAS-SDSW02). The detected concentrations are 0.944 J ng/L (VWAH-PFAS-SDSW02) and 1.75 J ng/L (VWAH-PFAS-SDSW01), which are more than an order of magnitude below the RSL (39 ng/L).
- PFOA, PFOS, PFBS, HFPO-DA, and PFNA were not detected in any of the surface water samples.

### Sediment Analytical Results

- PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected in any of the sediment samples.

### Human Health Risk Screening

An HHRS was not necessary because PFAS was not detected at concentrations above RSLs.

### Area Summary and Path Forward

PFOS was detected in surface soil and PFHxS was detected surface water, but at concentrations an order of magnitude or more below their respective RSLs. Therefore, no further investigation or action is warranted for NASD AOC H at this time.

## 4.1.5 NASD SWMU 6: Former Mangrove Disposal Site

A surface (0 to 1 foot bgs) sample was collected from one location within a soil area at the eastern end of the lagoon, where debris piles were historically located and removed. Since groundwater was encountered at approximately 1 foot bgs, the surface soil sample was collected from 0 to 1 foot bgs rather than 0 to 2 feet bgs and a subsurface soil sample was not collected. Co-located sediment and surface water samples were collected from two locations, with one location collected from the middle of the open water portion of the lagoon where debris piles were historically located and the other location collected where physical water exchange can take place between the SWMU 6 lagoon and the larger Laguna Kiana complex. Results of the six PFAS with RSLs (HFPO-DA, PFBS, PFHxS, PFNA, PFOS, PFOA) are presented on Figure 4-5 and summarized in Tables 4-19 through 4-21.

### Conceptual Site Model

Table 4-22 provides the summary of the CSM of Potential Former NASD SWMU 6.

**Table 4-22. NASD SWMU 6: Former Mangrove Disposal Site Conceptual Site Model**

| | |
|---|---|
| Description and Operational History and Potential for PFAS Release | • SWMU 6, the Former Mangrove Disposal Site, is located in a mangrove swamp in Laguna Arenas, part of the Laguna El Pobre and Kiani Lagoon system, along Highway 200 on the former NASD. The site was used for the disposal of solid waste from Navy operations within the former NASD during the 1960s and 1970s. Waste discarded at the site included empty containers of lubricants, oil, solvents, and paints; glass, wood, tires, scrap metal, and rubble. SWMU 6 is a shallow |

**Table 4-22. NASD SWMU 6: Former Mangrove Disposal Site Conceptual Site Model**

<table>
<tr><td></td><td colspan="10">estuarine lagoon, and the surrounding area is uninhabited and heavily vegetated, on DOI property managed by USFWS that has been designated part of the Vieques National Wildlife Refuge.<br>• Multiple investigations conducted since 1984 led to a waste removal action in 2009, and a no further investigation/action and a No Action Record of Decision in 2018.<br>• Interview indicates that AFFF was present at the former training facility and no disposal records were located.<br>• No historical information has been found regarding evidence of a release of AFFF or other PFAS-containing substances at SWMU 6. However, because information obtained during a Preliminary Assessment interview suggests AFFF was present at the former training facility it is conservatively assumed that materials containing AFFF or other PFAS-containing substances (e.g., empty containers, firefighting training materials) could have been disposed of at SWMU 6.</td></tr>
<tr><td>SI Approach</td><td colspan="10">• One surface soil sample was collected from one location from 0 to 1 foot bgs.<br>• No subsurface soil samples were collected due to groundwater at approximately 1 foot bgs<br>• Two co-located sediment and surface water samples were collected from two locations (sediment depth 0 to 6 inches).</td></tr>
<tr><td>Sample Stations (Figure 4-5)</td><td colspan="10">VWS6-PFAS-SO01, VWS6-PFAS-SDSW01, VWS6-PFAS-SDSW02</td></tr>
<tr><td>Site Lithology</td><td colspan="10">The lithology beneath the area consists of silty sand with organic material and well-graded sand with crushed shells.</td></tr>
<tr><td>Groundwater Flow Direction</td><td colspan="10">Based on water-level data collected from monitoring wells during the 2003 RI, groundwater flow approaching SWMU 6 is generally west-northwest toward the Laguna Kiani complex. Groundwater is not currently used as a drinking water source at the former NASD or by the residents of Vieques and there are no known private wells used for drinking water purposes. Potable water for the island population is supplied via a pipeline from the Rio Blanco filtration plant in eastern Puerto Rico.</td></tr>
<tr><td rowspan="8">SI Results Compared to Screening Levels</td><td rowspan="2">Analyte</td><td colspan="3">SS</td><td colspan="3">SW</td><td colspan="3">SD</td></tr>
<tr><td>Frequency of Detection</td><td>Frequency of Exceedance</td><td>Maximum Concentration (ng/g)</td><td>Frequency of Detection</td><td>Frequency of Exceedance</td><td>Maximum Concentration (ng/L)</td><td>Frequency of Detection</td><td>Frequency of Exceedance</td><td>Maximum Concentration (ng/g)</td></tr>
<tr><td>PFOA</td><td>0/1</td><td>0/1</td><td>ND</td><td>0/2</td><td>0/2</td><td>ND</td><td>0/2</td><td>0/2</td><td>ND</td></tr>
<tr><td>PFOS</td><td>0/1</td><td>0/1</td><td>ND</td><td>0/2</td><td>0/2</td><td>ND</td><td>0/2</td><td>0/2</td><td>ND</td></tr>
<tr><td>PFBS</td><td>0/1</td><td>0/1</td><td>ND</td><td>0/2</td><td>0/2</td><td>ND</td><td>0/2</td><td>0/2</td><td>ND</td></tr>
<tr><td>PFHxS</td><td>0/1</td><td>0/1</td><td>ND</td><td>0/2</td><td>0/2</td><td>ND</td><td>0/2</td><td>0/2</td><td>ND</td></tr>
<tr><td>PFNA</td><td>0/1</td><td>0/1</td><td>ND</td><td>0/2</td><td>0/2</td><td>ND</td><td>0/2</td><td>0/2</td><td>ND</td></tr>
<tr><td>HFPO-DA</td><td>0/1</td><td>0/1</td><td>ND</td><td>0/2</td><td>0/2</td><td>ND</td><td>0/2</td><td>0/2</td><td>ND</td></tr>
<tr><td>Results Summary, Conclusions, and Recommendations</td><td colspan="10">For surface soil, surface water, and sediment, PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected. Based on the information contained in the CSM and supported by the data collected during the SI, the area has been sufficiently characterized to conclude no further investigation or action is warranted at this time.</td></tr>
</table>

### Surface Soil Analytical Results

- PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected in the surface soil sample.

### Surface Water Analytical Results

- PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected in any of the surface water samples.

### Sediment Analytical Results

- PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected in any of the sediment samples.

### Human Health Risk Screening

An HHRS was not necessary because PFAS was not detected.

### Area Summary and Path Forward

PFAS was not detected in soil, surface water, or sediment. Therefore, no further investigation or action is warranted for NASD SWMU 6 at this time.

## 4.1.6 NASD SWMU 7: Former Quebrada Disposal Site

Three surface soil (0 to 1 foot bgs) samples were collected from three locations within the ephemeral stream channel; two locations (VWS7-PFAS-SO02 and VWS7-PFAS-SO03) were located within the former waste boundary and one location (VWS7-PFAS-SO01) was located further down-channel. As anticipated, no water was present in the ephemeral stream at the time of sampling. No subsurface soil samples were collected within the ephemeral stream channel as bedrock was encountered at approximately 1.5 feet bgs. One groundwater sample was collected from one newly installed monitoring well within the downgradient portion of the former waste boundary. Results of the six PFAS with RSLs (HFPO-DA, PFBS, PFHxS, PFNA, PFOS, PFOA) are presented on Figure 4-6 and summarized in Tables 4-23 and 4-24.

### Conceptual Site Model

Table 4-25 provides the summary of the CSM of NASD SWMU 7.

**Table 4-25. NASD SWMU 7: Former Quebrada Disposal Site Conceptual Site Model**

| | |
|---|---|
| Description and Operational History and Potential for PFAS Release | • SWMU 7, the Former Quebrada Disposal Site, is located along Highway 200 and 1,100 feet south of the Vieques Passage approximately 1 mile west of the MOV Public Works compound. The area is uninhabited and is heavily vegetated but is adjacent to several dwellings along Highway 200.<br>• SWMU 7 was a Navy disposal site from the early 1960s until the late 1970s. Material discarded at the site included construction rubble, empty containers (drums, cans, and bottles), used batteries, old tires, and sheet metal. Soil and debris were removed from the site as part of a removal action in 2010, and the site was closed with a No Further Action Record of Decision in 2011.<br>• No historical information has been found that AFFF or PFAS-containing materials were disposed of in SWMU 7. However, because AFFF was reportedly present at the base and other PFAS-containing materials may have been used, and because of the timeframe during which waste was being deposited at SWMU 7, the potential for disposal of empty drums of AFFF and containers of other PFAS-containing materials at the site exists. |
| SI Approach | • Three surface soil samples were collected from three locations from 0 to 1 foot bgs.<br>• No subsurface soil samples were collected since bedrock was encountered at approximately 1.5 feet bgs at the three soil locations within the ephemeral stream.<br>• One groundwater sample was collected from one newly installed monitoring well screened from 66 to 76 feet bgs within the bedrock. |

**Table 4-25. NASD SWMU 7: Former Quebrada Disposal Site Conceptual Site Model**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Sample Stations (Figure 4-6) | VWS7-PFAS-SO01, VWS7-PFAS-SO02, VWS7-PFAS-SO03, VWS7-PFAS-MW01 | | | | | | |
| Site Lithology | Lithology consists of silt with sand and gravel, approximately 1.5 feet thick at the ephemeral stream, and approximately 20 feet of unconsolidated materials at the well location along the ridgeline. Weathered rock was encountered at 20 feet bgs and bedrock (granodiorite) occurred at 21 feet bgs. | | | | | | |
| Groundwater Flow Direction | Based on water-level data collected from monitoring wells during the 2003 RI, groundwater flow is to the north-northwest in the direction of the Vieques Passage. Groundwater is not currently used as a drinking water source at the former NASD or by the residents of Vieques and there are no known private wells used for drinking water purposes. Potable water for the island population is supplied via a pipeline from the Rio Blanco filtration plant in eastern Puerto Rico. | | | | | | |
| SI Results Compared to Screening Levels | Analyte | SS | | | GW | | |
| | | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/L) |
| | PFOA | 0/3 | 0/3 | ND | 0/1 | 0/1 | ND |
| | PFOS | 2/3 | 0/3 | 0.407 J | 0/1 | 0/1 | ND |
| | PFBS | 0/3 | 0/3 | ND | 1/1 | 0/1 | 1.79 J |
| | PFHxS | 0/3 | 0/3 | ND | 0/1 | 0/1 | ND |
| | PFNA | 0/3 | 0/3 | ND | 0/1 | 0/1 | ND |
| | HFPO-DA | 0/3 | 0/3 | ND | 0/1 | 0/1 | ND |
| Results Summary, Conclusions, and Recommendations | For surface soil, PFOS was detected at two locations, but at concentrations below the RSL. For groundwater, PFBS was detected, but at a concentration below the RSL. Based on the information contained in the CSM and supported by the data collected during the SI, the area has been sufficiently characterized to conclude no further investigation or action is warranted at this time. | | | | | | |

## Surface Soil Analytical Results

- Three surface samples were collected from three locations within the ephemeral stream.
- Only PFOS was detected in the surface soil and only at two locations (VWS7-PFAS-SO01 and VWS7-PFAS-SO02). The detected concentrations, 0.251 J ng/g (VWS7-PFAS-SO01) and 0.407 J ng/g (VWS7-PFAS-SO02), are more than an order of magnitude below the RSL (13 ng/g).
- PFOA, PFBS, HFPO-DA, PFHxS, and PFNA were not detected in soil.

## Groundwater Analytical Results

- One monitoring well (VWS7-PFAS-MW01) was installed within bedrock (66 to 76 feet bgs), along the downgradient portion of the former waste boundary.
- Only PFBS was detected in the groundwater sample, at a concentration of 1.79 J ng/L, which is more than two orders of magnitude below the RSL (600 ng/L).
- PFOA, PFOS, HFPO-DA, PFHxS, and PFNA were not detected in groundwater.

### Human Health Risk Screening

An HHRS was not necessary because PFAS was not detected at concentrations above RSLs.

### Area Summary and Path Forward

PFOS was detected in surface soil and PFBS was detected in groundwater, but at concentrations an order of magnitude or more below their respective RSLs. Therefore, no further investigation or action for NASD SWMU 7 is warranted at this time.

# 4.2 Former VNTR

## 4.2.1 VNTR Former Camp Garcia Runway

Five surface soil samples (0 to 1 foot bgs) and 10 subsurface soil samples (4 to 6 feet bgs and from 19 to 33 feet bgs) were collected from five locations. One location (VERW-PFAS-SO03) was located in an ephemeral stream channel on the south side of the former runway; one location (VERW-PFAS-SO04) within the same ephemeral stream channel at the former runway; and three locations (VERW-PFAS-SO01, VERW-PFAS-SO02, and VERW-PFAS-SO04) were located in drainage areas to the south and east of the former runway. As anticipated, the ephemeral streams were dry at the time of sample collection. Three groundwater samples were collected from two newly installed monitoring wells located to the south (downgradient) of the former runway, and from one existing monitoring well located to the southeast of the former runway. Results of the six PFAS with RSLs (HFPO-DA, PFBS, PFHxS, PFNA, PFOS, PFOA) are presented on Figure 4-7 and summarized in Tables 4-26 through 4-28.

### Conceptual Site Model

Table 4-29 provides the summary of the CSM of VNTR Former Camp Garcia Runway.

**Table 4-29. VNTR Former Camp Garcia Runway Site Conceptual Site Model**

| | |
|---|---|
| Description and Operational History and Potential for PFAS Release | • The VNTR Camp Garcia Runway is an abandoned 5,016-foot east-west trending runway located one quarter mile south of Camp Garcia within the Vieques National Wildlife Refuge. The runway was described as being active from 1959 to 1964; however, documented air operations still occurred at the airfield annually with the last noted flights recorded in 1975. As of 2019, the airfield is permanently closed.<br>• Interview indicates that fire trucks were used to support operations at the two Vieques helicopter pads, but not at the airfield.<br>• No historical information has been found regarding a release of AFFF or other PFAS-containing substances at the Camp Garcia Runway or PI 5 located adjacent to the western end of the runway. However, because historical records indicate the runway was at least partially active between 1959 and 1975, a portion of which was when Navy use of AFFF was occurring (though not necessarily on Vieques), it is possible it was released at the airfield as part of fire-fighting demonstration or possibly in response to an aircraft crash (although no records of a crash or fire-fighting demonstration have been identified). |
| SI Approach | • Five surface soil samples were collected at five locations from 0 to 1 foot bgs.<br>• Ten subsurface soil samples were collected at five locations from two depth intervals: 4 to 6 feet bgs and ranging from 19 to 33 feet bgs.<br>• Three groundwater samples were collected from one existing monitoring well and two newly installed monitoring wells; newly installed monitoring wells were screened from 22 to 32 and 25 to 35 feet bgs within unconsolidated materials. |
| Sample Stations (Figure 4-7) | VERW-PFAS-SO01, VERW-PFAS-SO02, VERW-PFAS-SO03, VERW-PFAS-SO04, VERW-PFAS-SO05, VERW-PFAS-MW01, VERW-PFAS-MW02, EPI04-MW26 |
| Site Lithology | The lithology beneath the southern portion of the former runway includes unconsolidated silty sand and sand rich clay from the surface to approximately 35 feet bgs. |

**Table 4-29. VNTR Former Camp Garcia Runway Site Conceptual Site Model**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Groundwater Flow Direction | Based on data from adjacent SWMU 20, the groundwater flow direction is generally to the south-southeast in this area. Groundwater is not currently used as a drinking water source at the former VNTR or by the residents of Vieques and there are no known private wells used for drinking water purposes. Potable water for the island population is supplied via a pipeline from the Rio Blanco filtration plant in eastern Puerto Rico. | | | | | | | | |
| SI Results Compared to Screening Levels | Analyte | SS | | | SB | | | GW | | |
| | | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/L) |
| | PFOA | 0/5 | 0/5 | ND | 0/10 | 0/10 | ND | 0/3 | 0/3 | ND |
| | PFOS | 1/5 | 0/5 | 2.46 | 1/10 | 0/10 | 2.71 | 2/3 | 1/3 | 21.2 |
| | PFBS | 0/5 | 0/5 | ND | 0/10 | 0/10 | ND | 3/3 | 0/3 | 13.9 |
| | PFHxS | 0/5 | 0/5 | ND | 1/10 | 0/10 | 1.16 | 3/3 | 1/3 | 44.2 |
| | PFNA | 0/5 | 0/5 | ND | 0/10 | 0/10 | ND | 0/3 | 0/3 | ND |
| | HFPO-DA | 0/5 | 0/5 | ND | 0/10 | 0/10 | ND | 0/3 | 0/3 | ND |
| Results Summary, HHRS Findings, Conclusions, and Recommendations | For surface soil, PFOS was detected at one location but at a concentration below the RSL. For subsurface soil, PFOS and PFHxS were detected, but at concentrations below the RSLs. For groundwater, PFOS, PFBS, and PFHxS were detected in groundwater samples, with concentrations of PFOS and PFHxS above the RSLs (by less than an order of magnitude) at one location. Based on the RSL exceedances, the VNTR former Camp Garcia Runway is recommended for an RI.<br>For additional perspective regarding the RSL exceedances, an HHRS was conducted. Results of the HHRS indicate there is no potentially unacceptable risk associated with PFAS in groundwater.<br>With respect to the PFAS detected in wells along the downgradient side of the VNTR former Camp Garcia Runway, the relatively low concentrations may be indicative of little use/presence of AFFF at the runway during its operation, which is consistent with the CSM. Of note, there is an additional potential upgradient source of PFAS to the north-northeast of the runway (i.e., the Potential Former VNTR Motor Pool Area [including Building 340] and Former Fire Department Building 330 located approximately 0.5 mile north of the runway). The direction of groundwater flow, as demonstrated by data from SWMU 20 (which is almost due south of the potential former motor pool/fire department), is toward the south-southeast. Therefore, as part of developing the RI groundwater characterization approach for the Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330, monitoring wells will be positioned such that not only can the nature and extent of contamination be adequately delineated, but the direction of groundwater flow from this area can also be determined. This information will help confirm whether PFAS release(s) in this area could be responsible for the PFAS detected in the wells associated with the former runway (as well as in wells associated with PI 5 and SWMU 20, as noted in Sections 4.2.2 and 4.2.3). | | | | | | | | |

## Surface and Subsurface Soil Analytical Results

- Only one location (VERW-PFAS-SO03) had detections of PFOS and PFHxS in surface and/or subsurface soil with maximum concentrations of 2.71 and 1.16 ng/g, between approximately one and two orders of magnitude

below their RSLs (13 and 130 ng/g, respectively). PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected in any other surface or subsurface soil samples.

### Groundwater Analytical Results

- Two monitoring wells (VERW-PFAS-MW01 and VERW-PFAS-MW02) were installed along the southern side of the runway within unconsolidated materials (22 to 32 and 25 to 35 feet bgs, respectively). Note that EPI04-MW26 was sampled twice, the second of which (July 2022) to support an evaluation of SWMU 20 (see the SWMU 20 subsection), the data from which are not included in Table 4-30.
- PFOS and PFHxS were detected in groundwater from only one monitoring well (VERW-PFAS-MW02) at concentrations less than an order of magnitude above their respective RSLs (4 and 38 ng/L), with concentrations of 21.2 and 44.2 ng/L, respectively. PFOS was detected in groundwater from EPI04-MW26 at a concentration of 1.1 J ng/L, which is below the RSL (4 ng/L), and not detected in groundwater from VERW-PFAS-MW01. PFHxS was detected in groundwater from EPI04-MW26 and VERW-PFAS-MW01 at concentrations of 18.1 and 5.17 ng/L, respectively, below the RSL (38 ng/L).
- PFBS was detected in groundwater from the three monitoring wells, but at concentrations more than two orders of magnitude below the RSL (600 ng/L), with a maximum concentration of 13.9 ng/L (VERW-PFAS-MW02).
- PFOA, HFPO-DA, and PFNA were not detected in groundwater.

### Human Health Risk Screening

An HHRS was conducted because concentrations of one or more PFAS exceed RSLs. Results of the HHRS indicate there is no potentially unacceptable risk associated with PFAS in groundwater (Appendix I).

### Area Summary and Path Forward

PFOS and PFHxS were detected in groundwater at concentrations above their respective RSLs; therefore, the VNTR Former Camp Garcia Runway is recommended for an RI. Of note, the HHRS indicated the no potentially unacceptable risk associated with the PFAS concentrations detected.

## 4.2.2 VNTR PI 5: Surface Water Drainage Area from Former Camp Garcia Runway

Two surface soil samples (0 to 1 foot bgs) and four subsurface soil samples (4 to 6 feet bgs and from 15 to 25 feet bgs) were collected from two locations within an ephemeral stream channel at and downgradient of the former runway. As anticipated, the ephemeral stream was dry at the time of sample collection. One groundwater sample was collected from one newly installed monitoring well located to the south (downgradient) of the former runway. Results of the six PFAS with RSLs (HFPO-DA, PFBS, PFHxS, PFNA, PFOS, PFOA) are presented on Figure 4-8 and summarized in Tables 4-30 through 4-32.

### Conceptual Site Model

Table 4-33 below provides the summary of the CSM of VNTR PI5: Surface Water Drainage Area from Camp Garcia Runway.

**Table 4-33. PI 5: Surface Water Drainage Area form Former Camp Garcia Runway Conceptual Site Model**

| | |
|---|---|
| Description and Operational History and Potential for PFAS Release | • PI 5 drainage area is a feature on the south (downgradient) side of the former Camp Garcia Runway. It is bounded to the north by the former Camp Garcia Runway, to the south by Puerto Ferro, to the west by undeveloped land, and to the east by other areas of the runway drainage ditch system that only contain water during significant storm events. Currently the site is uninhabited and heavily vegetated.<br>• The operational history of PI 5 is directly associated with the operations of the former Camp Garcia Runway. Past investigation results indicated the site warranted no further investigation, and No Action/No Further Action status was granted in September 2010. |

**Table 4-33. PI 5: Surface Water Drainage Area form Former Camp Garcia Runway Conceptual Site Model**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | • No historical information has been found indicating that PFAS-containing AFFF was used at the former Camp Garcia Runway. However, because runway use (at least periodic) occurred during the timeframe when AFFF was in use Navy-wide for firefighting, the potential for AFFF use, testing, or demonstration at the former runway exists, and runoff carrying AFFF could have entered and flowed within PI 5. | | | | | | | | | |
| SI Approach | • Two surface soil samples were collected at two locations from 0 to 1 foot bgs.<br>• Four subsurface soil samples were collected at 2 locations from 4 to 6 feet bgs and ranging between 15 to 25 feet bgs.<br>• One groundwater sample was collected from one newly installed monitoring well screened from 22 to 32 feet bgs. | | | | | | | | | |
| Sample Stations (Figure 4-8) | VEP5-PFAS-SO01, VEP5-PFAS-SO02, VEP5-PFAS-MW01 | | | | | | | | | |
| Site Lithology | The lithology beneath the southern portion of the former runway includes unconsolidated silty sand and sand from the surface to approximately 35 feet bgs. | | | | | | | | | |
| Groundwater Flow Direction | Based on data from adjacent SWMU 20, the groundwater flow direction is generally to the south-southeast in this area. Groundwater is not currently used as a drinking water source at the former VNTR or by the residents of Vieques and there are no known private wells used for drinking water purposes. Potable water for the island population is supplied via a pipeline from the Rio Blanco filtration plant in eastern Puerto Rico. | | | | | | | | | |
| SI Results Compared to Screening Levels | Analyte | SS | | | SB | | | GW | | |
| | | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/L) |
| | PFOA | 0/2 | 0/2 | ND | 0/4 | 0/4 | ND | 0/1 | 0/1 | ND |
| | PFOS | 1/2 | 0/2 | 0.193 J | 0/4 | 0/4 | ND | 0/1 | 0/1 | ND |
| | PFBS | 0/2 | 0/2 | ND | 0/4 | 0/4 | ND | 1/1 | 0/1 | 2.65 J |
| | PFHxS | 0/2 | 0/2 | ND | 0/4 | 0/4 | ND | 1/1 | 0/1 | 1.44 J |
| | PFNA | 0/2 | 0/2 | ND | 0/4 | 0/4 | ND | 0/1 | 0/1 | ND |
| | HFPO-DA | 0/2 | 0/2 | ND | 0/4 | 0/4 | ND | 0/1 | 0/1 | ND |
| Results Summary, Conclusions, and Recommendations | For surface soil, PFOS was detected but at a concentration two orders of magnitude below the RSL. For subsurface soil, PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected. For groundwater, PFBS and PFHxS were detected but at concentrations between about one and two orders of magnitude below the RSLs. Therefore, based on the information contained in the CSM and supported by the data collected during the SI, the area has been sufficiently characterized to conclude no further investigation or action is warranted at this time.<br>Of note, the PFAS concentrations in the well associated with PI 5 are similar to those detected in the western-most well associated with the VNTR former Camp Garcia Runway. Therefore, the discussion regarding a potential upgradient source area and the recommendation regarding developing the RI groundwater characterization approach in Table 4-29 are also applicable to PI 5 given its association with the runway and location with respect to the additional potential upgradient source. | | | | | | | | | |

### Surface and Subsurface Soil Analytical Results

- Surface and subsurface soil samples were collected from two locations within an ephemeral stream at and downstream of the former runway
- PFOS was detected in the surface soil at one location (VEP5-PFAS-SO02), at a concentration of 0.193 J ng/g, which is two orders of magnitude below the RSL of 13 ng/g. PFOS was not detected in subsurface soil at this location.
- PFOA, PFBS, HFPO-DA, PFHxS, and PFNA were not detected in soil.

### Groundwater Analytical Results

- One monitoring well (VEP5-PFAS-MW01) was installed along the southern side of the runway within unconsolidated materials (24 to 34 feet bgs).
- PFBS and PFHxS were detected in the groundwater sample at concentrations of 2.65 J and 1.44 J ng/L, respectively, which are between about one to two orders of magnitude below their respective RSLs (600 and 39 ng/L).
- PFOA, PFOS, PFNA, and HFPO-DA were not detected in groundwater.

### Human Health Risk Summary

An HHRS was not necessary because no PFAS were detected at concentrations above RSLs.

### Area Summary and Path Forward

PFOS was detected in surface soil and PFBS and PFHxS were detected in groundwater, but at concentrations between about one and two orders of magnitude below their respective RSLs. Therefore, no further investigation or action is warranted for VNTR PI 5 at this time.

## 4.2.3 VNTR SWMU 20: Former Helicopter Maintenance Area

During groundwater sampling activities, EPI04-MW02 was found to be dry. As a result, the next downgradient monitoring well was selected for sampling (EPI04-MW15). In addition, while not a deviation from the PFAS SI SAP, sampling of more SWMU 20 wells for PFAS than planned in the PFAS SI SAP was performed in association with the planned SWMU 20 pilot study. Because the pilot study is intended to evaluate the efficacy of an in-situ treatment of TCE contamination, the sampling of additional wells for PFAS was intended to provide information that would help ensure the in-situ technology utilized for TCE treatment would not exacerbate the existing PFAS groundwater conditions at the site and to more effectively plan investigation-derived waste management. However, once the additional PFAS data were generated, it was decided to include the information in the PFAS SI Report because the sampling and analysis followed the protocols defined in the PFAS SI SAP and the information enhanced the understanding of PFAS distribution at the site.

One surface soil sample (0 to 1 foot bgs) and one subsurface soil sample (4 to 6 feet bgs) were collected from one location in the former helicopter maintenance area. In accordance with the SAP, five existing monitoring wells were sampled in February 2022; however, as noted above because EPI04-MW02 was dry, its planned groundwater sample was replaced with one from the next downgradient well (EPI04-MW15). Also as noted above, to support the planned pilot study for TCE treatment being conducted separately at SWMU 20, all 37 existing monitoring wells were sampled in June/July 2022. EPI04-MW02 was again dry during this sampling event. In total, 42 groundwater samples were collected from 37 existing monitoring wells over two events. Results of the six PFAS with RSLs (HFPO-DA, PFBS, PFHxS, PFNA, PFOS, PFOA) are presented on Figure 4-9 and summarized in Tables 4-34 through 4-36.

### Conceptual Site Model

Table 4-37 provides the summary of the CSM of VNTR SWMU 20.

**Table 4-37. VNTR SWMU 20: Former Helicopter Maintenance Area Conceptual Site Model**

| | |
|---|---|
| Description and Operational History and Potential for PFAS Release | • SWMU 20 (formerly PI 4) is located south of Camp Garcia and just north of the eastern end of the former Camp Garcia Runway. Historical information suggests the site was in use from 1959 to 1964 (helicopter maintenance and hangar until 1975) and included barracks, mess hall, trenched area, disturbed areas, and bermed area for storage of fuel bladders. The area is uninhabited and heavily vegetated, and the former helicopter maintenance building and other structures have been removed.<br>• Interview indicates that fire trucks were historically stored and used AFFF to support activities at the two Vieques helicopter pads and AFFF may have been present in the helicopter maintenance area/hangar area.<br>• No historical information has been found that AFFF or PFAS-containing materials were utilized or disposed of at SWMU 20. However, hangars commonly have fire suppression systems and AFFF was reportedly present at the base (although not likely at that time), the potential for use or spillage of AFFF at the site exists. |
| SI Approach | • One surface soil sample was collected from 1 location from 0 to 1 foot bgs.<br>• One subsurface soil sample was collected from 1 location from 4 to 6 feet bgs.<br>• 42 groundwater samples were collected from 37 existing monitoring wells; in accordance with the SAP (CH2M, 2021), five monitoring wells were initially sampled in February 2022 (EPI04-PFAS-GW02 was dry and its sample therefore replaced with one from EPI04-PFAS-GW15); to support the SWMU 20 pilot study for trichloroethene (TCE) treatment, all SWMU 20 monitoring wells were subsequently sampled for VOCs and PFAS in June/July 2022; VOCs are presented under a separate cover associated with the SWMU 20 pilot study. |
| Sample Stations (Figure 4-9) | EPI04-SO01, EPI04-PFAS-GW01, and EPI04-PFAS-GW03 through EPI04-PFAS-GW33 |
| Site Lithology | The lithology beneath the area is underlain by poorly graded dry sands and dry silty sands with occasional trace clay and gravel and intermittent clay-silt lenses above weathered bedrock (saprolite) grading into fractured, competent granodiorite bedrock. Historically, bedrock was encountered in the monitoring well borings at between 17 and 28 feet bgs. |
| Groundwater Flow Direction | Based on data (both water levels and contaminant distribution) collected from SWMU 20 monitoring wells over the last decade, groundwater flow in fractured bedrock in a south-southeast direction toward the Bahia Tapón. Groundwater is not currently used as a drinking water source at the former VNTR or by the residents of Vieques and there are no known private wells used for drinking water purposes. Potable water for the island population is supplied via a pipeline from the Rio Blanco filtration plant in eastern Puerto Rico. |

**Table 4-37. VNTR SWMU 20: Former Helicopter Maintenance Area Conceptual Site Model**

| | Analyte | SS | | | SB | | | GW | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/L) |
| SI Results Compared to Screening Levels | PFOA | 0/1 | 0/1 | ND | 0/1 | 0/1 | ND | 24/37 | 15/37 | 46.2 |
| | PFOS | 1/1 | 0/1 | 1.08 | 0/1 | 0/1 | ND | 25/37 | 20/37 | 107 |
| | PFBS | 0/1 | 0/1 | ND | 0/1 | 0/1 | ND | 31/37 | 0/37 | 144 |
| | PFHxS | 0/1 | 0/1 | ND | 0/1 | 0/1 | ND | 31/37 | 25/37 | 661 |
| | PFNA | 0/1 | 0/1 | ND | 0/1 | 0/1 | ND | 6/37 | 0/37 | 2.02 J |
| | HFPO-DA | 0/1 | 0/1 | ND | 0/1 | 0/1 | ND | 0/37 | 0/37 | ND |
| Results Summary, HHRS Findings, Conclusions, and Recommendations | For surface soil, PFOS was detected, but at a concentration an order of magnitude below the RSL. For subsurface soil, PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected. For groundwater, PFOA, PFOS, PFBS, PFHxS, and PFNA were detected, with concentrations of PFOA, PFOS, and PFHxS between about one and two orders of magnitude above RSLs. Based on the RSL exceedances, SWMU 20 is recommended for an RI.<br>For additional perspective regarding the RSL exceedances, an HHRS was conducted. Results of the HHRS performed indicate the potential for unacceptable risk based on PFOA, PFOS, and PFHxS concentrations in groundwater.<br>Although the groundwater PFAS concentrations at SWMU 20 indicate a PFAS release(s) may have occurred there, the data for the soil samples collected at the location deemed most likely to represent where a PFAS release(s) occurred (i.e., the former helicopter hangar location) are not indicative of a PFAS release(s). As described in Section 4.2.1, the potential former fire department and motor pool area at Camp Garcia is a potential upgradient source of PFAS detected in groundwater at the VNTR former Camp Garcia Runway. Based on the proximity of SWMU 20 to the former runway and the orientation (approximately due south) of SWMU 20 with respect to the Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330, the recommendation regarding developing the RI groundwater characterization approach in Table 4-29 is also applicable to SWMU 20. | | | | | | | | | |

## Surface and Subsurface Soil Analytical Results

- One surface and one subsurface soil sample were collected from one location at the former helicopter maintenance area.
- PFOS was detected in the surface soil but not in the subsurface soil. The detected concentration of 1.08 ng/g is an order of magnitude below the RSL (13 ng/g).
- PFOA, PFBS, HFPO-DA, PFHxS, and PFNA were not detected in soil.

## Groundwater Analytical Results

- PFOA, PFOS, and PFHxS were detected in groundwater from several monitoring wells above their respective RSLs (6, 4, and 39 ng/L), with maximum concentrations of 46.4 (EPI04-MW22), 107 (EPI04-MW03), and 661 (EPI04-MW15) ng/L, respectively.

- PFBS and PFNA were detected in groundwater from several monitoring wells, but at concentrations below their respective RSLs (600 and 5.9 ng/L), with maximum concentrations of 144 (EPI04-MW21) and 2.02 J (EPI04-MW06) ng/L, respectively.
- HFPO-DA was not detected in groundwater.

### Human Health Risk Screening

An HHRS was conducted because concentrations of one or more PFAS exceed RSLs. Results of the HHRS indicate the potential for unacceptable risk based on groundwater concentrations of PFOA, PFOS, and PFHxS (Appendix I).

### Area Summary and Path Forward

PFOA, PFOS and PFHxS were detected in groundwater at concentrations more than an order of magnitude above their respective RSLs; therefore, SWMU 20 is recommended for an RI. Further, the HHRS indicates the potential for unacceptable risk based on PFOA, PFOS, and PFHxS concentrations in groundwater. Of note, the pattern of PFAS detections suggests the presence of a distinct plume within the northern portion of SWMU 20; PFOA, PFOS, and PFHxS were non-detect in the southernmost monitoring wells.

## 4.2.4 Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330

Two subsurface soil samples (4 to 6 feet bgs) were collected from two locations (one between the former locations of former Buildings 330 and 340 and one south of the former Building 330). As planned, surface soil samples were not collected because soil in the area has been disturbed as part of construction of the new CERCLA cleanup base of operations. Two groundwater samples were collected from two newly installed monitoring wells located downgradient of the potential source area (VEFS-PFAS-MW01) and on the downgradient edge of the former motor pool area and adjacent buildings (VEFS-PFAS-MW02). Results of the six PFAS with RSLs (HFPO-DA, PFBS, PFHxS, PFNA, PFOS, PFOA) are presented on Figure 4-10 and summarized in Tables 4-38 and 4-39.

### Conceptual Site Model

Table 4-40 provides the summary of the CSM of Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330.

**Table 4-40. Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330 Conceptual Site Model**

| | |
|---|---|
| Description and Operational History and Potential for PFAS Release | • The potential former VNTR motor pool area and former fire department building are located at historic Camp Garcia, the base of operations supporting military training activities at the former VNTR. Buildings 330 and 340 are no longer present. The buildings were identified on a hand-drawn map of unknown origin, with Building 330 identified as the Camp Garcia Fire Department Building and Building 340 as a potential motor pool area.<br>• Interview indicates that fire truck maintenance was performed at the motor pool, the location of which was marked on a map of Camp Garcia.<br>• Building 330 is identified on a map as the Fire Department within Camp Garcia; motor pool was immediately adjacent.<br>• No historical information has been found regarding the use of Building 340. However, given its close proximity to the former Fire Department building (Building 340) and that historical imagery shows no structure in the area referred to by the interviewee, it is possible Building 340 was associated with the motor pool.<br>• No historical information has been found that identifies where specifically fire truck maintenance/washing occurred. Further, significant ground-disturbing activities occurred in the area during historic building demolition and construction of the new Vieques cleanup base of operations in the same area. |
| SI Approach | • Two subsurface soil samples were collected from two locations from 4 to 6 feet bgs. |

**Table 4-40. Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330 Conceptual Site Model**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | • Two groundwater samples were collected from two newly installed monitoring wells screened from 55 to 65 and 57 to 67 feet bgs. | | | | | | |
| Sample Stations (Figure 4-10) | VEFS-PFAS-SO01, VEFS-PFAS-SO02, VEFS-PFAS-MW01, VEFS-PFAS-MW02 | | | | | | |
| Site Lithology | The lithology beneath the area is underlain by unconsolidated clay and sand to a depth of approximately 30 feet, saprolite to a depth of approximately 45 to 60 feet, that transitions to granodiorite bedrock. | | | | | | |
| Groundwater Flow Direction | Based on water-level data gathered during historic SI activities (not associated with the PFAS SI) in and around Camp Garcia, groundwater flow in fractured bedrock in the vicinity of Camp Garcia is generally south toward the Caribbean Sea. Groundwater is not currently used as a drinking water source at the former VNTR or by the residents of Vieques and there are no known private wells used for drinking water purposes. Potable water for the island population is supplied via a pipeline from the Rio Blanco filtration plant in eastern Puerto Rico. | | | | | | |
| SI Results Compared to Screening Levels | Analyte | SB | | | GW | | |
| | | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/L) |
| | PFOA | 2/2 | 0/2 | 5.78 | 2/2 | 2/2 | 3,100 |
| | PFOS | 2/2 | 1/2 | 26.7 | 2/2 | 2/2 | 43.3 |
| | PFBS | 0/2 | 0/2 | ND | 2/2 | 1/2 | 15,400 |
| | PFHxS | 2/2 | 0/2 | 19.8 | 2/2 | 2/2 | 110,000 |
| | PFNA | 0/2 | 0/2 | ND | 0/2 | 0/2 | ND |
| | HFPO-DA | 0/2 | 0/2 | ND | 0/2 | 0/2 | ND |
| Results Summary, HHRS Findings, Conclusions, and Recommendations | For subsurface soil, PFOS was detected at a concentration above the RSL, but by less than an order of magnitude. For groundwater, PFOA, PFOS, PFBS, and PFHxS were detected at concentrations an order of magnitude or more above the RSLs. Based on the RSL exceedances, the Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330 is recommended for an RI.<br>For additional perspective regarding the RSL exceedances, an HHRS was conducted. Results of the HHRS indicate the potential for unacceptable risk based on concentrations of PFOA, PFOS, PFBS, and PFHxS in groundwater.<br>As noted previously, the Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330 is located in the approximate upgradient direction from SWMU 20 and at least the eastern portion of the VNTR former Camp Garcia Runway. Therefore, as noted previously, monitoring wells associated with the Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330 will be positioned such that not only can the nature and extent of contamination be adequately delineated, but the direction of groundwater flow from this area can also be determined. This information will help confirm whether PFAS release(s) in this area could be responsible for the PFAS detected in the wells located downgradient and associated with the former runway, PI 5, and SWMU 20. | | | | | | |

### Subsurface Soil Analytical Results

- Two subsurface soil samples were collected from two locations; one location between the former Buildings 330 and 340 and one location south of the former Building 330.
- PFOS was detected in subsurface soil at a concentration above the RSL (13 ng/g) at one location (VEFS-PFAS-SO02) with a concentration of 26.7 ng/g; PFAS was detected at the other location, but below the RSL with a concentration of 0.324 J ng/g.
- PFOA and PFHxS were also detected in subsurface soil at both locations, with maximum concentrations of 5.78 and 19.8 ng/g, respectively, which are below their respective RSLs (19 and 130 ng/g).
- PFBS, HFPO-DA, and PFNA were not detected in soil.

### Groundwater Analytical Results

- Two monitoring wells (VEFS-PFAS-MW01 and VEFS-PFAS-MW02) were installed within bedrock (55 to 65 and 57 to 67 feet bgs); VEFS-PFAS-MW01 was installed downgradient of the potential source area and VEFS-PFAS-MW02 was installed on the downgradient edge of the former motor pool area and adjacent buildings.
- PFOA, PFOS, PFBS, and PFHxS were detected in groundwater above their respective RSLs (6, 4, 600, and 39 ng/L) with maximum concentrations of 3,100; 43.3; 15,400; and 110,000 ng/L, respectively, all an order of magnitude or more above RSLs.
- HFPO-DA and PFNA were not detected in groundwater.

### Human Health Risk Screening

An HHRS was conducted because concentrations of one or more PFAS exceed RSLs. Results of the HHRS indicate the potential for unacceptable risk based on PFOA, PFOS, PFHxS, and PFBS concentrations in groundwater (Appendix I).

### Area Summary and Path Forward

PFOS was detected in soil at a concentration above the RSL, and PFOA, PFOS, PFBS, and PFHxS were detected in groundwater at concentrations an order of magnitude or more above their respective RSLs; therefore, the Potential Former VNTR Motor Pool Area and Former Fire Department Building 330 are recommended for an RI. Further, results of the HHRS performed indicate the potential for unacceptable risk based on PFOA, PFOS, PFHxS, and PFBS concentrations in groundwater. Of note, the elevated concentrations in groundwater suggests the potential presence of a PFAS plume as result of release to groundwater at the motor pool area and/or from the Former Fire Station Building 340.

## 4.2.5 VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building

Surface soil samples (0 to 1 foot bgs) and subsurface soil samples (4 to 6 feet bgs) were collected from six locations; deeper subsurface soil samples (ranging from 23 to 29 feet bgs) were collected from five locations due to groundwater occurring within bedrock at one location. VEW10-PFAS-SO01 through VEW10-PFAS-SO04 were collected from the approximate center of each of the four former treatment lagoons. VEW10-PFAS-SO05 and VEW10-PFAS-SO06 were collected at monitoring well VEW10-PFAS-MW03 and VEW10-PFAS-MW04 locations. Four groundwater samples were collected from four newly installed monitoring wells located immediately downgradient and central to the former SWMU 10 lagoon system, one located downgradient of the former AOC G chlorination building, and two additional monitoring wells located further downgradient. Results of the six PFAS with RSLs (HFPO-DA, PFBS, PFHxS, PFNA, PFOS, PFOA) are presented on Figure 4-11 and summarized in Tables 4-41 through 4-43.

### Conceptual Site Model

Table 4-44 provides the summary of the CSM of VNTR SWMU 10 and AOC G.

**Table 4-44. VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building Conceptual Site Model**

| | |
|---|---|
| Description and Operational History and Potential for PFAS Release | • SWMU 10 and AOC G are located approximately 0.5 mile southeast of Camp Garcia. The former wastewater treatment system is no longer operational, and the area is now overgrown with dense vegetation.<br>• The original domestic sewage treatment lagoons for Camp Garcia went into service in the early 1950s, decommissioned by 2000, and consisted of four unlined lagoons, two of them serving as receiving/equalization lagoons, and the other two providing polishing treatment, with raw wastewater from the Camp Garcia area discharging into the lagoons. Past investigations spanned from 1988 to 2010, at which time No Further Action was granted in September 2010.<br>• No historical information has been found regarding a release of AFFF or other PFAS-containing substances into or at SWMU 10 or AOC G. However, because SWMU 10 and AOC G were operational during the time when Navy use of PFAS-containing materials was occurring, if AFFF and/or other PFAS-containing substances were used at the former VNTR, it is possible they may have ultimately been present in wastewater influent associated with the SWMU 10/AOC G wastewater treatment system. |
| SI Approach | • Six surface soil samples were collected at six locations from 0 to 1 foot bgs.<br>• Six subsurface soil samples were collected from 4 to 6 feet bgs from six locations; and five deeper subsurface soil samples were collected from depths ranging from 23 to 29 feet bgs at five locations, as groundwater occurred in bedrock at one location.<br>• Four groundwater samples were collected from four newly installed monitoring wells screened from 22-32, 25-35, 25-35, and 6-16 feet bgs. |
| Sample Stations (Figure 4-11) | VEW10-PFAS-SO01, VEW10-PFAS-SO02, VEW10-PFAS-SO03, VEW10-PFAS-SO04, VEW10-PFAS-SO05, VEW10-PFAS-SO06, VEW10-PFAS-MW01, VEW10-PFAS-MW02, VEW10-PFAS-MW03, VEW10-PFAS-MW04 |
| Site Lithology | Beneath the former sewage treatment lagoons, the lagoon liner was encountered between approximately 1 and 3.5 feet bgs. Unconsolidated lean clays, poorly graded sand, and silty sands occurred beneath the liner. Granodiorite bedrock was encountered at approximately 30 feet bgs. |
| Groundwater Flow Direction | Based on water-level data gathered during historic SI activities (not associated with the PFAS SI) in and around Camp Garcia, groundwater flow is southward toward Bahia Tapón. Groundwater is not currently used as a drinking water source at the former VNTR or by the residents of Vieques and there are no known private wells used for drinking water purposes. Potable water for the island population is supplied via a pipeline from the Rio Blanco filtration plant in eastern Puerto Rico. |

**Table 4-44. VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building Conceptual Site Model**

| | Analyte | SS | | | SB | | | GW | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/g) | Frequency of Detection | Frequency of Exceedance | Maximum Concentration (ng/L) |
| SI Results Compared to Screening Levels | PFOA | 3/6 | 0/6 | 0.367 J | 0/11 | 0/11 | ND | 0/4 | 0/4 | ND |
| | PFOS | 5/6 | 2/6 | 24.4 | 2/11 | 0/11 | 1.45 | 2/4 | 1/4 | 7.81 |
| | PFBS | 0/6 | 0/6 | ND | 0/11 | 0/11 | ND | 2/4 | 0/4 | 3.71 J |
| | PFHxS | 0/6 | 0/6 | ND | 0/11 | 0/11 | ND | 3/4 | 1/4 | 42.2 |
| | PFNA | 1/6 | 0/6 | 0.254 J | 0/11 | 0/11 | ND | 0/4 | 0/4 | ND |
| | HFPO-DA | 0/6 | 0/6 | ND | 0/11 | 0/11 | ND | 0/4 | 0/4 | ND |
| Results Summary, HHRS Findings, Conclusions, and Recommendations | For surface soil, PFOA, PFOS, PFHxS, and PFNA were detected; however, only PFOS was detected at a concentration above the RSL. For subsurface soil, PFOS was detected, but at concentrations below the RSL. For groundwater, PFOS, PFBS, and PFHxS were detected; however, only PFOS and PFBS concentrations were above the RSLs. Based on the RSL exceedances, SWMU 10 and AOC G are recommended for an RI.<br>For additional perspective regarding the RSL exceedances, an HHRS was performed. The results of the HHRS indicate there is no potentially unacceptable risk associated with PFAS concentrations in soil and groundwater.<br>Based on the assumed groundwater flow direction in the area between Camp Garcia and the coastline, the Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330 is an unlikely PFAS source area for the PFAS detected in SWMU 10/AOC G groundwater. However, as a measure of conservatism, monitoring wells associated with the Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330 will be positioned such that the resulting data can be used to support or refute this assumption. | | | | | | | | | |

## Surface and Subsurface Soil Analytical Results

- Surface and subsurface soil samples were collected from the approximate center of each of the four treatment lagoons and further downgradient at monitoring wells VEW10-PFAS-MW03 and VEW10-PFAS-MW04.
- PFOS was detected in the surface soil at five locations (VEW10-PFAS-SO01, VEW10-PFAS-SO02, VEW10-PFAS-SO03, VEW10-PFAS-SO04, and VEW10-PFAS-SO06). Detected concentrations range from 0.44 J ng/g (VEW10-PFAS-SO06) to 24.4 ng/g (VEW10-PFAS-SO02), with only samples from VEW10-PFAS-SO04 (14.6 ng/g) and VEW10-PFAS-SO02 (24.4 ng/g) exceeding the RSL of 13 ng/g. PFOS was detected in subsurface soil (4 to 6 feet bgs) at only two locations with a maximum concentration of 1.45 ng/g, which is below the RSL.
- PFOA was detected in the surface soil at three locations (VEW10-PFAS-SO02, VEW10-PFAS-SO03, and VEW10-PFAS-SO06) with a maximum concentration of 0.367 J ng/g, which is below the RSL of 19 ng/g. PFNA was detected in the surface soil at one location (VEW10-PFAS-SO02) with a concentration of 0.254 J ng/g, which is below the RSL of 19 ng/g.

- PFBS, HFPO-DA, and PFHxS were not detected in soil.

### Groundwater Analytical Results

- Four monitoring wells (VEW10-PFAS-MW01, VEW10-PFAS-MW02, VEW10-PFAS-MW03, and VEW10-PFAS-MW04) were installed within unconsolidated materials (22 to 32, 25 to 35, 25 to 35, and 6 to 16 feet bgs); VEFS-PFAS-MW01 was installed downgradient of the former AOC G chlorination building, VEFS-PFAS-MW02 was installed downgradient (south) of the former SWMU 10 lagoon system, and VEW10-PFAS-MW03 and VEW10-PFAS-MW04 were installed further downgradient of these features.
- PFOS was detected in groundwater from two wells (VEW10-PFAS-MW02 and VEW10-PFAS-MW03). Detected concentrations are 2.24 J ng/L (at VEW10-PFAS-MW03) and 7.81 ng/L (at VEW10-PFAS-MW02), with only the concentration from VEW10-PFAS-MW02 exceeding the RSL of 4 ng/L. This well is located south of the former lagoons.
- PFHxS was detected in groundwater from three wells (VEW10-PFAS-MW01, VEW10-PFAS-MW02, and VEW10-PFAS-MW04). Detected concentrations are 5.02 ng/L (VEW10-PFAS-MW04), 8.92 ng/L (VEW10-PFAS-MW01), and 42.2 ng/L (VEW10-PFAS-MW02), with only the concentration from VEW10-PFAS-MW02 exceeding the RSL of 39 ng/L. This well is located south of the former lagoons.
- PFBS was detected in groundwater from two wells (VEW10-PFAS-MW01 and VEW10-PFAS-MW04). Detected concentrations are 3.43 J ng/L at VEW10-PFAS-MW04 and 3.71 J ng/L at VEW10-PFAS-MW01, which are more than two orders of magnitude below the RSL of 600 ng/L.
- HFPO-DA, PFNA, and PFOA were not detected in groundwater.

### Human Health Risk Summary

An HHRS was conducted because concentrations of one or more PFAS exceed RSLs. Results of the HHRS indicate there is no potential unacceptable risk associated with PFAS concentrations in soil or groundwater. Details of the HHRS are presented in Appendix I.

### Area Summary and Path Forward

PFOS and/or PFHxS were detected in soil and groundwater at concentrations above their respective RSLs; therefore SWMU 10 and AOC G are recommended for an RI. Of note, the HHRS indicated no potentially unacceptable risk associated with the PFAS concentrations detected.

## 4.2.6 VNTR SWMU 1: Former Camp Garcia Municipal Waste Management Unit (Landfill)

Six groundwater samples were collected from six existing monitoring wells at VNTR SWMU 1. Results of the six PFAS with RSLs (HFPO-DA, PFBS, PFHxS, PFNA, PFOS, PFOA) are presented on Figure 4-12 and summarized in Table 4-45.

### Conceptual Site Model

Table 4-46 provides the summary of the CSM of VNTR SWMU 1.

**Table 4-46. VNTR SWMU 1: Former Camp Garcia Municipal Waste Management Unit (Landfill) Conceptual Site Model**

| | |
|---|---|
| Description and Operational History and Potential for PFAS Release | • SWMU 1 is located approximately 4,000 feet northwest of Playa La Chiva (Blue Beach), roughly a mile east of the Camp Garcia Compound Area.<br>• SWMU 1 was used as an unlined landfill in operation from approximately 1954 to 1978 and was used for the disposal of municipal waste. Test pits excavated throughout the landfill confirmed this, along with several munitions-related items. No hazardous materials were reportedly placed in SWMU 1. SWMU 1 ceased landfilling operations in 1978, cover consisting of compacted native soils was installed, and a Record of Decision was signed in 2011 cover any exposed debris. A Record of Decision Explanation of Significant Differences was added in 2016 to address the greater amount of surface debris present across the |

**Table 4-46. VNTR SWMU 1: Former Camp Garcia Municipal Waste Management Unit (Landfill) Conceptual Site Model**

<table>
<tr><td></td><td colspan="4">landfill than originally anticipated, calling for the removal of the surface debris and allowing the landfill vegetation to naturally regrow.<br>• No historical information has been found regarding AFFF or other PFAS-containing substances disposed of at SWMU 1. However, because information obtained during a PA interview suggests AFFF was present at the former training facility, it is conservatively assumed that materials containing AFFF or other PFAS-containing substances (e.g., empty containers, firefighting training materials) could have been disposed of at SWMU 1.</td></tr>
<tr><td>SI Approach</td><td colspan="4">• Six groundwater samples were collected from six existing monitoring wells.</td></tr>
<tr><td>Sample Stations (Figure 4-12)</td><td colspan="4">CGW1MW02, CGW1MW03, CGW1MW06, CGW1MW08, CGW1MW10, CGW1MW11</td></tr>
<tr><td>Site Lithology</td><td colspan="4">The lithology beneath the SWMU consists of ephemeral alluvial depositional environment with sand, clay, silt, and gravel overlying saprolite diorite/granodiorite bedrock. Bedrock has been encountered from the surface down to 35 feet bgs during monitoring well installation, and the saprolite is believed to be the weathered material of quartz diorite/granodiorite.</td></tr>
<tr><td>Groundwater Flow Direction</td><td colspan="4">Based on water-level data collected prior to and after implementation of the SWMU 1 ROD, groundwater flow in the unconfined aquifer is generally towards the south-southwest in the northern portion of the site and to the southeast in the southern portion of the site. Groundwater is not currently used as a drinking water source at the former VNTR or by the residents of Vieques, Puerto Rico and there are no known private wells used for drinking water purposes. Potable water for the island population is supplied via a pipeline from the Rio Blanco filtration plant in eastern Puerto Rico.</td></tr>
<tr><td rowspan="8">SI Results Compared to Screening Levels</td><td rowspan="2">Analyte</td><td colspan="3">GW</td></tr>
<tr><td>Frequency of Detection</td><td>Frequency of Exceedance</td><td>Maximum Concentration (ng/L)</td></tr>
<tr><td>PFOA</td><td>0/6</td><td>0/6</td><td>ND</td></tr>
<tr><td>PFOS</td><td>0/6</td><td>0/6</td><td>ND</td></tr>
<tr><td>PFBS</td><td>1/6</td><td>0/6</td><td>1.02 J</td></tr>
<tr><td>PFHxS</td><td>1/6</td><td>0/6</td><td>1.28 J</td></tr>
<tr><td>PFNA</td><td>0/6</td><td>0/6</td><td>ND</td></tr>
<tr><td>HFPO-DA</td><td>0/6</td><td>0/6</td><td>ND</td></tr>
<tr><td>Results Summary, Conclusions, and Recommendations</td><td colspan="4">PFBS and PFHxS were detected in groundwater at concentrations more than two orders below the RSLs. Therefore, based on the information contained in the CSM and supported by the data collected during the SI, the area has been sufficiently characterized to conclude no further investigation or action is warranted at this time.</td></tr>
</table>

## Groundwater Analytical Results

- Groundwater samples were collected from the same six monitoring wells used as part of the SWMU 1 long-term monitoring.

- PFBS and PFHxS were detected in the groundwater at monitoring well CGW1MW11 at concentrations of 1.02 J and 1.28 J ng/L, respectively, which are more than two orders of magnitude below their respective RSLs (600 and 39 ng/L).
- HFPO-DA, PFNA, PFOS, and PFOA were not detected in groundwater.

### Human Health Risk Screening

An HHRS was not necessary because PFAS was not detected at concentrations above the RSLs.

### Area Summary and Path Forward

PFBS and PFHxS were detected in a groundwater sample, but at concentrations more than two orders of magnitude below their respective RSLs. Therefore, no further investigation or action for VNTR SWMU 1 is warranted at this time.

**TABLE 4-1**
**NASD AOC B: Former Wastewater Treatment Plant Surface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VWAB-PFAS-SO01 | | VWAB-PFAS-SO02 | VWAB-PFAS-SO03 | VWAB-PFAS-SO04 |
|---|---|---|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VWAB-PFAS-SS01-0001 | VWAB-PFAS-SS01P-0001 | VWAB-PFAS-SS02-0001 | VWAB-PFAS-SS03-0001 | VWAB-PFAS-SS04-0001 |
| **Sample Date** | **November 2022** | 5/11/2022 | 5/11/2022 | 5/11/2022 | 5/11/2022 | 5/11/2022 |
| **Chemical Name** | | | | | | |
| | | | | | | |
| **PFAS (NG/G)** | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.499 U | 0.498 U | 0.499 U | 0.5 U | 0.498 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.499 U | 0.498 U | 0.499 U | 0.5 U | 0.498 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.499 U | 0.498 U | **0.182 J** | 0.5 U | 0.498 U |
| Perfluorononanoic acid (PFNA) | 19 | **0.424 J** | **0.705 J** | **0.472 J** | **0.171 J** | 0.498 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | **24.5** | **32.2** | **24.8** | **5.91** | **7.85** |
| Perfluorooctanoic acid (PFOA) | 19 | **1.08** | **1.65** | **1.24** | **0.514 J** | **0.546 J** |

**Bold text indicates detected analyte**
Shading indicates result exceeded screening criteria
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = nanograms/gram

**TABLE 4-2**
**NASD AOC B: Former Wastewater Treatment Plant Subsurface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VWAB-PFAS-SO01 | | VWAB-PFAS-SO02 | VWAB-PFAS-SO03 | VWAB-PFAS-SO04 |
|---|---|---|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VWAB-PFAS-SB01-0406 | VWAB-PFAS-SB01P-0406 | VWAB-PFAS-SB02-0406 | VWAB-PFAS-SB03-0406 | VWAB-PFAS-SB04-0406 |
| **Sample Date** | **November 2022** | 5/11/2022 | 5/11/2022 | 5/11/2022 | 5/11/2022 | 5/11/2022 |
| **Chemical Name** | | | | | | |
| | | | | | | |
| **PFAS (NG/G)** | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluorononanoic acid (PFNA) | 19 | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | **1.06** | **0.659 J** | **4.95** | **3.32** | **8.83** |
| Perfluorooctanoic acid (PFOA) | 19 | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |

**Bold text indicates detected analyte**
Shading indicates result exceeded screening criteria
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = nanograms/gram

**TABLE 4-3**
**NASD AOC B: Former Wastewater Treatment Plant Groundwater Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater** | VWAB-PFAS-MW01 | |
|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VWAB-PFAS-GW01-0722 | VWAB-PFAS-GW01P-0722 |
| **Sample Date** | **November 2022** | 7/9/2022 | 7/9/2022 |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/L)** | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.16 U | 2.18 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | **36.9** | **37.2** |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | **181** | **197** |
| Perfluorononanoic acid (PFNA) | 5.9 | **1.6 J** | **1.85 J** |
| Perfluorooctane sulfonic acid (PFOS) | 4 | **83.3** | **82** |
| Perfluorooctanoic acid (PFOA) | 6 | **93.4** | **86.9** |

**Bold text indicates detected analyte**
Shading indicates result exceeded screening criteria
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/L = nanograms/liter

**TABLE 4-5**
**NASD Former Fire Station Building 2046 at the Public Works Area Surface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VWFS-PFAS-SO01 | | VWFS-PFAS-SO02 | | VWFS-PFAS-SO03 | VWFS-PFAS-SO04 | VWFS-PFAS-SO05 |
|---|---|---|---|---|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VWFS-PFAS-SS01-0001 | VWFS-PFAS-SS01P-0001 | VWFS-PFAS-SS02-0001 | VWFS-PFAS-SS02P-0001 | VWFS-PFAS-SS03-0001 | VWFS-PFAS-SS04-0001 | VWFS-PFAS-SS05-0001 |
| **Sample Date** | **November 2022** | 3/22/2022 | 3/22/2022 | 3/21/2022 | 3/21/2022 | 3/22/2022 | 3/22/2022 | 3/23/2022 |
| **Chemical Name** | | | | | | | | |
| | | | | | | | | |
| **PFAS (NG/G)** | | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.5 U | 0.5 U | 0.497 U | 0.507 U | 0.497 U | 0.499 U | 0.495 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.5 U | 0.5 U | 0.497 U | 0.507 U | 0.497 U | 0.499 U | 0.495 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | **0.436 J** | **0.445 J** | 0.497 U | 0.507 U | **0.182 J** | **1.39** | 0.495 U |
| Perfluorononanoic acid (PFNA) | 19 | 0.5 U | **0.467 J** | **0.858 J** | **0.335 J** | 0.497 U | **0.425 J** | 0.495 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | **27.2 J** | **69.4 J** | **13.3** | **9.87** | **2.22** | **36.7** | **0.51 J** |
| Perfluorooctanoic acid (PFOA) | 19 | **0.349 J** | **0.405 J** | **0.552 J** | 0.507 U | 0.497 U | **0.587 J** | 0.495 U |

**Bold text indicates detected analyte**
Shading indicates result exceeded screening criteria
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = nanograms/gram

**TABLE 4-6**
**NASD Former Fire Station Building 2046 at the Public Works Area Subsurface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Station ID | Residential Soil | VWFS-PFAS-SO01 | VWFS-PFAS-SO02 | | VWFS-PFAS-SO03 | VWFS-PFAS-SO04 | VWFS-PFAS-SO05 | |
|---|---|---|---|---|---|---|---|---|
| Sample ID | RSL, HQ=0.1 | VWFS-PFAS-SB01-0406 | VWFS-PFAS-SB02-0406 | VWFS-PFAS-SB02P-0406 | VWFS-PFAS-SB03-0406 | VWFS-PFAS-SB04-0406 | VWFS-PFAS-SB05-0406 | VWFS-PFAS-SB05D-5860 |
| Sample Date | November 2022 | 3/22/2022 | 3/21/2022 | 3/21/2022 | 3/22/2022 | 3/22/2022 | 3/23/2022 | 3/23/2022 |
| **Chemical Name** | | | | | | | | |
| | | | | | | | | |
| **PFAS (NG/G)** | | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.54 U | 0.538 U | 0.538 U | 0.573 U | 0.529 U | 0.563 U | 0.62 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.54 U | 0.538 U | 0.538 U | 0.573 U | 0.529 U | 0.563 U | 0.62 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | **2.87** | 0.538 U | 0.538 U | 0.573 U | **0.23 J** | 0.563 U | 0.62 U |
| Perfluorononanoic acid (PFNA) | 19 | 0.54 U | **2.19** | **3.55** | 0.573 U | **0.471 J** | 0.563 U | 0.62 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | **102** | **57.9 J** | **92.3 J** | **8.37 J** | **104** | 0.563 U | **3.75** |
| Perfluorooctanoic acid (PFOA) | 19 | 0.54 U | **0.232 J** | **0.331 J** | 0.573 U | 0.529 U | **0.362 J** | 0.62 U |

**Bold text indicates detected analyte**
Shading indicates result exceeded screening criteria
J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = nanograms/gram

**TABLE 4-7**

**NASD Former Fire Station Building 2046 at the Public Works Area Groundwater Compared to Screening Criteria**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | VWFS-PFAS-MW01 | | VWFS-PFAS-MW02 |
|---|---|---|---|---|
| **Sample ID** | | VWFS-PFAS-GW01-0622 | VWFS-PFAS-GW01P-0622 | VWFS-PFAS-GW02-0622 |
| **Sample Date** | | 6/23/2022 | 6/23/2022 | 6/22/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/L)** | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.46 U | 2.4 U | 2.43 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | **68700** | **63100** | **6610** |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | **159000** | **175000** | **104000** |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.46 U | 2.4 U | **72.8** |
| Perfluorooctane sulfonic acid (PFOS) | 4 | **36.9** | **35.8** | **4530** |
| Perfluorooctanoic acid (PFOA) | 6 | **247** | **246** | **29700 J** |

**Bold text indicates detected analyte**

Shading indicates result exceeded screening criteria

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L - nanograms/liter

**TABLE 4-9**
**Potential Former NASD Motor Pool Area Surface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil RSL, HQ=0.1 November 2022** | VWMP-PFAS-SO01 | VWMP-PFAS-SO02 | | VWMP-PFAS-SO03 | VWMP-PFAS-SO04 |
|---|---|---|---|---|---|---|
| **Sample ID** | | VWMP-PFAS-SS01-0001 | VWMP-PFAS-SS02-0001 | VWMP-PFAS-SS02P-0001 | VWMP-PFAS-SS03-0001 | VWMP-PFAS-SS04-0001 |
| **Sample Date** | | 3/24/2022 | 3/25/2022 | 3/25/2022 | 3/23/2022 | 3/29/2022 |
| **Chemical Name** | | | | | | |
| | | | | | | |
| **PFAS (NG/G)** | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Perfluorononanoic acid (PFNA) | 19 | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Perfluorooctane sulfonic acid (PFOS) | 13 | **0.227 J** | **0.739 J** | **0.723 J** | **0.41 J** | **1.01 J** |
| Perfluorooctanoic acid (PFOA) | 19 | 0.499 UJ | **0.534 J** | **1.61 J** | 0.501 UJ | 0.502 UJ |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.
NG/G = Nanograms/gram
**Detected Analyte**
**Result exceeded screening criteria**

**TABLE 4-10**
**Potential Former NASD Motor Pool Area Subsurface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Station ID | Residential Soil | VWMP-PFAS-SO01 | | VWMP-PFAS-SO02 | | | |
|---|---|---|---|---|---|---|---|
| Sample ID | RSL, HQ=0.1 | VWMP-PFAS-SB01-0406 | VWMP-PFAS-SB01D-4446 | VWMP-PFAS-SB02-0406 | VWMP-PFAS-SB02D-4850 | VWMP-PFAS-SB02DP-4850 | VWMP-PFAS-SB02P-0406 |
| Sample Date | November 2022 | 3/24/2022 | 3/24/2022 | 3/25/2022 | 3/25/2022 | 3/25/2022 | 3/25/2022 |
| **Chemical Name** | | | | | | | |
| | | | | | | | |
| **PFAS (NG/G)** | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ | 0.5 UJ |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ | 0.5 UJ |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ | 0.5 UJ |
| Perfluorononanoic acid (PFNA) | 19 | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ | 0.5 UJ |
| Perfluorooctane sulfonic acid (PFOS) | 13 | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ | 0.5 UJ |
| Perfluorooctanoic acid (PFOA) | 19 | 0.5 UJ | 0.498 UJ | **0.302 J** | 0.498 UJ | 0.5 UJ | 0.502 UJ |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.
NG/G = Nanograms/gram
**Detected Analyte**
**Result exceeded screening criteria**

**TABLE 4-10**
**Potential Former NASD Motor Pool Area Subsurface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VWMP-PFAS-SO03 | | VWMP-PFAS-SO04 | |
|---|---|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VWMP-PFAS-SB03-0406 | VWMP-PFAS-SB03D-4850 | VWMP-PFAS-SB04-0406 | VWMP-PFAS-SB04D-4749 |
| **Sample Date** | **November 2022** | 3/23/2022 | 3/23/2022 | 3/29/2022 | 3/29/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorononanoic acid (PFNA) | 19 | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorooctane sulfonic acid (PFOS) | 13 | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorooctanoic acid (PFOA) | 19 | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.
NG/G = Nanograms/gram
**Detected Analyte**
**Result exceeded screening criteria**

**TABLE 4-11**
**Potential Former NASD Motor Pool Area Groundwater Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | VWMP-PFAS-MW01 | VWMP-PFAS-MW02 | | VWMP-PFAS-MW03 |
|---|---|---|---|---|---|
| **Sample ID** | | VWMP-PFAS-GW01-0722 | VWMP-PFAS-GW02-0722 | VWMP-PFAS-GW02P-0722 | VWMP-PFAS-GW03-0722 |
| **Sample Date** | | 7/9/2022 | 7/9/2022 | 7/9/2022 | 7/9/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/L)** | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.4 U | 2.19 U | 2.11 U | 2.42 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | **0.958 J** | **3.59 J** | **3.42 J** | **8.06** |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | 2.4 U | **31.9** | **31.2** | **71.5** |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.4 U | 2.19 U | 2.11 U | 2.42 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | **1.65 J** | **96.3** | **91.7** | **87.1** |
| Perfluorooctanoic acid (PFOA) | 6 | **4.8 J** | **19.7** | **19.4** | **10.8** |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/L - Nanograms/liter
**Detected Analyte**
**Result exceeded screening criteria**

**TABLE 4-13**
**NASD AOC H: Abandoned Power Plant/Former Fire Training Area Surface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VWAH-PFAS-SO01 | | VWAH-PFAS-SO02 | VWAH-PFAS-SO03 | VWAH-PFAS-SO04 |
|---|---|---|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VWAH-PFAS-SS01-0002 | VWAH-PFAS-SS01P-0002 | VWAH-PFAS-SS02-0002 | VWAH-PFAS-SS03-0002 | VWAH-PFAS-SS04-0001 |
| **Sample Date** | **November 2022** | 4/21/2022 | 4/21/2022 | 4/21/2022 | 4/21/2022 | 4/21/2022 |
| **Chemical Name** | | | | | | |
| | | | | | | |
| **PFAS (NG/G)** | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluorononanoic acid (PFNA) | 19 | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | 0.496 U | **0.195 J** | 0.503 U | 0.496 U | **0.258 J** |
| Perfluorooctanoic acid (PFOA) | 19 | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
**Detected Analyte**
**Result exceeded screening criteria**

**TABLE 4-14**
**NASD AOC H: Abandoned Power Plant/Former Fire Training Area**
**Subsurface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VWAH-PFAS-SO01 | | VWAH-PFAS-SO02 | |
|---|---|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VWAH-PFAS-SB01-0406 | VWAH-PFAS-SB01P-0406 | VWAH-PFAS-SB02-0406 | VWAH-PFAS-SB02D-0810 |
| **Sample Date** | **November 2022** | 4/21/2022 | 4/21/2022 | 4/21/2022 | 4/21/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluorohexanesulfonic acid (PFHxS) | 19 | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluorononanoic acid (PFNA) | 130 | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluorooctane sulfonic acid (PFOS) | 19 | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluorooctanoic acid (PFOA) | 13 | 0.496 U | 0.505 U | 0.501 U | 0.497 U |

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
Detected Analyte

**TABLE 4-14**
**NASD AOC H: Abandoned Power Plant/Former Fire Training Area**
**Subsurface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VWAH-PFAS-SO03 | | VWAH-PFAS-SO04 | |
|---|---|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VWAH-PFAS-SB03-0406 | VWAH-PFAS-SB03D-0709 | VWAH-PFAS-SB04-0406 | VWAH-PFAS-SB04D-0810 |
| **Sample Date** | **November 2022** | 4/21/2022 | 4/21/2022 | 4/21/2022 | 4/21/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorohexanesulfonic acid (PFHxS) | 19 | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorononanoic acid (PFNA) | 130 | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorooctane sulfonic acid (PFOS) | 19 | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorooctanoic acid (PFOA) | 13 | 0.5 U | 0.503 U | 0.498 U | 0.503 U |

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
Detected Analyte

**TABLE 4-15**
**NASD AOC H: Abandoned Power Plant/Former Fire Training Area Groundwater Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | VWAH-PFAS-MW01 | | VWAH-PFAS-MW02 |
|---|---|---|---|---|
| **Sample ID** | | VWAH-PFAS-GW01-0622 | VWAH-PFAS-GW01P-0622 | VWAH-PFAS-GW02-0622 |
| **Sample Date** | | 6/28/2022 | 6/28/2022 | 6/28/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/L)** | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.22 U | 2.3 U | 2.35 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | 2.22 U | 2.3 U | 2.35 U |
| Perfluorohexanesulfonic acid (PFHxS) | 5.9 | 2.22 U | 2.3 U | 2.35 U |
| Perfluorononanoic acid (PFNA) | 39 | 2.22 U | 2.3 U | 2.35 U |
| Perfluorooctane sulfonic acid (PFOS) | 6 | 2.22 U | 2.3 U | 2.35 U |
| Perfluorooctanoic acid (PFOA) | 4 | 2.22 U | 2.3 U | 2.35 U |

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/L = Nanograms/liter
Detected Analyte

**TABLE 4-16**
**NASD AOC H: Abandoned Power Plant/Former Fire Training Area Surface Water Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1** | VWAH-PFAS-SDSW01 | | VWAH-PFAS-SDSW02 | VWAH-PFAS-SDSW03 |
|---|---|---|---|---|---|
| **Sample ID** | | VWAH-PFAS-SW01-0222 | VWAH-PFAS-SW01P-0222 | VWAH-PFAS-SW02-0222 | VWAH-PFAS-SW03-0222 |
| **Sample Date** | **November 2022** | 2/3/2022 | 2/3/2022 | 2/3/2022 | 2/3/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/L)** | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.35 U | 2.3 U | 2.34 UJ | 2.3 UJ |
| Perfluorobutanesulfonic acid (PFBS) | 600 | 2.35 U | 2.3 UJ | 2.34 U | 2.3 UJ |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | **1.75 J** | **1.54 J** | **0.944 J** | 2.3 U |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| Perfluorooctanoic acid (PFOA) | 6 | 2.35 U | 2.3 U | 2.34 U | 2.3 U |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.
NG/L = Nanograms/liter
**Detected Analyte**
**Result exceeded screening criteria**

**TABLE 4-17**
**NASD AOC H: Abandoned Power Plant/Former Fire Training Area Sediment Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VWAH-PFAS-SDSW01 | | VWAH-PFAS-SDSW02 | VWAH-PFAS-SDSW03 |
|---|---|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VWAH-PFAS-SD01-0006 | VWAH-PFAS-SD01P-0006 | VWAH-PFAS-SD02-0006 | VWAH-PFAS-SD03-0006 |
| **Sample Date** | **November 2022** | 2/3/2022 | 2/3/2022 | 2/3/2022 | 2/3/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorohexanesulfonic acid (PFHxS) | 19 | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorononanoic acid (PFNA) | 130 | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorooctane sulfonic acid (PFOS) | 19 | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorooctanoic acid (PFOA) | 13 | 0.499 U | 0.5 U | 0.5 U | 0.502 U |

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
Detected Analyte

**TABLE 4-19**
**NASD SWMU 6: Former Mangrove Disposal Site Surface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil RSL, HQ=0.1 November 2022** | VWS6-PFAS-SO01 | |
|---|---|---|---|
| **Sample ID** | | VWS6-PFAS-SS01-0001 | |
| **Sample Date** | | 2/7/2022 | |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/G)** | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.499 | U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.499 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 19 | 0.499 | U |
| Perfluorononanoic acid (PFNA) | 130 | 0.499 | U |
| Perfluorooctane sulfonic acid (PFOS) | 19 | 0.499 | U |
| Perfluorooctanoic acid (PFOA) | 13 | 0.499 | U |

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
Detected Analyte

**TABLE 4-20**
**NASD SWMU 6: Former Mangrove Disposal Site Surface Water Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL,** | VWS6-PFAS-SDSW01 | VWS6-PFAS-SDSW02 |
|---|---|---|---|
| **Sample ID** | **HQ=0.1** | VWS6-PFAS-SW01-0222 | VWS6-PFAS-SW02-0222 |
| **Sample Date** | **November 2022** | 2/4/2022 | 2/4/2022 |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/L)** | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.31 U | 2.36 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | 2.31 UJ | 2.36 U |
| Perfluorohexanesulfonic acid (PFHxS) | 5.9 | 2.31 U | 2.36 U |
| Perfluorononanoic acid (PFNA) | 39 | 2.31 U | 2.36 U |
| Perfluorooctane sulfonic acid (PFOS) | 6 | 2.31 U | 2.36 U |
| Perfluorooctanoic acid (PFOA) | 4 | 2.31 U | 2.36 U |

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.
NG/L = Nanograms/liter
Detected Analyte

**TABLE 4-21**
**NASD SWMU 6: Former Mangrove Disposal Site Sediment Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VWS6-PFAS-SDSW01 | VWS6-PFAS-SDSW02 |
|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VWS6-PFAS-SD01-0006 | VWS6-PFAS-SD02-0006 |
| **Sample Date** | **November 2022** | 2/4/2022 | 2/4/2022 |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/G)** | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.628 U | 0.533 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.628 U | 0.533 U |
| Perfluorohexanesulfonic acid (PFHxS) | 19 | 0.628 U | 0.533 U |
| Perfluorononanoic acid (PFNA) | 130 | 0.628 U | 0.533 U |
| Perfluorooctane sulfonic acid (PFOS) | 19 | 0.628 U | 0.533 U |
| Perfluorooctanoic acid (PFOA) | 13 | 0.628 U | 0.533 U |

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
Detected Analyte

**TABLE 4-23**
**NASD SWMU 7: Former Quebrada Disposal Site Surface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VWS7-PFAS-SO01 | | VWS7-PFAS-SO02 | VWS7-PFAS-SO03 |
|---|---|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VWS7-PFAS-SS01-0001 | VWS7-PFAS-SS01P-0001 | VWS7-PFAS-SS02-0001 | VWS7-PFAS-SS03-0001 |
| **Sample Date** | **November 2022** | 3/28/2022 | 3/28/2022 | 3/28/2022 | 3/29/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorononanoic acid (PFNA) | 19 | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorooctane sulfonic acid (PFOS) | 13 | **0.251 J** | **0.211 J** | **0.407 J** | 0.5 UJ |
| Perfluorooctanoic acid (PFOA) | 19 | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.
NG/G = Nanograms/gram
**Detected Analyte**
**Result exceeded screening criteria**

**TABLE 4-24**
**NASD SWMU 7: Former Quebrada Disposal Site Groundwater Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | VWS7-PFAS-MW01 | |
|---|---|---|---|
| **Sample ID** | | VWS7-PFAS-GW01-0722 | VWS7-PFAS-GW01P-0722 |
| **Sample Date** | | 7/9/2022 | 7/9/2022 |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/L)** | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.3 U | 2.22 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | **1.79 J** | **1.63 J** |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | 2.3 U | 2.22 U |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.3 U | 2.22 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | 2.3 U | 2.22 U |
| Perfluorooctanoic acid (PFOA) | 6 | 2.3 U | 2.22 U |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/L = Nanograms/liter
**Detected Analyte**
**Result exceeded screening criteria**

**TABLE 4-26**
**VNTR Former Camp Garcia Runway Surface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil RSL, HQ=0.1 November 2022** | VERW-PFAS-SO01 | VERW-PFAS-SO02 | VERW-PFAS-SO03 | VERW-PFAS-SO04 | VERW-PFAS-SO05 |
|---|---|---|---|---|---|---|
| **Sample ID** | | VERW-PFAS-SS01-0001 | VERW-PFAS-SS02-0001 | VERW-PFAS-SS03-0001 | VERW-PFAS-SS04-0001 | VERW-PFAS-SS05-0001 |
| **Sample Date** | | 2/24/2022 | 2/28/2022 | 2/25/2022 | 2/25/2022 | 3/1/2022 |
| **Chemical Name** | | | | | | |
| | | | | | | |
| **PFAS (NG/G)** | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Perfluorononanoic acid (PFNA) | 19 | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | 0.497 U | 0.506 U | **2.46** | 0.503 U | 0.497 U |
| Perfluorooctanoic acid (PFOA) | 19 | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
**Detected analyte**
**Result exceeded screening criteria**

**TABLE 4-27**
**VNTR Former Camp Garcia Runway Subsurface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Station ID | Residential Soil RSL, HQ=0.1 November 2022 | VERW-PFAS-SO01 | | VERW-PFAS-SO02 | | VERW-PFAS-SO03 | |
|---|---|---|---|---|---|---|---|
| Sample ID | | VERW-PFAS-SB01-0406 | VERW-PFAS-SB01D-2728 | VERW-PFAS-SB02-0406 | VERW-PFAS-SB02D-3132 | VERW-PFAS-SB03-0406 | VERW-PFAS-SB03D-3132 |
| Sample Date | | 2/24/2022 | 2/24/2022 | 2/28/2022 | 2/28/2022 | 2/25/2022 | 2/25/2022 |
| **Chemical Name** | | | | | | | |
| | | | | | | | |
| **PFAS (NG/G)** | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.497 U | 0.503 U | 0.493 U | 0.498 U | 0.496 U | 0.489 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.497 U | 0.503 U | 0.493 U | 0.498 U | 0.496 U | 0.489 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.497 U | 0.503 U | 0.493 U | 0.498 U | **1.16** | 0.489 U |
| Perfluorononanoic acid (PFNA) | 19 | 0.497 U | 0.503 U | 0.493 U | 0.498 U | 0.496 U | 0.489 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | 0.497 U | 0.503 U | 0.493 U | 0.498 U | **2.71** | 0.489 U |
| Perfluorooctanoic acid (PFOA) | 19 | 0.497 U | 0.503 U | 0.493 U | 0.498 U | 0.496 U | 0.489 U |

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
**Detected analyte**
**Result exceeded screening criteria**

**TABLE 4-27**
**VNTR Former Camp Garcia Runway Subsurface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Station ID | Residential Soil RSL, HQ=0.1 November 2022 | VERW-PFAS-SO04 | | VERW-PFAS-SO05 | |
|---|---|---|---|---|---|
| Sample ID | | VERW-PFAS-SB04-0406 | VERW-PFAS-SB04D-3233 | VERW-PFAS-SB05-0406 | VERW-PFAS-SB05D-1920 |
| Sample Date | | 2/25/2022 | 2/25/2022 | 3/1/2022 | 3/1/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.498 U | 0.501 U | 0.504 U | 0.504 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.498 U | 0.501 U | 0.504 U | 0.504 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.498 U | 0.501 U | 0.504 U | 0.504 U |
| Perfluorononanoic acid (PFNA) | 19 | 0.498 U | 0.501 U | 0.504 U | 0.504 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | 0.498 U | 0.501 U | 0.504 U | 0.504 U |
| Perfluorooctanoic acid (PFOA) | 19 | 0.498 U | 0.501 U | 0.504 U | 0.504 U |

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
**Detected analyte**
**Result exceeded screening criteria**

**TABLE 4-28**
**VNTR Former Camp Garcia Runway Groundwater Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | VERW-PFAS-MW01 | VERW-PFAS-MW02 | EPI04-MW26 |
|---|---|---|---|---|
| **Sample ID** | | VERW-PFAS-GW01-0422 | VERW-PFAS-GW02-0422 | EPI04-PFAS-GW26-0222 |
| **Sample Date** | | 4/6/2022 | 4/7/2022 | 2/2/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/L)** | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.27 U | 2.25 U | 2.3 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | **1.19 J** | **13.9** | **6.7** |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | **5.17** | **44.2** | **18.1** |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.27 U | 2.25 U | 2.3 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | 2.27 U | **21.2** | **1.1 J** |
| Perfluorooctanoic acid (PFOA) | 6 | 2.27 U | 2.25 U | 2.3 U |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/L = Nanograms/liter
**Detected analyte**
**Result exceeded screening criteria**

**TABLE 4-30**
**PI 5: Surface Water Drainage Area from Former Camp Garcia Runway Groundwater Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | VEP5-PFAS-MW01 | |
|---|---|---|---|
| **Sample ID** | | VEP5-PFAS-GW01-0422 | |
| **Sample Date** | | 4/6/2022 | |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/L)** | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.25 | U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | **2.65** | **J** |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | **1.44** | **J** |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.25 | U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | 2.25 | U |
| Perfluorooctanoic acid (PFOA) | 6 | 2.25 | UJ |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.
NG/L = Nanograms/liter
**Detected analyte**
**Result exceeded screening criteria**

**TABLE 4-31**

**PI 5: Surface Water Drainage Area from Former Camp Garcia Runway Surface Soil Compared to Screening Criteria**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VEP5-PFAS-SO01 | VEP5-PFAS-SO02 |
|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VEP5-PFAS-SS01-0001 | VEP5-PFAS-SS02-0001 |
| **Sample Date** | **November 2022** | 2/23/2022 | 2/24/2022 |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/G)** | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.5 U | 0.507 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.5 U | 0.507 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.5 U | 0.507 U |
| Perfluorononanoic acid (PFNA) | 19 | 0.5 U | 0.507 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | 0.5 U | **0.193 J** |
| Perfluorooctanoic acid (PFOA) | 19 | 0.5 U | 0.507 U |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/G = Nanograms/gram

**Detected analyte**

**Result exceeded screening criteria**

**TABLE 4-32**

**PI 5: Surface Water Drainage Area from Former Camp Garcia Runway Subsurface Soil Compared to Screening Criteria**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VEP5-PFAS-SO01 | | VEP5-PFAS-SO02 | |
|---|---|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VEP5-PFAS-SB01-0406 | VEP5-PFAS-SB01D-1516 | VEP5-PFAS-SB02-0406 | VEP5-PFAS-SB02D-2425 |
| **Sample Date** | **November 2022** | 2/23/2022 | 2/23/2022 | 2/24/2022 | 2/24/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorononanoic acid (PFNA) | 19 | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorooctanoic acid (PFOA) | 19 | 0.502 U | 0.507 U | 0.498 U | 0.493 U |

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/G = Nanograms/gram

Detected analyte

**TABLE 4-34**
**VNTR SWMU 20: Former Helicopter Maintenance Area Surface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil RSL, HQ=0.1 November 2022** | EPI04-SO01 | |
|---|---|---|---|
| **Sample ID** | | VEP4-PFAS-SS01-0001 | |
| **Sample Date** | | 3/3/2022 | |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/G)** | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.504 | U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.504 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.504 | U |
| Perfluorononanoic acid (PFNA) | 19 | 0.504 | U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | **1.08** | |
| Perfluorooctanoic acid (PFOA) | 19 | 0.504 | U |

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
**Detected analyte**
**Result exceeded screening criteria**

**TABLE 4-35**
**VNTR SWMU 20: Former Helicopter Maintenance Area Subsurface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | EPI04-SO01 | |
|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VEP4-PFAS-SB01-0406 | |
| **Sample Date** | **November 2022** | 3/3/2022 | |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/G)** | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.494 | U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.494 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.494 | U |
| Perfluorononanoic acid (PFNA) | 19 | 0.494 | U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | 0.494 | U |
| Perfluorooctanoic acid (PFOA) | 19 | 0.494 | U |

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
Detected analyte

**TABLE 4-36**
**VNTR SWMU 20: Former Helicopter Maintenance Area Groundwater**
**Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | EPI04-MW01 | | EPI04-MW03 | EPI04-MW04 | EPI04-MW05 |
|---|---|---|---|---|---|---|
| **Sample ID** | | VEP4-PFAS-GW01-0222 | VEP4-GW01-0722 | VEP4-GW03-0722 | VEP4-GW04-0722 | VEP4-GW05-0722 |
| **Sample Date** | | 2/8/2022 | 7/4/2022 | 7/13/2022 | 7/13/2022 | 7/12/2022 |
| **Chemical Name** | | | | | | |
| | | | | | | |
| **PFAS (NG/L)** | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.31 U | 2.27 U | 2.5 U | 2.13 U | 2.22 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | **125** | **132** | **70** | **101** | **44.2** |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | **358** | **512** | **498** | **517** | **260** |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.31 U | **1.14 J** | **1.04 J** | 2.13 U | 2.22 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | **41.3** | **54.9** | **107** | **44.3** | **32.2** |
| Perfluorooctanoic acid (PFOA) | 6 | **35.4** | **42.4** | **40.7** | **28.6** | **15.9** |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L = Nanograms/liter

**Detected analyte**

**Result exceeded screening criteria**

**TABLE 4-36**
**VNTR SWMU 20: Former Helicopter Maintenance Area Groundwater**
**Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Station ID | Tapwater RSL, HQ=0.1 November 2022 | EPI04-MW06 | | EPI04-MW07 | | EPI04-MW08 | EPI04-MW09 | EPI04-MW10 |
|---|---|---|---|---|---|---|---|---|
| Sample ID | | VEP4-PFAS-GW06-0222 | VEP4-GW06-0722 | VEP4-GW07-0722 | VEP4-GW07P-0722 | VEP4-GW08-0722 | VEP4-GW09-0722 | VEP4-GW10-0722 |
| Sample Date | | 2/1/2022 | 7/12/2022 | 7/4/2022 | 7/4/2022 | 7/11/2022 | 7/5/2022 | 7/5/2022 |
| **Chemical Name** | | | | | | | | |
| | | | | | | | | |
| **PFAS (NG/L)** | | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.39 U | 2.38 U | 2.1 U | 2.14 U | 2.22 U | 2.15 U | 2.18 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | **80.6** | **77** | **14.6** | **12.5** | **10.7** | **87.1** | **10.4** |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | **563** | **545** | **76.1** | **63.3** | **60.8** | **628** | **59.6** |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.39 U | **2.02 J** | 2.1 U | 2.14 U | 2.22 U | 2.15 U | 2.18 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | **71.1** | **78.2** | **3.45 J** | **3.32 J** | **5.8** | **73.6** | **4.33 J** |
| Perfluorooctanoic acid (PFOA) | 6 | **36.7** | **34.9** | **2.88 J** | **2.55 J** | **2.61 J** | **35.7** | **2.24 J** |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L = Nanograms/liter

**Detected analyte**

**Result exceeded screening criteria**

**TABLE 4-36**
**VNTR SWMU 20: Former Helicopter Maintenance Area Groundwater**
**Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | EPI04-MW11 | EPI04-MW12 | EPI04-MW13 | EPI04-MW13D | EPI04-MW14 | |
|---|---|---|---|---|---|---|---|
| **Sample ID** | | VEP4-GW11-0722 | VEP4-GW12-0722 | VEP4-GW13-0722 | VEP4-GW13D-0722 | VEP4-GW14-0722 | VEP4-GW14P-0722 |
| **Sample Date** | | 7/12/2022 | 7/12/2022 | 7/5/2022 | 7/5/2022 | 7/5/2022 | 7/5/2022 |
| **Chemical Name** | | | | | | | |
| | | | | | | | |
| **PFAS (NG/L)** | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.2 U | 2.22 U | 2.26 U | 2.15 U | 2.14 U | 2.2 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | **76.9** | **12.1** | **13.3** | **3.59 J** | **77.9** | **67.6** |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | **549** | **78.9** | **74.9** | **18.3** | **506** | **536** |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.2 U | 2.22 U | 2.26 U | 2.15 U | 2.14 U | 2.2 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | **77** | **9.05** | **5.84** | **1.85 J** | **54.4** | **59.2** |
| Perfluorooctanoic acid (PFOA) | 6 | **33.9** | **4.07 J** | **4.24 J** | **0.89 J** | **33** | **29.7** |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L = Nanograms/liter

**Detected analyte**

**Result exceeded screening criteria**

**TABLE 4-36**
**VNTR SWMU 20: Former Helicopter Maintenance Area Groundwater**
**Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | EPI04-MW15 | | EPI04-MW16 | EPI04-MW17 | EPI04-MW17D | EPI04-MW18 | EPI04-MW19 |
|---|---|---|---|---|---|---|---|---|
| **Sample ID** | | VEP4-PFAS-GW15-0222 | VEP4-GW15-0622 | VEP4-GW16-0622 | VEP4-GW17-0622 | VEP4-GW17D-0622 | VEP4-GW18-0622 | VEP4-GW19-0722 |
| **Sample Date** | | 2/8/2022 | 6/30/2022 | 6/30/2022 | 6/30/2022 | 6/30/2022 | 6/30/2022 | 7/4/2022 |
| **Chemical Name** | | | | | | | | |
| | | | | | | | | |
| **PFAS (NG/L)** | | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.25 U | 2.26 U | 2.16 U | 2.13 U | 2.16 U | 2.16 U | 2.12 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | **90** | **89.6** | **50.6** | **27.4** | **8.81** | **34.5** | **65** |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | **592** | **661** | **331** | **135** | **35.2** | **249** | **247** |
| Perfluorononanoic acid (PFNA) | 5.9 | **1.72 J** | **1.12 J** | **0.821 J** | 2.13 U | 2.16 U | 2.16 U | 2.12 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | **62.9** | **86.4** | **40.8** | **6.89** | **1.83 J** | **21.6** | **10.5** |
| Perfluorooctanoic acid (PFOA) | 6 | **34.7** | **42.3** | **20.6** | **4.44** | **1.41 J** | **13.7** | **7.28** |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L = Nanograms/liter

**Detected analyte**

**Result exceeded screening criteria**

**TABLE 4-36**
**VNTR SWMU 20: Former Helicopter Maintenance Area Groundwater**
**Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | EPI04-MW20 | EPI04-MW21 | EPI04-MW22 | EPI04-MW23 | EPI04-MW24 | | EPI04-MW24D |
|---|---|---|---|---|---|---|---|---|
| **Sample ID** | | VEP4-GW20-0722 | VEP4-GW21-0722 | VEP4-GW22-0722 | VEP4-GW23-0722 | VEP4-PFAS-GW24-0222 | VEP4-GW24-0622 | VEP4-GW24D-0622 |
| **Sample Date** | | 7/4/2022 | 7/4/2022 | 7/4/2022 | 7/1/2022 | 2/1/2022 | 6/29/2022 | 6/29/2022 |
| **Chemical Name** | | | | | | | | |
| | | | | | | | | |
| **PFAS (NG/L)** | | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.22 U | 2.13 U | 2.15 U | 2.22 U | 2.36 U | 2.06 U | 2.13 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | **37.8** | **144** | **138** | **22.6** | **19.2** | **20.5** | **13.9** |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | **131** | **469** | **600** | **84.1** | **61.4** | **69.9** | **73.2** |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.22 U | 2.13 U | **0.784 J** | 2.22 U | 2.36 U | 2.06 U | 2.13 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | **12** | **47.1** | **45.7** | **2.85 J** | **2.92 J** | 2.22 U | 2.13 U |
| Perfluorooctanoic acid (PFOA) | 6 | **6.82** | **41.7** | **46.4** | **2.07 J** | **1.11 J** | 2.06 U | 2.13 U |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L = Nanograms/liter

**Detected analyte**

**Result exceeded screening criteria**

**TABLE 4-36**
**VNTR SWMU 20: Former Helicopter Maintenance Area Groundwater**
**Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | EPI04-MW25 | | EPI04-MW25D | EPI04-MW26 | EPI04-MW27 | EPI04-MW28 | EPI04-MW28D |
|---|---|---|---|---|---|---|---|---|
| **Sample ID** | | VEP4-GW25-0622 | VEP4-GW25P-0622 | VEP4-GW25D-0622 | VEP4-GW26-0722 | VEP4-GW27-0722 | VEP4-GW28-0622 | VEP4-GW28D-0622 |
| **Sample Date** | | 6/27/2022 | 6/27/2022 | 6/27/2022 | 7/1/2022 | 7/1/2022 | 6/29/2022 | 6/29/2022 |
| **Chemical Name** | | | | | | | | |
| | | | | | | | | |
| **PFAS (NG/L)** | | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.22 U | 2.22 U | 2.16 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | 2.22 U | 2.22 U | 2.16 U | **6.38** | **0.805 J** | 2.17 U | 2.28 U |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | 2.22 U | **1.39 J** | 2.16 U | **22.2** | **2.73 J** | 2.17 U | 2.28 U |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.22 U | 2.22 U | 2.16 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | 2.22 U | 2.22 U | 2.16 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U |
| Perfluorooctanoic acid (PFOA) | 6 | 2.22 U | 2.22 U | 2.16 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L = Nanograms/liter

**Detected analyte**

**Result exceeded screening criteria**

**TABLE 4-36**
**VNTR SWMU 20: Former Helicopter Maintenance Area Groundwater**
**Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | EPI04-MW29 | EPI04-MW30 | | EPI04-MW31 | EPI04-MW32 | EPI04-MW33 |
|---|---|---|---|---|---|---|---|
| **Sample ID** | | VEP4-GW29-0622 | VEP4-GW30-0722 | VEP4-GW30P-0722 | VEP4-GW31-0622 | VEP4-GW32-0722 | VEP4-GW33-0722 |
| **Sample Date** | | 6/27/2022 | 7/1/2022 | 7/1/2022 | 6/28/2022 | 7/7/2022 | 7/7/2022 |
| **Chemical Name** | | | | | | | |
| | | | | | | | |
| **PFAS (NG/L)** | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.15 U | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | **3.3 J** | **40.3** | **41.2** | 2.22 U | **0.987 J** | 2.16 U |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | **14.3** | **120** | **119** | 2.22 U | 2.07 U | 2.16 U |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.15 U | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | 2.15 U | **2.03 J** | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| Perfluorooctanoic acid (PFOA) | 6 | 2.15 U | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L = Nanograms/liter

**Detected analyte**

**Result exceeded screening criteria**

**TABLE 4-38**
**Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330 Subsurface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil RSL, HQ=0.1 November 2022** | VEFS-PFAS-SO01 | VEFS-PFAS-SO02 |
|---|---|---|---|
| **Sample ID** | | VEFS-PFAS-SB01-0406 | VEFS-PFAS-SB02-0406 |
| **Sample Date** | | 3/15/2022 | 3/14/2022 |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/G)** | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.526 U | 0.519 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.526 U | 0.519 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | **8.44** | **19.8** |
| Perfluorononanoic acid (PFNA) | 19 | 0.526 U | 0.519 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | **0.324 J** | **26.7** |
| Perfluorooctanoic acid (PFOA) | 19 | **1.1** | **5.78** |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
**Detected analyte**
**Result exceeded screening criteria**

**TABLE 4-39**

**Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330 Groundwater Compared to Screening Criteria**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | VEFS-PFAS-MW01 | | VEFS-PFAS-MW02 |
|---|---|---|---|---|
| **Sample ID** | | VEFS-PFAS-GW01-0722 | VEFS-PFAS-GW01P-0722 | VEFS-PFAS-GW02-0722 |
| **Sample Date** | | 7/11/2022 | 7/11/2022 | 7/11/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/L)** | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.18 U | 2.23 U | 2.15 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | **14600** | **15400** | **22** |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | **110000** | **101000** | **74.1** |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.18 U | 2.23 U | 2.15 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | **10.2** | **17.1** | **43.3** |
| Perfluorooctanoic acid (PFOA) | 6 | **3100** | **2750** | **9.89** |

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L = Nanograms/liter

**Detected analyte**

**Result exceeded screening criteria**

**TABLE 4-41**
**VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building Surface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil RSL, HQ=0.1 November 2022** | VEW10-PFAS-SO01 | VEW10-PFAS-SO02 | VEW10-PFAS-SO03 | VEW10-PFAS-SO04 | VEW10-PFAS-SO05 | VEW10-PFAS-SO06 |
|---|---|---|---|---|---|---|---|
| **Sample ID** | | VEW10-PFAS-SS01-0001 | VEW10-PFAS-SS02-0001 | VEW10-PFAS-SS03-0001 | VEW10-PFAS-SS04-0001 | VEW10-PFAS-SS05-0001 | VEW10-PFAS-SS06-0001 |
| **Sample Date** | | 3/9/2022 | 3/9/2022 | 3/9/2022 | 3/9/2022 | 3/2/2022 | 3/1/2022 |
| **Chemical Name** | | | | | | | |
| | | | | | | | |
| **PFAS (NG/G)** | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.502 U | 0.502 U | 0.49 U | 0.506 U | 0.501 U | 0.505 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.502 U | 0.502 U | 0.49 U | 0.506 U | 0.501 U | 0.505 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.502 U | 0.502 U | 0.49 U | 0.506 U | 0.501 U | 0.505 U |
| Perfluorononanoic acid (PFNA) | 19 | 0.502 U | **0.254 J** | 0.49 U | 0.506 U | 0.501 U | 0.505 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | **1.13** | **24.4** | **0.564 J** | **14.6** | 0.501 U | **0.44 J** |
| Perfluorooctanoic acid (PFOA) | 19 | 0.502 U | **0.367 J** | 0.49 U | **0.265 J** | 0.501 U | **0.234 J** |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
**Detected analyte**
**Result exceeded screening criteria**

**TABLE 4-42**
**VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building Subsurface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VEW10-PFAS-SO01 | | VEW10-PFAS-SO02 | VEW10-PFAS-SO03 | |
|---|---|---|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VEW10-PFAS-SB01-0406 | VEW10-PFAS-SB01D-2627 | VEW10-PFAS-SB02-0406 | VEW10-PFAS-SB03-0406 | VEW10-PFAS-SB03D-2324 |
| **Sample Date** | **November 2022** | 3/9/2022 | 3/9/2022 | 3/9/2022 | 3/9/2022 | 3/9/2022 |
| **Chemical Name** | | | | | | |
| | | | | | | |
| **PFAS (NG/G)** | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.492 U | 0.502 U | 0.502 U | 0.498 U | 0.493 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.492 U | 0.502 U | 0.502 U | 0.498 U | 0.493 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.492 U | 0.502 U | 0.502 U | 0.498 U | 0.493 U |
| Perfluorononanoic acid (PFNA) | 19 | 0.492 U | 0.502 U | 0.502 U | 0.498 U | 0.493 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | 0.492 U | 0.502 U | **1.45** | 0.498 U | 0.493 U |
| Perfluorooctanoic acid (PFOA) | 19 | 0.492 U | 0.502 U | 0.502 U | 0.498 U | 0.493 U |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
**Detected analyte**
**Result exceeded screening criteria**

**TABLE 4-42**
**VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building Subsurface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VEW10-PFAS-SO04 | | VEW10-PFAS-SO05 | |
|---|---|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VEW10-PFAS-SB04-0406 | VEW10-PFAS-SB04D-2829 | VEW10-PFAS-SB05-0406 | VEW10-PFAS-SB05D-2829 |
| **Sample Date** | **November 2022** | 3/9/2022 | 3/9/2022 | 3/2/2022 | 3/2/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.491 U | 0.5 U | 0.493 U | 0.497 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.491 U | 0.5 U | 0.493 U | 0.497 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.491 U | 0.5 U | 0.493 U | 0.497 U |
| Perfluorononanoic acid (PFNA) | 19 | 0.491 U | 0.5 U | 0.493 U | 0.497 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | **0.335 J** | 0.5 U | 0.493 U | 0.497 U |
| Perfluorooctanoic acid (PFOA) | 19 | 0.491 U | 0.5 U | 0.493 U | 0.497 U |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
**Detected analyte**
**Result exceeded screening criteria**

**TABLE 4-42**
**VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building Subsurface Soil Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Residential Soil** | VEW10-PFAS-SO06 | |
|---|---|---|---|
| **Sample ID** | **RSL, HQ=0.1** | VEW10-PFAS-SB06-0406 | VEW10-PFAS-SB06D-0708 |
| **Sample Date** | **November 2022** | 3/1/2022 | 3/1/2022 |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/G)** | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 23 | 0.502 U | 0.5 U |
| Perfluorobutanesulfonic acid (PFBS) | 1,900 | 0.502 U | 0.5 U |
| Perfluorohexanesulfonic acid (PFHxS) | 130 | 0.502 U | 0.5 U |
| Perfluorononanoic acid (PFNA) | 19 | 0.502 U | 0.5 U |
| Perfluorooctane sulfonic acid (PFOS) | 13 | 0.502 U | 0.5 U |
| Perfluorooctanoic acid (PFOA) | 19 | 0.502 U | 0.5 U |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/G = Nanograms/gram
**Detected analyte**
**Result exceeded screening criteria**

**TABLE 4-43**
**VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building Groundwater Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | VEW10-PFAS-MW01 | | VEW10-PFAS-MW02 | VEW10-PFAS-MW03 | VEW10-PFAS-MW04 |
|---|---|---|---|---|---|---|
| **Sample ID** | | VEW10-PFAS-GW01-0422 | VEW10-PFAS-GW01P-0422 | VEW10-PFAS-GW02-0422 | VEW10-PFAS-GW03-0422 | VEW10-PFAS-GW04-0422 |
| **Sample Date** | | 4/6/2022 | 4/6/2022 | 4/5/2022 | 4/5/2022 | 4/5/2022 |
| **Chemical Name** | | | | | | |
| | | | | | | |
| **PFAS (NG/L)** | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | **3.71 J** | **3.7 J** | 2.3 U | 2.26 U | **3.43 J** |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | **8.92** | **8.07** | **42.2** | 2.26 U | **5.02** |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | 2.2 U | 2.23 U | **7.81** | **2.24 J** | 2.26 U |
| Perfluorooctanoic acid (PFOA) | 6 | 2.2 UJ | 2.23 UJ | 2.3 U | 2.26 U | 2.26 U |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.
NG/L = Nanograms/liter
**Detected analyte**
**Result exceeded screening criteria**

**TABLE 4-45**
**VNTR SWMU 1: Former Camp Garcia Municipal Waste Management Unit (Landfill) Groundwater Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | CGW1MW02 | | CGW1MW03 | CGW1MW06 |
|---|---|---|---|---|---|
| **Sample ID** | | VEW01-PFAS-MW02-0122 | VEW01-PFAS-MW02P-0122 | VEW01-PFAS-MW03-0222 | VEW01-PFAS-MW06-0222 |
| **Sample Date** | | 1/31/2022 | 1/31/2022 | 2/1/2022 | 2/3/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/L)** | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorooctanoic acid (PFOA) | 6 | 2.32 U | 2.43 U | 2.39 U | 2.35 U |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/L = Nanograms/liter
**Detected analyte**
**Result exceeded screening criteria**

**TABLE 4-45**
**VNTR SWMU 1: Former Camp Garcia Municipal Waste Management Unit (Landfill) Groundwater Compared to Screening Criteria**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | **Tapwater RSL, HQ=0.1 November 2022** | CGW1MW08 | CGW1MW10 | CGW1MW11 |
|---|---|---|---|---|
| **Sample ID** | | VEW01-PFAS-MW08-0122 | VEW01-PFAS-MW10-0122 | VEW01-PFAS-MW11-0122 |
| **Sample Date** | | 1/31/2022 | 1/31/2022 | 1/31/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/L)** | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6 | 2.34 U | 2.36 U | 2.35 U |
| Perfluorobutanesulfonic acid (PFBS) | 600 | 2.34 U | 2.36 U | **1.02 J** |
| Perfluorohexanesulfonic acid (PFHxS) | 39 | 2.34 U | 2.36 U | **1.28 J** |
| Perfluorononanoic acid (PFNA) | 5.9 | 2.34 U | 2.36 U | 2.35 U |
| Perfluorooctane sulfonic acid (PFOS) | 4 | 2.34 U | 2.36 U | 2.35 U |
| Perfluorooctanoic acid (PFOA) | 6 | 2.34 U | 2.36 U | 2.35 U |

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NG/L = Nanograms/liter
**Detected analyte**
**Result exceeded screening criteria**

\\dc1vs01\GISNavyClean\LANT\Vieques\MapFiles\PFAS_SI\Fig04-01_PFAS-SI_AOCb.mxd 3/23/2023 mcotterb

| VWAB-PFAS-SO03 | | |
|---|---|---|
| | SS 0-1' | SB 4-6' |
| PFOA | **0.514 J** | 0.499 U |
| PFOS | **5.91** | **3.32** |
| PFBS | 0.5 U | 0.499 U |
| HFPO-DA | 0.5 U | 0.499 U |
| PFHxS | 0.5 U | 0.499 U |
| PFNA | **0.171 J** | 0.499 U |

| VWAB-PFAS-MW01 | |
|---|---|
| Screen 75-85' | |
| PFOA | **93.4** |
| PFOS | **83.3** |
| PFBS | **37.2** |
| HFPO-DA | 2.18 U |
| PFHxS | **197** |
| PFNA | **1.85 J** |

| VWAB-PFAS-SO04 | | |
|---|---|---|
| | SS 0-1' | SB 4-6' |
| PFOA | **0.546 J** | 0.499 U |
| PFOS | **7.85** | **8.83** |
| PFBS | 0.498 U | 0.499 U |
| HFPO-DA | 0.498 U | 0.499 U |
| PFHxS | 0.498 U | 0.499 U |
| PFNA | 0.498 U | 0.499 U |

| VWAB-PFAS-SO02 | | |
|---|---|---|
| | SS 0-1' | SB 4-6' |
| PFOA | **1.24** | 0.501 U |
| PFOS | **24.8** | **4.95** |
| PFBS | 0.499 U | 0.501 U |
| HFPO-DA | 0.499 U | 0.501 U |
| PFHxS | **0.182 J** | 0.501 U |
| PFNA | **0.472 J** | 0.501 U |

| VWAB-PFAS-SO01 | | |
|---|---|---|
| | SS 0-1' | SB 4-6' |
| PFOA | **1.65** | 0.499 U |
| PFOS | **32.2** | **1.06** |
| PFBS | 0.499 U | 0.499 U |
| HFPO-DA | 0.499 U | 0.499 U |
| PFHxS | 0.499 U | 0.499 U |
| PFNA | **0.705 J** | 0.499 U |




**Legend**

- Monitoring Well
- Soil Boring
- Potential PFAS Release Area
- Ephemeral Stream
- Road
- 0.57 Groundwater Elevation (Feet Above Mean Sea Level)

| Analyte | Soil RSLs (ng/g) | Groundwater RSLs (ng/L) |
|---|---|---|
| PFOA | 19 | 6 |
| PFOS | 13 | 4 |
| PFBS | 1,900 | 600 |
| HFPO-DA | 23 | 6 |
| PFHxS | 130 | 39 |
| PFNA | 19 | 5.9 |

**Notes:**
1. **Bolded** values indicate detections.
2. Shading indicates exceedance of Regional Screening Level (RSL).

**Acronyms:**
J - Analyte present. Value may or may not be accurate or precise
NG/G - Nanograms per gram
NG/L - Nanograms per liter
U - The material was analyzed for, but not detected

N
W E
S

0 75 150
Feet

Imagery Date: 1994

**Figure 4-1**
**PFAS Sampling Results at NASD AOC B: Former Wastewater Treatment Plant**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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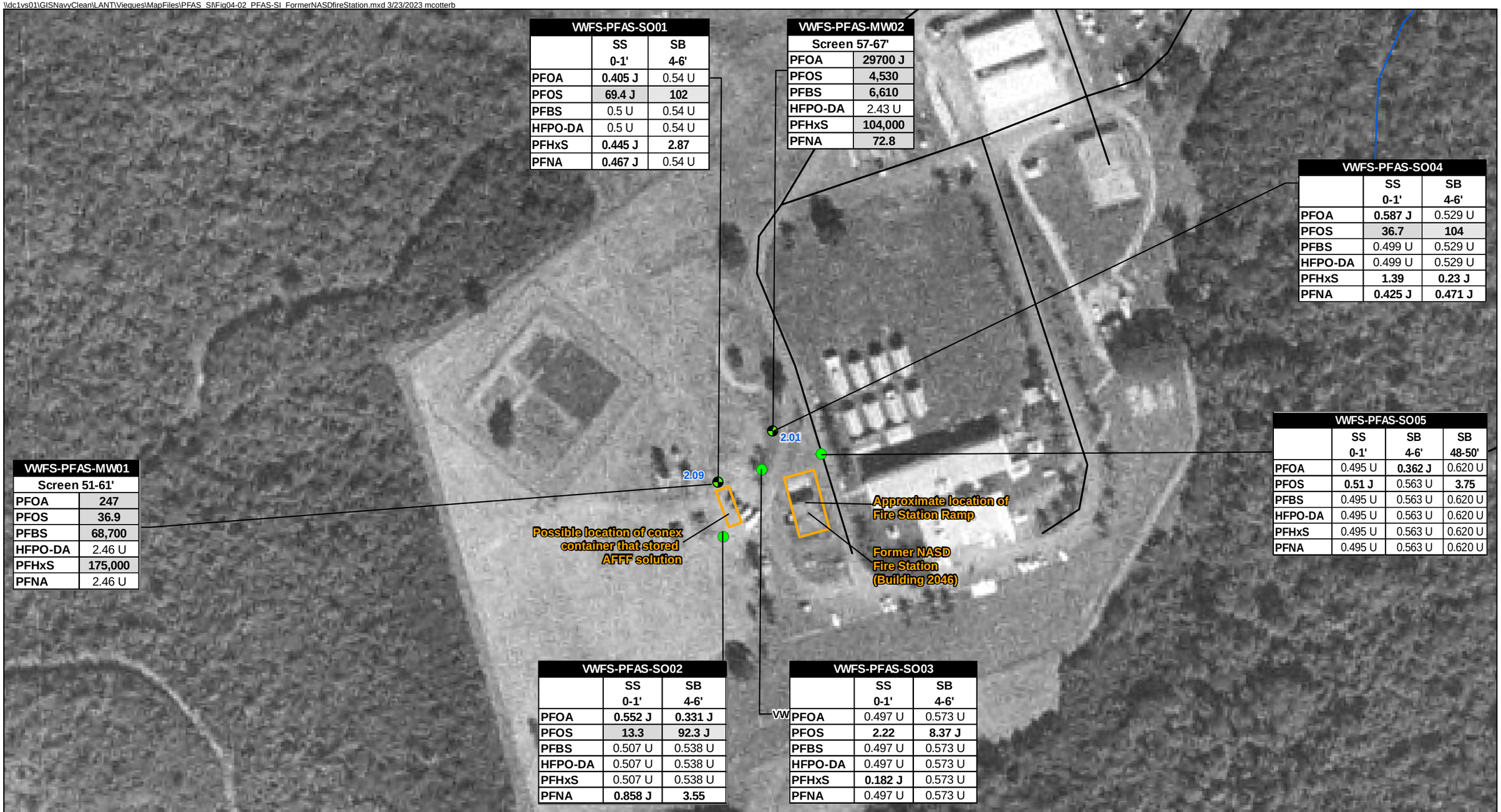


| VWFS-PFAS-SO01 | SS 0-1' | SB 4-6' |
|---|---|---|
| PFOA | **0.405 J** | 0.54 U |
| PFOS | **69.4 J** | **102** |
| PFBS | 0.5 U | 0.54 U |
| HFPO-DA | 0.5 U | 0.54 U |
| PFHxS | **0.445 J** | **2.87** |
| PFNA | **0.467 J** | 0.54 U |

| VWFS-PFAS-MW02 Screen 57-67' | |
|---|---|
| PFOA | **29700 J** |
| PFOS | **4,530** |
| PFBS | **6,610** |
| HFPO-DA | 2.43 U |
| PFHxS | **104,000** |
| PFNA | **72.8** |

| VWFS-PFAS-SO04 | SS 0-1' | SB 4-6' |
|---|---|---|
| PFOA | **0.587 J** | 0.529 U |
| PFOS | **36.7** | **104** |
| PFBS | 0.499 U | 0.529 U |
| HFPO-DA | 0.499 U | 0.529 U |
| PFHxS | **1.39** | **0.23 J** |
| PFNA | **0.425 J** | **0.471 J** |

| VWFS-PFAS-SO05 | SS 0-1' | SB 4-6' | SB 48-50' |
|---|---|---|---|
| PFOA | 0.495 U | **0.362 J** | 0.620 U |
| PFOS | **0.51 J** | 0.563 U | **3.75** |
| PFBS | 0.495 U | 0.563 U | 0.620 U |
| HFPO-DA | 0.495 U | 0.563 U | 0.620 U |
| PFHxS | 0.495 U | 0.563 U | 0.620 U |
| PFNA | 0.495 U | 0.563 U | 0.620 U |

| VWFS-PFAS-MW01 Screen 51-61' | |
|---|---|
| PFOA | 247 |
| PFOS | **36.9** |
| PFBS | **68,700** |
| HFPO-DA | 2.46 U |
| PFHxS | **175,000** |
| PFNA | 2.46 U |

| VWFS-PFAS-SO02 | SS 0-1' | SB 4-6' |
|---|---|---|
| PFOA | **0.552 J** | **0.331 J** |
| PFOS | **13.3** | **92.3 J** |
| PFBS | 0.507 U | 0.538 U |
| HFPO-DA | 0.507 U | 0.538 U |
| PFHxS | 0.507 U | 0.538 U |
| PFNA | **0.858 J** | **3.55** |

| VWFS-PFAS-SO03 | SS 0-1' | SB 4-6' |
|---|---|---|
| PFOA | 0.497 U | 0.573 U |
| PFOS | **2.22** | **8.37 J** |
| PFBS | 0.497 U | 0.573 U |
| HFPO-DA | 0.497 U | 0.573 U |
| PFHxS | **0.182 J** | 0.573 U |
| PFNA | 0.497 U | 0.573 U |

**Legend**

- Monitoring Well
- Soil Boring
- Potential PFAS Release Area
- Ephemeral Stream
- Road
- 2.09 Groundwater Elevation (Feet Above Mean Sea Level)

| Analyte | Soil RSLs (ng/g) | Groundwater RSLs (ng/L) |
|---|---|---|
| PFOA | 19 | 6 |
| PFOS | 13 | 4 |
| PFBS | 1,900 | 600 |
| HFPO-DA | 23 | 6 |
| PFHxS | 130 | 39 |
| PFNA | 19 | 5.9 |

**Notes:**
1. **Bolded** values indicate detections.
2. Shading indicates exceedance of Regional Screening Level (RSL).

**Acronyms:**
J - Analyte present. Value may or may not be accurate or precise
NG/G - Nanograms per gram
NG/L - Nanograms per liter
U - The material was analyzed for, but not detected

N W E S

0 75 150 Feet

Imagery Date: 1994

**Figure 4-2**
**PFAS Sampling Results at Former Fire Station Building 2046 at the Public Works Area**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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| VWMP-PFAS-MW03 | |
|---|---|
| Screen 36-46' | |
| PFOA | 10.8 |
| PFOS | 87.1 |
| PFBS | 8.06 |
| HFPO-DA | 2.42 U |
| PFHxS | 71.5 |
| PFNA | 2.42 U |

| VWMP-PFAS-MW02 | |
|---|---|
| Screen 39-49' | |
| PFOA | 19.7 |
| PFOS | 96.3 |
| PFBS | 3.59 J |
| HFPO-DA | 2.19 U |
| PFHxS | 31.9 |
| PFNA | 2.19 U |

| VWMP-PFAS-MW01 | |
|---|---|
| Screen 42-52' | |
| PFOA | 4.8 J |
| PFOS | 1.65 J |
| PFBS | 0.958 J |
| HFPO-DA | 2.4 U |
| PFHxS | 2.4 U |
| PFNA | 2.4 U |

| VWMP-PFAS-SO02 | | | |
|---|---|---|---|
| | SS 0-1' | SB 4-6' | SB 48-50' |
| PFOA | 1.61 J | 0.302 J | 0.5 UJ |
| PFOS | 0.739 J | 0.501 UJ | 0.502 UJ |
| PFBS | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| HFPO-DA | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| PFHxS | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| PFNA | 0.501 UJ | 0.501 UJ | 0.502 UJ |

| VWMP-PFAS-SO04 | | | |
|---|---|---|---|
| | SS 0-1' | SB 4-6' | SB 47-49' |
| PFOA | 0.502 UJ | 0.502 UJ | 0.5 UJ |
| PFOS | 1.01 J | 0.502 UJ | 0.5 UJ |
| PFBS | 0.502 UJ | 0.502 UJ | 0.5 UJ |
| HFPO-DA | 0.502 UJ | 0.502 UJ | 0.5 UJ |
| PFHxS | 0.502 UJ | 0.502 UJ | 0.5 UJ |
| PFNA | 0.502 UJ | 0.502 UJ | 0.5 UJ |

| VWMP-PFAS-SO01 | | | |
|---|---|---|---|
| | SS 0-1' | SB 4-6' | SB 44-46' |
| PFOA | 0.499 UJ | 0.5 UJ | 0.498 UJ |
| PFOS | 0.227 J | 0.5 UJ | 0.498 UJ |
| PFBS | 0.499 UJ | 0.5 UJ | 0.498 UJ |
| HFPO-DA | 0.499 UJ | 0.5 UJ | 0.498 UJ |
| PFHxS | 0.499 UJ | 0.5 UJ | 0.498 UJ |
| PFNA | 0.499 UJ | 0.5 UJ | 0.498 UJ |

| VWMP-PFAS-SO03 | | | |
|---|---|---|---|
| | SS 0-1' | SB 4-6' | SB 48-50' |
| PFOA | 0.501 UJ | 0.5 UJ | 0.5 UJ |
| PFOS | 0.41 J | 0.5 UJ | 0.5 UJ |
| PFBS | 0.501 UJ | 0.5 UJ | 0.5 UJ |
| HFPO-DA | 0.501 UJ | 0.5 UJ | 0.5 UJ |
| PFHxS | 0.501 UJ | 0.5 UJ | 0.5 UJ |
| PFNA | 0.501 UJ | 0.5 UJ | 0.5 UJ |

1.01
1.31
0.34*
Potential Former NASD Motor Pool Area
2023
2022
4021
4001
4010
4011
AOC E
Former Wash Rack

**Legend**

- Potential PFAS Release Area
- Approximate Building Location
- Monitoring Well
- Soil Boring
- Groundwater Flow Direction (AOC E Annual Report [2019])
- Ephemeral Stream
- Road
- 0.57 Groundwater Elevation (Feet Above Mean Sea Level)
- * Water Level Appears to be Anomalous

| Analyte | Soil RSLs (ng/g) | Groundwater RSLs (ng/L) |
|---|---|---|
| PFOA | 19 | 6 |
| PFOS | 13 | 4 |
| PFBS | 1,900 | 600 |
| HFPO-DA | 23 | 6 |
| PFHxS | 130 | 39 |
| PFNA | 19 | 5.9 |

**Notes:**
1. **Bolded** values indicate detections.
2. Shading indicates exceedance of Regional Screening Level (RSL).

**Acronyms:**
J - Analyte present. Value may or may not be accurate or precise
NG/G - Nanograms per gram
NG/L - Nanograms per liter
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate

N W E S

0 75 150 Feet

Imagery Date: 1994

**Figure 4-3**
**PFAS Sampling Results at Potential Former NASD Motor Pool Area**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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| VWAH-PFAS-SDSW03 | SD 0-0.5' | SW |
|---|---|---|
| PFOA | 0.502 U | 2.3 U |
| PFOS | 0.502 U | 2.3 U |
| PFBS | 0.502 U | 2.3 UJ |
| HFPO-DA | 0.502 U | 2.3 UJ |
| PFHxS | 0.502 U | 2.3 U |
| PFNA | 0.502 U | 2.3 U |

| VWAH-PFAS-SDSW02 | SD 0-0.5' | SW |
|---|---|---|
| PFOA | 0.5 U | 2.34 U |
| PFOS | 0.5 U | 2.34 U |
| PFBS | 0.5 U | 2.34 U |
| HFPO-DA | 0.5 U | 2.34 UJ |
| PFHxS | 0.5 U | **0.944 J** |
| PFNA | 0.5 U | 2.34 U |

| VWAH-PFAS-SDSW01 | SD 0-0.5' | SW |
|---|---|---|
| PFOA | 0.5 U | 2.35 U |
| PFOS | 0.5 U | 2.35 U |
| PFBS | 0.5 U | 2.35 U |
| HFPO-DA | 0.5 U | 2.35 U |
| PFHxS | 0.5 U | **1.75 J** |
| PFNA | 0.5 U | 2.35 U |

| VWAH-PFAS-MW02 Screen 5-15' | |
|---|---|
| PFOA | 2.35 U |
| PFOS | 2.35 U |
| PFBS | 2.35 U |
| HFPO-DA | 2.35 U |
| PFHxS | 2.35 U |
| PFNA | 2.35 U |

| VWAH-PFAS-SO01 | SS 0-1' | SB 4-6' |
|---|---|---|
| PFOA | 0.502 U | 0.505 U |
| PFOS | **0.195 J** | 0.505 U |
| PFBS | 0.502 U | 0.505 U |
| HFPO-DA | 0.502 U | 0.505 U |
| PFHxS | 0.502 U | 0.505 U |
| PFNA | 0.502 U | 0.505 U |

| VWAH-PFAS-SO02 | SS 0-1' | SB 4-6' | SB 8-10' |
|---|---|---|---|
| PFOA | 0.503 U | 0.501 U | 0.497 U |
| PFOS | 0.503 U | 0.501 U | 0.497 U |
| PFBS | 0.503 U | 0.501 U | 0.497 U |
| HFPO-DA | 0.503 U | 0.501 U | 0.497 U |
| PFHxS | 0.503 U | 0.501 U | 0.497 U |
| PFNA | 0.503 U | 0.501 U | 0.497 U |

| VWAH-PFAS-SO04 | SS 0-1' | SB 4-6' | SB 8-10' |
|---|---|---|---|
| PFOA | 0.496 U | 0.498 U | 0.503 U |
| PFOS | **0.258 J** | 0.498 U | 0.503 U |
| PFBS | 0.496 U | 0.498 U | 0.503 U |
| HFPO-DA | 0.496 U | 0.498 U | 0.503 U |
| PFHxS | 0.496 U | 0.498 U | 0.503 U |
| PFNA | 0.496 U | 0.498 U | 0.503 U |

| VWAH-PFAS-MW01 Screen 8-18' | |
|---|---|
| PFOA | 2.3 U |
| PFOS | 2.3 U |
| PFBS | 2.3 U |
| HFPO-DA | 2.3 U |
| PFHxS | 2.3 U |
| PFNA | 2.3 U |

| VWAH-PFAS-SO03 | SS 0-1' | SB 4-6' | SB 7-9' |
|---|---|---|---|
| PFOA | 0.496 U | 0.5 U | 0.503 U |
| PFOS | 0.496 U | 0.5 U | 0.503 U |
| PFBS | 0.496 U | 0.5 U | 0.503 U |
| HFPO-DA | 0.496 U | 0.5 U | 0.503 U |
| PFHxS | 0.496 U | 0.5 U | 0.503 U |
| PFNA | 0.496 U | 0.5 U | 0.503 U |

**Legend**

- Monitoring Well
- Soil Boring
- Surface Water and Sediment Sample
- Potential PFAS Release Area
- Ephemeral Stream
- Road
- 0.46 Groundwater Elevation (Feet Above Mean Sea Level)

| Analyte | Soil RSLs (ng/g) | Groundwater RSLs (ng/L) |
|---|---|---|
| PFOA | 19 | 6 |
| PFOS | 13 | 4 |
| PFBS | 1,900 | 600 |
| HFPO-DA | 23 | 6 |
| PFHxS | 130 | 39 |
| PFNA | 19 | 5.9 |

**Notes:**
1. **Bolded** values indicate detections.
2. Shading indicates exceedance of Regional Screening Level (RSL).

**Acronyms:**
J - Analyte present. Value may or may not be accurate or precise
NG/G - Nanograms per gram
NG/L - Nanograms per liter
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate

N W E S

0 50 100 Feet

Imagery Date: 2004

**Figure 4-4**
**PFAS Sampling Results at NASD AOC H: Abandoned Power Plant**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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| VWS6-PFAS-SDSW01 | SD 0-0.5' | SW |
|---|---|---|
| PFOA | 0.628 U | 2.31 U |
| PFOS | 0.628 U | 2.31 U |
| PFBS | 0.628 U | 2.31 UJ |
| HFPO-DA | 0.628 U | 2.31 U |
| PFHxS | 0.628 U | 2.31 U |
| PFNA | 0.628 U | 2.31 U |

| VWS6-PFAS-SO01 | SS 0-1' |
|---|---|
| PFOA | 0.499 U |
| PFOS | 0.499 U |
| PFBS | 0.499 U |
| HFPO-DA | 0.499 U |
| PFHxS | 0.499 U |
| PFNA | 0.499 U |

| VWS6-PFAS-SDSW02 | SD 0-0.5' | SW |
|---|---|---|
| PFOA | 0.533 U | 2.36 U |
| PFOS | 0.533 U | 2.36 U |
| PFBS | 0.533 U | 2.36 U |
| HFPO-DA | 0.533 U | 2.36 U |
| PFHxS | 0.533 U | 2.36 U |
| PFNA | 0.533 U | 2.36 U |

**Legend**

- Soil Boring
- Surface Water and Sediment Sample
- Potential PFAS Release
- Road

| Analyte | Soil RSLs (ng/g) | Groundwater RSLs (ng/L) |
|---|---|---|
| PFOA | 19 | 6 |
| PFOS | 13 | 4 |
| PFBS | 1,900 | 600 |
| HFPO-DA | 23 | 6 |
| PFHxS | 130 | 39 |
| PFNA | 19 | 5.9 |

**Acronyms:**
NG/G - Nanograms per gram
NG/L - Nanograms per liter
RSL - Regional Screening Level
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate

N
W E
S

0 50 100
Feet

Imagery Date: 2021, ESRI.

**Figure 4-5**
**PFAS Sampling Results at SWMU 6: Former Mangrove Disposal Site**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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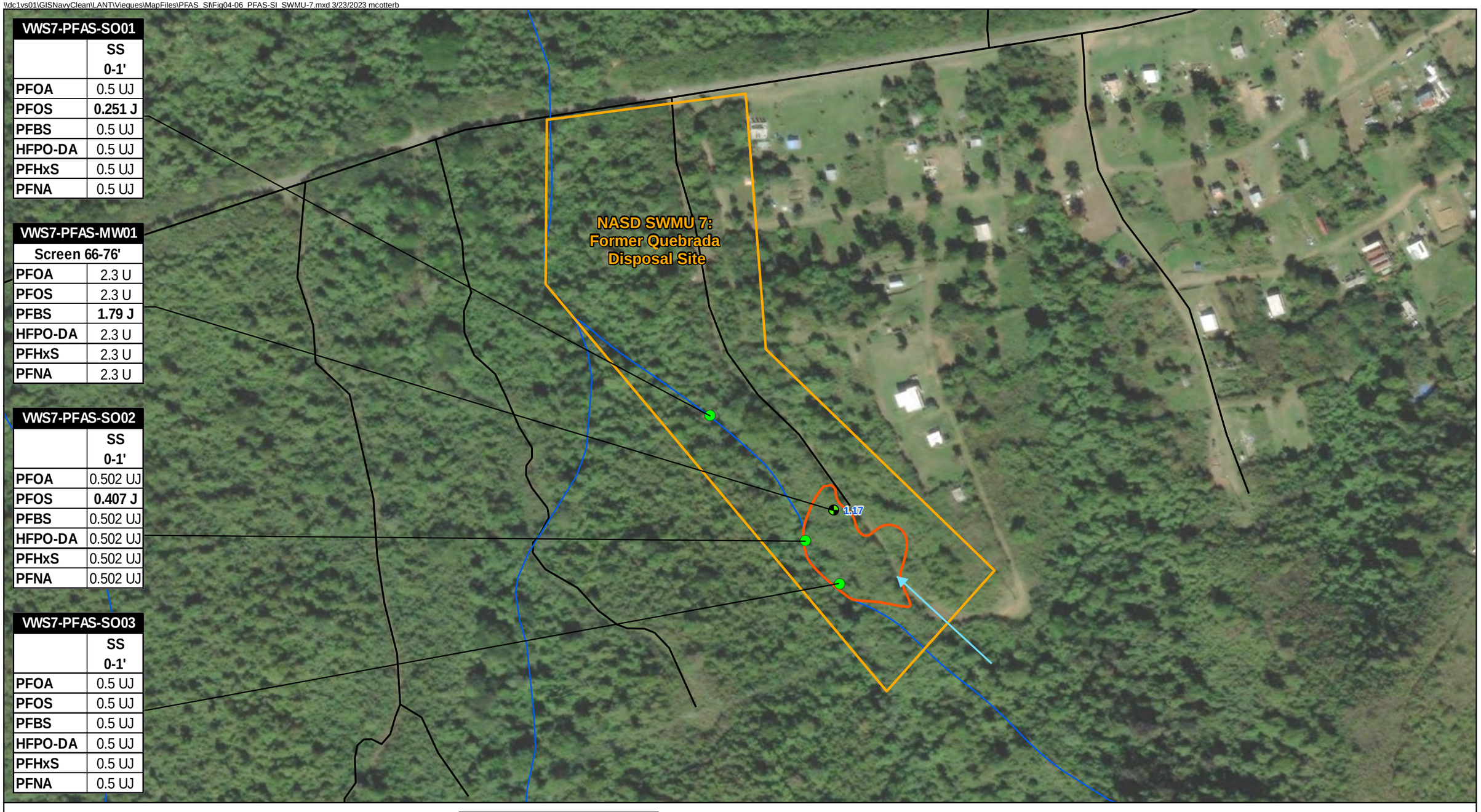
| VWS7-PFAS-SO01 | SS 0-1' |
|---|---|
| PFOA | 0.5 UJ |
| PFOS | **0.251 J** |
| PFBS | 0.5 UJ |
| HFPO-DA | 0.5 UJ |
| PFHxS | 0.5 UJ |
| PFNA | 0.5 UJ |

| VWS7-PFAS-MW01 | Screen 66-76' |
|---|---|
| PFOA | 2.3 U |
| PFOS | 2.3 U |
| PFBS | **1.79 J** |
| HFPO-DA | 2.3 U |
| PFHxS | 2.3 U |
| PFNA | 2.3 U |

| VWS7-PFAS-SO02 | SS 0-1' |
|---|---|
| PFOA | 0.502 UJ |
| PFOS | **0.407 J** |
| PFBS | 0.502 UJ |
| HFPO-DA | 0.502 UJ |
| PFHxS | 0.502 UJ |
| PFNA | 0.502 UJ |

| VWS7-PFAS-SO03 | SS 0-1' |
|---|---|
| PFOA | 0.5 UJ |
| PFOS | 0.5 UJ |
| PFBS | 0.5 UJ |
| HFPO-DA | 0.5 UJ |
| PFHxS | 0.5 UJ |
| PFNA | 0.5 UJ |




**Legend**

- Monitoring Well
- Soil Boring
- Potential PFAS Release Area
- Interpreted Waste Boundary
- Road
- Groundwater Flow Direction (SWMU 7 RI Report [2008])
- Ephemeral Stream
- 0.46 Groundwater Elevation (Feet Above Mean Sea Level)

| Analyte | Soil RSLs (ng/g) | Groundwater RSLs (ng/L) |
|---|---|---|
| PFOA | 19 | 6 |
| PFOS | 13 | 4 |
| PFBS | 1,900 | 600 |
| HFPO-DA | 23 | 6 |
| PFHxS | 130 | 39 |
| PFNA | 19 | 5.9 |

**Notes:**
1. **Bolded** values indicate detections.

**Acronyms:**
J - Analyte present. Value may or may not be accurate or precise
NG/G - Nanograms per gram
NG/L - Nanograms per liter
RSL - Regional Screening Level
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate

N
W E
S

0 25 50
Meters

Imagery Date: 2021, ESRI

**Figure 4-6**
**PFAS Sampling Results at NASD SWMU 7: Former Quebrada Disposal Site**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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| VERW-PFAS-SO01 | SS 0-1' | SB 4-6' | SB 27-28' |
|---|---|---|---|
| PFOA | 0.497 U | 0.497 U | 0.503 U |
| PFOS | 0.497 U | 0.497 U | 0.503 U |
| PFBS | 0.497 U | 0.497 U | 0.503 U |
| HFPO-DA | 0.497 U | 0.497 U | 0.503 U |
| PFHxS | 0.497 U | 0.497 U | 0.503 U |
| PFNA | 0.497 U | 0.497 U | 0.503 U |

| VERW-PFAS-SO04 | SS 0-1' | SB 4-6' | SB 32-33' |
|---|---|---|---|
| PFOA | 0.503 U | 0.498 U | 0.501 U |
| PFOS | 0.503 U | 0.498 U | 0.501 U |
| PFBS | 0.503 U | 0.498 U | 0.501 U |
| HFPO-DA | 0.503 U | 0.498 U | 0.501 U |
| PFHxS | 0.503 U | 0.498 U | 0.501 U |
| PFNA | 0.503 U | 0.498 U | 0.501 U |

| VERW-PFAS-MW02 Screen 25-35' | |
|---|---|
| PFOA | 2.25 U |
| PFOS | **21.2** |
| PFBS | **13.9** |
| HFPO-DA | 2.25 U |
| PFHxS | **44.2** |
| PFNA | 2.25 U |

| VERW-PFAS-SO05 | SS 0-1' | SB 4-6' | SB 19-20' |
|---|---|---|---|
| PFOA | 0.497 U | 0.504 U | 0.504 U |
| PFOS | 0.497 U | 0.504 U | 0.504 U |
| PFBS | 0.497 U | 0.504 U | 0.504 U |
| HFPO-DA | 0.497 U | 0.504 U | 0.504 U |
| PFHxS | 0.497 U | 0.504 U | 0.504 U |
| PFNA | 0.497 U | 0.504 U | 0.504 U |

Camp Garcia Drive

SWMU 20
Helicopter
Maint. Bldg.

Camp Garcia
Runway

-1.74

0.60

-2.22

PI 5

Surface Water Drainage
from Runway Area

| VERW-PFAS-MW01 Screen 22-32' | |
|---|---|
| PFOA | 2.27 U |
| PFOS | 2.27 U |
| PFBS | **1.19 J** |
| HFPO-DA | 2.27 U |
| PFHxS | **5.17** |
| PFNA | 2.27 U |

| VERW-PFAS-SO03 | SS 0-1' | SB 4-6' | SB 31-32' |
|---|---|---|---|
| PFOA | 0.499 U | 0.496 U | 0.498 U |
| PFOS | **2.46** | **2.71** | 0.498 U |
| PFBS | 0.499 U | 0.496 U | 0.498 U |
| HFPO-DA | 0.499 U | 0.496 U | 0.498 U |
| PFHxS | 0.499 U | **1.16** | 0.498 U |
| PFNA | 0.499 U | 0.496 U | 0.498 U |

| VERW-PFAS-SO02 | SS 0-1' | SB 4-6' | SB 31-32' |
|---|---|---|---|
| PFOA | 0.506 U | 0.493 U | 0.498 U |
| PFOS | 0.506 U | 0.493 U | 0.498 U |
| PFBS | 0.506 U | 0.493 U | 0.498 U |
| HFPO-DA | 0.506 U | 0.493 U | 0.498 U |
| PFHxS | 0.506 U | 0.493 U | 0.498 U |
| PFNA | 0.506 U | 0.493 U | 0.498 U |

| EPI04-MW26 Screen 9-19' | |
|---|---|
| PFOA | 2.3 U |
| PFOS | **1.1 J** |
| PFBS | **6.7** |
| HFPO-DA | 2.3 U |
| PFHxS | **18.1** |
| PFNA | 2.3 U |

Bahia
Tapon

Puerto Ferro

**Legend**

- Monitoring Well
- Soil Boring
- Potential PFAS Release Area
- Road
- Ephemeral Stream
- 0.60 Groundwater Elevation (Feet Above Mean Sea Level)

| Analyte | Soil RSLs (ng/g) | Groundwater RSLs (ng/L) |
|---|---|---|
| PFOA | 19 | 6 |
| PFOS | 13 | 4 |
| PFBS | 1,900 | 600 |
| HFPO-DA | 23 | 6 |
| PFHxS | 130 | 39 |
| PFNA | 19 | 5.9 |

**Notes:**
1. **Bolded** values indicate detections.
2. Shadingindicates exceedance of Regional Screening Level (RSL).

**Acronyms:**
J - Analyte present. Value may or may not be accurate or precise
NG/G - Nanograms per gram
NG/L - Nanograms per liter
U - The material was analyzed for, but not detected

N
W E
S

0 250 500
Feet

Imagery Date: 2021, ESRI

**Figure 4-7**
**PFAS Sampling Results at VNTR Camp Garcia Runway: Former Helicopter Maintenance Area**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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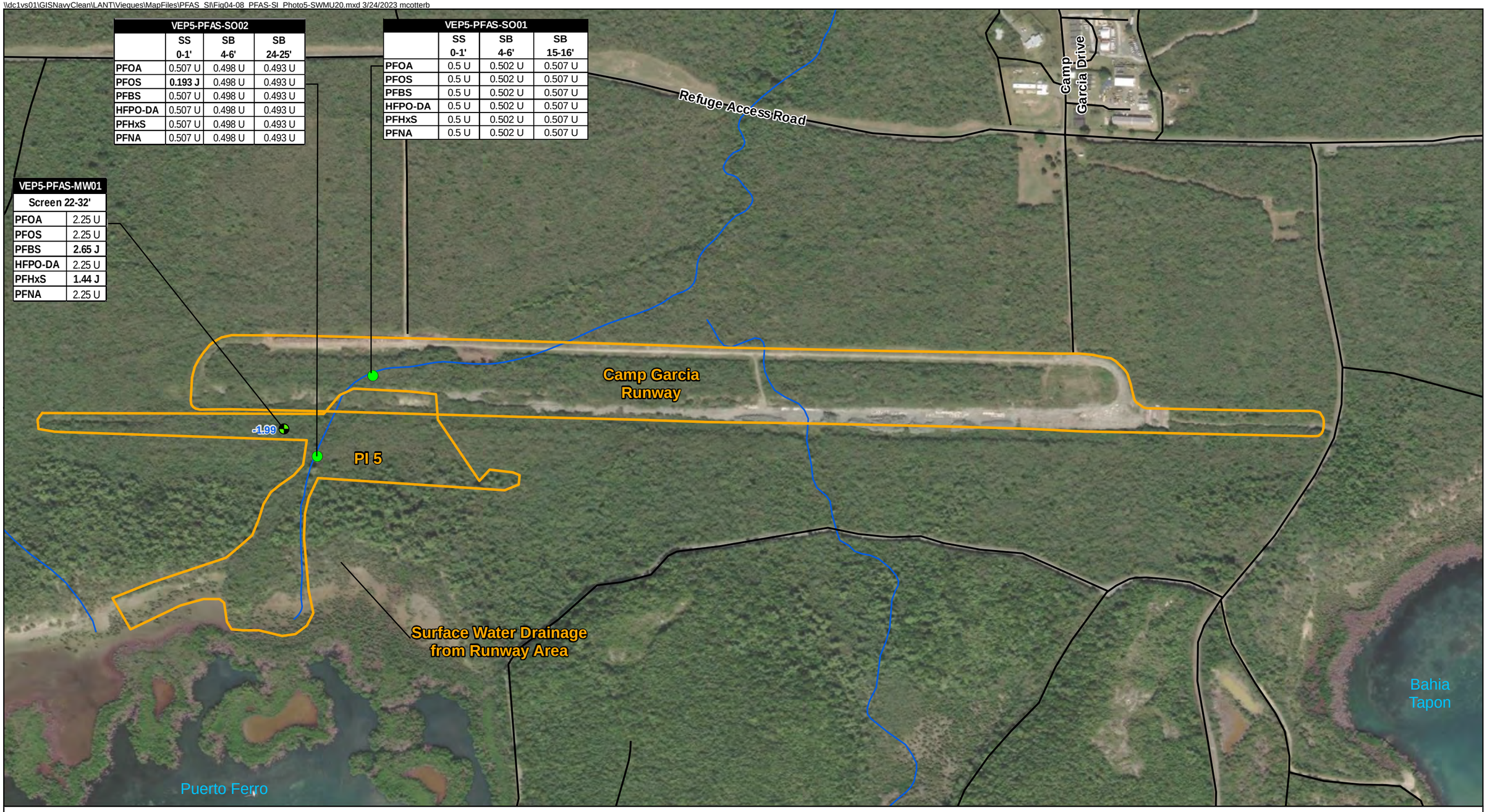
| VEP5-PFAS-SO02 | | | |
|---|---|---|---|
| | SS 0-1' | SB 4-6' | SB 24-25' |
| PFOA | 0.507 U | 0.498 U | 0.493 U |
| PFOS | **0.193 J** | 0.498 U | 0.493 U |
| PFBS | 0.507 U | 0.498 U | 0.493 U |
| HFPO-DA | 0.507 U | 0.498 U | 0.493 U |
| PFHxS | 0.507 U | 0.498 U | 0.493 U |
| PFNA | 0.507 U | 0.498 U | 0.493 U |

| VEP5-PFAS-SO01 | | | |
|---|---|---|---|
| | SS 0-1' | SB 4-6' | SB 15-16' |
| PFOA | 0.5 U | 0.502 U | 0.507 U |
| PFOS | 0.5 U | 0.502 U | 0.507 U |
| PFBS | 0.5 U | 0.502 U | 0.507 U |
| HFPO-DA | 0.5 U | 0.502 U | 0.507 U |
| PFHxS | 0.5 U | 0.502 U | 0.507 U |
| PFNA | 0.5 U | 0.502 U | 0.507 U |

| VEP5-PFAS-MW01 | |
|---|---|
| Screen 22-32' | |
| PFOA | 2.25 U |
| PFOS | 2.25 U |
| PFBS | **2.65 J** |
| HFPO-DA | 2.25 U |
| PFHxS | **1.44 J** |
| PFNA | 2.25 U |




**Legend**

- Monitoring Well
- Soil Boring
- Potential PFAS Release Area
- -1.99 Groundwater Elevation (Feet Above Mean Sea Level)
- Road
- Ephemeral Stream

| Analyte | Soil RSLs (ng/g) | Groundwater RSLs (ng/L) |
|---|---|---|
| PFOA | 19 | 6 |
| PFOS | 13 | 4 |
| PFBS | 1,900 | 600 |
| HFPO-DA | 23 | 6 |
| PFHxS | 130 | 39 |
| PFNA | 19 | 5.9 |

**Notes:**
1. **Bolded** values indicate detections.

**Acronyms:**
J - Analyte present. Value may or may not be accurate or precise
NG/G - Nanograms per gram
NG/L - Nanograms per liter
RSL - Regional Screening Level
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate

N W E S

0 250 500 Feet

Imagery Date: 2021, ESRI

**Figure 4-8**
**PFAS Sampling Results at VNTR PI 5: Surface Water Drainage Area from Camp Garcia Runway (Down Gradient)**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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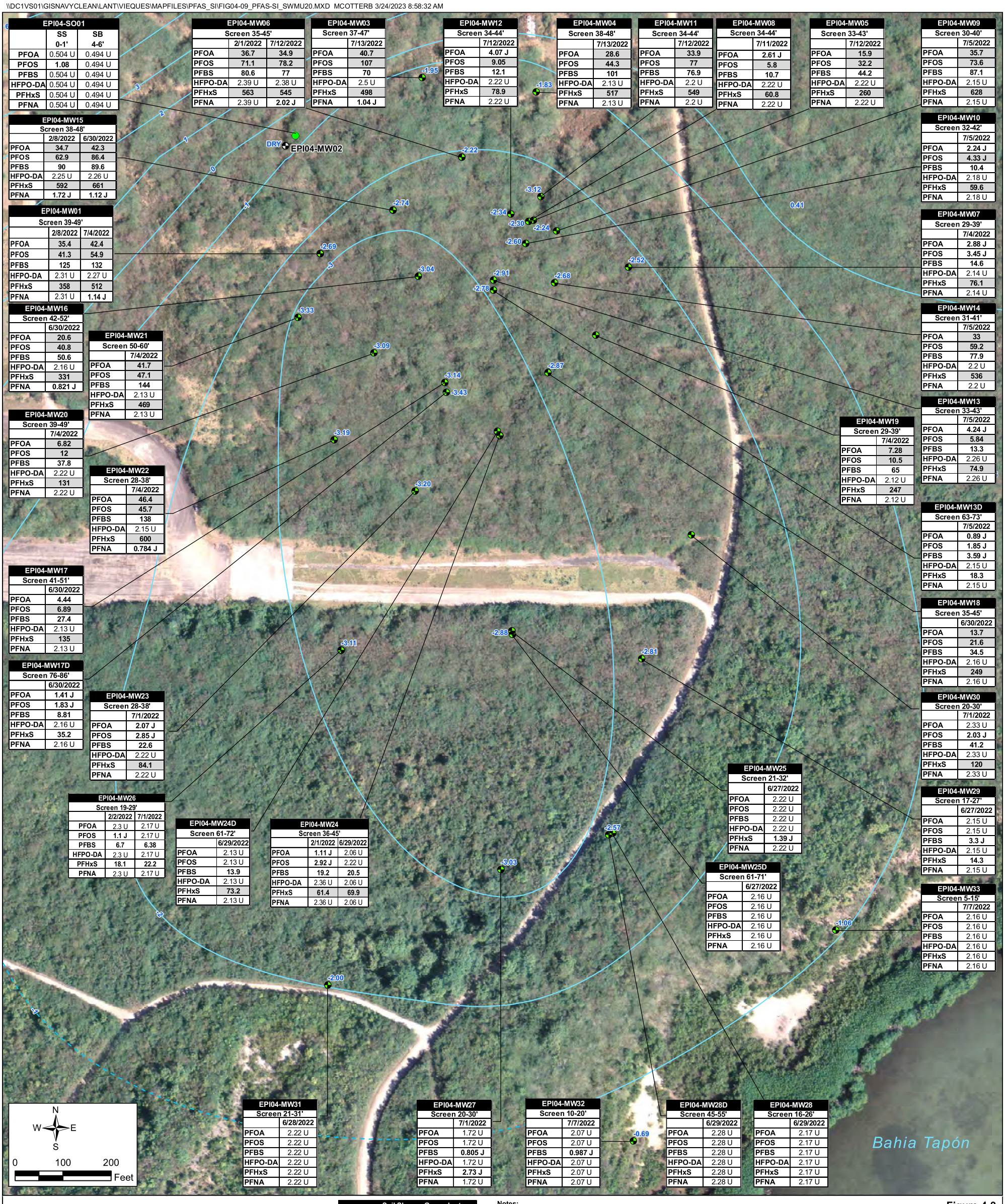


| EPI04-SO01 | SS 0-1' | SB 4-6' |
|---|---|---|
| PFOA | 0.504 U | 0.494 U |
| PFOS | 1.08 | 0.494 U |
| PFBS | 0.504 U | 0.494 U |
| HFPO-DA | 0.504 U | 0.494 U |
| PFHxS | 0.504 U | 0.494 U |
| PFNA | 0.504 U | 0.494 U |

| EPI04-MW06 Screen 35-45' | 2/1/2022 | 7/12/2022 |
|---|---|---|
| PFOA | 36.7 | 34.9 |
| PFOS | 71.1 | 78.2 |
| PFBS | 80.6 | 77 |
| HFPO-DA | 2.39 U | 2.38 U |
| PFHxS | 563 | 545 |
| PFNA | 2.39 U | 2.02 J |

| EPI04-MW03 Screen 37-47' | 7/13/2022 |
|---|---|
| PFOA | 40.7 |
| PFOS | 107 |
| PFBS | 70 |
| HFPO-DA | 2.5 U |
| PFHxS | 498 |
| PFNA | 1.04 J |

| EPI04-MW12 Screen 34-44' | 7/12/2022 |
|---|---|
| PFOA | 4.07 J |
| PFOS | 9.05 |
| PFBS | 12.1 |
| HFPO-DA | 2.22 U |
| PFHxS | 78.9 |
| PFNA | 2.22 U |

| EPI04-MW04 Screen 38-48' | 7/13/2022 |
|---|---|
| PFOA | 28.6 |
| PFOS | 44.3 |
| PFBS | 101 |
| HFPO-DA | 2.13 U |
| PFHxS | 517 |
| PFNA | 2.13 U |

| EPI04-MW11 Screen 34-44' | 7/12/2022 |
|---|---|
| PFOA | 33.9 |
| PFOS | 77 |
| PFBS | 76.9 |
| HFPO-DA | 2.2 U |
| PFHxS | 549 |
| PFNA | 2.2 U |

| EPI04-MW08 Screen 34-44' | 7/11/2022 |
|---|---|
| PFOA | 2.61 J |
| PFOS | 5.8 |
| PFBS | 10.7 |
| HFPO-DA | 2.22 U |
| PFHxS | 60.8 |
| PFNA | 2.22 U |

| EPI04-MW05 Screen 33-43' | 7/12/2022 |
|---|---|
| PFOA | 15.9 |
| PFOS | 32.2 |
| PFBS | 44.2 |
| HFPO-DA | 2.22 U |
| PFHxS | 260 |
| PFNA | 2.22 U |

| EPI04-MW09 Screen 30-40' | 7/5/2022 |
|---|---|
| PFOA | 35.7 |
| PFOS | 73.6 |
| PFBS | 87.1 |
| HFPO-DA | 2.15 U |
| PFHxS | 628 |
| PFNA | 2.15 U |

| EPI04-MW15 Screen 38-48' | 2/8/2022 | 6/30/2022 |
|---|---|---|
| PFOA | 34.7 | 42.3 |
| PFOS | 62.9 | 86.4 |
| PFBS | 90 | 89.6 |
| HFPO-DA | 2.25 U | 2.26 U |
| PFHxS | 592 | 661 |
| PFNA | 1.72 J | 1.12 J |

| EPI04-MW10 Screen 32-42' | 7/5/2022 |
|---|---|
| PFOA | 2.24 J |
| PFOS | 4.33 J |
| PFBS | 10.4 |
| HFPO-DA | 2.18 U |
| PFHxS | 59.6 |
| PFNA | 2.18 U |

| EPI04-MW01 Screen 39-49' | 2/8/2022 | 7/4/2022 |
|---|---|---|
| PFOA | 35.4 | 42.4 |
| PFOS | 41.3 | 54.9 |
| PFBS | 125 | 132 |
| HFPO-DA | 2.31 U | 2.27 U |
| PFHxS | 358 | 512 |
| PFNA | 2.31 U | 1.14 J |

| EPI04-MW07 Screen 29-39' | 7/4/2022 |
|---|---|
| PFOA | 2.88 J |
| PFOS | 3.45 J |
| PFBS | 14.6 |
| HFPO-DA | 2.14 U |
| PFHxS | 76.1 |
| PFNA | 2.14 U |

| EPI04-MW16 Screen 42-52' | 6/30/2022 |
|---|---|
| PFOA | 20.6 |
| PFOS | 40.8 |
| PFBS | 50.6 |
| HFPO-DA | 2.16 U |
| PFHxS | 331 |
| PFNA | 0.821 J |

| EPI04-MW21 Screen 50-60' | 7/4/2022 |
|---|---|
| PFOA | 41.7 |
| PFOS | 47.1 |
| PFBS | 144 |
| HFPO-DA | 2.13 U |
| PFHxS | 469 |
| PFNA | 2.13 U |

| EPI04-MW14 Screen 31-41' | 7/5/2022 |
|---|---|
| PFOA | 33 |
| PFOS | 59.2 |
| PFBS | 77.9 |
| HFPO-DA | 2.2 U |
| PFHxS | 536 |
| PFNA | 2.2 U |

| EPI04-MW20 Screen 39-49' | 7/4/2022 |
|---|---|
| PFOA | 6.82 |
| PFOS | 12 |
| PFBS | 37.8 |
| HFPO-DA | 2.22 U |
| PFHxS | 131 |
| PFNA | 2.22 U |

| EPI04-MW19 Screen 29-39' | 7/4/2022 |
|---|---|
| PFOA | 7.28 |
| PFOS | 10.5 |
| PFBS | 65 |
| HFPO-DA | 2.12 U |
| PFHxS | 247 |
| PFNA | 2.12 U |

| EPI04-MW13 Screen 33-43' | 7/5/2022 |
|---|---|
| PFOA | 4.24 J |
| PFOS | 5.84 |
| PFBS | 13.3 |
| HFPO-DA | 2.26 U |
| PFHxS | 74.9 |
| PFNA | 2.26 U |

| EPI04-MW22 Screen 28-38' | 7/4/2022 |
|---|---|
| PFOA | 46.4 |
| PFOS | 45.7 |
| PFBS | 138 |
| HFPO-DA | 2.15 U |
| PFHxS | 600 |
| PFNA | 0.784 J |

| EPI04-MW13D Screen 63-73' | 7/5/2022 |
|---|---|
| PFOA | 0.89 J |
| PFOS | 1.85 J |
| PFBS | 3.59 J |
| HFPO-DA | 2.15 U |
| PFHxS | 18.3 |
| PFNA | 2.15 U |

| EPI04-MW17 Screen 41-51' | 6/30/2022 |
|---|---|
| PFOA | 4.44 |
| PFOS | 6.89 |
| PFBS | 27.4 |
| HFPO-DA | 2.13 U |
| PFHxS | 135 |
| PFNA | 2.13 U |

| EPI04-MW18 Screen 35-45' | 6/30/2022 |
|---|---|
| PFOA | 13.7 |
| PFOS | 21.6 |
| PFBS | 34.5 |
| HFPO-DA | 2.16 U |
| PFHxS | 249 |
| PFNA | 2.16 U |

| EPI04-MW17D Screen 76-86' | 6/30/2022 |
|---|---|
| PFOA | 1.41 J |
| PFOS | 1.83 J |
| PFBS | 8.81 |
| HFPO-DA | 2.16 U |
| PFHxS | 35.2 |
| PFNA | 2.16 U |

| EPI04-MW23 Screen 28-38' | 7/1/2022 |
|---|---|
| PFOA | 2.07 J |
| PFOS | 2.85 J |
| PFBS | 22.6 |
| HFPO-DA | 2.22 U |
| PFHxS | 84.1 |
| PFNA | 2.22 U |

| EPI04-MW30 Screen 20-30' | 7/1/2022 |
|---|---|
| PFOA | 2.33 U |
| PFOS | 2.03 J |
| PFBS | 41.2 |
| HFPO-DA | 2.33 U |
| PFHxS | 120 |
| PFNA | 2.33 U |

| EPI04-MW25 Screen 21-32' | 6/27/2022 |
|---|---|
| PFOA | 2.22 U |
| PFOS | 2.22 U |
| PFBS | 2.22 U |
| HFPO-DA | 2.22 U |
| PFHxS | 1.39 J |
| PFNA | 2.22 U |

| EPI04-MW29 Screen 17-27' | 6/27/2022 |
|---|---|
| PFOA | 2.15 U |
| PFOS | 2.15 U |
| PFBS | 3.3 J |
| HFPO-DA | 2.15 U |
| PFHxS | 14.3 |
| PFNA | 2.15 U |

| EPI04-MW26 Screen 19-29' | 2/2/2022 | 7/1/2022 |
|---|---|---|
| PFOA | 2.3 U | 2.17 U |
| PFOS | 1.1 J | 2.17 U |
| PFBS | 6.7 | 6.38 |
| HFPO-DA | 2.3 U | 2.17 U |
| PFHxS | 18.1 | 22.2 |
| PFNA | 2.3 U | 2.17 U |

| EPI04-MW24D Screen 61-72' | 6/29/2022 |
|---|---|
| PFOA | 2.13 U |
| PFOS | 2.13 U |
| PFBS | 13.9 |
| HFPO-DA | 2.13 U |
| PFHxS | 73.2 |
| PFNA | 2.13 U |

| EPI04-MW24 Screen 36-45' | 2/1/2022 | 6/29/2022 |
|---|---|---|
| PFOA | 1.11 J | 2.06 U |
| PFOS | 2.92 J | 2.22 U |
| PFBS | 19.2 | 20.5 |
| HFPO-DA | 2.36 U | 2.06 U |
| PFHxS | 61.4 | 69.9 |
| PFNA | 2.36 U | 2.06 U |

| EPI04-MW25D Screen 61-71' | 6/27/2022 |
|---|---|
| PFOA | 2.16 U |
| PFOS | 2.16 U |
| PFBS | 2.16 U |
| HFPO-DA | 2.16 U |
| PFHxS | 2.16 U |
| PFNA | 2.16 U |

| EPI04-MW33 Screen 5-15' | 7/7/2022 |
|---|---|
| PFOA | 2.16 U |
| PFOS | 2.16 U |
| PFBS | 2.16 U |
| HFPO-DA | 2.16 U |
| PFHxS | 2.16 U |
| PFNA | 2.16 U |

| EPI04-MW31 Screen 21-31' | 6/28/2022 |
|---|---|
| PFOA | 2.22 U |
| PFOS | 2.22 U |
| PFBS | 2.22 U |
| HFPO-DA | 2.22 U |
| PFHxS | 2.22 U |
| PFNA | 2.22 U |

| EPI04-MW27 Screen 20-30' | 7/1/2022 |
|---|---|
| PFOA | 1.72 U |
| PFOS | 1.72 U |
| PFBS | 0.805 J |
| HFPO-DA | 1.72 U |
| PFHxS | 2.73 J |
| PFNA | 1.72 U |

| EPI04-MW32 Screen 10-20' | 7/7/2022 |
|---|---|
| PFOA | 2.07 U |
| PFOS | 2.07 U |
| PFBS | 0.987 J |
| HFPO-DA | 2.07 U |
| PFHxS | 2.07 U |
| PFNA | 2.07 U |

| EPI04-MW28D Screen 45-55' | 6/29/2022 |
|---|---|
| PFOA | 2.28 U |
| PFOS | 2.28 U |
| PFBS | 2.28 U |
| HFPO-DA | 2.28 U |
| PFHxS | 2.28 U |
| PFNA | 2.28 U |

| EPI04-MW28 Screen 16-26' | 6/29/2022 |
|---|---|
| PFOA | 2.17 U |
| PFOS | 2.17 U |
| PFBS | 2.17 U |
| HFPO-DA | 2.17 U |
| PFHxS | 2.17 U |
| PFNA | 2.17 U |

**Legend**

- Monitoring Well
- Soil Boring
- Monitoring Well (Dry - Not Sampled)
- Groundwater Elevation Contour (ft amsl)
- Inferred Groundwater Contour
- -2.57 Groundwater Elevation (Feet Above Mean Sea Level)

| Analyte | Soil SLs (ng/g) | Groundwater RSLs (ng/L) |
|---|---|---|
| PFOA | 19 | 6 |
| PFOS | 13 | 4 |
| PFBS | 1,900 | 600 |
| HFPO-DA | 23 | 6 |
| PFHxS | 130 | 39 |
| PFNA | 19 | 5.9 |

**Notes:**
1. **Bolded** values indicate detections.
2. Shading indicates exceedance of Regional Screening Level (RSL).

**Acronyms:**
J - Analyte present. Value may or may not be accurate or precise
NG/G - Nanograms per gram
NG/L - Nanograms per liter
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate

**Figure 4-9**
**PFAS Sampling Results at SWMU 20**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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**Legend**

- Monitoring Well
- Soil Boring
- Potential PFAS Release Area
- Potential Former VNTR Motor Pool Area
- Former Building Area
- Elevation Contour (feet)

-1.99 Groundwater Elevation (Feet Above Mean Sea Level)

| Analyte | Soil RSLs (ng/g) | Groundwater RSLs (ng/L) |
|---|---|---|
| PFOA | 19 | 6 |
| PFOS | 13 | 4 |
| PFBS | 1,900 | 601 |
| HFPO-DA | 23 | 6 |
| PFHxS | 130 | 39 |
| PFNA | 19 | 5.9 |

**Notes:**
1. **Bolded** values indicate detections.
2. Shading indicates exceedance of Regional Screening Level (RSL).

**Acronyms:**
J - Analyte present. Value may or may not be accurate or precise
NG/G - Nanograms per gram
NG/L - Nanograms per liter
U - The material was analyzed for, but not detected

N
W E
S

0 35 70
Feet

Imagery Date: 2020.

**Figure 4-10**
**PFAS Sampling Results at Potential Former VNTR Motor Pool Area**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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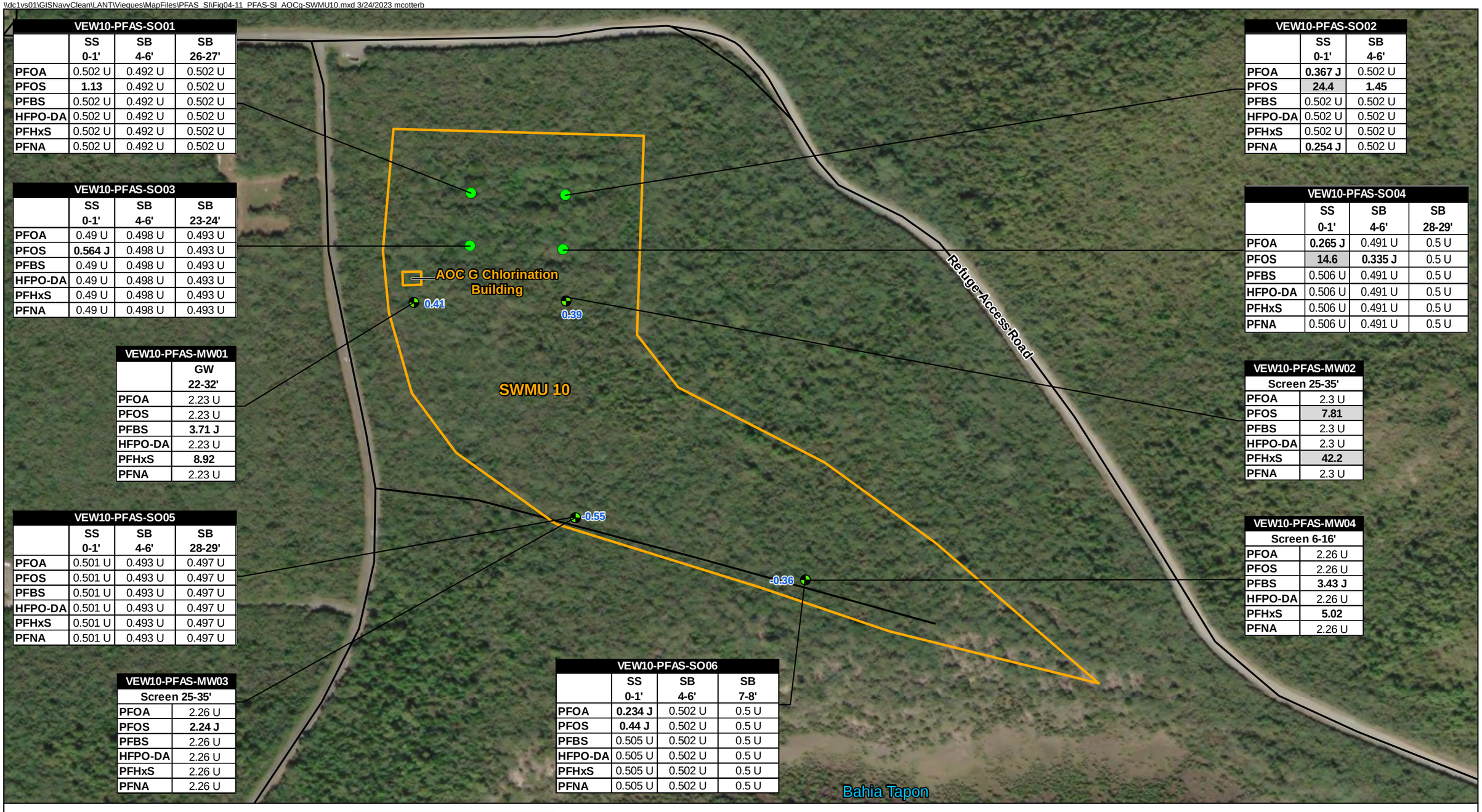


| VEW10-PFAS-SO01 | SS 0-1' | SB 4-6' | SB 26-27' |
|---|---|---|---|
| PFOA | 0.502 U | 0.492 U | 0.502 U |
| PFOS | **1.13** | 0.492 U | 0.502 U |
| PFBS | 0.502 U | 0.492 U | 0.502 U |
| HFPO-DA | 0.502 U | 0.492 U | 0.502 U |
| PFHxS | 0.502 U | 0.492 U | 0.502 U |
| PFNA | 0.502 U | 0.492 U | 0.502 U |

| VEW10-PFAS-SO02 | SS 0-1' | SB 4-6' |
|---|---|---|
| PFOA | **0.367 J** | 0.502 U |
| PFOS | **24.4** | **1.45** |
| PFBS | 0.502 U | 0.502 U |
| HFPO-DA | 0.502 U | 0.502 U |
| PFHxS | 0.502 U | 0.502 U |
| PFNA | **0.254 J** | 0.502 U |

| VEW10-PFAS-SO03 | SS 0-1' | SB 4-6' | SB 23-24' |
|---|---|---|---|
| PFOA | 0.49 U | 0.498 U | 0.493 U |
| PFOS | **0.564 J** | 0.498 U | 0.493 U |
| PFBS | 0.49 U | 0.498 U | 0.493 U |
| HFPO-DA | 0.49 U | 0.498 U | 0.493 U |
| PFHxS | 0.49 U | 0.498 U | 0.493 U |
| PFNA | 0.49 U | 0.498 U | 0.493 U |

| VEW10-PFAS-SO04 | SS 0-1' | SB 4-6' | SB 28-29' |
|---|---|---|---|
| PFOA | **0.265 J** | 0.491 U | 0.5 U |
| PFOS | **14.6** | **0.335 J** | 0.5 U |
| PFBS | 0.506 U | 0.491 U | 0.5 U |
| HFPO-DA | 0.506 U | 0.491 U | 0.5 U |
| PFHxS | 0.506 U | 0.491 U | 0.5 U |
| PFNA | 0.506 U | 0.491 U | 0.5 U |

| VEW10-PFAS-MW01 | GW 22-32' |
|---|---|
| PFOA | 2.23 U |
| PFOS | 2.23 U |
| PFBS | **3.71 J** |
| HFPO-DA | 2.23 U |
| PFHxS | **8.92** |
| PFNA | 2.23 U |

| VEW10-PFAS-MW02 | Screen 25-35' |
|---|---|
| PFOA | 2.3 U |
| PFOS | **7.81** |
| PFBS | 2.3 U |
| HFPO-DA | 2.3 U |
| PFHxS | **42.2** |
| PFNA | 2.3 U |

| VEW10-PFAS-SO05 | SS 0-1' | SB 4-6' | SB 28-29' |
|---|---|---|---|
| PFOA | 0.501 U | 0.493 U | 0.497 U |
| PFOS | 0.501 U | 0.493 U | 0.497 U |
| PFBS | 0.501 U | 0.493 U | 0.497 U |
| HFPO-DA | 0.501 U | 0.493 U | 0.497 U |
| PFHxS | 0.501 U | 0.493 U | 0.497 U |
| PFNA | 0.501 U | 0.493 U | 0.497 U |

| VEW10-PFAS-MW04 | Screen 6-16' |
|---|---|
| PFOA | 2.26 U |
| PFOS | 2.26 U |
| PFBS | **3.43 J** |
| HFPO-DA | 2.26 U |
| PFHxS | **5.02** |
| PFNA | 2.26 U |

| VEW10-PFAS-MW03 | Screen 25-35' |
|---|---|
| PFOA | 2.26 U |
| PFOS | **2.24 J** |
| PFBS | 2.26 U |
| HFPO-DA | 2.26 U |
| PFHxS | 2.26 U |
| PFNA | 2.26 U |

| VEW10-PFAS-SO06 | SS 0-1' | SB 4-6' | SB 7-8' |
|---|---|---|---|
| PFOA | **0.234 J** | 0.502 U | 0.5 U |
| PFOS | **0.44 J** | 0.502 U | 0.5 U |
| PFBS | 0.505 U | 0.502 U | 0.5 U |
| HFPO-DA | 0.505 U | 0.502 U | 0.5 U |
| PFHxS | 0.505 U | 0.502 U | 0.5 U |
| PFNA | 0.505 U | 0.502 U | 0.5 U |

**Legend**

- Monitoring Well
- Soil Boring
- Road
- Potential PFAS Release Area
- 0.39 Groundwater Elevation (Feet Above Mean Sea Level)

| Analyte | Soil RSLs (ng/g) | Groundwater RSLs (ng/L) |
|---|---|---|
| PFOA | 19 | 6 |
| PFOS | 13 | 4 |
| PFBS | 1,900 | 601 |
| HFPO-DA | 23 | 6 |
| PFHxS | 130 | 39 |
| PFNA | 19 | 5.9 |

**Notes:**
1. **Bolded** values indicate detections.
2. Shading indicates exceedance of Regional Screening Level (RSL).

**Acronyms:**
J - Analyte present. Value may or may not be accurate or precise
NG/G - Nanograms per gram
NG/L - Nanograms per liter
U - The material was analyzed for, but not detected

N W E S

0 125 250 Feet

Imagery Date: 2021, ESRI

**Figure 4-11**
**PFAS Sampling Results at VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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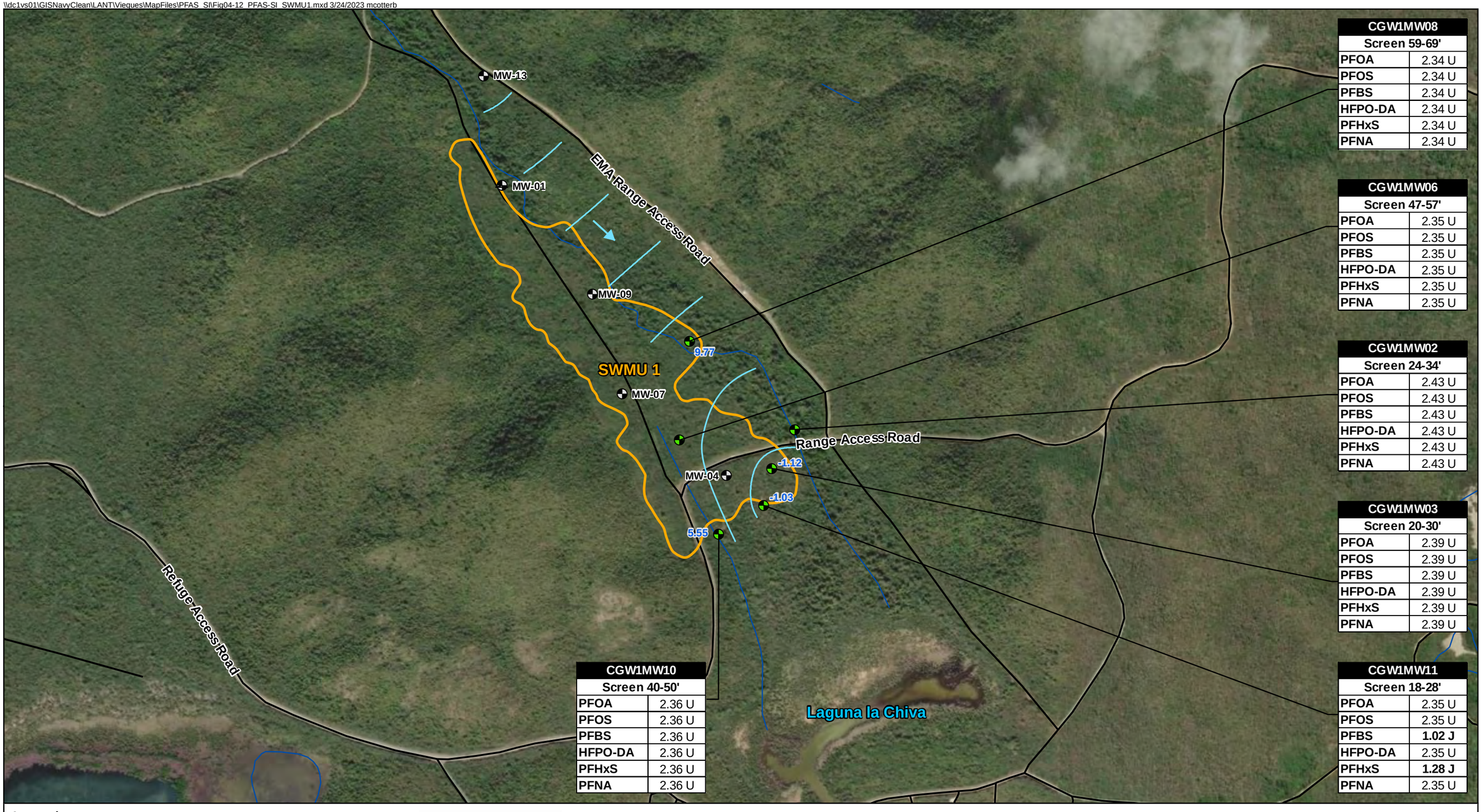


| CGW1MW08 | |
|---|---|
| Screen 59-69' | |
| PFOA | 2.34 U |
| PFOS | 2.34 U |
| PFBS | 2.34 U |
| HFPO-DA | 2.34 U |
| PFHxS | 2.34 U |
| PFNA | 2.34 U |

| CGW1MW06 | |
|---|---|
| Screen 47-57' | |
| PFOA | 2.35 U |
| PFOS | 2.35 U |
| PFBS | 2.35 U |
| HFPO-DA | 2.35 U |
| PFHxS | 2.35 U |
| PFNA | 2.35 U |

| CGW1MW02 | |
|---|---|
| Screen 24-34' | |
| PFOA | 2.43 U |
| PFOS | 2.43 U |
| PFBS | 2.43 U |
| HFPO-DA | 2.43 U |
| PFHxS | 2.43 U |
| PFNA | 2.43 U |

| CGW1MW03 | |
|---|---|
| Screen 20-30' | |
| PFOA | 2.39 U |
| PFOS | 2.39 U |
| PFBS | 2.39 U |
| HFPO-DA | 2.39 U |
| PFHxS | 2.39 U |
| PFNA | 2.39 U |

| CGW1MW10 | |
|---|---|
| Screen 40-50' | |
| PFOA | 2.36 U |
| PFOS | 2.36 U |
| PFBS | 2.36 U |
| HFPO-DA | 2.36 U |
| PFHxS | 2.36 U |
| PFNA | 2.36 U |

| CGW1MW11 | |
|---|---|
| Screen 18-28' | |
| PFOA | 2.35 U |
| PFOS | 2.35 U |
| PFBS | **1.02 J** |
| HFPO-DA | 2.35 U |
| PFHxS | **1.28 J** |
| PFNA | 2.35 U |

**Legend**

- Monitoring Well (Sampled)
- Monitoring Well (Not Sampled)
- Road
- Ephemeral Stream
- Groundwater Flow Direction
- Estimated Groundwater Contours (1'- 5' Intervals)
- Potential PFAS Release Area
- -1.03 Groundwater Elevation (Feet Above Mean Sea Level)

| Analyte | Groundwater RSLs (ng/L) |
|---|---|
| PFOA | 6 |
| PFOS | 4 |
| PFBS | 600 |
| HFPO-DA | 6 |
| PFHxS | 39 |
| PFNA | 5.9 |

**Notes:**
1. **Bolded** values indicate detections.

**Acronyms:**
J - Analyte present. Value may or may not be accurate or precise
NG/G - Nanograms per gram
NG/L - Nanograms per liter
RSL - Regional Screening Level
U - The material was analyzed for, but not detected

N
W E
S

0 350 700
Feet

Imagery Date: 2014/2021, ESRI.

**Figure 4-12**
**PFAS Sampling Results at VNTR SWMU 1: Former Camp Garcia Municipal Waste Management Unit (Landfill)**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

SECTION 5

# Conclusions and Recommendations

Thirteen potential PFAS release areas were evaluated for this SI at the former NASD and former VNTR in Vieques, Puerto Rico. Table 5-1 and the bullets below summarize the recommended path forward for each area based on the data evaluation performed in accordance with the SI SAP.

- 5 areas are recommended for no further investigation or action at this time because PFAS concentrations in all associated media are below RSLs. If new information and/or updated screening criteria are later identified, these areas will be re-evaluated to determine if further investigation/action is warranted.
- 8 areas are recommended for an RI because PFAS are present at concentrations above RSLs, the criterion established in the SAP for making this determination. The results of the HHRss performed for these eight areas indicated potentially unacceptable risk from exposure to the associated medium or media for five of the eight areas with RSL exceedances and no potentially unacceptable risk for three of the eight areas.

Figures 5-1 and 5-2 depict the potential PFAS release areas, and the areas recommended for no additional investigation or action at this time as well as those recommended for additional investigation via an RI.

For those areas warranting an RI, an inter-agency RI scoping session will be conducted and a Quality Assurance Project Plan will be prepared.

**TABLE 5-1**
**Summary of Basewide PFAS Site Inspection Findings and Recommendations**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| |
|---|
| **No Additonal Investigation/Action Recommendation at this time - PFOA, PFOS, PFBS, PFHxS, and/or PFNA concentrations in media are below RSLs** |
| NASD AOC H |
| NASD SWMU 6 |
| NASD SWMU 7 |
| VNTR PI 5 |
| VNTR SWMU 1 |
| **Remedial Investigation Recommendation - PFOA, PFOS, PFBS, PFHxS, and/or PFNA concentrations are present at concentrations above RSLs in media** |
| NASD AOC B[1] |
| NASD Former Fire Station Building 2046 at the Public Works Area[1] |
| VNTR AOC G[2] |
| VNTR Former Camp Garcia Runway[2] |
| VNTR SWMU 10[2] |
| Potential Former NASD Motor Pool Area[1] |
| VNTR SWMU 20[1] |
| Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330[1] |

Notes:
For informational purposes a PFAS Human Health Risk Screening (HHRS) was performed for areas where PFAS concentration(s) exceeded RSL(s) to provide additional perspective regarding those exceedances.

[1]HHRS indicated potentially unacceptable risk

[2]HHRS indicated no potentially unacceptable risk

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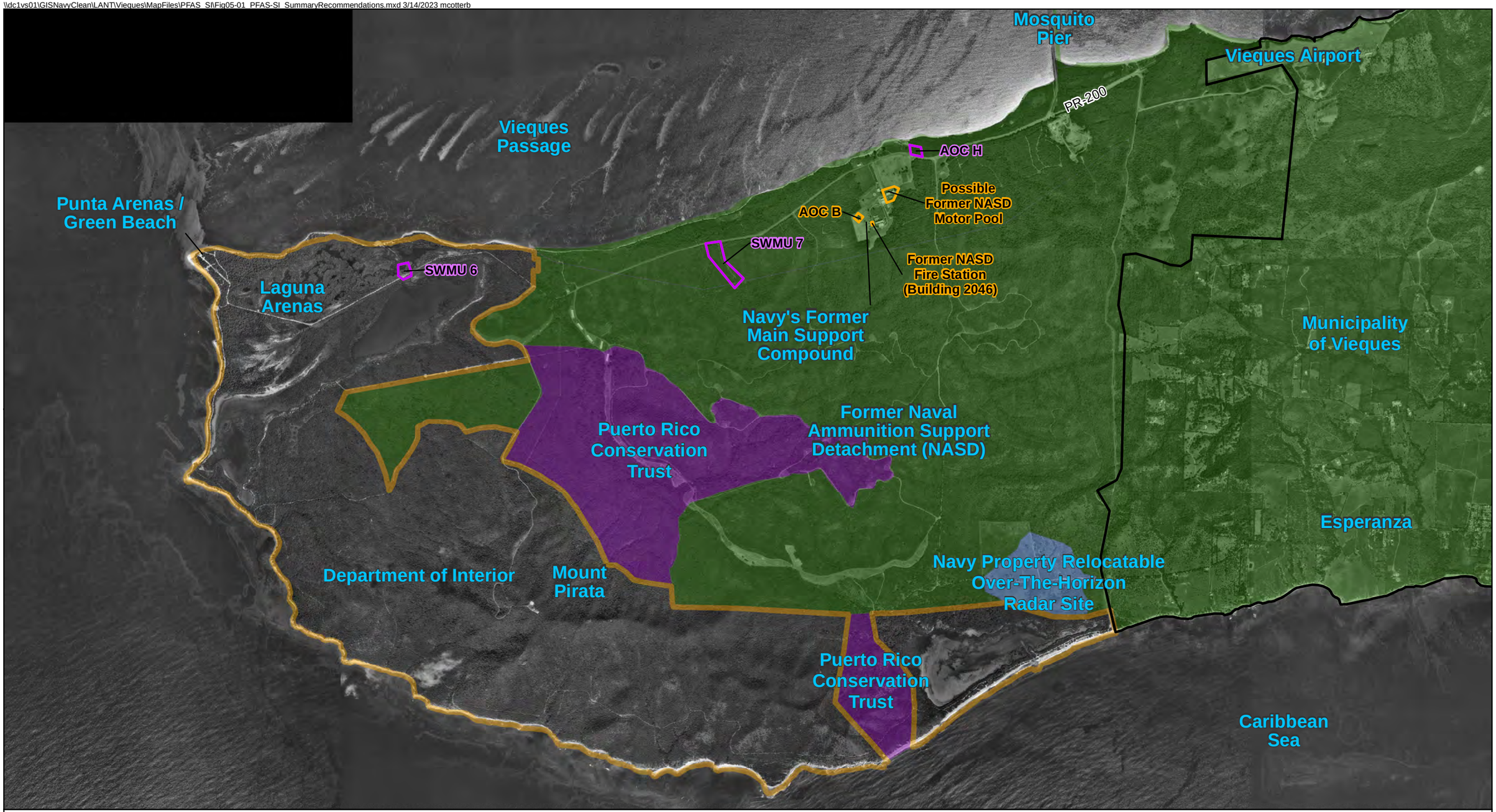
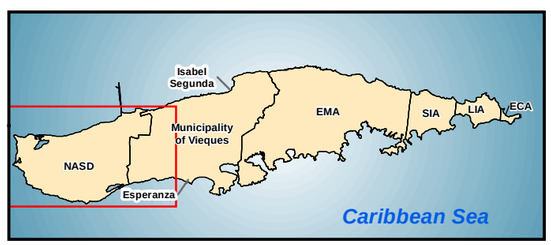



**Legend**
- Area Recommended for an RI
- Area Recommended for No Additional Investigation at this time




N
W E
S

0 1,250 2,500
Feet

1994 Aerial Photograph

**Figure 5-1**
**Former NASD Summary of Recommendations**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

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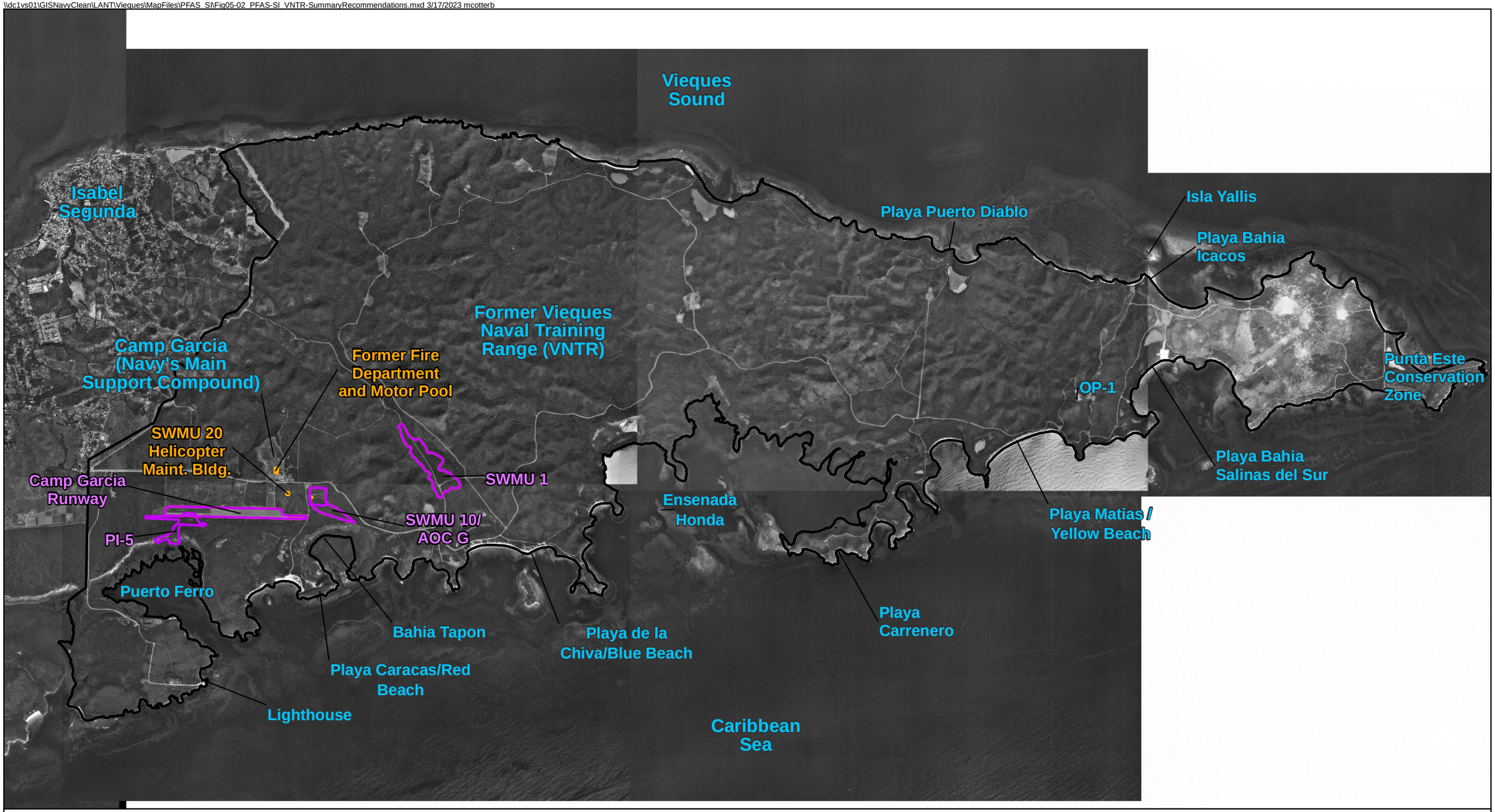
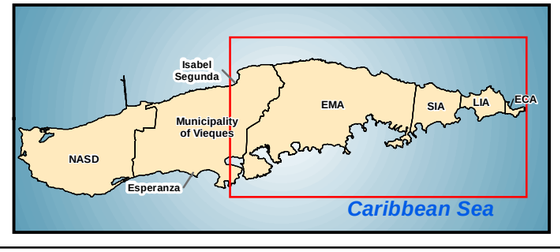



**Legend**

- Area Recommended for an RI
- Area Recommended for No Additional Investigation at this time




N
W E
S

0 2,000 4,000
Feet

Imagery Date: 1994

**Figure 5-2**
**Former VNTR Summary of Recommendations**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

SECTION 6

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# Appendix A
# Photographic Log

APPENDIX A

# Photographic Log



*Photograph 1. NASD AOC B. Aerial view west.*



*Photograph 2. NASD AOC B. Monitoring well installation at location VWAB-PFAS-MW01.*



*Photograph 3. NASD Former Fire Station Building 2046. Aerial view east. Building converted to Crab Island Rum Distillery.*



*Photograph 4. NASD Former Fire Station Building 2046. View of new distillery construction on north side.*



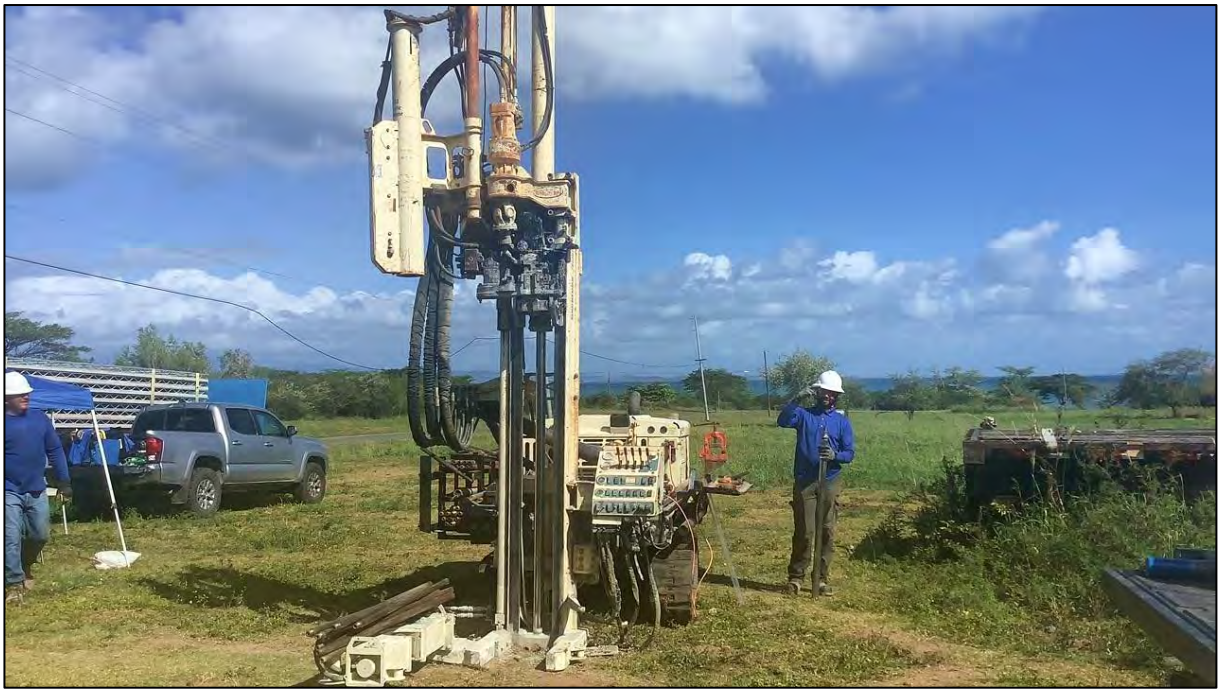
*Photograph 5. NASD Former Fire Station Building 2046. Drill rig at location VWFS-PFAS-SS/SB02.*



*Photograph 6. NASD Former Fire Station Building 2046. Soil core inspection station.*



*Photograph 7. Potential Former NASD Motor Pool Area. Aerial view west.*



*Photograph 8. Potential Former NASD Motor Pool Area. Monitoring well installation at location VWMP-PFAS-MW03.*



*Photograph 9. NASD AOC H. Overhead aerial view generally facing south.*



*Photograph 10. NASD AOC H. Installed monitoring well at location VWAH-PFAS-MW02.*




*Photograph 11. NASD AOC H. 12-foot soil core at location VWAH-PFAS-SB04/SO04.*



*Photograph 12. NASD SWMU 6. Overhead aerial view, generally facing north.*



*Photograph 13. VNTR Former Camp Garcia Runway. Aerial view east.*




*Photograph 14. VNTR Former Camp Garcia Runway. Drill rig at location VERW-PFAS-SS/SB05.*



*Photograph 15. VNTR PI 5. Aerial view southeast.*



*Photograph 16. VNTR PI 5. Drill rig at location VEP5-PFAS-SS/SB01.*



*Photograph 17. VNTR SWMU 20. Aerial view southwest. Camp Garcia runway in background.*



*Photograph 18. Potential Former VNTR Motor Pool Area. Drill rig at location VEFS-PFAS-MW02.*




*Photograph 19. Potential Former VNTR Motor Pool Area. Soil core inspection station.*



*Photograph 20. Potential Former VNTR Motor Pool Area. Drill rig at location VEFS-PFAS-SB02.*



*Photograph 21. VNTR SWMU 10 and AOC G. Aerial view north.*



*Photograph 22. VNTR SWMU 10. Drill rig at location VEW10-PFAS-SS/SB01.*

# Appendix B
# Soil Boring Logs and Well Construction Diagrams

# Soil Boring Logs

# COMPLETION REPORT OF WELL No. VEP4-PFAS-SO01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **244602.9**
EASTING: **2004963.1**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **March 3, 2022**

LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | 0.0 | Ground Surface | |
| Silt with Gravel (ML). Brown (7.5YR 4/3), moist, stiff, few gravel, fine gravel, angular gravel, trace sand, fine sand, faint odor. (DPT) | 0 | | | | |
| Well Graded Sand (SW). Moist, loose, trace gravel, fine gravel, subangular gravel, fine sand, subrounded sand. (DPT) | 5 | | | | |
| Silt with Sand (ML). Brownish Yellow (10YR 6/6), moist, stiff, few sand, fine sand. (DPT) | 10 | | | | |
| Silty Sand (SM). Brown (7.5YR 5/4), dry, loose to medium dense, little gravel, fine gravel, subangular gravel, fine to medium sand, subrounded sand, no odor. (DPT) | 15 | | | | |
| Silty Sand (SM). Yellow (10YR 7/6), dry, medium dense, little gravel, fine gravel, subrounded gravel, fine sand, weathered granodiorite. (DPT) | | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S):
Date:
Event:

ch2m

**COMPLETION REPORT OF WELL No. VEP4-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\BOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| | 20 | | | | | |
| Poorly Graded Sand with Gravel (SP). Yellowish Brown (10YR 5/4), dry, loose, few gravel, fine gravel, subangular to angular gravel, fine to medium sand, subrounded sand, weathered granodiorite. (DPT) | | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

ch2m

**COMPLETION REPORT OF**
**WELL No. VEP4-PFAS-SO01**

# COMPLETION REPORT OF WELL No. VEP5-PFAS-SO01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **243207.4**
EASTING: **2004623.2**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **February 23, 2022**

LOGGED BY: **M. Tekle, B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | 0.0 | Ground Surface | |
| Silty Sand (SM). Weak Red (2.5YR 5/2), dry, loose, some silt, no odor. (DPT) | 0 | | | | |
| Silt with Gravel (ML). Yellowish Red (5YR 5/6), very stiff, little gravel, coarse angular to sub-angular gravel, no odor. (DPT) | 5 | | | | |
| Silt with Sand (ML). Dry, very stiff, some sand, fine angular to sub-angular sand, no odor. (DPT) | | | | | |
| Lean Clay with Sand (CL). Strong Brown (7.5YR 5/6) mottled with Light Grayish Green (5GY 6/2), moist, very stiff, low plasticity, little sand, fine angular to sub-angular sand, no odor. (DPT) | 10 | | | | |
| Lean Clay with Sand (CL). Very stiff, low to medium plasticity, few sand, fine angular to subangular sand, little silt, no odor. (DPT) | | | | | |
| Lean Clay with Sand (CL). Reddish Yellow (7.5YR 6/6), moist, stiff to very stiff, low plasticity, some sand, fine angular to sub-angular sand, few silt, no odor. (DPT) | 15 | | | | |
| Clayey Sand (SC). Loose to medium dense, non-plastic, angular to subangular gravel, medium sand, angular to subangular sand, little silt, few clay, no odor. (DPT) | | | | | |
| Lean Clay with Sand (CL). Reddish Yellow (7.5YR 7/6), wet, very stiff, low to medium plasticity, some sand, fine angular to subangular sand, little silt, no odor. (DPT) | | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **15**
Date: **2/23/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VEP5-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJCLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VEP5-PFAS-SO02

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **243300.9**
EASTING: **2004759.2**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **February 24, 2022**

LOGGED BY: **M. Tekle, B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | 0.0 | Ground Surface | |
| Silt (ML). Very Dark Gray (7.5YR 3/1), moist, soft to medium, no odor. (DPT) | 0 | | | | |
| Silt with Sand (ML). Light Brown (7.5YR 6/4), moist, very stiff, few sand, medium to coarse angular to sub-angular sand, no odor. (DPT) | 5 | | | | |
| Silty Sand (SM). White (7.5YR 8/1), moist, loose to medium dense, medium to coarse angular to sub-angular sand, few silt, no odor. (DPT) | 10 | | | | |
| Silt with Sand (ML). Yellow (10YR 7/6), moist, stiff to very stiff, some sand, medium to coarse angular to sub-angular sand, no odor. (DPT) | 15 | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **23**
Date: **2/24/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VEP5-PFAS-SO02**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **M. Tekle, B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Silt with Sand (ML). Brownish Yellow (10YR 6/6), moist, stiff to very stiff, some sand, medium to coarse angular to sub-rounded sand, few clay, no odor. (DPT) | 20 | | | | | |
| Silty Sand (SM). Yellow (10YR 7/6), wet, medium dense to dense, medium to coarse angular to sub-angular sand, some silt, trace clay, no odor. (DPT) | | | | | | |
| Silty Sand (SM). Sand grain size coarsen downwards. Light Yellowish Brown (10YR 6/4), wet, very loose, fine to coarse angular to sub-angular sand, few silt, no odor. (DPT) | 25 | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

ch2m

**COMPLETION REPORT OF WELL No. VEP5-PFAS-SO02**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VERW-PFAS-MW01 / VERW-PFAS-SO01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **14.17**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **243638.1**
EASTING: **2004646.8**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **February 24, 2022**

LOGGED BY: **M. Tekle, B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | **0.0** | Ground Surface | **14.17** |
| Silt with Sand (ML). Silt with fine sand and few clay. Dark Gray (10YR 4/1) changes to Yellowish Brown (10YR 5/4), dry, stiff to very stiff, few sand, fine to medium sand, angular to subangular sand grains, little clay, no odor. (DPT) | 0 | | | | |
| Poorly Graded Sand (SP). Very Pale Brown (10YR 7/4), medium dense, fine to medium sand, angular to subangular sand grains, no odor. (DPT) | 5 | | | | |
| Silt with Sand (ML). Brown (10YR 5/3), moist, stiff to very stiff, few sand, fine sand, angular to subangular sand grains, no odor. (DPT) | | | | | |
| Lean Clay with Sand (CL). Moisture and sand content increased from 22-24. Yellowish Brown (10YR 5/4), moist, stiff to very stiff, low to medium plasticity, few sand, fine to medium sand, angular to subangular sand grains, no odor. (DPT) | 10 | | | | |
| | 15 | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **26**
Date: **2/24/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VERW-PFAS-MW01 / VERW-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **14.2**
LOGGED BY: **M. Tekle, B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| | 20 | | | | | |
| Lean Clay with Sand (CL). Wet at 25' bgs. Dark Yellowish Brown (10YR 4/4), wet, stiff to very stiff, medium plasticity, few sand, fine to medium sand, angular to subangular sand grains, no odor. (DPT) | 25 | | | | | |
| Silty Sand (SM). Yellowish Brown (10YR 5/4), wet, loose to medium dense, fine to medium sand, angular to subangular sand grains, few silt, no odor. (DPT) | 30 | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

ch2m

**COMPLETION REPORT OF**
**WELL No. VERW-PFAS-MW01 / VERW-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VERW-PFAS-MW02 / VERW-PFAS-SO02

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **20.65**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **244152.8**
EASTING: **2004630.7**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **February 28, 2022**

LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | **0.0** | Ground Surface | **20.65** |
| Silt with Sand (ML). Dark Brown (7.5 YR 3/3), dry, loose, very stiff, non-plastic, little gravel, fine gravel, angular gravel grains, some sand, fine sand, subrounded sand grains, no odor. (DPT) | 0 | | | | |
| Silty Sand (SM). Light Yellowish Brown (10YR 6/4), dry, loose, very stiff, non-plastic, trace, fine gravel, subangular gravel grains, medium sand, subrounded sand grains, little silt, no odor. (DPT) | 5 | | | | |
| Silty Sand (SM). Dry, medium dense, trace gravel, fine gravel, angular gravel grains, fine sand, subrounded sand grains, few silt, no odor. (DPT) | | | | | |
| Lean Clay with Sand (CL). Reddish Brown (5YR 4/4), very stiff, low plasticity, trace sand, fine sand, no odor. (DPT) | 10 | | | | |
| Lean Clay with Sand (CL). Very stiff, low plastictiy, little sand, fine sand, subrounded sand grains, little silt, no odor. (DPT) | 15 | | | | |
| Lean Clay (CL). Dark Reddish Gray (5YR 4/2), dry, stiff, low plasticity, little silt, no odor. (DPT) | | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **26**
Date: **2/28/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VERW-PFAS-MW02 / VERW-PFAS-SO02**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **20.6**
LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Lean Clay (CL). Reddish Brown (5YR 4/3), moist, medium to stiff, low plasticity, little silt, no odor. (DPT) | 20 | | | | | |
| Lean Clay (CL). Weak Red (2.5YR 5/2), moist, medium, medium plasticity, trace sand, fine sand, rounded sand grains, little silt, no odor. (DPT) | 25 | | | | | |
| Lean Clay with Sand (CL). Sand at 31-32. Brown (7.5YR 4/4), moist, medium to stiff, medium plasticity, little sand, fine sand, little silt, no odor. (DPT) | 30 | | | | | |
| Poorly Graded Sand (SP). Brownish Yellow (10YR 6/6), loose, soft, low plasticity, trace gravel, fine to medium sand, subrounded to rounded sand grains, no odor. (DPT) | | | | | | |
| Lean Clay with Sand (CL). White (5Y 8/1) mottled with Pale Olive (5Y 6/3), moist, hard, low plasticity, few sand, medium sand, rounded sand grains, no odor. (DPT) | 35 | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

ch2m

**COMPLETION REPORT OF**
**WELL No. VERW-PFAS-MW02 / VERW-PFAS-SO02**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VERW-PFAS-SO03

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **244011.9**
EASTING: **2004632.5**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **February 25, 2022**

LOGGED BY: **B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | 0 | | **0.0** | Ground Surface | |
| Silt with Sand (ML). Brown (10YR 4/3), moist, medium, no odor. (DPT) | | | | | |
| Poorly Graded Sand with Silt (SP-SM). Dry, loose, fine to medium sub-rounded sand, no odor. (DPT) | | | | | |
| Sandy Silt (ML). Light Yellowish Brown (10YR 6/4), stiff, few sand, fine subrounded sand, little clay, no odor. (DPT) | 5 | | | | |
| Sandy Silt with Gravel (ML). Yellowish Red (5YR 4/6), dry, very stiff, trace gravel, fine sub-angular gravel, fine sand. (DPT) | 10 | | | | |
| Sandy Silt with Gravel (ML). Moist, dense, stiff, trace gravel, sub-angular gravel, medium sub-rounded sand, trace clay, no odor. (DPT) | 15 | | | | |
| Sandy Silt (ML). Dry, medium to stiff, trace gravel, few sand, medium to sub-rounded sand, no odor. (DPT) | | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **30**
Date: **2/25/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VERW-PFAS-SO03**

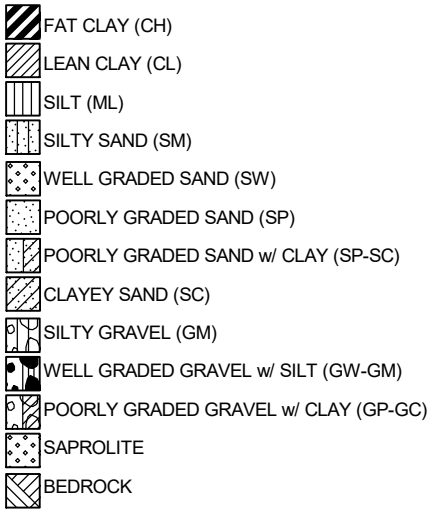


2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| | 20 | | | | | |
| Silty Sand with Gravel (SM). White (8/N) mottled with Yellowish Brown (10YR 5/4), dry, medium dense, trace gravel, coarse sub-angular gravel, fine to medium sand, few silt, no odor. (DPT) | 25 | | | | | |
| Sandy Silt (ML). Dry, stiff, fine sand, no odor. (DPT) | | | | | | |
| Silty Sand (SM). Weak Red (5R 4/4), loose to medium dense, fine to medium sand, sub-rounded sand, few silt, no odor. (DPT) | | | | | | |
| Silty Sand with Gravel (SM). Yellowish Brown (10YR 5/4), wet, loose, rapid, coarse sub-angular gravel, trace clay, no odor. (DPT) | 30 | | | | | |




ch2m

**COMPLETION REPORT OF WELL No. VERW-PFAS-SO03**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VERW-PFAS-SO04

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **243947.8**
EASTING: **2004751.7**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **February 25, 2022**

LOGGED BY: **M. Tekle, B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL |
|---|---|---|
| Silt with Sand (ML). Brown (10YR 4/3), dry, medium to stiff, some sand, fine to medium angular to sub-angular sand, little clay, no odor. (DPT) | 0 | |
| Sandy Silt with Gravel (ML). Yellowish Brown (10YR 5/4), dry, stiff to very stiff, little gravel, coarse angular to sub-angular gravel, some sand, fine to medium angular to sub-angular sand, little clay, no odor. (DPT) | 5 | |
| Sandy Silt with Gravel (ML). Moist, very stiff, trace gravel, coarse angular to sub-angular gravel, few sand, fine angular to sub-angular sand, few clay, no odor. (DPT) | | |
| Lean Clay with Sand (CL). Yellowish Brown (10YR 5/4), moist, very stiff, low to medium plasticity, few sand, fine angular to sub-angular sand, no odor. (DPT) | 10 | |
| Lean Clay with Sand (CL). Light Yellowish Brown (10YR 6/4), very stiff, low to medium plasticity, little sand, fine angular to sub-angular sand, no odor. (DPT) | | |
| Silt with Sand (ML). Brown (10YR 5/3), moist, stiff to very stiff, some sand, fine to medium angular to sub-angular sand, trace clay, no odor. (DPT) | 15 | |

| DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|
| **0.0** | Ground Surface | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **32**
Date: **2/25/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VERW-PFAS-SO04**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **M. Tekle, B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Lean Clay with Sand (CL). Sand and moisture content increase from 26-32' bgs. Yellowish Brown (10YR 5/4), moist, very stiff, low plasticity, few sand, fine to medium angular to sub-angular sand, no odor. (DPT) | 20<br>25<br>30 | | | | | STRATA<br>FAT CLAY (CH)<br>LEAN CLAY (CL)<br>SILT (ML)<br>SILTY SAND (SM)<br>WELL GRADED SAND (SW)<br>POORLY GRADED SAND (SP)<br>POORLY GRADED SAND w/ CLAY (SP-SC)<br>CLAYEY SAND (SC)<br>SILTY GRAVEL (GM)<br>WELL GRADED GRAVEL w/ SILT (GW-GM)<br>POORLY GRADED GRAVEL w/ CLAY (GP-GC)<br>SAPROLITE<br>BEDROCK |
| Lean Clay with Sand (CL). Brownish Yellow (10YR 6/6), wet, stiff to very stiff, medium plasticity, some sand, fine to medium angular to sub-angular sand, no odor. (DPT) | 35 | | | | | |

ch2m

**COMPLETION REPORT OF**
**WELL No. VERW-PFAS-SO04**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VERW-PFAS-SO05

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **244899.0**
EASTING: **2004711.8**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **March 1, 2022**

LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL |
|---|---|---|
| Silt (ML). Dark Brown (10YR 3/3), dry, stiff to very stiff, few sand, fine sub-rounded sand, no odor. (DPT) | 0 | |
| Silt with Sand (ML). Dark Brown (7.5YR 3/4), dry, very stiff, trace gravel, fine sub-angular gravel, few sand, fine sub-rounded sand. (DPT) | | |
| Silty Sand with Gravel (SM). Light Yellowish Brown (10YR 6/4), dry, medium dense, little gravel, fine gravel, fine sand, few silt. (DPT) | 5 | |
| Silt with Sand (ML). Dark Reddish Brown (5YR 3/3), dry, very stiff, trace gravel, fine sub-angular gravel, few sand, fine sand, no odor. (DPT) | | |
| Silty Sand (SM). Dry, loose, little gravel, fine sub-angular gravel, fine sub-rounded sand, little silt, no odor. (DPT) | 10 | |
| Silt (ML). Reddish Brown (5YR 4/4), moist, stiff, trace sand, fine sand, little clay, no odor. (DPT) | | |
| Silty Sand (SM). Strong Brown (7.5YR 5/6), moist, medium dense, fine to medium sub-rounded sand, few silt, trace clay, no odor. (DPT) | 15 | |
| Lean Clay (CL). Dark Reddish Gray (5YR 4/2), moist, medium to stiff, little silt, no odor. (DPT) | | |
| Silty Sand (SM). Wet, loose to medium dense, fine to medium sub-rounded sand, few silt, no odor. (DPT) | | |

| DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|
| **0.0** | Ground Surface | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **20**
Date: **3/1/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VERW-PFAS-SO05**

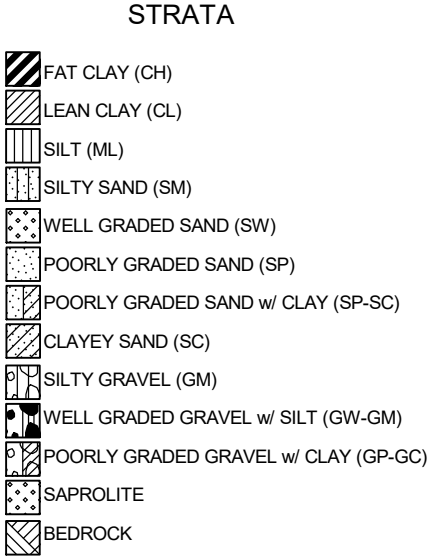


2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Lean Clay with Sand (CL). Brown (7.5YR 4/3), moist, medium to stiff, few sand, fine sub-rounded sand, little silt, no odor. (DPT) | 20 | | | | | |
| Well Graded Sand with Clay (SW-SC). Brownish Yellow (10YR 6/6), wet, loose, soft, fine to coarse sub-rounded to rounded sand, few clay, no odor. (DPT) | 25 | | | | | |




ch2m

**COMPLETION REPORT OF WELL No. VERW-PFAS-SO05**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VEW10-PFAS-MW03 / VEW10-PFAS-SO05

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **12.70**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **245035.9**
EASTING: **2004746.5**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **March 2, 2022**

LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | **0.0** | Ground Surface | **12.70** |
| Not available due to electronic data loss. | 0 | | | | |
| | 5 | | | | |
| | 10 | | | | |
| | 15 | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **29**
Date: **3/2/2022**
Event: **Drilling**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **12.7**
LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| | 20 | | | | | |
| | 25 | | | | | STRATA |
| | 30 | ▽ | | | | FAT CLAY (CH)<br>LEAN CLAY (CL)<br>SILT (ML)<br>SILTY SAND (SM)<br>WELL GRADED SAND (SW)<br>POORLY GRADED SAND (SP)<br>POORLY GRADED SAND w/ CLAY (SP-SC)<br>CLAYEY SAND (SC)<br>SILTY GRAVEL (GM)<br>WELL GRADED GRAVEL w/ SILT (GW-GM)<br>POORLY GRADED GRAVEL w/ CLAY (GP-GC)<br>SAPROLITE<br>BEDROCK |
| | 35 | | | | | |

ch2m

**COMPLETION REPORT OF**
**WELL No. VEW10-PFAS-MW03 / VEW10-PFAS-SO05**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VEW10-PFAS-MW04 / VEW10-PFAS-SO06

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **6.14**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **245222.5**
EASTING: **2004696.6**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **March 1, 2022**

LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL |
|---|---|---|
| Silt (ML). Brown (7.5YE 4/3), moist, medium to stiff consistency, trace sand, fine sand, little clay, no odor. (DPT) | 0 | |
| Silty Sand (SM). Dark Yellowish Brown (10YR 4/6), moist, medium dense, little gravel, fine gravel, subangular gravel, fine sand, subrounded sand, some clay, no odor. (DPT) | 5 | |
| Poorly Graded Sand (SP). Yellowish Brown (10YR 5/6), loose dense, fine to medium sand, subrounded sand, little silt, faint odor. (DPT) | | |
| Poorly Graded Sand with Clay (SP-SC). 0.3ft clay at top, Yellowish Brown (10YR 5/8), wet, very loose, stiff, low to medium plasticity, medium sand, subangular to subrounded sand, no odor. (DPT) | | |
| Lean CLay (CL). Reddish Brown (5YR 4/3) mottled with Black (5YR 2/1), moist, stiff, medium plasticity, no odor. (DPT) | 10 | |
| Poorly Graded Sand (SP). Brownish Yellow (10YR 6/6), wet, very loose, medium sand, subrounded sand, little clay, no odor. (DPT) | | |
| | 15 | |

| DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|
| **0.0** | Ground Surface | **6.14** |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **8**
Date: **3/1/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VEW10-PFAS-MW04 / VEW10-PFAS-SO06**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VEW10-PFAS-SO01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **244960.3**
EASTING: **2005008.4**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **March 9, 2022**

LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | **0.0** | Ground Surface | |
| Silt (ML). Dark Brown (7.5YR 3/3), moist, medium, trace sand, fine sand, no odor. (DPT) | 0 | | | | |
| Poorly Graded Sand (SP). Brownish Yellow (10YR 6/6), dry, loose, fine to medium sub-rounded sand, no odor. (DPT) | | | | | |
| Lean Clay (CL). Brown (7.5YR 5/4), dry, stiff, low plasticity, no odor. (DPT) | | | | | |
| Well Graded Sand (SW). Dry, loose to medium dense, fine to coarse sub-rounded to rounded sand, no odor. (DPT) | 5 | | | | |
| Silt with Sand (ML). Mottled black nodules, Strong Brown (7.5YR 5/6), dry, very stiff to hard, low plasticity, little gravel, fine gravel, trace sand, fine sand, no odor. (DPT) | 10 | | | | |
| Silt with Sand (ML). Yellowish Red (5YR 4/6), dry, medium to stiff, few sand, fine rounded sand, no odor. (DPT) | 15 | | | | |
| Silty Sand (ML). Dry, medium dense to dense, fine to coarse sub-rounded to rounded sand, no odor. (DPT) | | | | | |
| Lean Clay (CL). Mottled black nodules, Reddish Brown (5Y 4/4), moist, stiff, low plasticity, no odor. (DPT) | | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **27**
Date: **3/9/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VEW10-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| | 20 | | | | | |
| Sandy Lean Clay (CL). Reddish Brown (5YR 5/4), moist, stiff, low plasticity, some sand, fine rounded sand, no odor. (DPT) | | | | | | |
| Lean Clay (CL). Mottled black nodules, Yellowish Red (5YR 4/6), moist, medium to stiff, low plasticity, no odor. (DPT) | 25 | | | | | |
| Silty Sand (SM). Wet, very loose, little gravel, fine sub-angular gravel, fine to medium sub-rounded sand, no odor. (DPT) | | | | | | |
| Sandy Lean Clay (CL). Yellowish Red (5YR 5/6), moist, very stiff, low plasticity, some sand, fine rounded sand, no odor. (DPT) | 30 | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

ch2m

**COMPLETION REPORT OF WELL No. VEW10-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VEW10-PFAS-SO02

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **245037.4**
EASTING: **2005006.6**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **March 9, 2022**

LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | 0.0 | Ground Surface | |
| Lean Clay (CL). Color change at 1' bgs, mottled black nodules, Brown (10YR 4/3) mottled with Brown (7.5YR 4/4), dry, very stiff, low plasticity, few silt, no odor. (DPT) | 0 | | | | |
| Silt with Sand (ML). Black nodules throughout, Yellowish Brown (10YR 5/8), dry, very stiff to hard, few sand, fine sand, no odor. (DPT) | 5 | | | | |
| Silty Sand (SM). Yellowish Brown (10YR 5/4), dense, trace gravel, fine gravel, fine to medium subrounded sand, few silt, no odor. (DPT)) | 10 | | | | |
| Well Graded Sand with Gravel (SW). Light Yellowish Brown (10YR 6/4), dry, dense, few, fine subangular gravel, fine to coarse sub-rounded sand, no odor. (DPT) | 15 | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S):
Date:
Event:

ch2m

**COMPLETION REPORT OF WELL No. VEW10-PFAS-SO02**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | STRATA DEPTH (ft.) | STRATA SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| | 20 | | | | | |
| | 25 | | | | | |
| Well Graded Sand (SW). Very Pale Brown (10YR 7/4), moist, medium dense, little silt. (DPT) | | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

ch2m

**COMPLETION REPORT OF WELL No. VEW10-PFAS-SO02**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VEW10-PFAS-SO03

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **244959.4**
EASTING: **2004965.1**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **March 9, 2022**

LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | 0.0 | Ground Surface | |
| Silt with Sand (ML). Dark Brown (7.5YR 3/3), dry, very stiff, few sand, fine sub-rounded sand, no odor. (DPT) | 0 | | | | |
| Poorly Graded Sand (SP). Light Olive Brown (2.5Y 5/6), dry, medium dense, fine sub-rounded sand, no odor. (DPT) | | | | | |
| Lean Clay (CL). Mottled black nodules, Brown (7.5YR 4/4), dry, very stiff to hard, non-plastic, no odor. (DPT) | 5 | | | | |
| Silt with Gravel (ML). Strong Brown (7.5YR 4/6), dry, hard, few gravel, fine to coarse sub-angular gravel. (DPT) | 10 | | | | |
| Poorly Graded Sand with Gravel (SP). Brownish Yellow (10YR 6/6), dry, very dense, few gravel, fine to coarse sub-angular gravel, no odor. (DPT) | 15 | | | | |
| Lean Clay (CL). Mottled black nodules, Strong Brown (7.5YR 5/8), dry, low plasticity, no odor. (DPT) | | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **24**
Date: **3/9/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VEW10-PFAS-SO03**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Lean Clay with Sand (CL). Yellowish Brown (10YR 5/8), moist, stiff, low plasticity, few sand, fine sub-rounded sand, no odor. (DPT) | 20 | | | | | |
| Silty Sand (SM). Brownish Yellow (10YR 6/8), wet, loose, fine to coarse rounded sand, few silt, no odor. (DPT) | | | | | | |
| Sandy Lean Clay with Gravel (CL). Mottled black nodules, moist, hard, low plasticity, little gravel, fine angular gravel, no odor. (DPT) | 25 | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

ch2m

**COMPLETION REPORT OF**
**WELL No. VEW10-PFAS-SO03**

# COMPLETION REPORT OF WELL No. VEW10-PFAS-SO04

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **245035.6**
EASTING: **2004962.0**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **March 9, 2022**

LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | 0.0 | Ground Surface | |
| Silt (ML). Dark Brown (7.5YR 3/3), moist, stiff, little clay, no odor. (DPT) | 0 | | | | |
| Silt with Sand (ML). Brown (7.5YR 4/4), dry, stiff, trace gravel, fine gravel, few sand, fine sub-rounded sand, no odor. (DPT) | | | | | |
| Lean Clay (CL). Brown (7.5YR 4/3), very stiff, low plasticity, little clay, no odor. (DPT) | 5 | | | | |
| Silt (ML). Brown (7.5YR 4/4), dry, medium to stiff, trace sand, fine sand, few clay, no odor. (DPT) | 10 | | | | |
| Silty Sand (SM). Color change at 20' bgs, Light Yellowish Brown (10YR 6/4), dry, medium dense, fine to medium sand, sub-rounded sand, little clay, no odor. (DPT) | 15 | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **29**
Date: **3/9/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VEW10-PFAS-SO04**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\BOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| | 20 | | | | | |
| Silty Sand (SM). Moist, medium dense, fine to medium sand, no odor. (DPT) | | | | | | |
| | 25 | | | | | STRATA |
| Silt (ML). Light Yellowish Brown (10YR 6/4), moist, very stiff, few clay, no odor. (DPT) | | | | | | FAT CLAY (CH)<br>LEAN CLAY (CL)<br>SILT (ML)<br>SILTY SAND (SM)<br>WELL GRADED SAND (SW)<br>POORLY GRADED SAND (SP)<br>POORLY GRADED SAND w/ CLAY (SP-SC)<br>CLAYEY SAND (SC)<br>SILTY GRAVEL (GM)<br>WELL GRADED GRAVEL w/ SILT (GW-GM)<br>POORLY GRADED GRAVEL w/ CLAY (GP-GC)<br>SAPROLITE<br>BEDROCK |
| Silty Sand (SM). Yellowish Brown (10YR 5/4), wet, very loose, fine to medium subrounded sand, few silt, little clay, no odor. (DPT) | 30 | | | | | |

2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

ch2m

**COMPLETION REPORT OF**
**WELL No. VEW10-PFAS-SO04**

# COMPLETION REPORT OF WELL No. VWAB-PFAS-SO01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **232629.4**
EASTING: **2005516.0**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **May 11, 2022**

LOGGED BY: **C. Dronfield**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | 0.0 | Ground Surface | |
| Orgainic Soil (OL). Organic material (roots), Brown (10YR 4/3), dry, soft, no odor. (DPT) | 0 | | | | |
| Sandy Lean Clay (CL). Strong Brown (7.5YR 4/6), dry, hard, non-plastic, trace gravel, fine angular gravel, some sand, fine to coarse sand. (DPT) | | | | | |
| Well Graded Sand (SW). Reddish Yellow (7.5YR 6/6), dry, loose, trace gravel, fine angular gravel, fine to coarse sand, no odor. (DPT) | 5 | | | | |
| Lean Clay with Sand (CL). Brown (7.5YR 5/2) mottled with Yellowidh Red (5YR 5/6), dry, hard, non-plastic, few sand, fine to coarse sand, no odor. (DPT) | | | | | |
| Lean Clay (CL). Reddish Yellow (7.5YR 6/6), very soft, low plasticity, some silt, no odor. (DPT) | | | | | |
| Well Graded Gravel (GW). (GLEY 1 6/N), very loose, fine to coarse gravel, no odor. (DPT) | | | | | |
| Fat Clay with Sand (CH). Light Yellowish Brown (10YR 6/4), dry, very soft, high plasticity, few sand, fine to medium sand, few silt, no odor (DPT) | 10 | | | | |
| Well Graded Sand (SW). Dry, very loose, fine to medium sand, trace clay, no odor. (DPT) | 15 | | | | |
| No Recovery. (NR) | | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S):
Date:
Event:

ch2m

**COMPLETION REPORT OF WELL No. VWAB-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **C. Dronfield**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Well Graded Sand (SW). Dry, medium dense, trace gravel, fine sub-angular gravel, fine to coarse sand, trace clay, no odor. (DPT) | 20 | | | | | |
| Lean Clay (CL). Yellowish Brown (10YR 5/4), dry, hard, non-plastic, trace gravel, coarse sub-angular gravel, trace silt, no odor. (DPT) | 25 | | | | | STRATA<br>FAT CLAY (CH)<br>LEAN CLAY (CL)<br>SILT (ML)<br>SILTY SAND (SM)<br>WELL GRADED SAND (SW)<br>POORLY GRADED SAND (SP)<br>POORLY GRADED SAND w/ CLAY (SP-SC)<br>CLAYEY SAND (SC)<br>SILTY GRAVEL (GM)<br>WELL GRADED GRAVEL w/ SILT (GW-GM)<br>POORLY GRADED GRAVEL w/ CLAY (GP-GC)<br>SAPROLITE<br>BEDROCK |
| Silt (ML). Very Pale Brown (10YR 7/3), very soft, non-plastic, trace sand, fine to coarse sand, no odor. (DPT) | | | | | | |
| Bedrock. White, crystalline (quartz), massive, dry. (DPT) | | | | | | |

2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

ch2m

**COMPLETION REPORT OF**
**WELL No. VWAB-PFAS-SO01**

# COMPLETION REPORT OF WELL No. VWAB-PFAS-SO02

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **232644.1**
EASTING: **2005533.5**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **May 11, 2022**

LOGGED BY: **C. Dronfield**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | 0.0 | Ground Surface | |
| Organic Soil (OL). Brown (10YR 5/3), dry, loose, trace gravel, fine gravel, angular gravel, no odor. (DPT) | 0 | | | | |
| Sandy Lean Clay (CL). Strong Brown (7.5YR 5/6), dry, hard, non-plastic, trace gravel, fine gravel, some sand, fine to coarse sand, no odor. (DPT) | | | | | |
| Well Graded Sand (SW). Brownish Yellow (10YR 6/6), dry, loose, trace gravel, fine gravel, no odor. (DPT) | 5 | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S):
Date:
Event:

ch2m

**COMPLETION REPORT OF WELL No. VWAB-PFAS-SO02**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VWAB-PFAS-SO03

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **232626.3**
EASTING: **2005547.7**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **May 11, 2022**

LOGGED BY: **C. Dronfield**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | **0.0** | Ground Surface | |
| Organic Soil (OL). Trace organic roots, Brown (7.5YR 4/2), dry, very loose, trace gravel, fine gravel, subangular gravel, no odor. (DPT) | 0 | | | | |
| Well Graded Sand with Silt (SW-SM). Brown (7.5YR 5/3), dry, loose, trace gravel, some silt, no odor. (DPT) | | | | | |
| Sandy Lean Clay (CL). Yellowish Brown (10YR 5/4), dry, very stiff to hard, nonplastic, some sand, fine to coarse sand, no odor. (DPT) | 5 | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S):
Date:
Event:

ch2m

**COMPLETION REPORT OF WELL No. VWAB-PFAS-SO03**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VWAB-PFAS-SO04

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **232611.5**
EASTING: **2005530.9**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **May 11, 2022**

LOGGED BY: **C. Dronfield**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | **0.0** | Ground Surface | |
| Lean Clay with Sand (CL). Brown (7.5YR 5/3), dry, hard, trace gravel, fine gravel, little sand, fine to coarse sand, no odor. (DPT) | 0<br>5 | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S):
Date:
Event:

ch2m

**COMPLETION REPORT OF WELL No. VWAB-PFAS-SO04**



2 - LOG A EWNL02.GDT - 3/22/23 15:37 - \\WBOFPP01\PROJ\CLEANII\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VWAH-PFAS-MW02 / VWAH-PFAS-SO01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **233090.9**
EASTING: **2006070.9**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **April 21, 2022**

LOGGED BY: **T. Stewart**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | 0.0 | Ground Surface | |
| Silty Sand (SM). Brown (7.5YR 4/3), wet t 6.0' bgs, loose, medium to coarse sand, red brick fragments to 2" size from 0.5-1.3' bgs, up to 30% coarse blocky organics from 4.5 to 6.8', color grades to very dark brown (7.5YR 2/3) at 5.0' bgs. (DPT) | 0 | | | | |
| Clay (CL). Dark Greenish Gray (5GY 4/1), moist-dry, 15-20% organics, low plasticity. (DPT) | 5 | | | | |
| Fat Clay (CH). Grayish Green (5G 5/2), mottled dark greenish black (5G 4/1) with white, dry, very stiff to hard, colored red (2.5YR 4/6) from 9.8-10.5' bgs. (DPT) | 10 | | | | |
| Silty, Clayey Sand (SC-SM). Very Dark Gray (10YR 3/1), dry, fine to medium sand, 10-15% brownish black blocky, coarse organics. (DPT) | 15 | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **5.6**
Date: **4/21/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VWAH-PFAS-MW02 / VWAH-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VWAH-PFAS-SO02

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **233106.5**
EASTING: **2006052.4**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **April 21, 2022**

LOGGED BY: **T. Stewart**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | **0.0** | Ground Surface | |
| Silty Sand (SM). Grayish Brown (10YR 5/2), dry, fine to med. sand, dense to loose sand, 10-15% organics throughtout. (DPT) | 0 | | | | |
| Clay with Silt (CL). Dark Brown (10YR 3/3), dry to moist, nonplastic. (DPT) | 5 | | | | |
| Organic Clay (OH). Very Dark Gray (2.5Y 3/6), moist, nonplastic. (DPT) | | | | | |
| Silty Sand (SM). Dark Yellowish Brown (10YR 3/4), wet at 9.0' bgs, carse sand, loose. (DPT) | 10 | | | | |
| Fat Clay (CH). Grayish Green (5G 5/2), very stiff, high plasticity, dry. (DPT) | | | | | |
| Silty, Clayey Sand (SC-SM). Dark Grayish Brown (10YR 4/2), dry, dense, coarse sand, trace organics. (DPT) | | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **9**
Date: **4/21/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VWAH-PFAS-SO02**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VWAH-PFAS-SO03

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **233088.3**
EASTING: **2006049.8**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **April 21, 2022**

LOGGED BY: **T. Stewart**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | 0.0 | Ground Surface | |
| Silty Sand (SM). Grayish Brown (10YR 5/2), dry, loose, medium to coarse sand, some blocky organics, roots 0-0.4' bgs. (DPT) | 0 | | | | |
| | 5 | | | | |
| Silty Sand (SM). Dark Greenish Black (5GY 4/1), wet, dense, medium to coarse sand, trace organics, cohesive. (DPT) | | | | | |
| Silty Sand (SM). Light Brown (7.5YR 6/3) to Brown (7.5YR 5/4), wet, coarse, mottled gray from 10.4-10.7' bgs. (DPT) | 10 | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **7.8**
Date: **4/21/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VWAH-PFAS-SO03**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VWAH-PFAS-SO04

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **233103.1**
EASTING: **2006040.4**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **April 21, 2022**

LOGGED BY: **T. Stewart**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | **0.0** | Ground Surface | |
| Silt with Sand (ML). Brown (7.5YR 5/2), dry, loose to very loose, medium to coarse grained sand, coarse rock gravel at 1.5-2.1' bgs. (DPT) | 0 | | | | |
| | 5 | | | | |
| Silty, Clayey Sand (SC-SM). Brown (7.5YR 4/3), mottled Dark Greenish Gray, edium sand, dense, 10-15% organics, wet at 9.5-10' bgs. (DPT) | | | | | |
| | 10 | | | | |
| Silty Sand (SM). Grayish Green (5G 5/2) with White, dry, coarse, dense to loose, nonplastic. (DPT) | | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **9.5**
Date: **4/21/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VWAH-PFAS-SO04**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VWFS-PFAS-SO01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **232704.5**
EASTING: **2005492.1**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **March 22, 2022**

LOGGED BY: **B. Davis & I. Dinelman**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | 0.0 | Ground Surface | |
| Clayey Sand with Gravel (SC). Top 4.0" (0.33') is orgainic soil with roots and grasses. Color (10YR 4/4). Strong Brown (7.5YR 4/6) mottled with Pale olive (5Y 6/3) and White (2.5Y 8/1), moist, little gravel, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | 0 | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Strong Brown (7.5YR 5/6), moist, little gravel, fine gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | 5 | | | | |
| Well Graded Sand with Silt (SW-SM). Color changes at 7.5' and 8.0' bgs to 10YR 6/6 and 5/8 respectively. Reddish Yellow (7.5YR 6/6) color change with Brownish Yellow (10YR 6/6) and Yellowish Brown (10YR 5/8), moist, trace gravel, fine gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, little silt, trace clay, no odor. (DPT) | | | | | |
| Sandy Fat Clay (CH). Strong Brown (7.5YR 4/6), moist, stiff, high plasticity, some sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | 10 | | | | |
| Well Graded Sand with Silt (SW-SM). Strong Brown (7.5YR 5/8), moist, loose, trace gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | | | | | |
| Clayey Sand with Gravel (SC). Brown (7.5YR 4/4), moist, medium dense, little gravel, fine gravel angular to subangular gravel, fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | | | | | |
| Sandy Fat Clay (CH). Interbedded with two layers of SW-SM at 17.0'-17.25' bgs and 18.5'-18.75' bgs. Sand is well graded with 6-15% gravel, silt and clay. At 19.5' bgs CH changes color to 5YR 4/6. Yellowish Red (5YR 4/6) color change with Yellowish Brown (10YR 5/6), moist, stiff, high plasticity, some sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | 15 | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S):
Date:
Event:

ch2m

**COMPLETION REPORT OF WELL No. VWFS-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Clayey Sand with Gravel (SC). Large rock broken up at 20.75' bgs. Dark Yellowish Brown (10YR 4/4) color change with (5.0YR 6/6), moist, loose, little gravel, fine to coarse gravel, angular gravel, fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | 20 | | | | | |
| Sandy Fat Clay with Gravel (CH). Strong Brown (7.5YR 5/6) color change with Yellowish Brown (10YR 5/4), moist, stiff, high plasticity, few gravel, fine to coarse gravel, angular to subangular gravel, some sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | | | | | | |
| Clayey Sand with Gravel (SC). Gravelly Layer encountered at ~25' bgs. Strong Brown (7.5YR 5/8) color change with Reddish Yellow (7.5YR 6/8), moist, medium dense, little gravel, fine to coarse gravel, angular to subangular gravel, fine to coarse sand angular to subangular sand, few clay, no odor. (DPT) | 25 | | | | | STRATA<br>FAT CLAY (CH)<br>LEAN CLAY (CL)<br>SILT (ML)<br>SILTY SAND (SM)<br>WELL GRADED SAND (SW)<br>POORLY GRADED SAND (SP)<br>POORLY GRADED SAND w/ CLAY (SP-SC)<br>CLAYEY SAND (SC)<br>SILTY GRAVEL (GM)<br>WELL GRADED GRAVEL w/ SILT (GW-GM)<br>POORLY GRADED GRAVEL w/ CLAY (GP-GC)<br>SAPROLITE<br>BEDROCK |
| | 30 | | | | | |
| Fat Clay with Sand (CH). Strong Brown (7.5YR 5/8) mottled with Light Gray (2.5Y 7/2), White (5Y 8/1), and Very Dark Gray (10YR 3/1), moist, stiff, high plasticity, trace gravel, fine grvel, angular gravel, little sand, fine to medium sand, angular sand, no odor. (DPT) | | | | | | |
| Clayey Sand (SC). Brownish Yellow (10YR 6/6), moist, loose, little gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | 35 | | | | | |
| Fat Clay with Sand (CH). Sand percentage and grain size increases with depth. Brown (7.5YR 4/4), very stiff, high plasticity, little sand, fine to coarse sand, angular sand, no odor. (DPT) | | | | | | |
| Sandy Fat Clay (CH). Yellowish Brown (10YR 5/6), moist, stiff, high plasticity, trace gravel, fine gravel, angular gravel, few sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | 40 | | | | | |
| Silt with Sand (ML). Interbedded with gravels. Brown (10YR 4/3), stiff, rapid, non to low plasticity, few gravel, fine gravel, angular gravel, few sand, fine to coarse sand, angualr to subangular sand, little clay, no odor. (DPT) | | | | | | |

ch2m

**COMPLETION REPORT OF WELL No. VWFS-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Fat Clay with Sand (CH). Brown (7.5YR 5/4), moist, stiff, high plasticity, little sand, fine to medium sand, angular sand, no odor. (DPT) | | | | | | |
| Sandy Silt (ML). Yellowish Brown (10YR 5/6), dry, stiff, rapid, low plasticity, little gravel, fine gravel, angular gravel, few sand, fine to coarse sand, angular sand, little clay, no odor. (DPT) | | | | | | |
| Well Graded Gravel with Silt and Sand (GW-GM). Likely bedrock pulverized. Light Olive Brown (2.5Y 5/3), very dense, fine gravel, angular gravel, few sand, fine to coarse sand, angular to subangular sand, few silt, little clay, no odor. (DPT) | 50 | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

ch2m

**COMPLETION REPORT OF**
**WELL No. VWFS-PFAS-SO01**

# COMPLETION REPORT OF WELL No. VWFS-PFAS-SO02

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **232713.6**
EASTING: **2005471.0**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **March 21, 2022**

LOGGED BY: **B. Davis & I. Dinelman**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | **0.0** | Ground Surface | |
| Silty Sand (SM). Top of soil boring. Surface sample includes roots and grasses. Brown (10YR 4/3), dry, loose, fine to coarse sand, angular sand, some silt, no odor. (DPT) | 0 | | | | |
| Clayey Sand (SC). Roots observed in lithology at ~2.0' bgs. Brown (7.5YR 4/4), medium dense, trace gravel, fine gravel, subangular gravel, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | | | | | |
| Clayey Sand (SC). Strong Brown (7.5YR 4/6), loose, fine to coarse sand, angular to subangular sand, little silt, few clay, no odor. (DPT) | 5 | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Strong Brown (7.5YR 5/6), moist, loose, little gravel, fine to coarse gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | | | | | |
| Well Graded Sand with Silt (SW-SM). Reddish Yellow (7.5YR 6/6), loose, fine to coarse sand, angular to subangular sand, little silt, trace clay, no odor. (DPT) | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Loose, little gravel, fine to coarse gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, little silt, trace clay, no odor. (DPT) | | | | | |
| Clayey Sand (SC). Strong Brown (7.5YR 4/6), medium dense, trace gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | 10 | | | | |
| Sandy Fat Clay with Gravel (CH). Strong Brown (7.5YR 4/6), moist, stiff, high plasticity, little gravel, fine to coarse gravel, angular gravel, few sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | | | | | |
| Silty Sand (SM). There is a layer of sandy fat clay (2.0") at 15.0' bgs no color change. Strong Brown (7.5YR 4/6), moist, loose, fine to medium sand, subangular sand, some silt, little clay, no odor. (DPT) | 15 | | | | |
| Clayey Sand (SC). Strong Brown (7.5YR 4/6), loose, fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | | | | | |
| Sandy Fat Clay (CH). Strong Brown (7.5YR 4/6), moist, stiff, high plasticity, few sand, fine to medium sand, angular to subangular sand, no odor. (DPT) | | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S):
Date:
Event:

ch2m

**COMPLETION REPORT OF WELL No. VWFS-PFAS-SO02**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Clayey Sand (SC). Moist, loose, fine to coarse sand, angular to subangular sand, few clay. (DPT) | 20 | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Strong Brown (7.5YR 5/6), dry, loose, little gravel, fine to coarse gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | | | | | | |
| Well Graded Sand with Silt (SW-SM). Strong Brown (7.5YR 4/6), loose, trace gravel, fine gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, little silt, trace clay, no odor. (DPT) | | | | | | |
| Clayey Sand with Gravel (SC). Brown (7.5YR 5/4), loose, fine gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | 25 | | | | | |
| Clayey Sand (SC). Strong Brown (7.5YR 5/8), moist, medium dense, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | | | | | | |
| Clayey Sand with Gravel (SC). Dark Yellowish Brown (10YR 4/4), moist, dense, little gravel, fine gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | | | | | | |
| Sandy Fat Clay (CH). Yellowish Brown (10YR 5/8), moist, medium, high plasticity, some sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | | | | | | |
| Clayey Sand with Gravel (SC). Yellowish Brown (10YR 5/6) mottled with Very Pale Brown (10YR 7/4), moist, dense, little gravel, fine to coarse gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | 30 | | | | | |
| Well Graded Sand with Silt (SW-SM). Yellowish Brown (10YR 5/6), medium dense, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | | | | | | |
| Clayey Sand (SC). Yellowish Brown (10YR 5/8), moist, loose, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | | | | | | |
| Clayey Sand with Gravel (SC). Weathered rock. White (2.5Y 8/1) mottled with Dark Gray (2.5Y 4/1) and Brownish Yellow (10YR 6/8), moist, medium dense, little gravel, fine gravel, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | 35 | | | | | |
| Clayey Sand (SC). Brownish Yellow (10YR 6/6), moist, loose, fine to medium sand, angular to subangular sand, few clay, no odor. (DPT) | | | | | | |
| Sandy Fat Clay with Gravel (CH). Pale Yellow (5Y 7/3) mottled with Light Olive Brown (2.5Y 5/3), Greenish Gray (10GY 6/1), Light Yellowish Brown (2.5Y 6/4), stiff, high plasticity, little gravel, fine to coarse gravel, angular to subangular gravel, few sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | | | | | | |
| Clayey Sand (SC). Decompressed/weathered gravel. Strong Brown (7.5YR 5/8) mottled with Pale Yellow (5Y 7/3), Black (10YR 2/1), White (5Y 8/1), dense, little gravel, fine gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | 40 | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

ch2m

**COMPLETION REPORT OF**
**WELL No. VWFS-PFAS-SO02**

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Fat Clay (CH). Strong Brown (7.5YR 4/6), very stiff, high plasticity, trace clay, no odor. (DPT) | 50 | | | | | |
| Clayey Sand (SC). Rock at 57' bgs, color change at 57' bgs. Reddish Yellow (7.5YR 6/8) color change with Yellowish Brown (10YR 5/8), moist, dense, little gravel, fine to coarse gravel, angular gravel, fine to coarse sand, angular sand, some clay. (DPT) | 55 | | | | | |
| Sandy Fat Clay (CH). Yellowish Brown (10YR 5/6), stiff, high plasticity, trace gravel, fine gravel, angular gravel, few sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | | | | | | |
| Clayey Sand (SC). Dark Yellowish Brown (10YR 4/6), medium dense, fine to coarse sand, angular sand, few clay, no odor. (DPT) | 60 | | | | | |
| Clayey Sand with Gravel (SC). Some oxidation observed in core. Strong Brown (7.5YR 5/8) color change with Strong Brown (7.5YR 4/6), medium dense, few gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | | | | | | |
| Well Graded Gravel with Silt and Sand (GW-GM). Dark Brown (7.5YR 3/2), dense to very dense, fine to coarse gravel, angular gravel, few sand, fine to coarse sand, angular sand, little silt, little clay, no odor. (DPT) | | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

ch2m

**COMPLETION REPORT OF WELL No. VWFS-PFAS-SO02**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VWFS-PFAS-SO03

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **232731.5**
EASTING: **2005488.3**

DRILLING CONTRACTOR:
DRILLING METHOD:
DATE COMPLETED:

LOGGED BY:
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | **0.0** | Ground Surface | | |
| No data due to electronic data loss. | 0 | | | | | STRATA |
| | 5 | | | | | FAT CLAY (CH)<br>LEAN CLAY (CL)<br>SILT (ML)<br>SILTY SAND (SM)<br>WELL GRADED SAND (SW)<br>POORLY GRADED SAND (SP)<br>POORLY GRADED SAND w/ CLAY (SP-SC)<br>CLAYEY SAND (SC)<br>SILTY GRAVEL (GM)<br>WELL GRADED GRAVEL w/ SILT (GW-GM)<br>POORLY GRADED GRAVEL w/ CLAY (GP-GC)<br>SAPROLITE<br>BEDROCK |
| | | | | | | D.T.W. (ft. b.G.S):<br>Date:<br>Event: |

2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

ch2m

**COMPLETION REPORT OF WELL No. VWFS-PFAS-SO03**

# COMPLETION REPORT OF WELL No. VWFS-PFAS-SO04

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **232738.6**
EASTING: **2005497.6**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **March 22, 2022**

LOGGED BY: **I. Dinelman, B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL |
|---|---|---|
| Silty Sand with Gravel (SM). Surface soils with organic roots, leaves, and grasses, Brown (10YR 4/3), dry, little gravel, fine to coarse gravel, angular to subangular gravel, fine to medium sand, subangular sand, some silt, no odor. (DPT) | 0 | |
| Clayey Sand (SC). From 3.75 to 4.0' (3") bgs there is an interbedded layer of SW-SM - well graded sand with silt (7.5YR 4/6), little clay, trace gravel, Strong Brown (7.5YR 5/6) color change to Strong Brown (7.5YR 4/6), moist, loose to medium dense, trace gravel, fine gravel, subangular gravel, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | 5 | |
| Sandy Fat Clay (CH). Brown (7.5YR 4/4), very stiff, high plasticity, few sand, fine to coarse angular sand, no odor. (DPT) | | |
| Clayey Sand (SC). Interbedded with fat clay with sand at 6.5-6.75 (3.0") (7.5YR 4/4), Strong Brown (7.5YR 5/6), moist, loose, stiff, trace gravel, fine gravel, angular gravel, fine to coarse sand, angular sand, some clay, no odor. (DPT) | | |
| Sandy Fat Clay (CH). Thin gravelly layer (<1 cm) at color change boundary at 8.5' bgs, Strong Brown (7.5YR 4/6) color change with Dark Yellowish Brown (10YR 4/4), very stiff, high plasticity, trace gravel, fine gravel, angular gravel, few sand, fine to coarse sand, angular sand, no odor. (DPT) | 10 | |
| Well Graded Sand with Silt and Gravel (SW-SM). Strong Brown (7.5YR 5/6) color change with Light Yellowish Brown (10YR 6/4), moist, loose, few gravel, fine to coarse gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | | |
| Clayey Sand (SC). Brown (7.5YR 4/4), fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | | |
| Sandy Fat Clay (CH). Strong Brown (7.5YR 4/6), moist, stiff, high plasticity, few sand, fine to coarse sand, subangular sand, no odor. (DPT) | | |
| Clayey Sand with Gravel (SC). Strong Brown (7.5YR 5/8), moist, medium dense, little gravel, fine to coarse gravel, angular gravel, fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | 15 | |
| Well Graded Sand with Silt and Gravel (SW-SM). Broken rock at 15.25' bgs, loose, few gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, no odor. (DPT) | | |
| Sandy Fat Clay (CH). Strong Brown (7.5YR 4/6), moist, stiff, high plasticity, some sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | | |
| Well Graded Sand with Silt and Gravel (SW-SM). At 18.5-18.75' bgs (3.0") interbedded with sandy fat clay (CH) | | |

| DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|
| **0.0** | Ground Surface | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S):
Date:
Event:

ch2m

**COMPLETION REPORT OF WELL No. VWFS-PFAS-SO04**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **I. Dinelman, B. Da**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| (7.5YR 5/6). High plasticity and toughness. No dilatency. Rock at 18.5' above SC layer. Rock at 19.25' bgs, Reddish Yellow (7.5YR 6/6), loose, little gravel, fine to coarse gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | 20 | | | | | |
| Sandy Fat Clay (CH). Strong Brown (7.5YR 5/8), stiff, high plasticity, some sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | | | | | | |
| Clayey Sand (SC). Reddish Yellow (7.5YR 6/6), medium dense, trace gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | | | | | | |
| Fat Clay with Sand (CH). Yellowish Brown (10YR 5/8), moist, stiff, high plasticity, few sand, fine to medium sand, angular sand, little silt, no odor. (DPT) | 25 | | | | | STRATA<br>FAT CLAY (CH)<br>LEAN CLAY (CL)<br>SILT (ML)<br>SILTY SAND (SM)<br>WELL GRADED SAND (SW)<br>POORLY GRADED SAND (SP)<br>POORLY GRADED SAND w/ CLAY (SP-SC)<br>CLAYEY SAND (SC)<br>SILTY GRAVEL (GM)<br>WELL GRADED GRAVEL w/ SILT (GW-GM)<br>POORLY GRADED GRAVEL w/ CLAY (GP-GC)<br>SAPROLITE<br>BEDROCK |
| Cannot get good log on sample due to water logging of core. May be a silt with sand (ML) as what remains in core appears to have high dilatency, but not confident in description. (DPT) | 30 | | | | | |
| Clayey Sand (SC). Brownish Yellow (10YR 6/6), medium dense, trace gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Yellowish Brown (10YR 5/8) color change with Brownish Yellow (10YR 6/8), moist, loose, little gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | 35 | | | | | |
| Clayey Sand with Gravel (SC). Strong Brown (7.5YR 5/8), moist, medium dense, little gravel, fine gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | | | | | | |
| Fat Clay with Sand (CH). Yellowish Brown (10YR 5/8) mottled with Light Brownish Gray (2.5Y 6/2) and Dark Grayish Brown (10YR 4/2), moist, very stiff, high plasticity, little sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | 40 | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Bottom of borehole. Very hard drilling. Last few feet believed to be | | | | | | |

ch2m

**COMPLETION REPORT OF**
**WELL No. VWFS-PFAS-SO04**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **I. Dinelman, B. Da**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| pulverized rock. Light Olive Brown (2.5Y 5/4), dense to very dense, few gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, few silt, no odor. (DPT) | | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

ch2m

**COMPLETION REPORT OF WELL No. VWFS-PFAS-SO04**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VWFS-PFAS-SO05

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **232750.0**
EASTING: **2005493.4**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **March 23, 2022**

LOGGED BY: **B. Davis & I. Dinelman**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | **0.0** | Ground Surface | |
| Well Graded Gravel with Silt and Sand (GW-GM). Asphalt and road base, Black (2.5/N) color change with Light Gray (2.5Y 7/2) and Pale Olive (5Y 6/3), moist, dense, fine to coarse gravel, angular gravel, few sand, fine to coarse sand, angular to subangular sand, little silt, no odor. (DPT) | 0 | | | | |
| Clayey Sand (SC). Brown (7.5YR 4/4), moist, medium dense, fine to coarse sand, angular sand, little silt, some clay, no odor. (DPT) | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Strong Brown (7.5YR 5/6), moist, loose, little gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, trace clay, no odor. (DPT) | 5 | | | | |
| Clayey Sand (SC). Interbedded with a sandy fat clay (CH) (7.5YR 4/6) from 5.5-5.75' bgs and 6.25-6.5' bgs, Strong Brown (7.5YR 4/6) color change with Strong Brown (7.5YR 5/6), loose to dense, fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Reddish Yellow (7.5YR 6/6), loose, little gravel, fine to coarse gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, little silt, no odor. (DPT) | 10 | | | | |
| Clayey Sand (SC). Only 1.5' recovery in core sample. Think lost at bottom. Added length to bottom soil description (SC). Only 0.75' in core but assumption lost remaining when pulling sample. Strong Brown (7.5YR 4/6), moist, medium dense, fine to coarse sand, angular to subangular sand, little silt, some clay, no odor. (DPT) | | | | | |
| Well Graded Sand with Silt (SW-SM). At 13.5-13.75' bgs and 14.25-14.50' bgs interbedded with fat clay with sand (CH) (10YR 4/6). Sand grain size gets finer with depth. Dark Yellowish Brown (10YR 4/6), loose, trace gravel, fine to coarse gravel, angular gravel, fine to coarse sand, angular to sub-angular sand, little silt, little clay, no odor. (DPT) | 15 | | | | |
| Fat Clay with Sand (CH). Strong Brown (7.5YR 5/6) mottled with Very Dark Gray (7.5YR 3/1), stiff, little sand, fine to medium sand, subangular sand, no odor. (DPT) | | | | | |
| Sandy Fat Clay (CH). Interbedded with clayey sand (SC). Sand well graded 18.75-19.0' bgs. Yellowish Brown (10YR 5/6) mottled with Pale Olive (5Y 6/3) and Very Dark Grayish Brown (10YR 3/2), very stiff, some sand, fine to coarse sand, no odor. (DPT) | | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **59**
Date: **3/23/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VWFS-PFAS-SO05**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Fat Clay with Sand (CH). Strong Brown (7.5YR 5/8), moist, stiff, fine to medium sand, angular sand, no odor. (DPT) | 20 | | | | | |
| Clayey Sand (SC). White (2.5Y 8/1), medium dense to dense, trace gravel, fine gravel, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | | | | | | |
| Fat Clay with Sand (SC). Interbedded with a layer of clayey sand (SC) at 26.5-26.75' bgs (10YR 5/8) medium to fine grained. Stiff, little sand, fine to medium sand, subangular sand, no odor. (DPT) | 25 | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Fat clay (CH) from 32.25-32.5' bgs, strong brown (7.5YR 5/6); and crushed/broken rock at ~34.5' bgs. Brownish Yellow (10YR 6/6) color change with Yellowish Brown (10YR 5/8) and Pale Brown (10YR 6/3), moist, loose to medium dense, few gravel, fine to coarse gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | 30 | | | | | |
| Clayey Sand (SC). Strong Brown (7.5YR 5/8), moist, medium dense, fine to medium sand, subangular sand, little silt, few clay, no odor. (DPT) | 35 | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Yellowish Brown (10YR 5/6), moist, loose, little gravel, fine to coarse gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | | | | | | |
| Clayey Sand (SC). Yellowish Brown (10YR 5/8), moist, medium dense, fine to coarse sand, angular to subangular sand, little silt, few clay, no odor (DPT) | 40 | | | | | |
| Fat Clay with Sand (CH). Yellowish Brown (10YR 5/4), stiff, high plasticity, little sand, fine to medium sand, subangular sand, no odor. (DPT) | | | | | | |
| Clayey Sand (SC). Interbedded wiht SW-SM at depth of 41' and 41.5' bgs. Yellowish Brown (10YR 5/6), medium dense, fine to medium sand, angular to subangular sand, little silt, some clay, no odor. (DPT) | | | | | | |
| Fat Clay with Sand (CH). Strong Brown (7.5YR 5/6) mottled with Very Dark Grayish Brown (10YR 3/2), moist, stiff, high | | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

ch2m

**COMPLETION REPORT OF WELL No. VWFS-PFAS-SO05**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| plasticity, little sand, fine to medium sand, subangular sand, no odor. (DPT) | | | | | | |
| Clayey Sand (SC). Dark Yellowish Brown (10YR 4/6) mottled with Very Dark Grayish Brown (10YR 3/2), medium dense, trace gravel, fine gravel, angular gravel, fine to coarse sand, subangular sand, little silt, some clay, no odor. (DPT) | | | | | | |
| Fat Clay with Sand (CH). Few mica observed in clay. Thin interbedded layers (<1.5") of SW-SM at 46.5' and 53.75' bgs. Dark Yellowish Brown (10YR 4/6) mottled with Very Dark Grayish Brown (10YR 3/2) and Strong Brown (7.5YR 5/8), stiff to very stiff, high plasticity, little sand, fine to medium sand, subangular sand, no odor. (DPT) | 50 | | | | | |
| Clayey Sand (SC). Dark Yellowish Brown (10YR 4/6), moist, medium dense, fine to medium sand, subangular sand, few clay, no odor. (DPT) | 55 | | | | | |
| Fat Clay with Sand (CH). Iron staining or oxidation appears present. Thin interbedded layer of well graded sand (<5 mm) at 56.5' bgs. Dark Yellowish Brown (10YR 4/6) mottled with Light Olive Brown (2.5Y 5/4), moist, stiff, high plasticity, little sand, fine to medium sand, subangular sand, no odor. (DPT) | | | | | | |
| Clayey Sand (SC). Yellowish Brown (10YR 5/6), medium dense, fine to medium sand, subangular sand, few clay, no odor. (DPT) | | | | | | |
| Well Graded Sand with Silt (SW-SM). Dark Yellowish Brown (10YR 4/4), moist, loose, fine to coarse sand, subangular sand, little silt, little clay, no odor. (DPT) | 60 | | | | | |
| Sandy Silt (ML). Dark Yellowish Brown (10YR 4/4), wet, very soft, rapid, nonplastic, fine to coarse sand, angular to subangular sand, little clay, no odor. (DPT) | | | | | | |
| Sandy Fat Clay (CH). Yellowish Brown (10YR 5/4), moist, medium dense, some sand, fine to coarse sand, angular to subangular sand, little silt, no odor. (DPT) | | | | | | |
| Well Graded Gravel with Silt and Sand (GW-GM). Bedrock encountered ~63.5' bgs. Olive Brown (2.5Y 4/3), dense to very dense, fine to coarse gravel, angular gravel, some sand, fine to coarse sand, angular to subangular sand, few silt, little clay, no odor. (DPT) | 65 | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

ch2m

**COMPLETION REPORT OF WELL No. VWFS-PFAS-SO05**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VWMP-PFAS-MW01 / VWMP-PFAS-SO01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **45.25**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **232873.5**
EASTING: **2005680.9**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **March 24, 2022**

LOGGED BY: **B. Davis & I. Dinelman**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | **0.0** | Ground Surface | **45.25** |
| Well Graded Sand with Silt (SW-SM). Dark Yellowish Brown (10YR 4/4), surface soils rich organic roots and grasses, moist, no odor. (DPT) | 0 | | | | |
| Silty Sand (SM). Brown (10YR 4/3), some organics, no odor. (DPT) | | | | | |
| Sandy Fat Clay (CH). Yellowish Brown (10YR 5/6), transitions to Light Olive Brown (2.5Y 5/4) and Very Dark Grayish Brown (10YR 3/2), crushed rock at 3.25 ft bgs and a clayey sand from rock base to ~3.5 feet bgs, fat clay from 3.5 - 4.0 ft bgs, no odor. (DPT) | 5 | | | | |
| Fat Clay with Sand (CH). Strong Brown (7.5YR 4/6), moist, no odor. (DPT) | | | | | |
| Well Graded Sand with Silt (SW-SM). Strong Brown (7.5YR 5/8), moist, no odor. (DPT) | | | | | |
| Fat Clay (CH). Strong Brown (7.5YR 4/6) transitions to Very Dark Grayish Brown (10YR 3/2), no odor. (DPT) | | | | | |
| Clayey Sand (SC). Dark Yellowish Brown (10YR 4/4), no odor. | | | | | |
| Welll Graded Sand with Silt and Gravel (SW-SM). Moist, no odor. (DPT) | | | | | |
| Fat Clay with Sand (CH). Strong Brown (7.5YR 5/6), no odor. | 10 | | | | |
| Clayey Sand (SC). Strong Brown (7.5YR 4/6), no odor. | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Olive Brown (2.5Y 4/3) transitions to Strong Brown (7.5YR 5/6), crushed rock at ~11.25 ft bgs, no odor. (DPT) | | | | | |
| Clayey Sand (SC). Dark Yellowish Brown (10YR 4/6), moist, no odor. (DPT) | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Yellowish Brown (10YR 5/6) transitions to Brown (10YR 4/3), Grayish Brown (2.5Y 5/2), Yellowish Brown (10YR 5/6), broken rock at 12.5 ft bgs, no odor. (DPT) | 15 | | | | |
| Fat Clay with Sand (CH). Dark Yellowish Brown (10YR 4/6), moist, no odor. (DPT) | | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **44**
Date: **3/24/2022**
Event: **Drilling**

2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS SI REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **45.2**
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Sandy Fat Clay (CH). Fat clay with alternating beds of higher percentages of well graded sands, moist, no odor. (DPT) | 20 | | | | | |
| Silty Sand (SM). No odor. (DPT) | | | | | | |
| Clayey Sand with Gravel (SC). Light Yellowish Brown (10YR 6/4), dry, no odor. (DPT) | | | | | | |
| Fat Clay (CH). Strong Brown (7.5YR 5/8), moist, no odor. (DPT) | 25 | | | | | |
| Clayey Sand with Gravel (SC). Yellowish Brown (10YR 5/6), moist, no odor. (DPT) | | | | | | |
| Fat Clay (CH). Yellowish Brown (10YR 5/8) transitions to Very Dark Grayish Brown (10YR 3/2), Brown (10YR 4/3), Light Yellowish Brown (2.5Y 6/3), fat clay transitions to a fat clay with sand at 28.25 ft bgs and a sandy fat clay at 28.5 ft bgs, gravel within the fat clay is encountered at ~28.75 ft bgs. The clay becommes mottled at 29.25 ft bgs, moist, no odor. (DPT) | 30 | | | | | |
| Sandy Fat Clay (CH). Light Yellowish Brown (10YR 6/4), no odor. (DPT) | | | | | | |
| Fat Clay (CH). Very Dark Grayish Brwn (10YR 3/2), thick layer of fat clay, transitioning to fat clay with sand. Interbedded with SW-SM in layers <0.5 ft thickness at 39.0 ft bgs and 43.0 ft bgs, no odor. (DPT) | 35 | | | | | |
| | 40 | | | | | |
| Poorly Graded Sand with Silt (SP-SM). Yellowish Brown (10YR 5/6), moist. (DPT) | | | | | | |
| Well Graded Sand with Silt (SW-SM). Yellowish Brown | | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

ch2m

**COMPLETION REPORT OF**
**WELL No. VWMP-PFAS-MW01 / VWMP-PFAS-SO01**

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **45.2**
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| (10YR 5/4) transitions to Yellowish Brown (10YR 5/8), Olive Yellow (2.5Y 6/6), Olive Brown (2.5Y 4/3), Pale Yellow (2.5Y 7/4), Very Dark Grayish (2.5Y 3/2), Olive Yellow (2.5Y 6/6), sample taken from 44 - 46 ft bgs at groundwater interface and all soil from 44 - 45 ft bgs was used before logged. No logging information from 44 - 45 ft bgs. Some soil remains for logging 45 - 46 ft bgs. A 1.25 inch clayey sand layer (SC) is at ~46.5 ft bgs (10YR 5/8), wet, no odor. (DPT) | 50 | | | | | STRATA<br>FAT CLAY (CH)<br>LEAN CLAY (CL)<br>SILT (ML)<br>SILTY SAND (SM)<br>WELL GRADED SAND (SW)<br>POORLY GRADED SAND (SP)<br>POORLY GRADED SAND w/ CLAY (SP-SC)<br>CLAYEY SAND (SC)<br>SILTY GRAVEL (GM)<br>WELL GRADED GRAVEL w/ SILT (GW-GM)<br>POORLY GRADED GRAVEL w/ CLAY (GP-GC)<br>SAPROLITE<br>BEDROCK |

ch2m

**COMPLETION REPORT OF**
**WELL No. VWMP-PFAS-MW01 / VWMP-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VWMP-PFAS-SO02

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **232871.4**
EASTING: **2005670.5**

DRILLING CONTRACTOR:
DRILLING METHOD:
DATE COMPLETED:

LOGGED BY:
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | 0 | | **0.0** | Ground Surface | |
| No data due to electronic data loss. | 5 | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S):
Date:
Event:

2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VWMP-PFAS-SO03

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **232882.1**
EASTING: **2005673.4**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **March 23, 2022**

LOGGED BY: **B. Davis & I. Dinelman**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | **0.0** | Ground Surface | |
| Silty Sand (SM). Rich in organics. Roots and grasses. Dark Brown (7.5YR 3/4), dry, loose, few sand, fine to coarse sand, subangular sand, few silt, no odor (DPT). | 0 | | | | |
| Clayey Sand (SC). Dark Yellowish Brown (10YR 4/4), loose, fine to coarse sand, angular to subangular sand, few silt, few clay, no odor. (DPT) | | | | | |
| Fat Clay with Sand (CH). Top 0.5' are highly mottled (3.0'-3.5' bgs). Roots visible at 4.5' bgs. Interbedded with clayey sand (SC) from 4.5'-4.75' bgs. Strong Brown (7.5YR 4/6) mottled with Pale Olive (5Y 6/3) and Very Dark Grayish Brown (10YR 3/2), stiff, high plasticity, little sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | 5 | | | | |
| Well Graded Sand with Silt (SW-SM). Dark Yellowish Brown (10YR 4/6), moist, loose, trace gravel, fine to coarse gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, trace clay, no odor. (DPT) | | | | | |
| Fat Clay with Sand (CH). Very stiff, high plasticity, few sand, fine to medium sand, subangular sand, no odor. (DPT) | | | | | |
| Clayey Sand (SC). Moist, medium dense, fine to medium sand, subangular sand, little silt, few clay, no odor. (DPT) | 10 | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Yellowish Brown (10YR 5/4), loose, little gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | | | | | |
| Sandy Fat Clay (CH). Interior of core was a little wet. Dark Yellowish Brown (10YR 4/4), moist, stiff, high plasticity, few sand, fine to coarse sand, angular sand, no odor. (DPT) | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Yellowish Brown (10YR 5/4), moist, very loose to medium dense, little gravel, fine to coarse gravel, fine to coarse angular sand, little silt, little clay, no odor. (DPT) | | | | | |
| Sandy Fat Clay (CH). Dark Yellowish Brown (10YR 4/6) color change with Yellowish Brown (10YR 5/4) and Yellowish Brown (10YR 5/8), moist, stiff, high plasticity, few sand, fine to coarse sand, angular to subangular sand, little silt, no odor. (DPT) | 15 | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **48.25**
Date: **3/23/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VWMP-PFAS-SO03**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Clayey Sand (SC). Above clayey sand is an interbedded layer of well graded sand with silt and gravel (10.5'-20.75' bgs). Yellowish Brown (10YR 5/6), moist, medium dense, trace gravel, fine gravel, angular gravel, fine to medium sand, subangular sand, little silt, some clay, no odor. (DPT) | 20 | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Moist, loose, little gravel, fine gravel, angular to subangular gravel, fine to coarse angular sand, little silt, little clay, no odor. (DPT) | | | | | | |
| Clayey Sand (SC). Rock at ~24.5'. Medium dense, trace gravel, coarse gravel, angular gravel, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | 25 | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Loose, little gravel, fine to coarse gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, trace clay, no odor. (DPT) | | | | | | |
| Clayey Gravel with Sand (GC). Light Yellowish Brown (2.5Y 6/4), dense, few gravel, coarse gravel, subrounded to rounded gravel, few sand, fine to medium sand, subrounded sand, no odor. (DPT) | | | | | | |
| Clayey Sand (SC). Light Yellowish Brown (2.5Y 6/4), dense, fine to coarse sand, subangular sand, some clay, no odor. (DPT) | 30 | | | | | |
| Sandy Fat Clay (CH). Yellowish Brown (10YR 5/6), stiff, high plasticity, some sand, fine to medium sand, subangular sand, no odor. (DPT) | | | | | | |
| Fat Clay (CH). Thick layer of fat clay, alternating with beds of sandy fat clay 9CH) until groundwater was encountered at ~48' bgs. Strong Brown (7.5YR 5/8) mottled with Very Dark Grayish Brown (10YR 3/2), very stiff, high plasticity, some sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | 35 | | | | | |
| | 40 | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

ch2m

**COMPLETION REPORT OF WELL No. VWMP-PFAS-SO03**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Well Graded Sand with Silt (SW-SM). Yellowish Brown (10YR 5/4) mottled with Very Dark Grayish Brown (10YR 3/2), loose, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | | | | | | |
| Clayey Sand (SC). Brownish Yellow (10YR 6/6), dense, fine to coarse sand, little silt, some clay, no odor. (DPT) | 50 | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Yellowish Brown (10YR 5/6), wet, loose, little gravel, fine to coarse angular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | | | | | | |
| Clayey Sand (SC). Yellowish Brown (10YR 5/4), wet, loose, fine to medium sand, little silt, few clay, no odor. (DPT) | | | | | | |
| Well Graded Sand with Silt (SW-SM). Loose. (DPT) | | | | | | |
| Fat Clay with Sand (CH). Yellowish Brown (10YR 5/8) mottled with Pale Olive (5Y 6/3), stiff, little sand, fine to medium sand, subangular sand, no odor. (DPT) | 55 | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

ch2m

**COMPLETION REPORT OF**
**WELL No. VWMP-PFAS-SO03**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VWMP-PFAS-SO04

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.):
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **232879.5**
EASTING: **2005664.3**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT**
DATE COMPLETED: **March 29, 2022**

LOGGED BY: **B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|
| | | | **0.0** | Ground Surface | |
| Poorly Graded Sand with Gravel (SP). Roots and grass. Brown (10YR 4/3), dry, loose, little gravel, fine gravel, angular gravel, fine sand, subangular sand, no odor. (DPT) | 0 | | | | |
| Silty Sand with Gravel (SM). Dark Brown (7.5YR 3/4) color change with Yellowish Brown (10YR 5/4), dry, loose, trace gravel, fine gravel, angular gravel, fine to medium sand, subangular sand, little silt, no odor. (DPT) | | | | | |
| Lean Clay with Sand (CL). Brown (7.5YR 4/3), moist, medium, low plasticity, little sand, fine sand, subangular sand. (DPT) | | | | | |
| Silty Sand (SM). Strong Brown (7.5YR 4/6), dry, loose, rapid, fine sand, subangular sand, few silt, no odor. (DPT) | 5 | | | | |
| Sandy Silt (ML). Brown (7.5YR 4/4), loose, soft, rapid, some sand, fine sand, subrounded sand. (DPT) | | | | | |
| Lean Clay with Sand (CL). Brown (7.5YR 5/4), dry, medium, slow, low plasticity, little sand, fine sand, subangular sand, trace silt, no odor. (DPT) | 10 | | | | |
| | 15 | | | | |
| Silty Sand (SM). Strong Brown (7.5YR 5/6), dry, loose to medium dense, slow, fine to medium sand, subangular to subrounded sand, few silt, little clay, no odor. (DPT) | | | | | |

LEGEND

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

D.T.W. (ft. b.G.S): **47**
Date: **3/29/2022**
Event: **Drilling**

ch2m

**COMPLETION REPORT OF WELL No. VWMP-PFAS-SO04**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| | 20 | | | | | |
| Poorly Graded Sand (SP). Brown (7.5YR 5/4), dry, very loose, fine to coarse sand, subrounded sand, little silt, no odor. (DPT) | | | | | | |
| Fat Clay (CH). Strong Brown (7.5YR 4/6), dry, soft, high plasticity, no odor. (DPT) | 25 | | | | | |
| Poorly Graded Sand (SP). Dry, very loose, fine to medium sand, subrounded sand, no odor. (DPT) | | | | | | |
| Fat Clay (CH). Dry, very soft, no odor. (DPT) | | | | | | |
| Poorly Graded Sand (SP). Dry, very loose, fine to medium sand, subrounded sand, no odor. (DPT) | | | | | | |
| Fat Clay (CH). Brown (7.5YR 5/4) mottled with Black (7.5YR 2/1), dry, stiff, high plasticity, no odor. (DPT) | 30 | | | | | |
| | 35 | | | | | |
| Gravelly Silt (ML). Dark Yellowish Brown (10YR 4/4), dry, very loose, very soft, rapid, little gravel, fine gravel, angular gravel, little sand, fine sand, subrounded sand, no odor. (DPT) | | | | | | |
| Fat Clay (CH). Strong Brown (7.5YR 4/6) mottled with Black (7.5YR 2/1) and White (White 9.5/7.5YR/1), dry, medium, high plasticity, no odor. (DPT) | | | | | | |
| Sandy Silt (ML). From 38' to 40' bgs no clay, From 40' to 44' bgs trace clay. Strong Brown (7.5YR 4/6), dry, soft, slow, some sand, fine sand, subrounded sand, trace clay, no odor. (DPT) | 40 | | | | | |
| Fat Clay (CH). Moist, soft to medium, high plasticity, little sand, fine sand, subrounded sand, no odor. (DPT) | | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

ch2m

**COMPLETION REPORT OF WELL No. VWMP-PFAS-SO04**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION:
LOGGED BY: **B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | DEPTH (ft.) | | ELEVATION (ft.) | LEGEND |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Silty Sand (SM). Wet, loose, rapid, medium sand, subrounded sand, few silt, no odor. (DPT) | 50 | | | | | STRATA<br>FAT CLAY (CH)<br>LEAN CLAY (CL)<br>SILT (ML)<br>SILTY SAND (SM)<br>WELL GRADED SAND (SW)<br>POORLY GRADED SAND (SP)<br>POORLY GRADED SAND w/ CLAY (SP-SC)<br>CLAYEY SAND (SC)<br>SILTY GRAVEL (GM)<br>WELL GRADED GRAVEL w/ SILT (GW-GM)<br>POORLY GRADED GRAVEL w/ CLAY (GP-GC)<br>SAPROLITE<br>BEDROCK |

ch2m

**COMPLETION REPORT OF**
**WELL No. VWMP-PFAS-SO04**



2 - LOG A EWNL02.GDT - 3/22/23 15:38 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_SBS.GPJ

# COMPLETION REPORT OF WELL No. VEFS-PFAS-MW01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **58.34**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **761642.5**
EASTING: **1009751.9**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **HSA, DPT & Air Rotary**
DATE COMPLETED: **May 26, 2022**

LOGGED BY: **C. Dronfield**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL |
|---|---|---|
| Sandy Fat Clay (CH). Top 1.5" is a silty sand with gravel and with organics (grasses and roots). Dark Brown (7.5YR 3/2), dry, very stiff, high plasticity, few sand, fine to coarse sand, angular to subangular sand, little silt, faint odor. (DPT) | 0 | |
| Sandy Fat Clay (CH). Brown (10YR 4/3), stiff, high plasticity, some sand, fine to coarse sand, angular sand, little silt, no odor. (DPT) | | |
| Silty Sand (SM). Dark Yellowish Brown (10YR 4/4), dry, loose, trace gravel, coarse gravel, angular gravel, fine to coarse sand, angular to subangular sand, few silt, no odor. (DPT) | | |
| Well Graded Sand with Silt (SW-SM). Strong Brown (7.5YR 5/6), moist, loose, medium consistency, trace gravel, fine gravel size, angular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | 5 | |
| Sandy Fat Clay (CH). At 7.25' bgs there is a layer (1.25") of clayey sand 10YR 4/3 Brown with a more poorly graded medium sand. Moist, dark yellowish brown (10YR 4/4), moist, high plasticity, some sand, fine to coarse sand, angular sand. (DPT) | | |
| Clayey Sand (SC). Yellowish Brown (10YR 5/4), dry, fine to medium sand, subangular sand, some clay. (DPT) | | |
| Sandy Fat Clay (CH). Brown (7.5YR 5/4), moist, high plasticity, some sand, fine to coarse sand, angular sand, no odor. (DPT) | 10 | |
| Sandy Fat Clay (CH). Oxidation observed in section of core. Reddish and yellowish staining. Light Olive Brown (2.5Y 5/3), moist, stiff, high plasticity, some sand, fine to coarse sand, subangular sand, no odor. (DPT) | | |
| Clayey Sand (CH). Dark Yellowish Brown (10YR 4/4), moist, medium dense, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | 15 | |
| Sandy Fat Clay (CH). Brown (10YR 4/3), moist, high plasticity, few sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | | |
| Clayey Sand with Gravel (SC). Zone of high weathering. Mottled in color and texture. Characteristic of decompoled granitic rock. Brownish Yellow (10YR 6/6) mottled with Yellowish Brown (10YR 5/4) mottled with Pale Yellow (2.5Y 7/3), moist, little gravel. (DPT) | | |

| WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|
| | -2.32 | Top of Riser | 60.66 |
| | 0.0 | Ground Surface | 58.34 |
| | 0.0 | | 58.34 |

WELL CONSTRUCTION DETAILS

RISER CASING
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **7.31 ft ags - 55 ft bgs**

GROUT
Type: **Type I/II Portland**
Interval: **0 ft bgs - 50 ft bgs**

SEAL
Type: **3/8" bentonite chips**
Interval: **50 ft bgs - 52.5 bgs**

SANDPACK
Type: **20-30 mesh silica sand**
Interval: **52.5 ft bgs - 65 ft bgs**

SCREEN
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **55 ft bgs - 65 ft bgs**

D.T.W. (ft. b.G.S): **55**
Date: **5/26/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **49.65**
Date: **7/11/2022**
Event: **GW Sampling**

LEGEND
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VEFS-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\VBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **58.3**
LOGGED BY: **C. Dronfield**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|
| | | | | | | (See Page 1) |
| Well Graded Sand with Silt and Gravel (SW-SM). Weathered material characteristic of decomposed granite. At 19.25' there is a layer (2.5") of sandy fat clay (CH) may be slough 10YR 4.4. Light Yellowish Brown (2.5Y 6/3) mottled with Very Pale Brown (10YR 7/1). (DPT) | 20 | | | | | |
| No Recovery. (NR) | | | | | | |
| Fat Clay with Sand (CH). Believe this sample to be slough from top and likely was no recovery from 22-25 feet bgs. Brown (10YR 4/3), moist, high plastictiy, few sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | 25 | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Pulverized rock. Grayish Brown (2.5Y 5/2), dry, few gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, few silt, little clay, no odor. (Air Rotary) | 30 | | | | | |
| | 35 | | | | | |
| Well Graded Gravel with Silt (GW-GM). Gravels are lighter in color (2.5Y 6/3) silts when pinched between fingers appear darker (2.5Y 4/2) silts clump to small blocky or rounded particulates similar to gravels in appearance. Light Yellowish Brown (2.5Y 6/3). (Air Rotary) | | | | | | |
| Saprolite, granular, small fragments of granodiorite. Dry, very loose, no odor. (Air Rotary) | 40 | | | | | |
| Bedrock, granodiorite chips/rock dust, white minerals (quartz, plagioclase feldspar), black minerals (biotite, | | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VEFS-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **58.3**
LOGGED BY: **C. Dronfield**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| hornblende). Dry, no odor. (Air Rotary) | 50 | | | 50.0 | | 8.34 | |
| | | | | 52.5 | BS | 5.84 | |
| Bedrock, granodiorite, some weathering (iron oxides) present, white minerals (quartx, plagioclase feldspar) and black minerals (biotite, hornblende amphibole). No odor. (Air Rotary) | 55 | | | 55.0 | FP | 3.34 | |
| | 60 | | | | | | |
| | 65 | | | 65.0 | BSC | -6.66 | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VEFS-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VEFS-PFAS-MW02

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

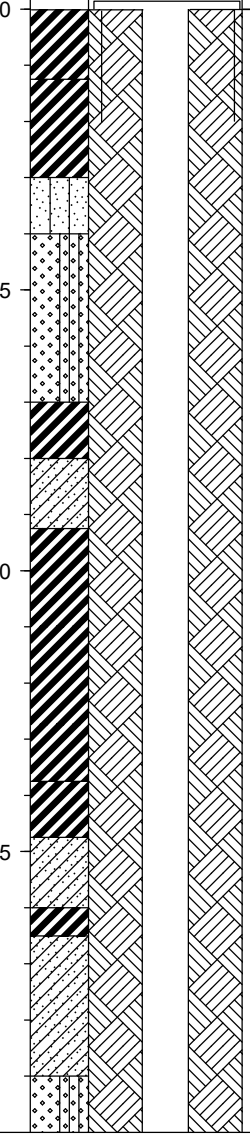
GROUND SURFACE ELEVATION (ft.): **62.18**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **761497.3**
EASTING: **1009749.7**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **HSA, DPT & Air Rotary**
DATE COMPLETED: **May 24, 2022**

LOGGED BY: **I. Dinelman, B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) |
|---|---|
| Sandy Fat Clay (CH). Top 1.5" is a silty sand with gravel and with organics (grasses and roots). Dark Brown (7.5YR 3/2), dry, very stiff, high plasticity, few sand, fine to coarse sand, angular to subangular sand, little silt, faint odor. (DPT) | 0 |
| Sandy Fat Clay (CH). Brown (10YR 4/3), stiff, high plasticity, some sand, fine to coarse sand, angular sand, little silt, no odor. (DPT) | |
| Silty Sand (SM). Dark Yellowish Brown (10YR 4/4), dry, loose, trace gravel, coarse gravel, angular gravel, fine to coarse sand, angular to subangular sand, few silt, no odor. (DPT) | |
| Well Graded Sand with Silt (SW-SM). Strong Brown (7.5YR 5/6), moist, loose, medium consistency, trace gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | 5 |
| Sandy Fat Clay (CH). At 7.25' bgs there is a layer (1.25") of clayey sand 10YR 4/3 Brown with a more poorly graded medium size sand. Moist, dark yellowish brown (10YR 4/4), moist, high plasticity, some sand fine to coarse sand, angular sand, little silt, no odor. (DPT) | |
| Clayey Sand (SC). Yellowish Brown (10YR 5/4), dry, fine to medium sand, subangular sand, some clay. (DPT) | |
| Sandy Fat Clay (CH). Brown (7.5YR 5/4), moist, high plasticity, some sand, fine to coarse sand, angular sand, no odor. (DPT) | 10 |
| Sandy Fat Clay (CH). Oxidation observed in section of core. Reddish and yellowish staining. Light Olive Brown (2.5Y 5/3), moist, stiff, high plasticity, some sand, fine to coarse sand, subangular sand, no odor. (DPT) | 15 |
| Clayey Sand (CH). Dark Yellowish Brown (10YR 4/4), moist, medium dense, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | |
| Sandy Fat Clay (CH). Brown (10YR 4/3), moist, high plasticity, few sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | |
| Clayey Sand with Gravel (SC). Zone of high weathering. Mottled in color and texture. Characteristic of decomposed granitic rock. Brownish Yellow (10YR 6/6) mottled with Yellowish Brown (10YR 5/4) mottled with Pale Yellow (2.5Y 7/3), moist, little gravel, fine gravel, angular gravel, fine to | |

| WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|
| | 0.16 | Top of Riser | 62.02 |
| | 0.0 | Ground Surface | 62.18 |
| | 0.0 | | 62.18 |



**WELL CONSTRUCTION DETAILS**

RISER CASING
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **0.17 ft bgs - 57 ft bgs**

GROUT
Type: **Portland cement w/ bent.**
Interval: **0 ft bgs - 52 ft bgs**

SEAL
Type: **3/8" bentonite chips**
Interval: **52 ft bgs - 54 bgs**

SANDPACK
Type: **20-30 mesh silica sand**
Interval: **54 ft bgs - 67 ft bgs**

SCREEN
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **57 ft bgs - 67 ft bgs**

D.T.W. (ft. b.G.S): **61**
Date: **5/24/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **47.92**
Date: **7/11/2022**
Event: **GW Sampling**

LEGEND
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VEFS-PFAS-MW02**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\VBOFPP01\PROJ\CLEANII\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **62.2**
LOGGED BY: **I. Dinelman, B. Da**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| coarse sand, angular to subangular sand, trace to some clay, no odor. (DPT) | 20 | | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Weathered material characteristic of decomposed granite. At 19.25' there is a layer (2.5") of sandy fat clay (CH) may be slough 10YR 4.4. Light Yellowish Brown (2.5Y 6/3) mottled with Very Pale Brown (10YR 7/4), Pale Yellow (2.5Y 7/4), Dark Gray (2.5Y 4/1), Pale Yellow (2.5Y 8/3), moist, few gravel, fine gravel, anglar to subangular gravel, fine to coarse sand, subangular sand, little silt, trace clay, no odor. (DPT) | | | | | | | |
| Fat Clay with Sand (CH). Believe this sample to be slough from top and likely was no recovery from 22-23 feet bgs. Brown (10YR 4/3), moist, high plastictiy, few sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | 25 | | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Pulverized rock. Grayish Brown (2.5Y 5/2), dry, few gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, few silt, little clay, no odor. (Air Rotary) | 30 | | | | | | |
| | 35 | | | | | | |
| Well Graded Gravel with Silt (GW-GM). Gravels are lighter in color (2.5Y 6/3) silts when pinched between fingers appear darker (2.5Y 4/2) silts clump to small blocky or rounded particulates similar to gravels in appearance. Light Yellowish Brown (2.5Y 6/3) mottled with, Dark Grayish Brown (2.5Y 4/2), dry, medium dense, fine gravel, angular to subrounded gravel, little silt, no odor. (Air Rotary) | | | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Lithologic soil description from soil cuttings retrieved from air rotary drilling. Light Olive Brown (2.5Y 5/3), dry, little gravel, fine gravel, angular to subangular gravel, fine to coarse sand, angular sand, little silt, trace clay, no odor. (Air Rotary) | 40 | | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VEFS-PFAS-MW02**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **62.2**
LOGGED BY: **I. Dinelman, B. Da**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| Silty Sand (SM). Lithologic description from air rotary soil cuttings. Light Olive Brown (2.5Y 5/4), dry, angular to subangular sand, few silt, no odor. (Air Rotary) | | | | | | | |
| Well Graded Sand with Silt (SW-SM). Lithologic description from air rotary soil cuttings. Pulverized bedrock. Light Gray (2.5Y 7/1), dry, trace gravel, fine gravel, angular gravel, fine to coarse sand, angular sand, little silt, trace clay, no odor. (Air Rotary) | 50 | | | 52.0 | | 10.18 | |
| | | | | 54.0 | BS | 8.18 | |
| Well Graded Sand with Silt (SW-SM). Light Gray (2.5Y 7/1), dry, trace gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, trace clay, no odor. (Air Rotary) | 55 | | | | | | |
| Bedrock, no returns in March drilling mobilization. (Air Rotary) | 60 | | | | | | |
| Bedrock, light gray, dry, granular returns. Light Gray (2.5Y 7/1), dry, no odor. (Air Rotary) | 65 | | | 67.0 | FP<br>BSC | -4.82 | |
| | 70 | | | 70.0 | | -7.82 | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VEFS-PFAS-MW02**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VEP5-PFAS-MW01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **15.06**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **759618.5**
EASTING: **1005543.0**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **February 23, 2022**

LOGGED BY: **M. Tekle, B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|---|
| | | | | **-2.15** | Top of Riser | **17.21** |
| | | | | **0.0** | Ground Surface | **15.06** |
| Silty Gravel with Sand (GM). White (5YR 8/1), dry, dense, stiff to vey stiff, non-plastic, some gravel, coarse gravel, angular gravel, little sand, fine sand, angular sand, some silt, no odor. (DPT) | 0 | | | 0.0 | | 15.06 |
| | 5 | | | | | |
| Silt with Sand (ML). Light Gray (5YR 7/1), dry, very stiff, non-plastic, little sand, fine sand, angular sand, no odor. (DPT) | | | | | | |
| Silty Sand (SM). Dry, loose, fine sand, angular sand, few silt, no odor. (DPT) | | | | | | |
| Silty Sand (SM). Light Reddish Brown (5YR 6/4), dry, medium dense to dense, fine to medium sand, angular to subangular sand, few silt, no odor. (DPT) | 10 | | | | | |
| Silty Sand (ML). Moist, dense to very dense, fine to medium sand, angular to subangular sand, some silt, no odor. (DPT) | 15 | | | | | |
| | | | | 20.0 | | -4.94 |

### WELL CONSTRUCTION DETAILS

**RISER CASING**
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **2.146 ft ags - 57 ft bgs**

**GROUT**
Type: **Portland cement w/ bent.**
Interval: **0 ft bgs - 20 ft bgs**

**SEAL**
Type: **3/8" bentonite chips**
Interval: **20 ft bgs - 22 bgs**

**SANDPACK**
Type: **20-30 mesh silica sand**
Interval: **22 ft bgs - 34 ft bgs**

**SCREEN**
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **24 ft bgs - 34 ft bgs**

D.T.W. (ft. b.G.S): **25**
Date: **2/23/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **19.19**
Date: **4/6/2022**
Event: **GW Sampling**

**LEGEND**
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VEP5-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **15.1**
LOGGED BY: **M. Tekle, B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| Sandy Lean Clay (CL). With greenish gray mottling. Reddish Brown (5YR 5/4), moist, very stiff, medium plasticity, few sand, fine sand, angular sand, few silt, no odor. (DPT) | 20 | | | 22.0 | BS | -6.94 | STRATA |
| Lean Clay with Sand (CL). Yellowish Red (5YR 5/6), wet, medium to high plasticity, few sand, fine sand, angular to subangular sand, little silt, no odor. (DPT) | 25 | | | | | | |
| Clayey Sand (SC). Brown (5.0YR 6/6), wet, medium dense to dense, non-plastic, angular to subangular sand, little silt, few clay, no odor. (DPT) | | | | | | | |
| Poorly Graded Sand (SP). Light Yellowish Brown (10YR 6/4), wet, loose to medium dense, fine sand, angular to subangular, no odor. (DPT) | 30 | | | | | | |
| Well Graded Sand (SW). Fine to coarse grained sand, coarsening downward. Light Gray (10YR 7/2), wet, loose, fine to coarse sand, subangular to rounded sand, no odor. (DPT) | | | | 34.0 | FP<br>BSC | -18.94 | |

STRATA
- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VEP5-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VERW-PFAS-MW01 / VERW-PFAS-SO01

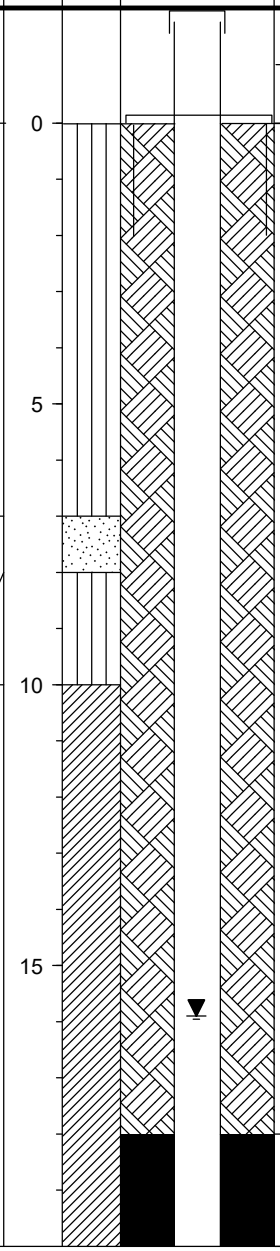
PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **14.17**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **759584.4**
EASTING: **1007120.6**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **February 24, 2022**

LOGGED BY: **M. Tekle, B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|---|
| | | | | -2.39 | Top of Riser | 16.55 |
| | | | | 0.0 | Ground Surface | 14.17 |
| Silt with Sand (ML). Silt with fine sand and few clay. Dark Gray (10YR 4/1) changes to Yellowish Brown (10YR 5/4), dry, stiff to very stiff, few sand, fine to medium sand, angular to subangular sand, little clay, no odor. (DPT) | 0 | | | 0.0 | | 14.17 |
| Poorly Graded Sand (SP). Very Pale Brown (10YR 7/4), medium dense, fine to medium sand, angular to subangular sand, no odor. (DPT) | 5 | | | | | |
| Silt with Sand (ML). Brown (10YR 5/3), moist, stiff to very stiff, few sand, fine sand, angular to subangular sand, no odor. (DPT) | | | | | | |
| Lean Clay with Sand (CL). Moisture and sand content increased from 22-24' bgs. Yellowish Brown (10YR 5/4), moist, stiff to very stiff, low to medium plasticity, few sand, fine to medium sand, angular to subangular sand, no odor. (DPT) | 10 | | | | | |
| | 15 | | | 18.0 | | -3.83 |
| | | | | 20.0 | BS | -5.83 |



### WELL CONSTRUCTION DETAILS

**RISER CASING**
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **2.38 ft ags - 22 ft bgs**

**GROUT**
Type: **Portland cement w/ bent.**
Interval: **0 ft bgs - 18 ft bgs**

**SEAL**
Type: **3/8" bentonite chips**
Interval: **18 ft bgs - 20 bgs**

**SANDPACK**
Type: **20-30 mesh silica sand**
Interval: **20 ft bgs - 33 ft bgs**

**SCREEN**
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **22 ft bgs - 32 ft bgs**

D.T.W. (ft. b.G.S): **26**
Date: **2/24/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **18.29**
Date: **4/6/2022**
Event: **GW Sampling**

**LEGEND**
FILTER PACK
BENTONITE
CEMENT GROUT
CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VERW-PFAS-MW01 / VERW-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **14.2**
LOGGED BY: **M. Tekle, B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| | 20 | | | | | | |
| Lean Clay with Sand (CL). Wet at 25' bgs. Dark Yellowish Brown (10YR 4/4), wet, stiff to very stiff, medium plasticity, few sand, fine to medium sand, angular to subangular sand, no odor. (DPT) | 25 | | | | | | |
| Silty Sand (SM). Yellowish Brown (10YR 5/4), wet, loose to medium dense, fine to medium sand, angular to subangular sand, few silt, no odor. (DPT) | 30 | | | 32.0 | FP<br>BSC | -17.83 | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VERW-PFAS-MW01 / VERW-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VERW-PFAS-MW02 / VERW-PFAS-SO02

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

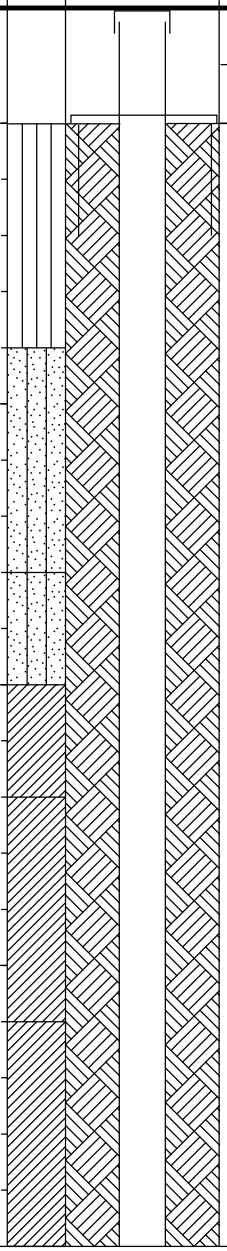
GROUND SURFACE ELEVATION (ft.): **20.65**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **759565.5**
EASTING: **1008844.7**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **February 28, 2022**

LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL |
|---|---|---|
| Silt with Sand (ML). Dark Brown (7.5 YR 3/3), dry, loose, very stiff, non-plastic, little gravel, fine gravel, angular gravel, some sand, fine sand, subrounded sand, no odor. (DPT) | 0 | |
| Silty Sand (SM). Light Yellowish Brown (10YR 6/4), dry, loose, very stiff, non-plastic, trace, fine gravel, subangular gravel, medium sand, subrounded sand, little silt, no odor. (DPT) | 5 | |
| Silty Sand (SM). Dry, medium dense, trace gravel, fine gravel, angular gravel, fine sand, subrounded sand, few silt, no odor. (DPT) | | |
| Lean Clay with Sand (CL). Reddish Brown (5YR 4/4), very stiff, low plasticity, trace sand, fine sand, no odor. (DPT) | 10 | |
| Lean Clay with Sand (CL). Very stiff, low plastictiy, little sand, fine sand, subrounded sand, little silt, no odor. (DPT) | | |
| Lean Clay (CL). Dark Reddish Gray (5YR 4/2), dry, stiff, low plasticity, little silt, no odor. (DPT) | 15 | |

WELL DETAILS



| DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|
| -3.15 | Top of Riser | 23.80 |
| 0.0 | Ground Surface | 20.65 |
| 0.0 | | 20.65 |

WELL CONSTRUCTION DETAILS

RISER CASING
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **3.15 ft ags - 25 ft bgs**

GROUT
Type: **Portland cement w/ bent.**
Interval: **0 ft bgs - 21 ft bgs**

SEAL
Type: **3/8" bentonite chips**
Interval: **21 ft bgs - 23 bgs**

SANDPACK
Type: **20-30 mesh silica sand**
Interval: **23 ft bgs - 36 ft bgs**

SCREEN
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **25 ft bgs - 35 ft bgs**

D.T.W. (ft. b.G.S): **26**
Date: **2/28/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **23.2**
Date: **4/7/2022**
Event: **GW Sampling**

LEGEND
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VERW-PFAS-MW02 / VERW-PFAS-SO02**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **20.6**
LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| Lean Clay (CL). Reddish Brown (5YR 4/3), moist, medium to stiff, low plasticity, little silt, no odor. (DPT) | 20 | | | 21.0 | | -0.36 | |
| | | | | 23.0 | BS | -2.36 | |
| Lean Clay (CL). Weak Red (2.5YR 5/2), moist, medium, medium plasticity, trace sand, fine sand, rounded sand, little silt, no odor. (DPT) | 25 | | | | | | |
| Lean Clay with Sand (CL). Sand at 31-32' bgs. Brown (7.5YR 4/4), moist, medium to stiff, medium plasticity, little sand, fine sand, little silt, no odor. (DPT) | 30 | | | | | | |
| Poorly Graded Sand (SP). Brownish Yellow (10YR 6/6), loose, soft, low plasticity, trace gravel, fine to medium sand, subrounded to rounded sand, no odor. (DPT) | | | | | | | |
| | 35 | | | 35.0 | BSC | -14.36 | |
| Lean Clay with Sand (CL). White (5Y 8/1) mottled with Pale Olive (5Y 6/3), moist, hard, low plasticity, few sand, medium sand, rounded sand, no odor. (DPT) | | | | 36.0 | FP | -15.36 | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VERW-PFAS-MW02 / VERW-PFAS-SO02**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VEW10-PFAS-MW01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **24.98**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **760543.6**
EASTING: **1011255.1**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **March 4, 2022**

LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|---|
| | | | | -2.41 | Top of Riser | 27.38 |
| | | | | 0.0 | Ground Surface | 24.98 |
| Lean Clay (CL). Color change 6.5. Dark Brown (7.5YR 3/4) changes to Brown (7.5YR 4/4), very stiff, low plasticity, little silt, no odor. (DPT) | 0 | | | 0.0 | | 24.98 |
| Well Graded Sand with Gravel (SW). Brownish Yellow (10YR 6/6), dry, medium dense, few gravel, fine gravel, subangular gravel, fine to coarse sand, subangular to subrounded sand, no odor. (DPT) | 5 | | | | | |
| Lean Clay (CL). Mottled black, white sand and gravel. Black (7.5YR 2/1) mottled with, white (10YR 8/1), moist, very stiff, low plasticity, little gravel, fine gravel, subangular gravel, little sand, fine sand, subrounded sand, little silt, no odor. (DPT) | | | | | | |
| Silty Sand (SM). Dry, medium dense to dense, fine sand, few silt, no odor. (DPT) | 10 | | | | | |
| Lean Clay with Sand (CL). Mottled black nodules, white sand and gravel. Brown (7.5YR 5/3) mottled with Black (7.5YR 2/1), dry, stiff, non-plastic, little gravel, fine gravel, subangular gravel, little sand, fine sand, subrounded sand, no odor. (DPT) | | | | | | |
| Well Graded Sand (SW). Dry, loose to medium dense, trace gravel, fine gravel, fine to coarse sand, no odor. (DPT) | 15 | | | 18.0 | | 6.98 |
| Sandy Lean Clay (CL). Strong Brown (7.5YR 4/6), moist, very stiff, low plasticity, few sand, fine to medium sand, subrounded sand, no odor. (DPT) | | | | 20.0 | BS | 4.98 |

### WELL CONSTRUCTION DETAILS

**RISER CASING**
Diameter: **4-in.**
Type: **Sch 40 PVC**
Interval: **2.41 ft ags - 22 ft bgs**

**GROUT**
Type: **Portland cement w/ water**
Interval: **0 ft bgs - 18 ft bgs**

**SEAL**
Type: **3/8" bentonite chips**
Interval: **18 ft bgs - 20 bgs**

**SANDPACK**
Type: **20-30 mesh silica sand**
Interval: **20 ft bgs - 32 ft bgs**

**SCREEN**
Diameter: **4-in.**
Type: **0.010 factory slotted**
Interval: **22 ft bgs - 32 ft bgs**

D.T.W. (ft. b.G.S): **28**
Date: **3/4/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **26.97**
Date: **4/6/2022**
Event: **GW Sampling**

**LEGEND**
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VEW10-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **25.0**
LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| | 20 | | | | | | |
| Silty Sand (SM). Brownish Yellow (10YR 6/8), moist, loose, medium dense, fine sand, subrounded sand, few silt, no odor. (DPT) | 25 | | | | | | |
| Lean Clay with Gravel (CL). Mottled black nodules. Strong Brown (7.5YR 5/6) mottled with Black (7.5YR 2/1), dry, very stiff to hard, low plasticity, few gravel, fine gravel, angular to subangular gravel, no odor. (DPT) | | | | | | | |
| Poorly Graded Sand (SP). Wet, very loose, fine sand, little clay, no odor. (DPT) | 30 | | | 32.0 | FP<br>BSC | -7.02 | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VEW10-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VEW10-PFAS-MW02

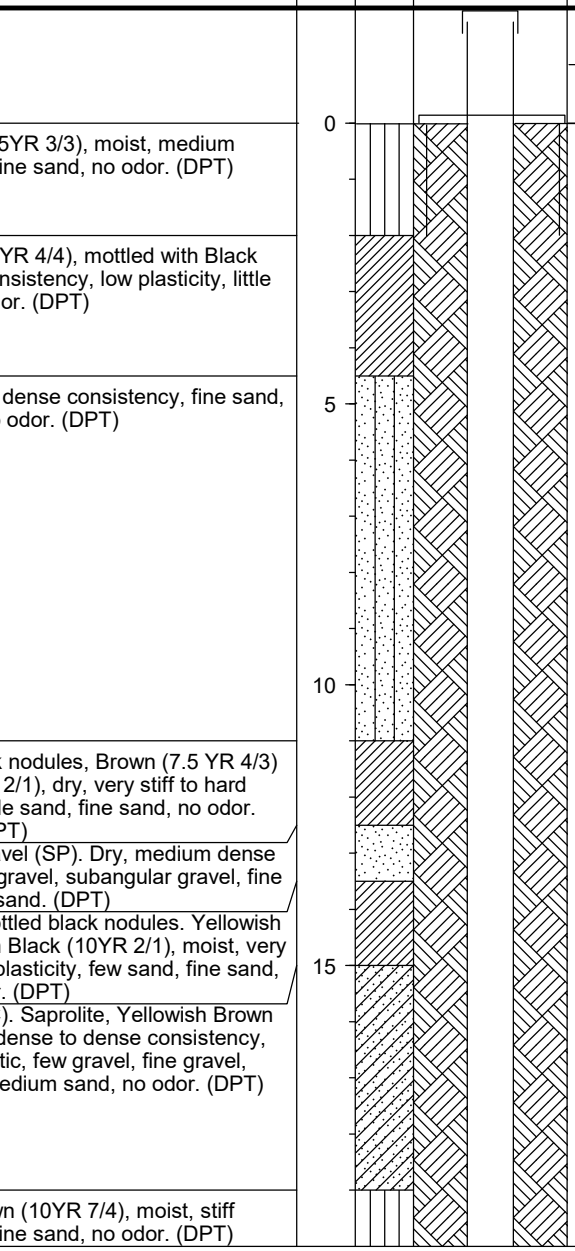
PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **20.46**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **760556.3**
EASTING: **1011681.0**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **March 8, 2022**

LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL |
|---|---|---|
| Silt (ML). Dark Brown (7.5YR 3/3), moist, medium consistency, little sand, fine sand, no odor. (DPT) | 0 | |
| Lean Clay (CL). Brown (7.5YR 4/4), mottled with Black (7.5YR 2/1), dry, very stiff consistency, low plasticity, little silt, no odor. (DPT) | | |
| Silty Sand (SM). Dry, medium dense consistency, fine sand, some silt, no odor. (DPT) | 5 | |
| Lean Clay (CL). Mottled black nodules, Brown (7.5 YR 4/3) mottled with Black (7.5YR 2/1), dry, very stiff to hard consistency, nonplastic, little sand, fine sand, no odor. (DPT) | 10 | |
| Poorly Graded Sand with Gravel (SP). Dry, medium dense consistency, little gravel, fine gravel, subangular gravel, fine to medium sand. (DPT) | | |
| Lean Clay with Sand (CL). Mottled black nodules. Yellowish Brown (10YR 5/6) mottled with Black (10YR 2/1), moist, very stiff to hard consistency, low plasticity, few sand, fine sand, no odor. (DPT) | 15 | |
| Clayey Sand with Gravel (SC). Saprolite, Yellowish Brown (10YR 5/8), moist, medium dense to dense consistency, hard consistency, nonplastic, few gravel, fine gravel, subangular gravel, fine to medium sand, no odor. (DPT) | | |
| Silt (ML). Very Pale Brown (10YR 7/4), moist, stiff consistency, little sand, fine sand, no odor. (DPT) | | |



| WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|
| | -3.13 | Top of Riser | 23.59 |
| | 0.0 | Ground Surface | 20.46 |
| | 0.0 | | 20.46 |

WELL CONSTRUCTION DETAILS

RISER CASING
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **3.133 ft ags - 25 ft bgs**

GROUT
Type: **Portland cement**
Interval: **0 ft bgs - 21 ft bgs**

SEAL
Type: **3/8" bentonite chips**
Interval: **21 ft bgs - 23 bgs**

SANDPACK
Type: **20-30 mesh silica sand**
Interval: **23 ft bgs - 33.5 ft bgs**

SCREEN
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **25 ft bgs - 33.5 ft bgs**

D.T.W. (ft. b.G.S): **30**
Date: **3/8/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **23.2**
Date: **4/5/2022**
Event: **GW Sampling**

LEGEND
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VEW10-PFAS-MW02**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **20.5**
LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| | 20 | | | 21.0 | | -0.54 | STRATA |
| | | | | 23.0 | BS | -2.54 | |
| Lean Clay (CL). Yellowish Brown (10YR 5/4), moist, stiff consistency, low plasticity, no odor. (DPT) | 25 | | | | | | |
| Lean Clay with Sand (CL). Saprolite, moist, stiff consistency, low plasticity, little sand, fine sand, subrounded sand, no odor. (DPT) | | | | | | | |
| Silty Sand (SM). Brownish Yellow (10YR 6/8), wet, very loose, trace gravel, fine gravel, subangular gravel, fine sand, little clay, no odor. (DPT) | 30 | | | | | | |
| Silty Sand (SM). Yellowish Brown (10YR 5/6), wet, loose consistency, trace gravel, fine gravel, subangular gravel, fine to medium sand, subangular to subrounded sand, few silt, little clay, no odor. (DPT) | | | | 33.5 | FP BSC | -13.04 | |

FAT CLAY (CH)
LEAN CLAY (CL)
SILT (ML)
SILTY SAND (SM)
WELL GRADED SAND (SW)
POORLY GRADED SAND (SP)
POORLY GRADED SAND w/ CLAY (SP-SC)
CLAYEY SAND (SC)
SILTY GRAVEL (GM)
WELL GRADED GRAVEL w/ SILT (GW-GM)
POORLY GRADED GRAVEL w/ CLAY (GP-GC)
SAPROLITE
BEDROCK

LEGEND

FILTER PACK
BENTONITE
CEMENT GROUT
CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VEW10-PFAS-MW02**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VEW10-PFAS-MW03 / VEW10-PFAS-SO05

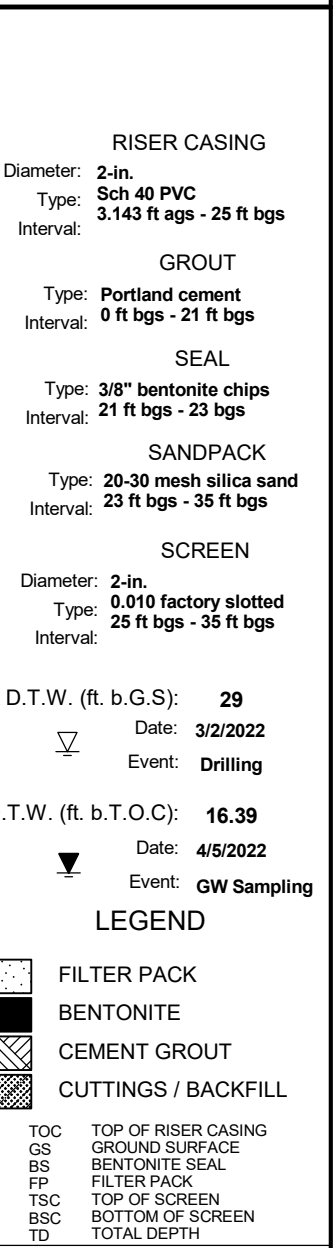
PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **12.70**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **759968.0**
EASTING: **1011707.4**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **March 2, 2022**

LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | -3.14 | Top of Riser | 15.84 | |
| | | | | 0.0 | Ground Surface | 12.70 | |
| Not available due to electronic data loss. | 0 | | | 0.0 | | 12.70 | |
| | 5 | | | | | | |
| | 10 | | | | | | |
| | 15 | | | | | | |




ch2m

**COMPLETION REPORT OF WELL No. VEW10-PFAS-MW03 / VEW10-PFAS-SO05**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\VBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **12.7**
LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| | 20 | | | 21.0 | | -8.30 | STRATA |
| | | | | 23.0 | BS | -10.30 | FAT CLAY (CH) |
| | 25 | | | | | | LEAN CLAY (CL) |
| | | | | | | | SILT (ML) |
| | | | | | | | SILTY SAND (SM) |
| | | | | | | | WELL GRADED SAND (SW) |
| | | | | | | | POORLY GRADED SAND (SP) |
| | | | | | | | POORLY GRADED SAND w/ CLAY (SP-SC) |
| | | | | | | | CLAYEY SAND (SC) |
| | 30 | | | | | | SILTY GRAVEL (GM) |
| | | | | | | | WELL GRADED GRAVEL w/ SILT (GW-GM) |
| | | | | | | | POORLY GRADED GRAVEL w/ CLAY (GP-GC) |
| | | | | | | | SAPROLITE |
| | | | | | | | BEDROCK |
| | 35 | | | 35.0 | FP<br>BSC | -22.30 | |

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VEW10-PFAS-MW03 / VEW10-PFAS-SO05**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VEW10-PFAS-MW04 / VEW10-PFAS-SO06

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **6.14**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **759817.6**
EASTING: **1012339.9**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **March 1, 2022**

LOGGED BY: **J. Locus**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) |
|---|---|
| Silt (ML). Brown (7.5YE 4/3), moist, medium to stiff consistency, trace sand, fine sand, little clay, no odor. (DPT) | 0 |
| Silty Sand (SM). Dark Yellowish Brown (10YR 4/6), moist, medium dense, little gravel, fine gravel, subangular gravel, fine sand, subrounded sand, some clay, no odor. (DPT) | 5 |
| Poorly Graded Sand (SP). Yellowish Brown (10YR 5/6), loose dense, fine to medium sand, subrounded sand, little silt, faint odor. (DPT) | |
| Poorly Graded Sand with Clay (SP-SC). 0.3 ft clay at top, Yellowish Brown (10YR 5/8), wet, very loose, stiff, low to medium plasticity, medium sand, subangular to subrounded sand, no odor. (DPT) | |
| Lean CLay (CL). Reddish Brown (5YR 4/3) mottled with Black (5YR 2/1), moist, stiff, medium plasticity, no odor. (DPT) | 10 |
| Poorly Graded Sand (SP). Brownish Yellow (10YR 6/6), wet, very loose, medium sand, subrounded sand, little clay, no odor. (DPT) | 15 |

| WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|
| | -2.61 | Top of Riser | 8.75 |
| | 0.0 | Ground Surface | 6.14 |
| | 0.0 | | 6.14 |
| | 2.0 | | 4.14 |
| | 4.0 | BS | 2.14 |
| | 16.0 | FP BSC | -9.86 |

WELL CONSTRUCTION DETAILS

RISER CASING
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **2.607 ft ags - 6 ft bgs**

GROUT
Type: **Portland cement**
Interval: **0 ft bgs - 2 ft bgs**

SEAL
Type: **3/8" bentonite chips**
Interval: **2 ft bgs - 4 bgs**

SANDPACK
Type: **20-30 mesh silica sand**
Interval: **4 ft bgs - 16 ft bgs**

SCREEN
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **6 ft bgs - 16 ft bgs**

D.T.W. (ft. b.G.S): **8**
Date: **3/1/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **9.11**
Date: **4/5/2022**
Event: **GW Sampling**

LEGEND
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VEW10-PFAS-MW04 / VEW10-PFAS-SO06**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VWAB-PFAS-MW01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **54.28**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **761841.8**
EASTING: **970926.7**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **March 31, 2022**

LOGGED BY: **B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|---|
| | | | | -2.97 | Top of Riser | 57.24 |
| | | | | 0.0 | Ground Surface | 54.28 |
| Clayey Sand with Gravel (SC). Dark Brown (10YR 3/3) mottled with White (White 9.5/7/5YR/1), dry, loose, little gravel, fine to coarse gravel, angular gravel, fine sand, subrounded sand, few clay, no odor. (DPT) | 0 | | | 0.0 | | 54.28 |
| Silty Sand (SM). Brown (7.5YR 4/4) mottled with White, dry, very loose, trace gravel, fine gravel, subangular to subrounded gravel, few silt, trace clay, no odor. (DPT) | 5 | | | | | |
| Clayey Sand (SC). Dry, loose, trace gravel, fine gravel, fine sand, few clay, no odor. (DPT) | 10 | | | | | |
| Silty Sand with Gravel (SM). Strong Brown (7.5YR 4/6), very loose, little gravel, fine to coarse gravel, subangular gravel, fine to medium sand, subangular to subrounded sand, few silt, no odor. (DPT) | 15 | | | | | |

WELL CONSTRUCTION DETAILS

RISER CASING
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **2.966 ft ags - 75 ft bgs**

GROUT
Type: **Portland cement w/ bent,**
Interval: **0 ft bgs - 71 ft bgs**

SEAL
Type: **3/8" bentonite chips**
Interval: **71 ft bgs - 73 ft bgs**

SANDPACK
Type: **20-30 mesh silica sand**
Interval: **73 ft bgs - 86 ft bgs**

SCREEN
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **75 ft bgs - 85 ft bgs**

D.T.W. (ft. b.G.S): **54.5**
Date: **4/14/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **56.67**
Date: **7/9/2022**
Event: **GW Sampling**

LEGEND
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VWAB-PFAS-MW01**

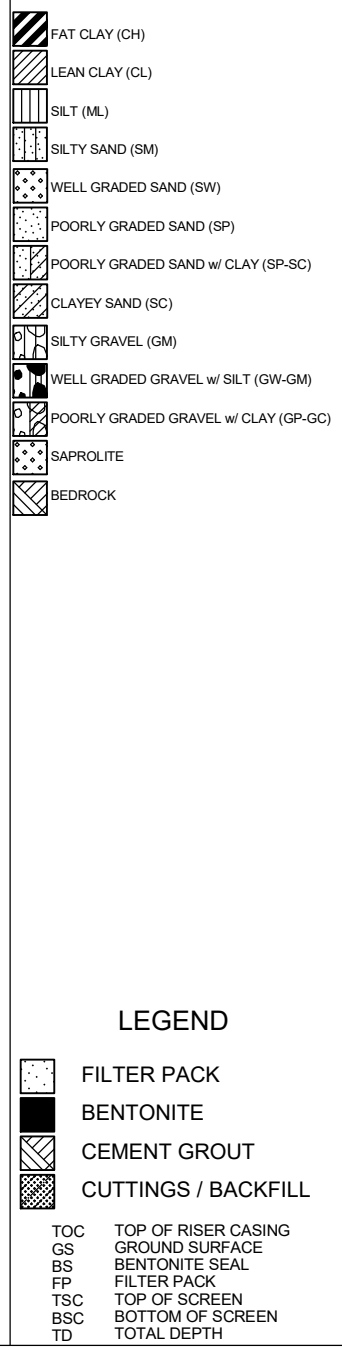


2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **54.3**
LOGGED BY: **B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| No Recovery. (NR) | 20 | | | | | | |
| Lean Clay with Gravel (CL). Red (2.5YR 4/8), dry, medium, medium plasticity, few gravel, fine, gravel, angular gravel, no odor. (DPT) | 25 | | | | | | |
| Sandy Lean Clay with Gravel (CL). Light Yellowish Brown (10YR 6/4), dry, soft, low plasticity, few gravel, fine gravel, angular gravel, little sand, fine to medium sand, angular sand, no odor, interbedded poorly sorted sand lenses within lean clay with gravel bed. (DPT) | 30 | | | | | | |
| Fat Clay (CH). Brown (10YR 5/3), dry, medium, high plasticity, no odor. (DPT) | 35 | | | | | | |
| Silty Gravel (GM). Greenish Gray (10GY 6/1), dry, loose, subangular gravel, few silt, no odor, possibly bedrock broken up by drilling. (DPT) | 40 | | | | | | |




ch2m

## COMPLETION REPORT OF WELL No. VWAB-PFAS-MW01

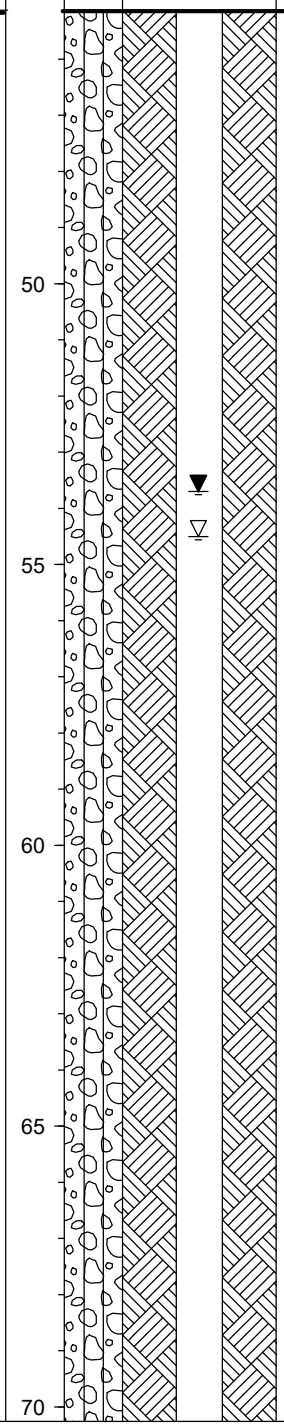


2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **54.3**
LOGGED BY: **B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |




STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VWAB-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **54.3**
LOGGED BY: **B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| | | | | 71.0 | | -16.73 | |
| | | | | 73.0 | BS | -18.73 | |
| | 75 | | | | | | |
| | 80 | | | | | | |
| | 85 | | | 85.0 | BSC | -30.73 | |
| | | | | 86.0 | FP | -31.73 | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VWAB-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VWAH-PFAS-MW01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **6.31**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **763563.8**
EASTING: **972407.3**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **April 21, 2022**

LOGGED BY: **T. Stewart**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|---|
| | | | | -2.55 | Top of Riser | 8.86 |
| | | | | 0.0 | Ground Surface | 6.31 |
| Silty Sand with Gravel (SM). Light Brown (7.5YR 6/4), dry, very loose to loose, rapid dilatancy, nonplastic, little gravel, coarse gravel, angular to subangular gravel, few sand, fine to medium sand, subrounded to rounded sand, trace to little silt, trace clay, no odor. (HSA) | 0 | | | 0.0 | | 6.31 |
| | | | | 4.0 | | 2.31 |
| | 5 | | | 6.0 | BS | 0.31 |
| Well Graded Sand with Silt (SW-SM). Gray (5YR 5/1), loose, soft, non plastic, some sand, medium to coarse sand, angular to subangular sand, little silt, no odor. (HSA) | | | | | | |
| Fat Clay with Sand (CH). Pale Green (5G 6/2) mottled with Light Red (2.5YR 6/6), moist, dense, very stiff, high plasticity, trace sand, fine to medium sand, no odor. (HSA) | 10 | | | | | |
| Poorly Graded Gravel with Silt and Sand (GP-GM). Very Pale Brown (10YR 8/4), very loose, nonplastic, trace gravel, fine gravel, subangular gravel, some sand, coarse sand, angular sand, trace silt, no odor. (HSA) | 15 | | | 18.0 | FP | -11.69 |
| | | | | | BSC | |
| | | | | 19.0 | | -12.69 |

## WELL CONSTRUCTION DETAILS

**RISER CASING**
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **2.55 ft ags - 8 ft bgs**

**GROUT**
Type: **Portland cement w/ bent,**
Interval: **0 ft bgs - 4 ft bgs**

**SEAL**
Type: **3/8" bentonite chips**
Interval: **4 ft bgs - 6 ft bgs**

**SANDPACK**
Type: **20-30 mesh silica sand**
Interval: **6 ft bgs - 18 ft bgs**

**SCREEN**
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **8 ft bgs - 18 ft bgs**

D.T.W. (ft. b.G.S): **7.8**
Date: **4/21/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **8.4**
Date: **6/28/2022**
Event: **GW Sampling**

**LEGEND**
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VWAH-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\BOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VWAH-PFAS-MW02 / VWAH-PFAS-SO01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **4.97**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **763620.1**
EASTING: **972404.8**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **April 21, 2022**

LOGGED BY: **T. Stewart**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|---|
| | | | | -2.60 | Top of Riser | 7.57 |
| | | | | 0.0 | Ground Surface | 4.97 |
| Silty Sand (SM). Brown (7.5YR 4/3), wet t 6.0' bgs, loose, medium to coarse sand, red brick fragments to 2" size from 0.5-1.3' bgs, up to 30% coarse blocky organics from 4.5 to 6.8', color grades to very dark brown (7.5YR 2/3) at 5.0' bgs. (DPT) | 0 | | | 0.0 | | 4.97 |
| | | | | 1.0 | | 3.97 |
| | | | | 3.0 | BS | 1.97 |
| Clay (CL). Dark Greenish Gray (5GY 4/1), moist-dry, 15-20% organics, low plasticity. (DPT) | 5 | | | | | |
| Fat Clay (CH). Grayish Green (5G 5/2), mottled dark greenish black (5G 4/1) with white, dry, very stiff to hard, colored red (2.5YR 4/6) from 9.8-10.5' bgs. (DPT) | 10 | | | | | |
| Silty, Clayey Sand (SC-SM). Very Dark Gray (10YR 3/1), dry, fine to medium sand, 10-15% brownish black blocky, coarse organics. (DPT) | 15 | | | 15.0 | FP | -10.03 |
| | | | | | BSC | |
| | | | | 16.0 | | -11.03 |

WELL CONSTRUCTION DETAILS

RISER CASING
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **2.60 ft ags - 5 ft bgs**

GROUT
Type: **Portland cement w/ bent,**
Interval: **0 ft bgs - 1 ft bgs**

SEAL
Type: **3/8" bentonite chips**
Interval: **1 ft bgs - 3 ft bgs**

SANDPACK
Type: **20-30 mesh silica sand**
Interval: **3 ft bgs - 15 ft bgs**

SCREEN
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **5 ft bgs - 15 ft bgs**

D.T.W. (ft. b.G.S): **5.6**
Date: **4/21/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **7.12**
Date: **6/28/2022**
Event: **GW Sampling**

LEGEND
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VWAH-PFAS-MW02 / VWAH-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VWFS-PFAS-MW01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

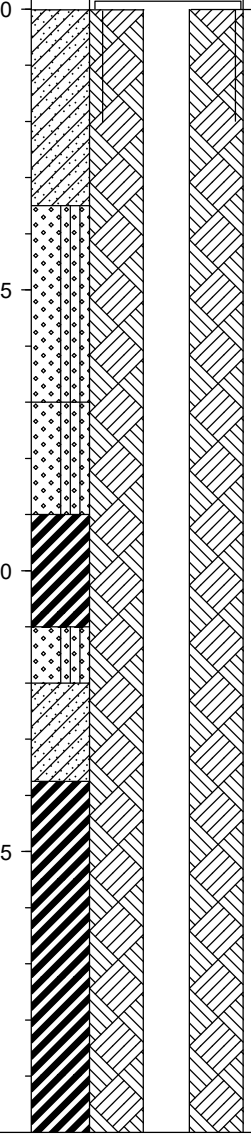
GROUND SURFACE ELEVATION (ft.): **60.15**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **761673.2**
EASTING: **971188.6**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **March 22, 2022**

LOGGED BY: **B. Davis & I. Dinelman**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL |
|---|---|---|
| Clayey Sand with Gravel (SC). Strong Brown (7.5YR 4/6) mottled with Pale Olive (5Y 6/3) and White (2.5Y 8/1), moist, little gravel, fine to coarse sand, angular to subangular sand, some clay, no odor, top 4" (.33') is organic soil with roots and grasses (10YR 4/4). (DPT) | 0 | |
| Well Graded Sand with Silt and Gravel (SW-SM). Strong Brown (7.5YR 5/6), moist, little gravel, fine gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, little sand, little clay, no odor. (DPT) | 5 | |
| Well Graded Sand with Silt (SW-SM). Reddish Yellow (7.5YR 6/6) with color change to Brownish Yellow (10YR 6/6) at 7.5' bgs and Yellowish Brown (10YR 5/8) at 8.0' bgs, moist, trace gravel, fine gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, little silt, trace clay, no odor. (DPT) | | |
| Sandy Fat Clay (CH). Strong Brown (7.5YR 4/6), moist, stiff, high plasticity, some sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | 10 | |
| Well Graded Sand with Silt (SW-SM). Strong Brown (7.5YR 5/8), moist, loose, trace gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | | |
| Clayey Sand with Gravel (SC). Brown (7.5YR 4/4), moist, medium dense, little gravel, fine gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | | |
| Sandy Fat Clay (CH). Yellowish Brown (10YR 5/6), at 19.5' bgs CH changes color to Yellowish Red (5YR 4/6), moist, stiff, high plasticity, some sand, fine to coarse sand, angular to subangular sand, interbedded with two layers of SW-SM at 17.0-17.25' bgs and 18.5-18.75' bgs, sand is well graded with 6-15% gravel, silt, and clay, no odor. (DPT) | 15 | |

| WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|
| | 0.19 | Top of Riser | 59.96 |
| | 0.0 | Ground Surface | 60.15 |



**RISER CASING**
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **0.19 ft bgs - 51 ft bgs**

**GROUT**
Type: **Portland cement w/ bent,**
Interval: **0 ft bgs - 47 ft bgs**

**SEAL**
Type: **3/8" bentonite chips**
Interval: **47 ft bgs - 49 ft bgs**

**SANDPACK**
Type: **20-30 mesh silica sand**
Interval: **49 ft bgs - 61.5 ft bgs**

**SCREEN**
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **51 ft bgs - 61 ft bgs**

D.T.W. (ft. b.G.S): **57**
Date: **3/22/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **57.87**
Date: **6/23/2022**
Event: **GW Sampling**

LEGEND
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VWFS-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **60.2**
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| No Revcovery. (NR) | 20 | | | | | | |
| Clayey Sand with Gravel (SC). Dark Yellowish Brown (10YR 4/4) color change to 5YR 6/6, moist, loose, little gravel, fine to coarse gravel, angular gravel, fine to coarse sand, angular to subangular sand, few clay, large rock broken up at 20.75' bgs, no odor. (DPT) | | | | | | | |
| Sandy Fat Clay with Gravel (CH). Strong Brown (7.5YR 5/6) color change to Yellowish Brown (10YR 5/4), moist, stiff, high plasticity, few gravel, fine to coarse gravel, angular to subangular gravel, some sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | | | | | | | |
| Clayey Sand with Gravel (SC). Strong Brown (7.5YR 5/8) color change to Reddish Yellow (7.5YR 6/8), moist, medium dense, little gravel, fine to coarse gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, few clay, gravelly layer encountered at ~25.0' bgs, no odor. (DPT) | 25 | | | | | | |
| | 30 | | | | | | |
| No Recovery. (NR) | | | | | | | |
| Clayey Sand with Gravel (SC). Brownish Yellow (10YR 6/6), moist, loose, little gravel, fine graveel, angular gravel, fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | 35 | | | | | | |
| Fat Clay with Sand (CH). Brown (7.5YR 4/4), very stiff, high plasticity, little sand, fine to coarse sand, angular sand, sand percentage and grain size increases with depth, no odor. (DPT) | | | | | | | |
| No Recovery. (NR) | 40 | | | | | | |
| Sandy Fat Clay (CH). Yellowish Brown (10YR 5/6), moist, stiff, high plasticity, trace gravel, fine gravel, angular gravel, few sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | | | | | | | |
| Silt with Sand (ML). Brown (10YR 4/3), stiff, rapid dilatancy, nonplastic to low plasticity, few gravel, fine gravel, angular gravel, few sand, fine to coarse sand, angular to subangular sand, little clay, interbedded with gravels, no odor. (DPT) | | | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VWFS-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\VBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **60.2**
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| Fat Clay with Sand (CH). Brown (7.5YR 5/4), moist, stiff, high plasticity, little sand, fine to medium sand, angular sand, no odor. (DPT) | | | | 47.0 | | 13.15 | |
| Sandy Silt (ML). Yellowish Brown (10YR 5/6), dry, stiff, rapid dilatancy, low plasticity, little gravel, fine gravel, angular gravel, few sand, fine to coarse sand, angular sand, little clay, no odor. (DPT) | | | | 49.0 | BS | 11.15 | |
| Well Graded Gravel with Silt and Sand (GW-GM). Light Olive Brown (2.5Y 5/3), very dense, fine gravel, angular gravel, few sand, fine to coarse sand, angular to subangular sand, few silt, little clay, likely bedrock pulverized, no odor. (DPT) | 50 | | | | | | |
| Logged by auger cuttings. | 55 | | | | | | |
| | 60 | | | 61.0 | BSC | -0.85 | |
| | | | | 61.5 | FP | -1.35 | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VWFS-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VWFS-PFAS-MW02

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **59.95**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **761758.6**
EASTING: **971276.4**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **March 22, 2022**

LOGGED BY: **B. Davis & I. Dinelman**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL |
|---|---|---|
| Silty Sand with Gravel (SM). Brown (10YR 4/3), dry, little gravel, fine to coarse gravel, angular to subangular gravel, fine to medium sand, subangular sand, some silt, surface soils with organic roots, leaves, and grasses, no odor. (DPT) | 0 | |
| Clayey Sand (SC). Strong Brown (7.5YR 5/6), moist, loose to medium dense, trace gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, some clay, no odor, from 3.75 to 4.0' there is an interbedded layer of SW-SM - well graded sand with silt 7.5YR 4/6, little clay, trace gravel. (DPT) | | |
| Sandy Fat Clay (CH). Brown (7.5YR 4/4), very stiff, high plasticity, few sand, fine to coarse sand, angular sand, no odor. (DPT) | 5 | |
| Clayey Sand (SC). Strong Brown (7.5YR 5/6), moist, loose, stiff, trace gravel, fine gravel, angular gravel, fine to coarse sand, angular sand, some clay, no odor, interbedded with fat clay with sand at 6.5 - 6.75' 7.5YR 4/4. (DPT) | | |
| Sandy Fat Clay (CH). Strong Brown (7.5YR 4/6), very stiff, high plasticity, trace gravel, fine gravel, angular gravel, few sand, fine to coarse sand, angular sand, no odor, thin gravelly layer (<1cm) at color change boundary at 8.5' bgs. (DPT) | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Strong Brown (7.5YR 5/6), moist, loose, few gravel, fine to coarse gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | 10 | |
| Clayey Sand (SC). Brown (7.5YR 4/4), fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | | |
| Sandy Fat Clay (CH). Strong Brown (7.5YR 4/6), moist, stiff, high plasticity, few sand, fine to coarse sand, subangular sand, no odor. (DPT) | | |
| Clayey Sand with Gravel (SC). Strong Brown (7.5YR 5/8), moist, medium dense, little gravel, fine to coarse gravel, angular gravel, fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | 15 | |
| Well Graded Sand with Silt and Gravel (SW-SM). Loose, few gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, no odor, broken rock at 15.25' bgs. (DPT) | | |
| Sandy Fat Clay (CH). Strong Brown (7.5YR 4/6), moist, stiff, high plasticity, some sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Reddish Yellow (7.5YR 6/6), loose, little gravel, fine to coarse gravel, | | |

WELL DETAILS

| DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|
| 0.19 | Top of Riser | 59.76 |
| 0.0 | Ground Surface | 59.95 |

WELL CONSTRUCTION DETAILS

RISER CASING
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **0.194 ft bgs - 57 ft bgs**

GROUT
Type: **Portland cement w/ bent.**
Interval: **0 ft bgs - 53 bgs**

SEAL
Type: **3/8" bentonite chips**
Interval: **53 ft bgs - 55 ft bgs**

SANDPACK
Type: **20-30 mesh silica sand**
Interval: **55 ft bgs - 68 ft bgs**

SCREEN
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **57 ft bgs - 67 ft bgs**

D.T.W. (ft. b.G.S): **59.52**
Date: **4/13/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **57.75**
Date: **6/22/2022**
Event: **GW Sampling**

LEGEND
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VWFS-PFAS-MW02**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\BOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **60.0**
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| angular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor, at 18.5-18.75' interbedded with sandy fat clay (CH) 7.5YR 5/6 high plasticity and toughness, no dilatency, rock at 18.5' above SC layer, rock at 19.25' bgs. (DPT) | 20 | | | | | | |
| Sandy Fat Clay (CH). Strong Brown (7.5YR 5/8), stiff, high plasticity, some sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | | | | | | | |
| Clayey Sand (SC). Reddish Yellow (7.5YR 6/6), medium dense, trace gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | | | | | | | |
| Fat Clay with Sand (CH). Yellowish Brown (10YR 5/8), moist, stiff, high plasticity, few sand, fine to medium sand, angular sand, little silt, no odor. (DPT) | 25 | | | | | | |
| No Recovery. (NR) | 30 | | | | | | |
| Clayey Sand (SC). Brownish Yellow (10YR 6/6), medium dense, trace gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, few clay, no odor. (DPT) | | | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Yellowish Brown (10YR 5/8) with color change to brownish yellow (10YR 6/8), moist, loose, little gravel, fine gravel, angular gravel, fine to coarse sand, angular to subangular sand, little silt, little clay, no odor. (DPT) | 35 | | | | | | |
| Clayey Sand with Gravel (SC). Strong Brown (7.5YR 5/8), moist, medium dense, little gravel, fine gravel, angular to subangular gravel, fine to coarse sand, angular to subangular sand, some clay, no odor. (DPT) | | | | | | | |
| Fat Clay with Sand (CH). Yellowish Brown (10YR 5/8), mottled with light brownish gray (2.5Y 6/2) and dark grayish brown (10YR 4/2), moist, very stiff, high plasticity, little sand, fine to coarse sand, angular to subangular sand, no odor. (DPT) | 40 | | | | | | |
| Well Graded Sand with Silt and Gravel (SW-SM). Light Olive Brown (2.5Y 5/4), dense to very dense, few gravel, fine | | | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VWFS-PFAS-MW02**

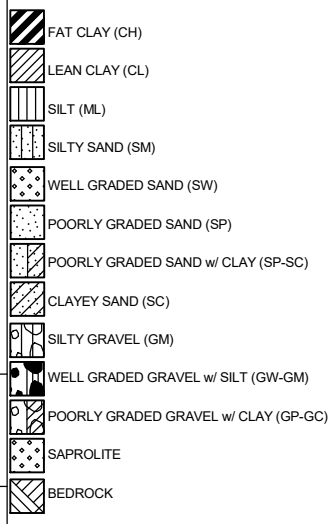


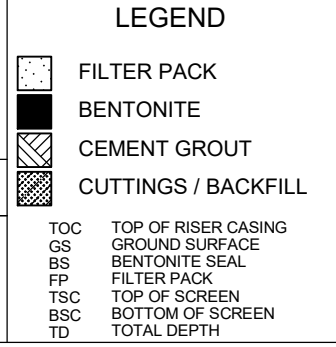
2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **60.0**
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| gravel, angular gravel, fine to coarse sand, angular to subangular sand, few silt, no odor, bottom of borehole very hard drilling, last few feet believed to be pulverized bedrock. (DPT) | | | | | | | |
| Logged by auger cuttings. (HSA) | | | | | | | |
| | | | | 53.0 | | 6.95 | |
| | | | | 55.0 | BS | 4.95 | |
| | | | | 67.0 | BSC | -7.05 | |
| | | | | 68.0 | FP | -8.05 | |




ch2m

**COMPLETION REPORT OF**
**WELL No. VWFS-PFAS-MW02**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VWMP-PFAS-MW01 / VWMP-PFAS-SO01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **45.25**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **762322.9**
EASTING: **971734.2**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **March 24, 2022**

LOGGED BY: **B. Davis & I. Dinelman**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) |
|---|---|
| Well Graded Sand with Silt (SW-SM). Dark Yellowish Brown (10YR 4/4), surface soils rich organic roots and grasses, moist, no odor. (DPT) | 0 |
| Silty Sand (SM). Brown (10YR 4/3), some organics, no odor. (DPT) | |
| Sandy Fat Clay (CH). Yellowish Brown (10YR 5/6), transitions to Light Olive Brown (2.5Y 5/4) and Very Dark Grayish Brown (10YR 3/2), crushed rock at 3.25 ft bgs and a clayey sand from rock base to ~3.5 feet bgs, fat clay from 3.5 - 4.0 ft bgs, no odor. (DPT) | 5 |
| Fat Clay with Sand (CH). Strong Brown (7.5YR 4/6), moist, no odor. (DPT) | |
| Well Graded Sand with Silt (SW-SM). Strong Brown (7.5YR 5/8), moist, no odor. (DPT) | |
| Fat Clay (CH). Strong Brown (7.5YR 4/6) transitions to Very Dark Grayish Brown (10YR 3/2), no odor. (DPT) | |
| Clayey Sand (SC). Dark Yellowish Brown (10YR 4/4), no odor. (DPT) | |
| Welll Graded Sand with Silt and Gravel (SW-SM). Moist, no odor. (DPT) | |
| Fat Clay with Sand (CH). Strong Brown (7.5YR 5/6), no odor. (DPT) | 10 |
| Clayey Sand (SC). Strong Brown (7.5YR 4/6), no odor. (DPT) | |
| Well Graded Sand with Silt and Gravel (SW-SM). Olive Brown (2.5Y 4/3) transitions to Strong Brown (7.5YR 5/6), crushed rock at ~11.25 ft bgs, no odor. (DPT) | |
| Clayey Sand (SC). Dark Yellowish Brown (10YR 4/6), moist, no odor. (DPT) | |
| Well Graded Sand with Silt and Gravel (SW-SM). Yellowish Brown (10YR 5/6) transitions to Brown (10YR 4/3), Grayish Brown (2.5Y 5/2), Yellowish Brown (10YR 5/6), broken rock at 12.5 ft bgs, no odor. (DPT) | 15 |
| Fat Clay with Sand (CH). Dark Yellowish Brown (10YR 4/6), moist, no odor. (DPT) | |

| WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|
| | -2.83 | Top of Riser | 48.07 |
| | 0.0 | Ground Surface | 45.25 |
| | 0.0 | | 45.25 |

WELL CONSTRUCTION DETAILS

RISER CASING
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **2.80 ft ags - 42 ft bgs**

GROUT
Type: **Portland cement w/ bent.**
Interval: **0 ft bgs - 34.5 ft bgs**

SEAL
Type: **3/8" bentonite chips**
Interval: **34.5 ft bgs - 39.5 ft bgs**

SANDPACK
Type: **20-30 mesh silica sand**
Interval: **39.5 ft bgs - 53 ft bgs**

SCREEN
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **42 ft bgs - 52 ft bgs**

D.T.W. (ft. b.G.S): **44**
Date: **3/24/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **47.73**
Date: **7/9/2022**
Event: **GW Sampling**

LEGEND
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VWMP-PFAS-MW01 / VWMP-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **45.2**
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| Sandy Fat Clay (CH). Fat clay with alternating beds of higher percentages of well graded sands, moist, no odor. (DPT) | 20 | | | | | | |
| Silty Sand (SM). No odor. (DPT) | | | | | | | |
| Clayey Sand with Gravel (SC). Light Yellowish Brown (10YR 6/4), dry, no odor. (DPT) | | | | | | | |
| Fat Clay (CH). Strong Brown (7.5YR 5/8), moist, no odor. (DPT) | 25 | | | | | | |
| Clayey Sand with Gravel (SC). Yellowish Brown (10YR 5/6), moist, no odor. (DPT) | | | | | | | |
| Fat Clay (CH). Yellowish Brown (10YR 5/8) transitions to Very Dark Grayish Brown (10YR 3/2), Brown (10YR 4/3), Light Yellowish Brown (2.5Y 6/3), fat clay transitions to a fat clay with sand at 28.25 ft bgs and a sandy fat clay at 28.5 ft bgs, gravel within the fat clay is encountered at ~28.75 ft bgs. The clay becommes mottled at 29.25 ft bgs, moist, no odor. (DPT) | | | | | | | |
| Sandy Fat Clay (CH). Light Yellowish Brown (10YR 6/4), no odor. (DPT) | 30 | | | | | | |
| Fat Clay (CH). Very Dark Grayish Brwn (10YR 3/2), thick layer of fat clay, transitioning to fat clay with sand. Interbedded with SW-SM in layers <0.5 ft thickness at 39.0 ft bgs and 43.0 ft bgs, no odor. (DPT) | | | | 34.5 | | 10.75 | |
| | 35 | | | | | | |
| | | | | 39.5 | BS | 5.75 | |
| | 40 | | | | | | |
| Poorly Graded Sand with Silt (SP-SM). Yellowish Brown (10YR 5/6), moist. (DPT) | | | | | | | |
| Well Graded Sand with Silt (SW-SM). Yellowish Brown | | | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VWMP-PFAS-MW01 / VWMP-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **45.2**
LOGGED BY: **B. Davis & I. Dine**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| (10YR 5/4) transitions to Yellowish Brown (10YR 5/8), Olive Yellow (2.5Y 6/6), Olive Brown (2.5Y 4/3), Pale Yellow (2.5Y 7/4), Very Dark Grayish (2.5Y 3/2), Olive Yellow (2.5Y 6/6), sample taken from 44 - 46 ft bgs at groundwater interface and all soil from 44 - 45 ft bgs was used before logged. No logging information from 44 - 45 ft bgs. Some soil remains for logging 45 - 46 ft bgs. A 1.25 inch clayey sand layer (SC) is at ~46.5 ft bgs (10YR 5/8), wet, no odor. (DPT) | 50 | | | 52.0<br>53.0 | BSC<br>FP | -6.75<br>-7.75 | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VWMP-PFAS-MW01 / VWMP-PFAS-SO01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VWMP-PFAS-MW02

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **42.07**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **762433.5**
EASTING: **971594.9**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **April 5, 2022**

LOGGED BY: **C. Reed**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|---|
| | | | | **0.19** | Top of Riser | **41.89** |
| | | | | **0.0** | Ground Surface | **42.07** |
| Silty Sand (SM). Dry, dense, stiff, some sand, fine to coarse sand, subrounded sand, some silt, some clay, no odor. (DPT) | 0 | | | | | |
| | 5 | | | | | |
| Sandy Silt (ML). Yellowish Red (5YR 5/8), dry, medium dense, stiff, trace gravel, fine gravel, subangular gravel, some sand, fine to coarse sand, subangular sand, some silt, some clay, no odor. (DPT) | 10 | | | | | |
| Sandy Lean Clay (CL). Reddish Yellow (5YR 7/8), dry, medium dense, stiff, trace gravel, fine gravel, subangular gravel, some sand, fine to coarse sand, subangular sand, some clay, no odor. (DPT) | 15 | | | | | |

WELL CONSTRUCTION DETAILS

RISER CASING
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **.188 ft bgs - 39 ft bgs**

GROUT
Type: **Portland cement w/ bent.**
Interval: **0 ft bgs - 35 ft bgs**

SEAL
Type: **3/8" bentonite chips**
Interval: **35 ft bgs - 37 ft bgs**

SANDPACK
Type: **20-30 mesh silica sand**
Interval: **37 ft bgs - 50 ft bgs**

SCREEN
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **39 ft bgs - 49 ft bgs**

D.T.W. (ft. b.G.S):
Date:
Event:

D.T.W. (ft. b.T.O.C): **40.58**
Date: **7/9/2022**
Event: **GW Sampling**

LEGEND
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VWMP-PFAS-MW02**

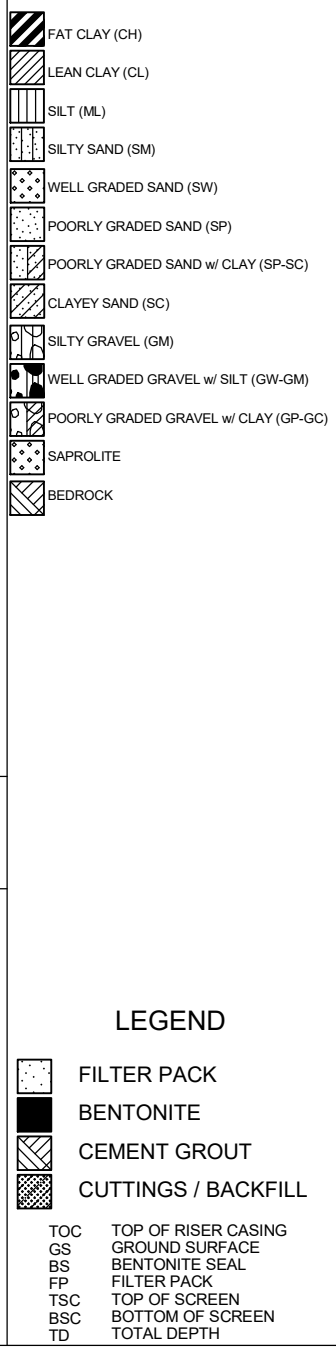


2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **42.1**
LOGGED BY: **C. Reed**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| Clayey Sand (SC). Reddish Yellow (5YR 6/8), moist, loose, some sand, fine to coarse sand, subangular sand, few clay, no odor. (DPT) | 20 | | | | | | |
| Lean Clay with Sand (CL). Reddish Yellow (7.5YR 7/6), moist, dense, stiff, little sand, fine to coarse sand, subangular sand, some clay, no odor. (DPT) | 25 | | | | | | |
| Sandy Lean Clay with Gravel (CL). Reddish Brown (5YR 5/4), moist, very stiff, little gravel, fine gravel, subangular gravel, few sand, fine to coarse sand, subangular sand, some clay, no odor. (DPT) | 30 | | | | | | |
| | 35 | | | 35.0 | | 7.07 | |
| | | | | 37.0 | BS | 5.07 | |
| No Recovery. (NR) | 40 | | | | | | |




2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

ch2m

**COMPLETION REPORT OF**
**WELL No. VWMP-PFAS-MW02**

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **42.1**
LOGGED BY: **C. Reed**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| Lean Clay (CL). Light Reddish Brown (5YR 6/3), medium, little sand, fine to medium sand, subangular sand, some clay, no odor. (DPT) | 50 | | | 49.0<br>50.0 | BSC<br>FP | -6.93<br>-7.93 | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VWMP-PFAS-MW02**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VWMP-PFAS-MW03

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **37.47**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **762602.7**
EASTING: **971664.3**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **DPT & HSA**
DATE COMPLETED: **April 1, 2022**

LOGGED BY: **B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL |
|---|---|---|
| Silty Sand (SM). Reddish Brown (2.5YR 4/3), dry, loose, trace gravel, coarse gravel, angular to subangular gravel, fine sand, subrounded to rounded sand, few silt, no odor, gravel, grass, and roots from 0-4". (DPT) | 0 | |
| Clayey Sand (SC). Brown (7.5YR 4/4), dry, loose, fine sand, little silt, few clay, no odor. (DPT) | | |
| Silty Sand (SM). Brown (7.5YR 5/4) mottled with White (7.5YR 8/1), dry, loose, fine sand, subrounded sand, few silt, trace clay, no odor. (DPT) | 5 | |
| Poorly Graded Sand (SP). Strong Brown (7.5YR 5/6), dry, very loose, fine to medium sand, subrounded to rounded sand, little silt, no odor. (DPT) | 10 | |
| Lean Clay with Sand (CL). Brown (7.5YR 4/4) mottled with Black (7.5YR 2/1) and White (7.5YR 8/1), dry, medium, low plasticity, trace sand, medium sand, angular sand, no odor. (DPT) | 15 | |
| Lean Clay (CL). Yellowish Red (5YR 4/6), dry, soft, medium plasticity, trace gravel, fine to coarse gravel, subangular gravel, trace sand, fine to coarse sand, subangular to | | |

WELL DETAILS

| DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|
| **-2.87** | Top of Riser | **40.34** |
| **0.0** | Ground Surface | **37.47** |
| 0.0 | | 37.47 |

WELL CONSTRUCTION DETAILS

RISER CASING
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **2.866 ft ags - 36 ft bgs**

GROUT
Type: **Portland cement w/ bent.**
Interval: **0 ft bgs - 32 ft bgs**

SEAL
Type: **3/8" bentonite chips**
Interval: **32 ft bgs - 34 ft bgs**

SANDPACK
Type: **20-30 mesh silica sand**
Interval: **34 ft bgs - 47 ft bgs**

SCREEN
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **36 ft bgs - 46 ft bgs**

D.T.W. (ft. b.G.S): **37**
Date: **4/1/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **39.33**
Date: **7/9/2022**
Event: **GW Sampling**

LEGEND
- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VWMP-PFAS-MW03**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **37.5**
LOGGED BY: **B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| subrounded sand, no odor, 2" poorly sorted sand and gravel lenses interbedded with lean clay. (DPT) | 20 | | | | | | |
| Fat Clay (CH). Strong Brown (7.5YR 4/6), moist, very soft, high plasticity, no odor. (DPT) | 25 | | | | | | |
| Clayey Sand (SC). Strong Brown (7.5YR 4/6) mottled with Black (7.5YR 2/1), dry, loose, no plasticity, few clay, dark round 2-3 mm nodules in strong brown clayey matrix (chocolate chip cookie). (DPT) | 30 | | | | | | |
| Fat Clay (CH). Brown (7.5YR 4/4) mottled with Light Greenish Gray (10Y 7/1), dry, soft, high plasticity, no odor. (DPT) | 35 | | | 32.0<br>34.0 | <br>BS | 5.47<br>3.47 | |
| Poorly Graded Sand (SP). Wet, loose, trace coarse gravel, subangular gravel, fine sand, subrounded sand, little silt. (DPT) | | | | | | | |
| Silty Sand with Gravel (SM). Wet, medium dense, few gravel, fine to coarse gravel, angular to subangular gravel, fine sand, subrounded to rounded sand, little silt, no odor. (DPT) | 40 | | | | | | |
| Well Graded Sand (SW). Yellowish Brown (10YR 5/4), wet, very loose, medium to coarse sand, subangular sand, little silt, no odor. (DPT) | | | | | | | |
| Clayey Sand with Gravel (SC). Strong Brown (7.5YR 4/6) mottled with White (7.5YR 8/1), medium dense, some gravel, fine gravel, coarse sand, angular sand, few clay, no odor. (DPT) | | | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

# COMPLETION REPORT OF WELL No. VWMP-PFAS-MW03



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **37.5**
LOGGED BY: **B. Davis**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | STRATA DEPTH (ft.) | STRATA SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| | | | | 46.0 | BSC | -8.53 | STRATA |
| | | | | 47.0 | FP | -9.53 | FAT CLAY (CH)<br>LEAN CLAY (CL)<br>SILT (ML)<br>SILTY SAND (SM)<br>WELL GRADED SAND (SW)<br>POORLY GRADED SAND (SP)<br>POORLY GRADED SAND w/ CLAY (SP-SC)<br>CLAYEY SAND (SC)<br>SILTY GRAVEL (GM)<br>WELL GRADED GRAVEL w/ SILT (GW-GM)<br>POORLY GRADED GRAVEL w/ CLAY (GP-GC)<br>SAPROLITE<br>BEDROCK |

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VWMP-PFAS-MW03**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

# COMPLETION REPORT OF WELL No. VWS7-PFAS-MW01

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION (ft.): **68.30**
HORIZONTAL DATUM: **NAD 83**
VERTICAL DATUM: **PRVD02**
NORTHING: **760255.8**
EASTING: **967612.2**

DRILLING CONTRACTOR: **GeoEnviroTech**
DRILLING METHOD: **HSA & Air Rotary**
DATE COMPLETED: **May 19, 2022**

LOGGED BY: **C. Dronfield**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) |
|---|---|---|---|---|---|---|
| | | | | **-2.67** | Top of Riser | **70.97** |
| | | | | **0.0** | Ground Surface | **68.30** |
| Silt (ML). Brown (7.5YR 5/4) until 3.0' then color change to Pale Brown (10YR 6/3), dry, very soft, no odor. (HSA) | 0 | | | 0.0 | | 68.30 |
| Silt (ML). Light Brownish Gray (2.5Y 6/2), dry, very soft, no odor. (HSA) | 5 | | | | | |
| Gravelly Silt (ML). Light Brownish Gray (2.5Y 6/2), dry, some gravel, subangular to subrounded gravel, no odor. (HSA) | 10 | | | | | |
| Silt (ML). Dry, very stiff, trace gravel, fine gravel, subrounded gravel, no odor. (HSA) | 15 | | | | | |
| Gravelly Silt (ML). Dry, very stiff, some gravel, fine gravel, subangular gravel, no odor. (HSA) | | | | | | |

### WELL CONSTRUCTION DETAILS

**RISER CASING**
Diameter: **2-in.**
Type: **Sch 40 PVC**
Interval: **2.667 ft ags - 66 ft bgs**

**GROUT**
Type: **Portland cement**
Interval: **0 ft bgs - 61 ft bgs**

**SEAL**
Type: **3/8" bentonite chips**
Interval: **61 ft bgs - 63 ft bgs**

**SANDPACK**
Type: **20-30 mesh silica sand**
Interval: **63 ft bgs - 76 ft bgs**

**SCREEN**
Diameter: **2-in.**
Type: **0.010 factory slotted**
Interval: **66 ft bgs - 76 ft bgs**

D.T.W. (ft. b.G.S): **66.70**
Date: **5/19/2022**
Event: **Drilling**

D.T.W. (ft. b.T.O.C): **69.80**
Date: **7/9/2022**
Event: **GW Sampling**

**LEGEND**

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF WELL No. VWS7-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **68.3**
LOGGED BY: **C. Dronfield**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| Poorly Graded Gravel with Clay (GP-GC): Dark Yellowish Brown (10YR 3/4), dry, very stiff, medium plasticity, coarse gravel, angular gravel, no odor, saprolite - weathered bedrock with brown clay. (HSA)<br>Saprolite, gray, dry, dust and very small (1mm) weathered rock chips produced by air rotary method, no odor. (Air Rotary) | 20<br>25 | | | | | | |
| Bedrock, granodiorite, dark gray with white quartz, dry, very loose. (Air Rotary) | 30<br>35<br>40 | | | | | | |

STRATA

- FAT CLAY (CH)
- LEAN CLAY (CL)
- SILT (ML)
- SILTY SAND (SM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- POORLY GRADED SAND w/ CLAY (SP-SC)
- CLAYEY SAND (SC)
- SILTY GRAVEL (GM)
- WELL GRADED GRAVEL w/ SILT (GW-GM)
- POORLY GRADED GRAVEL w/ CLAY (GP-GC)
- SAPROLITE
- BEDROCK

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VWS7-PFAS-MW01**

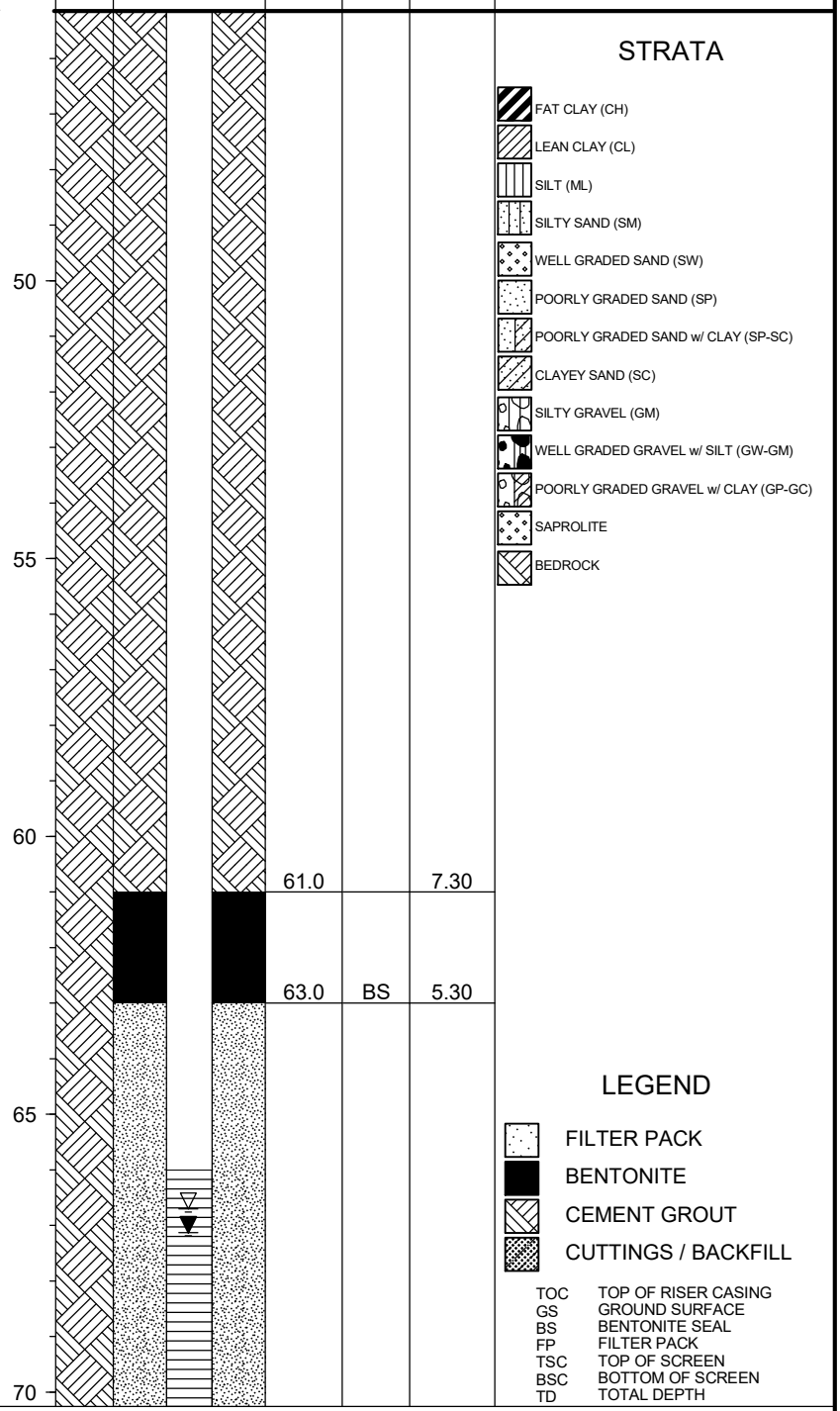


2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **68.3**
LOGGED BY: **C. Dronfield**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| | | | | 61.0 | | 7.30 | |
| | | | | 63.0 | BS | 5.30 | |




ch2m

**COMPLETION REPORT OF**
**WELL No. VWS7-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\IBASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

PROJECT: **Basewide PFAS Facility Assessment**
PROJECT NO: **675884CH**
PROJECT LOCATION: **Vieques NASD and VNTR, Puerto Rico**

GROUND SURFACE ELEVATION: **68.3**
LOGGED BY: **C. Dronfield**
CHECKED BY: **T. Stewart**

| STRATA DESCRIPTION | DEPTH (ft.) | SYMBOL | WELL DETAILS | DEPTH (ft.) | | ELEVATION (ft.) | WELL CONSTRUCTION DETAILS |
|---|---|---|---|---|---|---|---|
| | | | | | | | (See Page 1) |
| | 75 | | | 76.0 | FP<br>BSC | -7.70 | STRATA<br>FAT CLAY (CH)<br>LEAN CLAY (CL)<br>SILT (ML)<br>SILTY SAND (SM)<br>WELL GRADED SAND (SW)<br>POORLY GRADED SAND (SP)<br>POORLY GRADED SAND w/ CLAY (SP-SC)<br>CLAYEY SAND (SC)<br>SILTY GRAVEL (GM)<br>WELL GRADED GRAVEL w/ SILT (GW-GM)<br>POORLY GRADED GRAVEL w/ CLAY (GP-GC)<br>SAPROLITE<br>BEDROCK |
| | 80 | | | 80.0 | | -11.70 | |

LEGEND

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS / BACKFILL

| | |
|---|---|
| TOC | TOP OF RISER CASING |
| GS | GROUND SURFACE |
| BS | BENTONITE SEAL |
| FP | FILTER PACK |
| TSC | TOP OF SCREEN |
| BSC | BOTTOM OF SCREEN |
| TD | TOTAL DEPTH |

ch2m

**COMPLETION REPORT OF**
**WELL No. VWS7-PFAS-MW01**



2 - LOG A EWNL02.GDT - 3/22/23 15:39 - \\WBOFPP01\PROJ\CLEAN\BASES\VIEQUES\PFAS INFO\PFAS_SI_REPORT\1_PRE-DRAFT\4_APPENDIX\OLD\0_BACKGROUND FILES FOR APPENDIX\VIEQUES_BW_MW_WCD.GPJ

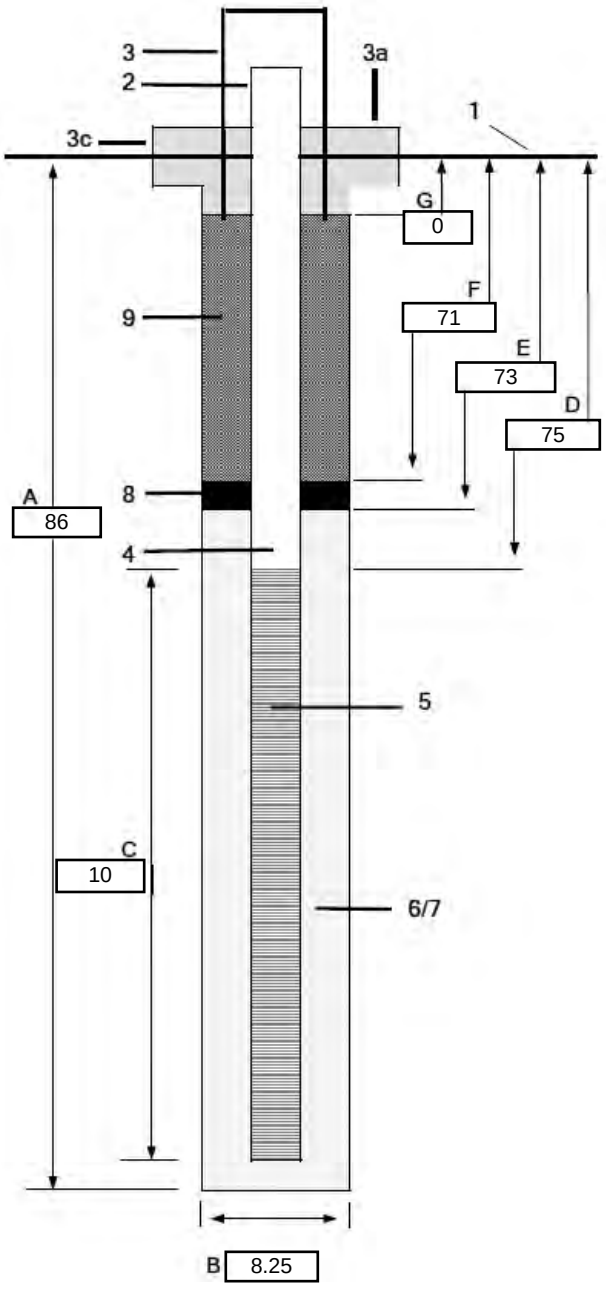
# Well Construction Diagrams

| Jacobs | PROJECT NUMBER: 675884CH.FI.PF | WELL NUMBER: VWAB-PFAS-MW01 |
|---|---|---|

# WELL COMPLETION DIAGRAM

**PROJECT:** PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico
**INSTALLATION:** VIEQUES_WEST
**SITE:** AOC B
**LOGGER:** Christopher Reed
**DRILLING CONTRACTOR:** GeoEnviroTech ,

**DRILLING METHOD AND EQUIPMENT USED:** Air Rotary,
**OUTER DIA: INNER DIA:**
**WATER LEVEL:** 54.5 (ft bgs)
**TOTAL WELL DEPTH:** 85 (ft)
**START:** April 14, 2022 **END:** April 14, 2022




Single Well Above Ground Surface

1 – **Ground elevation at well:** TBD

2 – **Top of casing elevation**: TBD

3 – **Wellhead Cover:** 3.5 **(ft)**, Steel, Riser - casing that is above the ground surface
a) **Concrete Pad Length (ft**): 0
b) **Concrete Pad Width (ft):** 0
c) **Concrete Pad Depth (ft):** 0

4 – **Well Casing (in):** 2 / Schedule 40 PVC

5 – **Well Screen (in):** 0.01 / Factory slotted

6/7 – **Type screen filter**: 20/30 grade (Standard Sand & Silica, Davenport, FL)
a) **Quantity:** 8 - 50 lb bags

8 – **Type of seal (in):** 3/8" sodium bentonite chips (PDS, El Dorado, AR)
a) **Quantity:** 1 - 50 lb bag

9 – **Grout Mixture**: Portland cement with bentonite
**Amount of Cement Used:** 22 - 50 lb bags
a) **Amount of bentonite used:** 20
b) **Amount of water used:** 50
c) **Method of placement:** Poured from land surface
d) **Vol. of well casing grout:** 105

10 – **End Cap**: Schedule 40 PVC, 3 **(in)**, Cone

**Comments:**

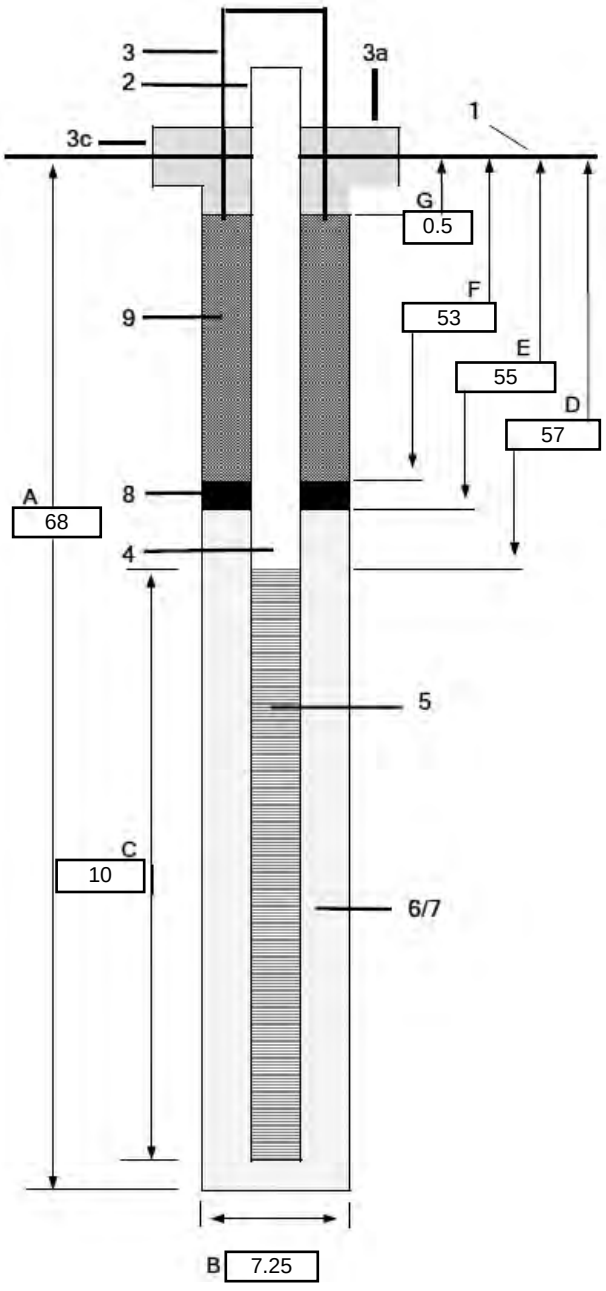
A= Boring Depth (feet)
B= Borehole Diameter (inches)
C= Length of Screen (feet)
D= Depth to Top of Screen (feet)
E= Top of Sand Pack (feet)
F= Top of Annular Seal (feet)
G= Top of Grout Seal (feet)

| Jacobs | PROJECT NUMBER: 675884CH.FI.PF | WELL NUMBER: VWFS-PFAS-MW02 |
|---|---|---|

# WELL COMPLETION DIAGRAM

**PROJECT:** PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico
**INSTALLATION:** VIEQUES_WEST
**SITE:** Former NASD Fire Station Area
**LOGGER:** Christopher Reed
**DRILLING CONTRACTOR:** GeoEnviroTech ,

**DRILLING METHOD AND EQUIPMENT USED:** Hollow Stem Auger,
**OUTER DIA:** 7.25 **INNER DIA:** 4.25
**WATER LEVEL:** 59.52 (ft bgs)
**TOTAL WELL DEPTH:** 67 (ft)
**START:** April 13, 2022 **END:** April 13, 2022




Single Well Below Ground Surface

1 – **Ground elevation at well:** TBD

2 – **Top of casing elevation**: TBD

3 – **Wellhead Cover:** 0 **(ft)**, Steel, Flush Mounted
a) **Concrete Pad Length (ft**): 2
b) **Concrete Pad Width (ft):** 2
c) **Concrete Pad Depth (ft):** 0.33

4 – **Well Casing (in):** 2 / Schedule 40 PVC

5 – **Well Screen (in):** 0.01 / Factory slotted

6/7 – **Type screen filter**: 20/30 grade (Standard Sand & Silica, Davenport, FL)
a) **Quantity:** 8.5 - 50 lb bags

8 – **Type of seal (in):** 3/8" sodium bentonite chips (PDS, El Dorado, AR)
a) **Quantity:** 1 - 50 lb bag

9 – **Grout Mixture**: Portland cement with bentonite
**Amount of Cement Used:** 20 - 50 lb bags
a) **Amount of bentonite used:** 24
b) **Amount of water used:** 80
c) **Method of placement:** Poured from land surface
d) **Vol. of well casing grout:** 102

10 – **End Cap**: Schedule 40 PVC, 3 **(in)**, Cone

**Comments:**

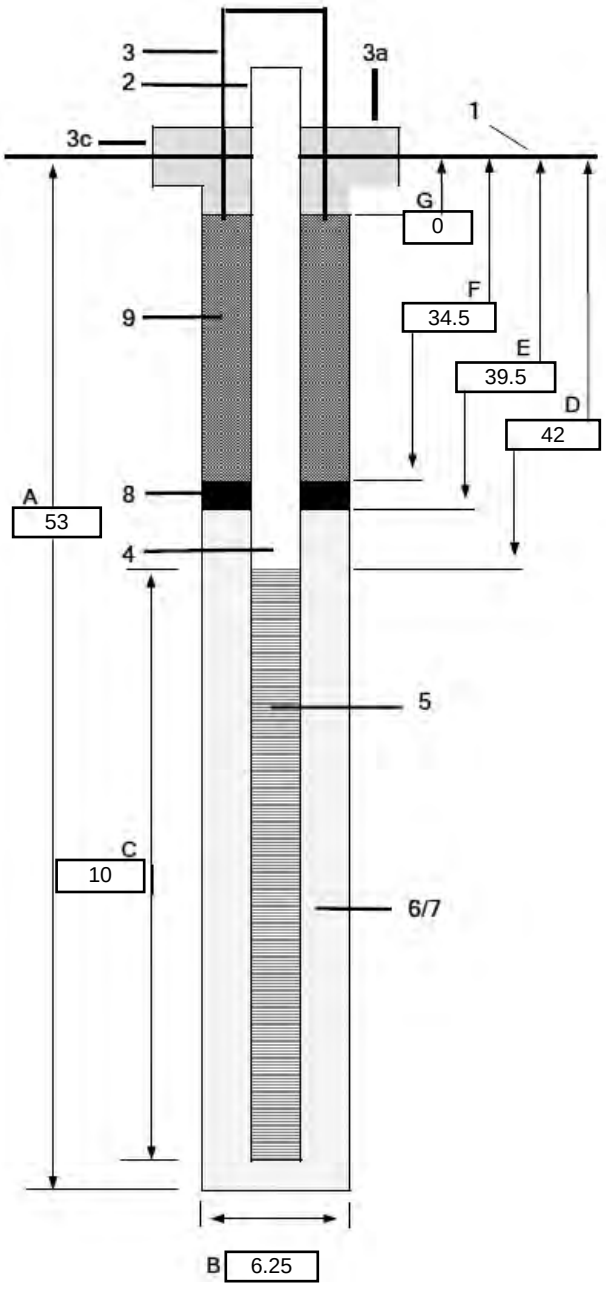
A= Boring Depth (feet)
B= Borehole Diameter (inches)
C= Length of Screen (feet)
D= Depth to Top of Screen (feet)
E= Top of Sand Pack (feet)
F= Top of Annular Seal (feet)
G= Top of Grout Seal (feet)

| | | |
|---|---|---|
| Jacobs | **PROJECT NUMBER: 675884CH.FI.PF** | **WELL NUMBER: VWMP-PFAS-MW01** |

# WELL COMPLETION DIAGRAM

**PROJECT:** PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico
**INSTALLATION:** VIEQUES_EAST
**SITE:** NASD Motor Pool
**LOGGER:** Beth Davis
**DRILLING CONTRACTOR:** GeoEnviroTech,

**DRILLING METHOD AND EQUIPMENT USED:** Direct Push, Hollow Stem Auger,
**OUTER DIA:** 6 **INNER DIA:** 4
**WATER LEVEL:** 44 (ft bgs)
**TOTAL WELL DEPTH:** 52 (ft)
**START:** March 28, 2022 **END:** March 28, 2022




Single Well Above Ground Surface

1 – **Ground elevation at well:** TBD

2 – **Top of casing elevation**: TBD

3 – **Wellhead Cover:** 3.5 **(ft)**, Steel, Riser - casing that is above the ground surface
a) **Concrete Pad Length (ft**): 2
b) **Concrete Pad Width (ft):** 2
c) **Concrete Pad Depth (ft):** 0.5

4 – **Well Casing (in):** 2 / Schedule 40 PVC

5 – **Well Screen (in):** 0.01 / Factory slotted

6/7 – **Type screen filter**: 20-30
a) **Quantity:** 6.5 - 50 lbs bag

8 – **Type of seal (in):** Bentonite chips
a) **Quantity:** 0.5 - 50 lbs bag

9 – **Grout Mixture**: Portland cement with bentonite
**Amount of Cement Used:** 15 -50 lbs
a) **Amount of bentonite used:** 15
b) **Amount of water used:** 80
c) **Method of placement:** Pour from land surface
d) **Vol. of well casing grout:** 80

10 – **End Cap**: Schedule 40 PVC, 3 **(in)**, Cone

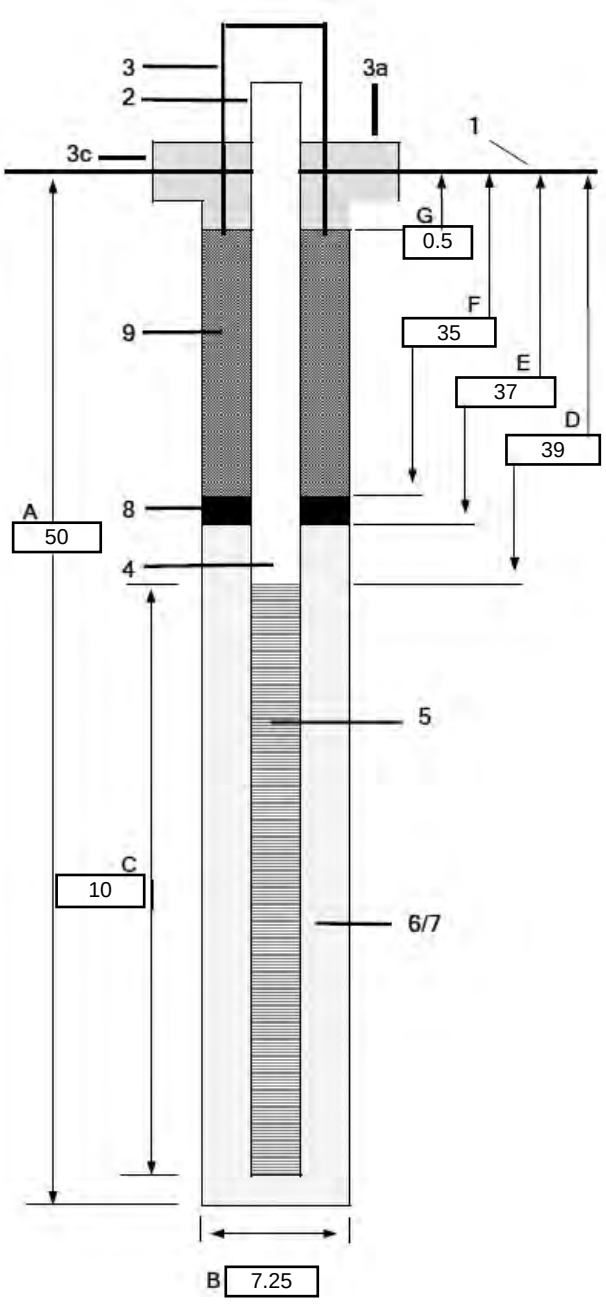
**Comments:**

A= Boring Depth (feet)
B= Borehole Diameter (inches)
C= Length of Screen (feet)
D= Depth to Top of Screen (feet)
E= Top of Sand Pack (feet)
F= Top of Annular Seal (feet)
G= Top of Grout Seal (feet)

| Jacobs | PROJECT NUMBER: 675884CH.FI.PF | WELL NUMBER: VWMP-PFAS-MW02 |
|---|---|---|
| | **WELL COMPLETION DIAGRAM** | |

**PROJECT:** PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico
**INSTALLATION:** VIEQUES_WEST
**SITE:** Former NASD Motor Pool Area
**LOGGER:** Christopher Reed
**DRILLING CONTRACTOR:** GeoEnviroTech ,

**DRILLING METHOD AND EQUIPMENT USED:** Hollow Stem Auger,
**OUTER DIA:** 7.25 **INNER DIA:** 4.25
**WATER LEVEL:** 43 (ft bgs)
**TOTAL WELL DEPTH:** 49 (ft)
**START:** April 8, 2022 **END:** April 8, 2022




Single Well Below Ground Surface

1 – **Ground elevation at well:** TBD

2 – **Top of casing elevation**: TBD

3 – **Wellhead Cover:** 0.33 **(ft)**, Steel, Flush Mounted
a) **Concrete Pad Length (ft**): 2
b) **Concrete Pad Width (ft):** 2
c) **Concrete Pad Depth (ft):** 0.33

4 – **Well Casing (in):** 2 / Schedule 40 PVC

5 – **Well Screen (in):** 0.01 / Factory slotted

6/7 – **Type screen filter**: 20/30 grade (Standard Sand & Silica, Davenport, FL)
a) **Quantity:** 8 - 50 lb bags

8 – **Type of seal (in):** 3/8" sodium bentonite chips (PDS, El Dorado, AR)
a) **Quantity:** 1/2 - 50 lb bag

9 – **Grout Mixture**: Portland cement with bentonite
**Amount of Cement Used:** 16 - 50 lb bags
a) **Amount of bentonite used:** 21
b) **Amount of water used:** 63
c) **Method of placement:** Poured from land surface
d) **Vol. of well casing grout:** 84

10 – **End Cap**: Schedule 40 PVC, 3 **(in)**, Cone

**Comments:**

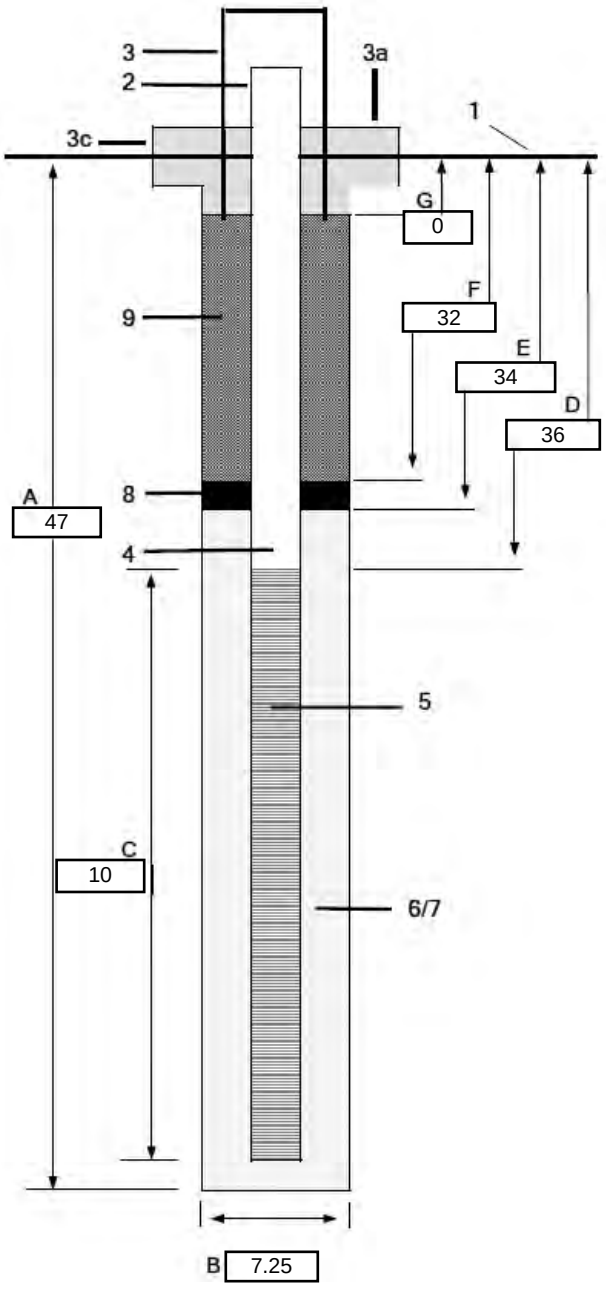
A= Boring Depth (feet)
B= Borehole Diameter (inches)
C= Length of Screen (feet)
D= Depth to Top of Screen (feet)
E= Top of Sand Pack (feet)
F= Top of Annular Seal (feet)
G= Top of Grout Seal (feet)

| Jacobs | PROJECT NUMBER: 675884CH.FI.PF | WELL NUMBER: VWMP-PFAS-MW03 |
|---|---|---|

# WELL COMPLETION DIAGRAM

**PROJECT:** PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico
**INSTALLATION:** VIEQUES_WEST
**SITE:** Former NASD Motor Pool Area
**LOGGER:** Christopher Reed
**DRILLING CONTRACTOR:** GeoEnviroTech ,

**DRILLING METHOD AND EQUIPMENT USED:** Hollow Stem Auger,
**OUTER DIA:** 7.25 **INNER DIA:** 4.25
**WATER LEVEL:** 36 (ft bgs)
**TOTAL WELL DEPTH:** 46 (ft)
**START:** April 5, 2022 **END:** April 5, 2022




Single Well Above Ground Surface

1 – **Ground elevation at well:** TBD

2 – **Top of casing elevation**: TBD

3 – **Wellhead Cover:** 3.5 **(ft)**, Steel, Riser - casing that is above the ground surface
a) **Concrete Pad Length (ft**): 0
b) **Concrete Pad Width (ft):** 0
c) **Concrete Pad Depth (ft):** 0

4 – **Well Casing (in):** 2 / Schedule 40 PVC

5 – **Well Screen (in):** 0.01 / Factory slotted

6/7 – **Type screen filter**: 20/30 grade (Standard Sand & Silica, Davenport, FL)
a) **Quantity:** 7 - 50 lb bags

8 – **Type of seal (in):** 3/8" sodium bentonite chips (PDS, El Dorado, AR)
a) **Quantity:** 1/2 - 50 lb bag

9 – **Grout Mixture**: Portland cement with bentonite
**Amount of Cement Used:** 14 - 50 lb bags
a) **Amount of bentonite used:** 18.75
b) **Amount of water used:** 40
c) **Method of placement:** Poured from land surface
d) **Vol. of well casing grout:** 85

10 – **End Cap**: Schedule 40 PVC, 3 **(in)**, Cone

**Comments:**

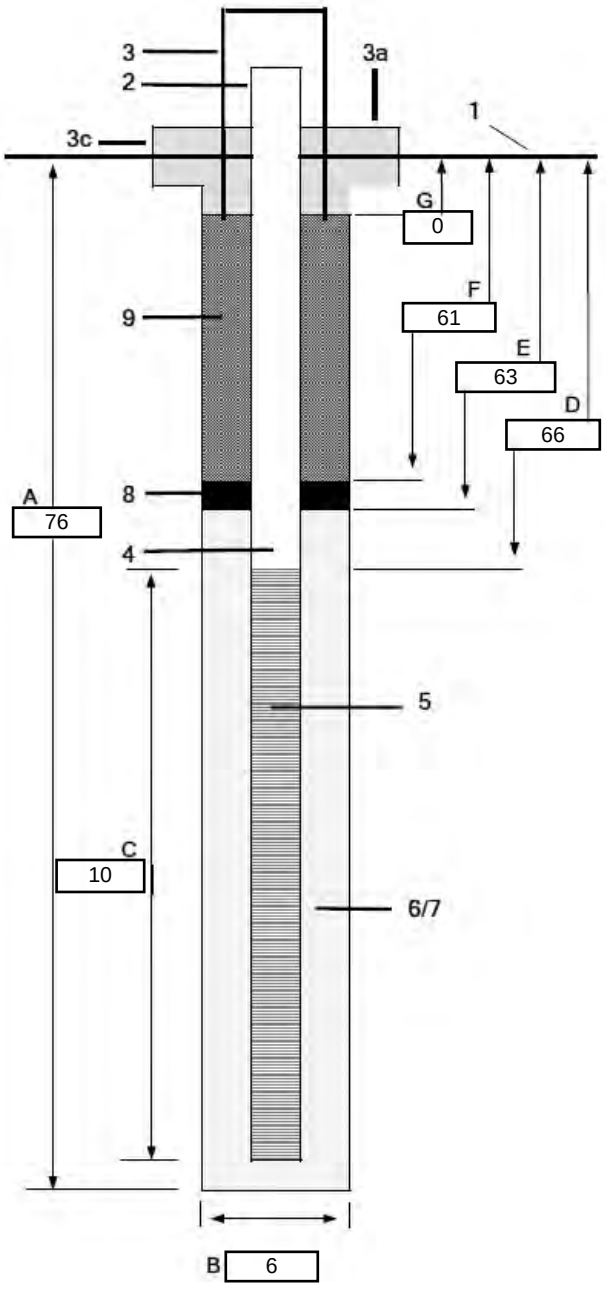
A= Boring Depth (feet)
B= Borehole Diameter (inches)
C= Length of Screen (feet)
D= Depth to Top of Screen (feet)
E= Top of Sand Pack (feet)
F= Top of Annular Seal (feet)
G= Top of Grout Seal (feet)

| Jacobs | PROJECT NUMBER: 675884CH.FI.PF | WELL NUMBER: VWS7-PFAS-MW01 |
|---|---|---|

# WELL COMPLETION DIAGRAM

**PROJECT:** PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico
**INSTALLATION:** VIEQUES_EAST
**SITE:** SWMU 7
**LOGGER:** Caitlin Dronfield, Tatum Magill
**DRILLING CONTRACTOR:** GeoEnviroTech,

**DRILLING METHOD AND EQUIPMENT USED:** AirRotary, HS
**OUTER DIA:** 8 **INNER DIA:** 6.25
**WATER LEVEL:** 66.7 (ft bgs)
**TOTAL WELL DEPTH:** 76 (ft)
**START:** May 19, 2022 **END:** May 19, 2022




Single Well Above Ground Surface

1 – **Ground elevation at well:** TBD

2 – **Top of casing elevation**: TBD

3 – **Wellhead Cover:** 2.62 **(ft)**, Steel, Riser - casing that is above the ground surface
a) **Concrete Pad Length (ft**): 0
b) **Concrete Pad Width (ft):** 0
c) **Concrete Pad Depth (ft):** 0

4 – **Well Casing (in):** 2 / Schedule 40 PVC

5 – **Well Screen (in):** 0.01 / Factory slotted

6/7 – **Type screen filter**: 20-30 Silica Sand, Edgar Minerals
a) **Quantity:** 8

8 – **Type of seal (in):** 3/8" bentonite chips, POS Plug
a) **Quantity:** 1

9 – **Grout Mixture**: Portland Cement - cemex concreto tipo 00
**Amount of Cement Used:** 18
a) **Amount of bentonite used:** 18 handfuls
b) **Amount of water used:** 60
c) **Method of placement:** Tremie/pour from surface
d) **Vol. of well casing grout:** 60

10 – **End Cap**: Schedule 40 PVC, 6 **(in)**, Flat

**Comments:**

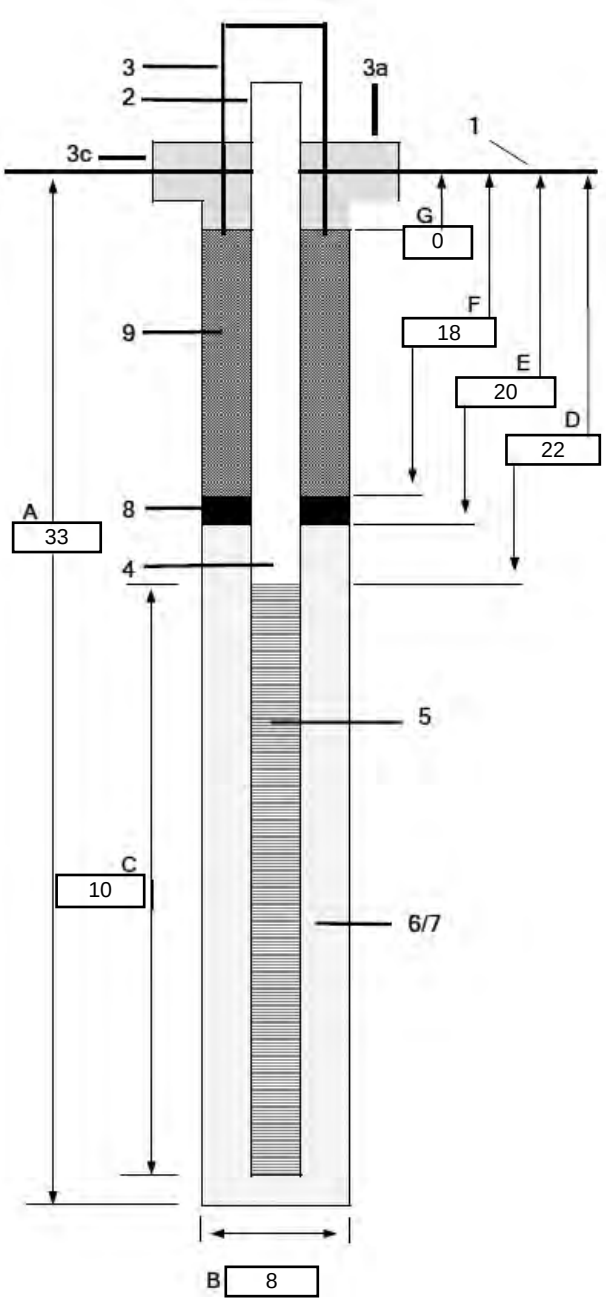
A= Boring Depth (feet)
B= Borehole Diameter (inches)
C= Length of Screen (feet)
D= Depth to Top of Screen (feet)
E= Top of Sand Pack (feet)
F= Top of Annular Seal (feet)
G= Top of Grout Seal (feet)

| Jacobs | PROJECT NUMBER: 675884CH.FI.PF | WELL NUMBER: VERW-PFAS-MW01 |
|---|---|---|

# WELL COMPLETION DIAGRAM

**PROJECT:** PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico
**INSTALLATION:** VIEQUES_EAST
**SITE:** VERW
**LOGGER:** Beth Davis, Micheal Tekle
**DRILLING CONTRACTOR:** GeoEnviroTech Inc.,

**DRILLING METHOD AND EQUIPMENT USED:** Hollow Stem Auger,
**OUTER DIA:** 8 **INNER DIA:** 4.25
**WATER LEVEL:** 26 (ft bgs)
**TOTAL WELL DEPTH:** 32 (ft)
**START:** February 24, 2022 **END:** February 24, 2022




Single Well Above Ground Surface

1 – **Ground elevation at well:** TBD

2 – **Top of casing elevation**: TBD

3 – **Wellhead Cover:** 3.5 **(ft)**, Steel, Riser - casing that is above the ground surface
a) **Concrete Pad Length (ft**): 2
b) **Concrete Pad Width (ft):** 2
c) **Concrete Pad Depth (ft):** 1

4 – **Well Casing (in):** 2 / Schedule 40 PVC

5 – **Well Screen (in):** 0.01 / Factory slotted

6/7 – **Type screen filter**: 20-30
a) **Quantity:** 6-50lb bags

8 – **Type of seal (in):** 3/8" bentonite chips
a) **Quantity:** 1/2-50lb bag

9 – **Grout Mixture**: Portland cement with bentonite
**Amount of Cement Used:** 8 - 47 lb bags
a) **Amount of bentonite used:**
b) **Amount of water used:**
c) **Method of placement:** Pour
d) **Vol. of well casing grout:** 20

10 – **End Cap**: Schedule 40 PVC, 4 **(in)**, Cone

**Comments:**

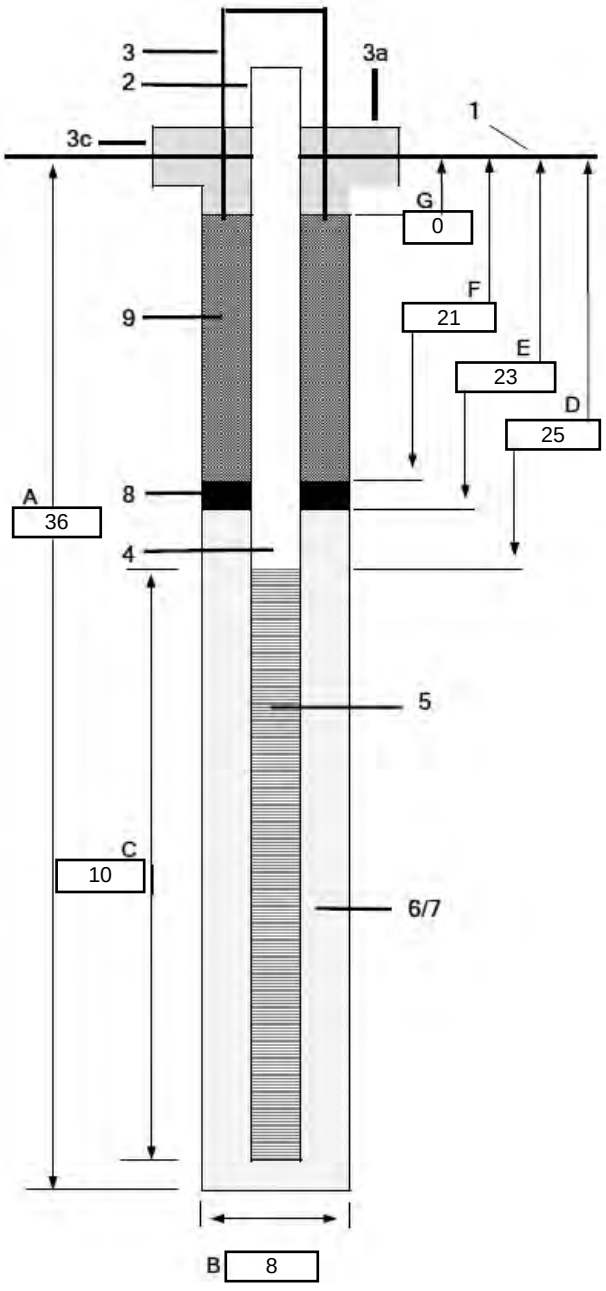
A= Boring Depth (feet)
B= Borehole Diameter (inches)
C= Length of Screen (feet)
D= Depth to Top of Screen (feet)
E= Top of Sand Pack (feet)
F= Top of Annular Seal (feet)
G= Top of Grout Seal (feet)

| Jacobs | PROJECT NUMBER: 675884CH.FI.PF | WELL NUMBER: VERW-PFAS-MW02 |
|---|---|---|

# WELL COMPLETION DIAGRAM

**PROJECT:** PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico
**INSTALLATION:** VIEQUES_EAST
**SITE:** VERW
**LOGGER:** Justin Locus
**DRILLING CONTRACTOR:** GeoEnviroTech ,

**DRILLING METHOD AND EQUIPMENT USED:** Hollow Stem Auger,
**OUTER DIA:** 8 **INNER DIA:** 4.25
**WATER LEVEL:** 32 (ft bgs)
**TOTAL WELL DEPTH:** 35 (ft)
**START:** March 1, 2022 **END:** March 1, 2022




Single Well Above Ground Surface

1 – **Ground elevation at well:** TBD

2 – **Top of casing elevation**: TBD

3 – **Wellhead Cover:** 0 **(ft)**, Steel, Riser - casing that is above the ground surface
a) **Concrete Pad Length (ft**): 2
b) **Concrete Pad Width (ft):** 2
c) **Concrete Pad Depth (ft):** 0.5

4 – **Well Casing (in):** / Schedule 40 PVC

5 – **Well Screen (in):** 0.01 / Factory slotted

6/7 – **Type screen filter**: 20-30
a) **Quantity:** 7-50lb bag

8 – **Type of seal (in):** 3/8" bentonite chips
a) **Quantity:** 1/2 - 50lb bag

9 – **Grout Mixture**: Portland cement with bentonite
**Amount of Cement Used:** 12 - 50lb bag
a) **Amount of bentonite used:**
b) **Amount of water used:** 62
c) **Method of placement:** Pour from land surface
d) **Vol. of well casing grout:** 62

10 – **End Cap**: Schedule 40 PVC, 2 **(in)**, Flat

**Comments:**

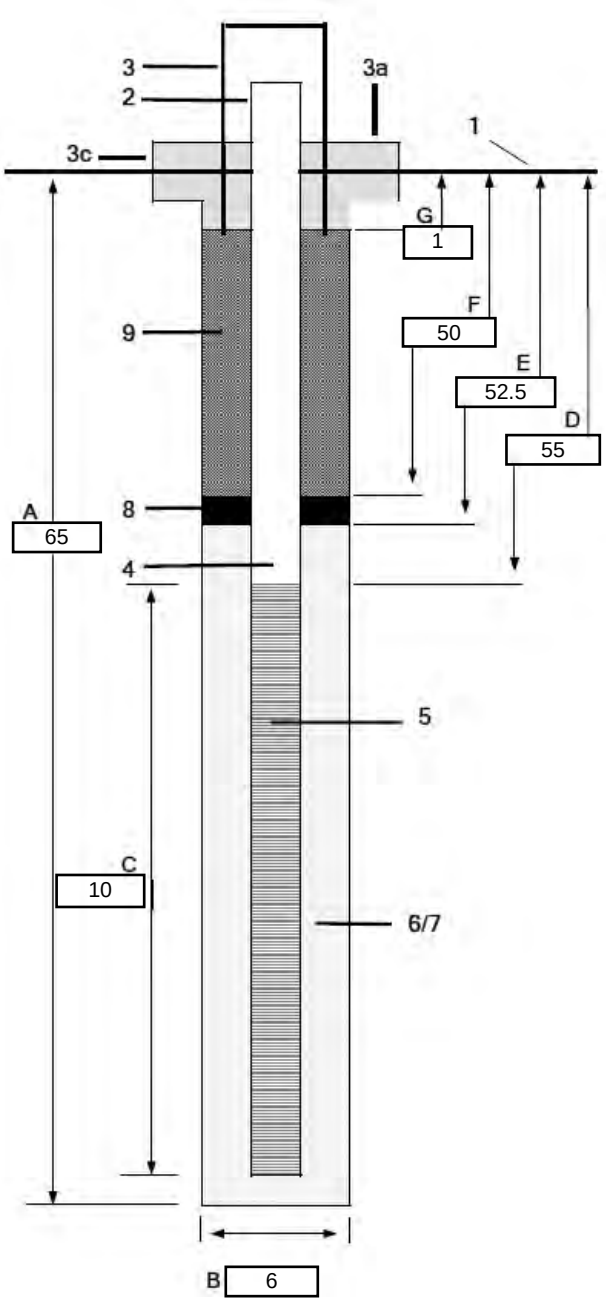
A= Boring Depth (feet)
B= Borehole Diameter (inches)
C= Length of Screen (feet)
D= Depth to Top of Screen (feet)
E= Top of Sand Pack (feet)
F= Top of Annular Seal (feet)
G= Top of Grout Seal (feet)

| Jacobs | PROJECT NUMBER: 675884CH.FI.PF | WELL NUMBER: VEFS-PFAS-MW01 |
|---|---|---|

# WELL COMPLETION DIAGRAM

**PROJECT:** PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico
**INSTALLATION:** VIEQUES_EAST
**SITE:** Vefs-pfas-Mw01
**LOGGER:** Caitlin Dronfield
**DRILLING CONTRACTOR:** GeoEnviroTech ,

**DRILLING METHOD AND EQUIPMENT USED:** AirRotary, HS
**OUTER DIA:** 10.5 **INNER DIA:** 6.25
**WATER LEVEL:** 55 (ft bgs)
**TOTAL WELL DEPTH:** 65 (ft)
**START:** May 26, 2022 **END:** May 26, 2022




Single Well Below Ground Surface

1 – **Ground elevation at well:** TBD

2 – **Top of casing elevation**: TBD

3 – **Wellhead Cover:** 0 **(ft)**, Steel, Flush Mounted
a) **Concrete Pad Length (ft**): 2
b) **Concrete Pad Width (ft):** 2
c) **Concrete Pad Depth (ft):** 0.5

4 – **Well Casing (in):** 2 / Schedule 40 PVC

5 – **Well Screen (in):** 0.01 / Factory slotted

6/7 – **Type screen filter**: 20-30 mesh silica sand, Edgar Minerals/Standard Sand
a) **Quantity:** 7 50-lb bags

8 – **Type of seal (in):** 3/8" bentonite chips, PDS bentonite plug
a) **Quantity:** 1 50-lb bag

9 – **Grout Mixture**: Cement Portland cement with bentonite
**Amount of Cement Used:** 26 50 lb bags
a) **Amount of bentonite used:** 40 handfuls ~25 lbs
b) **Amount of water used:** 98
c) **Method of placement:** Pour from surface
d) **Vol. of well casing grout:** 98

10 – **End Cap**: Schedule 40 PVC, 6 **(in)**, Flat

**Comments:**

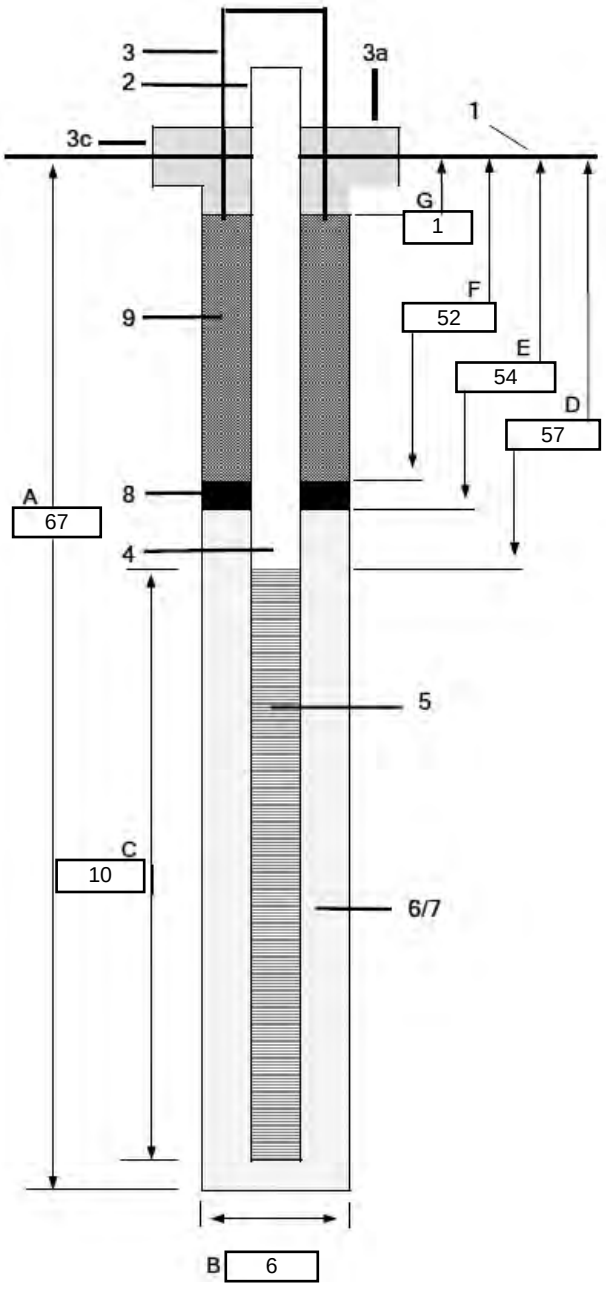
A= Boring Depth (feet)
B= Borehole Diameter (inches)
C= Length of Screen (feet)
D= Depth to Top of Screen (feet)
E= Top of Sand Pack (feet)
F= Top of Annular Seal (feet)
G= Top of Grout Seal (feet)

| Jacobs | PROJECT NUMBER: 675884CH.FI.PF | WELL NUMBER: VEFS-PFAS-MW02 |
|---|---|---|

# WELL COMPLETION DIAGRAM

**PROJECT:** PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico
**INSTALLATION:** VIEQUES_EAST
**SITE:** VEFS
**LOGGER:** Caitlin Dronfield
**DRILLING CONTRACTOR:** GEOENVIROTECH ,

**DRILLING METHOD AND EQUIPMENT USED:** Air Rotary,
**OUTER DIA: INNER DIA:**
**WATER LEVEL:** 57 (ft bgs)
**TOTAL WELL DEPTH:** 67 (ft)
**START:** May 24, 2022 **END:** May 24, 2022




Single Well Below Ground Surface

1 – **Ground elevation at well:** TBD

2 – **Top of casing elevation**: TBD

3 – **Wellhead Cover:** 0 **(ft)**, Steel, Flush Mounted
a) **Concrete Pad Length (ft**): 2
b) **Concrete Pad Width (ft):** 2
c) **Concrete Pad Depth (ft):** 0.5

4 – **Well Casing (in):** 2 / Schedule 40 PVC

5 – **Well Screen (in):** 0.01 / Factory slotted

6/7 – **Type screen filter**: 20-30 mesh sand, Edgar Minerals
a) **Quantity:** 7 50 lb bag

8 – **Type of seal (in):** 3/8" bentonite chips, PDS Bentonite plug
a) **Quantity:** 1 50 lb bag

9 – **Grout Mixture**: Cemex Portland cement with bentonite
**Amount of Cement Used:** 15 50 lb bags
a) **Amount of bentonite used:** 1-2 handfuls per 4 gal grout mixed - 16 handfuls
b) **Amount of water used:** 50
c) **Method of placement:** Pour from land surface, 4 gal bucketful at a time
d) **Vol. of well casing grout:** 55

10 – **End Cap**: Schedule 40 PVC, 6 **(in)**, Flat

**Comments:**

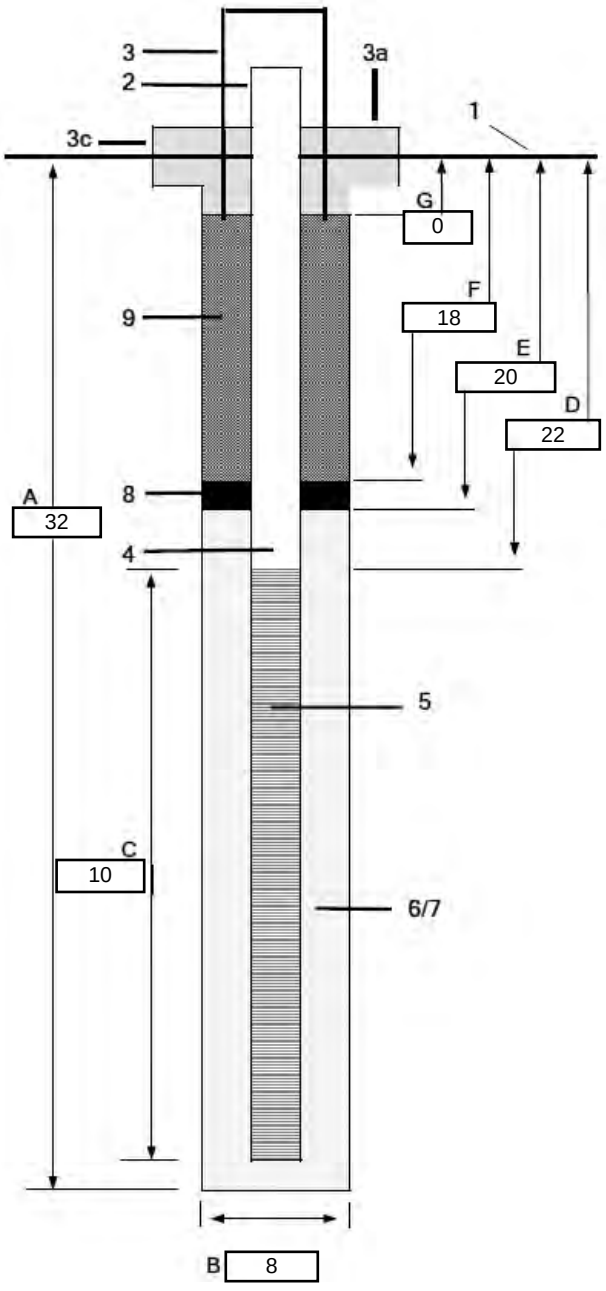
A= Boring Depth (feet)
B= Borehole Diameter (inches)
C= Length of Screen (feet)
D= Depth to Top of Screen (feet)
E= Top of Sand Pack (feet)
F= Top of Annular Seal (feet)
G= Top of Grout Seal (feet)

| Jacobs | PROJECT NUMBER: 675884CH.FI.PF | WELL NUMBER: VEW10-PFAS-MW01 |
|---|---|---|

# WELL COMPLETION DIAGRAM

**PROJECT:** PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico
**INSTALLATION:** VIEQUES_EAST
**SITE:** SWMU 10
**LOGGER:** Justin Locus
**DRILLING CONTRACTOR:** GeoEnviroTech ,

**DRILLING METHOD AND EQUIPMENT USED:** Hollow Stem Auger,
**OUTER DIA:** 8 **INNER DIA:** 4.25
**WATER LEVEL:** 28 (ft bgs)
**TOTAL WELL DEPTH:** 32 (ft)
**START:** March 7, 2022 **END:** March 7, 2022




Single Well Above Ground Surface

1 – **Ground elevation at well:** TBD

2 – **Top of casing elevation**: TBD

3 – **Wellhead Cover:** 3.5 **(ft)**, Steel, Riser - casing that is above the ground surface
a) **Concrete Pad Length (ft**): 2
b) **Concrete Pad Width (ft):** 2
c) **Concrete Pad Depth (ft):** 0.5

4 – **Well Casing (in):** 4 / Schedule 40 PVC

5 – **Well Screen (in):** 0.01 / Factory slotted

6/7 – **Type screen filter**: 20-30
a) **Quantity:** 7 - 50lb bag

8 – **Type of seal (in):** 3/8" bentonite chip
a) **Quantity:** 1/2 - 50lb bag

9 – **Grout Mixture**: Portland cement and water
**Amount of Cement Used:** 9 - 50lb bag
a) **Amount of bentonite used:**
b) **Amount of water used:** 60
c) **Method of placement:** Pour from land surface
d) **Vol. of well casing grout:**

10 – **End Cap**: Schedule 40 PVC, 4 **(in)**, Cone

**Comments:**

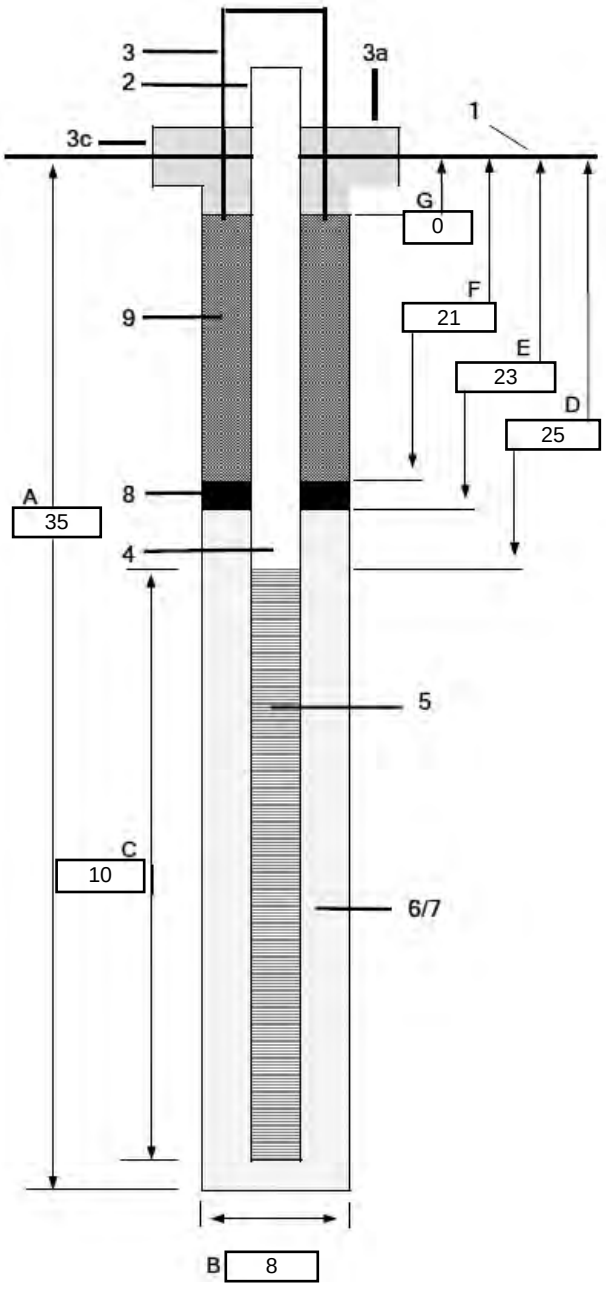
A= Boring Depth (feet)
B= Borehole Diameter (inches)
C= Length of Screen (feet)
D= Depth to Top of Screen (feet)
E= Top of Sand Pack (feet)
F= Top of Annular Seal (feet)
G= Top of Grout Seal (feet)

| Jacobs | PROJECT NUMBER: 675884CH.FI.PF | WELL NUMBER: VEW10-PFAS-MW02 |
|---|---|---|

# WELL COMPLETION DIAGRAM

**PROJECT:** PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico
**INSTALLATION:** VIEQUES_EAST
**SITE:** SWMU 10
**LOGGER:** Justin Locus
**DRILLING CONTRACTOR:** GeoEnviroTech ,

**DRILLING METHOD AND EQUIPMENT USED:** Hollow Stem Auger,
**OUTER DIA:** 8 **INNER DIA:** 4.25
**WATER LEVEL:** 30 (ft bgs)
**TOTAL WELL DEPTH:** 35 (ft)
**START:** March 9, 2022 **END:** March 9, 2022




Single Well Above Ground Surface

1 – **Ground elevation at well:** TBD

2 – **Top of casing elevation**: TBD

3 – **Wellhead Cover:** 3.5 **(ft)**, Steel, Riser - casing that is above the ground surface
a) **Concrete Pad Length (ft**): 2
b) **Concrete Pad Width (ft):** 2
c) **Concrete Pad Depth (ft):** 0.5

4 – **Well Casing (in):** 2 / Schedule 40 PVC

5 – **Well Screen (in):** 0.01 / Factory slotted

6/7 – **Type screen filter**: 20-30
a) **Quantity:** 7-50lb bag

8 – **Type of seal (in):** 3/8" bentonite chips
a) **Quantity:** 1/2 - 50lb bag

9 – **Grout Mixture**: Portland cement
**Amount of Cement Used:** 8 - 47lb bag
a) **Amount of bentonite used:**
b) **Amount of water used:** 55 gallons
c) **Method of placement:** Pour from land surface
d) **Vol. of well casing grout:**

10 – **End Cap**: Schedule 40 PVC, 4 **(in)**, Flat

**Comments:**

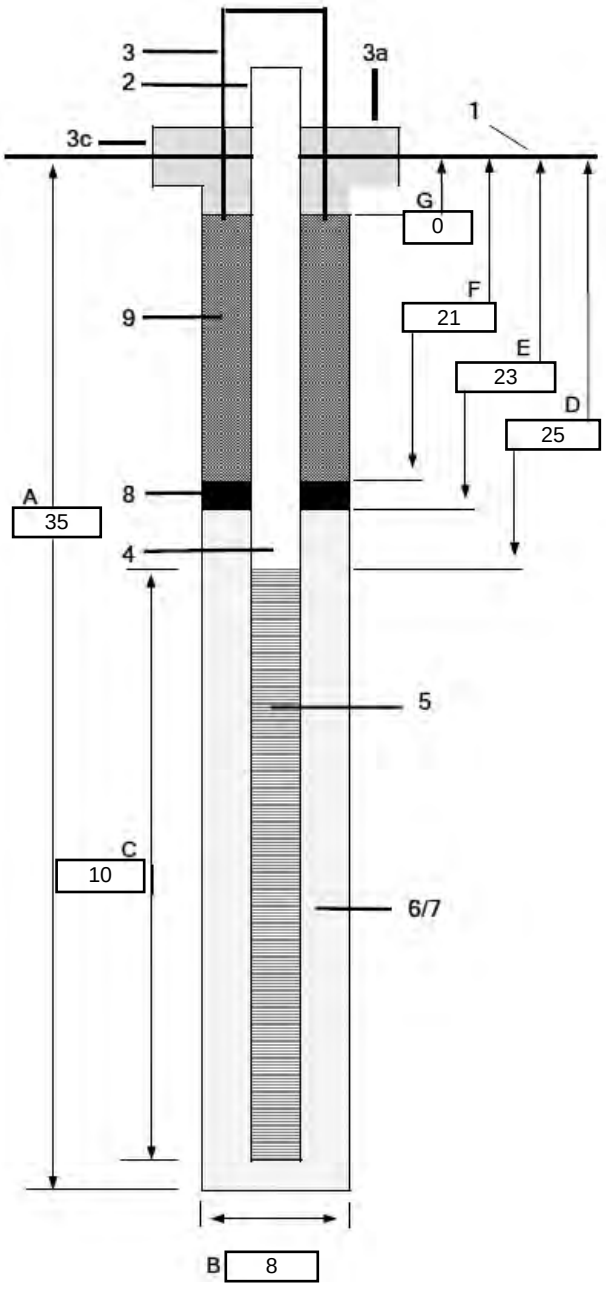
A= Boring Depth (feet)
B= Borehole Diameter (inches)
C= Length of Screen (feet)
D= Depth to Top of Screen (feet)
E= Top of Sand Pack (feet)
F= Top of Annular Seal (feet)
G= Top of Grout Seal (feet)

| Jacobs | PROJECT NUMBER: 675884CH.FI.PF | WELL NUMBER: VEW10-PFAS-MW03 |
|---|---|---|

# WELL COMPLETION DIAGRAM

**PROJECT:** PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico
**INSTALLATION:** VIEQUES_EAST
**SITE:** VEW10
**LOGGER:** Justin Locus
**DRILLING CONTRACTOR:** GeoEnviroTech,

**DRILLING METHOD AND EQUIPMENT USED:** Hollow Stem Auger,
**OUTER DIA:** 8 **INNER DIA:** 4.25
**WATER LEVEL:** 29 (ft bgs)
**TOTAL WELL DEPTH:** 35 (ft)
**START:** March 3, 2022 **END:** March 3, 2022




Single Well Above Ground Surface

1 – **Ground elevation at well:** TBD

2 – **Top of casing elevation**: TBD

3 – **Wellhead Cover:** 3.5 **(ft)**, Steel, Riser - casing that is above the ground surface
a) **Concrete Pad Length (ft**): 2
b) **Concrete Pad Width (ft):** 2
c) **Concrete Pad Depth (ft):** 0.5

4 – **Well Casing (in):** 4 / Schedule 40 PVC

5 – **Well Screen (in):** 0.01 / Factory slotted

6/7 – **Type screen filter**: 20-30
a) **Quantity:** 8-50lb bag

8 – **Type of seal (in):** 3/8" bentonite chips
a) **Quantity:** 1/2 - bag

9 – **Grout Mixture**: Portland cement
**Amount of Cement Used:** 5- 50lb bag
a) **Amount of bentonite used:**
b) **Amount of water used:** 35
c) **Method of placement:** Pour
d) **Vol. of well casing grout:**

10 – **End Cap**: Schedule 40 PVC, 4 **(in)**, Cone

**Comments:**

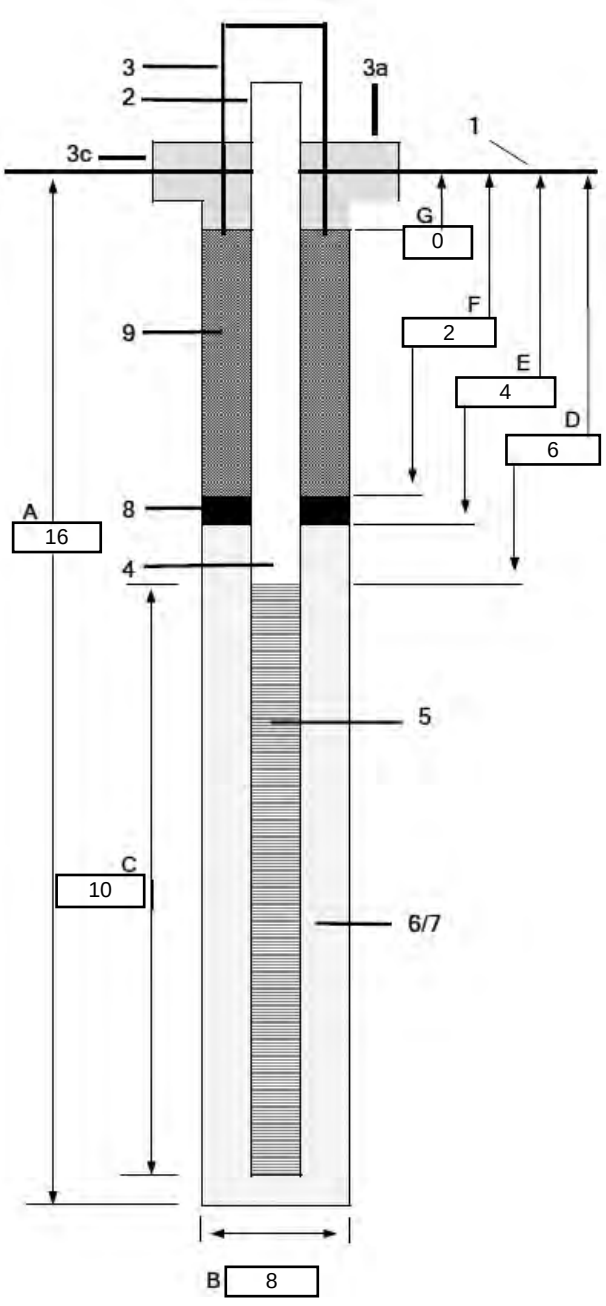
A= Boring Depth (feet)
B= Borehole Diameter (inches)
C= Length of Screen (feet)
D= Depth to Top of Screen (feet)
E= Top of Sand Pack (feet)
F= Top of Annular Seal (feet)
G= Top of Grout Seal (feet)

| Jacobs | PROJECT NUMBER: 675884CH.FI.PF | WELL NUMBER: VEW10-PFAS-MW04 |
|---|---|---|

# WELL COMPLETION DIAGRAM

**PROJECT:** PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico
**INSTALLATION:** VIEQUES_EAST
**SITE:** VEW10
**LOGGER:** Justin Locus
**DRILLING CONTRACTOR:** GeoEnviroTech ,

**DRILLING METHOD AND EQUIPMENT USED:** Hollow Stem Auger,
**OUTER DIA:** 8 **INNER DIA:** 4.25
**WATER LEVEL:** 8 (ft bgs)
**TOTAL WELL DEPTH:** 16 (ft)
**START:** March 2, 2022 **END:** March 2, 2022




Single Well Above Ground Surface

1 – **Ground elevation at well:** TBD

2 – **Top of casing elevation**: TBD

3 – **Wellhead Cover:** 3.5 **(ft)**, Steel, Riser - casing that is above the ground surface
a) **Concrete Pad Length (ft**): 2
b) **Concrete Pad Width (ft):** 2
c) **Concrete Pad Depth (ft):** 0.5

4 – **Well Casing (in):** 2 / Schedule 40 PVC

5 – **Well Screen (in):** 0.01 / Factory slotted

6/7 – **Type screen filter**: 20-30
a) **Quantity:** 7-50lb bag

8 – **Type of seal (in):** 3/8" bentonite chips
a) **Quantity:** 1/2 - 50lb bag

9 – **Grout Mixture**: Portland cement
**Amount of Cement Used:** 3.5 -50lb bag
a) **Amount of bentonite used:**
b) **Amount of water used:** 20
c) **Method of placement:** Pour from land surface
d) **Vol. of well casing grout:** 20

10 – **End Cap**: Schedule 40 PVC, 4 **(in)**, Cone

**Comments:**

A= Boring Depth (feet)
B= Borehole Diameter (inches)
C= Length of Screen (feet)
D= Depth to Top of Screen (feet)
E= Top of Sand Pack (feet)
F= Top of Annular Seal (feet)
G= Top of Grout Seal (feet)

# Appendix C
# Well Development Logs

# NASD AOC B: Former Wastewater Treatment Plant at the Public Works Area

# WELL DEVELOPMENT LOG

**WELL ID: VWAB-PFAS-MW01**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 87.60 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 55.98 | Ft btoc |
| Event Date: | 06/15/2022 | Water Column: | 31.62 | Ft |
| Development Team: | Chris Reed, R.Etiemble | Screened Interval: | 78-88 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 5.16 | Gal |
| Equipment | Submersible Pump<br>YSI, YSI Quatro Backup<br>MiniRAE, MiniRAE 3000 Honeywell C103319 | Start Time: | 11:33 | |
| Tubing Materials: | Poly Tubing<br>3/8 x 1/2 | End Time: | 16:45 | |
| | | Total Volume Purged: | 20 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 12:33 | 1 | 84.40 | 7.10 | 1.78 | 28.7 | 148.5 | 1.38 | 1,000.00 | Cloudy | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# NASD Former Fire Station Building 2046 at the Public Works Area

# WELL DEVELOPMENT LOG

**WELL ID: VWFS-PFAS-MW01**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 62.03 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 57.35 | Ft btoc |
| Event Date: | 05/12/2022 | Water Column: | 4.68 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 52-62 | Ft btoc |
| | | Stickup Height Above Surface: | -0.2 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 0.76 | Gal |
| Equipment | Submersible Pump<br><br>YSI, YSI Quatro C103145<br>None, | Start Time: | 10:21 | |
| Tubing Materials: | HDPE<br>3/8" id | End Time: | 11:05 | |
| | | Total Volume Purged: | 14 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 10:25 | 0.5 | NM | 7.67 | 0.95 | 29.4 | 75.2 | 4.05 | 1,000.00 | Brown | |
| 10:30 | 0.5 | NM | 7.48 | 0.97 | 28.7 | 67.4 | 4.09 | 1,000.00 | Brown | |
| 10:58 | 0.5 | 59.20 | 7.29 | 1.02 | 28.9 | 68.1 | 3.61 | 1,000.00 | Brown | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: VWFS-PFAS-MW02**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 67.41 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 57.24 | Ft btoc |
| Event Date: | 05/12/2022 | Water Column: | 10.17 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 57-67 | Ft btoc |
| | | Stickup Height Above Surface: | -0.19 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.66 | Gal |
| Equipment | Submersible Pump<br>YSI, YSI Quatro C103145<br>None, | Start Time: | 12:44 | |
| Tubing Materials: | HDPE<br>3/8" ID | End Time: | 13:16 | |
| | | Total Volume Purged: | 26 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 13:00 | 2 | 60.00 | 7.31 | 1.05 | 28.5 | 112.2 | 2.85 | 1,000.00 | Brown | |
| 13:05 | 2 | 60.00 | 7.28 | 0.59 | 28.2 | 90.7 | 2.80 | 1,000.00 | Brown | |
| 13:06 | 2 | 60.00 | 7.17 | 1.05 | 28.1 | 84.8 | 2.34 | 1,000.00 | Cloudy | |
| 13:13 | 2 | 60.00 | 7.19 | 1.01 | 28.0 | 86.1 | 4.17 | 116.00 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# Potential Former NASD Motor Pool Area

# WELL DEVELOPMENT LOG

**WELL ID: VWMP-PFAS-MW01**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 55.74 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 46.32 | Ft btoc |
| Event Date: | 05/12/2022 | Water Column: | 9.42 | Ft |
| Development Team: | | Screened Interval: | 42-52 | Ft btoc |
| | | Stickup Height Above Surface: | 2.41 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.54 | Gal |
| Equipment | Submersible Pump<br>YSI, YSI Quatro C103145<br>None, | Start Time: | 08:23 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 09:30 | |
| | | Total Volume Purged: | 22.668 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 08:24 | 2 | 48.32 | 7.01 | 1.36 | 27.7 | 123.3 | 5.30 | 1,000.00 | Brown | |
| 08:30 | 0.527922 | 47.62 | 7.11 | 1.34 | 27.9 | 112.1 | 4.70 | 1,000.00 | Brown | |
| 08:38 | 0.5 | 49.75 | 6.90 | 1.33 | 27.6 | 109.0 | 4.50 | 1,000.00 | Brown | |
| 08:55 | 0.5 | 49.90 | 6.84 | 1.34 | 28.2 | 104.4 | 3.60 | 1,000.00 | Brown | |
| 08:57 | 0 | 52.50 | NM | NM | NM | NM | NM | NM | Cloudy | |
| 09:03 | 0.5 | NM | 6.84 | 1.34 | 27.6 | 103.6 | 3.40 | 1,000.00 | Cloudy | |
| 09:17 | 0.5 | 50.70 | 6.92 | 1.33 | 27.6 | 98.9 | 4.10 | 1,000.00 | Cloudy | |
| 09:21 | 0.5 | 50.60 | 6.85 | 1.33 | 27.8 | 99.6 | 3.90 | 76.20 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: VWMP-PFAS-MW02**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 50.15 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 40.22 | Ft btoc |
| Event Date: | 05/11/2022 | Water Column: | 9.93 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 40-50 | Ft btoc |
| | | Stickup Height Above Surface: | -0.19 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.62 | Gal |
| Equipment | Submersible Pump<br>YSI, YSI Quatro Backup<br>None, | Start Time: | 15:03 | |
| Tubing Materials: | HDPE<br>3/8" id | End Time: | 15:53 | |
| | | Total Volume Purged: | 17 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 15:15 | 1 | 40.22 | 7.21 | 1.28 | 29.1 | 44.5 | 2.01 | 1,000.00 | Brown | |
| 15:22 | 1 | 42.44 | 7.02 | 1.32 | 29.0 | 58.8 | 1.41 | 1,000.00 | Brown | |
| 15:33 | 1 | 42.55 | 6.95 | 1.32 | 28.9 | 62.9 | 1.32 | 1,000.00 | Brown | |
| 15:34 | 1 | 42.59 | 6.96 | 1.32 | 28.8 | 62.1 | 1.66 | 1,000.00 | Brown | |
| 15:39 | 1 | NM | 6.96 | 1.32 | 28.8 | 62.6 | 1.79 | 393.00 | Cloudy | |
| 15:47 | 1 | 42.49 | 6.94 | 1.32 | 28.9 | 63.0 | 1.45 | 79.70 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: VWMP-PFAS-MW03**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 48.90 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 39.26 | Ft btoc |
| Event Date: | 05/11/2022 | Water Column: | 9.64 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 39-49 | Ft btoc |
| | | Stickup Height Above Surface: | 2.87 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.57 | Gal |
| Equipment | Submersible Pump<br>YSI, YSI Quatro Backup<br>None, | Start Time: | 16:32 | |
| Tubing Materials: | HDPE<br>3/8" ID | End Time: | 16:48 | |
| | | Total Volume Purged: | 24 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 16:32 | 2 | 39.40 | 6.93 | 1.31 | 28.3 | 72.9 | 2.07 | 1,000.00 | Brown | |
| 16:39 | 2 | 39.45 | 6.83 | 1.31 | 28.1 | 75.4 | 1.63 | 174.00 | Clear | |
| 16:44 | 2 | 39.47 | 6.85 | 1.31 | 28.1 | 74.4 | 1.66 | 42.30 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# NASD AOC H: Abandoned Power Plant/Former Fire Training Area

# WELL DEVELOPMENT LOG

**WELL ID: VWAH-PFAS-MW01**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 21.18 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 8.55 | Ft btoc |
| Event Date: | 05/12/2022 | Water Column: | 12.63 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 8-18 | Ft btoc |
| | | Stickup Height Above Surface: | 2.55 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 2.06 | Gal |
| Equipment | Submersible Pump<br>YSI, YSI Quatro Backup<br>None, | Start Time: | 14:15 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 14:50 | |
| | | Total Volume Purged: | 64 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:15 | 2 | 19.00 | 7.44 | 1.35 | 26.6 | 85.5 | 3.10 | 1,000.00 | Brown | |
| 14:24 | 2 | 19.00 | 7.46 | 1.44 | 26.5 | 86.4 | 2.13 | 1,000.00 | Cloudy | |
| 14:27 | 2 | 19.00 | 7.35 | 1.43 | 26.4 | 86.8 | 2.38 | 1,000.00 | Cloudy | |
| 14:32 | 2 | NM | 7.34 | 1.38 | 26.9 | 82.7 | 2.98 | 816.00 | Cloudy | |
| 14:38 | 2 | 19.00 | 7.35 | 1.39 | 26.5 | 81.2 | 2.35 | 272.00 | | |
| 14:47 | 2 | 19.00 | 7.36 | 1.41 | 26.6 | 81.0 | 2.37 | 163.00 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: VWAH-PFAS-MW02**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 17.89 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 7.3 | Ft btoc |
| Event Date: | 05/12/2022 | Water Column: | 10.59 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 5-15 | Ft btoc |
| | | Stickup Height Above Surface: | 2.55 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.73 | Gal |
| Equipment | Submersible Pump<br>YSI, YSI Quatro C103145<br>None, | Start Time: | 15:23 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 16:02 | |
| | | Total Volume Purged: | 2.5 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 15:28 | 1 | 15.00 | 7.05 | 12.01 | 26.8 | 108.7 | 2.45 | 1,000.00 | Brown | |
| 15:29 | 0.1 | 15.00 | 7.16 | 12.47 | 26.8 | 91.5 | 4.85 | 1,000.00 | Brown | |
| 15:37 | 0.1 | 15.00 | 7.09 | 13.31 | 26.9 | 84.9 | 3.94 | 1,000.00 | Cloudy | |
| 15:48 | 0.1 | 15.00 | 7.03 | 14.28 | 26.9 | 84.5 | 6.33 | 592.00 | Cloudy | |
| 15:54 | 0.1 | 15.00 | 7.02 | 14.64 | 26.5 | 82.6 | 5.41 | 213.00 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# NASD SWMU 7: Former Quebrada Disposal Site

# WELL DEVELOPMENT LOG

**WELL ID: VWS7-PFAS-MW01**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 78.50 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 70.01 | Ft btoc |
| Event Date: | 06/14/2022 | Water Column: | 8.49 | Ft |
| Development Team: | Chris Reed, R.Etiemble | Screened Interval: | 66-76 | Ft btoc |
| | | Stickup Height Above Surface: | 2.75 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.39 | Gal |
| Equipment | Submersible Pump<br>YSI, YSI Quatro Backup<br>MiniRAE, MiniRAE 3000 Honeywell C103319 | Start Time: | 12:45 | |
| Tubing Materials: | Poly Tubing<br>3/8" x 1/2" | End Time: | 16:57 | |
| | | Total Volume Purged: | 10 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 12:55 | 1 | 73.50 | 7.66 | 1.29 | 28.6 | 106.9 | 1.53 | 1,000.00 | Cloudy | |
| 13:10 | 1 | 74.50 | 7.34 | 1.36 | 29.1 | 81.8 | 4.95 | 1,000.00 | Cloudy | |
| 13:45 | 1 | 74.28 | 7.18 | 1.37 | 28.5 | 100.5 | 5.10 | 250.00 | Cloudy | |
| 14:14 | 1 | 74.06 | 7.07 | 1.38 | 28.2 | 115.1 | 5.15 | 38.50 | Clear | |
| 16:01 | 1 | 74.39 | 7.12 | 1.40 | 29.1 | 128.2 | 5.51 | 1,000.00 | Cloudy | |
| 16:26 | 1 | 75.50 | 7.08 | 1.40 | 28.5 | 128.6 | 4.71 | 719.00 | Clear | |
| 16:54 | 1 | 75.75 | 7.05 | 1.40 | 29.1 | 128.1 | 4.23 | 84.30 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# VNTR Former Camp Garcia Runway

# WELL DEVELOPMENT LOG

**WELL ID: VERW-PFAS-MW01**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 34.38 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 17.91 | Ft btoc |
| Event Date: | 03/14/2022 | Water Column: | 16.47 | Ft |
| Development Team: | Beth Davis | Screened Interval: | 22-32 | Ft btoc |
| | | Stickup Height Above Surface: | 2.39 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 2.68 | Gal |
| Equipment | Submersible Pump<br>YSI, ProPlus<br>None, | Start Time: | 14:39 | |
| Tubing Materials: | HDPE<br>1/2" | End Time: | 15:11 | |
| | | Total Volume Purged: | 27.9 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:40 | 1 | NM | 7.04 | 3.22 | 29.2 | 196.3 | 4.20 | NM | Brown | |
| 14:46 | 1 | NM | 7.10 | 3.43 | 28.5 | 75.3 | 4.80 | 400.00 | Cloudy | |
| 14:50 | 1 | NM | 7.10 | 3.18 | 28.2 | 53.5 | 4.20 | 1,000.00 | Cloudy | |
| 14:54 | 1 | NM | 7.10 | 3.18 | 27.9 | 52.4 | 4.80 | 253.00 | Cloudy | |
| 14:59 | 1.1 | NM | 7.12 | 3.18 | 27.9 | 40.0 | 4.30 | 158.00 | Cloudy | |
| 15:06 | 1.2 | NM | 7.13 | 3.19 | 28.1 | 43.1 | 4.50 | 175.00 | Cloudy | |
| 15:10 | 1 | 21.32 | 7.13 | 3.18 | 28.1 | 43.5 | 4.40 | 52.00 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: VERW-PFAS-MW02**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 38.15 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 22.73 | Ft btoc |
| Event Date: | 03/14/2022 | Water Column: | 15.42 | Ft |
| Development Team: | Beth Davis | Screened Interval: | 25-35 | Ft btoc |
| | | Stickup Height Above Surface: | 3.14 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 2.51 | Gal |
| Equipment | Submersible Pump<br>YSI,<br>None, | Start Time: | 15:27 | |
| Tubing Materials: | Poly Tubing<br>1/2 id | End Time: | 15:50 | |
| | | Total Volume Purged: | 11.9 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 15:32 | 1 | NM | 6.85 | 4.44 | 27.9 | 43.4 | 5.10 | 127.00 | Cloudy | |
| 15:39 | 1.1 | NM | 6.86 | 4.48 | 28.1 | 39.4 | 4.70 | 51.00 | Clear | |
| 15:42 | 1.4 | 22.96 | 6.85 | 4.46 | 27.8 | 41.0 | 4.00 | 24.00 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# VNTR PI 5: Surface Water Drainage Area from Former Camp Garcia Runway

# WELL DEVELOPMENT LOG

**WELL ID: VEP5-PFAS-MW01**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 36.14 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 18.78 | Ft btoc |
| Event Date: | 03/14/2022 | Water Column: | 36 | Ft |
| Development Team: | Beth Davis | Screened Interval: | 22-32 | Ft btoc |
| | | Stickup Height Above Surface: | 2.15 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 2.83 | Gal |
| Equipment | Submersible Pump<br>YSI, ProPlus 14K103301<br>None, | Start Time: | 11:32 | |
| Tubing Materials: | Poly Tubing<br>1/2" ID | End Time: | 12:34 | |
| | | Total Volume Purged: | 10.29 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 11:35 | 1 | 18.78 | NM | NM | NM | NM | NM | NM | Brown | |
| 11:45 | 1 | 19.69 | 7.05 | 7.66 | 29.4 | 76.8 | 1.90 | 1,000.00 | Cloudy | |
| 12:00 | 0.1 | NM | 7.28 | 7.42 | 30.9 | 68.0 | 3.40 | 1,000.00 | Cloudy | |
| 12:16 | 0.1 | NM | 7.10 | 7.56 | 29.3 | 62.7 | 2.40 | 561.00 | Cloudy | |
| 12:28 | 0.1 | 29.78 | 7.03 | 7.91 | 28.7 | 73.6 | 3.00 | 88.30 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# VNTR SWMU 20: Former Helicopter Maintenance Area

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW03**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 48.93 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 45.7 | Ft btoc |
| Event Date: | 06/21/2022 | Water Column: | 3.23 | Ft |
| Development Team: | Chris Reed, R.Etiemble | Screened Interval: | 40-50 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 0.53 | Gal |
| Equipment | Submersible Pump<br>Whale Super Purger WP6012<br>YSI, Turbidity Meter, YSI (C103143)<br>MiniRAE, MiniRAE 3000 (C103319) | Start Time: | 14:18 | |
| Tubing Materials: | HDPE<br>3/8 x 1/2 | End Time: | 14:55 | |
| | | Total Volume Purged: | 20 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:18 | 1 | 46.40 | 6.70 | 3.19 | 30.0 | 162.8 | 1.44 | 1,000.00 | Brown | |
| 14:38 | 1 | 45.87 | 6.74 | 3.00 | 28.8 | 123.4 | 0.58 | 1,000.00 | Cloudy | |
| 14:45 | 1 | 45.88 | 6.74 | 3.04 | 2.5 | 120.8 | 0.60 | 38.40 | | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW04**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 50.94 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 42.28 | Ft btoc |
| Event Date: | 05/13/2022 | Water Column: | 8.659 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 38-48 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.41 | Gal |
| Equipment | Submersible Pump, Surge Block<br>YSI, Turbidity Meter, YSI Quatro C103145<br>MiniRAE, MiniRAE 3000 Honeywell C103319 | Start Time: | 12:21 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 13:08 | |
| | | Total Volume Purged: | 16 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 12:37 | 2 | 47.50 | 6.71 | 5.25 | 30.4 | 95.9 | 3.51 | 1,000.00 | Brown | |
| 12:40 | 2 | 48.94 | 6.74 | 2.70 | 29.5 | 99.4 | 4.77 | 1,000.00 | Cloudy | |
| 13:00 | 0.5 | 48.90 | 6.86 | 5.02 | 29.3 | 95.7 | 4.12 | 653.00 | Cloudy | |
| 13:01 | 0.5 | 48.94 | 6.76 | 5.11 | 29.2 | 114.4 | 3.16 | 1,000.00 | Cloudy | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW05**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 46.40 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 36.34 | Ft btoc |
| Event Date: | 05/16/2022 | Water Column: | 10.06 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 36-46 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.64 | Gal |
| Equipment | Submersible Pump<br><br>YSI, Turbidity Meter, YSI Quatro C103145<br>MiniRAE, MiniRAE 3000 Honeywell C103319 | Start Time: | 12:00 | |
| Tubing Materials: | HDPE<br>3/8" ID | End Time: | 12:42 | |
| | | Total Volume Purged: | 4.2 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 12:05 | 1 | 46.00 | 6.92 | 3.44 | 29.9 | 91.3 | 6.30 | 1,000.00 | Brown | |
| 12:08 | | | 6.92 | 6.46 | 29.4 | 124.0 | 4.50 | 1,000.00 | Cloudy | Purged Dry |
| 12:26 | 0.2 | 46.00 | 6.93 | 6.12 | 29.3 | 109.5 | 5.00 | 1,000.00 | Cloudy | |
| 12:29 | 0.2 | 46.00 | 6.85 | 5.76 | 29.6 | 100.4 | 3.10 | 861.00 | Cloudy | |
| 12:41 | NM | NM | NM | NM | NM | NM | NM | NM | Clear | |
| 12:42 | NM | NM | NM | NM | NM | NM | NM | NM | | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW07**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 42.45 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 31.18 | Ft btoc |
| Event Date: | 05/17/2022 | Water Column: | 11.27 | Ft |
| Development Team: | Beth Davis, Caitlin Dronfield, Tatum Magill | Screened Interval: | 29-39 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.84 | Gal |
| Equipment | Submersible Pump<br>YSI, Turbidity Meter, YSI Quatro C103145<br>MiniRAE, MiniRAE 3001 Honeywell | Start Time: | 11:20 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 11:36 | |
| | | Total Volume Purged: | 10 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 11:25 | 1 | NM | 6.64 | 13.36 | 29.7 | -46.6 | 4.01 | 1,000.00 | Brown | |
| 11:30 | 1 | NM | 6.86 | 13.78 | 29.1 | -13.4 | 2.10 | 352.00 | Cloudy | |
| 11:35 | 1 | 39.00 | 6.95 | 13.95 | 28.9 | 34.3 | 1.30 | 45.00 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW08**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 46.82 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 36.34 | Ft btoc |
| Event Date: | 05/16/2022 | Water Column: | 10.48 | Ft |
| Development Team: | Caitlin Dronfield, Tatum Magill | Screened Interval: | 34-44 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.71 | Gal |
| Equipment | Submersible Pump<br>YSI, YSI Quatro C103145<br>MiniRAE, | Start Time: | 14:51 | |
| Tubing Materials: | Poly Tubing | End Time: | 15:49 | |
| | | Total Volume Purged: | 40 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:56 | 2 | 44.82 | 6.88 | 7.58 | 29.3 | 94.0 | 3.20 | 1,000.00 | Brown | |
| 15:01 | 2 | 44.82 | 6.87 | 7.11 | 29.0 | 85.9 | 3.50 | 1,000.00 | Brown | |
| 15:01 | NM | NM | NM | NM | NM | NM | NM | NM | | Surge Screen Interval |
| 15:06 | 2 | 44.82 | 6.89 | 4.05 | 29.0 | 83.3 | 4.60 | 1,000.00 | Cloudy | |
| 15:21 | 2 | 44.82 | 7.05 | 8.05 | 29.7 | 81.0 | 5.60 | 1,000.00 | Brown | |
| 15:24 | NM | NM | NM | NM | NM | NM | NM | NM | | Surge Screen Interval |
| 15:43 | 2 | 44.82 | 6.84 | 7.72 | 29.5 | 87.4 | 5.60 | NM | Cloudy | |
| 15:47 | NM | NM | NM | NM | NM | NM | NM | NM | | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW09**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 42.42 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 34.25 | Ft btoc |
| Event Date: | 05/16/2022 | Water Column: | 8.17 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 30-40 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.33 | Gal |
| Equipment | Submersible Pump<br>YSI, Turbidity Meter, YSI Quatro C103145<br>MiniRAE, MiniRAE 3000 Honeywell C103319 | Start Time: | 16:13 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 16:28 | |
| | | Total Volume Purged: | 10 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 16:18 | 2 | 37.54 | 6.79 | 4.40 | 29.9 | 84.8 | 1.50 | 117.00 | Clear | |
| 16:18 | 2 | 37.54 | 6.75 | 4.20 | 29.8 | 82.6 | 1.00 | 66.00 | Clear | |
| 16:23 | 2 | 37.55 | 6.90 | 4.18 | 28.8 | 83.5 | 1.80 | 24.80 | Other | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW10**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 42.33 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 37.48 | Ft btoc |
| Event Date: | 05/17/2022 | Water Column: | 4.85 | Ft |
| Development Team: | Caitlin Dronfield, Tatum Magill | Screened Interval: | 32.5-42.5 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 0.79 | Gal |
| Equipment | Submersible Pump<br>YSI, Turbidity Meter, YSI Quatro C103145<br>MiniRAE, MiniRAE 3001 Honeywell | Start Time: | 07:58 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 08:45 | |
| | | Total Volume Purged: | 22 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 08:03 | 1 | 40.22 | 6.64 | 5.89 | 29.1 | 156.7 | 5.00 | 1,000.00 | Brown | |
| 08:05 | 1 | 42.00 | 6.85 | 6.12 | 28.9 | 133.2 | 4.50 | 1,000.00 | | |
| 08:08 | NM | NM | NM | NM | NM | NM | NM | MN | | Surge Screen Interval |
| 08:15 | 1 | 38.15 | 6.80 | 6.79 | 29.0 | 96.8 | 4.10 | 1,000.00 | Brown | |
| 08:18 | 1 | 42.00 | NM | NM | NM | NM | NM | NM | | Surge Screen Interval |
| 08:30 | 1 | 38.92 | 6.98 | 6.44 | 28.9 | 86.8 | 5.90 | 1,000.00 | Cloudy | |
| 08:44 | 1 | 37.73 | 6.80 | 6.55 | 28.8 | 83.6 | 4.90 | 1,000.00 | Cloudy | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW11**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 46.76 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 36.61 | Ft btoc |
| Event Date: | 05/16/2022 | Water Column: | 10.15 | Ft |
| Development Team: | Toby Stewart, Caitlin Dronfield | Screened Interval: | 36-46 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.66 | Gal |
| Equipment | Submersible Pump<br>YSI, Turbidity Meter, YSI Quatro C103145<br>MiniRAE, MiniRAE 3000 Honeywell C103319 | Start Time: | 11:15 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 11:36 | |
| | | Total Volume Purged: | 15 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 11:20 | 1 | 40.98 | 6.81 | 4.17 | 29.9 | 139.7 | 4.70 | 1,000.00 | Brown | |
| 11:25 | 1 | 45.23 | 6.73 | 4.88 | 29.9 | 90.9 | 2.70 | 1,000.00 | Brown | |
| 11:30 | 1 | 46.00 | 6.91 | 2.33 | 29.2 | 97.1 | 5.20 | 404.00 | Cloudy | |
| 11:35 | 1 | 46.00 | 6.87 | 2.31 | 29.3 | 84.9 | 4.80 | 57.10 | Clear | |
| 11:36 | NM | NM | NM | NM | NM | NM | NM | NM | | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW12**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 46.76 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 36.53 | Ft btoc |
| Event Date: | 05/16/2022 | Water Column: | 10.23 | Ft |
| Development Team: | Caitlin Dronfield, Tatum Magill | Screened Interval: | 34-44 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.67 | Gal |
| Equipment | Submersible Pump, Surge Block<br>YSI, Turbidity Meter, YSI Quatro C103145<br>MiniRAE, MiniRAE 3000 Honeywell C103319 | Start Time: | 16:53 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 17:14 | |
| | | Total Volume Purged: | 14 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 16:53 | 1 | 46.00 | 6.97 | 7.83 | 29.0 | 91.8 | 5.80 | 1,000.00 | Brown | |
| 16:55 | 1 | 46.00 | 6.84 | 4.02 | 28.9 | 85.7 | 5.00 | 100,046.00 | Brown | |
| 17:00 | 1 | 46.00 | 6.93 | 8.07 | 28.9 | 94.8 | 4.90 | 814.00 | Cloudy | |
| 17:05 | 1 | 46.00 | 7.06 | 8.04 | 28.7 | 80.3 | 5.70 | 41.40 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW13**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 46.50 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 36.75 | Ft btoc |
| Event Date: | 05/17/2022 | Water Column: | 9.75 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 33.5-43.5 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.589 | Gal |
| Equipment | Submersible Pump, Surge Block<br>YSI, Turbidity Meter, YSI Quatro C103145<br>MiniRAE, MiniRAE 3001 Honeywell | Start Time: | 09:15 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 09:45 | |
| | | Total Volume Purged: | 50 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 09:20 | 1 | 46.00 | 7.07 | 5.83 | 29.0 | 87.6 | 7.10 | 1,000.00 | Brown | |
| 09:25 | 2 | 46.00 | 7.01 | 5.90 | 28.6 | 82.8 | 4.40 | 1,000.00 | Cloudy | |
| 09:30 | 2 | 46.00 | 7.20 | 6.14 | 28.4 | 79.0 | 3.20 | 1,000.00 | Cloudy | |
| 09:35 | 2 | 46.00 | 6.99 | 6.39 | 28.7 | 79.4 | 3.50 | 1,000.00 | Brown | |
| 09:40 | 2 | 46.00 | 7.09 | 6.39 | 28.7 | 80.4 | 4.60 | 1,000.00 | Cloudy | |
| 09:45 | 2 | 46.00 | 7.27 | 6.79 | 28.8 | 81.1 | 6.50 | 84.80 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW13D**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 76.40 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 36.05 | Ft btoc |
| Event Date: | 06/17/2022 | Water Column: | 40.35 | Ft |
| Development Team: | Chris Reed, R.Etiemble | Screened Interval: | 66-76 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 6.59 | Gal |
| Equipment | Submersible Pump<br>Whale Super Purger WP6012<br>YSI, Turbidity Meter, YSI (C103143)<br>MiniRAE, MiniRAE 3000 (C103319) | Start Time: | 14:05 | |
| Tubing Materials: | HDPE<br>3/8 x 1/2 | End Time: | 14:51 | |
| | | Total Volume Purged: | 15 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:05 | 1 | 46.80 | 6.84 | 14.90 | 29.1 | 126.9 | 1.95 | 1,000.00 | Brown | |
| 14:29 | 1 | 56.70 | 7.02 | 10.51 | 28.6 | 119.8 | 1.05 | 49.50 | Clear | |
| 14:44 | 1 | 62.65 | 6.77 | 13.70 | 29.0 | 131.0 | 0.76 | 10.20 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW14**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 44.72 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 34.6 | Ft btoc |
| Event Date: | 05/17/2022 | Water Column: | 10.12 | Ft |
| Development Team: | Caitlin Dronfield, Tatum Magill | Screened Interval: | 31.5-41.5 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.65 | Gal |
| Equipment | Submersible Pump<br>YSI, Turbidity Meter, YSI Quatro C103145<br>MiniRAE, MiniRAE 3001 Honeywell | Start Time: | 10:12 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 10:48 | |
| | | Total Volume Purged: | 21 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 10:17 | 1 | 44.00 | 6.90 | 4.76 | 29.9 | 90.4 | 3.50 | 1,000.00 | Brown | |
| 10:22 | 1 | 44.00 | 6.85 | 4.71 | 29.6 | 85.6 | 1.40 | 1,000.00 | Brown | |
| 10:27 | 1 | 44.00 | 6.91 | 4.70 | 29.5 | 82.9 | 3.90 | 1,000.00 | Brown | |
| 10:32 | 1 | 44.00 | 7.05 | 2.70 | 2.5 | 86.8 | 2.40 | 1,000.00 | Brown | |
| 10:37 | 1 | 44.00 | 7.11 | 4.75 | 29.7 | 85.9 | 3.20 | 1,000.00 | Cloudy | |
| 10:42 | 1 | 44.00 | 6.96 | 4.71 | 29.6 | 84.9 | 2.80 | 1,000.00 | Cloudy | |
| 10:47 | 1 | 44.00 | 7.09 | 4.75 | 29.6 | 82.9 | 2.90 | 216.00 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW16**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 54.30 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 38.26 | Ft btoc |
| Event Date: | 05/23/2022 | Water Column: | 16.04 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 42-52 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 2.62 | Gal |
| Equipment | Submersible Pump, Surge Block<br>YSI, Turbidity Meter, YSI Quatro Backup<br>MiniRAE, MiniRAE 3001 Honeywell | Start Time: | 15:42 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 16:18 | |
| | | Total Volume Purged: | 30 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 15:47 | 1 | 40.04 | 6.86 | 5.52 | 28.9 | 75.7 | 1.13 | 1,000.00 | Brown | |
| 15:52 | 1 | 43.19 | 6.95 | 5.10 | 28.8 | 11.2 | 1.66 | 1,000.00 | Brown | |
| 15:57 | 1 | 43.68 | 6.85 | 5.47 | 28.7 | 43.6 | 0.95 | 1,000.00 | Cloudy | |
| 16:02 | 1 | 43.63 | 6.82 | 5.64 | 28.7 | 66.9 | 0.93 | 333.00 | Cloudy | |
| 16:07 | 1 | 43.82 | 6.80 | 5.70 | 28.5 | 76.2 | 0.68 | 127.00 | Clear | |
| 16:08 | 1 | 44.25 | 6.81 | 5.71 | 28.5 | 83.6 | 0.89 | 151.00 | Clear | |
| 16:17 | 1 | 45.10 | 6.77 | 5.71 | 28.5 | 87.1 | 0.75 | 17.50 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW17**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 54.19 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 34.7 | Ft btoc |
| Event Date: | 05/17/2022 | Water Column: | 17.06 | Ft |
| Development Team: | Caitlin Dronfield, Tatum Magill | Screened Interval: | 41-51 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 2.78 | Gal |
| Equipment | Bladder Pump, Surge Block<br>YSI, Turbidity Meter, YSI Quatro C103145<br>MiniRAE, MiniRAE 3001 Honeywell | Start Time: | 16:19 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 16:39 | |
| | | Total Volume Purged: | 10 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 16:24 | 1 | 54.00 | 7.20 | 9.34 | 28.5 | 79.8 | 2.40 | 1,000.00 | Cloudy | |
| 16:29 | 1 | 54.00 | 6.69 | 9.32 | 28.5 | 80.6 | 0.90 | 263.00 | Cloudy | |
| 16:34 | 1 | 54.00 | 6.75 | 9.33 | 147.0 | 78.7 | 1.30 | 147.00 | Clear | |
| 16:39 | 1 | 54.00 | 6.77 | 9.33 | 28.2 | 76.4 | 1.50 | 99.70 | Clear | |
| 16:39 | NM | NM | NM | NM | NM | NM | NM | NM | | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW17D**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 89.40 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 35.31 | Ft btoc |
| Event Date: | 06/17/2022 | Water Column: | 54.09 | Ft |
| Development Team: | Chris Reed, R.Etiemble | Screened Interval: | 79-89 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 8.83 | Gal |
| Equipment | Submersible Pump<br>Whale Super Purger WP6012<br>YSI, Turbidity Meter, YSI (C103143)<br>MiniRAE, MiniRAE 3000 (C103319) | Start Time: | 12:43 | |
| Tubing Materials: | HDPE<br>3/8 x 1/2 | End Time: | 12:59 | |
| | | Total Volume Purged: | 15 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 12:43 | 1 | 53.90 | 6.68 | 17.42 | 30.9 | 127.4 | 0.48 | 87.20 | Clear | |
| 12:50 | 1 | 55.05 | 6.60 | 16.78 | 28.8 | 120.2 | 0.35 | 128.00 | Clear | |
| 12:58 | 1 | 56.77 | 6.59 | 16.65 | 28.9 | 121.3 | 0.52 | 40.90 | | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW18**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 48.04 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 31.31 | Ft btoc |
| Event Date: | 05/17/2022 | Water Column: | 16.73 | Ft |
| Development Team: | Caitlin Dronfield, Tatum Magill | Screened Interval: | 35-45 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 2.73 | Gal |
| Equipment | Submersible Pump, Surge Block<br>YSI, Turbidity Meter, YSI Quatro C103145<br>MiniRAE, MiniRAE 3001 Honeywell | Start Time: | 14:40 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 15:15 | |
| | | Total Volume Purged: | 25 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:45 | 1 | 31.83 | 6.70 | 10.76 | 29.2 | 87.2 | 2.70 | 1,000.00 | Brown | |
| 14:47 | 1 | 31.81 | 6.59 | 10.85 | 28.9 | 81.0 | 0.90 | 1,000.00 | Cloudy | |
| 14:55 | 1 | 31.81 | 6.67 | 10.81 | 28.7 | 79.9 | 1.40 | 1,000.00 | Cloudy | |
| 15:00 | 1 | 31.79 | 6.67 | 11.01 | 28.7 | 79.5 | 1.10 | 607.00 | Cloudy | |
| 15:05 | 1 | 31.79 | 6.87 | 11.02 | 28.7 | 77.4 | 1.10 | 451.00 | Cloudy | |
| 15:10 | 1 | 31.79 | 6.95 | 11.03 | 28.6 | 78.1 | 1.90 | 330.00 | Cloudy | |
| 15:15 | 1 | 31.80 | 6.72 | 11.02 | 28.6 | 77.1 | 1.30 | 243.00 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW19**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 41.74 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 30.74 | Ft btoc |
| Event Date: | 05/17/2022 | Water Column: | 11 | Ft |
| Development Team: | Caitlin Dronfield, Tatum Magill | Screened Interval: | 29-39 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.8 | Gal |
| Equipment | Submersible Pump, Surge Block<br>YSI, Turbidity Meter, YSI Quatro C103145<br>MiniRAE, MiniRAE 3001 Honeywell | Start Time: | 13:44 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 14:11 | |
| | | Total Volume Purged: | 20 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 13:48 | 1 | 41.00 | 6.69 | 11.09 | 29.4 | 85.7 | 3.50 | 1,000.00 | Brown | |
| 13:53 | 1 | 41.00 | 6.64 | 11.20 | 29.1 | 82.2 | 3.70 | 1,000.00 | Brown | |
| 13:58 | 1 | 41.00 | 6.65 | 11.19 | 28.9 | 80.8 | 3.20 | 1,000.00 | Brown | |
| 14:03 | 1 | 41.00 | 6.70 | 11.47 | 28.8 | 79.9 | 2.50 | 748.00 | Cloudy | |
| 14:08 | 1 | 41.00 | 6.74 | 11.50 | 28.6 | 80.5 | 1.60 | 76.40 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW20**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 52.90 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 35.8 | Ft btoc |
| Event Date: | 06/20/2022 | Water Column: | 17.1 | Ft |
| Development Team: | Chris Reed, R.Etiemble | Screened Interval: | 42.5-52.5 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 2.79 | Gal |
| Equipment | Submersible Pump<br>Whale Super Purger WP6012<br>YSI, Turbidity Meter, YSI (C103143)<br>MiniRAE, MiniRAE 3000 (C103319) | Start Time: | 12:14 | |
| Tubing Materials: | HDPE<br>3/8 x 1/2 | End Time: | 12:44 | |
| | | Total Volume Purged: | 26 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 12:14 | 1 | 40.03 | 6.71 | 6.69 | 31.3 | 88.3 | 1.13 | 1,000.00 | Brown | |
| 12:23 | 1 | 43.52 | 6.72 | 7.12 | 28.7 | 73.1 | 0.82 | 581.00 | Cloudy | |
| 12:29 | 1 | 43.84 | 6.71 | 7.11 | 28.4 | 71.1 | 0.73 | 723.00 | | |
| 12:40 | 1 | 43.75 | 6.81 | 7.10 | 28.3 | 79.9 | 0.91 | 323.00 | Cloudy | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW21**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 63.45 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 37.28 | Ft btoc |
| Event Date: | 06/17/2022 | Water Column: | 26.17 | Ft |
| Development Team: | Chris Reed, R.Etiemble | Screened Interval: | 53.5-63.5 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 4.27 | Gal |
| Equipment | Submersible Pump<br>Whale Super Purger WP6012<br>YSI, Turbidity Meter, YSI (C103143)<br>MiniRAE, MiniRAE 3000 (C103319) | Start Time: | 16:22 | |
| Tubing Materials: | HDPE<br>3/8 x 1/2 | End Time: | 16:36 | |
| | | Total Volume Purged: | 11 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 16:22 | 1 | 43.65 | 7.15 | 3.64 | 28.5 | 112.5 | 2.28 | 1,000.00 | Brown | |
| 16:29 | 1 | 43.68 | 7.01 | 3.80 | 28.2 | 121.5 | 0.99 | 459.00 | Clear | |
| 16:33 | 1 | 43.72 | 7.03 | 3.69 | 28.1 | 121.6 | 0.87 | 31.60 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW22**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 41.40 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 32.39 | Ft btoc |
| Event Date: | 06/20/2022 | Water Column: | 9.01 | Ft |
| Development Team: | Chris Reed, R.Etiemble | Screened Interval: | 31 - 41 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.47 | Gal |
| Equipment | Submersible Pump<br>Whale Super Purger WP6012<br>YSI, Turbidity Meter, YSI (C103143)<br>MiniRAE, MiniRAE 3000 (C103319) | Start Time: | 14:30 | |
| Tubing Materials: | HDPE<br>3/8 x 1/2 | End Time: | 14:54 | |
| | | Total Volume Purged: | 23 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:30 | 1 | 32.56 | 6.84 | 4.10 | 30.6 | 113.9 | 0.98 | 1,000.00 | Brown | |
| 14:48 | 1 | 34.30 | 6.84 | 4.00 | 28.9 | 113.5 | 1.36 | 334.00 | Cloudy | |
| 14:53 | 1 | 34.86 | 6.83 | 3.99 | 28.6 | 115.2 | 0.99 | 232.00 | Cloudy | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW23**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 40.05 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 30.95 | Ft btoc |
| Event Date: | 06/17/2022 | Water Column: | 9.1 | Ft |
| Development Team: | Chris Reed, R.Etiemble | Screened Interval: | 31-41 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.49 | Gal |
| Equipment | Submersible Pump<br>Whale Super Purger WP6012<br>YSI, Turbidity Meter, YSI (C103143)<br>MiniRAE, MiniRAE 3000 (C103319) | Start Time: | 17:57 | |
| Tubing Materials: | HDPE<br>3/8 x 1/2 | End Time: | 18:33 | |
| | | Total Volume Purged: | 35 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 17:57 | 1 | 36.54 | 6.57 | 14.10 | 28.5 | 153.7 | 2.11 | 1,000.00 | Brown | |
| 18:08 | 1 | 38.50 | 6.58 | 14.24 | 28.2 | 154.6 | 1.15 | 851.00 | Cloudy | |
| 18:20 | 1 | 38.75 | 6.61 | 14.14 | 28.5 | 153.5 | 2.07 | 274.00 | Cloudy | |
| 18:32 | 1 | 38.82 | 6.59 | 14.09 | 28.4 | 152.0 | 1.79 | 32.80 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW24D**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 74.30 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 31.25 | Ft btoc |
| Event Date: | 06/17/2022 | Water Column: | 43.05 | Ft |
| Development Team: | Chris Reed, R.Etiemble | Screened Interval: | 64-74 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 7.03 | Gal |
| Equipment | Submersible Pump<br>Whale Super Purger WP6012<br>YSI, Turbidity Meter, YSI (C103143)<br>MiniRAE, MiniRAE 3000 (C103319) | Start Time: | 10:09 | |
| Tubing Materials: | HDPE<br>3/8 x 1/2 | End Time: | 10:55 | |
| | | Total Volume Purged: | 41 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 10:09 | 1 | 31.25 | 6.77 | 11.96 | 32.4 | 138.2 | 0.77 | 1,000.00 | Cloudy | |
| 10:41 | 1 | 46.15 | 6.88 | 11.30 | 28.7 | 39.3 | 0.92 | 67.90 | Clear | |
| 10:50 | 1 | 48.43 | 6.77 | 12.01 | 28.8 | 31.2 | 0.66 | 28.70 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW25**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 33.25 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 21.73 | Ft btoc |
| Event Date: | 05/13/2022 | Water Column: | 11.52 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 23-33 | Ft btoc |
| | | Stickup Height Above Surface: | 2.4 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.88 | Gal |
| Equipment | Submersible Pump, Surge Block<br><br>YSI, Turbidity Meter, YSI Quatro Backup MiniRAE, MiniRAE 3000 Honeywell C103319 | Start Time: | 08:32 | |
| Tubing Materials: | HDPE<br>3/8" ID | End Time: | 08:56 | |
| | | Total Volume Purged: | 46 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 08:32 | 2 | 27.01 | 6.55 | 14.43 | 27.7 | 128.0 | 2.15 | 1,000.00 | Cloudy | |
| 08:37 | 2 | 27.60 | 6.65 | 13.79 | 27.7 | 97.8 | 1.18 | 1,000.00 | Cloudy | |
| 08:41 | 2 | 28.19 | 6.65 | 13.88 | 27.7 | 86.2 | 0.90 | 1,000.00 | Cloudy | |
| 08:46 | 2 | 28.34 | 6.66 | 1.27 | 27.7 | 81.1 | 1.17 | 531.00 | Cloudy | |
| 08:50 | 2 | 28.55 | 6.70 | 7.29 | 27.5 | 70.5 | 1.75 | 588.00 | Cloudy | |
| 08:55 | 2 | 28.62 | 6.67 | 13.84 | 27.7 | 76.2 | 1.51 | 135.00 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW25D**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 73.29 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 21.31 | Ft btoc |
| Event Date: | 05/13/2022 | Water Column: | 51.98 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 61-71 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 8.48 | Gal |
| Equipment | Submersible Pump, Surge Block<br>YSI, Turbidity Meter, YSI Quatro Backup<br>MiniRAE, MiniRAE 3000 Honeywell C103319 | Start Time: | 09:00 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 09:38 | |
| | | Total Volume Purged: | 70 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 09:00 | 2 | 40.03 | 6.94 | 9.87 | 28.7 | 89.9 | 1.45 | 76.00 | Clear | |
| 09:31 | 2 | 54.61 | 6.83 | 10.99 | 28.3 | 84.7 | 1.26 | 32.30 | Clear | |
| 09:35 | 2 | 55.84 | 6.78 | 11.56 | 28.2 | 80.6 | 1.56 | 20.80 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW27**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 33.10 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 12.37 | Ft btoc |
| Event Date: | 06/20/2022 | Water Column: | 20.73 | Ft |
| Development Team: | Chris Reed, R.Etiemble | Screened Interval: | 23.4 - 33.4 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 3.38 | Gal |
| Equipment | Submersible Pump<br>Whale Super Purger WP6012<br>YSI, Turbidity Meter, YSI (C103143)<br>MiniRAE, MiniRAE 3000 (C103319) | Start Time: | 15:50 | |
| Tubing Materials: | HDPE<br>3/8 x 1/2 | End Time: | 16:25 | |
| | | Total Volume Purged: | 12 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 16:08 | 1 | 14.16 | 6.61 | 30.95 | 29.0 | 163.8 | 1.06 | 1,000.00 | Brown | |
| 16:13 | 1 | 16.75 | 6.58 | 31.70 | 28.1 | 164.7 | 0.84 | 90.90 | Clear | |
| 16:20 | 1 | 18.34 | 6.59 | 31.83 | 27.7 | 163.2 | 0.70 | 49.80 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW28**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 26.05 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 10.31 | Ft btoc |
| Event Date: | 05/23/2022 | Water Column: | 15.74 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 16-26 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 2.57 | Gal |
| Equipment | Submersible Pump, Surge Block<br>YSI, Turbidity Meter, YSI Quatro Backup MiniRAE, MiniRAE 3001 Honeywell | Start Time: | 12:15 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 12:40 | |
| | | Total Volume Purged: | 30 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 12:20 | 2 | 12.45 | 6.71 | 18.09 | 28.8 | 93.4 | 1.07 | 1,000.00 | Cloudy | |
| 12:25 | 2 | 12.46 | 6.73 | 17.87 | 28.4 | 96.8 | 1.05 | 497.00 | Cloudy | |
| 12:30 | 2 | 12.46 | 6.73 | 17.89 | 28.3 | 94.1 | 0.96 | 252.00 | Cloudy | |
| 12:35 | 2 | 12.47 | 6.76 | 17.97 | 28.4 | 87.6 | 1.24 | 167.00 | Clear | |
| 12:40 | 2 | 12.48 | 6.74 | 17.90 | 28.2 | 87.3 | 1.01 | 118.00 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW28D**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 55.39 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 9.11 | Ft btoc |
| Event Date: | 05/23/2022 | Water Column: | 46.28 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 45-55 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 7.55 | Gal |
| Equipment | Submersible Pump, Surge Block<br>YSI, Turbidity Meter, YSI Quatro Backup<br>MiniRAE, MiniRAE 3001 Honeywell | Start Time: | 11:38 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 11:50 | |
| | | Total Volume Purged: | 20 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 11:40 | 2 | 55.00 | 6.77 | 22.34 | 30.3 | 199.4 | 0.93 | 1,000.00 | Cloudy | |
| 11:45 | 2 | 55.00 | 6.77 | 23.20 | 28.7 | 172.3 | 0.73 | 46.90 | Clear | |
| 11:50 | 2 | 55.00 | 6.77 | 23.52 | 28.6 | 133.7 | 0.83 | 13.90 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW29**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 30.18 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 17.78 | Ft btoc |
| Event Date: | 05/13/2022 | Water Column: | 12.4 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 20-30 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 2.02 | Gal |
| Equipment | Submersible Pump, Surge Block<br>YSI, Turbidity Meter, YSI Quatro Backup<br>MiniRAE, MiniRAE 3000 Honeywell C103319 | Start Time: | 10:20 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 10:48 | |
| | | Total Volume Purged: | 35 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 10:20 | 2 | 28.00 | 6.56 | 21.47 | 28.3 | 85.1 | 2.50 | 1,000.00 | Cloudy | |
| 10:26 | 0.5 | 28.00 | 6.55 | 21.23 | 27.7 | 77.9 | 2.32 | 761.00 | Cloudy | |
| 10:32 | 2 | 28.00 | 6.59 | 21.18 | 27.5 | 76.0 | 3.39 | 90.30 | Clear | |
| 10:42 | 2 | 28.00 | 6.85 | 21.16 | 27.5 | 75.0 | 3.45 | 75.30 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW30**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 33.30 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 23.3 | Ft btoc |
| Event Date: | 05/13/2022 | Water Column: | 10 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 20-30 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.63 | Gal |
| Equipment | Submersible Pump, Surge Block<br>YSI, Turbidity Meter, YSI Quatro Backup<br>MiniRAE, MiniRAE 3000 Honeywell C103319 | Start Time: | 11:25 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 11:44 | |
| | | Total Volume Purged: | 36 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 11:25 | 2 | 30.13 | 6.54 | 11.28 | 29.2 | 98.5 | 4.03 | 1,000.00 | Brown | |
| 11:31 | 2 | 31.00 | 6.47 | 20.04 | 28.8 | 68.4 | 2.24 | 178.00 | Clear | |
| 11:43 | 2 | 31.00 | 6.49 | 19.95 | 28.7 | 57.8 | 2.60 | 30.40 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: EPI04-MW31**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 31.13 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 13.83 | Ft btoc |
| Event Date: | 05/23/2022 | Water Column: | 17.3 | Ft |
| Development Team: | Caitlin Dronfield | Screened Interval: | 21-31 | Ft btoc |
| | | Stickup Height Above Surface: | 3 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 2.82 | Gal |
| Equipment | Submersible Pump, Surge Block<br>YSI, Turbidity Meter, YSI Quatro Backup MiniRAE, MiniRAE 3000 Honeywell C103319 | Start Time: | 14:03 | |
| Tubing Materials: | HDPE<br>3/8” | End Time: | 14:58 | |
| | | Total Volume Purged: | 65 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:05 | 2 | 19.05 | 7.08 | 17.29 | 29.4 | 104.4 | 4.11 | 1,000.00 | Brown | |
| 14:10 | 2 | 23.57 | 6.97 | 17.20 | 28.6 | 108.5 | 0.80 | 1,000.00 | Brown | |
| 14:15 | 2 | 26.18 | 6.98 | 17.97 | 28.5 | 105.6 | 1.53 | 1,000.00 | Brown | |
| 14:20 | 2 | 27.42 | 6.99 | 18.38 | 28.4 | 103.4 | 2.23 | 1,000.00 | Brown | |
| 14:25 | 1 | 27.88 | 7.05 | 11.87 | 28.5 | 100.2 | 3.57 | 1,000.00 | Brown | |
| 14:30 | 1 | 31.00 | 7.01 | 18.23 | 28.4 | 100.3 | 2.79 | 1,000.00 | Brown | |
| 14:35 | 1 | 31.00 | 7.02 | 18.43 | 28.5 | 97.9 | 3.36 | 1,000.00 | Cloudy | |

| WELL STABILIZATION DATA | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Time** | **Pumping rate (gal/min)** | **Water level (ft btoc)** | **pH (SU)** | **S. COND. (mS/cm)** | **Temp. (°C)** | **ORP (mV)** | **D.O. (mg/L)** | **Turbidity (NTU)** | **Appearance** | **Comments** |
| 14:40 | 1 | 31.00 | 7.06 | 16.75 | 28.6 | 95.0 | 3.78 | 380.00 | Cloudy | |
| 14:45 | 1 | 31.00 | 7.02 | 18.48 | 28.6 | 94.2 | 3.49 | 1,000.00 | Brown | |
| 14:50 | 1 | 30.45 | 7.08 | 17.99 | 28.6 | 92.1 | 4.25 | 298.00 | Cloudy | |
| 14:55 | 1 | 28.77 | 7.09 | 17.86 | 28.5 | 90.2 | 4.29 | 61.50 | Clear | |
| 14:58 | NM | NM | NM | NM | NM | NM | NM | NM | | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330

# WELL DEVELOPMENT LOG

**WELL ID: VEFS-PFAS-MW01**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 65.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 43.03 | Ft btoc |
| Event Date: | 06/16/2022 | Water Column: | 21.97 | Ft |
| Development Team: | Chris Reed | Screened Interval: | 55-65 | Ft btoc |
| | | Stickup Height Above Surface: | 2.32 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 3.59 | Gal |
| Equipment | Submersible Pump<br>YSI, YSI Quatro Backup<br>MiniRAE, MiniRAE 3000 Honeywell C103319 | Start Time: | 10:02 | |
| Tubing Materials: | Poly Tubing<br>3/8 x 1/2 | End Time: | 12:00 | |
| | | Total Volume Purged: | 76 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 10:02 | 1 | 56.30 | 7.05 | 2.80 | 30.3 | 155.9 | 1.43 | 1,000.00 | Cloudy | |
| 11:18 | 1 | 60.50 | 7.37 | 2.85 | 31.0 | 124.8 | 3.43 | 1,000.00 | Cloudy | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: VEFS-PFAS-MW02**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 67.40 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 43.45 | Ft btoc |
| Event Date: | 06/16/2022 | Water Column: | 23.95 | Ft |
| Development Team: | Chris Reed, R.Etiemble | Screened Interval: | 57-67 | Ft btoc |
| | | Stickup Height Above Surface: | -0.17 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 3.91 | Gal |
| Equipment | Submersible Pump<br>YSI, YSI Quatro Backup<br>MiniRAE, MiniRAE 3000 Honeywell C103319 | Start Time: | 12:57 | |
| Tubing Materials: | Poly Tubing<br>3/8 x 1/2 | End Time: | 14:12 | |
| | | Total Volume Purged: | 41 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 12:57 | 1 | 56.33 | 7.22 | 0.95 | 29.8 | 132.3 | 2.27 | 1,000.00 | Cloudy | |
| 13:38 | 1 | 58.65 | 7.22 | 0.94 | 31.5 | 134.2 | 5.04 | 237.00 | Cloudy | |
| 14:11 | 1 | 59.55 | 7.55 | 1.01 | 29.9 | 132.6 | 2.68 | 777.00 | | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building

# WELL DEVELOPMENT LOG

**WELL ID: VEW10-PFAS-MW01**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 34.41 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 25.94 | Ft btoc |
| Event Date: | 03/15/2022 | Water Column: | 8.47 | Ft |
| Development Team: | Beth Davis | Screened Interval: | 22-32 | Ft btoc |
| | | Stickup Height Above Surface: | 2.41 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.38 | Gal |
| Equipment | Submersible Pump<br>YSI, Turbidity Meter | Start Time: | 09:20 | |
| Tubing Materials: | Poly Tubing<br>1/2" ID | End Time: | 09:50 | |
| | | Total Volume Purged: | 25 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 09:25 | 1 | NM | 6.55 | 17.35 | 28.5 | 75.7 | 2.20 | 1,000.00 | Brown | |
| 09:30 | 1 | NM | 6.74 | 13.40 | 28.8 | 70.4 | 4.30 | 1,000.00 | | |
| 09:36 | 1 | NM | 6.82 | 11.63 | 28.3 | 66.4 | 4.20 | 629.00 | Cloudy | |
| 09:41 | 1 | NM | 6.78 | 11.14 | 28.3 | 70.7 | 2.80 | 442.00 | Cloudy | |
| 09:45 | 1 | NM | 6.73 | 10.96 | 28.1 | 74.7 | 2.00 | 111.00 | Cloudy | |
| 09:50 | 1 | 28.88 | 6.80 | 11.20 | 29.3 | 76.0 | 2.60 | 83.00 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: VEW10-PFAS-MW02**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 36.33 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 22.84 | Ft btoc |
| Event Date: | 03/15/2022 | Water Column: | 13.79 | Ft |
| Development Team: | Beth Davis | Screened Interval: | 25-35 | Ft btoc |
| | | Stickup Height Above Surface: | 3.13 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 2.25 | Gal |
| Equipment | Submersible Pump<br>YSI, Turbidity Meter | Start Time: | 10:05 | |
| Tubing Materials: | Poly Tubing<br>.5" ID | End Time: | 11:06 | |
| | | Total Volume Purged: | 36.65 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 10:15 | 1 | NM | 6.76 | 13.38 | 29.8 | -98.8 | 0.90 | 1,000.00 | Brown | |
| 10:22 | 1 | NM | 6.81 | 13.41 | 28.6 | -73.8 | 3.30 | 1,000.00 | Brown | |
| 10:28 | 0.75 | NM | 6.77 | 13.74 | 29.0 | -79.8 | 2.50 | 1,000.00 | Brown | |
| 10:34 | 0.75 | NM | 6.75 | 13.75 | 27.7 | -68.5 | 2.20 | 1,000.00 | Brown | |
| 10:40 | 0.75 | NM | 6.77 | 13.86 | 29.1 | -54.4 | 2.70 | 553.00 | Cloudy | |
| 10:47 | 0.6 | NM | 6.75 | 13.74 | 28.7 | -52.0 | 3.40 | 265.00 | Cloudy | |
| 10:53 | 1 | NM | 6.73 | 13.82 | 28.7 | -50.9 | 2.50 | 272.00 | Clear | |
| 11:00 | 0.7 | 30.64 | 6.71 | 13.81 | 29.2 | -50.1 | 2.60 | 233.00 | Clear | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: VEW10-PFAS-MW03**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 38.14 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 15.89 | Ft btoc |
| Event Date: | 03/15/2022 | Water Column: | 22.85 | Ft |
| Development Team: | Beth Davis | Screened Interval: | 25-35 | Ft btoc |
| | | Stickup Height Above Surface | 3.14 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 2.49 | Gal |
| Equipment | Submersible Pump<br>YSI, Turbidity Meter,<br>None, | Start Time: | 08:00 | |
| Tubing Materials: | Poly Tubing<br>1/2" ID | End Time: | 09:03 | |
| | | Total Volume Purged: | 7.92 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 08:04 | 1 | NM | NM | NM | NM | NM | NM | NM | Brown | Purged Dry |
| 08:19 | 0.14 | NM | NM | NM | NM | NM | NM | NM | Brown | Purged Dry |
| 08:29 | 0.05 | NM | NM | NM | NM | NM | NM | NM | Brown | Purged Dry |
| 08:41 | 0.04 | NM | 7.39 | 12.76 | 28.3 | 39.3 | 6.20 | 1,000.00 | Brown | |
| 08:51 | 0.04 | NM | 7.43 | 12.81 | 28.2 | 20.5 | 5.80 | 1,000.00 | Brown | |
| 09:02 | 0.04 | 34.68 | 7.41 | 12.90 | 28.5 | 0.8 | 4.90 | 645.00 | Cloudy | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# WELL DEVELOPMENT LOG

**WELL ID: VEW10-PFAS-MW04**

| | | | | |
|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Well Depth: | 16.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Initial Static Water Level: | 8.73 | Ft btoc |
| Event Date: | 03/14/2022 | Water Column: | 7.27 | Ft |
| Development Team: | Beth Davis | Screened Interval: | 6-16 | Ft btoc |
| | | Stickup Height Above Surface: | 2.61 | Ft |
| | | Well Diameter: | 2 | In |
| | | Volume per Foot: | 0.163 | Gal/ft |
| Development Method: | Submersible pump purging across screen interval and surge block swabbing | Well Volume: | 1.19 | Gal |
| Equipment | Submersible Pump<br>YSI | Start Time: | 16:08 | |
| Tubing Materials: | Poly Tubing<br>1/2" ID | End Time: | 17:10 | |
| | | Total Volume Purged: | 26.65 | Gal |

## WELL STABILIZATION DATA

| Time | Pumping rate (gal/min) | Water level (ft btoc) | pH (SU) | S. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 16:14 | 1 | NM | 6.53 | 28.93 | 27.9 | 45.7 | 5.30 | 1,000.00 | Brown | |
| 16:27 | 0.75 | NM | 6.53 | 29.12 | 27.9 | 44.1 | 5.80 | 1,000.00 | Brown | |
| 16:34 | 0.4 | NM | 6.57 | 27.94 | 27.7 | 47.2 | 5.50 | 1,000.00 | Brown | |
| 16:42 | 0.4 | NM | 6.72 | 27.25 | 27.7 | 48.7 | 5.40 | 1,000.00 | Brown | |
| 16:52 | 0.2 | NM | 6.57 | 26.70 | 27.2 | 49.2 | 6.80 | 255.00 | Cloudy | |
| 17:01 | 0.35 | NM | 6.57 | 27.54 | 27.5 | 46.9 | 5.60 | 411.00 | Cloudy | |
| 17:07 | 0.3 | 14.29 | 6.56 | 26.58 | 27.2 | 48.6 | 6.60 | 440.00 | Cloudy | |

**Legend: gal/min=** gallons per minute **SU**= Standard Units **mS/cm** = millisiemens per centimeter **mL/min**= milliliters per minute **mL**= milliliters **mV**= millivolts **mg/L**= micrograms per liter **NTU=** Nephelometric Turbidity Unit **btoc=** below top of casing **Ft**=feet **°C**=Degrees Centigrade **mg/L** =milligrams per Liter **OD** = outer diameter **ID** = Inner Diameter **In**= inches **NM**= Not Measured

# Appendix D
# Groundwater Purge Logs

# NASD AOC B: Former Wastewater Treatment Plant at the Public Works Area

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VWAB-PFAS-MW01**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 88.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 56.67 | Ft btoc |
| Start Date: | July 9, 2022 | Weather: | Partly Cloudy , 86 F | Water Column: | 31.33 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Submersible Pump<br>Hurricane Pump Control Box (C102311) | | | Purging Start Time: | 00:18 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>3/8” | | | Total Volume Purged: | | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 00:33 | 150 | 0 | 65.36 | 6.99 | 1.57 | 28.60 | 223.80 | 1.96 | 462.00 | Cloudy |
| 12:38 | 150 | 28.73 | 67.47 | 7.02 | 1.57 | 28.60 | 219.20 | 1.66 | 413.00 | Cloudy |
| 12:43 | 250 | 0.33 | 68.58 | 7.03 | 1.57 | 28.50 | 211.80 | 1.58 | 305.00 | Cloudy |
| 12:48 | 250 | 0.33 | 69.70 | 7.04 | 1.57 | 28.80 | 205.40 | 1.36 | 264.00 | Cloudy |
| 12:53 | 250 | 0.33 | 70.52 | 7.06 | 1.57 | 29.10 | 199.70 | 1.27 | 110.00 | Cloudy |
| 12:59 | 250 | 0.4 | 71.15 | 7.08 | 1.57 | 29.50 | 194.40 | 1.34 | 90.90 | Clear |
| 13:04 | 250 | 0.33 | 72.27 | 7.08 | 1.57 | 29.10 | 192.10 | 1.43 | 51.70 | Clear |
| 13:09 | 250 | 0.33 | 73.00 | 7.09 | 1.57 | 29.50 | 188.60 | 1.33 | 44.80 | Clear |
| 13:14 | 250 | 0.33 | 73.88 | 7.10 | 1.55 | 29.70 | 185.90 | 1.25 | 36.90 | Clear |
| 13:19 | 250 | 0.33 | 74.43 | 7.10 | 1.56 | 29.80 | 184.90 | 1.21 | 41.60 | Clear |
| 13:24 | 250 | 0.33 | 75.34 | 7.10 | 1.56 | 29.30 | 183.60 | 1.20 | 50.30 | Clear |
| 13:29 | 250 | 0.33 | 76.45 | 7.09 | 1.56 | 29.60 | 181.70 | 1.17 | 67.90 | Clear |
| 13:34 | 250 | 0.33 | 76.99 | 7.09 | 1.57 | 29.40 | 180.20 | 1.55 | 52.60 | Clear |
| 13:39 | 250 | 0.33 | 77.67 | 7.09 | 1.57 | 29.50 | 179.30 | 1.30 | 33.90 | Clear |

| ch2m | GROUNDWATER SAMPLING DATA SHEET | WELL ID: VWAB-PFAS-MW01 |
|---|---|---|

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VWAB-PFAS-GW01-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-15 | Shipment Method: | |
| Collection Date/Time: | 07/09/22 01:40 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# NASD Former Fire Station Building 2046 at the Public Works Area

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VWFS-PFAS-MW01**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 61.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 57.87 | Ft btoc |
| Start Date: | June 23, 2022 | Weather: | Sunny , 90 F | Water Column: | 3.13 | Ft |
| Sampling Team: | Chris Reed, Reece Etiemble, Tim Dronfield Reece Etiemble, Tim Dronfield | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Submersible Pump Hurricane Pump #1345 (C-102814) | | | Purging Start Time: | 09:37 | |
| | | | | Purging End Time: | 09:55 | |
| Tubing Materials: | HDPE 3/8 x 1/2 | | | Total Volume Purged: | 2.00 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 59 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 09:40 | 300 | 0 | 57.95 | 7.10 | 0.86 | 28.80 | 158.90 | 0.71 | 112.00 | Clear |
| 09:45 | 200 | 1.74 | 58.58 | 7.15 | 0.88 | 30.50 | 118.80 | 0.51 | 118.00 | Clear |
| 09:50 | 200 | 1.69 | 58.92 | 7.14 | 0.91 | 30.20 | 104.80 | 0.83 | 121.00 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VWFS-PFAS-GW01-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-18 | Shipment Method: | |
| Collection Date/Time: | 06/23/22 10:30 | QC Sample: | YES |
| Sample Comments: | Pump stopped pumping due low head pressure. Allowed groundwater to recharge then collected first-draw sample. Actual sample location is VWFS-PFAS-MW01, but temporarily logged as VWMP-PFAS-MW01. Primary sample at 10:30; duplicate at 10:35. | QC Sample ID: | VWFS-PFAS-GW01P-0622 |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VWFS-PFAS-MW02**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 67.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 57.75 | Ft btoc |
| Start Date: | June 22, 2022 | Weather: | Sunny , 95 F | Water Column: | 9.25 | Ft |
| Sampling Team: | Chris Reed, other Reece Etiemble, Tim Dronfield | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 1.51 | Gal |
| Equipment | Submersible Pump Hurricane Pump #1345 (C-102814) | | | Purging Start Time: | 16:05 | |
| | | | | Purging End Time: | 16:40 | |
| Tubing Materials: | HDPE 3/8 x 1/2 | | | Total Volume Purged: | | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 64 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 16:05 | 300 | 0 | 57.75 | 7.00 | 1.02 | 30.00 | 145.60 | 1.63 | 375.00 | Cloudy |
| 16:10 | 300 | 0.4 | 57.98 | 6.98 | 1.02 | 29.20 | 151.40 | 2.06 | 251.00 | Clear |
| 16:15 | 300 | 0.4 | 58.03 | 6.98 | 1.02 | 29.30 | 152.60 | 1.92 | 139.00 | Clear |
| 16:20 | 300 | 0.4 | 58.05 | 6.97 | 1.02 | 29.30 | 154.20 | 2.03 | 128.00 | Clear |
| 16:25 | 300 | 0.4 | 58.05 | 6.97 | 1.02 | 29.50 | 155.30 | 2.03 | 96.30 | Clear |
| 16:30 | 300 | 0.4 | 58.05 | 6.97 | 1.02 | 29.40 | 157.10 | 2.06 | 86.10 | Clear |
| 16:35 | 300 | 0.4 | 57.98 | 6.96 | 1.02 | 29.80 | 157.80 | 2.04 | 63.90 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VWFS-PFAS-GW02-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-17 | Shipment Method: | |
| Collection Date/Time: | 06/22/22 16:40 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | VWFS-PFAS-GW02-0622-MS VWFS-PFAS-GW02-0622-MSD |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# Potential Former NASD Motor Pool Area

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VWMP-PFAS-MW01**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 55.74 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 47.73 | Ft btoc |
| Start Date: | July 9, 2022 | Weather: | Partly Cloudy , 88 F | Water Column: | 8.01 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Submersible Pump<br>Hurricane Pump Control Box (C102311) | | | Purging Start Time: | 15:48 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>3/8” | | | Total Volume Purged: | | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 15:51 | 300 | 0 | 48.19 | 7.08 | 1.27 | 28.70 | 97.70 | 0.98 | 747.00 | Cloudy |
| 15:54 | 200 | | 47.32 | 6.81 | 1.26 | 28.90 | 99.30 | 0.46 | 1,000.00 | Brown |
| 15:59 | 200 | 0.26 | 46.96 | 6.76 | 1.26 | 29.20 | 104.60 | 0.46 | 1,000.00 | Brown |
| 16:04 | 200 | 0.26 | 46.95 | 6.73 | 1.25 | 29.50 | 109.40 | 0.50 | 1,000.00 | Brown |
| 16:09 | 200 | 0.26 | 46.95 | 6.67 | 1.24 | 29.80 | 122.00 | 0.62 | 1,000.00 | Brown |
| 16:14 | 200 | 0.26 | 46.93 | 6.61 | 1.24 | 30.10 | 136.00 | 1.12 | 639.00 | Brown |
| 16:19 | 200 | 0.26 | 46.93 | 6.59 | 1.24 | 30.20 | 143.10 | 1.15 | 479.00 | Cloudy |
| 16:24 | 200 | 0.26 | 46.93 | 6.55 | 1.24 | 30.20 | 157.60 | 1.31 | 276.00 | Cloudy |
| 16:29 | 200 | 0.26 | 46.93 | 6.54 | 1.23 | 30.30 | 162.00 | 1.36 | 238.00 | Cloudy |
| 16:34 | 200 | 0.26 | 46.93 | 6.54 | 1.23 | 30.30 | 167.10 | 1.38 | 191.00 | Cloudy |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VWMP-PFAS-GW01-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-18 | Shipment Method: | |
| Collection Date/Time: | 07/09/22<br>16:35 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VWMP-PFAS-MW02**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 50.15 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 40.58 | Ft btoc |
| Start Date: | July 9, 2022 | Weather: | Partly Cloudy , F | Water Column: | 9.57 | Ft |
| Sampling Team: | | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Submersible Pump<br>Hurricane Pump Control Box (C102311) | | | Purging Start Time: | 17:30 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>3/8” | | | Total Volume Purged: | | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 43 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 17:35 | 400 | 0 | 40.75 | 6.81 | 1.26 | 29.40 | 224.40 | 0.28 | 1,000.00 | Brown |
| 17:40 | 400 | 0.53 | | 6.86 | 1.27 | 30.40 | 214.60 | 0.41 | 1,000.00 | Brown |
| 17:45 | 400 | 0.53 | 40.71 | 6.86 | 1.26 | 30.70 | 207.80 | 0.45 | 1,000.00 | Brown |
| 17:50 | 400 | 0.53 | 40.70 | 6.94 | 1.25 | 30.90 | 200.80 | 0.38 | 1,000.00 | Brown |
| 17:55 | 400 | 0.53 | 40.71 | 6.90 | 1.26 | 31.60 | 196.30 | 0.48 | 1,000.00 | Brown |
| 18:00 | 400 | 0.53 | 40.70 | 6.90 | 1.26 | 30.90 | 192.80 | 1.01 | 1,000.00 | Brown |
| 18:05 | 400 | 0.53 | 40.70 | 6.75 | 1.25 | 30.50 | 197.60 | 0.75 | 1,000.00 | Brown |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VWMP-PFAS-GW02-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-19 | Shipment Method: | |
| Collection Date/Time: | 07/09/22 18:05 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | -0722 |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VWMP-PFAS-MW03**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 48.90 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 39.33 | Ft btoc |
| Start Date: | July 9, 2022 | Weather: | Partly Cloudy , F | Water Column: | 9.57 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Submersible Pump<br>Hurricane Pump Control Box (C102311) | | | Purging Start Time: | 18:35 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>3/8” | | | Total Volume Purged: | | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 18:40 | 400 | 0 | 39.37 | 6.58 | 1.21 | 28.50 | 225.10 | 1.14 | 1,000.00 | Brown |
| 18:45 | 400 | 0.53 | 39.36 | 6.59 | 1.21 | 29.10 | 220.80 | 1.22 | 1,000.00 | Brown |
| 18:50 | 400 | 0.53 | 39.37 | 6.67 | 1.21 | 29.60 | 201.50 | 1.16 | 919.00 | Brown |
| 18:55 | 400 | 0.53 | 39.37 | 6.68 | 1.22 | 29.70 | 182.40 | 1.25 | 394.00 | Cloudy |
| 19:00 | 400 | 0.53 | 39.37 | 6.68 | 1.22 | 29.80 | 173.20 | 1.18 | 189.00 | Cloudy |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VWMP-PFAS-GW03-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-20 | Shipment Method: | |
| Collection Date/Time: | 07/09/22 19:00 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | VWMP-PFAS-GW03-0722-MS VWMP-PFAS-GW03-0722-MSD |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# NASD AOC H: Abandoned Power Plant/Former Fire Training Area

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VWAH-PFAS-MW01**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 21.15 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 8.4 | Ft btoc |
| Start Date: | June 28, 2022 | Weather: | Partly Cloudy , 86 F | Water Column: | 12.75 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101998) | | | Purging Start Time: | 12:17 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 16 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 12:25 | 300 | 0 | 8.94 | 6.94 | 1.35 | 27.00 | 137.10 | 0.10 | 3.15 | Clear |
| 12:30 | 300 | 0.4 | 9.02 | 6.96 | 1.34 | 27.00 | 102.80 | 0.10 | 3.83 | Clear |
| 12:35 | 280 | 0.37 | 9.09 | 6.98 | 1.45 | 27.00 | 76.10 | 0.10 | 3.41 | Clear |
| 12:40 | 280 | 0.37 | 9.14 | 6.96 | 1.77 | 27.20 | 67.70 | 0.10 | 2.92 | Clear |
| 12:45 | 200 | 0.26 | 9.09 | 6.98 | 2.00 | 27.30 | 65.70 | 0.10 | 2.66 | Clear |
| 12:50 | 200 | 0.26 | 9.09 | 6.99 | 2.20 | 27.40 | 64.90 | 0.10 | 3.10 | Clear |
| 12:54 | 200 | 0.21 | 9.09 | 6.97 | 2.75 | 27.40 | 68.70 | 0.10 | 2.55 | Clear |
| 12:58 | 200 | 0.21 | 9.11 | 6.96 | 2.88 | 27.30 | 66.40 | 0.10 | 2.57 | Clear |
| 13:02 | | | 9.11 | 6.94 | 3.16 | 27.20 | 67.00 | 0.10 | 2.45 | Clear |
| 13:06 | 209 | 0.22 | 9.12 | 6.95 | 3.34 | 27.30 | 66.60 | 0.10 | 2.66 | Clear |
| 13:10 | 200 | 0.21 | 9.13 | 6.94 | 3.49 | 27.50 | 67.20 | 0.10 | 2.46 | Clear |
| 13:18 | 200 | 0.42 | 9.16 | 6.91 | 4.37 | 27.40 | 72.70 | 0.10 | | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VWAH-PFAS-GW01-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-21 | Shipment Method: | |
| Collection Date/Time: | 06/28/22<br>13:20 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | VWAH-PFAS-GW01P-0622 |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VWAH-PFAS-MW02**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 18.15 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 7.12 | Ft btoc |
| Start Date: | June 28, 2022 | Weather: | Partly Cloudy , 87 F | Water Column: | 11.02 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 1.8 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101998) | | | Purging Start Time: | 13:47 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE, Other<br>1/4 | | | Total Volume Purged: | | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 13 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 13:50 | 300 | 0 | 7.44 | 6.83 | 9.75 | 27.80 | 125.20 | 0.90 | 31.30 | Micro bubbles giving the appearance of cloudiness |
| 13:53 | 300 | 0.24 | 7.45 | 6.84 | 9.20 | 28.20 | 121.50 | 0.20 | 13.80 | Clear |
| 13:56 | 300 | 0.24 | 7.48 | 6.84 | 9.23 | 27.90 | 120.50 | 0.10 | 8.97 | Clear |
| 13:59 | 300 | 0.24 | 7.50 | 6.82 | 9.60 | 27.80 | 118.90 | 0.10 | 10.80 | Clear |
| 14:02 | 300 | 0.24 | 7.52 | 6.79 | 10.07 | 28.00 | 115.90 | 0.10 | 7.62 | Clear |
| 14:05 | 300 | 0.24 | 7.54 | 6.78 | 10.49 | 27.80 | 111.80 | 0.10 | 5.09 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VWAH-PFAS-GW02-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-22 | Shipment Method: | |
| Collection Date/Time: | 06/28/22 14:05 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | VWAH-PFAS-GW02-0622-MS VWAH-PFAS-GW02-0622-MSD |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# NASD SWMU 7: Former Quebrada Disposal Site

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VWS7-PFAS-MW01**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 78.50 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 69.8 | Ft btoc |
| Start Date: | July 9, 2022 | Weather: | Cloudy , 88 F | Water Column: | 8.7 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 1.42 | Gal |
| Equipment | Submersible Pump | | | Purging Start Time: | 10:30 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE 3/8 | | | Total Volume Purged: | | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 73 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 10:35 | 300 | 0 | 70.57 | 6.82 | 1.25 | 27.60 | 161.20 | 0.45 | 71.90 | Clear |
| 10:38 | 300 | 0.24 | 70.55 | 6.86 | 1.25 | 27.90 | 155.40 | 0.52 | 56.10 | Clear |
| 10:41 | 300 | 0.24 | 70.56 | 6.88 | 1.25 | 28.10 | 152.90 | 0.58 | 36.40 | Clear |
| 10:44 | 300 | 0.24 | 70.56 | 6.91 | 1.25 | 28.70 | 148.50 | 0.64 | 21.80 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VWS7-PFAS-GW01-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-23 | Shipment Method: | |
| Collection Date/Time: | 07/09/22 10:45 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | -0722 VWS7-PFAS-GW01-0722-MS VWS7-PFAS-GW01-0722-MSD |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# VNTR Former Camp Garcia Runway

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VERW-PFAS-MW01**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 32.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 18.29 | Ft btoc |
| Start Date: | April 6, 2022 | Weather: | Sunny , 88 F | Water Column: | 13.71 | Ft |
| Sampling Team: | Juan Acaron, Jack Quin | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 2.24 | Gal |
| Equipment | Peristaltic Pump<br>Peristaltic Pump Proactive Environmental Products Alexis C101861 | | | Purging Start Time: | 14:45 | |
| | | | | Purging End Time: | 15:35 | |
| Tubing Materials: | Poly Tubing<br>1/4" x 1/8" | | | Total Volume Purged: | 0.90 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 27 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:50 | 100 | 0.13 | 18.39 | 7.13 | 3.02 | 29.40 | 87.00 | 0.50 | 6.17 | Clear |
| 14:55 | 100 | 0.13 | 18.37 | 7.10 | 3.01 | 29.70 | 88.30 | 0.50 | 2.84 | Clear |
| 15:00 | 100 | 0.13 | 18.37 | 7.09 | 2.99 | 29.70 | 90.10 | 0.30 | 3.18 | Clear |
| 15:05 | 100 | 0.13 | 18.37 | 7.09 | 2.99 | 30.00 | 91.30 | 0.20 | 3.28 | Clear |
| 15:10 | 100 | 0.13 | 18.37 | 7.09 | 2.99 | 29.90 | 91.70 | 0.20 | 3.14 | Clear |
| 15:15 | 100 | 0.13 | 18.37 | 7.09 | 2.99 | 29.90 | 91.90 | 0.20 | 3.30 | Clear |
| 15:20 | 100 | 0.13 | 18.37 | 7.09 | 2.99 | 29.90 | 91.90 | 0.20 | 3.20 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VERW-PFAS-GW01-0422 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-24 | Shipment Method: | |
| Collection Date/Time: | 04/06/22 15:25 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VERW-PFAS-MW02**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 35.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 23.2 | Ft btoc |
| Start Date: | April 7, 2022 | Weather: | Partly Cloudy , 80 F | Water Column: | 11.8 | Ft |
| Sampling Team: | Juan Acaron, Jack Quin | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 1.93 | Gal |
| Equipment | Peristaltic Pump Peristaltic Pump Proactive Environmental Products Alexis C101861 | | | Purging Start Time: | 09:15 | |
| | | | | Purging End Time: | 10:40 | |
| Tubing Materials: | Poly Tubing 1/4" x 1/8" | | | Total Volume Purged: | 1.80 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 30 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 09:20 | 100 | 0.13 | 23.24 | 6.95 | 3.88 | 29.70 | 87.80 | 0.90 | 121.00 | Cloudy |
| 09:25 | 100 | 0.13 | 23.24 | 6.95 | 3.87 | 29.20 | 84.20 | 0.60 | 120.00 | Cloudy |
| 09:30 | 100 | 0.13 | 23.24 | 6.95 | 3.87 | 29.80 | 83.30 | 0.50 | 65.80 | Clear |
| 09:35 | 100 | 0.13 | 23.24 | 6.95 | 3.86 | 29.40 | 83.20 | 0.40 | 54.90 | Clear |
| 09:40 | 100 | 0.13 | 23.24 | 6.95 | 3.77 | 29.40 | 83.40 | 0.40 | 43.70 | Clear |
| 09:45 | 100 | 0.13 | 23.24 | 6.95 | 3.86 | 30.00 | 82.10 | 0.20 | 35.70 | Clear |
| 09:50 | 100 | 0.13 | 23.24 | 6.95 | 3.86 | 30.30 | 81.90 | 0.20 | 32.40 | Clear |
| 09:55 | 100 | 0.13 | 23.24 | 6.94 | 3.85 | 30.20 | 81.80 | 0.20 | 30.20 | Clear |
| 10:00 | 100 | 0.13 | 23.24 | 6.95 | 3.87 | 30.60 | 81.90 | 0.20 | 26.20 | Clear |
| 10:05 | 100 | 0.13 | 23.24 | 6.95 | 3.85 | 30.10 | 81.70 | 0.10 | 28.30 | Clear |
| 10:10 | 100 | 0.13 | 23.40 | 6.95 | 3.85 | 30.60 | 81.70 | 0.10 | 17.90 | Clear |
| 10:15 | 100 | 0.13 | 23.40 | 6.95 | 3.84 | 30.60 | 81.90 | 0.10 | 13.80 | Clear |
| 10:20 | 100 | 0.13 | 23.24 | 6.95 | 3.85 | 30.80 | 82.10 | 0.10 | 13.60 | Clear |
| 10:25 | 100 | 0.13 | 23.24 | 6.95 | 3.84 | 30.70 | 82.30 | 0.10 | 13.80 | Clear |

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VERW-PFAS-MW02**

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VERW-PFAS-GW02-0422 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-25 | Shipment Method: | |
| Collection Date/Time: | 04/07/22 10:30 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# VNTR PI 5: Surface Water Drainage Area from Former Camp Garcia Runway

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VEP5-PFAS-MW01**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 32.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 19.19 | Ft btoc |
| Start Date: | April 6, 2022 | Weather: | Partly Cloudy , 84 F | Water Column: | 12.81 | Ft |
| Sampling Team: | Juan Acaron, Jack Quin | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 2.09 | Gal |
| Equipment | Peristaltic Pump Peristaltic Pump Proactive Environmental Products Alexis C101861 | | | Purging Start Time: | 10:55 | |
| | | | | Purging End Time: | 11:45 | |
| Tubing Materials: | Poly Tubing 1/4" x 1/8" | | | Total Volume Purged: | 0.90 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 27 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 11:00 | 100 | 0.13 | 19.89 | 6.98 | 6.89 | 28.90 | 76.20 | 0.30 | 7.16 | Clear |
| 11:05 | 75 | 0.1 | 19.90 | 6.97 | 6.84 | 28.90 | 77.50 | 0.30 | 5.45 | Clear |
| 11:10 | 75 | 0.1 | 19.90 | 6.96 | 6.80 | 29.10 | 78.60 | 0.20 | 8.51 | Clear |
| 11:15 | 75 | 0.1 | 19.90 | 6.95 | 6.78 | 29.00 | 79.70 | 0.20 | 6.40 | Clear |
| 11:20 | 75 | 0.1 | 19.90 | 6.94 | 6.76 | 29.30 | 80.40 | 0.10 | 7.82 | Clear |
| 11:25 | 75 | 0.1 | 19.90 | 6.93 | 6.76 | 29.20 | 81.20 | 0.10 | 11.60 | Clear |
| 11:30 | 75 | 0.1 | 19.90 | 6.92 | 6.76 | 29.40 | 81.80 | 0.10 | 10.90 | Clear |
| 11:35 | 75 | 0.1 | 19.90 | 6.91 | 6.74 | 29.00 | 82.10 | 0.10 | 11.20 | Clear |
| 11:40 | 75 | 0.1 | 19.90 | 6.92 | 6.75 | 29.20 | 82.50 | 0.10 | 11.00 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP5-PFAS-GW01-0422 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-27 | Shipment Method: | |
| Collection Date/Time: | 04/06/22 11:45 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# VNTR SWMU 20: Former Helicopter Maintenance Area

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW01**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 52.76 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 38.27 | Ft btoc |
| Start Date: | February 8, 2022 | Weather: | Partly Cloudy , 80 F | Water Column: | 14.49 | Ft |
| Sampling Team: | Meg Gillespie, Todd Arrowood | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 2.36 | Gal |
| Equipment | Submersible Pump | | | Purging Start Time: | 15:38 | |
| | Hurricane xl #24432, C102813, inverter C102815 | | | Purging End Time: | 16:36 | |
| Tubing Materials: | | | | Total Volume Purged: | 1.90 | Gal |
| | 5/8 | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 47.76 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 15:45 | 125 | 0.23 | 38.40 | 6.69 | 3.80 | 29.30 | 79.80 | 1.80 | 911.00 | Clear |
| 15:50 | 125 | 0.17 | 38.38 | 6.70 | 3.77 | 29.50 | 78.80 | 1.60 | 810.00 | Clear |
| 15:55 | 125 | 0.17 | 38.38 | 6.71 | 3.74 | 29.30 | 78.20 | 1.60 | 496.00 | Clear |
| 16:00 | 125 | 0.17 | 38.38 | 6.72 | 3.69 | 29.10 | 77.50 | 1.60 | 271.00 | Clear |
| 16:05 | 125 | 0.17 | 38.39 | 6.72 | 3.65 | 29.30 | 77.10 | 1.40 | 139.00 | Clear |
| 16:10 | 125 | 0.17 | 39.40 | 6.72 | 3.61 | 29.50 | 77.10 | 1.30 | 102.00 | Clear |
| 16:15 | 125 | 0.17 | 39.40 | 6.73 | 3.55 | 29.50 | 77.30 | 1.30 | 43.20 | Clear |
| 16:20 | 125 | 0.17 | 39.40 | 6.75 | 3.51 | 29.20 | 77.40 | 1.20 | 25.90 | Clear |
| 16:25 | 125 | 0.17 | 39.40 | 6.74 | 3.49 | 29.20 | 77.20 | 1.20 | 15.00 | Clear |
| 16:30 | 125 | 0.17 | 39.40 | 6.74 | 3.47 | 29.10 | 77.30 | 1.20 | 11.40 | Clear |
| 16:35 | 125 | 0.17 | 39.40 | 6.74 | 3.46 | 29.00 | 77.30 | 1.20 | 8.10 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-PFAS-GW01-0222 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-28 | Shipment Method: | |
| Collection Date/Time: | 02/08/22 16:40 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW01**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 51.50 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 39.4 | Ft btoc |
| Start Date: | July 4, 2022 | Weather: | Partly Cloudy , 87 F | Water Column: | 12.1 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 1.97 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 16:30 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>Bonded 1/4 | | | Total Volume Purged: | 2.30 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 46 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 16:40 | 450 | 0 | 39.65 | 6.71 | 2.36 | 28.20 | 129.70 | 2.10 | 4.93 | Clear |
| 16:43 | 450 | 0.36 | 39.59 | 6.72 | 2.36 | 28.10 | 128.00 | 1.40 | 4.07 | Clear |
| 16:46 | 450 | 0.36 | 39.59 | 6.72 | 2.36 | 28.10 | 126.60 | 1.40 | 4.62 | Clear |
| 16:49 | 450 | 0.36 | 39.59 | 6.72 | 2.37 | 28.10 | 126.20 | 1.50 | 4.16 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-PFAS-GW01-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-28 | Shipment Method: | |
| Collection Date/Time: | 07/04/22 16:50 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW02**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 51.20 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 41.3 | Ft btoc |
| Start Date: | February 8, 2022 | Weather: | Sunny , 81 F | Water Column: | 9.9 | Ft |
| Sampling Team: | Meg Gillespie | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Submersible Pump Hurricane XL C-102813 | | | Purging Start Time: | 13:15 | |
| | | | | Purging End Time: | 13:55 | |
| Tubing Materials: | HDPE 3/8" | | | Total Volume Purged: | 2.80 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 46 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 13:25 | 300 | 0.79 | 41.45 | 7.68 | 0.02 | 24.60 | 32.70 | 6.10 | 28.50 | Clear |
| 13:30 | 300 | 0.4 | 41.51 | 6.65 | 4.29 | 25.10 | 39.70 | 0.30 | 18.50 | Clear |
| 13:35 | 300 | 0.4 | 41.48 | 6.72 | 4.22 | 24.90 | 41.90 | 0.30 | 12.70 | Clear |
| 13:40 | 300 | 0.4 | 41.49 | 6.63 | 4.29 | 25.40 | 53.40 | 0.30 | 10.20 | Clear |
| 13:45 | 300 | 0.4 | 41.50 | 6.64 | 4.30 | 25.10 | 57.60 | 0.30 | 8.54 | Clear |
| 13:50 | 300 | 0.4 | 41.50 | 6.63 | 4.29 | 24.90 | 59.30 | 0.30 | 9.04 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-PFAS-GW02-0222 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-29 | Shipment Method: | |
| Collection Date/Time: | 02/08/22 13:55 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW03**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 47.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 45.52 | Ft btoc |
| Start Date: | July 13, 2022 | Weather: | Partly Cloudy , F | Water Column: | 1.48 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 10:02 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4” | | | Total Volume Purged: | 1.00 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 10:04 | 225 | 0 | 45.52 | 6.64 | 3.20 | 28.80 | -129.50 | 0.30 | 589.00 | Dark grey |
| 10:07 | 225 | 0.18 | 45.52 | 6.63 | 3.20 | 28.60 | -123.20 | 0.55 | 117.00 | Cloudy |
| 10:10 | 225 | 0.18 | 45.52 | 6.64 | 3.18 | 28.30 | -99.20 | 0.55 | 74.10 | Cloudy |
| 10:13 | 225 | | 45.52 | 6.65 | 3.18 | 28.30 | -98.20 | 0.55 | 49.30 | Clear |
| 10:16 | 225 | 0.18 | 45.52 | 6.67 | 3.17 | 28.30 | -85.20 | 0.71 | 23.60 | Clear |
| 10:19 | 225 | 0.18 | 45.53 | 6.66 | 3.19 | 28.40 | -96.40 | 0.42 | 13.40 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW03-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/13/22 10:20 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | VEP4-GW03-0722-MS VEP4-GW03-0722-MSD |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW04**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 50.94 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 42.55 | Ft btoc |
| Start Date: | July 13, 2022 | Weather: | Cloudy , 88 F | Water Column: | 8.39 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 1.37 | Gal |
| Equipment | Submersible Pump Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 12:46 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE 1/4 | | | Total Volume Purged: | 2.50 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 44 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 13:02 | 450 | 0 | 43.12 | 6.54 | 5.12 | 28.40 | 70.70 | 0.39 | 16.20 | Clear |
| 13:05 | 450 | | 43.75 | 6.54 | 5.12 | 28.40 | 42.30 | 0.83 | 22.20 | Clear |
| 13:08 | 150 | 0.12 | 44.04 | 6.56 | 5.11 | 28.40 | -9.20 | 1.11 | 16.10 | Clear |
| 13:11 | 150 | 0.12 | 44.06 | 6.57 | 5.13 | 28.50 | -11.60 | 1.24 | 10.60 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW04-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/13/22 13:13 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW05**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 46.40 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 36.46 | Ft btoc |
| Start Date: | July 12, 2022 | Weather: | Partly Cloudy , F | Water Column: | 9.94 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 11:26 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | 1/4” | | | Total Volume Purged: | 2.10 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 41 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 11:29 | 225 | 0 | 36.50 | 6.53 | 6.61 | 29.30 | 163.50 | 0.30 | 81.10 | Cloudy |
| 11:32 | 225 | 0.18 | 36.50 | 6.59 | 6.97 | 29.00 | 147.00 | 0.27 | 53.80 | Cloudy |
| 11:35 | 150 | 0.18 | 36.50 | 6.62 | 6.39 | 29.00 | 141.00 | 0.60 | 70.20 | Cloudy |
| 11:40 | 150 | | 36.48 | 6.64 | 5.97 | 29.40 | 135.40 | 1.05 | 59.00 | Cloudy |
| 11:45 | 225 | 0.3 | 36.50 | 6.65 | 5.88 | 29.50 | 132.70 | 1.41 | 36.60 | Clear |
| 11:50 | 225 | 0.3 | 36.50 | 6.66 | 5.86 | 29.00 | 131.70 | 1.59 | 31.90 | Clear |
| 11:55 | 225 | 0.3 | 36.52 | 6.66 | 5.80 | 28.80 | 130.90 | 1.69 | 32.00 | Clear |
| 12:00 | 225 | 0.3 | 36.49 | 6.65 | 5.78 | 28.90 | 130.70 | 1.71 | 43.60 | Clear |
| 12:05 | 225 | 0.42 | 36.49 | 6.66 | 5.74 | 28.90 | 129.40 | 1.68 | 25.00 | Clear |
| 12:10 | 225 | | 36.49 | 6.65 | 5.74 | 28.80 | 128.60 | 1.57 | 21.60 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW05-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/12/22 00:12 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW06**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 44.20 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 41.09 | Ft btoc |
| Start Date: | February 1, 2022 | Weather: | Sunny , 80 F | Water Column: | 3.11 | Ft |
| Sampling Team: | Meg Gillespie, Todd Arrowood | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0.51 | Gal |
| Equipment | Submersible Pump Hurricane XL, serial #24932, C102813, Inverter C102815 | | | Purging Start Time: | 10:07 | |
| | | | | Purging End Time: | 11:00 | |
| Tubing Materials: | HDPE 1/4 | | | Total Volume Purged: | 3.50 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 42.2 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 10:15 | 200 | 0.42 | 41.36 | 6.69 | 5.00 | 31.30 | 96.20 | 1.20 | 501.00 | Clear |
| 10:20 | 200 | 0.26 | 41.37 | 6.68 | 4.99 | 29.50 | 94.10 | 0.70 | 389.00 | Clear |
| 10:25 | 200 | 0.26 | 41.35 | 6.68 | 4.97 | 29.90 | 94.20 | 0.60 | 202.00 | Clear |
| 10:30 | 280 | 0.37 | 41.35 | 6.68 | 4.93 | 30.10 | 94.20 | 0.40 | 137.00 | Clear |
| 10:35 | 280 | 0.37 | 41.36 | 6.68 | 4.89 | 30.00 | 93.60 | 0.30 | 63.20 | Clear |
| 10:40 | 280 | 0.37 | 41.37 | 6.68 | 4.87 | 30.10 | 94.10 | 0.20 | 33.40 | Clear |
| 10:45 | 280 | 0.37 | 41.38 | 6.68 | 4.82 | 30.10 | 94.10 | 0.20 | 34.10 | Clear |
| 10:48 | 280 | 0.22 | 41.38 | 6.68 | 4.81 | 30.00 | 94.40 | 0.20 | 21.00 | Clear |
| 10:52 | 280 | 0.3 | 41.38 | 6.68 | 4.78 | 30.10 | 94.60 | 0.20 | 12.40 | Clear |
| 10:56 | 280 | 0.3 | 41.38 | 6.68 | 4.78 | 30.20 | 95.20 | 0.10 | 9.42 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-PFAS-GW06-0222 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-30 | Shipment Method: | |
| Collection Date/Time: | 02/01/22 11:05 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW06**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 41.76 | Ft btoc |
| Start Date: | July 12, 2022 | Weather: | Partly Cloudy , F | Water Column: | | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 17:27 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE, Teflon<br>1/4” | | | Total Volume Purged: | 1.30 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 17:37 | 175 | 0 | 41.86 | 6.65 | 3.61 | 28.50 | 139.60 | 0.31 | 115.00 | Cloudy |
| 17:42 | | | | 6.65 | 3.57 | 28.40 | 136.70 | 0.51 | | |
| 17:45 | 250 | 0.2 | 41.92 | 6.66 | 3.55 | 28.40 | 134.00 | 0.55 | 48.80 | Clear |
| 17:48 | 250 | 0.2 | 41.91 | 6.67 | 3.55 | 28.40 | 132.90 | 0.61 | 25.50 | Clear |
| 17:51 | 250 | 0.2 | 41.91 | 6.67 | 3.54 | 28.40 | 131.50 | 0.66 | 16.80 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-PFAS-GW06-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-30 | Shipment Method: | |
| Collection Date/Time: | 07/12/22 17:55 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW07**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 42.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 31.69 | Ft btoc |
| Start Date: | July 4, 2022 | Weather: | Cloudy , 84 F | Water Column: | 10.31 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 08:49 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>Bonded 1/4 | | | Total Volume Purged: | 1.70 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 36 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 08:52 | 250 | 0 | 31.81 | 6.35 | 10.72 | 28.20 | 95.10 | 0.30 | 6.47 | Clear |
| 08:55 | 250 | 0.2 | 31.83 | 6.38 | 10.84 | 28.10 | 87.30 | 0.30 | 3.47 | Clear |
| 08:58 | 250 | 0.2 | 31.83 | 6.37 | 11.04 | 28.20 | -8.00 | 0.30 | 2.99 | Clear |
| 09:02 | 250 | 0.26 | 31.99 | 6.38 | 11.28 | 28.10 | -103.30 | 0.20 | 2.29 | Clear with very fine white particulate |
| 09:05 | 250 | 0.2 | | 6.40 | 11.34 | 28.00 | -125.00 | 0.20 | 1.82 | Clear |
| 09:08 | 250 | 0.2 | 31.92 | 6.41 | 11.33 | 28.10 | -138.40 | 0.20 | 2.43 | Clear |
| 09:11 | 250 | 0.2 | 31.90 | 6.41 | 11.34 | 28.10 | -140.20 | 0.20 | 2.21 | Clear |
| 09:14 | 250 | 0.2 | 31.91 | 6.41 | 11.35 | 28.10 | -141.30 | 0.20 | 2.18 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW07-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/04/22 09:15 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | -0722 |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW08**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 46.82 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 36.52 | Ft btoc |
| Start Date: | July 11, 2022 | Weather: | Partly Cloudy , F | Water Column: | 10.3 | Ft |
| Sampling Team: | | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 16:34 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4” | | | Total Volume Purged: | 0.90 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 16:35 | 325 | 0 | 36.49 | 6.59 | 7.69 | 29.10 | 124.90 | 0.42 | 33.30 | Clear |
| 16:38 | 325 | 0.26 | 36.72 | 6.58 | 7.46 | 29.10 | 123.90 | 0.41 | 14.20 | Clear |
| 16:41 | 325 | 0.27 | 36.77 | 6.58 | 7.28 | 29.00 | 121.10 | 0.34 | 14.30 | Clear |
| 16:44 | 325 | | 36.78 | 6.58 | 7.20 | 29.00 | 118.30 | 0.26 | 9.01 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW08-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/11/22 16:45 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW09**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 42.42 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 35.85 | Ft btoc |
| Start Date: | July 5, 2022 | Weather: | Partly Cloudy , F | Water Column: | 6.57 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 1.07 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 16:15 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 1.60 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 37 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 16:24 | 400 | 0 | 35.90 | 6.72 | 3.72 | 28.60 | 150.50 | 0.78 | 8.35 | Clear |
| 16:27 | 400 | 0.32 | 35.90 | 6.72 | 3.72 | 28.50 | 149.50 | 0.80 | 4.08 | Clear |
| 16:30 | 400 | 0.32 | 35.90 | 6.72 | 3.71 | 28.50 | 147.00 | 0.80 | 2.27 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW09-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/05/22<br>16:30 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW10**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 42.33 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 36.59 | Ft btoc |
| Start Date: | July 5, 2022 | Weather: | Partly Cloudy , 88 F | Water Column: | 5.74 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0.94 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 14:42 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>Bonded 1/4 | | | Total Volume Purged: | 1.60 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 31 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 15:04 | 200 | 0 | 37.14 | 6.75 | 5.82 | 29.40 | 156.80 | 1.30 | 48.50 | Clear |
| 15:07 | 200 | 0.16 | 37.44 | 6.75 | 5.80 | 29.30 | 153.60 | 1.80 | 50.00 | Clear |
| 15:10 | 200 | 0.16 | 37.56 | 6.75 | 5.80 | 29.20 | 162.20 | 1.70 | 45.40 | Clear |
| 15:13 | 200 | 0.16 | 37.61 | 6.74 | 5.80 | 29.10 | 151.00 | 1.70 | 56.30 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW10-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/05/22 15:15 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW11**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 46.76 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 37.63 | Ft btoc |
| Start Date: | July 12, 2022 | Weather: | Partly Cloudy , F | Water Column: | 9.13 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 1.49 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 14:48 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4” | | | Total Volume Purged: | 2.00 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 40 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:50 | 450 | 0 | 36.90 | 6.67 | 3.85 | 28.60 | 121.50 | 0.84 | 31.90 | Clear |
| 14:55 | 225 | 0.3 | 36.90 | 6.60 | 3.86 | 29.00 | 120.80 | 3.55 | 100.00 | Cloudy |
| 15:00 | 225 | 0.3 | 36.90 | 6.59 | 3.86 | 28.80 | 119.00 | 3.47 | 79.50 | Cloudy |
| 15:05 | 225 | 0.3 | 36.90 | 6.59 | 3.86 | 28.70 | 112.90 | 0.84 | 44.60 | Cloudy |
| 15:10 | 225 | 0.3 | 36.90 | 6.58 | 3.86 | 28.70 | 110.60 | 0.72 | 25.50 | Clear |
| 15:19 | 225 | 0.54 | 36.90 | 6.60 | 3.87 | 28.50 | 108.60 | 0.88 | 19.10 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW11-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/12/22 15:20 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW12**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 46.76 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 36.69 | Ft btoc |
| Start Date: | July 12, 2022 | Weather: | Partly Cloudy , F | Water Column: | 10.07 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 12:55 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4” | | | Total Volume Purged: | 6.30 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 41 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 12:58 | 375 | 0 | 36.76 | 6.59 | 7.09 | 29.00 | 150.00 | 1.37 | 47.40 | Clear |
| 13:03 | | | 36.79 | 6.56 | 7.08 | 28.90 | 144.50 | 1.06 | 33.10 | Clear |
| 13:08 | 375 | 0.5 | 36.82 | 6.57 | 7.08 | 28.80 | 138.50 | 1.17 | 18.60 | Clear |
| 13:13 | 375 | | | 6.57 | 7.08 | 28.60 | 136.20 | 1.11 | 13.10 | Clear |
| 13:18 | 375 | 0.5 | 36.82 | 6.56 | 7.08 | 28.70 | 132.40 | 1.03 | 15.90 | Clear |
| 13:23 | 375 | | 36.84 | 6.56 | 7.07 | 28.70 | 127.50 | 1.03 | 8.62 | Clear |
| 13:28 | 375 | 0.5 | 36.85 | 6.56 | 7.07 | 28.60 | 126.10 | 0.98 | 8.12 | Clear |
| 13:33 | 375 | 0.5 | 36.85 | 6.56 | 7.08 | 28.70 | 122.30 | 0.96 | | Clear |
| 13:59 | 375 | 2.58 | 36.84 | 6.54 | 7.04 | 28.60 | 15.40 | 0.91 | 6.60 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW12-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/12/22<br>14:00 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW13**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 37.19 | Ft btoc |
| Start Date: | July 5, 2022 | Weather: | Partly Cloudy , 86 F | Water Column: | | Ft |
| Sampling Team: | | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 13:13 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4” | | | Total Volume Purged: | 2.10 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 13:15 | 400 | 0 | 37.42 | 6.95 | 5.09 | 29.20 | 148.40 | 1.80 | 54.10 | Clear |
| 13:18 | 400 | 0.32 | 37.58 | 6.84 | 5.03 | 28.60 | 148.10 | 1.60 | 35.40 | Clear |
| 13:21 | 400 | 0.32 | 37.61 | 6.81 | 6.04 | 28.60 | 147.20 | 1.40 | 32.40 | Clear |
| 13:24 | 400 | 0.32 | 37.65 | 6.80 | 5.03 | 28.50 | 145.30 | 1.40 | 20.70 | Clear |
| 13:27 | 400 | 0.32 | 37.69 | 6.80 | 5.03 | 28.50 | 141.50 | 1.40 | 16.30 | Clear |
| 13:30 | 400 | 0.32 | 37.73 | 6.80 | 5.03 | 28.50 | 139.30 | 1.40 | 13.90 | Clear |
| 13:33 | 350 | 0.28 | 37.69 | 6.80 | 5.03 | 28.60 | 137.80 | 1.40 | 12.20 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW13-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/05/22 13:35 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW13D**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 76.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 36.24 | Ft btoc |
| Start Date: | July 5, 2022 | Weather: | Partly Cloudy , 86 F | Water Column: | 39.76 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 12:14 | |
| | | | | Purging End Time: | 12:44 | |
| Tubing Materials: | HDPE<br>1/4” | | | Total Volume Purged: | 1.30 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 71 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 12:16 | 250 | 0.13 | 37.17 | 6.64 | 12.77 | 29.30 | 144.70 | 0.70 | 11.40 | Clear |
| 12:19 | 300 | 0.24 | 37.54 | 6.64 | 12.57 | 29.00 | 142.20 | 0.80 | 9.72 | Clear |
| 12:22 | 300 | 0.24 | 37.79 | 6.64 | 12.45 | 28.90 | 140.40 | 1.50 | 10.50 | Clear |
| 12:25 | 300 | 0.24 | 38.08 | 6.64 | 12.40 | 28.80 | 140.70 | 1.90 | 10.80 | Clear |
| 12:28 | 300 | 0.24 | 38.22 | 6.65 | 12.38 | 28.80 | 142.10 | 2.30 | 7.63 | Clear |
| 12:31 | 150 | 0.12 | 38.05 | 6.65 | 12.37 | 28.80 | 143.60 | 2.70 | 5.90 | Clear |
| 12:34 | 150 | 0.12 | 37.80 | 6.65 | 12.38 | 29.40 | 145.00 | 2.30 | 5.92 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW13D-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/05/22 12:35 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW14**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 44.72 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 34.87 | Ft btoc |
| Start Date: | July 5, 2022 | Weather: | Partly Cloudy , 86 F | Water Column: | 9.85 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 1.61 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 10:57 | |
| | | | | Purging End Time: | 11:32 | |
| Tubing Materials: | HDPE<br>Bonded 1/4 | | | Total Volume Purged: | 1.40 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 39 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 11:01 | 450 | 0 | 34.92 | 6.76 | 4.10 | 28.70 | 136.80 | 0.70 | 136.00 | Cloudy |
| 11:04 | 300 | 0.24 | 34.90 | 6.76 | 4.10 | 28.70 | 125.00 | 1.00 | 105.00 | Cloudy |
| 11:07 | 300 | 0.24 | 34.90 | 6.77 | 4.00 | 28.60 | 120.60 | 0.90 | 81.60 | Cloudy |
| 11:10 | 300 | 0.24 | 34.90 | 6.77 | 4.10 | 28.70 | 115.20 | 1.00 | 61.70 | Cloudy |
| 11:13 | 300 | 0.24 | 34.90 | 6.77 | 4.10 | 28.70 | 111.00 | 0.90 | 60.40 | Clear |
| 11:16 | 300 | 0.24 | 34.90 | 6.77 | 4.10 | 28.70 | 104.60 | 1.00 | 32.90 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW14-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/05/22 11:16 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | -0722 |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW15**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 41.32 | Ft btoc |
| Start Date: | June 30, 2022 | Weather: | Partly Cloudy , 87 F | Water Column: | | Ft |
| Sampling Team: | | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 14:26 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4” | | | Total Volume Purged: | 0.90 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 45 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:30 | 250 | 0 | 41.37 | 6.64 | 3.74 | 29.20 | 100.80 | 0.30 | 2.09 | Clear |
| 14:33 | 250 | | 41.37 | 6.63 | 3.73 | 28.70 | 100.30 | 0.20 | 5.05 | Clear |
| 14:36 | 250 | 0.2 | 41.37 | 6.63 | 3.72 | 28.70 | 99.70 | 0.20 | 2.77 | Clear |
| 14:39 | 250 | 0.2 | 41.38 | 6.63 | 3.73 | 28.70 | 75.60 | 0.20 | 1.65 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW15-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C \|Methane Ethane and Ethene \| Volatile Fatty Acids \| TOC \| Chloride Nitrate Nitriteand Sulfate \| Alkalinity \| TDS \|Sulfide \| Dehalococcoides \| Functional Genes (add to DHC) | Shipment Method: | |
| Collection Date/Time: | 06/30/22<br>14:40 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW16**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 54.30 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 38.74 | Ft btoc |
| Start Date: | June 30, 2022 | Weather: | Partly Cloudy , 87 F | Water Column: | 15.56 | Ft |
| Sampling Team: | | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 15:16 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4” | | | Total Volume Purged: | 1.60 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 48 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 15:18 | 400 | 0 | 39.00 | 6.64 | 5.46 | 29.50 | 118.00 | 0.30 | 113.00 | Cloudy |
| 15:21 | 400 | 0.32 | 39.89 | 6.60 | 5.53 | 29.00 | 114.30 | 0.30 | 98.20 | Cloudy |
| 15:24 | 400 | 0.32 | 39.89 | 6.58 | 5.71 | 28.90 | 112.40 | 0.40 | 73.40 | Cloudy |
| 15:27 | 400 | 0.32 | 40.20 | 6.57 | 5.50 | 28.70 | 110.50 | 0.30 | 109.00 | Cloudy |
| 15:30 | 250 | 0.2 | 39.93 | 6.57 | 5.57 | 28.80 | 108.20 | 0.30 | 156.00 | Cloudy |
| 15:33 | 250 | 0.2 | 39.95 | 6.57 | 5.56 | 28.60 | 105.00 | 0.30 | 142.00 | Cloudy |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW16-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C \|Methane Ethane and Ethene \| Volatile Fatty Acids \| TOC \| Chloride Nitrate Nitriteand Sulfate \| Alkalinity \| TDS \|Sulfide \| Dehalococcoides \| Functional Genes (add to DHC) | Shipment Method: | |
| Collection Date/Time: | 06/30/22<br>15:35 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW17**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 54.19 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 35.19 | Ft btoc |
| Start Date: | June 30, 2022 | Weather: | Partly Cloudy , 87 F | Water Column: | 19 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 12:55 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4” | | | Total Volume Purged: | 3.30 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 12:57 | 375 | 0 | 35.26 | 6.55 | 8.00 | 28.60 | 130.80 | 0.50 | 9.07 | Clear |
| 13:03 | 375 | 0.59 | 35.30 | 6.54 | 8.21 | 28.40 | 128.40 | 0.30 | 10.40 | Clear |
| 13:08 | 375 | 0.5 | 35.30 | 6.54 | 8.42 | 28.40 | -104.70 | 0.30 | 6.92 | Clear |
| 13:13 | 375 | 0.5 | 35.27 | 6.54 | 8.43 | 28.30 | -95.80 | 0.40 | 10.90 | Clear |
| 13:18 | 375 | | 35.27 | 6.54 | 8.44 | 28.30 | -63.00 | 0.40 | 19.00 | Clear |
| 13:23 | 375 | 0.5 | 35.27 | 6.54 | 8.46 | 28.20 | -33.60 | 0.40 | 16.50 | Clear |
| 13:28 | 375 | 0.5 | 35.28 | 6.54 | 8.49 | 28.30 | -4.30 | 0.40 | 10.00 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW17-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C \|Methane Ethane and Ethene \| Volatile Fatty Acids \| TOC \| Chloride Nitrate Nitriteand Sulfate \| Alkalinity \| TDS \|Sulfide \| Dehalococcoides \| Functional Genes (add to DHC) | Shipment Method: | |
| Collection Date/Time: | 06/30/22<br>13:30 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW17D**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 89.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 35.48 | Ft btoc |
| Start Date: | June 30, 2022 | Weather: | Partly Cloudy , F | Water Column: | 53.52 | Ft |
| Sampling Team: | | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 11:50 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4” | | | Total Volume Purged: | 2.10 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 84 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 11:55 | 400 | 0 | 36.73 | 6.37 | 15.30 | 29.10 | 125.80 | 0.80 | 6.46 | Clear |
| 12:00 | 400 | 0.53 | 37.19 | 6.35 | 15.15 | 29.00 | 123.80 | 0.50 | 2.63 | Clear |
| 12:05 | 400 | 0.53 | 37.19 | 6.35 | 15.12 | 28.80 | 122.70 | 0.40 | 2.40 | Clear |
| 12:10 | 400 | 0.53 | 37.19 | 6.35 | 15.13 | 28.80 | 122.60 | 0.40 | 1.38 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW17D-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C \|Methane Ethane and Ethene \| Volatile Fatty Acids \| TOC \| Chloride Nitrate Nitriteand Sulfate \| Alkalinity \| TDS \|Sulfide \| Dehalococcoides \| Functional Genes (add to DHC) | Shipment Method: | |
| Collection Date/Time: | 06/30/22<br>00:15 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW18**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 48.04 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 31.81 | Ft btoc |
| Start Date: | June 30, 2022 | Weather: | Cloudy , 86 F | Water Column: | 16.23 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 10:03 | |
| | | | | Purging End Time: | 10:46 | |
| Tubing Materials: | HDPE<br>Bonded 1/4” | | | Total Volume Purged: | 2.60 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 43 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 10:07 | 400 | 0 | 31.82 | 6.45 | 8.67 | 28.60 | 118.90 | 0.40 | 95.30 | Cloudy |
| 10:13 | 400 | 0.63 | 31.86 | 6.42 | 9.40 | 28.60 | 117.80 | 0.40 | 60.00 | Cloudy |
| 10:18 | 400 | 0.53 | 31.84 | 6.43 | 9.50 | 28.60 | 115.80 | 0.30 | 138.00 | Cloudy |
| 10:23 | 400 | 0.53 | 31.84 | 6.43 | 9.58 | 28.50 | 114.00 | 0.30 | 110.00 | Cloudy |
| 10:28 | 400 | 0.53 | 31.83 | 6.43 | 9.61 | 28.60 | 112.80 | 0.30 | 77.90 | Cloudy |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW18-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C \|Methane Ethane and Ethene \| Volatile Fatty Acids \| TOC \| Chloride Nitrate Nitriteand Sulfate \| Alkalinity \| TDS \|Sulfide \| Dehalococcoides \| Functional Genes (add to DHC) | Shipment Method: | |
| Collection Date/Time: | 06/30/22<br>10:30 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW19**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 41.72 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 31.23 | Ft btoc |
| Start Date: | July 4, 2022 | Weather: | Cloudy , 85 F | Water Column: | 10.49 | Ft |
| Sampling Team: | Toby Stewart | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 10:38 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>Bonded 1/4in | | | Total Volume Purged: | 1.00 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 36 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 09:55 | | 0 | | | | | | | | |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW19-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/04/22<br>09:55 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW19**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 41.74 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 31.22 | Ft btoc |
| Start Date: | July 4, 2022 | Weather: | Partly Cloudy , 88 F | Water Column: | 10.52 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101861) | | | Purging Start Time: | 00:06 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 1.00 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 36 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 00:13 | 175 | 0 | 31.22 | 6.39 | 9.72 | 30.00 | 95.10 | 0.50 | 141.00 | Cloudy |
| 12:17 | 175 | 33.47 | 31.30 | 6.40 | 9.64 | 30.00 | 96.00 | 0.70 | 121.00 | Cloudy |
| 12:21 | 175 | 0.19 | 31.30 | 6.39 | 9.54 | 29.90 | 91.30 | 0.80 | 109.00 | Cloudy |
| 12:28 | 175 | 0.32 | 31.31 | 6.39 | 9.47 | 29.90 | 98.30 | 0.80 | 117.00 | Cloudy |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW19-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/04/22<br>00:30 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW20**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 52.90 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 35.87 | Ft btoc |
| Start Date: | July 4, 2022 | Weather: | Partly Cloudy , 86 F | Water Column: | 17.03 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 14:29 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 1.30 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 47 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:33 | 300 | 0 | 35.96 | 6.52 | 6.55 | 28.50 | 119.60 | 1.70 | 606.00 | Cloudy |
| 14:36 | 300 | 0.24 | 35.96 | 6.51 | 6.53 | 28.40 | 120.30 | 1.60 | 416.00 | Cloudy |
| 14:39 | 300 | 0.24 | 35.97 | 6.50 | 6.50 | 28.40 | 120.10 | 1.60 | 365.00 | Cloudy |
| 14:42 | 300 | 0.24 | 35.97 | 6.50 | 6.48 | 28.30 | 119.90 | 1.50 | 284.00 | Cloudy |
| 14:45 | 300 | 0.24 | 35.98 | 6.50 | 6.46 | 28.20 | 119.40 | 1.50 | 210.00 | Cloudy |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW20-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/04/22 14:45 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW21**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 63.45 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 37.42 | Ft btoc |
| Start Date: | July 4, 2022 | Weather: | Partly Cloudy , 88 F | Water Column: | 26.03 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 4.25 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 15:30 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>Bonded 1/4 | | | Total Volume Purged: | 1.80 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 57 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 15:37 | 350 | 0 | 37.88 | 6.69 | 2.88 | 28.40 | 121.90 | 0.90 | 10.10 | Clear |
| 15:40 | 350 | 0.28 | 37.88 | 6.69 | 2.99 | 28.30 | 120.80 | 0.90 | 8.08 | Clear |
| 15:43 | 350 | 0.28 | 37.88 | 6.69 | 3.03 | 28.30 | 119.60 | 0.90 | 6.92 | Clear |
| 15:46 | 350 | 0.28 | 37.88 | 6.69 | 3.08 | 28.30 | 118.30 | 0.90 | 5.56 | Clear |
| 15:49 | 350 | 0.28 | 37.88 | 6.69 | 3.12 | 28.20 | 117.30 | 0.90 | 4.85 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW21-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/04/22 15:50 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW22**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 41.40 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 32.36 | Ft btoc |
| Start Date: | July 4, 2022 | Weather: | Cloudy , 88 F | Water Column: | 9.04 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble 88 | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Peristaltic Pump Alexis Peristaltic Pump #24336 (C101861) | | | Purging Start Time: | 13:13 | |
| | | | | Purging End Time: | 13:56 | |
| Tubing Materials: | HDPE 1/4 | | | Total Volume Purged: | 0.60 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 36 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 13:19 | 100 | 0 | 32.38 | 6.63 | 3.56 | 30.60 | 99.60 | 0.70 | 5.35 | Clear |
| 13:25 | 100 | 0.16 | 32.38 | 6.56 | 3.53 | 30.40 | 96.10 | 0.70 | 3.34 | Clear |
| 13:30 | 100 | 0.13 | 32.38 | 6.55 | 3.51 | 29.80 | 95.10 | 0.60 | 2.42 | Clear |
| 13:35 | 100 | 0.13 | 32.38 | 6.57 | 3.51 | 30.20 | 92.40 | 0.60 | 4.74 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW22-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/04/22 13:35 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW23**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 40.08 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 31.12 | Ft btoc |
| Start Date: | July 1, 2022 | Weather: | Partly Cloudy , 86 F | Water Column: | 8.96 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble, Toby Stewart | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101998) | | | Purging Start Time: | 14:53 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4” | | | Total Volume Purged: | 0.50 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:55 | 150 | 0 | 31.18 | 6.51 | 13.08 | 30.40 | 128.60 | 0.30 | 13.40 | Clear |
| 14:58 | 150 | 0.12 | 31.18 | 6.49 | 13.04 | 30.90 | 124.00 | 0.20 | 15.50 | Clear |
| 15:01 | 150 | 0.12 | 31.16 | 6.48 | 13.05 | 30.30 | 119.80 | 0.20 | 11.60 | Clear |
| 15:04 | 150 | 0.12 | 31.16 | 6.47 | 13.00 | 30.60 | 116.40 | 0.20 | 11.80 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW23-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/01/22 15:05 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW24**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 47.64 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 30.12 | Ft btoc |
| Start Date: | February 1, 2022 | Weather: | Sunny , 82 F | Water Column: | 17.52 | Ft |
| Sampling Team: | Meg Gillespie, Todd Arrowood | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 2.86 | Gal |
| Equipment | Submersible Pump Hurricane xl, serial # 24932, C102813, inverter c102815 | | | Purging Start Time: | 12:10 | |
| | | | | Purging End Time: | 13:55 | |
| Tubing Materials: | HDPE, Flex Tubing 5/8 | | | Total Volume Purged: | 5.00 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 42.64 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 12:15 | 300 | 0.4 | 30.24 | 6.51 | 12.89 | 30.60 | 101.70 | 1.20 | 1,000.00 | Clear |
| 12:20 | 185 | 0.24 | 30.19 | 6.51 | 12.87 | 30.70 | 102.10 | 1.10 | 1,000.00 | Clear |
| 12:25 | 185 | 0.24 | 30.20 | 6.51 | 12.75 | 30.70 | 102.50 | 1.00 | 1,000.00 | Clear |
| 12:30 | 185 | 0.24 | 30.20 | 6.52 | 12.62 | 30.80 | 102.30 | 0.80 | 1,000.00 | Clear |
| 12:35 | 185 | 0.24 | 30.20 | 6.52 | 12.68 | 30.90 | 102.10 | 0.70 | 531.00 | Clear |
| 12:40 | 185 | 0.24 | 30.20 | 6.52 | 12.58 | 31.00 | 102.90 | 0.60 | 284.00 | Clear |
| 12:45 | 185 | 0.24 | 30.20 | 6.52 | 12.59 | 31.00 | 104.30 | 0.60 | 160.00 | Clear |
| 12:50 | 185 | 0.24 | 30.20 | 6.52 | 12.60 | 31.30 | 105.30 | 0.60 | 137.00 | Clear |
| 12:55 | 185 | 0.24 | 30.20 | 6.51 | 12.61 | 31.40 | 106.20 | 0.40 | 87.80 | Clear |
| 13:00 | 185 | 0.24 | 30.20 | 6.52 | 12.62 | 31.30 | 107.30 | 0.40 | 74.30 | Clear |
| 13:05 | 185 | 0.24 | 30.20 | 6.51 | 12.64 | 31.10 | 107.50 | 0.40 | 51.80 | Clear |
| 13:10 | 185 | 0.24 | 30.20 | 6.51 | 12.65 | 31.30 | 107.70 | 0.30 | 39.30 | Clear |
| 13:15 | 185 | 0.24 | 30.19 | 6.52 | 12.63 | 31.30 | 108.00 | 0.30 | 39.70 | Clear |
| 13:20 | 185 | 0.24 | 30.19 | 6.51 | 12.66 | 31.40 | 108.40 | 0.30 | 26.40 | Clear |
| 13:25 | 185 | 0.24 | 30.19 | 6.52 | 12.56 | 31.50 | 106.00 | 0.40 | 23.40 | Clear |
| 13:30 | 185 | 0.24 | 30.19 | 6.52 | 12.67 | 31.50 | 101.40 | 0.30 | 20.10 | Clear |

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW24**

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 13:35 | 185 | 0.24 | 30.19 | 6.51 | 12.69 | 31.70 | 100.30 | 0.30 | 15.40 | Clear |
| 13:40 | 185 | 0.24 | 30.19 | 6.51 | 12.67 | 31.50 | 100.10 | 0.30 | 12.80 | Clear |
| 13:45 | 185 | 0.24 | 30.19 | 6.51 | 12.69 | 31.60 | 100.20 | 0.30 | 10.60 | Clear |
| 13:50 | 185 | 0.24 | 30.19 | 6.51 | 12.69 | 31.70 | 100.20 | 0.30 | 8.69 | Clear |

## SAMPLE INFORMATION

Sample ID: VEP4-PFAS-GW24-0222
Analyses: PFAS (18 analyte list)/QSM v5.1.1 Table B-31
Collection Date/Time: 02/01/22 13:55
Sample Comments:

Primary Laboratory: Battelle Analytical Services
Shipment Method:
QC Sample: N/A
QC Sample ID: N/A

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW24**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 48.25 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 31.04 | Ft btoc |
| Start Date: | June 29, 2022 | Weather: | Cloudy , 89 F | Water Column: | 17.21 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 14:25 | |
| | | | | Purging End Time: | 15:05 | |
| Tubing Materials: | HDPE<br>Bonded 1/4 | | | Total Volume Purged: | 3.10 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 43 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:29 | 300 | 0 | 31.27 | 6.70 | 10.43 | 29.50 | 157.90 | 5.20 | 1,000.00 | Brown |
| 14:34 | 300 | 0.4 | 31.30 | 6.68 | 10.37 | 29.40 | 156.20 | 4.50 | 692.00 | Cloudy |
| 14:39 | 300 | 0.4 | 31.22 | 6.68 | 10.34 | 29.50 | 155.00 | 4.00 | 475.00 | Cloudy |
| 14:44 | 300 | 0.4 | 31.29 | 6.68 | 10.29 | 29.40 | 153.60 | 3.70 | 352.00 | Cloudy |
| 14:53 | 300 | 0.71 | 31.26 | 6.69 | 10.27 | 29.40 | 150.70 | 3.40 | 157.00 | Cloudy |
| 14:59 | 300 | 0.48 | 31.24 | 6.69 | 10.26 | 29.50 | 148.30 | 0.70 | 143.00 | Cloudy |
| 15:04 | 300 | 0.4 | 31.25 | 6.69 | 10.27 | 29.50 | 146.60 | 0.70 | 146.00 | Cloudy |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-PFAS-GW24-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-31 | Shipment Method: | |
| Collection Date/Time: | 06/29/22 14:14 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW24D**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 74.40 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 31.42 | Ft btoc |
| Start Date: | June 29, 2022 | Weather: | Partly Cloudy , 89 F | Water Column: | 42.98 | Ft |
| Sampling Team: | Toby Stewart, other Reece etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 12:37 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 1.90 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 69 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 13:03 | 150 | 0 | 31.63 | 6.68 | 11.14 | 30.80 | 131.70 | 0.80 | 18.60 | Clear |
| 13:08 | 150 | 0.2 | 31.80 | 6.67 | 11.11 | 30.40 | 127.30 | 0.40 | 12.50 | Clear |
| 13:13 | 150 | 0.2 | 31.82 | 6.71 | 11.13 | 30.30 | 130.70 | 2.40 | 15.20 | Clear |
| 13:21 | 150 | 0.32 | 31.91 | 6.69 | 11.12 | 29.90 | 127.00 | 1.20 | 9.48 | Clear |
| 13:26 | 150 | 0.2 | 32.15 | 6.69 | 11.07 | 29.60 | 123.50 | 0.80 | 12.00 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW24D-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 06/29/22 13:30 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW25**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 33.32 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 22.14 | Ft btoc |
| Start Date: | June 27, 2022 | Weather: | Cloudy , 87 F | Water Column: | 11.18 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101998) | | | Purging Start Time: | 13:08 | |
| | | | | Purging End Time: | 13:49 | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 1.80 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 28 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 13:14 | 220 | 0 | 22.30 | 6.65 | 14.08 | 29.40 | 80.90 | 0.70 | 196.00 | Cloudy |
| 13:20 | 220 | 0.35 | 22.30 | 6.63 | 14.38 | 29.40 | 79.10 | 0.50 | 116.00 | Cloudy |
| 13:28 | 170 | 0.36 | 22.26 | 6.62 | 15.19 | 29.50 | 79.40 | 0.70 | 35.80 | Cloudy |
| 13:34 | 170 | 0.27 | 22.25 | 6.62 | 15.19 | 29.50 | 78.30 | 0.60 | 28.40 | Cloudy |
| 13:39 | 150 | 0.2 | 22.25 | 6.64 | 14.71 | 29.70 | 77.60 | 1.00 | | Clear |
| 13:45 | 150 | 0.24 | 22.25 | 6.63 | 15.12 | 29.40 | 79.50 | 1.00 | 20.30 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW25-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 06/27/22 13:50 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | -0622 |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW25D**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 73.42 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 21.7 | Ft btoc |
| Start Date: | June 27, 2022 | Weather: | Cloudy , 86 F | Water Column: | 51.72 | Ft |
| Sampling Team: | | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101998) | | | Purging Start Time: | 11:45 | |
| | | | | Purging End Time: | 12:18 | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 1.20 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 68 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 11:55 | 180 | 0 | 22.78 | 6.73 | 11.15 | 29.60 | 75.60 | 0.70 | 11.90 | Clear |
| 12:05 | 180 | 0.48 | 22.81 | 6.74 | 11.15 | 29.50 | 76.20 | 0.60 | 9.35 | Clear |
| 12:10 | | | | 6.75 | 11.14 | 29.30 | 76.30 | 0.60 | 7.63 | Clear |
| 12:15 | 180 | 0.24 | 22.82 | 6.75 | 11.14 | 29.40 | 76.90 | 0.60 | 7.41 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW25D-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 06/27/22 00:18 | QC Sample: | N/A |
| Sample Comments: | Sampled at 12:18 | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW26**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 23.17 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 22.17 | Ft btoc |
| Start Date: | February 2, 2022 | Weather: | Sunny , 79 F | Water Column: | 1 | Ft |
| Sampling Team: | Meg Gillespie, Todd Arrowood | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0.16 | Gal |
| Equipment | Submersible Pump<br>Hurricane xl, serial # 24432, C102813, inverter C102815 | | | Purging Start Time: | 09:27 | |
| | | | | Purging End Time: | 10:15 | |
| Tubing Materials: | HDPE<br>5/8 | | | Total Volume Purged: | 1.10 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 23 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 09:35 | 100 | 0.21 | 22.50 | 6.40 | 27.52 | 29.80 | 96.10 | 2.00 | 19.30 | Clear |
| 09:40 | 100 | 0.13 | 22.50 | 6.40 | 27.21 | 31.80 | 88.80 | 2.00 | 6.49 | Clear |
| 09:45 | 100 | 0.13 | 22.50 | 6.39 | 27.07 | 31.30 | 90.60 | 1.70 | 4.46 | Clear |
| 09:50 | 100 | 0.13 | 22.50 | 6.39 | 26.98 | 32.10 | 87.40 | 1.60 | 4.28 | Clear |
| 09:55 | 100 | 0.13 | 22.50 | 6.37 | 26.93 | 31.30 | 85.50 | 1.10 | 4.89 | Clear |
| 10:00 | 100 | 0.13 | 22.50 | 6.38 | 26.89 | 30.90 | 86.60 | 1.10 | 2.03 | Clear |
| 10:05 | 100 | 0.13 | 22.50 | 6.37 | 26.79 | 30.80 | 87.70 | 1.10 | 1.55 | Clear |
| 10:10 | 100 | 0.13 | 22.50 | 6.37 | 26.82 | 30.70 | 88.00 | 1.10 | 1.26 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | EPI04-PFAS-GW26-0222 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-26 | Shipment Method: | |
| Collection Date/Time: | 02/02/22<br>10:15 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW26**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 33.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 23.06 | Ft btoc |
| Start Date: | July 1, 2022 | Weather: | Partly Cloudy , 87 F | Water Column: | 9.94 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble, Tim Dronfield | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101998) | | | Purging Start Time: | 12:50 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE, Other<br>1/4’ | | | Total Volume Purged: | 0.90 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 28 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 12:51 | 300 | 0 | 23.08 | 6.48 | 21.32 | 28.70 | 161.50 | 0.20 | 8.36 | Clear |
| 12:55 | 300 | 0.32 | 23.10 | 6.47 | 21.32 | 28.60 | 160.10 | 0.20 | 10.20 | Clear |
| 12:58 | 300 | 0.24 | 23.08 | 6.46 | 21.32 | 28.60 | 157.70 | 0.10 | 7.34 | Clear |
| 13:01 | 300 | 0.24 | 23.10 | 6.45 | 21.34 | 28.60 | 154.00 | 0.10 | 7.65 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | EPI04-PFAS-GW26-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-26 | Shipment Method: | |
| Collection Date/Time: | 07/01/22 13:02 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW27**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 33.16 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 12.45 | Ft btoc |
| Start Date: | July 1, 2022 | Weather: | Partly Cloudy , 88 F | Water Column: | 20.71 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble, Tim Dronfield | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101998) | | | Purging Start Time: | 10:35 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4” | | | Total Volume Purged: | 1.30 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 10:38 | 300 | 0 | 12.55 | 6.50 | 29.76 | 28.30 | 147.50 | 0.20 | 6.35 | Clear |
| 10:45 | 300 | | 12.55 | 6.47 | 29.39 | 28.20 | 144.50 | 0.10 | 6.51 | Clear |
| 10:48 | 300 | 0.24 | 12.55 | 6.47 | 29.30 | 28.30 | 144.10 | 0.10 | 6.36 | Clear |
| 10:51 | 300 | 0.24 | 12.57 | 6.47 | 29.15 | 28.20 | 143.70 | 0.10 | 3.99 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW27-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/01/22 10:52 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW28**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 26.05 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 10.58 | Ft btoc |
| Start Date: | June 29, 2022 | Weather: | Sunny , 88 F | Water Column: | 15.47 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101998) | | | Purging Start Time: | 09:57 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 0.60 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 21 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 10:00 | 200 | 0 | 10.68 | 6.68 | 17.40 | 28.80 | 196.10 | 0.20 | 1.08 | Clear |
| 10:03 | 200 | 0.16 | 10.66 | 6.69 | 17.38 | 28.70 | 192.50 | 0.10 | 0.93 | Clear |
| 10:06 | 200 | 0.16 | 10.67 | 6.69 | 17.35 | 28.70 | 190.30 | 0.10 | 0.56 | Clear |
| 10:09 | 200 | 0.16 | 10.67 | 6.69 | 17.31 | 28.90 | 188.10 | 0.10 | 0.45 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW28-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 06/29/22 10:10 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW28D**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 55.50 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 9.68 | Ft btoc |
| Start Date: | June 29, 2022 | Weather: | Sunny , 87 F | Water Column: | 45.82 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101998) | | | Purging Start Time: | 08:50 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 0.80 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 50 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 08:55 | 250 | 0 | 10.00 | 6.75 | 21.65 | 28.50 | 190.20 | 0.20 | 42.40 | Clear |
| 08:58 | 250 | 0.2 | 9.98 | 6.75 | 21.70 | 28.60 | 184.10 | 0.20 | 44.00 | Clear |
| 09:02 | 175 | 0.19 | 9.92 | 6.75 | 21.69 | 28.70 | 180.20 | 0.10 | 35.60 | Cloudy |
| 09:07 | 175 | 0.23 | 9.92 | 6.75 | 21.67 | 28.70 | 177.50 | 0.10 | 29.50 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW28D-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 06/29/22<br>09:10 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW29**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 31.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 18.16 | Ft btoc |
| Start Date: | June 27, 2022 | Weather: | Cloudy , 86 F | Water Column: | 12.84 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101998) | | | Purging Start Time: | 15:51 | |
| | | | | Purging End Time: | 16:16 | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 1.70 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 26 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 15:57 | 300 | 0 | 18.33 | 6.57 | 19.69 | 28.60 | 110.20 | 1.50 | 21.60 | Clear |
| 16:02 | 300 | 0.4 | 18.34 | 6.56 | 19.61 | 28.50 | 108.10 | 1.40 | 12.30 | Clear |
| 16:06 | 300 | 0.32 | 18.34 | 6.55 | 19.59 | 28.50 | 108.90 | 1.40 | 8.02 | Clear |
| 16:12 | 300 | 0.48 | 18.34 | 6.55 | 19.57 | 28.40 | 109.80 | 1.40 | 5.21 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW29-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 06/27/22 16:20 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW30**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 33.30 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 23.78 | Ft btoc |
| Start Date: | July 1, 2022 | Weather: | Partly Cloudy , 87 F | Water Column: | 9.52 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble, Tim Dronfield | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101998) | | | Purging Start Time: | 11:40 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4” | | | Total Volume Purged: | 0.80 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 28 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 11:43 | 200 | 0 | 23.84 | 6.45 | 17.12 | 29.20 | 144.60 | 0.60 | 10.60 | Clear |
| 11:46 | 200 | | 23.84 | 6.44 | 17.08 | 29.00 | 139.60 | 0.70 | 7.34 | Clear |
| 11:49 | 200 | 0.16 | 23.84 | 6.42 | 17.09 | 29.00 | 135.50 | 0.50 | 4.40 | Clear |
| 11:52 | 200 | 0.16 | 23.84 | 6.41 | 17.08 | 29.00 | 128.70 | 0.50 | 4.86 | Clear |
| 11:55 | 200 | 0.16 | 23.84 | 6.41 | 17.07 | 29.10 | 123.20 | 0.40 | 3.83 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW30-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/01/22 11:55 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW31**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 31.22 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 12.8 | Ft btoc |
| Start Date: | June 28, 2022 | Weather: | Sunny , 91 F | Water Column: | 18.42 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101998) | | | Purging Start Time: | 16:03 | |
| | | | | Purging End Time: | 16:20 | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 0.90 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 26 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 16:06 | 275 | 0 | 13.52 | 6.79 | 16.87 | 28.80 | 498.80 | 1.30 | 24.90 | Clear |
| 16:11 | 275 | 0.36 | 14.16 | 6.78 | 16.84 | 28.80 | 529.90 | 1.40 | 24.80 | Clear |
| 16:14 | 200 | 0.16 | 14.25 | 6.78 | 16.84 | 29.00 | 532.60 | 1.30 | 14.60 | Clear |
| 16:17 | 200 | 0.16 | 14.25 | 6.77 | 16.87 | 29.00 | 536.70 | 1.20 | 9.71 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW31-0622 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 06/28/22 16:20 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW32**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 23.18 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 4.45 | Ft btoc |
| Start Date: | July 7, 2022 | Weather: | Partly Cloudy , 88 F | Water Column: | 18.73 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 3.06 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101998) | | | Purging Start Time: | 17:00 | |
| | | | | Purging End Time: | 17:37 | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 1.60 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 18 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 17:04 | 300 | 0 | 6.40 | 6.38 | 66.40 | 29.60 | 64.10 | 0.10 | 11.40 | Clear |
| 17:07 | 250 | 0.16 | 7.30 | 6.38 | 66.00 | 29.60 | 66.70 | 0.10 | 8.14 | Clear |
| 17:10 | 250 | 0.2 | 7.76 | 6.38 | 65.10 | 29.60 | 67.40 | 0.10 | 2.59 | Clear |
| 17:13 | 200 | 0.16 | 8.58 | 6.39 | 64.10 | 29.60 | 63.20 | 0.10 | 2.00 | Clear |
| 17:21 | 200 | 0.42 | 9.22 | 6.38 | 65.00 | 29.50 | 61.90 | 0.10 | 2.37 | Clear |
| 17:24 | 200 | 0.16 | 9.39 | 6.38 | 65.20 | 29.50 | 62.00 | 0.10 | 1.49 | Clear |
| 17:27 | 200 | 0.16 | 9.58 | 6.38 | 65.20 | 29.40 | 62.20 | 0.10 | 1.54 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW32-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/07/22 17:30 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: EPI04-MW33**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 17.93 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 4.37 | Ft btoc |
| Start Date: | July 7, 2022 | Weather: | Partly Cloudy , 89 F | Water Column: | 13.56 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 2.21 | Gal |
| Equipment | Peristaltic Pump<br>Alexis Peristaltic Pump #24336 (C101998) | | | Purging Start Time: | 16:10 | |
| | | | | Purging End Time: | 16:37 | |
| Tubing Materials: | 1/4good | | | Total Volume Purged: | 1.30 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 13 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 16:15 | 300 | 0 | 4.82 | 6.05 | 85.70 | 31.30 | -5.10 | 0.20 | 5.69 | Clear |
| 16:18 | 300 | 0.24 | 4.85 | 6.05 | 85.70 | 31.30 | -10.40 | 0.10 | 5.22 | Clear |
| 16:21 | 200 | 0.16 | 4.81 | 6.05 | 85.70 | 31.40 | -15.80 | 0.10 | 2.83 | Clear |
| 16:24 | 200 | 0.16 | 4.22 | 6.05 | 85.60 | 31.30 | -22.90 | 0.10 | 2.04 | Clear |
| 16:27 | 200 | 0.16 | 4.26 | 6.05 | 85.60 | 31.20 | -24.90 | 0.10 | 2.22 | Clear |
| 16:30 | 200 | 0.16 | 4.26 | 6.06 | 85.50 | 31.10 | -25.80 | 0.10 | 2.58 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEP4-GW33-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-44\| Select VOCs 8260C | Shipment Method: | |
| Collection Date/Time: | 07/07/22 16:30 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VEFS-PFAS-MW01**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | | Well Depth: | 65.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 49.65 | Ft btoc |
| Start Date: | July 11, 2022 | Weather: | Partly Cloudy , F | Water Column: | 15.35 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | | In |
| | | | | Volume per Foot: | 0 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 17:45 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4” | | | Total Volume Purged: | 3.00 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 17:48 | 300 | 0 | 50.70 | 7.23 | 2.54 | 30.30 | 116.00 | 2.85 | 3.10 | Clear |
| 17:53 | 300 | 0.4 | 51.13 | 7.03 | 2.49 | 29.50 | 125.50 | 2.40 | 3.39 | Clear |
| 17:56 | 300 | 0.24 | 52.25 | 7.05 | 2.49 | 29.40 | 125.90 | 2.74 | 3.76 | Clear |
| 17:59 | 225 | 0.18 | 52.85 | 7.07 | 2.48 | 29.50 | 126.00 | 2.81 | 5.48 | Clear |
| 18:02 | 200 | | 53.20 | 7.08 | 2.47 | 29.60 | 126.10 | 2.77 | 4.19 | Clear |
| 18:05 | 200 | 0.16 | 53.76 | 7.10 | 2.47 | 29.70 | 126.50 | 3.03 | 5.93 | Clear |
| 18:08 | 200 | 0.16 | 54.10 | 7.11 | 2.48 | 29.60 | 127.10 | 3.04 | 3.65 | Clear |
| 18:11 | 200 | 0.16 | 55.00 | 7.11 | 2.48 | 29.60 | 127.40 | 3.06 | 3.55 | Clear, lowered pump to attempt offset draw down |
| 18:14 | 200 | 0.16 | 55.23 | 7.10 | 2.47 | 29.60 | 129.00 | 3.00 | 45.50 | Clear |
| 18:17 | 350 | 0.28 | 55.56 | 7.06 | 2.47 | 29.50 | 130.10 | 1.08 | 467.00 | Cloudy |
| 18:20 | 350 | 0.28 | 55.74 | 7.06 | 2.48 | 29.30 | 129.30 | 2.25 | 55.30 | Clear |
| 18:23 | 200 | 0.16 | 55.90 | 7.08 | 2.48 | 29.30 | 129.10 | 2.29 | 27.90 | Clear |
| 18:26 | 175 | 0.14 | 56.10 | 7.11 | 2.48 | 29.50 | 128.70 | 3.21 | 20.20 | Clear |
| 18:29 | 175 | 0.14 | | 7.13 | 2.49 | 29.50 | 129.00 | 3.35 | 16.00 | Clear |

| ch2m | GROUNDWATER SAMPLING DATA SHEET | WELL ID: VEFS-PFAS-MW01 |
|---|---|---|

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEFS-PFAS-GW01-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-32 | Shipment Method: | |
| Collection Date/Time: | 07/11/22 18:30 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | -0722 |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VEFS-PFAS-MW02**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 67.40 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 47.92 | Ft btoc |
| Start Date: | July 11, 2022 | Weather: | Partly Cloudy , 88 F | Water Column: | 19.48 | Ft |
| Sampling Team: | Toby Stewart, other Reece Etiemble | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 3.18 | Gal |
| Equipment | Bladder Pump<br>Geotech Portable Bladder Pump CE 1667 | | | Purging Start Time: | 14:06 | |
| | | | | Purging End Time: | | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 2.60 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 62 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:12 | 325 | 0 | 47.35 | 6.76 | 0.82 | 29.60 | 106.50 | 2.43 | 571.00 | Cloudy |
| 14:17 | 325 | 0.43 | 49.86 | 6.79 | 0.82 | 29.70 | 104.80 | 2.81 | 658.00 | Cloudy |
| 14:24 | 325 | 0.6 | 51.10 | 6.81 | 0.81 | 29.90 | 107.70 | 3.15 | 953.00 | Cloudy |
| 14:29 | 150 | 0.2 | 50.95 | 6.94 | 0.81 | 30.40 | 104.90 | 2.92 | 492.00 | Cloudy |
| 14:32 | 150 | 0.12 | 51.00 | 7.00 | 0.82 | 30.30 | 104.40 | 2.20 | 325.00 | Cloudy |
| 14:36 | 150 | 0.16 | 51.00 | 7.02 | 0.83 | 30.30 | 104.50 | 1.85 | 282.00 | Cloudy |
| 14:39 | 150 | 0.12 | 51.00 | 7.04 | 0.83 | 30.20 | 104.50 | 1.56 | 182.00 | Cloudy |
| 14:42 | 150 | 0.12 | 51.00 | 7.06 | 0.83 | 30.20 | 104.00 | 1.21 | 134.00 | Cloudy |
| 14:45 | 150 | 0.12 | 51.01 | 7.11 | 0.83 | 30.10 | 104.40 | 1.55 | 140.00 | Cloudy |
| 14:48 | 150 | 0.12 | 51.00 | 7.08 | 0.84 | 30.10 | 105.60 | 0.96 | 81.90 | Cloudy |
| 14:51 | 150 | 0.12 | 51.10 | 7.08 | 0.84 | 30.20 | 105.20 | 0.82 | 74.50 | Cloudy |

| ch2m | GROUNDWATER SAMPLING DATA SHEET | WELL ID: VEFS-PFAS-MW02 |
|---|---|---|

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEFS-PFAS-GW02-0722 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-33 | Shipment Method: | |
| Collection Date/Time: | 07/11/22 14:55 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | VEFS-PFAS-GW02-0722-MS VEFS-PFAS-GW02-0722-MSD |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VEW10-PFAS-MW01**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 32.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 26.97 | Ft btoc |
| Start Date: | April 6, 2022 | Weather: | Cloudy , 80 F | Water Column: | 5.03 | Ft |
| Sampling Team: | Juan Acaron, Jack Quin | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 0.82 | Gal |
| Equipment | Peristaltic Pump<br>Peristaltic Pump Proactive Environmental Products Alexis C101861 | | | Purging Start Time: | 09:10 | |
| | | | | Purging End Time: | 10:25 | |
| Tubing Materials: | Poly Tubing<br>1/4" x 1/8" | | | Total Volume Purged: | 0.80 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 30 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 09:15 | 75 | 0.1 | 27.02 | 6.26 | 23.42 | 28.10 | 95.30 | 1.50 | 68.30 | Clear |
| 09:20 | 75 | 0.1 | 27.02 | 6.29 | 23.49 | 28.50 | 89.70 | 0.90 | 35.30 | Clear |
| 09:25 | 75 | 0.1 | 27.02 | 6.29 | 23.49 | 28.60 | 87.50 | 1.00 | 19.50 | Clear |
| 09:30 | 75 | 0.1 | 27.02 | 6.29 | 23.53 | 28.50 | 84.70 | 0.90 | 16.90 | Clear |
| 09:35 | 75 | 0.1 | 27.02 | 6.29 | 23.48 | 28.60 | 83.60 | 1.00 | 10.20 | Clear |
| 09:40 | 75 | 0.1 | 27.02 | 6.29 | 23.48 | 28.90 | 82.70 | 1.00 | 5.58 | Clear |
| 09:45 | 75 | 0.1 | 27.02 | 6.29 | 23.49 | 28.60 | 82.40 | 1.00 | 5.40 | Clear |
| 09:50 | 75 | 0.1 | 27.02 | 6.29 | 23.47 | 28.60 | 82.80 | 1.00 | 5.51 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEW10-PFAS-GW01-0422 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-34 | Shipment Method: | |
| Collection Date/Time: | 04/06/22<br>09:55 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | -0422 |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VEW10-PFAS-MW02**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 35.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 23.2 | Ft btoc |
| Start Date: | April 5, 2022 | Weather: | Sunny , 92 F | Water Column: | 11.8 | Ft |
| Sampling Team: | Juan Acaron, Jack Quin | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 1.93 | Gal |
| Equipment | Peristaltic Pump<br>Peristaltic Pump Proactive Environmental Products Alexis C101998 | | | Purging Start Time: | 14:15 | |
| | | | | Purging End Time: | 15:20 | |
| Tubing Materials: | Poly Tubing<br>1/4" x 1/8 | | | Total Volume Purged: | 1.50 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 25 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:20 | 100 | 0 | 23.41 | 7.05 | 14.10 | 30.00 | -98.00 | 0.40 | 14.00 | Clear |
| 14:25 | 100 | 0.13 | 23.45 | 7.04 | 14.07 | 29.80 | -102.50 | 0.30 | 12.30 | Clear |
| 14:30 | 100 | 0.13 | 23.46 | 7.02 | 14.00 | 29.90 | -103.70 | 0.20 | 16.10 | Clear |
| 14:35 | 100 | 0.13 | 23.50 | 6.98 | 13.89 | 30.00 | -98.60 | 0.20 | 23.70 | Clear |
| 14:40 | 100 | 0.13 | 23.50 | 6.95 | 13.74 | 30.20 | -94.90 | 0.10 | 25.60 | Clear |
| 14:45 | 100 | 0.13 | 23.50 | | 13.66 | 30.20 | -93.10 | 0.10 | 24.20 | Clear |
| 14:50 | 100 | 0.13 | 23.50 | 6.94 | 13.63 | 30.40 | -92.80 | 0.10 | 21.70 | Clear |
| 14:55 | 100 | 0.13 | 23.50 | 6.94 | 13.66 | 30.40 | -91.10 | 0.10 | 19.00 | Clear |
| 15:00 | 100 | 0.13 | 23.50 | 6.94 | 13.65 | 30.40 | -88.00 | 0.10 | 16.80 | Clear |
| 15:05 | 100 | 0.13 | 23.50 | 6.94 | 13.66 | 30.50 | -85.10 | 0.10 | 15.40 | Clear |
| 15:10 | 100 | 0.13 | 23.50 | 6.94 | 13.65 | 30.40 | -86.50 | 0.10 | 15.90 | Clear |
| 15:08 | | | | | | | | | | |

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VEW10-PFAS-MW02**

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEW10-PFAS-GW02-0422 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-35 | Shipment Method: | |
| Collection Date/Time: | 04/05/22 15:15 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | VEW10-PFAS-GW02-0422-MS VEW10-PFAS-GW02-0422-MSD |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VEW10-PFAS-MW03**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 35.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 16.39 | Ft btoc |
| Start Date: | April 5, 2022 | Weather: | Sunny , 90 F | Water Column: | 18.61 | Ft |
| Sampling Team: | Juan Acaron, Jack Quin | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 3.04 | Gal |
| Equipment | Peristaltic Pump<br>Peristaltic Pump Proactive Environmental Products Alexis C101998 | | | Purging Start Time: | 11:10 | |
| | | | | Purging End Time: | 12:00 | |
| Tubing Materials: | Poly Tubing<br>1/4" x 1/8" | | | Total Volume Purged: | 1.00 | Gal |
| | | | | Screened Interval: | 25-35 | Ft bgs |
| | | | | Pumping/Tube Intake: | 30 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 11:15 | 185 | 0 | 17.62 | 7.18 | 12.17 | 29.40 | -30.00 | 0.60 | 4.18 | Clear |
| 11:20 | 100 | 0.13 | 17.69 | 7.18 | 12.20 | 29.70 | -39.20 | 0.70 | 2.73 | Clear |
| 11:25 | 100 | 0.13 | 17.70 | 7.18 | 12.19 | 29.90 | -40.60 | 0.70 | 1.81 | Clear |
| 11:30 | 100 | 0.13 | 17.70 | 7.18 | 12.19 | 29.70 | -39.00 | 0.70 | 1.75 | Clear |
| 11:35 | 100 | 0.13 | 17.70 | 7.18 | 12.20 | 30.10 | -39.60 | 0.70 | 1.11 | Clear |
| 11:40 | 100 | 0.13 | 17.70 | 7.18 | 12.20 | 30.00 | -39.20 | 0.70 | 1.20 | Clear |
| 11:45 | 100 | 0.13 | 17.70 | 7.18 | 12.20 | 30.00 | -39.40 | 0.70 | 1.16 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEW10-PFAS-GW03-0422 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-36 | Shipment Method: | |
| Collection Date/Time: | 04/05/22<br>11:50 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: VEW10-PFAS-MW04**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 16.00 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 9.11 | Ft btoc |
| Start Date: | April 5, 2022 | Weather: | Sunny , 88 F | Water Column: | 6.89 | Ft |
| Sampling Team: | Juan Acaron, Jack Quin | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 1.12 | Gal |
| Equipment | Peristaltic Pump<br>Peristaltic Pump Proactive Environmental Products Alexis C101861 | | | Purging Start Time: | 09:00 | |
| | | | | Purging End Time: | 10:05 | |
| Tubing Materials: | Poly Tubing<br>1/4" x 1/8" | | | Total Volume Purged: | 1.30 | Gal |
| | | | | Screened Interval: | 6-16 | Ft bgs |
| | | | | Pumping/Tube Intake: | 11 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 09:05 | 100 | 0.13 | 9.35 | 6.71 | 37.58 | 28.80 | 83.90 | 0.70 | 19.80 | Clear |
| 09:10 | 100 | 0.13 | 9.37 | 6.68 | 37.04 | 29.00 | 79.90 | 0.60 | 19.80 | Clear |
| 09:15 | 100 | 0.13 | 9.39 | 6.64 | 35.15 | 29.20 | 78.40 | 0.90 | 12.60 | Clear |
| 09:20 | 100 | 0.13 | 9.40 | 6.63 | 34.41 | 29.40 | 78.60 | 0.90 | 10.10 | Clear |
| 09:25 | 100 | 0.13 | 9.40 | 6.63 | 33.87 | 29.50 | 78.70 | 0.80 | 7.65 | Clear |
| 09:30 | 100 | 0.13 | | 6.63 | 32.92 | 29.60 | 78.90 | 0.60 | 8.50 | Clear |
| 09:35 | 100 | 0.13 | 9.40 | 6.62 | 32.30 | 29.60 | 79.20 | 0.70 | 7.49 | Clear |
| 09:40 | 100 | 0.13 | 9.40 | 6.62 | 32.04 | 29.50 | 79.30 | 0.50 | 6.28 | Clear |
| 09:45 | 100 | 0.13 | 9.40 | 6.61 | 32.09 | 29.40 | 79.30 | 0.50 | 6.40 | Clear |
| 09:50 | 100 | 0.13 | 9.40 | 6.62 | 32.03 | 29.50 | 79.40 | 0.50 | 6.35 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEW10-PFAS-GW04-0422 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-37 | Shipment Method: | |
| Collection Date/Time: | 04/05/22<br>09:55 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# VNTR SWMU 1: Former Camp Garcia Municipal Waste Management Unit (Landfill)

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: CGW1MW02**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 36.75 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 18.57 | Ft btoc |
| Start Date: | January 31, 2022 | Weather: | Partly Cloudy , 83 F | Water Column: | 18.18 | Ft |
| Sampling Team: | Meg Gillespie, Todd Arrowood | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 2.97 | Gal |
| Equipment | Peristaltic Pump alexis V3.0 peristaltic pump, c101998 | | | Purging Start Time: | 11:25 | |
| | | | | Purging End Time: | 12:00 | |
| Tubing Materials: | HDPE 1/4 | | | Total Volume Purged: | 1.70 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 31.75 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 11:30 | 185 | 0.24 | 18.70 | 6.83 | 5.91 | 28.40 | 52.30 | 1.20 | 31.60 | Clear |
| 11:35 | 185 | 0.24 | 18.73 | 6.83 | 5.90 | 28.40 | 53.50 | 0.20 | 25.40 | Clear |
| 11:40 | 185 | 0.24 | 18.76 | 6.83 | 5.90 | 28.50 | 55.70 | 0.20 | 13.00 | Clear |
| 11:45 | 185 | 0.24 | 18.75 | 6.83 | 5.91 | 28.50 | 58.40 | 0.10 | 5.40 | Clear |
| 11:50 | 185 | 0.24 | 18.75 | 6.83 | 5.92 | 28.60 | 61.80 | 0.10 | 7.85 | Clear |
| 11:55 | 185 | 0.24 | 18.75 | 6.83 | 5.91 | 28.60 | 62.40 | 0.10 | 7.05 | Clear |
| 12:00 | 185 | 0.24 | 18.76 | 6.84 | 5.92 | 28.50 | 64.40 | 0.10 | 4.58 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEW01-PFAS-MW02-0122 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-38 | Shipment Method: | |
| Collection Date/Time: | 01/31/22 12:00 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | VEW01-PFAS-MW02P-0122 |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: CGW1MW03**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 33.19 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 17.08 | Ft btoc |
| Start Date: | February 1, 2022 | Weather: | Sunny , 78 F | Water Column: | 16.11 | Ft |
| Sampling Team: | Meg Gillespie, Todd Arrowood | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 2.63 | Gal |
| Equipment | Peristaltic Pump<br>Alexis peri pro, V3.0, c101998 | | | Purging Start Time: | 08:10 | |
| | | | | Purging End Time: | 09:12 | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 2.20 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 28.19 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 08:15 | 155 | 0.21 | 17.35 | 6.84 | 5.16 | 27.70 | 103.80 | 0.50 | 11.70 | Clear |
| 08:24 | 155 | 0.37 | 17.38 | 6.84 | 5.17 | 27.70 | 102.70 | 0.50 | 13.70 | Clear |
| 08:30 | 135 | 0.21 | 17.38 | 6.83 | 5.18 | 27.80 | 98.60 | 0.20 | 12.60 | Clear |
| 08:35 | 135 | 0.18 | 17.34 | 6.83 | 5.17 | 27.80 | 95.90 | 0.20 | 10.10 | Clear |
| 08:41 | 135 | 0.21 | 17.35 | 6.83 | 5.17 | 27.70 | 94.30 | 0.10 | 10.10 | Clear |
| 08:45 | 135 | 0.14 | 17.35 | 6.82 | 5.17 | 27.90 | 91.50 | 0.10 | 11.40 | Clear |
| 08:50 | 135 | 0.18 | 17.35 | 6.82 | 5.16 | 28.00 | 90.80 | 0.10 | 11.00 | Clear |
| 08:55 | 135 | 0.18 | 17.35 | 6.82 | 5.16 | 28.00 | 90.50 | 0.10 | 11.80 | Clear |
| 09:00 | 135 | 0.18 | 17.35 | 6.82 | 5.17 | 28.00 | 89.70 | 0.10 | 8.83 | Clear |
| 09:05 | 135 | 0.18 | 17.35 | 6.82 | 5.17 | 28.00 | 88.90 | 0.10 | 8.56 | Clear |
| 09:10 | 135 | 0.18 | 17.35 | 6.82 | 5.16 | 28.10 | 88.70 | 0.10 | 8.76 | Clear |

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: CGW1MW03**

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEW01-PFAS-MW03-0222 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-39 | Shipment Method: | |
| Collection Date/Time: | 02/01/22 09:15 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: CGW1MW06**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 59.40 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 21.94 | Ft btoc |
| Start Date: | February 3, 2022 | Weather: | Sunny , 78 F | Water Column: | 37.45 | Ft |
| Sampling Team: | Meg Gillespie, Todd Arrowood | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 6.11 | Gal |
| Equipment | Peristaltic Pump Alexis peri pump, V3.0, C101998 | | | Purging Start Time: | 08:13 | |
| | | | | Purging End Time: | 09:00 | |
| Tubing Materials: | HDPE 1/4 | | | Total Volume Purged: | 1.30 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 54.5 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 08:20 | 110 | 0.2 | 22.58 | 6.91 | 3.52 | 27.00 | 95.50 | 0.70 | 22.60 | Clear |
| 08:25 | 110 | 0.14 | 22.50 | 6.88 | 3.52 | 27.10 | 89.20 | 0.40 | 23.90 | Clear |
| 08:30 | 110 | 0.14 | 22.80 | 6.88 | 3.52 | 27.20 | 85.70 | 0.40 | 20.40 | Clear |
| 08:35 | 100 | 0.13 | 22.85 | 6.88 | 3.52 | 27.10 | 84.50 | 0.30 | 19.40 | Clear |
| 08:40 | 100 | 0.13 | 22.75 | 6.87 | 3.52 | 27.00 | 82.20 | 0.20 | 18.60 | Clear |
| 08:45 | 100 | 0.13 | 22.68 | 6.87 | 3.52 | 27.20 | 81.30 | 0.20 | 22.50 | Clear |
| 08:50 | 100 | 0.13 | 22.63 | 6.87 | 3.52 | 27.30 | 79.90 | 0.20 | 17.80 | Clear |
| 08:55 | 100 | 0.13 | 22.60 | 6.87 | 3.52 | 27.40 | 79.30 | 0.20 | 16.90 | Clear |
| 09:00 | 100 | 0.13 | 22.54 | 6.86 | 3.52 | 27.40 | 78.90 | 0.20 | 17.70 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEW01-PFAS-MW06-0222 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-40 | Shipment Method: | |
| Collection Date/Time: | 02/03/22 09:05 | QC Sample: | YES |
| Sample Comments: | | QC Sample ID: | VEW01-PFAS-MW06-0222-MS VEW01-PFAS-MW06-0222-MSD |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: CGW1MW08**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 70.67 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 22.19 | Ft btoc |
| Start Date: | January 31, 2022 | Weather: | Partly Cloudy , 80 F | Water Column: | 48.48 | Ft |
| Sampling Team: | Meg Gillespie, Todd Arrowood | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 7.91 | Gal |
| Equipment | Peristaltic Pump<br>Alexis peristaltic pump, V3.0 C101998 | | | Purging Start Time: | 09:35 | |
| | | | | Purging End Time: | 10:25 | |
| Tubing Materials: | HDPE, Flex Tubing 1/4" | | | Total Volume Purged: | 2.40 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 65 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 09:40 | 180 | 0.24 | 22.42 | 6.89 | 3.93 | 27.70 | 88.20 | 0.70 | 18.50 | Clear |
| 09:45 | 180 | 0.24 | 22.52 | 6.88 | 3.91 | 27.70 | -18.20 | 0.20 | 15.00 | Clear |
| 09:50 | 180 | 0.24 | 22.50 | 6.86 | 3.88 | 27.70 | -70.60 | 0.10 | 13.10 | Clear |
| 09:55 | 180 | 0.24 | 22.50 | 6.86 | 3.87 | 27.70 | -100.20 | 0.10 | 13.10 | Clear |
| 10:00 | 180 | 0.24 | 22.51 | 6.86 | 3.86 | 27.80 | -104.50 | 0.10 | 8.60 | Clear |
| 10:05 | 180 | 0.24 | 22.50 | 6.86 | 3.85 | 27.70 | -117.00 | 0.10 | 8.87 | Clear |
| 10:10 | 180 | 0.24 | 22.50 | 6.85 | 3.83 | 27.80 | -132.00 | 0.10 | 7.95 | Clear |
| 10:15 | 180 | 0.24 | 22.50 | 6.85 | 3.81 | 27.80 | -149.60 | 0.10 | 5.99 | Clear |
| 10:20 | 180 | 0.24 | 22.51 | 6.86 | 3.81 | 27.80 | -142.50 | 0.10 | 3.60 | Clear |
| 10:25 | 180 | 0.24 | 22.51 | 6.86 | 3.81 | 27.70 | -147.10 | 0.10 | 4.78 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEW01-PFAS-MW08-0122 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-41 | Shipment Method: | |
| Collection Date/Time: | 01/31/22 10:30 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: CGW1MW10**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 52.61 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 9.27 | Ft btoc |
| Start Date: | January 31, 2022 | Weather: | Partly Cloudy , 85 F | Water Column: | 43.34 | Ft |
| Sampling Team: | Meg Gillespie, Todd Arrowood | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 7.07 | Gal |
| Equipment | Peristaltic Pump<br>Alexis peristaltic pump, V3.0, C101998 | | | Purging Start Time: | 13:03 | |
| | | | | Purging End Time: | 13:35 | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 1.20 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 47.61 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 13:10 | 200 | 0.37 | 11.00 | 6.81 | 5.85 | 29.60 | 69.70 | 0.30 | 4.65 | Clear |
| 13:15 | 160 | 0.21 | 11.32 | 6.81 | 5.85 | 29.80 | 70.90 | 0.20 | 3.87 | Clear |
| 13:20 | 100 | 0.13 | 11.41 | 6.81 | 5.84 | 30.20 | 72.20 | 0.20 | 3.50 | Clear |
| 13:21 | 100 | 0.03 | 11.40 | 6.80 | 5.86 | 30.60 | 74.40 | 0.20 | 7.84 | Clear |
| 13:30 | 100 | 0.24 | 11.41 | 6.81 | 5.86 | 30.50 | 77.20 | 0.10 | 5.23 | Clear |
| 13:35 | 100 | 0.13 | 11.41 | 6.80 | 5.85 | 30.40 | 78.20 | 0.10 | 4.12 | Clear |

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEW01-PFAS-MW10-0122 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-42 | Shipment Method: | |
| Collection Date/Time: | 01/31/22<br>13:40 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: CGW1MW11**

| | | | | | | |
|---|---|---|---|---|---|---|
| Project Name: | PFAS Site Inspection for Atlantic Fleet Weapons Training Area - Vieques Former Naval Ammunition Support Detachment (NASD) and Former Vieques Naval Training Range (VNTR), Puerto Rico | Casing Materials: | PVC | Well Depth: | 29.62 | Ft btoc |
| Project Number: | 675884CH.FI.PF | Well Head PID Reading: | **VOC:** 0 (ppm), **H2S:** 0 (ppm), **LEL:** 0 %, **CO:** 0 (ppm), **O2:** 20.9 % | Start Water Level: | 15.7 | Ft btoc |
| Start Date: | January 31, 2022 | Weather: | Partly Cloudy , 87 F | Water Column: | 13.92 | Ft |
| Sampling Team: | Meg Gillespie, Todd Arrowood | | | Well Diameter: | 2 | In |
| | | | | Volume per Foot: | 0.163 | Gal/ft |
| Purge Method: | Low Flow | | | Well Volume: | 2.27 | Gal |
| Equipment | Peristaltic Pump<br>Alexis peri pump, V 3.0, C101998 | | | Purging Start Time: | 14:00 | |
| | | | | Purging End Time: | 15:05 | |
| Tubing Materials: | HDPE<br>1/4 | | | Total Volume Purged: | 2.60 | Gal |
| | | | | Screened Interval: | | Ft bgs |
| | | | | Pumping/Tube Intake: | 24.62 | Ft btoc |

## WELL STABILIZATION DATA

| Time | Pumping rate (mL/min) | Volume Removed (GAL) | Water level (ft) | pH (SU) | SP. COND. (mS/cm) | Temp. (°C) | ORP (mV) | D.O. (mg/L) | Turbidity (NTU) | Appearance |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:05 | 150 | 0.2 | 15.72 | 6.64 | 11.72 | 29.90 | 72.20 | 1.10 | 66.70 | Clear |
| 14:10 | 150 | 0.2 | 15.71 | 6.64 | 11.69 | 29.70 | 70.90 | 0.20 | 64.10 | Clear |
| 14:15 | 150 | 0.2 | 15.71 | 6.65 | 11.67 | 26.60 | 70.20 | 0.20 | 42.20 | Clear |
| 14:20 | 150 | 0.2 | 15.71 | 6.65 | 11.66 | 29.50 | 71.90 | 0.10 | 24.00 | Clear |
| 14:25 | 150 | 0.2 | 15.71 | 6.59 | 11.66 | 29.50 | 71.20 | 0.10 | 20.10 | Clear |
| 14:30 | 150 | 0.2 | 15.71 | 6.65 | 11.63 | 29.70 | 68.80 | 0.10 | 19.70 | Clear |
| 14:35 | 150 | 0.2 | 15.71 | 6.66 | 11.58 | 29.50 | 55.50 | 0.10 | 22.40 | Clear |
| 14:38 | 150 | 0.12 | 15.71 | 6.66 | 11.57 | 29.60 | 41.70 | 0.10 | 15.90 | Clear |
| 14:45 | 150 | 0.28 | 15.71 | 6.66 | 11.53 | 29.60 | 31.10 | 0.10 | 10.50 | Clear |
| 14:50 | 150 | 0.2 | 15.71 | 6.66 | 11.51 | 29.60 | 29.50 | 0.10 | 7.00 | Clear |
| 15:00 | 150 | 0.4 | 15.71 | 6.66 | 11.50 | 29.60 | 30.10 | 0.10 | 5.80 | Clear |
| 15:05 | 150 | 0.2 | 15.71 | 6.67 | 11.51 | 29.60 | 29.80 | 0.10 | 4.80 | Clear |

# GROUNDWATER SAMPLING DATA SHEET

**WELL ID: CGW1MW11**

## SAMPLE INFORMATION

| | | | |
|---|---|---|---|
| Sample ID: | VEW01-PFAS-MW11-0122 | Primary Laboratory: | Battelle Analytical Services |
| Analyses: | PFAS (18 analyte list)/QSM v5.1.1 Table B-43 | Shipment Method: | |
| Collection Date/Time: | 01/31/22 15:05 | QC Sample: | N/A |
| Sample Comments: | | QC Sample ID: | N/A |

**Notes:** (mL/min) = milliliters per minute, (SU ) = Standard Units, (mS/cm) = milliSiemens per centimeter, (mV) = Millivolts, (mg/L) = Milligrams per liter, (NTU) = Nephelometric Turbidity Unit, NM= Not Measured

# Appendix E
# Survey Reports

J A V I E R  E  B I D O T  &  A S S O C I A T E S ,  P S C
L A N D  S U R V E Y O R S  -  C O N S U L T A N T S

DATE: September 7, 2022

TO: Toby L. Stewart, Scientist, Jacobs

FROM: Carlos M. Lebron, PLS
Vice President/Survey Manager,
Javier E. Bidot & Associates, PSC

SUBJECT: **Monitoring Wells Location Services at Former Vieques Naval Training Range, NAVY CLEAN CTO-003, Contract 62470-16-D-9000 - Vieques, Puerto Rico**

**Survey Report**

## I. Introduction

Javier E. Bidot & Associates, PSC, (JEBA) has been retained by Jacobs to perform a monitoring wells survey within the NASD and VNTR potential release areas, located at Camp Garcia in Vieques, Puerto Rico. Please refer to figures 1 thru 7, below.

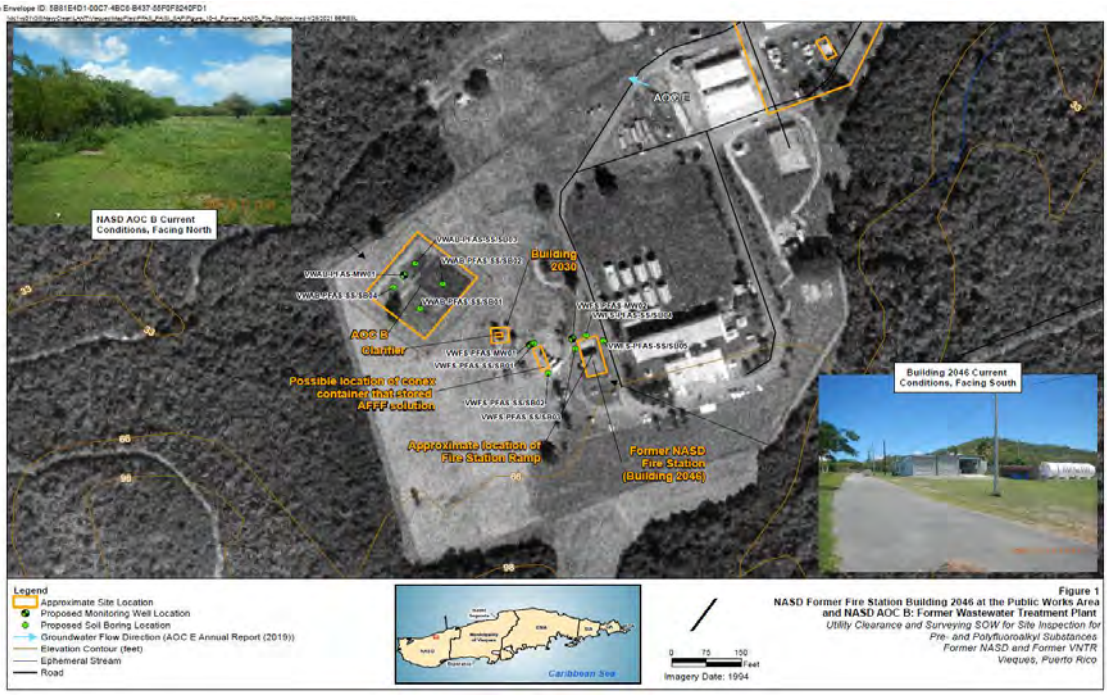



Figure 1.

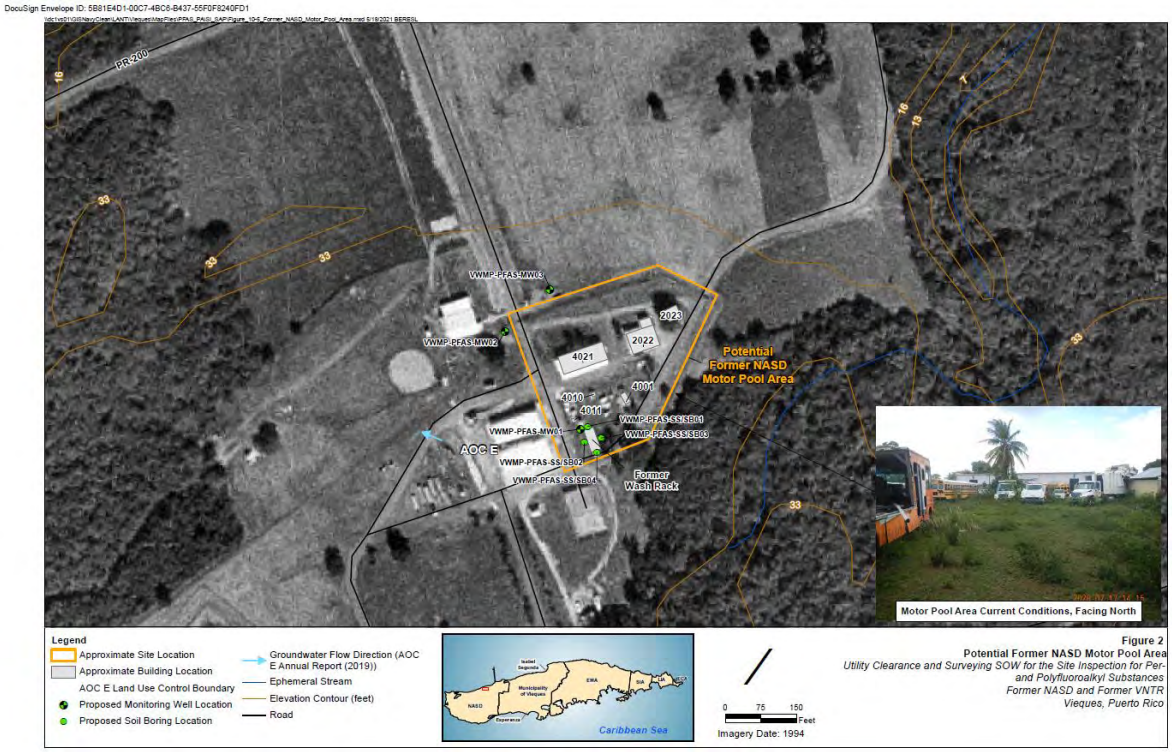



Figure 2.

Figure 2
**Potential Former NASD Motor Pool Area**
*Utility Clearance and Surveying SOW for the Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

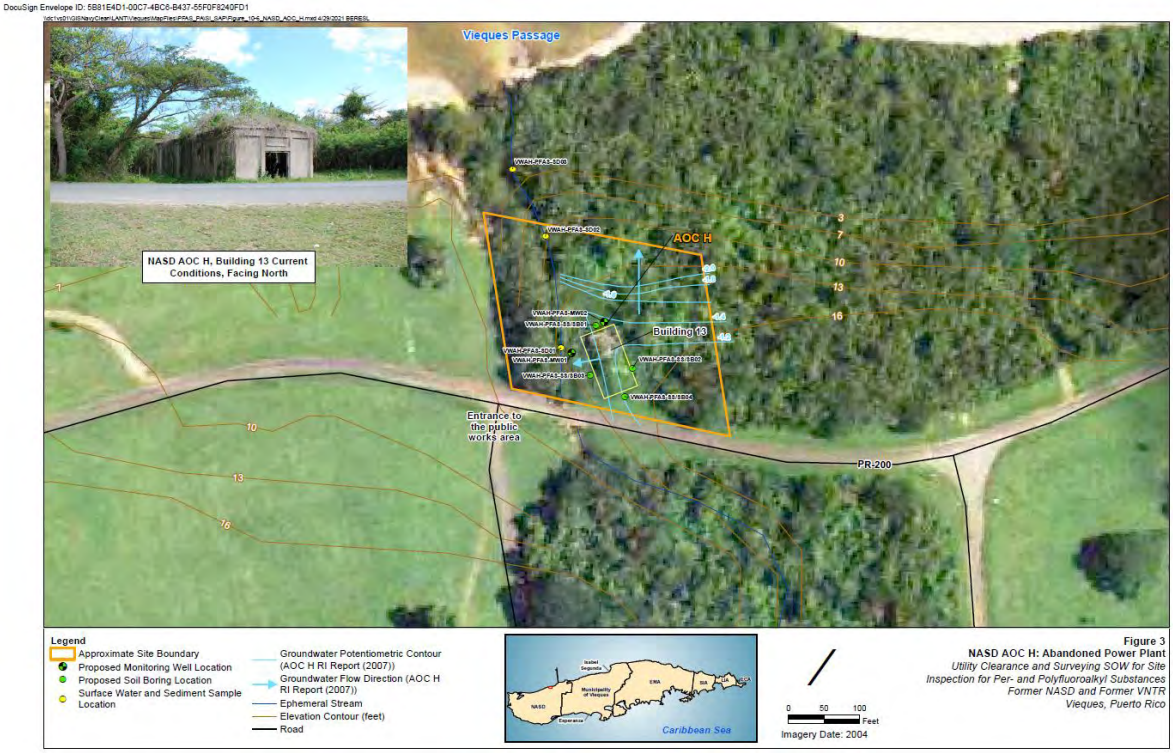



Figure 3.

Figure 3
**NASD AOC H: Abandoned Power Plant**
*Utility Clearance and Surveying SOW for Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

DocuSign Envelope ID: 5B81E4D1-00C7-4BC8-B437-55F0F8240FD1

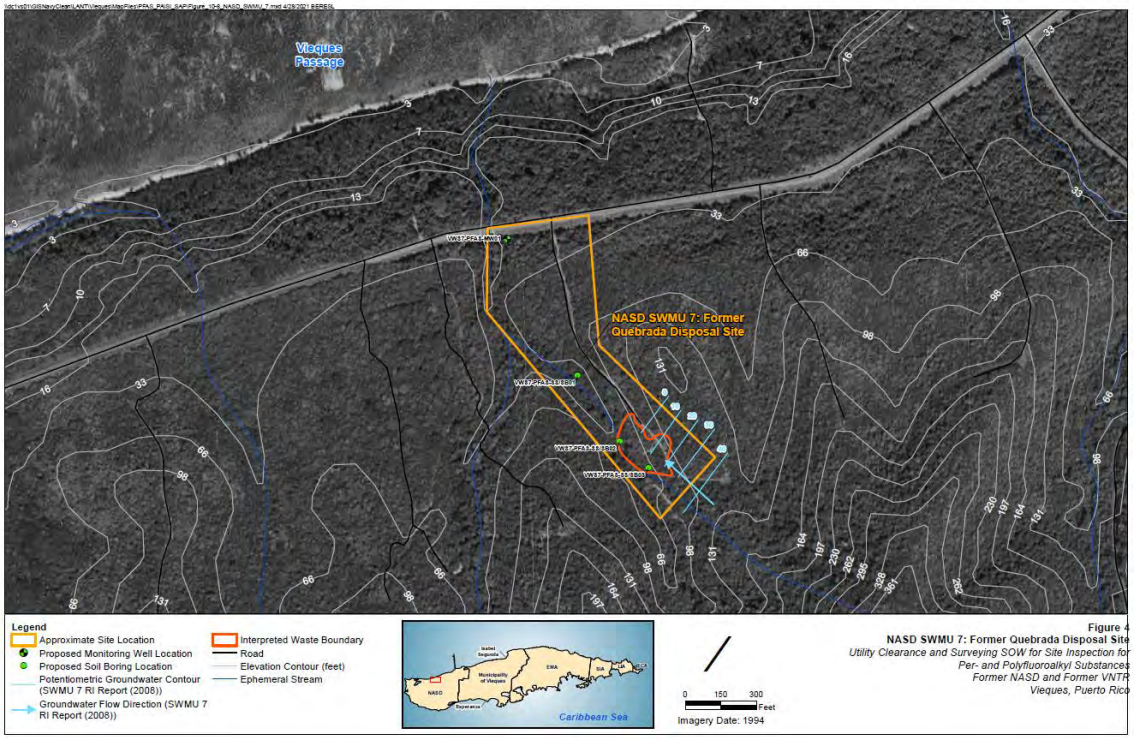



Figure 4.

DocuSign Envelope ID: 5B81E4D1-00C7-4BC8-B437-55F0F8240FD1

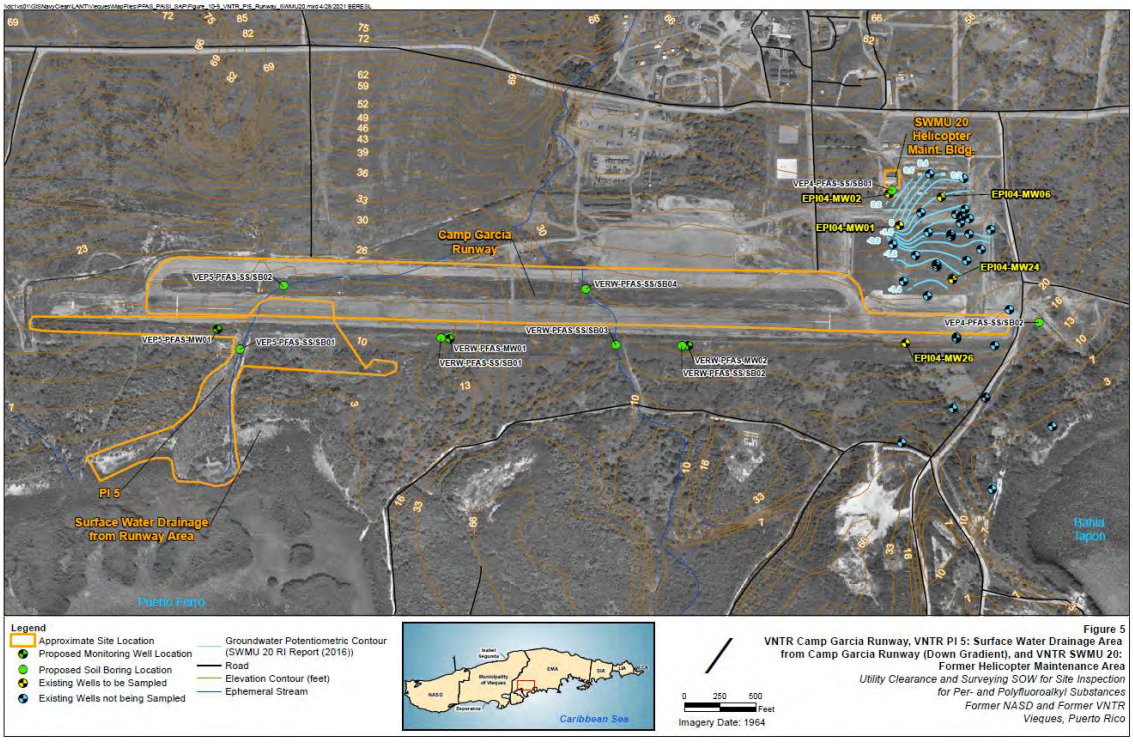



Figure 5.

DocuSign Envelope ID: 5B81E4D1-00C7-4BC6-B437-55F0F8240FD1

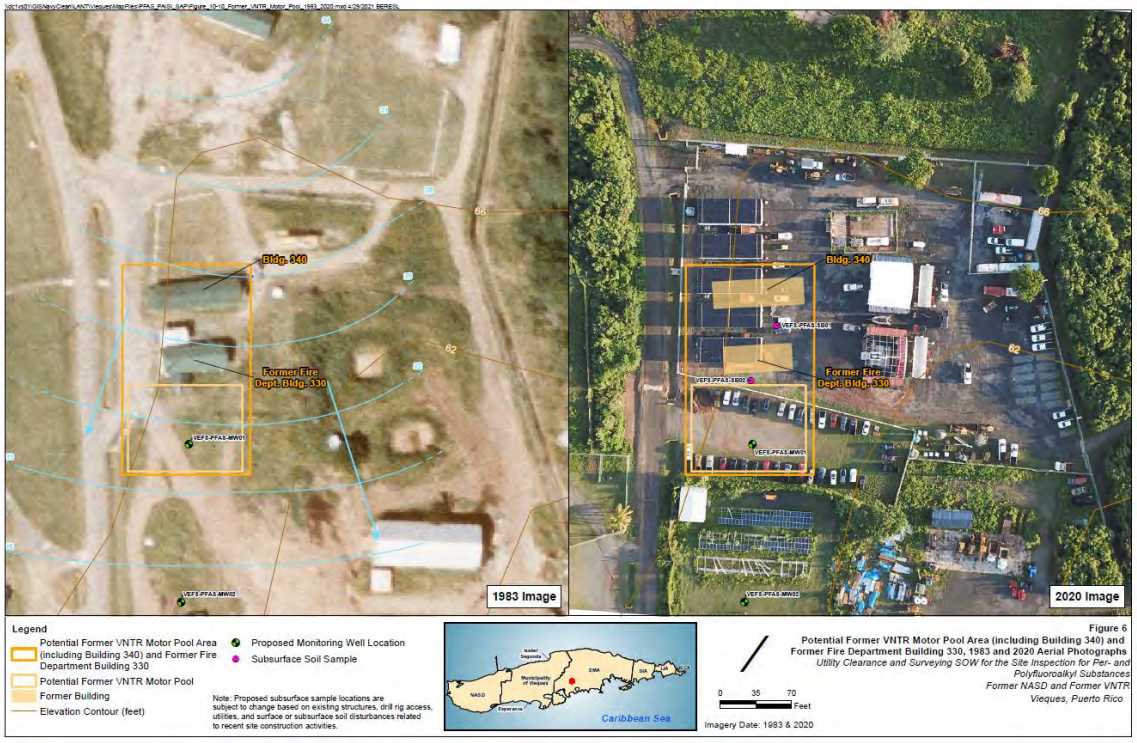



Figure 6.

DocuSign Envelope ID: 5B81E4D1-00C7-4BC6-B437-55F0F8240FD1

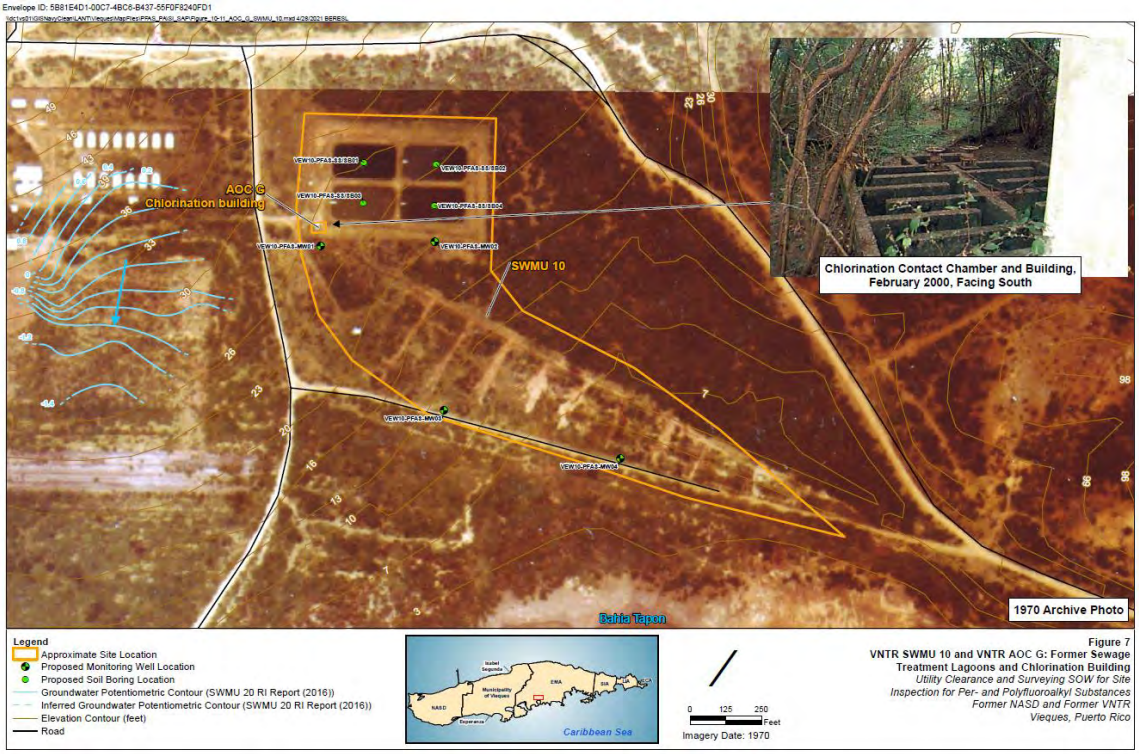



Figure 7.

The required services consist of the location of 18 newly installed monitoring wells.

The present document constitutes the Survey Report for mobilization no. 2 pursuant to document titled ***"Scope of Work/Technical Specifications Land Surveying and Subsurface Utility Location Services at the Former Vieques Naval Training Range, Vieques, Puerto Rico, Navy Clean CTO-003, Contract 62470-16-D-9000"***, attached as Enclosure 1.

## II. Scope of Work

**Task 1**- Mobilization/Demobilization

The notice to proceed was received on August 31, 2021. The period of performance of this task and project tasks was coordinated with Toby Stewart from Jacobs. Pursuant to SOW, work was conducted in two separate mobilizations.

1. Mobilization no.1 for the underground utility designation and location was performed from January 31 thru February 4, 2022.

2. Mobilization no.2 for the monitoring wells survey was conducted from August 22 thru August 25. The present is part of the deliverable package for this task order.

In compliance with SOW, an Activity Hazard Analysis (AHA) herein attached as Enclosure 2, was submitted on January 28, 2022.

**Task 2**- Survey Control & Reference Datums

Survey was performed establishing 4 permanent survey control monuments (3595-3, 3595-4, 3595-5 and 3595-6), within the project areas to support actual task order and future survey efforts. Additional survey controls 3167-1, 3167-2 & 3167-3 previously established by JEBA circa 2018 under NAVY Clean CTO-004 survey task were recovered in good condition.

Project datums for this project are NAD83(2011), epoch 2010, and PRDV02, horizontal and vertical datums, respectively. A 2-hour GPS observation was performed on all 4 primary survey controls established and processed by OPUS. Results are included on the NGS OPUS-Solutions, attached as Enclosure 3.

Horizontal Control

As a Quality Check, survey controls 3167-1, 3167-2, 3595-3 and 3595-6 were observed at different satellites constellation in order to validate the required horizontal positional accuracy of +/- 0.10 feet. Horizontal and Vertical Positional Accuracies @ 95% Confidence results in 0.03 feet and 0.06 feet respectively. Please refer to Positional Accuracy Calculator Report, attached as Enclosure 4. Pursuant to SOW, elevations derived from GPS were not used as final reported values on this task order.

Leveling Plan

In order to determine the most accurate elevation difference between recovered survey monuments and surveyed monitoring wells, a Second Order, Class II leveling procedure was performed to FGDC Geospatial Accuracy Standards. Fieldwork was executed under the supervision of a licensed land surveyor.

Survey monuments 3167-1, 3167-2, 3167-3, 3595-3, 3595-4, 3595-5 & 3595-6 were used as starting points to level the different monitoring wells surveyed under the present task. All leveled lines were completed within a closure error of 0.001 to 0.03 feet thus, achieving the SOW required accuracy for the present task.

Please refer to Table 1 below for stations coordinate values.

| SURVEY CONTROL (NAD 83 (2011) U.S. SURVEY FEET) | | | | | |
|---|---|---|---|---|---|
| STATION | NORTHING | EASTING | ELEVATION | DESCRIPTION | STATUS |
| 3167-1 | 761,869.819 | 1,009,827.656 | 69.802 | PK NAIL & WASHER | RECOVERED |
| 3167-2 | 761,811.609 | 1,009,672.715 | 72.001 | PK NAIL & WASHER | RECOVERED |
| 3167-3 | 761,483.241 | 1,009,656.850 | 62.989 | PK NAIL & WASHER | NEW |
| 3595-3 | 763,475.189 | 972,319.811 | 10.879 | PK NAIL & WASHER | NEW |
| 3595-4 | 761,135.577 | 967,219.257 | 27.014 | PK NAIL & WASHER | NEW |
| 3595-5 | 761,961.570 | 971,266.407 | 54.577 | PK NAIL & WASHER | NEW |
| 3595-6 | 762,150.523 | 971,497.719 | 51.880 | PK NAIL & WASHER | NEW |

*Table 1*

**Task 3**- Monitoring Well Survey

18 existing monitoring well locations at throughout the project areas were surveyed as requested by client and their geographical position (northing and easting) was determined by RTK methods.

Elevations corresponding to each monitoring well was determined by differential leveling at each top of casing. A notch with a file mas marked on each topo of casing where elevations were surveyed. Pursuant to scope of work, elevations at the inner topo of casing were determined as turning points on the level loop. Ground surface elevations adjacent to each well were recorded as well. Level notes, closure and control checks area herein included as Enclosure 3. Please refer to Table 2 below for as surveyed geographical coordinates.

| MONITORING WELLS (CTO-003) | | | | | | |
|---|---|---|---|---|---|---|
| WELL NO. | COORDINATES | | ELEVATION (T.O.C.) | ELEVATION (CONCRETE) | ELEVATION (GROUND) | ELEVATION (METAL CAP) |
| | NORTHING | EASTING | | | | |
| VEW10-PFAS-MW-03 | 759968.038 | 1011707.416 | 15.842 | | 12.699 | 15.769 |
| VEW10-PFAS-MW-04 | 759817.605 | 1012339.921 | 8.746 | | 6.139 | 8.825 |
| VEW10-PFAS-MW-02 | 760556.274 | 1011680.962 | 23.589 | | 20.456 | 23.657 |
| VEW10-PFAS-MW-01 | 760543.621 | 1011255.113 | 27.383 | | 24.978 | 27.442 |
| VEFS-PFAS-MW01 | 761642.529 | 1009751.932 | 65.659 | 58.371 | 58.344 | 58.376 |
| VEFS-PFAS-MW02 | 761497.329 | 1009749.714 | 62.016 | 62.255 | 62.181 | 62.292 |
| VWMP-PFAS-MW01 | 762322.928 | 971734.217 | 48.074 | | 45.247 | 48.165 |
| VEP5-PFAS-MW01 | 759618.540 | 1005543.020 | 17.205 | | 15.059 | 17.214 |
| VERW-PFAS-MW01 | 759584.364 | 1007120.569 | 16.552 | | 14.166 | 16.638 |
| VERW-PFAS-MW02 | 759565.515 | 1008844.665 | 23.798 | | 20.645 | 22.386 |
| VWMP-PFAS-MW02 | 762433.469 | 971594.874 | 41.886 | 42.146 | 42.074 | 42.190 |
| VWMP-PFAS-MW03 | 762602.688 | 971664.282 | 40.337 | | 37.471 | 40.401 |
| VWAB-PFAS-MW01 | 761841.802 | 970926.707 | 57.241 | | 54.275 | 57.242 |
| VWFS-PFAS-MW01 | 761673.217 | 971188.601 | 59.964 | 60.296 | 60.151 | 60.317 |
| VWFS-PFAS-MW02 | 761758.604 | 971276.428 | 59.759 | 59.978 | 59.953 | 60.006 |
| VWAH-PFAS-MW01 | 763563.784 | 972407.323 | 8.864 | | 6.313 | 8.951 |
| VWAH-PFAS-MW02 | 763620.102 | 972404.774 | 7.571 | | 4.971 | 7.665 |
| VWS7-PFAS-MW01 | 760255.839 | 967612.202 | 70.970 | | 68.303 | 71.019 |

*Table 2- CTO-003 Monitoring Wells*

**Task 4**- Surveyor's Report

The detailed description of the work and procedures utilized in this survey is herein informed. All present project data is contained on the present submittal. Technical information such as coordinates, and elevations is contained in Microsoft Excel, DWG and PDF files. Horizontal and vertical accuracies obtained, and results are herein described on the present survey report and corresponding enclosures.

## III. Survey Instruments

- Trimble R10 GPS Receivers
- Trimble TSC-3 Data Collectors
- Leica Sprinter Digital Level
- HPB 450 External Radio

## IV. Data Collection and Processing Software

Data Collection and Processing Softwares:

- Trimble Access
- Trimble Business Center (TBC).
- Carlson Civil Suite 2019 Software
- AutoCad 2010

## V. Points of Contact

| | |
|---|---|
| 1. Toby Stewart -CH Caribe Project Manager | (757) 419-0430 |
| 3. Javier E. Bidot- Principal JEBA | (787) 746-5486 |
| 4. Carlos M. Lebron-Survey Manager JEBA | (787) 240-0981 |

## VI. Health and Safety

Survey was conducted in a safe manner following Jacobs Health and Safety Plan. No injuries or accidents were reported during the course of the project. A safety call prior to mobilization was held by Toby Stewart and Carl Woods on Jacobs on June 29,2021.

## VII. List of Attached Documents:

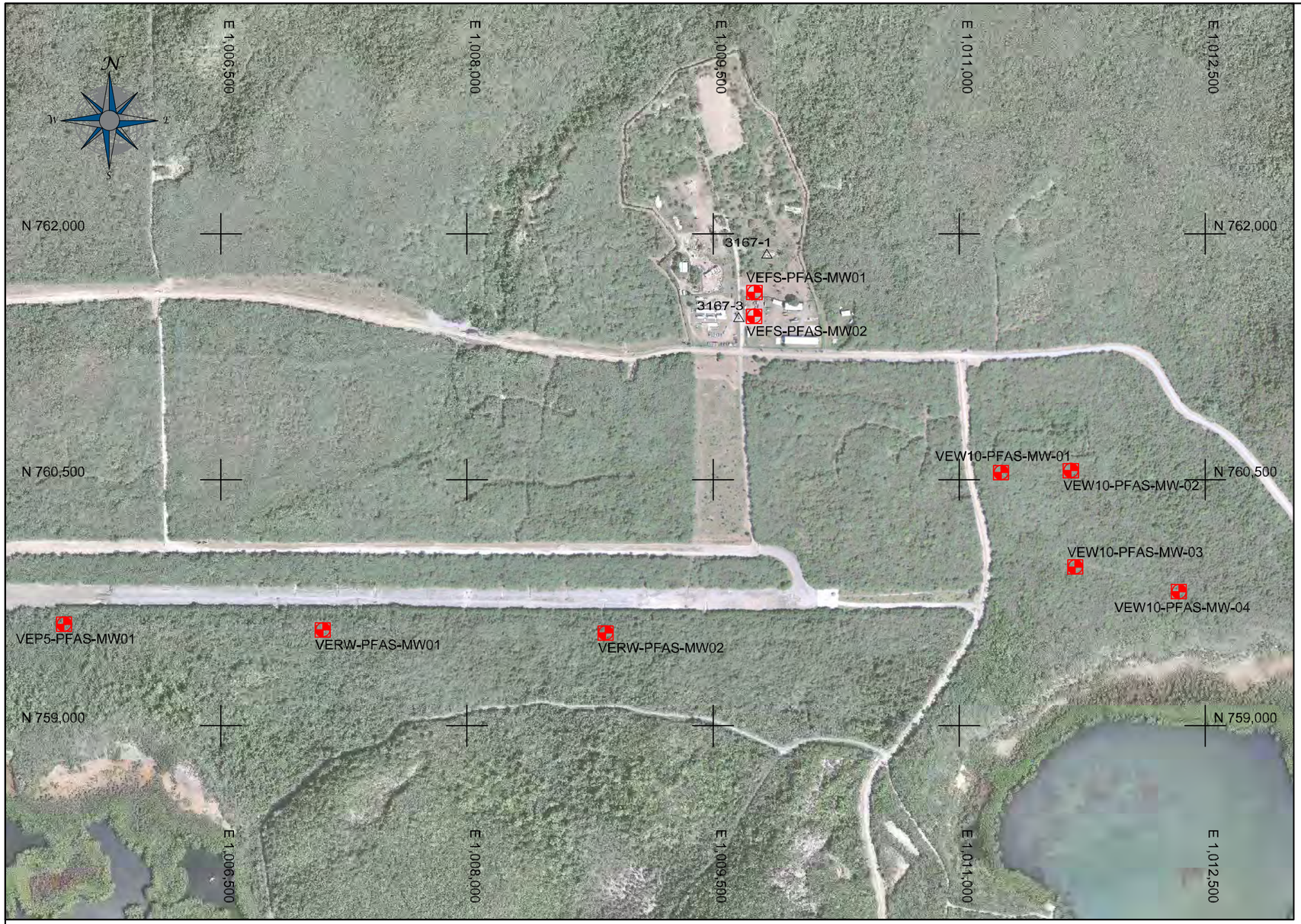
- Enclosure 1 ……..Jacobs Statement of Work
- Enclosure 2 ……..Activity Hazard Analysis
- Enclosure 3 ……..NGS OPUS Solutions
- Enclosure 4 ……..Positional Accuracy
- Enclosure 5 ……..Field Books
- Appendix 1 ……..Monitoring Wells Survey

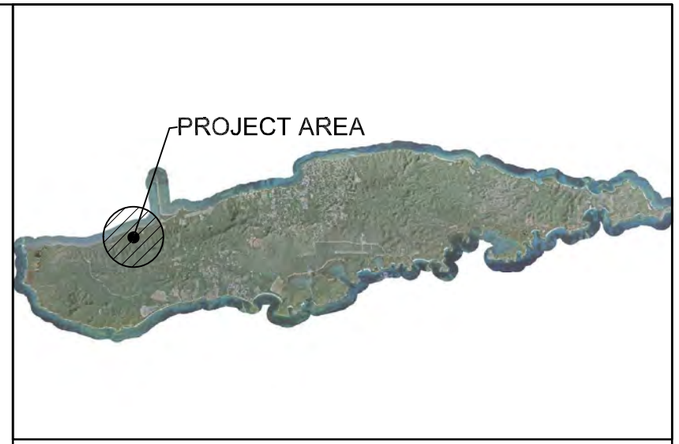
## VIII. Certification

This surveyor report accurately describes the conditions and procedures for the survey designation described herein. This Surveyor's Report and all digital files and maps herein referenced are made a part of each other by reference and are not to be considered valid if separate from each other.

Signed:_____ Dated:_____

Javier E. Bidot Cruz
Puerto Rico Licensed Surveyor No. 12972




LOCATION MAP — SCALE 1" = 22,000'

NOTES:

1. ALL DISTANCES ARE EXPRESSED IN US SURVEY FOOT, UNLESS OTHERWISE NOTED.
2. FIELDWORK PERFORMED FROM AUGUST 23 THRU AUGUST 25, 2022.
3. HORIZONTAL CONTROLS ARE REFERRED TO NAD 83 (2011) EPOCH 2010.00.
4. VERTICAL DATUM IS REFERRED TO PRVD02.
5. PLEASE REFER TO SURVEY JEB-3595.
6. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULT OF THE SURVEY MADE ON THE DATE INDICATED AND CAN BE ONLY CONSIDERED AS AN INDICATION OF THE GENERAL CONDITIONS EXISTING AT THAT TIME.
7. CONTRACTOR SHALL VERIFY FIELD CONDITIONS AND MEASUREMENTS AND ADVISE ARCHITECT OR OWNER OF ANY DIFFERENCES.
8. PLANIMETRIC MAPPING ENHANCED WITH RECORD AERIAL MAPPING, SHOWN FOR REFERENCE PURPOSES. ONLY INFORMATION COLLECTED ON GROUND SHALL BE USED FOR ENGINEERING DESIGN.

## LEGEND:

- 100 — CONTROL STATION
- MONITORING WELL
- GRID MARKER

## SURVEYORS CERTIFICATION

I , JAVIER E. BIDOT CRUZ , THIS SURVEYOR REPORT ACCURATELY DESCRIBES THE CONDITIONS AND PROCEDURES FOR THE SURVEY DESIGNATION DESCRIBED HEREIN. THIS SURVEYOR'S REPORT AND ALL DIGITAL FILES AND MAPS HEREIN REFERENCED ARE MADE A PART OF EACH OTHER BY REFERENCE AND ARE NOT TO BE CONSIDERED VALID IF SEPARATE FROM EACH OTHER. THE PRESENT WORK COMPLIES WITH THE ACCURACY REQUIREMENTS OF THE SCOPE OF WORK AND WITH ALL FEDERAL, STATE, AND LOCAL CODES, LAWS, AND REGULATIONS.

JAVIER E. BIDOT CRUZ
LAND SURVEYOR LIC.NO. 12972

GRAPHIC SCALE

0' 280' 560' 1120' 1680' 2240'

SCALE : 1" =700'

**MONITORING WELLS (CTO-003)**

| WELL NO. | COORDINATES | | ELEVATION (T.O.C.) | ELEVATION (CONCRETE) | ELEVATION (GROUND) | ELEVATION (METAL CAP) |
|---|---|---|---|---|---|---|
| | NORTHING | EASTING | | | | |
| VEW10-PFAS-MW-03 | 759968.038 | 1011707.416 | 15.842 | N/A | 12.699 | 15.769 |
| VEW10-PFAS-MW-04 | 759817.605 | 1012339.921 | 8.746 | N/A | 6.139 | 8.825 |
| VEW10-PFAS-MW-02 | 760556.274 | 1011680.962 | 23.589 | N/A | 20.456 | 23.657 |
| VEW10-PFAS-MW-01 | 760543.621 | 1011255.113 | 27.383 | N/A | 24.978 | 27.442 |
| VEFS-PFAS-MW01 | 761642.529 | 1009751.932 | 65.659 | 58.371 | 58.344 | 58.376 |
| VEFS-PFAS-MW02 | 761497.329 | 1009749.714 | 62.016 | 62.255 | 62.181 | 62.292 |
| VEP5-PFAS-MW01 | 759618.540 | 1005543.020 | 17.205 | N/A | 15.059 | 17.214 |
| VERW-PFAS-MW01 | 759584.364 | 1007120.569 | 16.552 | N/A | 14.166 | 16.638 |
| VERW-PFAS-MW02 | 759565.515 | 1008844.665 | 23.798 | N/A | 20.645 | 22.386 |

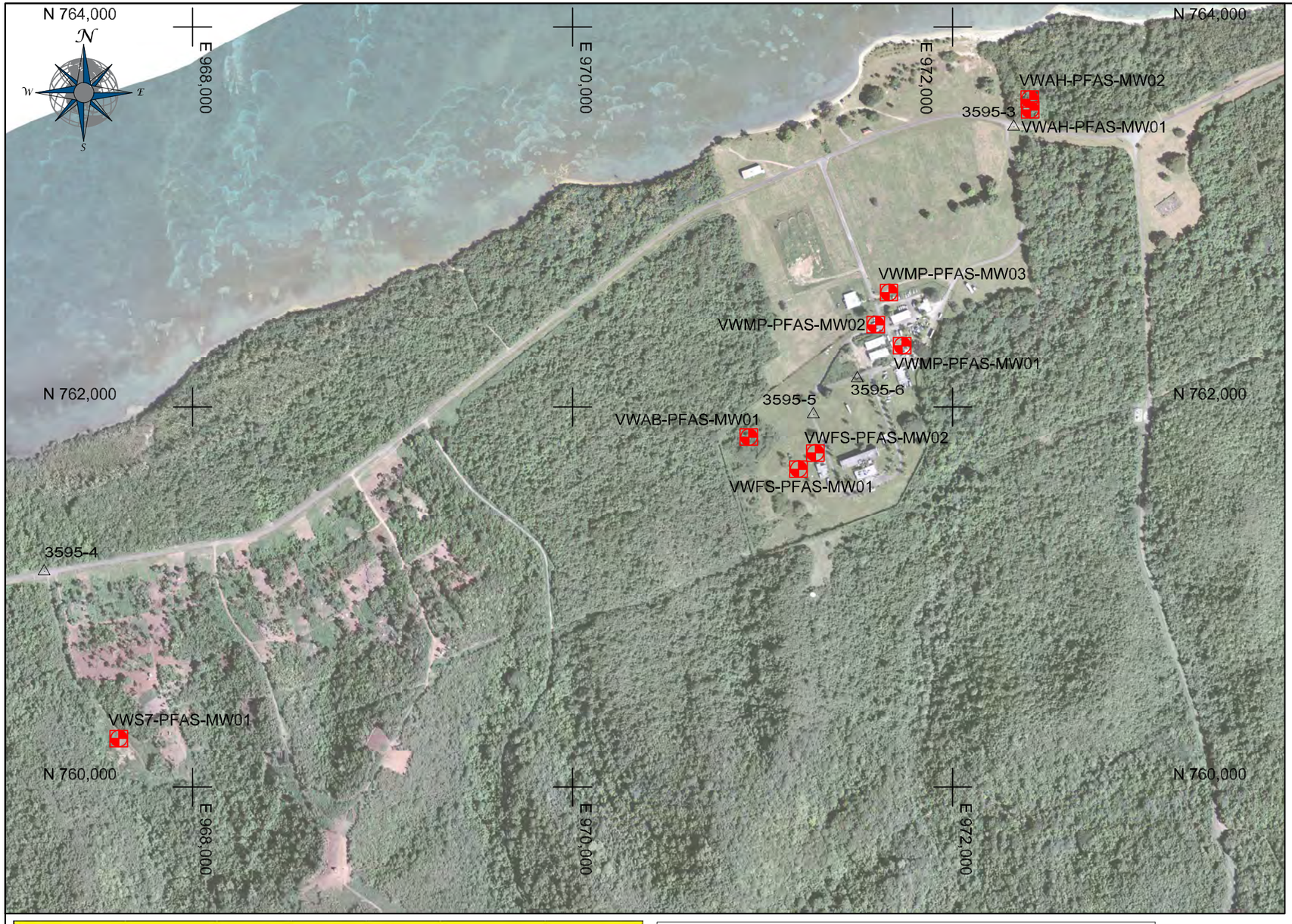
**SURVEY CONTROL**

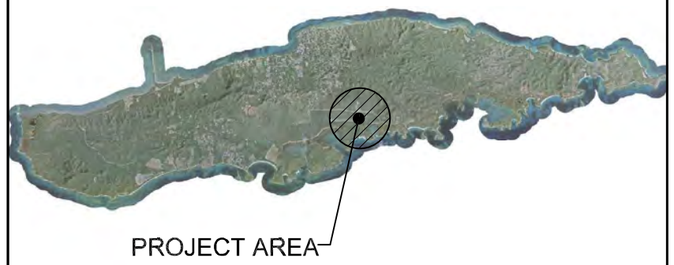
| STA | COORDINATES (NAD 83/2011) | | ELEVATION PRVD02 | DESCRIPTION |
|---|---|---|---|---|
| | NORTHING | EASTING | | |
| 3167-1 | 761,869.819 | 1,009,827.656 | 69.802 | PK NAIL & WASHER |
| 3167-3 | 761,483.241 | 1,009,656.850 | 62.989 | PK NAIL & WASHER |

JAVIER E. BIDOT ASSOCIATES, PSC
Land Surveyors & Consultants
16 Cordova St. | Terranuda | Caguas, PR 00727
Phone: (787)746-5486 Fax: (787)704-6215
www.jbcpr.com

MONITORING WELLS
CTO-003
AT FORMER VIEQUES NAVAL TRAINING RANGE
MUNICIPALITY OF VIEQUES, PR

| PAPER SIZE: 11x17 | SEP. 6, 2022 | DRAWING NO. VF-1 |
|---|---|---|




LOCATION MAP — SCALE 1" = 22,000'

LEGEND:

- 100 — CONTROL STATION
- MONITORING WELL
- GRID MARKER

GRAPHIC SCALE

0' 240' 480' 960' 1440' 1920'

SCALE : 1" = 600'

**MONITORING WELLS (CTO-003)**

| WELL NO. | COORDINATES | | ELEVATION | ELEVATION | ELEVATION | ELEVATION |
|---|---|---|---|---|---|---|
| | NORTHING | EASTING | (T.O.C.) | (CONCRETE) | (GROUND) | (METAL CAP) |
| VWMP-PFAS-MW02 | 762433.469 | 971594.874 | 41.886 | 42.146 | 42.074 | 42.190 |
| VWMP-PFAS-MW03 | 762602.688 | 971664.282 | 40.337 | N/A | 37.471 | 40.401 |
| VWAB-PFAS-MW01 | 761841.802 | 970926.707 | 57.241 | N/A | 54.275 | 57.242 |
| VWFS-PFAS-MW01 | 761673.217 | 971188.601 | 59.964 | 60.296 | 60.151 | 60.317 |
| VWFS-PFAS-MW02 | 761758.604 | 971276.428 | 59.759 | 59.978 | 59.953 | 60.006 |
| VWAH-PFAS-MW01 | 763563.784 | 972407.323 | 8.864 | N/A | 6.313 | 8.951 |
| VWAH-PFAS-MW02 | 763620.102 | 972404.774 | 7.571 | N/A | 4.971 | 7.665 |
| VWS7-PFAS-MW01 | 760255.839 | 967612.202 | 70.970 | N/A | 68.303 | 71.019 |
| VWMP-PFAS-MW01 | 762322.928 | 971734.217 | 48.074 | N/A | 45.247 | 48.165 |

**SURVEY CONTROL**

| STA | COORDINATES (NAD 83/2011) | | ELEVATION PRVD02 | DESCRIPTION |
|---|---|---|---|---|
| | NORTHING | EASTING | | |
| 3595-3 | 763,475.189 | 972,319.811 | 10.879 | PK NAIL & WASHER |
| 3595-4 | 761,135.577 | 967,219.257 | 27.014 | PK NAIL & WASHER |
| 3595-5 | 761,961.57 | 971,266.407 | 54.577 | PK NAIL & WASHER |
| 3595-6 | 762,150.523 | 971,497.719 | 51.880 | PK NAIL & WASHER |

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www.jebpsc.com

MONITORING WELLS
CTO-003
AT FORMER VIEQUES NAVAL TRAINING RANGE
MUNICIPALITY OF VIEQUES, PR

PAPER SIZE: 11x17 | SEP. 6, 2022 | DRAWING NO. VF-2

FILE: 11932341.22o OP1661369019055
POINT NO. 3595-3

# NGS OPUS SOLUTION REPORT

All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: https://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: jpagan@jebpr.com DATE: August 24, 2022
RINEX FILE: 1193234r.22o TIME: 19:24:40 UTC

SOFTWARE: page5 2008.25 master278.pl 160321 START: 2022/08/22 17:21:00
EPHEMERIS: igr22241.eph [rapid] STOP: 2022/08/22 19:26:00
NAV FILE: brdc2340.22n OBS USED: 4184 / 4771 : 88%
ANT NAME: TRMR8S NONE # FIXED AMB: 29 / 52 : 56%
ARP HEIGHT: 2.25 OVERALL RMS: 0.021(m)

| REF FRAME: | NAD_83(2011)(EPOCH:2010.0000) | | ITRF2014 (EPOCH:2022.6405) | |
|---|---|---|---|---|
| X: | 2512310.154(m) | 0.130(m) | 2512309.534(m) | 0.130(m) |
| Y: | -5518571.403(m) | 0.037(m) | -5518569.513(m) | 0.037(m) |
| Z: | 1971702.961(m) | 0.021(m) | 1971702.947(m) | 0.021(m) |
| LAT: | 18 7 36.05794 | 0.023(m) | 18 7 36.07752 | 0.023(m) |
| E LON: | 294 28 38.04110 | 0.133(m) | 294 28 38.04852 | 0.133(m) |
| W LON: | 65 31 21.95890 | 0.133(m) | 65 31 21.95148 | 0.133(m) |
| EL HGT: | -38.074(m) | 0.017(m) | -39.957(m) | 0.017(m) |
| ORTHO HGT: | 3.316(m) | 0.087(m) | [ H = h-N (N = GEOID18 HGT)] | |

| | UTM COORDINATES UTM (Zone 20) | STATE PLANE COORDINATES SPC (5200 PRVI) |
|---|---|---|
| Northing (Y) [meters] | 2006030.572 | 232707.703 |
| Easting (X) [meters] | 233054.658 | 296363.671 |
| Convergence [degrees] | -0.78534722 | 0.28490556 |
| Point Scale | 1.00048109 | 0.99999567 |
| Combined Factor | 1.00048708 | 1.00000166 |

US NATIONAL GRID DESIGNATOR: 20QKF3305506031(NAD 83)

## BASE STATIONS USED

| PID | DESIGNATION | LATITUDE | LONGITUDE | DISTANCE(m) |
|---|---|---|---|---|
| DL9080 | PRLP LAS PIEDRAS CORS ARP | N181141.627 | W0655205.750 | 37328.2 |
| DO2636 | PRFJ FAJARDO CORS ARP | N181934.736 | W0653905.008 | 25948.2 |
| DO1740 | STVI ST THOMAS CORS ARP | N182024.326 | W0645828.013 | 62618.0 |

## NEAREST NGS PUBLISHED CONTROL POINT

| | | | | |
|---|---|---|---|---|
| DN8521 | J 1019 | N1807000035 | W06531000021 | 17.1 |

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 10472343.22o OP1661369066861
POINT NO.: 3595-4

# NGS OPUS SOLUTION REPORT

All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: https://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: jpagan@jebpr.com DATE: August 24, 2022
RINEX FILE: 1047234r.22o TIME: 19:25:43 UTC

SOFTWARE: page5 2008.25 master293.pl 160321 START: 2022/08/22 17:31:00
EPHEMERIS: igr22241.eph [rapid] STOP: 2022/08/22 19:27:00
NAV FILE: brdc2340.22n OBS USED: 5266 / 5560 : 95%
ANT NAME: TRMR8S NONE # FIXED AMB: 32 / 45 : 71%
ARP HEIGHT: 2.00 OVERALL RMS: 0.025(m)

| REF FRAME: | NAD_83(2011)(EPOCH:2010.0000) | | ITRF2014 (EPOCH:2022.6405) | |
|---|---|---|---|---|
| X: | 2510984.798(m) | 0.035(m) | 2510984.178(m) | 0.035(m) |
| Y: | -5519420.811(m) | 0.083(m) | -5519418.921(m) | 0.083(m) |
| Z: | 1971034.057(m) | 0.068(m) | 1971034.043(m) | 0.068(m) |
| LAT: | 18 7 13.11298 | 0.053(m) | 18 7 13.13252 | 0.053(m) |
| E LON: | 294 27 45.03805 | 0.066(m) | 294 27 45.04547 | 0.066(m) |
| W LON: | 65 32 14.96195 | 0.066(m) | 65 32 14.95453 | 0.066(m) |
| EL HGT: | -33.135(m) | 0.070(m) | -35.018(m) | 0.070(m) |
| ORTHO HGT: | 8.234(m) | 0.121(m) | [ H = h-N (N = GEOID18 HGT)] | |

| | UTM COORDINATES UTM (Zone 20) | STATE PLANE COORDINATES SPC (5200 PRVI) |
|---|---|---|
| Northing (Y) [meters] | 2005346.280 | 231994.588 |
| Easting (X) [meters] | 231486.190 | 294809.019 |
| Convergence [degrees] | -0.78966667 | 0.28030000 |
| Point Scale | 1.00049147 | 0.99999588 |
| Combined Factor | 1.00049668 | 1.00000109 |

US NATIONAL GRID DESIGNATOR: 20QKF3148605346(NAD 83)

## BASE STATIONS USED

| PID | DESIGNATION | LATITUDE | LONGITUDE | DISTANCE(m) |
|---|---|---|---|---|
| DO2636 | PRFJ FAJARDO CORS ARP | N181934.736 | W0653905.008 | 25788.4 |
| DL7810 | PRHL BAYAMON CORS ARP | N182248.091 | W0660912.812 | 71211.3 |
| DO1740 | STVI ST THOMAS CORS ARP | N182024.326 | W0645828.013 | 64327.3 |

## NEAREST NGS PUBLISHED CONTROL POINT

| | | | | |
|---|---|---|---|---|
| DN8522 | K 1019 | N180700013. | W0653200012. | 73.4 |

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 11932340.22o OP1661258307287
POINT NO.: 3595-5

 2005   NOTE:  The IGS precise and IGS rapid orbits were not available
 2005   at processing time.  The IGS ultra-rapid orbit was/will be used to
 2005   process the data.
 2005

# NGS OPUS SOLUTION REPORT

All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: https://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: jpagan@jebpr.com DATE: August 23, 2022
RINEX FILE: 1193234p.22o TIME: 12:39:53 UTC

SOFTWARE: page5 2008.25 master293.pl 160321 START: 2022/08/22 15:04:00
EPHEMERIS: igu22241.eph [ultra-rapid] STOP: 2022/08/22 17:07:00
NAV FILE: brdc2340.22n OBS USED: 6207 / 6570 : 94%
ANT NAME: TRMR8S NONE # FIXED AMB: 35 / 48 : 73%
ARP HEIGHT: 2.25 OVERALL RMS: 0.021(m)

| REF FRAME: | NAD_83(2011)(EPOCH:2010.0000) | | ITRF2014 (EPOCH:2022.6402) | |
|---|---|---|---|---|
| X: | 2512080.346(m) | 0.022(m) | 2512079.726(m) | 0.022(m) |
| Y: | -5518847.061(m) | 0.131(m) | -5518845.171(m) | 0.131(m) |
| Z: | 1971270.162(m) | 0.038(m) | 1971270.148(m) | 0.038(m) |
| LAT: | 18 7 21.10411 | 0.003(m) | 18 7 21.12366 | 0.003(m) |
| E LON: | 294 28 27.04127 | 0.043(m) | 294 28 27.04872 | 0.043(m) |
| W LON: | 65 31 32.95873 | 0.043(m) | 65 31 32.95128 | 0.043(m) |
| EL HGT: | -24.759(m) | 0.130(m) | -26.643(m) | 0.130(m) |
| ORTHO HGT: | 16.635(m) | 0.172(m) | [ H = h-N (N = GEOID18 HGT)] | |

| | UTM COORDINATES UTM (Zone 20) | STATE PLANE COORDINATES SPC (5200 PRVI) |
|---|---|---|
| Northing (Y) [meters] | 2005575.076 | 232246.351 |
| Easting (X) [meters] | 232724.859 | 296042.593 |
| Convergence [degrees] | -0.78612500 | 0.28395000 |
| Point Scale | 1.00048327 | 0.99999580 |
| Combined Factor | 1.00048716 | 0.99999969 |

US NATIONAL GRID DESIGNATOR: 20QKF3272505575(NAD 83)

## BASE STATIONS USED

| PID | DESIGNATION | LATITUDE | LONGITUDE | DISTANCE(m) |
|---|---|---|---|---|
| DO2636 | PRFJ FAJARDO CORS ARP | N181934.736 | W0653905.008 | 26175.5 |
| DL9080 | PRLP LAS PIEDRAS CORS ARP | N181141.627 | W0655205.750 | 37108.7 |
| DL7810 | PRHL BAYAMON CORS ARP | N182248.091 | W0660912.812 | 72244.3 |

## NEAREST NGS PUBLISHED CONTROL POINT

| | | | | |
|---|---|---|---|---|
| DN8521 | J 1019 | N1807000035 | W06531000021 | 567.8 |

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

FILE: 10472340.22o OP1661257805713
POINT NO.: 3595-6

 2005   NOTE:  The IGS precise and IGS rapid orbits were not available
 2005   at processing time.  The IGS ultra-rapid orbit was/will be used to
 2005   process the data.
 2005

## NGS OPUS SOLUTION REPORT

All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: https://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: jpagan@jebpr.com DATE: August 23, 2022
RINEX FILE: 1047234p.22o TIME: 12:30:55 UTC

SOFTWARE: page5 2008.25 master250.pl 160321 START: 2022/08/22 15:04:00
EPHEMERIS: igu22241.eph [ultra-rapid] STOP: 2022/08/22 17:03:00
NAV FILE: brdc2340.22n OBS USED: 6385 / 6899 : 93%
ANT NAME: TRMR8S NONE # FIXED AMB: 51 / 57 : 89%
ARP HEIGHT: 2.00 OVERALL RMS: 0.024(m)

| REF FRAME: | NAD_83(2011)(EPOCH:2010.0000) | | ITRF2014 (EPOCH:2022.6402) | |
|---|---|---|---|---|
| X: | 2512137.074(m) | 0.018(m) | 2512136.454(m) | 0.018(m) |
| Y: | -5518800.818(m) | 0.005(m) | -5518798.928(m) | 0.005(m) |
| Z: | 1971324.310(m) | 0.012(m) | 1971324.296(m) | 0.012(m) |
| LAT: | 18 7 22.96600 | 0.011(m) | 18 7 22.98554 | 0.011(m) |
| E LON: | 294 28 29.44924 | 0.018(m) | 294 28 29.45669 | 0.018(m) |
| W LON: | 65 31 30.55076 | 0.018(m) | 65 31 30.54331 | 0.018(m) |
| EL HGT: | -25.581(m) | 0.005(m) | -27.464(m) | 0.005(m) |
| ORTHO HGT: | 15.813(m) | 0.087(m) | [ H = h-N (N = GEOID18 HGT)] | |

| | UTM COORDINATES UTM (Zone 20) | STATE PLANE COORDINATES SPC (5200 PRVI) |
|---|---|---|
| Northing (Y) [meters] | 2005631.370 | 232303.944 |
| Easting (X) [meters] | 232796.461 | 296113.097 |
| Convergence [degrees] | -0.78593889 | 0.28415833 |
| Point Scale | 1.00048279 | 0.99999579 |
| Combined Factor | 1.00048681 | 0.99999981 |

US NATIONAL GRID DESIGNATOR: 20QKF3279605631(NAD 83)

### BASE STATIONS USED

| PID | DESIGNATION | LATITUDE | LONGITUDE | DISTANCE(m) |
|---|---|---|---|---|
| DO2636 | PRFJ FAJARDO CORS ARP | N181934.736 | W0653905.008 | 26162.2 |
| DL9080 | PRLP LAS PIEDRAS CORS ARP | N181141.627 | W0655205.750 | 37165.4 |
| DL7810 | PRHL BAYAMON CORS ARP | N182248.091 | W0660912.812 | 72286.6 |

### NEAREST NGS PUBLISHED CONTROL POINT

| | | | | |
|---|---|---|---|---|
| DN8521 | J 1019 | N1807000035 | W06531000021 | 480.1 |

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

**Please provide information relative to the GPS system tools and network being used.**

FORMER VIEQUES NAVAL TRAINING RANGE
CTO-003

RTN Network:
Base Station Name(s): 3167-2
GPS Equipment:

| Point Number | Units | Date | Time | Baseline Distance | Collection Interval for how long | PDOP | Number of Satellites | Northing | Easting | Ortho Height or Elevation | RMSE Northing | RMSE Easting | RMSE Elevation | $RMSE_{min}$ $RMSE_{max}$ | Horizontal Positional Accuracy @ 95% Confidence | Vertical Positional Accuracy @ 95% Confidence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3167-1** | | | | | | | | | | | | | | | | |
| 20000 | US Feet | 8/23/2022 | | 165.5100 | 10 SEC | 2.3 | 13 | 761869.831 | 1009827.692 | 69.718 | | | | | | |
| 20004 | US Feet | 8/23/2022 | | 165.5381 | 10 SEC | 1.4 | 15 | 761869.843 | 1009827.672 | 69.748 | | | | | | |
| 20007 | US Feet | 8/23/2022 | | 165.5395 | 10 SEC | 1.3 | 15 | 761869.855 | 1009827.669 | 69.741 | | | | | | |
| 20013 | US Feet | 8/23/2022 | | 165.5411 | 10 SEC | 1.5 | 15 | 761869.846 | 1009827.674 | 69.758 | | | | | | |
| 20014 | US Feet | 8/25/2022 | | 165.5110 | 10 SEC | 1.5 | 15 | 761869.827 | 1009827.649 | 69.716 | | | | | | |
| 1 | US Feet | 8/25/2022 | | 165.5147 | 10 SEC | 1.6 | 16 | 761869.819 | 1009827.656 | 69.802 | | | | | | |
| **Average** | US Feet | | | | | | | 761869.84 | 1009827.67 | 69.75 | 0.011 | 0.014 | 0.029 | 0.773 | 0.030 | 0.056 |

Base Station Name(s): 3167-2

| Point Number | Units | Date | Time | Baseline Distance | Collection Interval for how long | PDOP | Number of Satellites | Northing | Easting | Ortho Height or Elevation | RMSE Northing | RMSE Easting | RMSE Elevation | $RMSE_{min}$ $RMSE_{max}$ | Horizontal Positional Accuracy @ 95% Confidence | Vertical Positional Accuracy @ 95% Confidence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3167-3** | | | | | | | | | | | | | | | | |
| 20001 | US Feet | 8/23/2022 | | 328.7249 | 10 SEC | 2 | 13 | 761483.264 | 1009656.916 | 62.925 | | | | | | |
| 20002 | US Feet | 8/23/2022 | | 328.7302 | 10 SEC | 1.3 | 16 | 761483.258 | 1009656.929 | 62.925 | | | | | | |
| 20006 | US Feet | 8/23/2022 | | 328.7380 | 10 SEC | 1.6 | 14 | 761483.250 | 1009656.933 | 62.949 | | | | | | |
| 20008 | US Feet | 8/23/2022 | | 328.6722 | 10 SEC | 1.3 | 15 | 761483.316 | 1009656.931 | 62.895 | | | | | | |
| 20012 | US Feet | 8/23/2022 | | 328.6954 | 10 SEC | 1.5 | 15 | 761483.293 | 1009656.926 | 62.946 | | | | | | |
| 20015 | US Feet | 8/25/2022 | | 328.7242 | 10 SEC | 1.7 | 14 | 761483.264 | 1009656.930 | 62.891 | | | | | | |
| 20019 | US Feet | 8/25/2022 | | 328.6934 | 10 SEC | 1.6 | 16 | 761483.295 | 1009656.926 | 62.910 | | | | | | |
| **Average** | US Feet | | | | | | | 761483.28 | 1009656.93 | 62.92 | 0.019 | 0.005 | 0.021 | 0.258 | 0.029 | 0.041 |

Base Station Name(s): 3595-5

| Point Number | Units | Date | Time | Baseline Distance | Collection Interval for how long | PDOP | Number of Satellites | Northing | Easting | Ortho Height or Elevation | RMSE Northing | RMSE Easting | RMSE Elevation | $RMSE_{min}$ $RMSE_{max}$ | Horizontal Positional Accuracy @ 95% Confidence | Vertical Positional Accuracy @ 95% Confidence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3595-6** | | | | | | | | | | | | | | | | |
| 20663 | US Feet | 8/24/2022 | | 298.6420 | 10 SEC | 1.4 | 15 | 762150.514 | 971497.680 | 51.902 | | | | | | |
| 20672 | US Feet | 8/24/2022 | | 298.6606 | 10 SEC | 1.6 | 15 | 762150.503 | 971497.713 | 51.912 | | | | | | |
| 150000 | US Feet | 8/22/2022 | 1:30 PM | 298.6778 | 2 HR | | | 762150.523 | 971497.719 | 51.929 | | | | | | |
| **Average** | US Feet | | | | | | | 762150.51 | 971497.70 | 51.91 | 0.008 | 0.017 | 0.011 | 0.471 | 0.031 | 0.022 |

**FL Office:** 2385 NW Executive Center Dr., Suite 100, Boca Raton, FL 33431 - Phone: 561-962-2851
**PR Office:** 16 Cordova, Terralinda, Caguas, PR 00727 - Phone: (787)746-5486 - Fax: (787) 704-6215
www.jebpr.com

"VIEQUES"

8-23-22

NIVELES

| △ | + | HI | - | ELEV | |
|---|---|---|---|---|---|
| 3167-2 | 2.71 | 74.711 | | 72.001 | |
| TP-1 | | | 9.504 | 65.207 | |
| | 2.779 | 67.986 | | | |
| Ground | | | 5.805 | | |
| SLAB | | | 5.731 | | |
| MC | | | 5.694 | | |
| * TOC VEFS-PFAS-MW02 | | | 5.97 | 62.016 | |
| | 5.859 | 67.875 | | | |
| TP-2 | | | 1.188 | 66.687 | |
| | 6.523 | 73.21 | | | |
| Ground | | | 7.315 | | |
| SLAB | | | 7.288 | | |
| MC | | | 7.283 | | |
| TOC VEFS-PFAS-MW01 | | | 7.551 | 65.659 | |
| | 7.641 | 73.3 | | | |
| 3167-2 | | | 1.306 | 71.994 | D: 0.007 |

CT

TA 3167-2 HI 7.382 ft

| PT | ΔN | ΔE | V | P/BOP | METHOD |
|---|---|---|---|---|---|
| 20000 | | | | | |
| 20001 | -0.023 | -0.066 | F=0.064 | | TP |
| 20002 | -0.017 | 0.079 | F=0.064 | | TP |
| 20004 | -0.024 | -0.016 | F=0.054 | | TP |
| 20006 | -0.009 | -0.083 | F=0.04 | | TP |
| 20007 | -0.036 | -0.03 | F=0.061 | | TP |
| 20008 | -0.075 | -0.081 | F=0.094 | | TP |
| 20012 | -0.052 | -0.076 | F=0.043 | | TP |
| 20013 | -0.027 | 0.018 | F=0.044 | | TP |

| HR | DESC. |
|---|---|
| C.562 | CHK 3167-1 |
| " | 3167-3 |
| " | 3167-3 |
| " | 3167-1 |
| " | 3167-3 |
| " | 3167-1 |
| " | 3167-3 |
| " | 3167-3 |
| " | 3167-1 |

| Δ | + | HI | - | ELEV. |
|---|---|---|---|---|
| 20003 | 1.148 | 33.5 | | 32.352 |
| TP-1 | | | 5.879 | 27.621 |
| | 4.549 | 32.17 | | |
| Ground | | | 7.192 | |
| TOP METAL CASE | | | 4.728 | |
| TOC VEW10-PFAS-MW01 | | | 4.787 | 27.383 |
| | 4.722 | 32.105 | | |
| TP-2 | | | 7.296 | 24.809 |
| | 3.581 | 28.39 | | |
| TP-3 | | | 7.239 | 21.151 |
| | 3.595 | 24.746 | | |
| Ground | | | 4.29 | |
| Top Metal case | | | 1.089 | |
| Toc VEW10-PFAS-MW02 | | | 1.157 | 23.589 |
| | 1.207 | 24.796 | | |
| TP-3 | | | 3.645 | 21.151 |
| | 6.85 | 28.001 | | |
| TP-4 | | | 2.688 | 25.313 |
| | 4.986 | 30.299 | | |
| TP-5 | | | 3.625 | 26.674 |
| | 6.454 | 33.128 | | |
| 20003 | | | 0.776 | 32.352 |

| △ | + | HI | − | ELEV |
|---|---|---|---|---|
| 20005 | 1.340 | 23.055 | | 21.715 |
| TP-1 | | | 6.974 | 16.081 |
| | 3.29 | 19.371 | | |
| TP-2 | | | 5.508 | 13.863 |
| | 3.02 | 16.883 | | |
| Ground | | | 4.184 | |
| Top Metal case | | | 1.114 | |
| TOC VEW10-PFAS-MW03 | | | 1.041 | 15.842 |
| | 1.095 | 16.937 | | |
| TP-3 | | | 7.626 | 9.311 |
| | 3.402 | 12.713 | | |
| TP-4 | | | 6.166 | 6.547 |
| | 4.851 | 11.398 | | |
| Ground | | | 5.259 | |
| Top Metal case | | | 2.573 | |
| TOC VEW10-PFAS MW04 | | | 2.652 | 8.746 |
| | 2.584 | 11.33 | | |
| TP-5 | | | 4.626 | 6.704 |
| | 6.092 | 12.796 | | |
| TP-6 | | | 2.578 | 10.218 |
| | 7.144 | 17.362 | | |
| TP-7 | | | 3.199 | 14.163 |
| | 5.452 | 19.615 | | |
| TP-8 | | | 3.227 | 16.388 |
| | 6.188 | 22.576 | | |

| | | | | |
|---|---|---|---|---|
| 20005 | | 0.884 | 21.692 | D= 0.023 |

| Δ | + | HI | − | ELEV. |
|---|---|---|---|---|
| 20009 | 2.297 | 19.459 | | 17.162 |
| Ground | | | 4.40 | |
| Top Metal | case | | 2.245 | |
| TOC | | | 2.254 | 17.205 |
| | 2.184 | 19.389 | | |
| 20009 | | | 2.228 | 17.161 |

| △ | + | HI | − | Elev. |
|---|---|---|---|---|
| 20010 | 2.289 | 21.304 | | 19.015 |
| Ground | | | 7.138 | |
| Top Metal | CASE | | 4.666 | |
| TOC VERW-PFAS-MW01 | | | 4.752 | 16.552 |
| | 4.808 | 21.36 | | |
| 20010 | | | 2.343 | 19.017 |

| △ | + | HI | − | ELEV. |
|---|---|---|---|---|
| 20011 | 2.891 | 25.443 | | 20.552 |
| Tp-1 | | | 6.183 | 19.26 |
| | 4.417 | 23.677 | | |
| Tp-2 | | | 5.272 | 18.405 |
| | 6.899 | 25.304 | | |
| Ground | | | 4.659 | |
| Top Metal case | | | 1.417 | |
| VERW-PFAS-MW02 | | (TOC) | 1.506 | 23.798 |
| | 1.548 | 25.346 | | |
| TP-3 | | | 6.943 | 18.403 |
| | 5.216 | 23.619 | | |
| TP-4 | | | 3.169 | 20.45 |
| | 5.006 | 25.456 | | |
| 20011 | | | 2.93 | 20.526 |

| Δ | + | HI | − | Σ/EV |
|---|---|---|---|---|
| 3525-3 | 5.519 | 16.398 | | 10.879 |
| TP-1 | | | 6.442 | 9.956 |
| | 1.519 | 11.475 | | |
| Ground | | | 5.162 | |
| Top metal case | | | 2.524 | |
| Toc VWAH-PFAS-MW01 | | | 2.611 | 8.864 |
| | 2.678 | 11.542 | | |
| Ground | | | 6.571 | |
| Top case Metal | | | 3.877 | |
| Toc VWAH-PFAS-MW02 | | | 3.971 | 7.571 |
| | 4.017 | 11.588 | | |
| TP-2 | | | 1.114 | 10.474 |
| | 5.779 | 16.253 | | |
| 3525-3 | | | 5.374 | 10.879 |

8-24-22

10.879 Elev New Volver a calcular

| △ | + | HI | - | ELEV. |
|---|---|---|---|---|
| 3525-5 (1) NEW | 4.418 | 58.994 | | 54.576 |
| TP-1 | | | 5.119 | 53.875 |
| | 4.119 | 57.994 | | |
| Ground | | | 3.719 | |
| TOP METAL CASE | | | 0.752 | |
| (TOC) VWAB-PFAS-MW01 | | | 0.753 | 57.241 |
| | 0.792 | 58.033 | | |
| TP-2 | | | 2.203 | 55.83 |
| | 3.182 | 64.012 | | |
| Ground | | | 3.861 | |
| Slab | | | 3.716 | |
| Top MC | | | 3.695 | |
| TOC VWFS-PFAS-MW01 | | | 4.048 | 59.964 |
| | 3.978 | 63.942 | | |
| Ground | | | 3.989 | |
| SLAB | | | 3.964 | |
| TOP MC | | | 3.936 | |
| TOC VWFS-PFAS-MW02 | | | 4.183 | 59.759 |
| | 4.248 | 64.007 | | |
| TP-3 | | | 6.740 | 57.267 |
| | 3.001 | 60.268 | | |
| 3525-5 | | | 5.698 | 54.57 |

16.635 m

| △ | + | HI | − | Elev. |
|---|---|---|---|---|
| 3525-6 (2) New | 3.934 | 55.814 | | 51.88 |
| TP-1 | | | 6.808 | 49.006 |
| | 4.289 | 53.295 | | |
| Ground | | | 8.648 | |
| Top Metal case | | | 5.13 | |
| (TOC) VWMP-PFAS-MW01 | | | 5.221 | 48.074 |
| | 5.169 | 53.243 | | |
| TP-2 | | | 4.236 | 49.007 |
| | 7.158 | 56.165 | | |
| 3525-6 (2) New | | | 4.283 | 51.882 |

| △ | + | Hc | - | CIEV |
|---|---|---|---|---|
| 3525-6 (12) New | 2.362 | 54.242 | | 51.88 |
| TP-1 | | | 8.817 | 45.425 |
| | 2.648 | 48.073 | | |
| Ground | | | 5.999 | |
| slab | | | 5.927 | |
| Top MC | | | 5.883 | |
| TOC VWMP-PFAS-MW02 | | | 6.187 | 41.886 |
| | 6.284 | 48.17 | | |
| TP-2 | | | 10.774 | 37.396 |
| | 5.08 | 42.476 | | |
| Ground | | | 5.005 | |
| Top metal case | | | 2.075 | |
| (TOC) VWMP-PFAS-MW03 | | | 2.139 | 40.337 |
| | 2.075 | 42.412 | | |
| TP-3 | | | 5.016 | 37.396 |
| | 9.286 | 46.682 | | |
| TP-4 | | | 1.426 | 45.256 |
| | 9.337 | 54.593 | | |
| 3525-6 | | | 2.715 | 51.878 |

| △ | + | HI | − | ELEV |
|---|---|---|---|---|
| 3525-4 | 7.334 | 34.35 | | 27.014 |
| TP-1 | | | 2.101 | 32.249 |
| | 7.91 | 40.159 | | |
| TP-2 | | | 0.834 | 39.325 |
| | 8.037 | 47.362 | | |
| TP-3 | | | 0.482 | 46.88 |
| | 6.803 | 53.683 | | |
| TP-4 | | | 1.506 | 52.177 |
| | 7.087 | 59.264 | | |
| TP-5 | | | 1.754 | 57.51 |
| | 6.678 | 64.188 | | |
| TP-6 | | | 1.033 | 63.155 |
| | 6.588 | 69.743 | | |
| TP-7 | | | 1.838 | 67.905 |
| | 6.557 | 74.462 | | |
| TP-8 | | | 2.144 | 72.318 |
| | 4.756 | 77.074 | | |
| Ground | | | 5.771 | |
| TIP METAL CASE | | | 6.055 | |
| (TOC) VWS7-PFAS-MW01 | | | 6.104 | 70.97 |
| | 6.216 | 77.186 | | |
| TP-9 | | | 4.867 | 72.319 |
| | 2.08 | 74.399 | | |
| TP-10 | | | 7.925 | 66.474 |
| | 2.018 | 68.492 | | |

| | | | | | |
|---|---|---|---|---|---|
| TP-11 | | | 7.355 | 61.137 | |
| | 1.898 | 63.035 | | | |
| TP-12 | | | 7.729 | 55.306 | |
| | 1.592 | 56.898 | | | |
| TP-13 | | | 8.337 | 48.561 | |
| | 1.151 | 49.712 | | | |
| TP-14 | | | 8.827 | 40.885 | |
| | 1.615 | 42.5 | | | |
| TP-15 | | | 8.333 | 34.167 | |
| | 2.08 | 32.247 | | | |
| TP-16 | | | 5.950 | 30.297 | |
| | 2.698 | 32.995 | | | |
| 3525-4 | | | 5.985 | 27.01 | Dif: .004 |

(1)

TA 3525-5 HI: 7.382 ft

| PT | ΔN | ΔE | ΔU | P/DOP | METHOD |
|---|---|---|---|---|---|
| 20663 | .008 | 0.039 | C=0022 | | TP |
| 20672 | .020 | 0.006 | C: 0.032 | | TP |
| 20673 | 0.091 | -0.489 | F=0,132 | | TP |
| 20674 | -0.058 | -0.126 | F=0.191 | | TP |
| 20675 | -0,006 | 0.187 | E=0.118 | | TP |
| 20676 | 0.010 | 0.237 | C=0.049 | | TP |
| 20677 | 0.112 | -0.31 | F=0.075 | | TP |
| 20679 | 0.022 | -0.176 | C=0.135 | | TP |

8-24-22

| HR | DESC. (2) |
|---|---|
| 6.502 | CHK 3525-6 NEW |
| " | CHK 3525-6 NEW |
| " | CHK 3525-3 (3) |
| | CHK 3525-4 |
| | CHK 3525-5 |
| | CHK 3525-6 |
| | CHK 3525-3 |

PT 9 3525-3 OBS 6 MIN
PT 10 4 6 MIN

NOTA: Se le cambiaron los numeros a las estaciones 3525-1, 3525-2 a 3525-5 y 3525-6. Las estaticas 3 y 4 no cuadran estan dando .33 de dif. en elevacion se volvieron a Calcular y cambiaron se utilizaron los nuevos

3525-3 STATIC NEW

N

E

Z

TA 3761-2 HI 7.382 ft

| PT | ΔN | ΔE | ΔV | P/DUP | METHOD |
|---|---|---|---|---|---|
| 20014 | -0.008 | 0.007 | F 0.086 | | TP |
| 15 | -0.023 | -0.080 | F -0.098 | | |
| 20019 | -0.054 | -0.076 | F -0.079 | | TP |
| | -0.026 | -0.012 | F 0.078 | | TP |

8-25-22

HI
6.562 ft

Desc.
CHK 3761-1
3761-3
3761-3
1

| △ | + | HI | − | ELEV. |
|---|---|---|---|---|
| 20016 | 5.579 | 43.357 | | 37.778 |
| Ground | | | 4.312 | |
| slab ~ | | | 4.070 | |
| Top METAL CASE | | | 1.727 | |
| (TOC) MW04 | | | 1.758 | 41.599 |
| | 1.84 | 43.439 | | |
| 20016 | | | 5.661 | 37.778 |
| | | | | |
| 20017 | 3.15 | 20.568 | | 17.418 |
| Ground | | | 7.00 | |
| SLAB | | | 6.889 | |
| Top Metal case | | | 4.233 | |
| Toc MW29 | | | 4.188 | 16.38 |
| | 4.278 | 20.658 | | |
| 20017 | | | 3.239 | 17.419 |

(20680) PT

| Δ | + | HI | - | ELEV. |
|---|---|---|---|---|
| 20017 | 5.819 | 23.237 | | 17.418 |
| TP-1 | | | 3.751 | 19.486 |
| | 4.279 | 23.765 | | |
| Ground | | | 6.561 | |
| SLAB | | | 6.41 | |
| Top metal case | | | 3.644 | |
| Toc MW 25 New | | | 3.696 | 20.069 |
| | 3.751 | 23.82 | | |
| Grand | | | 6.988 | |
| slab | | | 6.866 | |
| Top metal case | | | 3.809 | |
| *Toc MW-25D | | | 3.98 | 19.84 |
| | 4.073 | 23.913 | | |
| TP-2 | | | 4.429 | 19.484 |
| | 3.873 | 23.357 | | |
| 20017 | | | 5.941 | 17.416 |

| Δ | + | HI | − | Elev. |
|---|---|---|---|---|
| 20018 | 5.237 | 31.131 | | 25.894 |
| Ground | | | 5.28 | |
| Slab | | | 5.16 | |
| Top metal case | | | 2.236 | |
| (Toc) MW 24 | | | 2.285 | 28.846 |
| | 2.357 | 31.203 | | |
| Ground | | | 5.277 | |
| slab | | | 5.223 | |
| Top Meta case | | | 1.908 | |
| Toc MW 24D | | | 2.039 | 29.164 |
| | 2.105 | 31.269 | | |
| TP-1 | | | 5.659 | 25.61 |
| | 4.772 | 30.382 | | |
| G | | | 4.364 | |
| SLAB | | | 4.313 | |
| Top-M-Case | | | 1.383 | |
| Toc MW 23 | | | 1.515 | 28.867 |
| | 1.569 | 30.436 | | |
| TP-2 | | | 4.826 | 25.61 |
| | 5.405 | 31.015 | | |
| 20018 | | | 5.124 | 25.891 |

# Appendix F
# Raw Analytical Data Tables

# NASD AOC B: Former Wastewater Treatment Plant at the Public Works Area

**APPENDIX F**

**TABLE F-1. NASD AOC B Surface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWAB-PFAS-SO01 | | VWAB-PFAS-SO02 | VWAB-PFAS-SO03 | VWAB-PFAS-SO04 |
|---|---|---|---|---|---|
| **Sample ID** | VWAB-PFAS-SS01-0001 | VWAB-PFAS-SS01P-0001 | VWAB-PFAS-SS02-0001 | VWAB-PFAS-SS03-0001 | VWAB-PFAS-SS04-0001 |
| **Sample Date** | 5/11/2022 | 5/11/2022 | 5/11/2022 | 5/11/2022 | 5/11/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.499 U | 0.498 U | 0.499 U | 0.5 U | 0.498 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.499 U | 0.498 U | 0.499 U | 0.5 U | 0.498 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.499 U | 0.498 U | 0.499 U | 0.5 U | 0.498 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.499 U | 0.498 U | 0.294 J | 0.5 U | 0.498 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 1.99 J | 2.11 | 1.69 J | 0.5 U | 0.245 J |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.499 U | 0.498 U | 0.499 U | 0.5 U | 0.498 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.499 U | 0.498 U | 0.499 U | 0.5 U | 0.498 U |
| Perfluorodecanoic Acid (PFDA) | 2.51 | 2.99 | 2.7 | 0.25 J | 0.161 J |
| Perfluorododecanoic Acid (PFDoA) | 1.8 | 2.07 | 3.31 J | 0.173 J | 0.498 U |
| Perfluoroheptanoic acid (PFHpA) | 0.277 J | 0.374 J | 0.437 J | 0.2 J | 0.498 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.499 U | 0.498 U | 0.182 J | 0.5 U | 0.498 U |
| Perfluorohexanoic Acid (PFHxA) | 0.443 J | 0.486 J | 0.46 J | 0.313 J | 0.199 J |
| Perfluorononanoic acid (PFNA) | 0.424 J | 0.705 J | 0.472 J | 0.171 J | 0.498 U |
| Perfluorooctane sulfonic acid (PFOS) | 24.5 | 32.2 | 24.8 | 5.91 | 7.85 |
| Perfluorooctanoic acid (PFOA) | 1.08 | 1.65 | 1.24 | 0.514 J | 0.546 J |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.655 J | 0.677 J | 1.3 J | 0.5 UJ | 0.498 U |
| Perfluorotridecanoic Acid (PFTrDA) | 0.187 J | 0.229 J | 0.416 J | 0.5 U | 0.498 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.73 J | 0.772 J | 1.34 | 0.5 U | 0.498 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-2. NASD AOC B Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWAB-PFAS-SO01 | | VWAB-PFAS-SO02 | VWAB-PFAS-SO03 | VWAB-PFAS-SO04 |
|---|---|---|---|---|---|
| **Sample ID** | VWAB-PFAS-SB01-0406 | VWAB-PFAS-SB01P-0406 | VWAB-PFAS-SB02-0406 | VWAB-PFAS-SB03-0406 | VWAB-PFAS-SB04-0406 |
| **Sample Date** | 5/11/2022 | 5/11/2022 | 5/11/2022 | 5/11/2022 | 5/11/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluorodecanoic Acid (PFDA) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluorododecanoic Acid (PFDoA) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluoroheptanoic acid (PFHpA) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluorohexanoic Acid (PFHxA) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluorononanoic acid (PFNA) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluorooctane sulfonic acid (PFOS) | 1.06 | 0.659 J | 4.95 | 3.32 | 8.83 |
| Perfluorooctanoic acid (PFOA) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluorotridecanoic Acid (PFTrDA) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.499 U | 0.498 U | 0.501 U | 0.499 U | 0.499 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/G = Nanograms/gram

Detected Analyte

**APPENDEX F**

**TABLE F-3. NASD AOC B Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWAB-PFAS-MW01 | | | |
|---|---|---|---|---|
| **Sample ID** | VWAB-PFAS-GW01-0722 | | VWAB-PFAS-GW01P-0722 | |
| **Sample Date** | 7/9/2022 | | 7/9/2022 | |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/L)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.16 | U | 2.18 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.16 | U | 2.18 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.16 | U | 2.18 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.16 | U | 2.18 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.16 | U | 2.18 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.16 | U | 2.18 | U |
| Perfluorobutanesulfonic acid (PFBS) | 36.9 | | 37.2 | |
| Perfluorodecanoic Acid (PFDA) | 2.16 | U | 2.18 | U |
| Perfluorododecanoic Acid (PFDoA) | 2.16 | U | 2.18 | U |
| Perfluoroheptanoic acid (PFHpA) | 25.8 | | 26.1 | |
| Perfluorohexanesulfonic acid (PFHxS) | 181 | | 197 | |
| Perfluorohexanoic Acid (PFHxA) | 55.7 | | 54 | |
| Perfluorononanoic acid (PFNA) | 1.6 | J | 1.85 | J |
| Perfluorooctane sulfonic acid (PFOS) | 83.3 | | 82 | |
| Perfluorooctanoic acid (PFOA) | 93.4 | | 86.9 | |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.16 | U | 2.18 | U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.16 | U | 2.18 | U |
| Perfluoroundecanoic Acid (PFUnA) | 2.16 | U | 2.18 | U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L = Nanograms/liter

Detected Analyte

# NASD Former Fire Station Building 2046 at the Public Works Area

**APPENDIX F**

**TABLE F-4. NASD Former Fire Station Bldg 2046 Surface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWFS-PFAS-SO01 | | VWFS-PFAS-SO02 | |
|---|---|---|---|---|
| **Sample ID** | VWFS-PFAS-SS01-0001 | VWFS-PFAS-SS01P-0001 | VWFS-PFAS-SS02-0001 | VWFS-PFAS-SS02P-0001 |
| **Sample Date** | 3/22/2022 | 3/22/2022 | 3/21/2022 | 3/21/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/G)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.5 U | 0.5 U | 0.497 U | 0.507 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.5 U | 0.5 U | 0.497 U | 0.507 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.5 U | 0.5 U | 0.497 U | 0.507 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.5 U | 0.5 U | 0.497 U | 0.507 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.5 U | 0.5 U | 0.497 U | 0.507 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.5 U | 0.5 U | 0.497 U | 0.507 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.5 U | 0.5 U | 0.497 U | 0.507 U |
| Perfluorodecanoic Acid (PFDA) | 0.5 U | 0.5 U | 0.655 J | 0.411 J |
| Perfluorododecanoic Acid (PFDoA) | 0.5 U | 0.5 U | 0.497 U | 0.179 J |
| Perfluoroheptanoic acid (PFHpA) | 0.5 U | 0.5 U | 0.524 J | 0.507 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.436 J | 0.445 J | 0.497 U | 0.507 U |
| Perfluorohexanoic Acid (PFHxA) | 0.709 J | 1.16 | 0.71 J | 0.507 U |
| Perfluorononanoic acid (PFNA) | 0.5 U | 0.467 J | 0.858 J | 0.335 J |
| Perfluorooctane sulfonic acid (PFOS) | 27.2 J | 69.4 J | 13.3 | 9.87 |
| Perfluorooctanoic acid (PFOA) | 0.349 J | 0.405 J | 0.552 J | 0.507 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.5 U | 0.5 U | 0.497 U | 0.507 U |
| Perfluorotridecanoic Acid (PFTrDA) | 0.5 U | 0.5 U | 0.497 U | 0.507 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.5 U | 0.5 U | 1.78 | 1.54 |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-4. NASD Former Fire Station Bldg 2046 Surface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWFS-PFAS-SO03 | VWFS-PFAS-SO04 | VWFS-PFAS-SO05 |
|---|---|---|---|
| **Sample ID** | VWFS-PFAS-SS03-0001 | VWFS-PFAS-SS04-0001 | VWFS-PFAS-SS05-0001 |
| **Sample Date** | 3/22/2022 | 3/22/2022 | 3/23/2022 |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/G)** | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.497 U | 0.499 U | 0.495 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.497 U | 0.499 U | 0.495 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.497 U | 0.499 U | 0.495 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.497 U | 0.499 U | 0.495 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.497 U | 0.499 U | 0.495 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.497 U | 0.499 U | 0.495 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.497 U | 0.499 U | 0.495 U |
| Perfluorodecanoic Acid (PFDA) | 0.497 U | 0.379 J | 0.495 U |
| Perfluorododecanoic Acid (PFDoA) | 0.497 U | 0.232 J | 0.495 U |
| Perfluoroheptanoic acid (PFHpA) | 0.497 U | 0.423 J | 0.495 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.182 J | 1.39 | 0.495 U |
| Perfluorohexanoic Acid (PFHxA) | 0.497 U | 1.96 | 0.495 U |
| Perfluorononanoic acid (PFNA) | 0.497 U | 0.425 J | 0.495 U |
| Perfluorooctane sulfonic acid (PFOS) | 2.22 | 36.7 | 0.51 J |
| Perfluorooctanoic acid (PFOA) | 0.497 U | 0.587 J | 0.495 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.497 U | 0.499 U | 0.495 U |
| Perfluorotridecanoic Acid (PFTrDA) | 0.497 U | 0.499 U | 0.495 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.225 J | 1.39 | 0.495 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-5. NASD Former Fire Station Bldg 2046 Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWFS-PFAS-SO01 | VWFS-PFAS-SO02 | | VWFS-PFAS-SO03 |
|---|---|---|---|---|
| **Sample ID** | VWFS-PFAS-SB01-0406 | VWFS-PFAS-SB02-0406 | VWFS-PFAS-SB02P-0406 | VWFS-PFAS-SB03-0406 |
| **Sample Date** | 3/22/2022 | 3/21/2022 | 3/21/2022 | 3/22/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/G)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.54 U | 0.538 U | 0.538 U | 0.573 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.54 U | 0.538 U | 0.538 U | 0.573 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.54 U | 0.538 U | 0.538 U | 0.573 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.54 U | 0.538 U | 0.538 U | 0.573 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.54 U | 0.538 U | 0.538 U | 0.573 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.54 U | 0.538 U | 0.538 U | 0.573 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.54 U | 0.538 U | 0.538 U | 0.573 U |
| Perfluorodecanoic Acid (PFDA) | 0.54 U | 0.538 U | 0.538 U | 0.573 U |
| Perfluorododecanoic Acid (PFDoA) | 0.54 U | 0.538 U | 0.538 U | 0.573 U |
| Perfluoroheptanoic acid (PFHpA) | 0.54 U | 0.491 J | 0.654 J | 0.573 U |
| Perfluorohexanesulfonic acid (PFHxS) | 2.87 | 0.538 U | 0.538 U | 0.573 U |
| Perfluorohexanoic Acid (PFHxA) | 0.403 J | 0.663 J | 0.772 J | 0.573 U |
| Perfluorononanoic acid (PFNA) | 0.54 U | 2.19 | 3.55 | 0.573 U |
| Perfluorooctane sulfonic acid (PFOS) | 102 | 57.9 J | 92.3 J | 8.37 J |
| Perfluorooctanoic acid (PFOA) | 0.54 U | 0.232 J | 0.331 J | 0.573 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.54 U | 0.538 U | 0.538 U | 0.573 U |
| Perfluorotridecanoic Acid (PFTrDA) | 0.54 U | 0.538 U | 0.538 U | 0.573 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.54 U | 0.538 U | 0.538 U | 0.573 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-5. NASD Former Fire Station Bldg 2046 Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWFS-PFAS-SO04 | VWFS-PFAS-SO05 | |
|---|---|---|---|
| **Sample ID** | VWFS-PFAS-SB04-0406 | VWFS-PFAS-SB05-0406 | VWFS-PFAS-SB05D-5860 |
| **Sample Date** | 3/22/2022 | 3/23/2022 | 3/23/2022 |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/G)** | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.529 U | 0.563 U | 0.62 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.529 U | 0.563 U | 0.62 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.529 U | 0.563 U | 0.62 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.529 U | 0.563 U | 0.62 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.529 U | 0.563 U | 0.62 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.529 U | 0.563 U | 0.62 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.529 U | 0.563 U | 0.62 U |
| Perfluorodecanoic Acid (PFDA) | 0.264 J | 0.563 U | 0.62 U |
| Perfluorododecanoic Acid (PFDoA) | 0.529 U | 0.563 U | 0.62 U |
| Perfluoroheptanoic acid (PFHpA) | 0.529 U | 0.563 U | 0.62 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.23 J | 0.563 U | 0.62 U |
| Perfluorohexanoic Acid (PFHxA) | 0.277 J | 0.563 U | 0.62 U |
| Perfluorononanoic acid (PFNA) | 0.471 J | 0.563 U | 0.62 U |
| Perfluorooctane sulfonic acid (PFOS) | 104 | 0.563 U | 3.75 |
| Perfluorooctanoic acid (PFOA) | 0.529 U | 0.362 J | 0.62 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.529 U | 0.563 U | 0.62 UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.529 U | 0.563 U | 0.62 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.529 U | 0.563 U | 0.62 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-6. NASD Former Fire Station Bldg 2046 Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWFS-PFAS-MW01 | | VWFS-PFAS-MW02 | |
|---|---|---|---|---|
| **Sample ID** | VWFS-PFAS-GW01-0622 | VWFS-PFAS-GW01P-0622 | VWFS-PFAS-GW02-0622 | |
| **Sample Date** | 6/23/2022 | 6/23/2022 | 6/22/2022 | |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/L)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.46 U | 2.4 U | 2.43 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.46 U | 2.4 U | 2.43 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.46 U | 2.4 U | 2.43 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.46 U | 2.4 U | 2.43 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.46 U | 2.4 U | 2.43 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.46 U | 2.4 U | 2.43 | U |
| Perfluorobutanesulfonic acid (PFBS) | 68700 | 63100 | 6610 | |
| Perfluorodecanoic Acid (PFDA) | 2.46 U | 2.4 U | 2.43 | U |
| Perfluorododecanoic Acid (PFDoA) | 2.46 U | 2.4 U | 2.43 | U |
| Perfluoroheptanoic acid (PFHpA) | 5710 | 6840 | 9290 | |
| Perfluorohexanesulfonic acid (PFHxS) | 159000 | 175000 | 104000 | |
| Perfluorohexanoic Acid (PFHxA) | 50100 | 48000 | 24800 | |
| Perfluorononanoic acid (PFNA) | 2.46 U | 2.4 U | 72.8 | |
| Perfluorooctane sulfonic acid (PFOS) | 36.9 | 35.8 | 4530 | |
| Perfluorooctanoic acid (PFOA) | 247 | 246 | 29700 | J |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.46 U | 2.4 U | 2.43 | U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.46 U | 2.4 U | 2.43 | U |
| Perfluoroundecanoic Acid (PFUnA) | 2.46 U | 2.4 U | 2.43 | U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L - Nanograms/liter

Detected Analyte

# Potential Former NASD Motor Pool Area

**APPENDIX F**

**TABLE F-7. Former NASD Motor Pool Area Surface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWMP-PFAS-SO01 | VWMP-PFAS-SO02 | | VWMP-PFAS-SO03 | VWMP-PFAS-SO04 |
|---|---|---|---|---|---|
| **Sample ID** | VWMP-PFAS-SS01-0001 | VWMP-PFAS-SS02-0001 | VWMP-PFAS-SS02P-0001 | VWMP-PFAS-SS03-0001 | VWMP-PFAS-SS04-0001 |
| **Sample Date** | 3/24/2022 | 3/25/2022 | 3/25/2022 | 3/23/2022 | 3/29/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Perfluorobutanesulfonic acid (PFBS) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Perfluorodecanoic Acid (PFDA) | 0.252 J | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Perfluorododecanoic Acid (PFDoA) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Perfluoroheptanoic acid (PFHpA) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Perfluorohexanesulfonic acid (PFHxS) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Perfluorohexanoic Acid (PFHxA) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Perfluorononanoic acid (PFNA) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Perfluorooctane sulfonic acid (PFOS) | 0.227 J | 0.739 J | 0.723 J | 0.41 J | 1.01 J |
| Perfluorooctanoic acid (PFOA) | 0.499 UJ | 0.534 J | 1.61 J | 0.501 UJ | 0.502 UJ |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |
| Perfluoroundecanoic Acid (PFUnA) | 0.499 UJ | 0.501 UJ | 0.501 UJ | 0.501 UJ | 0.502 UJ |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-8. Former NASD Motor Pool Area Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | VWMP-PFAS-SO01 | | VWMP-PFAS-SO02 | | |
|---|---|---|---|---|---|
| **Sample ID** | VWMP-PFAS-SB01-0406 | VWMP-PFAS-SB01D-4446 | VWMP-PFAS-SB02-0406 | VWMP-PFAS-SB02P-0406 | VWMP-PFAS-SB02D-4850 |
| **Sample Date** | 3/24/2022 | 3/24/2022 | 3/25/2022 | 3/25/2022 | 3/25/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| Perfluorobutanesulfonic acid (PFBS) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| Perfluorodecanoic Acid (PFDA) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| Perfluorododecanoic Acid (PFDoA) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| Perfluoroheptanoic acid (PFHpA) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| Perfluorohexanesulfonic acid (PFHxS) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| Perfluorohexanoic Acid (PFHxA) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| Perfluorononanoic acid (PFNA) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| Perfluorooctane sulfonic acid (PFOS) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| Perfluorooctanoic acid (PFOA) | 0.5 UJ | 0.498 UJ | 0.302 J | 0.502 UJ | 0.498 UJ |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |
| Perfluoroundecanoic Acid (PFUnA) | 0.5 UJ | 0.498 UJ | 0.501 UJ | 0.502 UJ | 0.498 UJ |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-8. Former NASD Motor Pool Area Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | VWMP-PFAS-SO02 | VWMP-PFAS-SO03 | | VWMP-PFAS-SO04 | |
|---|---|---|---|---|---|
| **Sample ID** | VWMP-PFAS-SB02DP-4850 | VWMP-PFAS-SB03-0406 | VWMP-PFAS-SB03D-4850 | VWMP-PFAS-SB04-0406 | VWMP-PFAS-SB04D-4749 |
| **Sample Date** | 3/25/2022 | 3/23/2022 | 3/23/2022 | 3/29/2022 | 3/29/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorobutanesulfonic acid (PFBS) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorodecanoic Acid (PFDA) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorododecanoic Acid (PFDoA) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluoroheptanoic acid (PFHpA) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorohexanesulfonic acid (PFHxS) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorohexanoic Acid (PFHxA) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorononanoic acid (PFNA) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorooctane sulfonic acid (PFOS) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorooctanoic acid (PFOA) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |
| Perfluoroundecanoic Acid (PFUnA) | 0.5 UJ | 0.5 UJ | 0.5 UJ | 0.502 UJ | 0.5 UJ |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-9. Former NASD Motor Pool Area Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWMP-PFAS-MW01 | VWMP-PFAS-MW02 | | VWMP-PFAS-MW03 |
|---|---|---|---|---|
| **Sample ID** | VWMP-PFAS-GW01-0722 | VWMP-PFAS-GW02-0722 | VWMP-PFAS-GW02P-0722 | VWMP-PFAS-GW03-0722 |
| **Sample Date** | 7/9/2022 | 7/9/2022 | 7/9/2022 | 7/9/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/L)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.4 U | 2.19 U | 2.11 U | 2.42 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.4 U | 2.19 U | 2.11 U | 2.42 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.4 U | 2.19 U | 2.11 U | 2.42 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.4 U | 2.19 U | 2.11 U | 2.42 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.4 U | 2.19 U | 2.11 U | 2.42 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.4 U | 2.19 U | 2.11 U | 2.42 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.958 J | 3.59 J | 3.42 J | 8.06 |
| Perfluorodecanoic Acid (PFDA) | 2.4 U | 2.19 U | 2.11 U | 2.42 U |
| Perfluorododecanoic Acid (PFDoA) | 2.4 U | 2.19 U | 2.11 U | 2.42 U |
| Perfluoroheptanoic acid (PFHpA) | 2.4 U | 4.77 | 4.06 J | 6.16 |
| Perfluorohexanesulfonic acid (PFHxS) | 2.4 U | 31.9 | 31.2 | 71.5 |
| Perfluorohexanoic Acid (PFHxA) | 1.81 J | 9.58 | 9.55 | 19.2 |
| Perfluorononanoic acid (PFNA) | 2.4 U | 2.19 U | 2.11 U | 2.42 U |
| Perfluorooctane sulfonic acid (PFOS) | 1.65 J | 96.3 | 91.7 | 87.1 |
| Perfluorooctanoic acid (PFOA) | 4.8 J | 19.7 | 19.4 | 10.8 |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.4 U | 2.19 U | 2.11 U | 2.42 U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.4 U | 2.19 U | 2.11 U | 2.42 U |
| Perfluoroundecanoic Acid (PFUnA) | 2.4 U | 2.19 U | 2.11 U | 2.42 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L - Nanograms/liter

Detected Analyte

# NASD AOC H: Abandoned Power Plant/Former Fire Training Area

**APPENDIX F**

**TABLE F-10. NASD AOC H Surface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | VWAH-PFAS-SO01 | | VWAH-PFAS-SO02 | VWAH-PFAS-SO03 | VWAH-PFAS-SO04 |
|---|---|---|---|---|---|
| **Sample ID** | VWAH-PFAS-SS01-0002 | VWAH-PFAS-SS01P-0002 | VWAH-PFAS-SS02-0002 | VWAH-PFAS-SS03-0002 | VWAH-PFAS-SS04-0001 |
| **Sample Date** | 4/21/2022 | 4/21/2022 | 4/21/2022 | 4/21/2022 | 4/21/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluorodecanoic Acid (PFDA) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluorododecanoic Acid (PFDoA) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluoroheptanoic acid (PFHpA) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluorohexanoic Acid (PFHxA) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluorononanoic acid (PFNA) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluorooctane sulfonic acid (PFOS) | 0.496 U | 0.195 J | 0.503 U | 0.496 U | 0.258 J |
| Perfluorooctanoic acid (PFOA) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluorotridecanoic Acid (PFTrDA) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.496 U | 0.502 U | 0.503 U | 0.496 U | 0.496 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-11. NASD AOC H Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | VWAH-PFAS-SO01 | | VWAH-PFAS-SO02 | |
|---|---|---|---|---|
| **Sample ID** | VWAH-PFAS-SB01-0406 | VWAH-PFAS-SB01P-0406 | VWAH-PFAS-SB02-0406 | VWAH-PFAS-SB02D-0810 |
| **Sample Date** | 4/21/2022 | 4/21/2022 | 4/21/2022 | 4/21/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/G)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluorodecanoic Acid (PFDA) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluorododecanoic Acid (PFDoA) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluoroheptanoic acid (PFHpA) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluorohexanoic Acid (PFHxA) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluorononanoic acid (PFNA) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluorooctane sulfonic acid (PFOS) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluorooctanoic acid (PFOA) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.496 U | 0.505 UJ | 0.501 U | 0.497 UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.496 U | 0.505 U | 0.501 U | 0.497 U |

**Notes:**

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-11. NASD AOC H Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | VWAH-PFAS-SO03 | | VWAH-PFAS-SO04 | |
|---|---|---|---|---|
| **Sample ID** | VWAH-PFAS-SB03-0406 | VWAH-PFAS-SB03D-0709 | VWAH-PFAS-SB04-0406 | VWAH-PFAS-SB04D-0810 |
| **Sample Date** | 4/21/2022 | 4/21/2022 | 4/21/2022 | 4/21/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/G)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorodecanoic Acid (PFDA) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorododecanoic Acid (PFDoA) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluoroheptanoic acid (PFHpA) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorohexanoic Acid (PFHxA) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorononanoic acid (PFNA) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorooctane sulfonic acid (PFOS) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorooctanoic acid (PFOA) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluorotridecanoic Acid (PFTrDA) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.5 U | 0.503 U | 0.498 U | 0.503 U |

**Notes:**

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-12. NASD AOC H Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWAH-PFAS-MW01 | | VWAH-PFAS-MW02 |
|---|---|---|---|
| **Sample ID** | VWAH-PFAS-GW01-0622 | VWAH-PFAS-GW01P-0622 | VWAH-PFAS-GW02-0622 |
| **Sample Date** | 6/28/2022 | 6/28/2022 | 6/28/2022 |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/L)** | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.22 U | 2.3 U | 2.35 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.22 U | 2.3 U | 2.35 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.22 U | 2.3 U | 2.35 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.22 U | 2.3 U | 2.35 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.22 U | 2.3 U | 2.35 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.22 U | 2.3 U | 2.35 U |
| Perfluorobutanesulfonic acid (PFBS) | 2.22 U | 2.3 U | 2.35 U |
| Perfluorodecanoic Acid (PFDA) | 2.22 U | 2.3 U | 2.35 U |
| Perfluorododecanoic Acid (PFDoA) | 2.22 U | 2.3 U | 2.35 U |
| Perfluoroheptanoic acid (PFHpA) | 2.22 U | 2.3 U | 2.35 U |
| Perfluorohexanesulfonic acid (PFHxS) | 2.22 U | 2.3 U | 2.35 U |
| Perfluorohexanoic Acid (PFHxA) | 2.22 U | 2.3 U | 2.35 U |
| Perfluorononanoic acid (PFNA) | 2.22 U | 2.3 U | 2.35 U |
| Perfluorooctane sulfonic acid (PFOS) | 2.22 U | 2.3 U | 2.35 U |
| Perfluorooctanoic acid (PFOA) | 2.22 U | 2.3 U | 2.35 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.22 U | 2.3 U | 2.35 U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.22 U | 2.3 U | 2.35 U |
| Perfluoroundecanoic Acid (PFUnA) | 2.22 U | 2.3 U | 2.35 U |

**Notes:**

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L = Nanograms/liter

Detected Analyte

**APPENDIX F**

**TABLE F-13. NASD AOC H Sediment Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWAH-PFAS-SDSW01 | | VWAH-PFAS-SDSW02 | VWAH-PFAS-SDSW03 |
|---|---|---|---|---|
| **Sample ID** | VWAH-PFAS-SD01-0006 | VWAH-PFAS-SD01P-0006 | VWAH-PFAS-SD02-0006 | VWAH-PFAS-SD03-0006 |
| **Sample Date** | 2/3/2022 | 2/3/2022 | 2/3/2022 | 2/3/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/G)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorodecanoic Acid (PFDA) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorododecanoic Acid (PFDoA) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluoroheptanoic acid (PFHpA) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorohexanoic Acid (PFHxA) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorononanoic acid (PFNA) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorooctane sulfonic acid (PFOS) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorooctanoic acid (PFOA) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluorotridecanoic Acid (PFTrDA) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.499 U | 0.5 U | 0.5 U | 0.502 U |

**Notes:**

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-14. NASD AOC H Surface Water Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWAH-PFAS-SDSW01 | | VWAH-PFAS-SDSW02 | VWAH-PFAS-SDSW03 |
|---|---|---|---|---|
| **Sample ID** | VWAH-PFAS-SW01-0222 | VWAH-PFAS-SW01P-0222 | VWAH-PFAS-SW02-0222 | VWAH-PFAS-SW03-0222 |
| **Sample Date** | 2/3/2022 | 2/3/2022 | 2/3/2022 | 2/3/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/L)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.35 U | 2.3 U | 2.34 UJ | 2.3 UJ |
| Perfluorobutanesulfonic acid (PFBS) | 2.35 U | 2.3 UJ | 2.34 U | 2.3 UJ |
| Perfluorodecanoic Acid (PFDA) | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| Perfluorododecanoic Acid (PFDoA) | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| Perfluoroheptanoic acid (PFHpA) | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| Perfluorohexanesulfonic acid (PFHxS) | 1.75 J | 1.54 J | 0.944 J | 2.3 U |
| Perfluorohexanoic Acid (PFHxA) | 2.35 UJ | 2.3 UJ | 2.34 UJ | 2.3 UJ |
| Perfluorononanoic acid (PFNA) | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| Perfluorooctane sulfonic acid (PFOS) | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| Perfluorooctanoic acid (PFOA) | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.35 U | 2.3 U | 2.34 U | 2.3 U |
| Perfluoroundecanoic Acid (PFUnA) | 2.35 U | 2.3 U | 2.34 U | 2.3 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/L = Nanograms/liter

Detected Analyte

# NASD SWMU 6: Former Mangrove Disposal Site

**APPENDIX F**

**TABLE F-15. NASD SWMU 6 Surface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWS6-PFAS-SO01 | |
|---|---|---|
| **Sample ID** | VWS6-PFAS-SS01-0001 | |
| **Sample Date** | 2/7/2022 | |
| **Chemical Name** | | |
| | | |
| **PFAS (NG/G)** | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.499 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.499 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.499 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.499 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.499 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.499 | U |
| Perfluorobutanesulfonic acid (PFBS) | 0.499 | U |
| Perfluorodecanoic Acid (PFDA) | 0.499 | U |
| Perfluorododecanoic Acid (PFDoA) | 0.499 | U |
| Perfluoroheptanoic acid (PFHpA) | 0.499 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.499 | U |
| Perfluorohexanoic Acid (PFHxA) | 0.499 | U |
| Perfluorononanoic acid (PFNA) | 0.499 | U |
| Perfluorooctane sulfonic acid (PFOS) | 0.499 | U |
| Perfluorooctanoic acid (PFOA) | 0.499 | U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.499 | UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.499 | U |
| Perfluoroundecanoic Acid (PFUnA) | 0.499 | U |

**Notes:**

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-16. NASD SWMU 6 Sediment Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | VWS6-PFAS-SDSW01 | | VWS6-PFAS-SDSW02 | |
|---|---|---|---|---|
| **Sample ID** | VWS6-PFAS-SD01-0006 | | VWS6-PFAS-SD02-0006 | |
| **Sample Date** | 2/4/2022 | | 2/4/2022 | |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/G)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.628 | U | 0.533 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.628 | U | 0.533 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.628 | U | 0.533 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.628 | U | 0.533 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.628 | U | 0.533 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.628 | U | 0.533 | U |
| Perfluorobutanesulfonic acid (PFBS) | 0.628 | U | 0.533 | U |
| Perfluorodecanoic Acid (PFDA) | 0.628 | U | 0.533 | U |
| Perfluorododecanoic Acid (PFDoA) | 0.628 | U | 0.533 | U |
| Perfluoroheptanoic acid (PFHpA) | 0.628 | U | 0.533 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.628 | U | 0.533 | U |
| Perfluorohexanoic Acid (PFHxA) | 0.628 | U | 0.533 | U |
| Perfluorononanoic acid (PFNA) | 0.628 | U | 0.533 | U |
| Perfluorooctane sulfonic acid (PFOS) | 0.628 | U | 0.533 | U |
| Perfluorooctanoic acid (PFOA) | 0.628 | U | 0.533 | U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.628 | UJ | 0.533 | U |
| Perfluorotridecanoic Acid (PFTrDA) | 0.628 | U | 0.533 | U |
| Perfluoroundecanoic Acid (PFUnA) | 0.628 | U | 0.533 | U |

**Notes:**

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-17. NASD SWMU 6 Surface Water Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWS6-PFAS-SDSW01 | | VWS6-PFAS-SDSW02 | |
|---|---|---|---|---|
| **Sample ID** | VWS6-PFAS-SW01-0222 | | VWS6-PFAS-SW02-0222 | |
| **Sample Date** | 2/4/2022 | | 2/4/2022 | |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/L)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.31 | U | 2.36 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.31 | U | 2.36 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.31 | U | 2.36 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.31 | U | 2.36 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.31 | U | 2.36 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.31 | U | 2.36 | U |
| Perfluorobutanesulfonic acid (PFBS) | 2.31 | UJ | 2.36 | U |
| Perfluorodecanoic Acid (PFDA) | 2.31 | U | 2.36 | U |
| Perfluorododecanoic Acid (PFDoA) | 2.31 | U | 2.36 | U |
| Perfluoroheptanoic acid (PFHpA) | 2.31 | U | 2.36 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 2.31 | U | 2.36 | U |
| Perfluorohexanoic Acid (PFHxA) | 2.31 | UJ | 2.36 | U |
| Perfluorononanoic acid (PFNA) | 2.31 | U | 2.36 | U |
| Perfluorooctane sulfonic acid (PFOS) | 2.31 | U | 2.36 | U |
| Perfluorooctanoic acid (PFOA) | 2.31 | U | 2.36 | U |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.31 | U | 2.36 | U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.31 | U | 2.36 | U |
| Perfluoroundecanoic Acid (PFUnA) | 2.31 | U | 2.36 | U |

**Notes:**

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/L = Nanograms/liter

Detected Analyte

# NASD SWMU 7: Former Quebrada Disposal Site

**APPENDIX F**

**TABLE F-18. NASD SWMU 7 Surface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWS7-PFAS-SO01 | | VWS7-PFAS-SO02 | VWS7-PFAS-SO03 |
|---|---|---|---|---|
| **Sample ID** | VWS7-PFAS-SS01-0001 | VWS7-PFAS-SS01P-0001 | VWS7-PFAS-SS02-0001 | VWS7-PFAS-SS03-0001 |
| **Sample Date** | 3/28/2022 | 3/28/2022 | 3/28/2022 | 3/29/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/G)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorobutanesulfonic acid (PFBS) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorodecanoic Acid (PFDA) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorododecanoic Acid (PFDoA) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluoroheptanoic acid (PFHpA) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorohexanesulfonic acid (PFHxS) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorohexanoic Acid (PFHxA) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorononanoic acid (PFNA) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorooctane sulfonic acid (PFOS) | 0.251 J | 0.211 J | 0.407 J | 0.5 UJ |
| Perfluorooctanoic acid (PFOA) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |
| Perfluoroundecanoic Acid (PFUnA) | 0.5 UJ | 0.499 UJ | 0.502 UJ | 0.5 UJ |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected Analyte

**APPENDIX F**

**TABLE F-19. NASD SWMU 7 Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VWS7-PFAS-MW01 | | | |
|---|---|---|---|---|
| **Sample ID** | VWS7-PFAS-GW01-0722 | | VWS7-PFAS-GW01P-0722 | |
| **Sample Date** | 7/9/2022 | | 7/9/2022 | |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/L)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.3 | U | 2.22 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.3 | U | 2.22 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.3 | U | 2.22 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.3 | U | 2.22 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.3 | U | 2.22 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.3 | U | 2.22 | U |
| Perfluorobutanesulfonic acid (PFBS) | 1.79 | J | 1.63 | J |
| Perfluorodecanoic Acid (PFDA) | 2.3 | U | 2.22 | U |
| Perfluorododecanoic Acid (PFDoA) | 2.3 | U | 2.22 | U |
| Perfluoroheptanoic acid (PFHpA) | 2.3 | U | 2.22 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 2.3 | U | 2.22 | U |
| Perfluorohexanoic Acid (PFHxA) | 0.853 | J | 0.879 | J |
| Perfluorononanoic acid (PFNA) | 2.3 | U | 2.22 | U |
| Perfluorooctane sulfonic acid (PFOS) | 2.3 | U | 2.22 | U |
| Perfluorooctanoic acid (PFOA) | 2.3 | U | 2.22 | U |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.3 | U | 2.22 | U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.3 | U | 2.22 | U |
| Perfluoroundecanoic Acid (PFUnA) | 2.3 | U | 2.22 | U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L = Nanograms/liter

Detected Analyte

# VNTR Former Camp Garcia Runway

**APPENDIX F**

**TABLE F-20. Former VNTR Camp Garcia Runway Surface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VERW-PFAS-SO01 | VERW-PFAS-SO02 | VERW-PFAS-SO03 | VERW-PFAS-SO04 | VERW-PFAS-SO05 |
|---|---|---|---|---|---|
| **Sample ID** | VERW-PFAS-SS01-0001 | VERW-PFAS-SS02-0001 | VERW-PFAS-SS03-0001 | VERW-PFAS-SS04-0001 | VERW-PFAS-SS05-0001 |
| **Sample Date** | 2/24/2022 | 2/28/2022 | 2/25/2022 | 2/25/2022 | 3/1/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/G)** | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Perfluorodecanoic Acid (PFDA) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Perfluorododecanoic Acid (PFDoA) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Perfluoroheptanoic acid (PFHpA) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Perfluorohexanoic Acid (PFHxA) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Perfluorononanoic acid (PFNA) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Perfluorooctane sulfonic acid (PFOS) | 0.497 U | 0.506 U | 2.46 | 0.503 U | 0.497 U |
| Perfluorooctanoic acid (PFOA) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.497 U | 0.506 UJ | 0.499 U | 0.503 UJ | 0.497 UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.497 U | 0.506 U | 0.499 U | 0.503 U | 0.497 U |

**Notes:**

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected analyte

**APPENDIX F**

**TABLE F-21. Former VNTR Camp Garcia Runway Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VERW-PFAS-SO01 | | VERW-PFAS-SO02 | |
|---|---|---|---|---|
| **Sample ID** | VERW-PFAS-SB01-0406 | VERW-PFAS-SB01D-2728 | VERW-PFAS-SB02-0406 | VERW-PFAS-SB02D-3132 |
| **Sample Date** | 2/24/2022 | 2/24/2022 | 2/28/2022 | 2/28/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/G)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| Perfluorodecanoic Acid (PFDA) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| Perfluorododecanoic Acid (PFDoA) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| Perfluoroheptanoic acid (PFHpA) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| Perfluorohexanoic Acid (PFHxA) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| Perfluorononanoic acid (PFNA) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| Perfluorooctane sulfonic acid (PFOS) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| Perfluorooctanoic acid (PFOA) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.497 U | 0.503 U | 0.493 UJ | 0.498 UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.497 U | 0.503 U | 0.493 U | 0.498 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected analyte

**APPENDIX F**

**TABLE F-21. Former VNTR Camp Garcia Runway Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Station ID | VERW-PFAS-SO03 | | VERW-PFAS-SO04 | |
|---|---|---|---|---|
| Sample ID | VERW-PFAS-SB03-0406 | VERW-PFAS-SB03D-3132 | VERW-PFAS-SB04-0406 | VERW-PFAS-SB04D-3233 |
| Sample Date | 2/25/2022 | 2/25/2022 | 2/25/2022 | 2/25/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/G)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |
| Perfluorodecanoic Acid (PFDA) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |
| Perfluorododecanoic Acid (PFDoA) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |
| Perfluoroheptanoic acid (PFHpA) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |
| Perfluorohexanesulfonic acid (PFHxS) | 1.16 | 0.489 U | 0.498 U | 0.501 U |
| Perfluorohexanoic Acid (PFHxA) | 0.222 J | 0.489 U | 0.498 U | 0.501 U |
| Perfluorononanoic acid (PFNA) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |
| Perfluorooctane sulfonic acid (PFOS) | 2.71 | 0.489 U | 0.498 U | 0.501 U |
| Perfluorooctanoic acid (PFOA) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |
| Perfluorotridecanoic Acid (PFTrDA) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.496 U | 0.489 U | 0.498 U | 0.501 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.
NG/G = Nanograms/gram
Detected analyte

**APPENDIX F**

**TABLE F-21. Former VNTR Camp Garcia Runway Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | VERW-PFAS-SO05 | |
|---|---|---|
| **Sample ID** | VERW-PFAS-SB05-0406 | VERW-PFAS-SB05D-1920 |
| **Sample Date** | 3/1/2022 | 3/1/2022 |
| **Chemical Name** | | |
| | | |
| **PFAS (NG/G)** | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.504 U | 0.504 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.504 U | 0.504 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.504 U | 0.504 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.504 U | 0.504 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.504 U | 0.504 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.504 U | 0.504 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.504 U | 0.504 U |
| Perfluorodecanoic Acid (PFDA) | 0.504 U | 0.504 U |
| Perfluorododecanoic Acid (PFDoA) | 0.504 U | 0.504 U |
| Perfluoroheptanoic acid (PFHpA) | 0.504 U | 0.504 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.504 U | 0.504 U |
| Perfluorohexanoic Acid (PFHxA) | 0.504 U | 0.504 U |
| Perfluorononanoic acid (PFNA) | 0.504 U | 0.504 U |
| Perfluorooctane sulfonic acid (PFOS) | 0.504 U | 0.504 U |
| Perfluorooctanoic acid (PFOA) | 0.504 U | 0.504 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.504 U | 0.504 UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.504 U | 0.504 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.504 U | 0.504 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.
NG/G = Nanograms/gram
Detected analyte

**APPENDIX F**

**TABLE F-22. Former VNTR Camp Garcia Runway Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VERW-PFAS-MW01 | | VERW-PFAS-MW02 | | EPI04-MW26 | |
|---|---|---|---|---|---|---|
| **Sample ID** | VERW-PFAS-GW01-0422 | | VERW-PFAS-GW02-0422 | | EPI04-PFAS-GW26-0222 | |
| **Sample Date** | 4/6/2022 | | 4/7/2022 | | 2/2/2022 | |
| **Chemical Name** | | | | | | |
| | | | | | | |
| **PFAS (NG/L)** | | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.27 | U | 2.25 | U | 2.3 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.27 | U | 2.25 | U | 2.3 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.27 | U | 2.25 | U | 2.3 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.27 | U | 2.25 | U | 2.3 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.27 | U | 2.25 | U | 2.3 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.27 | U | 2.25 | U | 2.3 | U |
| Perfluorobutanesulfonic acid (PFBS) | 1.19 | J | 13.9 | | 6.7 | |
| Perfluorodecanoic Acid (PFDA) | 2.27 | U | 2.25 | U | 2.3 | U |
| Perfluorododecanoic Acid (PFDoA) | 2.27 | U | 2.25 | U | 2.3 | U |
| Perfluoroheptanoic acid (PFHpA) | 2.27 | U | 2.25 | U | 2.3 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 5.17 | | 44.2 | | 18.1 | |
| Perfluorohexanoic Acid (PFHxA) | 2.27 | U | 2.25 | U | 2.3 | U |
| Perfluorononanoic acid (PFNA) | 2.27 | U | 2.25 | U | 2.3 | U |
| Perfluorooctane sulfonic acid (PFOS) | 2.27 | U | 21.2 | | 1.1 | J |
| Perfluorooctanoic acid (PFOA) | 2.27 | U | 2.25 | U | 2.3 | U |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.27 | U | 2.25 | U | 2.3 | U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.27 | U | 2.25 | U | 2.3 | U |
| Perfluoroundecanoic Acid (PFUnA) | 2.27 | U | 2.25 | U | 2.3 | U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L = Nanograms/liter

Detected analyte

# VNTR PI 5: Surface Water Drainage Area from Former Camp Garcia Runway

**APPENDIX F**

**TABLE F-23. Former VNTR PI5 Surface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VEP5-PFAS-SO01 | | VEP5-PFAS-SO02 | |
|---|---|---|---|---|
| **Sample ID** | VEP5-PFAS-SS01-0001 | | VEP5-PFAS-SS02-0001 | |
| **Sample Date** | 2/23/2022 | | 2/24/2022 | |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/G)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.5 | U | 0.507 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.5 | U | 0.507 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.5 | U | 0.507 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.5 | U | 0.507 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.5 | U | 0.507 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.5 | U | 0.507 | U |
| Perfluorobutanesulfonic acid (PFBS) | 0.5 | U | 0.507 | U |
| Perfluorodecanoic Acid (PFDA) | 0.5 | U | 0.507 | U |
| Perfluorododecanoic Acid (PFDoA) | 0.5 | U | 0.507 | U |
| Perfluoroheptanoic acid (PFHpA) | 0.5 | U | 0.507 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.5 | U | 0.507 | U |
| Perfluorohexanoic Acid (PFHxA) | 0.5 | U | 0.507 | U |
| Perfluorononanoic acid (PFNA) | 0.5 | U | 0.507 | U |
| Perfluorooctane sulfonic acid (PFOS) | 0.5 | U | 0.193 | J |
| Perfluorooctanoic acid (PFOA) | 0.5 | U | 0.507 | U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.5 | UJ | 0.507 | UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.5 | U | 0.507 | U |
| Perfluoroundecanoic Acid (PFUnA) | 0.5 | U | 0.507 | U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected analyte

**APPENDIX F**

**TABLE F-24. Former VNTR PI5 Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VEP5-PFAS-SO01 | | VEP5-PFAS-SO02 | |
|---|---|---|---|---|
| **Sample ID** | VEP5-PFAS-SB01-0406 | VEP5-PFAS-SB01D-1516 | VEP5-PFAS-SB02-0406 | VEP5-PFAS-SB02D-2425 |
| **Sample Date** | 2/23/2022 | 2/23/2022 | 2/24/2022 | 2/24/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/G)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorodecanoic Acid (PFDA) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorododecanoic Acid (PFDoA) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluoroheptanoic acid (PFHpA) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorohexanoic Acid (PFHxA) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorononanoic acid (PFNA) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorooctane sulfonic acid (PFOS) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorooctanoic acid (PFOA) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluorotridecanoic Acid (PFTrDA) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.502 U | 0.507 U | 0.498 U | 0.493 U |

**Notes:**

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/G = Nanograms/gram

Detected analyte

**APPENDIX F**

**TABLE F-25. Former VNTR PI5 Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VEP5-PFAS-MW01 | |
|---|---|---|
| **Sample ID** | VEP5-PFAS-GW01-0422 | |
| **Sample Date** | 4/6/2022 | |
| **Chemical Name** | | |
| | | |
| **PFAS (NG/L)** | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.25 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.25 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.25 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.25 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.25 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.25 | U |
| Perfluorobutanesulfonic acid (PFBS) | 2.65 | J |
| Perfluorodecanoic Acid (PFDA) | 2.25 | U |
| Perfluorododecanoic Acid (PFDoA) | 2.25 | U |
| Perfluoroheptanoic acid (PFHpA) | 2.25 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 1.44 | J |
| Perfluorohexanoic Acid (PFHxA) | 2.25 | U |
| Perfluorononanoic acid (PFNA) | 2.25 | U |
| Perfluorooctane sulfonic acid (PFOS) | 2.25 | U |
| Perfluorooctanoic acid (PFOA) | 2.25 | UJ |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.25 | U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.25 | U |
| Perfluoroundecanoic Acid (PFUnA) | 2.25 | U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/L = Nanograms/liter

Detected analyte

# VNTR SWMU 20: Former Helicopter Maintenance Area

**APPENDIX F**

**TABLE F-26. VNTR SWMU 20 Surface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | EPI04-SO01 | |
|---|---|---|
| **Sample ID** | VEP4-PFAS-SS01-0001 | |
| **Sample Date** | 3/3/2022 | |
| **Chemical Name** | | |
| | | |
| **PFAS (NG/G)** | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.504 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.504 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.504 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.504 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.504 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.504 | U |
| Perfluorobutanesulfonic acid (PFBS) | 0.504 | U |
| Perfluorodecanoic Acid (PFDA) | 0.504 | U |
| Perfluorododecanoic Acid (PFDoA) | 0.504 | UJ |
| Perfluoroheptanoic acid (PFHpA) | 0.504 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.504 | U |
| Perfluorohexanoic Acid (PFHxA) | 0.504 | U |
| Perfluorononanoic acid (PFNA) | 0.504 | U |
| Perfluorooctane sulfonic acid (PFOS) | 1.08 | |
| Perfluorooctanoic acid (PFOA) | 0.504 | U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.504 | UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.504 | U |
| Perfluoroundecanoic Acid (PFUnA) | 0.504 | U |

**Notes:**

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected analyte

**APPENDIX F**

**TABLE F-27. VNTR SWMU 20 Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | EPI04-SO01 | |
|---|---|---|
| **Sample ID** | VEP4-PFAS-SB01-0406 | |
| **Sample Date** | 3/3/2022 | |
| **Chemical Name** | | |
| | | |
| **PFAS (NG/G)** | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.494 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.494 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.494 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.494 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.494 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.494 | U |
| Perfluorobutanesulfonic acid (PFBS) | 0.494 | U |
| Perfluorodecanoic Acid (PFDA) | 0.494 | U |
| Perfluorododecanoic Acid (PFDoA) | 0.494 | UJ |
| Perfluoroheptanoic acid (PFHpA) | 0.494 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.494 | U |
| Perfluorohexanoic Acid (PFHxA) | 0.494 | U |
| Perfluorononanoic acid (PFNA) | 0.494 | U |
| Perfluorooctane sulfonic acid (PFOS) | 0.494 | U |
| Perfluorooctanoic acid (PFOA) | 0.494 | U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.494 | UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.494 | U |
| Perfluoroundecanoic Acid (PFUnA) | 0.494 | U |

**Notes:**

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected analyte

**APPENDIX F**

**TABLE F-28. VNTR SWMU 20 Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Station ID | EPI04-MW01 | | EPI04-MW03 | EPI04-MW04 | EPI04-MW05 | EPI04-MW06 | |
|---|---|---|---|---|---|---|---|
| Sample ID | VEP4-PFAS-GW01-0222 | VEP4-GW01-0722 | VEP4-GW03-0722 | VEP4-GW04-0722 | VEP4-GW05-0722 | VEP4-PFAS-GW06-0222 | VEP4-GW06-0722 |
| Sample Date | 2/8/2022 | 7/4/2022 | 7/13/2022 | 7/13/2022 | 7/12/2022 | 2/1/2022 | 7/12/2022 |
| **Chemical Name** | | | | | | | |
| | | | | | | | |
| **PFAS (NG/L)** | | | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.31 U | 2.27 U | 2.5 U | 2.13 U | 2.22 U | 2.39 U | 2.38 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.31 U | 2.27 U | 2.5 U | 2.13 U | 2.22 U | 2.39 U | 2.38 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.31 U | 2.27 U | 2.5 U | 2.13 U | 2.22 U | 2.39 U | 2.38 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.31 U | 2.27 U | 2.5 U | 2.13 U | 2.22 U | 2.39 U | 2.38 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.31 U | 2.27 U | 2.5 U | 2.13 U | 2.22 U | 2.39 U | 2.38 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.31 U | 2.27 U | 2.5 U | 2.13 U | 2.22 U | 2.39 U | 2.38 U |
| Perfluorobutanesulfonic acid (PFBS) | 125 | 132 | 70 | 101 | 44.2 | 80.6 | 77 |
| Perfluorodecanoic Acid (PFDA) | 2.31 U | 2.27 U | 2.5 U | 2.13 U | 2.22 U | 2.39 U | 2.38 U |
| Perfluorododecanoic Acid (PFDoA) | 2.31 U | 2.27 U | 2.5 U | 2.13 U | 2.22 U | 2.39 U | 2.38 U |
| Perfluoroheptanoic acid (PFHpA) | 29.3 | 31.3 | 27.4 | 28.4 | 11.2 J | 26 | 27.2 |
| Perfluorohexanesulfonic acid (PFHxS) | 358 | 512 | 498 | 517 | 260 | 563 | 545 |
| Perfluorohexanoic Acid (PFHxA) | 149 | 168 | 119 | 79.5 | 41.7 J | 114 | 92.9 |
| Perfluorononanoic acid (PFNA) | 2.31 U | 1.14 J | 1.04 J | 2.13 U | 2.22 U | 2.39 U | 2.02 J |
| Perfluorooctane sulfonic acid (PFOS) | 41.3 | 54.9 | 107 | 44.3 | 32.2 | 71.1 | 78.2 |
| Perfluorooctanoic acid (PFOA) | 35.4 | 42.4 | 40.7 | 28.6 | 15.9 | 36.7 | 34.9 |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.31 U | 2.27 U | 2.5 UJ | 2.13 U | 2.22 U | 2.39 U | 2.38 U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.31 U | 2.27 U | 2.5 U | 2.13 U | 2.22 U | 2.39 U | 2.38 U |
| Perfluoroundecanoic Acid (PFUnA) | 2.31 U | 2.27 U | 2.5 U | 2.13 U | 2.22 U | 2.39 U | 2.38 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/L = Nanograms/liter

Detected analyte

**APPENDIX F**

**TABLE F-28. VNTR SWMU 20 Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Station ID | EPI04-MW07 | | EPI04-MW08 | EPI04-MW09 | EPI04-MW10 | EPI04-MW11 | EPI04-MW12 |
|---|---|---|---|---|---|---|---|
| **Sample ID** | VEP4-GW07-0722 | VEP4-GW07P-0722 | VEP4-GW08-0722 | VEP4-GW09-0722 | VEP4-GW10-0722 | VEP4-GW11-0722 | VEP4-GW12-0722 |
| **Sample Date** | 7/4/2022 | 7/4/2022 | 7/11/2022 | 7/5/2022 | 7/5/2022 | 7/12/2022 | 7/12/2022 |
| **Chemical Name** | | | | | | | |
| | | | | | | | |
| **PFAS (NG/L)** | | | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.1 U | 2.14 U | 2.22 U | 2.15 U | 2.18 U | 2.2 U | 2.22 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.1 U | 2.14 U | 2.22 U | 2.15 U | 2.18 U | 2.2 U | 2.22 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.1 U | 2.14 U | 2.22 U | 2.15 U | 2.18 U | 2.2 U | 2.22 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.1 UJ | 2.14 UJ | 2.22 U | 2.15 U | 2.18 UJ | 2.2 U | 2.22 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.1 U | 2.14 U | 2.22 U | 2.15 U | 2.18 U | 2.2 U | 2.22 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.1 U | 2.14 U | 2.22 U | 2.15 U | 2.18 U | 2.2 U | 2.22 U |
| Perfluorobutanesulfonic acid (PFBS) | 14.6 | 12.5 | 10.7 | 87.1 | 10.4 | 76.9 | 12.1 |
| Perfluorodecanoic Acid (PFDA) | 2.1 U | 2.14 U | 2.22 U | 2.15 U | 2.18 U | 2.2 U | 2.22 U |
| Perfluorododecanoic Acid (PFDoA) | 2.1 U | 2.14 U | 2.22 U | 2.15 U | 2.18 U | 2.2 U | 2.22 U |
| Perfluoroheptanoic acid (PFHpA) | 2.1 U | 0.856 J | 2.22 UJ | 21.9 | 2.18 U | 26.4 | 2.34 J |
| Perfluorohexanesulfonic acid (PFHxS) | 76.1 | 63.3 | 60.8 | 628 | 59.6 | 549 | 78.9 |
| Perfluorohexanoic Acid (PFHxA) | 2.45 J | 2.63 J | 2.75 J | 96.3 | 1.22 J | 85.9 | 7.32 |
| Perfluorononanoic acid (PFNA) | 2.1 U | 2.14 U | 2.22 U | 2.15 U | 2.18 U | 2.2 U | 2.22 U |
| Perfluorooctane sulfonic acid (PFOS) | 3.45 J | 3.32 J | 5.8 | 73.6 | 4.33 J | 77 | 9.05 |
| Perfluorooctanoic acid (PFOA) | 2.88 J | 2.55 J | 2.61 J | 35.7 | 2.24 J | 33.9 | 4.07 J |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.1 U | 2.14 UJ | 2.22 U | 2.15 U | 2.18 U | 2.2 UJ | 2.22 U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.1 U | 2.14 U | 2.22 U | 2.15 U | 2.18 U | 2.2 U | 2.22 U |
| Perfluoroundecanoic Acid (PFUnA) | 2.1 U | 2.14 U | 2.22 U | 2.15 U | 2.18 U | 2.2 U | 2.22 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/L = Nanograms/liter

Detected analyte

**APPENDIX F**

**TABLE F-28. VNTR SWMU 20 Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | EPI04-MW13 | EPI04-MW13D | EPI04-MW14 | | EPI04-MW15 | | EPI04-MW16 |
|---|---|---|---|---|---|---|---|
| **Sample ID** | VEP4-GW13-0722 | VEP4-GW13D-0722 | VEP4-GW14-0722 | VEP4-GW14P-0722 | VEP4-PFAS-GW15-0222 | VEP4-GW15-0622 | VEP4-GW16-0622 |
| **Sample Date** | 7/5/2022 | 7/5/2022 | 7/5/2022 | 7/5/2022 | 2/8/2022 | 6/30/2022 | 6/30/2022 |
| **Chemical Name** | | | | | | | |
| | | | | | | | |
| **PFAS (NG/L)** | | | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.26 U | 2.15 U | 2.14 U | 2.2 U | 2.25 U | 2.26 U | 2.16 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.26 U | 2.15 U | 2.14 U | 2.2 U | 2.25 U | 2.26 U | 2.16 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.26 U | 2.15 U | 2.14 U | 2.2 U | 2.25 U | 2.26 U | 2.16 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.26 UJ | 2.15 UJ | 2.14 U | 2.2 U | 2.25 U | 2.26 U | 2.16 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.26 UJ | 2.15 UJ | 2.14 U | 2.2 U | 2.25 U | 2.26 U | 2.16 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.26 U | 2.15 U | 2.14 U | 2.2 U | 2.25 U | 2.26 U | 2.16 U |
| Perfluorobutanesulfonic acid (PFBS) | 13.3 | 3.59 J | 77.9 | 67.6 | 90 | 89.6 | 50.6 |
| Perfluorodecanoic Acid (PFDA) | 2.26 U | 2.15 U | 2.14 U | 2.2 U | 2.25 U | 2.26 U | 2.16 U |
| Perfluorododecanoic Acid (PFDoA) | 2.26 U | 2.15 U | 2.14 U | 2.2 U | 2.25 U | 2.26 U | 2.16 U |
| Perfluoroheptanoic acid (PFHpA) | 1.86 J | 2.15 U | 19.3 | 19.1 | 31.4 | 27.4 | 14.3 |
| Perfluorohexanesulfonic acid (PFHxS) | 74.9 | 18.3 | 506 | 536 | 592 | 661 | 331 |
| Perfluorohexanoic Acid (PFHxA) | 7.18 | 0.893 J | 73 | 74.1 | 107 | 105 | 48.2 |
| Perfluorononanoic acid (PFNA) | 2.26 U | 2.15 U | 2.14 U | 2.2 U | 1.72 J | 1.12 J | 0.821 J |
| Perfluorooctane sulfonic acid (PFOS) | 5.84 | 1.85 J | 54.4 | 59.2 | 62.9 | 86.4 | 40.8 |
| Perfluorooctanoic acid (PFOA) | 4.24 J | 0.89 J | 33 | 29.7 | 34.7 | 42.3 | 20.6 |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.26 U | 2.15 U | 2.14 U | 2.2 U | 2.25 U | 2.26 U | 2.16 U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.26 U | 2.15 U | 2.14 U | 2.2 U | 2.25 U | 2.26 U | 2.16 U |
| Perfluoroundecanoic Acid (PFUnA) | 2.26 U | 2.15 U | 2.14 U | 2.2 U | 2.25 U | 2.26 U | 2.16 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/L = Nanograms/liter

Detected analyte

**APPENDIX F**

**TABLE F-28. VNTR SWMU 20 Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Station ID | EPI04-MW17 | EPI04-MW17D | EPI04-MW18 | EPI04-MW19 | EPI04-MW20 | EPI04-MW21 | EPI04-MW22 |
|---|---|---|---|---|---|---|---|
| **Sample ID** | VEP4-GW17-0622 | VEP4-GW17D-0622 | VEP4-GW18-0622 | VEP4-GW19-0722 | VEP4-GW20-0722 | VEP4-GW21-0722 | VEP4-GW22-0722 |
| **Sample Date** | 6/30/2022 | 6/30/2022 | 6/30/2022 | 7/4/2022 | 7/4/2022 | 7/4/2022 | 7/4/2022 |
| **Chemical Name** | | | | | | | |
| | | | | | | | |
| **PFAS (NG/L)** | | | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.13 U | 2.16 U | 2.16 U | 2.12 U | 2.22 U | 2.13 U | 2.15 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.13 U | 2.16 U | 2.16 U | 2.12 U | 2.22 U | 2.13 U | 2.15 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.13 U | 2.16 U | 2.16 U | 2.12 U | 2.22 U | 2.13 U | 2.15 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.13 U | 2.16 UJ | 2.16 U | 2.12 U | 2.22 U | 2.13 U | 2.15 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.13 U | 2.16 U | 2.16 U | 2.12 U | 2.22 U | 2.13 U | 2.15 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.13 U | 2.16 U | 2.16 U | 2.12 U | 2.22 U | 2.13 U | 2.15 U |
| Perfluorobutanesulfonic acid (PFBS) | 27.4 | 8.81 | 34.5 | 65 | 37.8 | 144 | 138 |
| Perfluorodecanoic Acid (PFDA) | 2.13 U | 2.16 U | 2.16 U | 2.12 U | 2.22 U | 2.13 U | 2.15 U |
| Perfluorododecanoic Acid (PFDoA) | 2.13 U | 2.16 U | 2.16 U | 2.12 U | 2.22 U | 2.13 U | 2.15 U |
| Perfluoroheptanoic acid (PFHpA) | 2.49 J | 2.16 U | 8.03 | 2.38 J | 5.43 | 28.2 | 35.5 |
| Perfluorohexanesulfonic acid (PFHxS) | 135 | 35.2 | 249 | 247 | 131 | 469 | 600 |
| Perfluorohexanoic Acid (PFHxA) | 12.3 | 3.5 J | 26.4 | 7.46 | 27.7 | 148 | 163 |
| Perfluorononanoic acid (PFNA) | 2.13 U | 2.16 U | 2.16 U | 2.12 U | 2.22 U | 2.13 U | 0.784 J |
| Perfluorooctane sulfonic acid (PFOS) | 6.89 | 1.83 J | 21.6 | 10.5 | 12 | 47.1 | 45.7 |
| Perfluorooctanoic acid (PFOA) | 4.44 | 1.41 J | 13.7 | 7.28 | 6.82 | 41.7 | 46.4 |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.13 U | 2.16 U | 2.16 U | 2.12 U | 2.22 U | 2.13 U | 2.15 U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.13 U | 2.16 U | 2.16 U | 2.12 U | 2.22 U | 2.13 U | 2.15 U |
| Perfluoroundecanoic Acid (PFUnA) | 2.13 U | 2.16 U | 2.16 U | 2.12 U | 2.22 U | 2.13 U | 2.15 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/L = Nanograms/liter

Detected analyte

**APPENDIX F**

**TABLE F-28. VNTR SWMU 20 Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | EPI04-MW23 | EPI04-MW24 | | EPI04-MW24D | EPI04-MW25 | | EPI04-MW25D |
|---|---|---|---|---|---|---|---|
| **Sample ID** | VEP4-GW23-0722 | VEP4-PFAS-GW24-0222 | VEP4-GW24-0622 | VEP4-GW24D-0622 | VEP4-GW25-0622 | VEP4-GW25P-0622 | VEP4-GW25D-0622 |
| **Sample Date** | 7/1/2022 | 2/1/2022 | 6/29/2022 | 6/29/2022 | 6/27/2022 | 6/27/2022 | 6/27/2022 |
| **Chemical Name** | | | | | | | |
| | | | | | | | |
| **PFAS (NG/L)** | | | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.22 U | 2.36 U | 2.06 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.22 U | 2.36 U | 2.06 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.22 U | 2.36 U | 2.06 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.22 UJ | 2.36 U | 2.06 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.22 U | 2.36 U | 2.06 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.22 U | 2.36 U | 2.06 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| Perfluorobutanesulfonic acid (PFBS) | 22.6 | 19.2 | 20.5 | 13.9 | 2.22 U | 2.22 U | 2.16 U |
| Perfluorodecanoic Acid (PFDA) | 2.22 U | 2.36 U | 2.06 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| Perfluorododecanoic Acid (PFDoA) | 2.22 U | 2.36 U | 2.06 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| Perfluoroheptanoic acid (PFHpA) | 0.964 J | 2.36 U | 2.06 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| Perfluorohexanesulfonic acid (PFHxS) | 84.1 | 61.4 | 69.9 | 73.2 | 2.22 U | 1.39 J | 2.16 U |
| Perfluorohexanoic Acid (PFHxA) | 6.38 | 2.08 J | 1.89 J | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| Perfluorononanoic acid (PFNA) | 2.22 U | 2.36 U | 2.06 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| Perfluorooctane sulfonic acid (PFOS) | 2.85 J | 2.92 J | 2.22 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| Perfluorooctanoic acid (PFOA) | 2.07 J | 1.11 J | 2.06 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.22 U | 2.36 U | 2.06 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.22 U | 2.36 U | 2.06 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |
| Perfluoroundecanoic Acid (PFUnA) | 2.22 U | 2.36 U | 2.06 U | 2.13 U | 2.22 U | 2.22 U | 2.16 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/L = Nanograms/liter

Detected analyte

**APPENDIX F**

**TABLE F-28. VNTR SWMU 20 Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| Station ID | EPI04-MW26 | EPI04-MW26 | EPI04-MW27 | EPI04-MW28 | EPI04-MW28D | EPI04-MW29 |
|---|---|---|---|---|---|---|
| **Sample ID** | EPI04-PFAS-GW26-0222 | VEP4-GW26-0722 | VEP4-GW27-0722 | VEP4-GW28-0622 | VEP4-GW28D-0622 | VEP4-GW29-0622 |
| **Sample Date** | 2/2/2022 | 7/1/2022 | 7/1/2022 | 6/29/2022 | 6/29/2022 | 6/27/2022 |
| **Chemical Name** | | | | | | |
| | | | | | | |
| **PFAS (NG/L)** | | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.3 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.3 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.3 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.3 UJ | 2.17 UJ | 1.72 UJ | 2.17 U | 2.28 U | 2.15 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.3 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.3 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |
| Perfluorobutanesulfonic acid (PFBS) | 6.7 | 6.38 | 0.805 J | 2.17 U | 2.28 U | 3.3 J |
| Perfluorodecanoic Acid (PFDA) | 2.3 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |
| Perfluorododecanoic Acid (PFDoA) | 2.3 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |
| Perfluoroheptanoic acid (PFHpA) | 2.3 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |
| Perfluorohexanesulfonic acid (PFHxS) | 18.1 | 22.2 | 2.73 J | 2.17 U | 2.28 U | 14.3 |
| Perfluorohexanoic Acid (PFHxA) | 2.3 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |
| Perfluorononanoic acid (PFNA) | 2.3 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |
| Perfluorooctane sulfonic acid (PFOS) | 1.1 J | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |
| Perfluorooctanoic acid (PFOA) | 2.3 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.3 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.3 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |
| Perfluoroundecanoic Acid (PFUnA) | 2.3 U | 2.17 U | 1.72 U | 2.17 U | 2.28 U | 2.15 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/L = Nanograms/liter

Detected analyte

**APPENDIX F**

**TABLE F-28. VNTR SWMU 20 Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | EPI04-MW30 | | EPI04-MW31 | EPI04-MW32 | EPI04-MW33 |
|---|---|---|---|---|---|
| **Sample ID** | VEP4-GW30-0722 | VEP4-GW30P-0722 | VEP4-GW31-0622 | VEP4-GW32-0722 | VEP4-GW33-0722 |
| **Sample Date** | 7/1/2022 | 7/1/2022 | 6/28/2022 | 7/7/2022 | 7/7/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/L)** | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 UJ |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 UJ |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| Perfluorobutanesulfonic acid (PFBS) | 40.3 | 41.2 | 2.22 U | 0.987 J | 2.16 U |
| Perfluorodecanoic Acid (PFDA) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| Perfluorododecanoic Acid (PFDoA) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 UJ |
| Perfluoroheptanoic acid (PFHpA) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| Perfluorohexanesulfonic acid (PFHxS) | 120 | 119 | 2.22 U | 2.07 U | 2.16 U |
| Perfluorohexanoic Acid (PFHxA) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| Perfluorononanoic acid (PFNA) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| Perfluorooctane sulfonic acid (PFOS) | 2.03 J | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| Perfluorooctanoic acid (PFOA) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |
| Perfluoroundecanoic Acid (PFUnA) | 2.33 U | 2.16 U | 2.22 U | 2.07 U | 2.16 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/L = Nanograms/liter

Detected analyte

# Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330

**APPENDIX F**

**TABLE F-29. Potential Former VNTR Motor Pool Area Bldg 340 and Former Fire Dept Bldg 330 Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VEFS-PFAS-SO01 | | VEFS-PFAS-SO02 | |
|---|---|---|---|---|
| **Sample ID** | VEFS-PFAS-SB01-0406 | | VEFS-PFAS-SB02-0406 | |
| **Sample Date** | 3/15/2022 | | 3/14/2022 | |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/G)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.526 | U | 0.519 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.526 | U | 0.519 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.526 | U | 0.519 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.526 | U | 0.519 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.526 | U | 0.519 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.526 | U | 0.519 | U |
| Perfluorobutanesulfonic acid (PFBS) | 0.526 | U | 0.519 | U |
| Perfluorodecanoic Acid (PFDA) | 0.526 | U | 0.519 | U |
| Perfluorododecanoic Acid (PFDoA) | 0.526 | U | 0.519 | U |
| Perfluoroheptanoic acid (PFHpA) | 0.306 | J | 0.327 | J |
| Perfluorohexanesulfonic acid (PFHxS) | 8.44 | | 19.8 | |
| Perfluorohexanoic Acid (PFHxA) | 0.526 | U | 0.212 | J |
| Perfluorononanoic acid (PFNA) | 0.526 | U | 0.519 | U |
| Perfluorooctane sulfonic acid (PFOS) | 0.324 | J | 26.7 | |
| Perfluorooctanoic acid (PFOA) | 1.1 | | 5.78 | |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.526 | U | 0.519 | U |
| Perfluorotridecanoic Acid (PFTrDA) | 0.526 | U | 0.519 | U |
| Perfluoroundecanoic Acid (PFUnA) | 0.526 | U | 0.519 | U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/G = Nanograms/gram

Detected analyte

**APPENDIX F**

**TABLE F-30. Potential Former VNTR Motor Pool Area Bldg 340 and Former Fire Dept Bldg 330 Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VEFS-PFAS-MW01 | | VEFS-PFAS-MW02 |
|---|---|---|---|
| **Sample ID** | VEFS-PFAS-GW01-0722 | VEFS-PFAS-GW01P-0722 | VEFS-PFAS-GW02-0722 |
| **Sample Date** | 7/11/2022 | 7/11/2022 | 7/11/2022 |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/L)** | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.18 U | 2.23 U | 2.15 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.18 U | 2.23 U | 2.15 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.18 U | 2.23 U | 2.15 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.18 U | 2.23 U | 2.15 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.18 U | 2.23 U | 2.15 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.18 U | 2.23 U | 2.15 U |
| Perfluorobutanesulfonic acid (PFBS) | 14600 | 15400 | 22 |
| Perfluorodecanoic Acid (PFDA) | 2.18 U | 2.23 U | 2.15 U |
| Perfluorododecanoic Acid (PFDoA) | 2.18 U | 2.23 U | 2.15 U |
| Perfluoroheptanoic acid (PFHpA) | 12300 J | 12200 J | 10.5 J |
| Perfluorohexanesulfonic acid (PFHxS) | 110000 | 101000 | 74.1 |
| Perfluorohexanoic Acid (PFHxA) | 55100 J | 56500 J | 18.8 J |
| Perfluorononanoic acid (PFNA) | 2.18 U | 2.23 U | 2.15 U |
| Perfluorooctane sulfonic acid (PFOS) | 10.2 | 17.1 | 43.3 |
| Perfluorooctanoic acid (PFOA) | 3100 | 2750 | 9.89 |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.18 U | 2.23 U | 2.15 U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.18 U | 2.23 U | 2.15 U |
| Perfluoroundecanoic Acid (PFUnA) | 2.18 U | 2.23 U | 2.15 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L = Nanograms/liter

Detected analyte

# VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building

**APPENDIX F**

**TABLE F-31. VNTR SWMU 10 and AOC G Surface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VEW10-PFAS-SO01 | | VEW10-PFAS-SO02 | | VEW10-PFAS-SO03 | |
|---|---|---|---|---|---|---|
| **Sample ID** | VEW10-PFAS-SS01-0001 | | VEW10-PFAS-SS02-0001 | | VEW10-PFAS-SS03-0001 | |
| **Sample Date** | 3/9/2022 | | 3/9/2022 | | 3/9/2022 | |
| **Chemical Name** | | | | | | |
| | | | | | | |
| **PFAS (NG/G)** | | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.502 | U | 0.502 | U | 0.49 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.502 | U | 0.502 | U | 0.49 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.502 | U | 0.502 | U | 0.49 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.502 | U | 0.502 | U | 0.49 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.502 | U | 0.502 | U | 0.49 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.502 | U | 0.502 | U | 0.49 | U |
| Perfluorobutanesulfonic acid (PFBS) | 0.502 | U | 0.502 | U | 0.49 | U |
| Perfluorodecanoic Acid (PFDA) | 0.502 | U | 0.502 | U | 0.49 | U |
| Perfluorododecanoic Acid (PFDoA) | 0.502 | U | 0.502 | UJ | 0.49 | UJ |
| Perfluoroheptanoic acid (PFHpA) | 0.502 | U | 0.502 | U | 0.49 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.502 | U | 0.502 | U | 0.49 | U |
| Perfluorohexanoic Acid (PFHxA) | 0.502 | U | 0.502 | U | 0.49 | U |
| Perfluorononanoic acid (PFNA) | 0.502 | U | 0.254 | J | 0.49 | U |
| Perfluorooctane sulfonic acid (PFOS) | 1.13 | | 24.4 | | 0.564 | J |
| Perfluorooctanoic acid (PFOA) | 0.502 | U | 0.367 | J | 0.49 | U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.502 | UJ | 0.502 | UJ | 0.49 | UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.502 | U | 0.502 | U | 0.49 | U |
| Perfluoroundecanoic Acid (PFUnA) | 0.502 | U | 0.502 | U | 0.49 | U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected analyte

**APPENDIX F**

**TABLE F-31. VNTR SWMU 10 and AOC G Surface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VEW10-PFAS-SO04 | | VEW10-PFAS-SO05 | | VEW10-PFAS-SO06 | |
|---|---|---|---|---|---|---|
| **Sample ID** | VEW10-PFAS-SS04-0001 | | VEW10-PFAS-SS05-0001 | | VEW10-PFAS-SS06-0001 | |
| **Sample Date** | 3/9/2022 | | 3/2/2022 | | 3/1/2022 | |
| **Chemical Name** | | | | | | |
| | | | | | | |
| **PFAS (NG/G)** | | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.506 | U | 0.501 | U | 0.505 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.506 | U | 0.501 | U | 0.505 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.506 | U | 0.501 | U | 0.505 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.506 | U | 0.501 | U | 0.505 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.506 | U | 0.501 | U | 0.505 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.506 | U | 0.501 | U | 0.505 | U |
| Perfluorobutanesulfonic acid (PFBS) | 0.506 | U | 0.501 | U | 0.505 | U |
| Perfluorodecanoic Acid (PFDA) | 0.506 | U | 0.501 | U | 0.505 | U |
| Perfluorododecanoic Acid (PFDoA) | 0.506 | UJ | 0.501 | U | 0.505 | UJ |
| Perfluoroheptanoic acid (PFHpA) | 0.506 | U | 0.501 | U | 0.505 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.506 | U | 0.501 | U | 0.505 | U |
| Perfluorohexanoic Acid (PFHxA) | 0.506 | U | 0.501 | U | 0.505 | U |
| Perfluorononanoic acid (PFNA) | 0.506 | U | 0.501 | U | 0.505 | U |
| Perfluorooctane sulfonic acid (PFOS) | 14.6 | | 0.501 | U | 0.44 | J |
| Perfluorooctanoic acid (PFOA) | 0.265 | J | 0.501 | U | 0.234 | J |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.506 | UJ | 0.501 | UJ | 0.505 | UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.506 | U | 0.501 | U | 0.505 | U |
| Perfluoroundecanoic Acid (PFUnA) | 0.506 | U | 0.501 | U | 0.505 | U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected analyte

**APPENDIX F**

**TABLE F-32. VNTR SWMU 10 and AOC G Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VEW10-PFAS-SO01 | | VEW10-PFAS-SO02 |
|---|---|---|---|
| **Sample ID** | VEW10-PFAS-SB01-0406 | VEW10-PFAS-SB01D-2627 | VEW10-PFAS-SB02-0406 |
| **Sample Date** | 3/9/2022 | 3/9/2022 | 3/9/2022 |
| **Chemical Name** | | | |
| | | | |
| **PFAS (NG/G)** | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.492 U | 0.502 U | 0.502 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.492 U | 0.502 U | 0.502 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.492 U | 0.502 U | 0.502 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.492 U | 0.502 U | 0.502 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.492 U | 0.502 U | 0.502 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.492 U | 0.502 U | 0.502 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.492 U | 0.502 U | 0.502 U |
| Perfluorodecanoic Acid (PFDA) | 0.492 U | 0.502 U | 0.502 U |
| Perfluorododecanoic Acid (PFDoA) | 0.492 UJ | 0.502 UJ | 0.502 U |
| Perfluoroheptanoic acid (PFHpA) | 0.492 U | 0.502 U | 0.502 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.492 U | 0.502 U | 0.502 U |
| Perfluorohexanoic Acid (PFHxA) | 0.492 U | 0.502 U | 0.502 U |
| Perfluorononanoic acid (PFNA) | 0.492 U | 0.502 U | 0.502 U |
| Perfluorooctane sulfonic acid (PFOS) | 0.492 U | 0.502 U | 1.45 |
| Perfluorooctanoic acid (PFOA) | 0.492 U | 0.502 U | 0.502 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.492 UJ | 0.502 UJ | 0.502 UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.492 U | 0.502 U | 0.502 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.492 U | 0.502 U | 0.502 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected analyte

**APPENDIX F**

**TABLE F-32. VNTR SWMU 10 and AOC G Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | VEW10-PFAS-SO03 | | VEW10-PFAS-SO04 | |
|---|---|---|---|---|
| **Sample ID** | VEW10-PFAS-SB03-0406 | VEW10-PFAS-SB03D-2324 | VEW10-PFAS-SB04-0406 | VEW10-PFAS-SB04D-2829 |
| **Sample Date** | 3/9/2022 | 3/9/2022 | 3/9/2022 | 3/9/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/G)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |
| Perfluorodecanoic Acid (PFDA) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |
| Perfluorododecanoic Acid (PFDoA) | 0.498 UJ | 0.493 U | 0.491 U | 0.5 UJ |
| Perfluoroheptanoic acid (PFHpA) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |
| Perfluorohexanoic Acid (PFHxA) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |
| Perfluorononanoic acid (PFNA) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |
| Perfluorooctane sulfonic acid (PFOS) | 0.498 U | 0.493 U | 0.335 J | 0.5 U |
| Perfluorooctanoic acid (PFOA) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.498 UJ | 0.493 UJ | 0.491 UJ | 0.5 UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.498 U | 0.493 U | 0.491 U | 0.5 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected analyte

**APPENDIX F**

**TABLE F-32. VNTR SWMU 10 and AOC G Subsurface Soil Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| Station ID | VEW10-PFAS-SO05 | | VEW10-PFAS-SO06 | |
|---|---|---|---|---|
| Sample ID | VEW10-PFAS-SB05-0406 | VEW10-PFAS-SB05D-2829 | VEW10-PFAS-SB06-0406 | VEW10-PFAS-SB06D-0708 |
| Sample Date | 3/2/2022 | 3/2/2022 | 3/1/2022 | 3/1/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/G)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| Perfluorobutanesulfonic acid (PFBS) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| Perfluorodecanoic Acid (PFDA) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| Perfluorododecanoic Acid (PFDoA) | 0.493 U | 0.497 UJ | 0.502 UJ | 0.5 UJ |
| Perfluoroheptanoic acid (PFHpA) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| Perfluorohexanoic Acid (PFHxA) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| Perfluorononanoic acid (PFNA) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| Perfluorooctane sulfonic acid (PFOS) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| Perfluorooctanoic acid (PFOA) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 0.493 UJ | 0.497 UJ | 0.502 UJ | 0.5 UJ |
| Perfluorotridecanoic Acid (PFTrDA) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |
| Perfluoroundecanoic Acid (PFUnA) | 0.493 U | 0.497 U | 0.502 U | 0.5 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/G = Nanograms/gram

Detected analyte

**APPENDIX F**

**TABLE F-33. VNTR SWMU 10 and AOC G Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | VEW10-PFAS-MW01 | | VEW10-PFAS-MW02 | VEW10-PFAS-MW03 | VEW10-PFAS-MW04 |
|---|---|---|---|---|---|
| **Sample ID** | VEW10-PFAS-GW01-0422 | VEW10-PFAS-GW01P-0422 | VEW10-PFAS-GW02-0422 | VEW10-PFAS-GW03-0422 | VEW10-PFAS-GW04-0422 |
| **Sample Date** | 4/6/2022 | 4/6/2022 | 4/5/2022 | 4/5/2022 | 4/5/2022 |
| **Chemical Name** | | | | | |
| | | | | | |
| **PFAS (NG/L)** | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| Perfluorobutanesulfonic acid (PFBS) | 3.71 J | 3.7 J | 2.3 U | 2.26 U | 3.43 J |
| Perfluorodecanoic Acid (PFDA) | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| Perfluorododecanoic Acid (PFDoA) | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| Perfluoroheptanoic acid (PFHpA) | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| Perfluorohexanesulfonic acid (PFHxS) | 8.92 | 8.07 | 42.2 | 2.26 U | 5.02 |
| Perfluorohexanoic Acid (PFHxA) | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| Perfluorononanoic acid (PFNA) | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| Perfluorooctane sulfonic acid (PFOS) | 2.2 U | 2.23 U | 7.81 | 2.24 J | 2.26 U |
| Perfluorooctanoic acid (PFOA) | 2.2 UJ | 2.23 UJ | 2.3 U | 2.26 U | 2.26 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |
| Perfluoroundecanoic Acid (PFUnA) | 2.2 U | 2.23 U | 2.3 U | 2.26 U | 2.26 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ = The analyte was below the reported sample quantitation limit. However, the reported value is approximate.

NG/L = Nanograms/liter

Detected analyte

# VNTR SWMU 1: Former Camp Garcia Municipal Waste Management Unit (Landfill)

**APPENDIX F**

**TABLE F-34. VNTR SWMU 1 Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*

*Former NASD and Former VNTR*

*Vieques, Puerto Rico*

| **Station ID** | CGW1MW02 | | CGW1MW03 | CGW1MW06 |
|---|---|---|---|---|
| **Sample ID** | VEW01-PFAS-MW02-0122 | VEW01-PFAS-MW02P-0122 | VEW01-PFAS-MW03-0222 | VEW01-PFAS-MW06-0222 |
| **Sample Date** | 1/31/2022 | 1/31/2022 | 2/1/2022 | 2/3/2022 |
| **Chemical Name** | | | | |
| | | | | |
| **PFAS (NG/L)** | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorobutanesulfonic acid (PFBS) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorodecanoic Acid (PFDA) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorododecanoic Acid (PFDoA) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluoroheptanoic acid (PFHpA) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorohexanesulfonic acid (PFHxS) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorohexanoic Acid (PFHxA) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorononanoic acid (PFNA) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorooctane sulfonic acid (PFOS) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorooctanoic acid (PFOA) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |
| Perfluoroundecanoic Acid (PFUnA) | 2.32 U | 2.43 U | 2.39 U | 2.35 U |

**Notes:**

J = The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NG/L = Nanograms/liter

Detected analyte

**APPENDIX F**

**TABLE F-34. VNTR SWMU 1 Groundwater Analytical Results**

*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former NASD and Former VNTR*
*Vieques, Puerto Rico*

| **Station ID** | CGW1MW08 | | CGW1MW10 | | CGW1MW11 | |
|---|---|---|---|---|---|---|
| **Sample ID** | VEW01-PFAS-MW08-0122 | | VEW01-PFAS-MW10-0122 | | VEW01-PFAS-MW11-0122 | |
| **Sample Date** | 1/31/2022 | | 1/31/2022 | | 1/31/2022 | |
| **Chemical Name** | | | | | | |
| | | | | | | |
| **PFAS (NG/L)** | | | | | | |
| 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 2.34 | U | 2.36 | U | 2.35 | U |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 2.34 | U | 2.36 | U | 2.35 | U |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 2.34 | U | 2.36 | U | 2.35 | U |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 2.34 | U | 2.36 | U | 2.35 | U |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 2.34 | U | 2.36 | U | 2.35 | U |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 2.34 | U | 2.36 | U | 2.35 | U |
| Perfluorobutanesulfonic acid (PFBS) | 2.34 | U | 2.36 | U | 1.02 | J |
| Perfluorodecanoic Acid (PFDA) | 2.34 | U | 2.36 | U | 2.35 | U |
| Perfluorododecanoic Acid (PFDoA) | 2.34 | U | 2.36 | U | 2.35 | U |
| Perfluoroheptanoic acid (PFHpA) | 2.34 | U | 3.71 | J | 2.35 | U |
| Perfluorohexanesulfonic acid (PFHxS) | 2.34 | U | 2.36 | U | 1.28 | J |
| Perfluorohexanoic Acid (PFHxA) | 1.91 | J | 7.74 | | 2.35 | U |
| Perfluorononanoic acid (PFNA) | 2.34 | U | 2.36 | U | 2.35 | U |
| Perfluorooctane sulfonic acid (PFOS) | 2.34 | U | 2.36 | U | 2.35 | U |
| Perfluorooctanoic acid (PFOA) | 2.34 | U | 2.36 | U | 2.35 | U |
| Perfluorotetradecanoic Acid (PFTeDA) | 2.34 | U | 2.36 | U | 2.35 | U |
| Perfluorotridecanoic Acid (PFTrDA) | 2.34 | U | 2.36 | U | 2.35 | U |
| Perfluoroundecanoic Acid (PFUnA) | 2.34 | U | 2.36 | U | 2.35 | U |

**Notes:**

J = The analyte was positively identified: the associated numerical value
U = The analyte was analyzed for, but was not detected above the report
NG/L = Nanograms/liter
Detected analyte

# Appendix G
# Data Validation Reports

# Soil Data Validation Reports

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0349
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 13, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEP5-FB01-022422 | F9078-FS | Water |
| 2 | VEP5-EB01-022422-SB | F9082-FS | Water |
| 3 | VERW-FB01-022522 | F9092-FS | Water |
| 4 | VERW-EB01-022522-SB | F9093-FS | Water |
| 5 | VERW-FB01-022822 | F9097-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for two aqueous equipment blank samples and three aqueous field blank samples soil samples collected on February 24-28, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

### LC/MS Tuning

- All criteria were met.

### Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VEP5-FB01-022422 | None - ND | - | - | - |
| VEP5-EB01-022422-SB | None - ND | - | - | - |
| VERW-FB01-022522 | None - ND | - | - | - |
| VERW-EB01-022522-SB | None - ND | - | - | - |
| VERW-FB01-022822 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

**Compound Quantitation**

- All criteria were met.

**Field Duplicate Sample Precision**

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP5-FB01-022422 |
| Battelle ID | F9078-FS |
| Sample Type | SA |
| Collection Date | 02/24/2022 |
| Extraction Date | 03/04/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.262 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.871 | 2.39 | 4.77 |
| PFHpA | 375-85-9 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.898 | 2.39 | 4.77 |
| PFOA | 335-67-1 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.964 | 2.39 | 4.77 |
| PFNA | 375-95-1 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.795 | 2.39 | 4.77 |
| PFDA | 335-76-2 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.748 | 2.39 | 4.77 |
| PFUnA | 2058-94-8 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.718 | 2.39 | 4.77 |
| PFDoA | 307-55-1 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.725 | 2.39 | 4.77 |
| PFTrDA | 72629-94-8 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.708 | 2.39 | 4.77 |
| PFTeDA | 376-06-7 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.755 | 2.39 | 4.77 |
| NMeFOSAA | 2355-31-9 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.983 | 2.39 | 4.77 |
| NEtFOSAA | 2991-50-6 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.945 | 2.39 | 4.77 |
| PFBS | 375-73-5 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.826 | 2.39 | 4.77 |
| PFHxS | 355-46-4 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.951 | 2.39 | 4.77 |
| PFOS | 1763-23-1 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 1.02 | 2.39 | 4.77 |
| HFPO-DA | 13252-13-6 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.825 | 2.39 | 4.77 |
| Adona | 919005-14-4 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.829 | 2.39 | 4.77 |
| 9Cl-PF3ONS | 756426-58-1 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.983 | 2.39 | 4.77 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.39 U | F9078-FS(0) | 1.000 | 3/27/2022 | 0.860 | 2.39 | 4.77 |

MW 8/13/22

Analyzed by: Griffith, Lauren
Printed: 3/28/2022

BATTELLE
It can be done

2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP5-EB01-022422-SB |
| Battelle ID | F9082-FS |
| Sample Type | SA |
| Collection Date | 02/24/2022 |
| Extraction Date | 03/04/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.290 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.787 | 2.16 | 4.31 |
| PFHpA | 375-85-9 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.811 | 2.16 | 4.31 |
| PFOA | 335-67-1 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.871 | 2.16 | 4.31 |
| PFNA | 375-95-1 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.718 | 2.16 | 4.31 |
| PFDA | 335-76-2 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.676 | 2.16 | 4.31 |
| PFUnA | 2058-94-8 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.648 | 2.16 | 4.31 |
| PFDoA | 307-55-1 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.655 | 2.16 | 4.31 |
| PFTrDA | 72629-94-8 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.640 | 2.16 | 4.31 |
| PFTeDA | 376-06-7 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.682 | 2.16 | 4.31 |
| NMeFOSAA | 2355-31-9 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.888 | 2.16 | 4.31 |
| NEtFOSAA | 2991-50-6 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.853 | 2.16 | 4.31 |
| PFBS | 375-73-5 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.747 | 2.16 | 4.31 |
| PFHxS | 355-46-4 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.859 | 2.16 | 4.31 |
| PFOS | 1763-23-1 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.922 | 2.16 | 4.31 |
| HFPO-DA | 13252-13-6 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.746 | 2.16 | 4.31 |
| Adona | 919005-14-4 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.749 | 2.16 | 4.31 |
| 9Cl-PF3ONS | 756426-58-1 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.888 | 2.16 | 4.31 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.16 U | F9082-FS(0) | 1.000 | 3/27/2022 | 0.777 | 2.16 | 4.31 |

NW 8/31/22

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It can be done

3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-FB01-022522 |
| Battelle ID | F9092-FS |
| Sample Type | SA |
| Collection Date | 02/25/2022 |
| Extraction Date | 03/04/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.262 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.871 | 2.39 | 4.77 |
| PFHpA | 375-85-9 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.898 | 2.39 | 4.77 |
| PFOA | 335-67-1 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.964 | 2.39 | 4.77 |
| PFNA | 375-95-1 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.795 | 2.39 | 4.77 |
| PFDA | 335-76-2 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.748 | 2.39 | 4.77 |
| PFUnA | 2058-94-8 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.718 | 2.39 | 4.77 |
| PFDoA | 307-55-1 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.725 | 2.39 | 4.77 |
| PFTrDA | 72629-94-8 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.708 | 2.39 | 4.77 |
| PFTeDA | 376-06-7 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.755 | 2.39 | 4.77 |
| NMeFOSAA | 2355-31-9 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.983 | 2.39 | 4.77 |
| NEtFOSAA | 2991-50-6 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.945 | 2.39 | 4.77 |
| PFBS | 375-73-5 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.826 | 2.39 | 4.77 |
| PFHxS | 355-46-4 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.951 | 2.39 | 4.77 |
| PFOS | 1763-23-1 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 1.02 | 2.39 | 4.77 |
| HFPO-DA | 13252-13-6 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.825 | 2.39 | 4.77 |
| Adona | 919005-14-4 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.829 | 2.39 | 4.77 |
| 9Cl-PF3ONS | 756426-58-1 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.983 | 2.39 | 4.77 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.39 U | F9092-FS(0) | 1.000 | 3/27/2022 | 0.860 | 2.39 | 4.77 |

NW 8/13/22

Analyzed by: Griffith, Lauren
Printed: 3/28/2022

BATTELLE
It can be done

4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-EB01-022522-SB |
| Battelle ID | F9093-FS |
| Sample Type | SA |
| Collection Date | 02/25/2022 |
| Extraction Date | 03/04/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.280 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.815 | 2.23 | 4.46 |
| PFHpA | 375-85-9 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.840 | 2.23 | 4.46 |
| PFOA | 335-67-1 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.902 | 2.23 | 4.46 |
| PFNA | 375-95-1 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.744 | 2.23 | 4.46 |
| PFDA | 335-76-2 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.700 | 2.23 | 4.46 |
| PFUnA | 2058-94-8 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.671 | 2.23 | 4.46 |
| PFDoA | 307-55-1 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.679 | 2.23 | 4.46 |
| PFTrDA | 72629-94-8 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.663 | 2.23 | 4.46 |
| PFTeDA | 376-06-7 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.706 | 2.23 | 4.46 |
| NMeFOSAA | 2355-31-9 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.920 | 2.23 | 4.46 |
| NEtFOSAA | 2991-50-6 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.884 | 2.23 | 4.46 |
| PFBS | 375-73-5 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.773 | 2.23 | 4.46 |
| PFHxS | 355-46-4 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.890 | 2.23 | 4.46 |
| PFOS | 1763-23-1 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.955 | 2.23 | 4.46 |
| HFPO-DA | 13252-13-6 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.772 | 2.23 | 4.46 |
| Adona | 919005-14-4 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.776 | 2.23 | 4.46 |
| 9Cl-PF3ONS | 756426-58-1 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.920 | 2.23 | 4.46 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.23 U | F9093-FS(0) | 1.000 | 3/27/2022 | 0.804 | 2.23 | 4.46 |

MW 8/13/22

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It can be done

S

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-FB01-022822 |
| Battelle ID | F9097-FS |
| Sample Type | SA |
| Collection Date | 02/28/2022 |
| Extraction Date | 03/04/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.263 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.868 | 2.38 | 4.75 |
| PFHpA | 375-85-9 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.894 | 2.38 | 4.75 |
| PFOA | 335-67-1 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.960 | 2.38 | 4.75 |
| PFNA | 375-95-1 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.792 | 2.38 | 4.75 |
| PFDA | 335-76-2 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.745 | 2.38 | 4.75 |
| PFUnA | 2058-94-8 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.715 | 2.38 | 4.75 |
| PFDoA | 307-55-1 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.722 | 2.38 | 4.75 |
| PFTrDA | 72629-94-8 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.705 | 2.38 | 4.75 |
| PFTeDA | 376-06-7 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.752 | 2.38 | 4.75 |
| NMeFOSAA | 2355-31-9 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.979 | 2.38 | 4.75 |
| NEtFOSAA | 2991-50-6 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.941 | 2.38 | 4.75 |
| PFBS | 375-73-5 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.823 | 2.38 | 4.75 |
| PFHxS | 355-46-4 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.948 | 2.38 | 4.75 |
| PFOS | 1763-23-1 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 1.02 | 2.38 | 4.75 |
| HFPO-DA | 13252-13-6 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.822 | 2.38 | 4.75 |
| Adona | 919005-14-4 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.826 | 2.38 | 4.75 |
| 9Cl-PF3ONS | 756426-58-1 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.979 | 2.38 | 4.75 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.38 U | F9097-FS(0) | 1.000 | 3/27/2022 | 0.856 | 2.38 | 4.75 |

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0350
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 13, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEP5-PFAS-SS01-0001 | F9075-FS | Soil |
| 2 | VEP5-PFAS-SB01-0406 | F9076-FS | Soil |
| 3 | VEP5-PFAS-SB01D-1516 | F9077-FS | Soil |
| 4 | VEP5-PFAS-SS02-0001 | F9079-FS | Soil |
| 5 | VEP5-PFAS-SB02-0406 | F9080-FS | Soil |
| 6 | VEP5-PFAS-SB02D-2425 | F9081-FS | Soil |
| 7 | VERW-PFAS-SS01-0001 | F9083-FS | Soil |
| 8 | VERW-PFAS-SB01-0406 | F9084-FS | Soil |
| 9 | VERW-PFAS-SB01D-2728 | F9085-FS | Soil |

A Stage 2B/4 data validation was performed on the analytical data for nine soil samples collected on February 23-24, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

## Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

## Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VEP5-FB01-022422 | None - ND | - | - | - |
| VEP5-EB01-022422-SB | None - ND | - | - | - |
| VERW-EB01-022522-SB | None - ND | - | - | - |
| VERW-FB01-022522 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

| EDS Sample | Surrogate | %R | Qualifier |
|---|---|---|---|
| 1 | 13C2-PFTeDA | 31% | UJ - Associated Cmpd |
| 4 | 13C2-PFTeDA | 35% | UJ - Associated Cmpd |

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

**Target Compound Identification**

- All mass spectra and quantitation criteria were met.

**Compound Quantitation**

- All criteria were met.

**Field Duplicate Sample Precision**

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEPS-PFAS-SS01-0001 |
| Battelle ID | F9075-FS |
| Sample Type | SA |
| Collection Date | 02/23/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 4.33 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.178 | 0.500 | 1.00 | |
| PFHpA | 375-85-9 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.168 | 0.500 | 1.00 | |
| PFOA | 335-67-1 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.214 | 0.500 | 1.00 | |
| PFNA | 375-95-1 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.157 | 0.500 | 1.00 | |
| PFDA | 335-76-2 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.158 | 0.500 | 1.00 | |
| PFUnA | 2058-94-8 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.156 | 0.500 | 1.00 | |
| PFDoA | 307-55-1 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.160 | 0.500 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.161 | 0.500 | 1.00 | |
| PFTeDA | 376-06-7 | 0.500 ~~U~~ UJ | F9075-FS(0) | 1.000 | 3/26/2022 | 0.162 | 0.500 | 2.00 | SSL |
| NMeFOSAA | 2355-31-9 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.159 | 0.500 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.165 | 0.500 | 2.00 | |
| PFBS | 375-73-5 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.171 | 0.500 | 1.00 | |
| PFHxS | 355-46-4 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.173 | 0.500 | 1.00 | |
| PFOS | 1763-23-1 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.175 | 0.500 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.159 | 0.500 | 2.00 | |
| Adona | 919005-14-4 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.160 | 0.500 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.154 | 0.500 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 U | F9075-FS(0) | 1.000 | 3/26/2022 | 0.150 | 0.500 | 2.00 | |

MW 8/3/22

Analyzed by: Schumitz, Matt
Printed: 3/28/2022

BATTELLE
It can be done

2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEPS-PFAS-SB01-0406 |
| Battelle ID | F9076-FS |
| Sample Type | SA |
| Collection Date | 02/23/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 17.90 |
| Matrix | SO |
| Sample Size | 4.980 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.179 | 0.502 | 1.00 |
| PFHpA | 375-85-9 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.169 | 0.502 | 1.00 |
| PFOA | 335-67-1 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.215 | 0.502 | 1.00 |
| PFNA | 375-95-1 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.158 | 0.502 | 1.00 |
| PFDA | 335-76-2 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.159 | 0.502 | 1.00 |
| PFUnA | 2058-94-8 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.157 | 0.502 | 1.00 |
| PFDoA | 307-55-1 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.161 | 0.502 | 1.00 |
| PFTrDA | 72629-94-8 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.162 | 0.502 | 1.00 |
| PFTeDA | 376-06-7 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.163 | 0.502 | 2.01 |
| NMeFOSAA | 2355-31-9 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.160 | 0.502 | 2.01 |
| NEtFOSAA | 2991-50-6 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.166 | 0.502 | 2.01 |
| PFBS | 375-73-5 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.172 | 0.502 | 1.00 |
| PFHxS | 355-46-4 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.174 | 0.502 | 1.00 |
| PFOS | 1763-23-1 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.176 | 0.502 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.160 | 0.502 | 2.01 |
| Adona | 919005-14-4 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.161 | 0.502 | 2.01 |
| 9Cl-PF3ONS | 756426-58-1 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.155 | 0.502 | 2.01 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.502 U | F9076-FS(0) | 1.000 | 3/26/2022 | 0.151 | 0.502 | 2.01 |

MW 8/13/22

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

3

| | |
|---|---|
| Client ID | VEP5-PFAS-SB01D-1516 |
| Battelle ID | F9077-FS |
| Sample Type | SA |
| Collection Date | 02/23/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 19.39 |
| Matrix | SO |
| Sample Size | 4.930 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.181 | 0.507 | 1.01 |
| PFHpA | 375-85-9 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.170 | 0.507 | 1.01 |
| PFOA | 335-67-1 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.217 | 0.507 | 1.01 |
| PFNA | 375-95-1 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.159 | 0.507 | 1.01 |
| PFDA | 335-76-2 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.160 | 0.507 | 1.01 |
| PFUnA | 2058-94-8 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.158 | 0.507 | 1.01 |
| PFDoA | 307-55-1 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.162 | 0.507 | 1.01 |
| PFTrDA | 72629-94-8 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.163 | 0.507 | 1.01 |
| PFTeDA | 376-06-7 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.164 | 0.507 | 2.03 |
| NMeFOSAA | 2355-31-9 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.161 | 0.507 | 2.03 |
| NEtFOSAA | 2991-50-6 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.167 | 0.507 | 2.03 |
| PFBS | 375-73-5 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.173 | 0.507 | 1.01 |
| PFHxS | 355-46-4 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.175 | 0.507 | 1.01 |
| PFOS | 1763-23-1 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.177 | 0.507 | 1.01 |
| HFPO-DA | 13252-13-6 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.161 | 0.507 | 2.03 |
| Adona | 919005-14-4 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.162 | 0.507 | 2.03 |
| 9Cl-PF3ONS | 756426-58-1 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.156 | 0.507 | 2.03 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.507 U | F9077-FS(0) | 1.000 | 3/26/2022 | 0.152 | 0.507 | 2.03 |

MW 8/13/22

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VEP5-PFAS-SS02-0001 |
| Battelle ID | F9079-FS |
| Sample Type | SA |
| Collection Date | 02/24/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 14.51 |
| Matrix | SO |
| Sample Size | 4.930 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.181 | 0.507 | 1.01 | |
| PFHpA | 375-85-9 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.170 | 0.507 | 1.01 | |
| PFOA | 335-67-1 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.217 | 0.507 | 1.01 | |
| PFNA | 375-95-1 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.159 | 0.507 | 1.01 | |
| PFDA | 335-76-2 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.160 | 0.507 | 1.01 | |
| PFUnA | 2058-94-8 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.158 | 0.507 | 1.01 | |
| PFDoA | 307-55-1 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.162 | 0.507 | 1.01 | |
| PFTrDA | 72629-94-8 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.163 | 0.507 | 1.01 | |
| PFTeDA | 376-06-7 | 0.507 UNJ | F9079-FS(0) | 1.000 | 3/26/2022 | 0.164 | 0.507 | 2.03 | SSL |
| NMeFOSAA | 2355-31-9 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.161 | 0.507 | 2.03 | |
| NEtFOSAA | 2991-50-6 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.167 | 0.507 | 2.03 | |
| PFBS | 375-73-5 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.173 | 0.507 | 1.01 | |
| PFHxS | 355-46-4 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.175 | 0.507 | 1.01 | |
| PFOS | 1763-23-1 | 0.193 J | F9079-FS(0) | 1.000 | 3/26/2022 | 0.177 | 0.507 | 1.01 | |
| HFPO-DA | 13252-13-6 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.161 | 0.507 | 2.03 | |
| Adona | 919005-14-4 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.162 | 0.507 | 2.03 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.156 | 0.507 | 2.03 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.507 U | F9079-FS(0) | 1.000 | 3/26/2022 | 0.152 | 0.507 | 2.03 | |

MW 8/13/22
Analyzed by: Schumitz, Matt
Printed: 3/28/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP5-PFAS-SB02-0406 |
| Battelle ID | F9080-FS |
| Sample Type | SA |
| Collection Date | 02/24/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 21.97 |
| Matrix | SO |
| Sample Size | 5.020 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.177 | 0.498 | 0.996 |
| PFHpA | 375-85-9 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.167 | 0.498 | 0.996 |
| PFOA | 335-67-1 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.213 | 0.498 | 0.996 |
| PFNA | 375-95-1 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.156 | 0.498 | 0.996 |
| PFDA | 335-76-2 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.157 | 0.498 | 0.996 |
| PFUnA | 2058-94-8 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.155 | 0.498 | 0.996 |
| PFDoA | 307-55-1 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.159 | 0.498 | 0.996 |
| PFTrDA | 72629-94-8 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.160 | 0.498 | 0.996 |
| PFTeDA | 376-06-7 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.161 | 0.498 | 1.99 |
| NMeFOSAA | 2355-31-9 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.158 | 0.498 | 1.99 |
| NEtFOSAA | 2991-50-6 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.164 | 0.498 | 1.99 |
| PFBS | 375-73-5 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.170 | 0.498 | 0.996 |
| PFHxS | 355-46-4 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.172 | 0.498 | 0.996 |
| PFOS | 1763-23-1 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.174 | 0.498 | 0.996 |
| HFPO-DA | 13252-13-6 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.158 | 0.498 | 1.99 |
| Adona | 919005-14-4 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.159 | 0.498 | 1.99 |
| 9Cl-PF3ONS | 756426-58-1 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.153 | 0.498 | 1.99 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.498 U | F9080-FS(0) | 1.000 | 3/26/2022 | 0.149 | 0.498 | 1.99 |

MW 8/13/22
Analyzed by: Schumitz, Matt
Printed: 3/28/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VEP5-PFAS-SB02D-2425 |
| Battelle ID | F9081-FS |
| Sample Type | SA |
| Collection Date | 02/24/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 23.15 |
| Matrix | SO |
| Sample Size | 5.070 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.176 | 0.493 | 0.986 |
| PFHpA | 375-85-9 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.166 | 0.493 | 0.986 |
| PFOA | 335-67-1 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.211 | 0.493 | 0.986 |
| PFNA | 375-95-1 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.155 | 0.493 | 0.986 |
| PFDA | 335-76-2 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.156 | 0.493 | 0.986 |
| PFUnA | 2058-94-8 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.154 | 0.493 | 0.986 |
| PFDoA | 307-55-1 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.158 | 0.493 | 0.986 |
| PFTrDA | 72629-94-8 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.159 | 0.493 | 0.986 |
| PFTeDA | 376-06-7 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.160 | 0.493 | 1.97 |
| NMeFOSAA | 2355-31-9 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.157 | 0.493 | 1.97 |
| NEtFOSAA | 2991-50-6 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.163 | 0.493 | 1.97 |
| PFBS | 375-73-5 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.169 | 0.493 | 0.986 |
| PFHxS | 355-46-4 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.171 | 0.493 | 0.986 |
| PFOS | 1763-23-1 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.173 | 0.493 | 0.986 |
| HFPO-DA | 13252-13-6 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.157 | 0.493 | 1.97 |
| Adona | 919005-14-4 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.158 | 0.493 | 1.97 |
| 9Cl-PF3ONS | 756426-58-1 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.152 | 0.493 | 1.97 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.493 U | F9081-FS(0) | 1.000 | 3/28/2022 | 0.148 | 0.493 | 1.97 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VERW-PFAS-SS01-0001 |
| Battelle ID | F9083-FS |
| Sample Type | SA |
| Collection Date | 02/24/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 10.12 |
| Matrix | SO |
| Sample Size | 5.030 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.177 | 0.497 | 0.994 |
| PFHpA | 375-85-9 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.167 | 0.497 | 0.994 |
| PFOA | 335-67-1 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.213 | 0.497 | 0.994 |
| PFNA | 375-95-1 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.156 | 0.497 | 0.994 |
| PFDA | 335-76-2 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.157 | 0.497 | 0.994 |
| PFUnA | 2058-94-8 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.155 | 0.497 | 0.994 |
| PFDoA | 307-55-1 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.159 | 0.497 | 0.994 |
| PFTrDA | 72629-94-8 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.160 | 0.497 | 0.994 |
| PFTeDA | 376-06-7 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.161 | 0.497 | 1.99 |
| NMeFOSAA | 2355-31-9 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.158 | 0.497 | 1.99 |
| NEtFOSAA | 2991-50-6 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.164 | 0.497 | 1.99 |
| PFBS | 375-73-5 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.170 | 0.497 | 0.994 |
| PFHxS | 355-46-4 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.172 | 0.497 | 0.994 |
| PFOS | 1763-23-1 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.174 | 0.497 | 0.994 |
| HFPO-DA | 13252-13-6 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.158 | 0.497 | 1.99 |
| Adona | 919005-14-4 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.159 | 0.497 | 1.99 |
| 9Cl-PF3ONS | 756426-58-1 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.153 | 0.497 | 1.99 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.497 U | F9083-FS(0) | 1.000 | 3/26/2022 | 0.149 | 0.497 | 1.99 |

MW 8/13/22

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VERW-PFAS-SB01-0406 |
| Battelle ID | F9084-FS |
| Sample Type | SA |
| Collection Date | 02/24/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 15.39 |
| Matrix | SO |
| Sample Size | 5.030 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.177 | 0.497 | 0.994 |
| PFHpA | 375-85-9 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.167 | 0.497 | 0.994 |
| PFOA | 335-67-1 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.213 | 0.497 | 0.994 |
| PFNA | 375-95-1 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.156 | 0.497 | 0.994 |
| PFDA | 335-76-2 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.157 | 0.497 | 0.994 |
| PFUnA | 2058-94-8 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.155 | 0.497 | 0.994 |
| PFDoA | 307-55-1 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.159 | 0.497 | 0.994 |
| PFTrDA | 72629-94-8 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.160 | 0.497 | 0.994 |
| PFTeDA | 376-06-7 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.161 | 0.497 | 1.99 |
| NMeFOSAA | 2355-31-9 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.158 | 0.497 | 1.99 |
| NEtFOSAA | 2991-50-6 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.164 | 0.497 | 1.99 |
| PFBS | 375-73-5 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.170 | 0.497 | 0.994 |
| PFHxS | 355-46-4 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.172 | 0.497 | 0.994 |
| PFOS | 1763-23-1 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.174 | 0.497 | 0.994 |
| HFPO-DA | 13252-13-6 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.158 | 0.497 | 1.99 |
| Adona | 919005-14-4 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.159 | 0.497 | 1.99 |
| 9Cl-PF3ONS | 756426-58-1 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.153 | 0.497 | 1.99 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.497 U | F9084-FS(0) | 1.000 | 3/26/2022 | 0.149 | 0.497 | 1.99 |

MW 8/13/22

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VERW-PFAS-SB01D-2728 |
| Battelle ID | F9085-FS |
| Sample Type | SA |
| Collection Date | 02/24/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 16.45 |
| Matrix | SO |
| Sample Size | 4.970 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.179 | 0.503 | 1.01 |
| PFHpA | 375-85-9 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.169 | 0.503 | 1.01 |
| PFOA | 335-67-1 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.215 | 0.503 | 1.01 |
| PFNA | 375-95-1 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.158 | 0.503 | 1.01 |
| PFDA | 335-76-2 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.159 | 0.503 | 1.01 |
| PFUnA | 2058-94-8 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.157 | 0.503 | 1.01 |
| PFDoA | 307-55-1 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.161 | 0.503 | 1.01 |
| PFTrDA | 72629-94-8 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.162 | 0.503 | 1.01 |
| PFTeDA | 376-06-7 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.163 | 0.503 | 2.01 |
| NMeFOSAA | 2355-31-9 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.160 | 0.503 | 2.01 |
| NEtFOSAA | 2991-50-6 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.166 | 0.503 | 2.01 |
| PFBS | 375-73-5 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.172 | 0.503 | 1.01 |
| PFHxS | 355-46-4 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.174 | 0.503 | 1.01 |
| PFOS | 1763-23-1 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.176 | 0.503 | 1.01 |
| HFPO-DA | 13252-13-6 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.160 | 0.503 | 2.01 |
| Adona | 919005-14-4 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.161 | 0.503 | 2.01 |
| 9Cl-PF3ONS | 756426-58-1 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.155 | 0.503 | 2.01 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.503 U | F9085-FS(0) | 1.000 | 3/26/2022 | 0.151 | 0.503 | 2.01 |

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0351
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 13, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VERW-PFAS-SS04-0001 | F9086-FS | Soil |
| 2 | VERW-PFAS-SB04-0406 | F9087-FS | Soil |
| 3 | VERW-PFAS-SB04D-3233 | F9088-FS | Soil |
| 4 | VERW-PFAS-SS03-0001 | F9089-FS | Soil |
| 5 | VERW-PFAS-SB03-0406 | F9090-FS | Soil |
| 6 | VERW-PFAS-SB03D-3132 | F9091-FS | Soil |
| 7 | VERW-PFAS-SS02-0001 | F9094-FS | Soil |
| 8 | VERW-PFAS-SB02-0406 | F9095-FS | Soil |
| 9 | VERW-PFAS-SB02D-3132 | F9096-FS | Soil |
| 10 | VERW-PFAS-SS05-0001 | F9098-FS | Soil |
| 11 | VERW-PFAS-SB05-0406 | F9099-FS | Soil |
| 12 | VERW-PFAS-SB05D-1920 | F9100-FS | Soil |

A Stage 2B/4 data validation was performed on the analytical data for twelve soil samples collected on February 25 - March 1, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VERW-EB01-022522-SB | None - ND | - | - | - |
| VERW-FB01-022522 | None - ND | - | - | - |
| VERW-FB01-022822 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

| EDS Sample | Surrogate | %R | Qualifier |
|---|---|---|---|
| 1 | 13C2-PFTeDA | 48% | UJ - Associated Cmpd |
| 7 | 13C2-PFTeDA | 40% | UJ - Associated Cmpd |
| 8 | 13C2-PFTeDA | 43% | UJ - Associated Cmpd |
| 9 | 13C2-PFTeDA | 37% | UJ - Associated Cmpd |
| 10 | 13C2-PFTeDA | 41% | UJ - Associated Cmpd |
| 12 | 13C2-PFTeDA | 34% | UJ - Associated Cmpd |

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

**Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries**

- MS/MSD samples were not analyzed.

**Internal Standard (IS) Area Performance**

- All internal standards met response and retention time (RT) criteria.

**Target Compound Identification**

- All mass spectra and quantitation criteria were met.

**Compound Quantitation**

- All criteria were met.

**Field Duplicate Sample Precision**

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-PFAS-SS04-0001 |
| Battelle ID | F9086-FS |
| Sample Type | SA |
| Collection Date | 02/25/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 13.17 |
| Matrix | SO |
| Sample Size | 4.970 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.179 | 0.503 | 1.01 | |
| PFHpA | 375-85-9 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.169 | 0.503 | 1.01 | |
| PFOA | 335-67-1 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.215 | 0.503 | 1.01 | |
| PFNA | 375-95-1 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.503 | 1.01 | |
| PFDA | 335-76-2 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.503 | 1.01 | |
| PFUnA | 2058-94-8 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.157 | 0.503 | 1.01 | |
| PFDoA | 307-55-1 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.503 | 1.01 | |
| PFTrDA | 72629-94-8 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.162 | 0.503 | 1.01 | |
| PFTeDA | 376-06-7 | 0.503 UJ | F9086-FS(0) | 1.000 | 3/27/2022 | 0.163 | 0.503 | 2.01 | SSC |
| NMeFOSAA | 2355-31-9 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.503 | 2.01 | |
| NEtFOSAA | 2991-50-6 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.166 | 0.503 | 2.01 | |
| PFBS | 375-73-5 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.172 | 0.503 | 1.01 | |
| PFHxS | 355-46-4 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.174 | 0.503 | 1.01 | |
| PFOS | 1763-23-1 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.176 | 0.503 | 1.01 | |
| HFPO-DA | 13252-13-6 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.503 | 2.01 | |
| Adona | 919005-14-4 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.503 | 2.01 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.155 | 0.503 | 2.01 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.503 U | F9086-FS(0) | 1.000 | 3/27/2022 | 0.151 | 0.503 | 2.01 | |

MW 8/13/22

Analyzed by: Griffith, Lauren
Printed: 3/28/2022

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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-PFAS-SB04-0406 |
| Battelle ID | F9087-FS |
| Sample Type | SA |
| Collection Date | 02/25/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 11.37 |
| Matrix | SO |
| Sample Size | 5.020 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.177 | 0.498 | 0.996 |
| PFHpA | 375-85-9 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.167 | 0.498 | 0.996 |
| PFOA | 335-67-1 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.213 | 0.498 | 0.996 |
| PFNA | 375-95-1 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.156 | 0.498 | 0.996 |
| PFDA | 335-76-2 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.157 | 0.498 | 0.996 |
| PFUnA | 2058-94-8 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.155 | 0.498 | 0.996 |
| PFDoA | 307-55-1 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.498 | 0.996 |
| PFTrDA | 72629-94-8 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.498 | 0.996 |
| PFTeDA | 376-06-7 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.498 | 1.99 |
| NMeFOSAA | 2355-31-9 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.498 | 1.99 |
| NEtFOSAA | 2991-50-6 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.164 | 0.498 | 1.99 |
| PFBS | 375-73-5 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.170 | 0.498 | 0.996 |
| PFHxS | 355-46-4 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.172 | 0.498 | 0.996 |
| PFOS | 1763-23-1 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.174 | 0.498 | 0.996 |
| HFPO-DA | 13252-13-6 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.498 | 1.99 |
| Adona | 919005-14-4 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.498 | 1.99 |
| 9Cl-PF3ONS | 756426-58-1 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.153 | 0.498 | 1.99 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.498 U | F9087-FS(0) | 1.000 | 3/27/2022 | 0.149 | 0.498 | 1.99 |

NW 8/13/22

Analyzed by: Griffith, Lauren
Printed: 3/28/2022

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3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-PFAS-SB04D-3233 |
| Battelle ID | F9088-FS |
| Sample Type | SA |
| Collection Date | 02/25/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 20.73 |
| Matrix | SO |
| Sample Size | 4.990 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.178 | 0.501 | 1.00 |
| PFHpA | 375-85-9 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.168 | 0.501 | 1.00 |
| PFOA | 335-67-1 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.214 | 0.501 | 1.00 |
| PFNA | 375-95-1 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.157 | 0.501 | 1.00 |
| PFDA | 335-76-2 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.501 | 1.00 |
| PFUnA | 2058-94-8 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.156 | 0.501 | 1.00 |
| PFDoA | 307-55-1 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.501 | 1.00 |
| PFTrDA | 72629-94-8 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.501 | 1.00 |
| PFTeDA | 376-06-7 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.162 | 0.501 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.501 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.165 | 0.501 | 2.00 |
| PFBS | 375-73-5 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.171 | 0.501 | 1.00 |
| PFHxS | 355-46-4 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.173 | 0.501 | 1.00 |
| PFOS | 1763-23-1 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.175 | 0.501 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.501 | 2.00 |
| Adona | 919005-14-4 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.501 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.154 | 0.501 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.501 U | F9088-FS(0) | 1.000 | 3/27/2022 | 0.150 | 0.501 | 2.00 |

NW 8/13/22

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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-PFAS-SS03-0001 |
| Battelle ID | F9089-FS |
| Sample Type | SA |
| Collection Date | 02/25/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sclex 5500 (AC) LC/MS/MS |
| % Moisture | 10.28 |
| Matrix | SO |
| Sample Size | 5.010 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.178 | 0.499 | 0.998 |
| PFHpA | 375-85-9 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.168 | 0.499 | 0.998 |
| PFOA | 335-67-1 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.214 | 0.499 | 0.998 |
| PFNA | 375-95-1 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.157 | 0.499 | 0.998 |
| PFDA | 335-76-2 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.499 | 0.998 |
| PFUnA | 2058-94-8 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.156 | 0.499 | 0.998 |
| PFDoA | 307-55-1 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.499 | 0.998 |
| PFTrDA | 72629-94-8 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.499 | 0.998 |
| PFTeDA | 376-06-7 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.162 | 0.499 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.499 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.165 | 0.499 | 2.00 |
| PFBS | 375-73-5 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.171 | 0.499 | 0.998 |
| PFHxS | 355-46-4 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.173 | 0.499 | 0.998 |
| PFOS | 1763-23-1 | 2.46 | F9089-FS(0) | 1.000 | 3/27/2022 | 0.175 | 0.499 | 0.998 |
| HFPO-DA | 13252-13-6 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.499 | 2.00 |
| Adona | 919005-14-4 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.499 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.154 | 0.499 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.499 U | F9089-FS(0) | 1.000 | 3/27/2022 | 0.150 | 0.499 | 2.00 |

BATTELLE
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5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-PFAS-SB03-0406 |
| Battelle ID | F9090-FS |
| Sample Type | SA |
| Collection Date | 02/25/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 18.98 |
| Matrix | SO |
| Sample Size | 5.040 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.222 J | F9090-FS(0) | 1.000 | 3/27/2022 | 0.177 | 0.496 | 0.992 |
| PFHpA | 375-85-9 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.167 | 0.496 | 0.992 |
| PFOA | 335-67-1 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.212 | 0.496 | 0.992 |
| PFNA | 375-95-1 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.156 | 0.496 | 0.992 |
| PFDA | 335-76-2 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.157 | 0.496 | 0.992 |
| PFUnA | 2058-94-8 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.155 | 0.496 | 0.992 |
| PFDoA | 307-55-1 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.496 | 0.992 |
| PFTrDA | 72629-94-8 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.496 | 0.992 |
| PFTeDA | 376-06-7 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.496 | 1.98 |
| NMeFOSAA | 2355-31-9 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.496 | 1.98 |
| NEtFOSAA | 2991-50-6 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.164 | 0.496 | 1.98 |
| PFBS | 375-73-5 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.170 | 0.496 | 0.992 |
| PFHxS | 355-46-4 | 1.16 | F9090-FS(0) | 1.000 | 3/27/2022 | 0.172 | 0.496 | 0.992 |
| PFOS | 1763-23-1 | 2.71 | F9090-FS(0) | 1.000 | 3/27/2022 | 0.174 | 0.496 | 0.992 |
| HFPO-DA | 13252-13-6 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.496 | 1.98 |
| Adona | 919005-14-4 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.496 | 1.98 |
| 9Cl-PF3ONS | 756426-58-1 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.153 | 0.496 | 1.98 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.496 U | F9090-FS(0) | 1.000 | 3/27/2022 | 0.149 | 0.496 | 1.98 |

NW 8/3/22

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VERW-PFAS-SB03D-3132 |
| Battelle ID | F9091-FS |
| Sample Type | SA |
| Collection Date | 02/25/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 23.05 |
| Matrix | SO |
| Sample Size | 5.110 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.174 | 0.489 | 0.978 |
| PFHpA | 375-85-9 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.164 | 0.489 | 0.978 |
| PFOA | 335-67-1 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.209 | 0.489 | 0.978 |
| PFNA | 375-95-1 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.154 | 0.489 | 0.978 |
| PFDA | 335-76-2 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.155 | 0.489 | 0.978 |
| PFUnA | 2058-94-8 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.153 | 0.489 | 0.978 |
| PFDoA | 307-55-1 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.157 | 0.489 | 0.978 |
| PFTrDA | 72629-94-8 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.489 | 0.978 |
| PFTeDA | 376-06-7 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.489 | 1.96 |
| NMeFOSAA | 2355-31-9 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.156 | 0.489 | 1.96 |
| NEtFOSAA | 2991-50-6 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.489 | 1.96 |
| PFBS | 375-73-5 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.167 | 0.489 | 0.978 |
| PFHxS | 355-46-4 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.169 | 0.489 | 0.978 |
| PFOS | 1763-23-1 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.171 | 0.489 | 0.978 |
| HFPO-DA | 13252-13-6 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.156 | 0.489 | 1.96 |
| Adona | 919005-14-4 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.157 | 0.489 | 1.96 |
| 9Cl-PF3ONS | 756426-58-1 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.151 | 0.489 | 1.96 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.489 U | F9091-FS(0) | 1.000 | 3/27/2022 | 0.147 | 0.489 | 1.96 |

NW 8/13/22
Analyzed by: Griffith, Lauren
Printed: 3/28/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-PFAS-SS02-0001 |
| Battelle ID | F9094-FS |
| Sample Type | SA |
| Collection Date | 02/28/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 7.54 |
| Matrix | SO |
| Sample Size | 4.940 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.180 | 0.506 | 1.01 | |
| PFHpA | 375-85-9 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.170 | 0.506 | 1.01 | |
| PFOA | 335-67-1 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.217 | 0.506 | 1.01 | |
| PFNA | 375-95-1 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.506 | 1.01 | |
| PFDA | 335-76-2 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.506 | 1.01 | |
| PFUnA | 2058-94-8 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.506 | 1.01 | |
| PFDoA | 307-55-1 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.162 | 0.506 | 1.01 | |
| PFTrDA | 72629-94-8 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.163 | 0.506 | 1.01 | |
| PFTeDA | 376-06-7 | 0.506 UJ | F9094-FS(0) | 1.000 | 3/27/2022 | 0.164 | 0.506 | 2.02 | SSL |
| NMeFOSAA | 2355-31-9 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.506 | 2.02 | |
| NEtFOSAA | 2991-50-6 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.167 | 0.506 | 2.02 | |
| PFBS | 375-73-5 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.173 | 0.506 | 1.01 | |
| PFHxS | 355-46-4 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.175 | 0.506 | 1.01 | |
| PFOS | 1763-23-1 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.177 | 0.506 | 1.01 | |
| HFPO-DA | 13252-13-6 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.506 | 2.02 | |
| Adona | 919005-14-4 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.162 | 0.506 | 2.02 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.156 | 0.506 | 2.02 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.506 U | F9094-FS(0) | 1.000 | 3/27/2022 | 0.152 | 0.506 | 2.02 | |

NS 8/13/22

Analyzed by: Griffith, Lauren
Printed: 3/28/2022

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8

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-PFAS-SB02-0406 |
| Battelle ID | F9095-FS |
| Sample Type | SA |
| Collection Date | 02/28/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 5.59 |
| Matrix | SO |
| Sample Size | 5.070 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.176 | 0.493 | 0.986 | |
| PFHpA | 375-85-9 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.166 | 0.493 | 0.986 | |
| PFOA | 335-67-1 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.211 | 0.493 | 0.986 | |
| PFNA | 375-95-1 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.155 | 0.493 | 0.986 | |
| PFDA | 335-76-2 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.156 | 0.493 | 0.986 | |
| PFUnA | 2058-94-8 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.154 | 0.493 | 0.986 | |
| PFDoA | 307-55-1 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.493 | 0.986 | |
| PFTrDA | 72629-94-8 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.493 | 0.986 | |
| PFTeDA | 376-06-7 | 0.493 UJ | F9095-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.493 | 1.97 | SSL |
| NMeFOSAA | 2355-31-9 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.157 | 0.493 | 1.97 | |
| NEtFOSAA | 2991-50-6 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.163 | 0.493 | 1.97 | |
| PFBS | 375-73-5 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.169 | 0.493 | 0.986 | |
| PFHxS | 355-46-4 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.171 | 0.493 | 0.986 | |
| PFOS | 1763-23-1 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.173 | 0.493 | 0.986 | |
| HFPO-DA | 13252-13-6 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.157 | 0.493 | 1.97 | |
| Adona | 919005-14-4 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.493 | 1.97 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.152 | 0.493 | 1.97 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.493 U | F9095-FS(0) | 1.000 | 3/27/2022 | 0.148 | 0.493 | 1.97 | |

NW 8/13/22

Analyzed by: Griffith, Lauren
Printed: 3/28/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-PFAS-SB02D-3132 |
| Battelle ID | F9096-FS |
| Sample Type | SA |
| Collection Date | 02/28/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 20.37 |
| Matrix | SO |
| Sample Size | 5.020 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.177 | 0.498 | 0.996 | |
| PFHpA | 375-85-9 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.167 | 0.498 | 0.996 | |
| PFOA | 335-67-1 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.213 | 0.498 | 0.996 | |
| PFNA | 375-95-1 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.156 | 0.498 | 0.996 | |
| PFDA | 335-76-2 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.157 | 0.498 | 0.996 | |
| PFUnA | 2058-94-8 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.155 | 0.498 | 0.996 | |
| PFDoA | 307-55-1 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.498 | 0.996 | |
| PFTrDA | 72629-94-8 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.498 | 0.996 | |
| PFTeDA | 376-06-7 | 0.498 UJ | F9096-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.498 | 1.99 | SSL |
| NMeFOSAA | 2355-31-9 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.498 | 1.99 | |
| NEtFOSAA | 2991-50-6 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.164 | 0.498 | 1.99 | |
| PFBS | 375-73-5 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.170 | 0.498 | 0.996 | |
| PFHxS | 355-46-4 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.172 | 0.498 | 0.996 | |
| PFOS | 1763-23-1 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.174 | 0.498 | 0.996 | |
| HFPO-DA | 13252-13-6 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.498 | 1.99 | |
| Adona | 919005-14-4 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.498 | 1.99 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.153 | 0.498 | 1.99 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.498 U | F9096-FS(0) | 1.000 | 3/27/2022 | 0.149 | 0.498 | 1.99 | |

MW 8/13/22

Analyzed by: Griffith, Lauren
Printed: 3/28/2022

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10

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-PFAS-SS05-0001 |
| Battelle ID | F9098-FS |
| Sample Type | SA |
| Collection Date | 03/01/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 11.90 |
| Matrix | SO |
| Sample Size | 5.030 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.177 | 0.497 | 0.994 | |
| PFHpA | 375-85-9 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.167 | 0.497 | 0.994 | |
| PFOA | 335-67-1 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.213 | 0.497 | 0.994 | |
| PFNA | 375-95-1 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.156 | 0.497 | 0.994 | |
| PFDA | 335-76-2 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.157 | 0.497 | 0.994 | |
| PFUnA | 2058-94-8 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.155 | 0.497 | 0.994 | |
| PFDoA | 307-55-1 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.497 | 0.994 | |
| PFTrDA | 72629-94-8 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.497 | 0.994 | |
| PFTeDA | 376-06-7 | 0.497 ✓ UJ | F9098-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.497 | 1.99 | SSL |
| NMeFOSAA | 2355-31-9 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.497 | 1.99 | |
| NEtFOSAA | 2991-50-6 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.164 | 0.497 | 1.99 | |
| PFBS | 375-73-5 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.170 | 0.497 | 0.994 | |
| PFHxS | 355-46-4 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.172 | 0.497 | 0.994 | |
| PFOS | 1763-23-1 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.174 | 0.497 | 0.994 | |
| HFPO-DA | 13252-13-6 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.497 | 1.99 | |
| Adona | 919005-14-4 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.497 | 1.99 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.153 | 0.497 | 1.99 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.497 U | F9098-FS(0) | 1.000 | 3/27/2022 | 0.149 | 0.497 | 1.99 | |

MW 8/13/22

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11

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-PFAS-SB05-0406 |
| Battelle ID | F9099-FS |
| Sample Type | SA |
| Collection Date | 03/01/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 4.28 |
| Matrix | SO |
| Sample Size | 4.960 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.179 | 0.504 | 1.01 |
| PFHpA | 375-85-9 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.169 | 0.504 | 1.01 |
| PFOA | 335-67-1 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.216 | 0.504 | 1.01 |
| PFNA | 375-95-1 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.504 | 1.01 |
| PFDA | 335-76-2 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.504 | 1.01 |
| PFUnA | 2058-94-8 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.157 | 0.504 | 1.01 |
| PFDoA | 307-55-1 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.504 | 1.01 |
| PFTrDA | 72629-94-8 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.162 | 0.504 | 1.01 |
| PFTeDA | 376-06-7 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.163 | 0.504 | 2.02 |
| NMeFOSAA | 2355-31-9 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.504 | 2.02 |
| NEtFOSAA | 2991-50-6 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.166 | 0.504 | 2.02 |
| PFBS | 375-73-5 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.172 | 0.504 | 1.01 |
| PFHxS | 355-46-4 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.174 | 0.504 | 1.01 |
| PFOS | 1763-23-1 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.176 | 0.504 | 1.01 |
| HFPO-DA | 13252-13-6 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.504 | 2.02 |
| Adona | 919005-14-4 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.504 | 2.02 |
| 9Cl-PF3ONS | 756426-58-1 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.155 | 0.504 | 2.02 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.504 U | F9099-FS(0) | 1.000 | 3/27/2022 | 0.151 | 0.504 | 2.02 |

MW 8/13/22

BATTELLE
It can be done

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-PFAS-SB05D-1920 |
| Battelle ID | F9100-FS |
| Sample Type | SA |
| Collection Date | 03/01/2022 |
| Extraction Date | 03/07/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 14.95 |
| Matrix | SO |
| Sample Size | 4.960 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.179 | 0.504 | 1.01 | |
| PFHpA | 375-85-9 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.169 | 0.504 | 1.01 | |
| PFOA | 335-67-1 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.216 | 0.504 | 1.01 | |
| PFNA | 375-95-1 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.158 | 0.504 | 1.01 | |
| PFDA | 335-76-2 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.159 | 0.504 | 1.01 | |
| PFUnA | 2058-94-8 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.157 | 0.504 | 1.01 | |
| PFDoA | 307-55-1 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.504 | 1.01 | |
| PFTrDA | 72629-94-8 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.162 | 0.504 | 1.01 | |
| PFTeDA | 376-06-7 | 0.504 y UJ | F9100-FS(0) | 1.000 | 3/27/2022 | 0.163 | 0.504 | 2.02 | SSL |
| NMeFOSAA | 2355-31-9 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.504 | 2.02 | |
| NEtFOSAA | 2991-50-6 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.166 | 0.504 | 2.02 | |
| PFBS | 375-73-5 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.172 | 0.504 | 1.01 | |
| PFHxS | 355-46-4 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.174 | 0.504 | 1.01 | |
| PFOS | 1763-23-1 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.176 | 0.504 | 1.01 | |
| HFPO-DA | 13252-13-6 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.160 | 0.504 | 2.02 | |
| Adona | 919005-14-4 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.161 | 0.504 | 2.02 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.155 | 0.504 | 2.02 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.504 U | F9100-FS(0) | 1.000 | 3/27/2022 | 0.151 | 0.504 | 2.02 | |

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0396
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 13, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEW10-FB01-030222 | F9348-FS | Water |
| 2 | VE-SWMU-20-FB01-030322 | F9354-FS | Water |
| 3 | VEW10-FB01-030922 | F9366-FS | Water |
| 4 | VEW10-EB01-030922-SS | F9367-FS | Water |
| 5 | VEW10-EB01-030922-SB | F9368-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for two aqueous equipment blank samples and three aqueous field blank samples soil samples collected on March 2-9, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

### LC/MS Tuning

- All criteria were met.

### Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VEW10-FB01-030222 | None - ND | - | - | - |
| VE-SWMU-20-FB01-030322 | None - ND | - | - | - |
| VEW10-FB01-030922 | None - ND | - | - | - |
| VEW10-EB01-030922-SS | None - ND | - | - | - |
| VEW10-EB01-030922-SB | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

**Compound Quantitation**

- All criteria were met.

**Field Duplicate Sample Precision**

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-FB01-030222 |
| Battelle ID | F9348-FS |
| Sample Type | SA |
| Collection Date | 03/02/2022 |
| Extraction Date | 03/14/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.264 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.865 | 2.37 | 4.73 |
| PFHpA | 375-85-9 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.891 | 2.37 | 4.73 |
| PFOA | 335-67-1 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.956 | 2.37 | 4.73 |
| PFNA | 375-95-1 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.789 | 2.37 | 4.73 |
| PFDA | 335-76-2 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.742 | 2.37 | 4.73 |
| PFUnA | 2058-94-8 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.712 | 2.37 | 4.73 |
| PFDoA | 307-55-1 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.720 | 2.37 | 4.73 |
| PFTrDA | 72629-94-8 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.703 | 2.37 | 4.73 |
| PFTeDA | 376-06-7 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.749 | 2.37 | 4.73 |
| NMeFOSAA | 2355-31-9 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.975 | 2.37 | 4.73 |
| NEtFOSAA | 2991-50-6 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.938 | 2.37 | 4.73 |
| PFBS | 375-73-5 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.820 | 2.37 | 4.73 |
| PFHxS | 355-46-4 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.944 | 2.37 | 4.73 |
| PFOS | 1763-23-1 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 1.01 | 2.37 | 4.73 |
| HFPO-DA | 13252-13-6 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.819 | 2.37 | 4.73 |
| Adona | 919005-14-4 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.823 | 2.37 | 4.73 |
| 9Cl-PF3ONS | 756426-58-1 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.975 | 2.37 | 4.73 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.37 U | F9348-FS(0) | 1.000 | 4/2/2022 | 0.853 | 2.37 | 4.73 |

MW 8/13/22

Analyzed by: Schumitz, Denise
Printed: 4/5/2022

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VE-SWMU-20-FB01-030322 |
| Battelle ID | F9354-FS |
| Sample Type | SA |
| Collection Date | 03/03/2022 |
| Extraction Date | 03/14/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.264 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.865 | 2.37 | 4.73 |
| PFHpA | 375-85-9 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.891 | 2.37 | 4.73 |
| PFOA | 335-67-1 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.956 | 2.37 | 4.73 |
| PFNA | 375-95-1 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.789 | 2.37 | 4.73 |
| PFDA | 335-76-2 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.742 | 2.37 | 4.73 |
| PFUnA | 2058-94-8 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.712 | 2.37 | 4.73 |
| PFDoA | 307-55-1 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.720 | 2.37 | 4.73 |
| PFTrDA | 72629-94-8 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.703 | 2.37 | 4.73 |
| PFTeDA | 376-06-7 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.749 | 2.37 | 4.73 |
| NMeFOSAA | 2355-31-9 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.975 | 2.37 | 4.73 |
| NEtFOSAA | 2991-50-6 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.938 | 2.37 | 4.73 |
| PFBS | 375-73-5 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.820 | 2.37 | 4.73 |
| PFHxS | 355-46-4 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.944 | 2.37 | 4.73 |
| PFOS | 1763-23-1 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 1.01 | 2.37 | 4.73 |
| HFPO-DA | 13252-13-6 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.819 | 2.37 | 4.73 |
| Adona | 919005-14-4 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.823 | 2.37 | 4.73 |
| 9Cl-PF3ONS | 756426-58-1 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.975 | 2.37 | 4.73 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.37 U | F9354-FS(0) | 1.000 | 4/2/2022 | 0.853 | 2.37 | 4.73 |

MW 8/13/22

Analyzed by: Schumitz, Denise
Printed: 4/5/2022

BATTELLE
it can be done

3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-FB01-030922 |
| Battelle ID | F9366-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/14/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.274 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.833 | 2.28 | 4.56 |
| PFHpA | 375-85-9 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.859 | 2.28 | 4.56 |
| PFOA | 335-67-1 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.922 | 2.28 | 4.56 |
| PFNA | 375-95-1 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.760 | 2.28 | 4.56 |
| PFDA | 335-76-2 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.715 | 2.28 | 4.56 |
| PFUnA | 2058-94-8 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.686 | 2.28 | 4.56 |
| PFDoA | 307-55-1 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.693 | 2.28 | 4.56 |
| PFTrDA | 72629-94-8 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.677 | 2.28 | 4.56 |
| PFTeDA | 376-06-7 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.722 | 2.28 | 4.56 |
| NMeFOSAA | 2355-31-9 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.940 | 2.28 | 4.56 |
| NEtFOSAA | 2991-50-6 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.903 | 2.28 | 4.56 |
| PFBS | 375-73-5 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.790 | 2.28 | 4.56 |
| PFHxS | 355-46-4 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.910 | 2.28 | 4.56 |
| PFOS | 1763-23-1 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.976 | 2.28 | 4.56 |
| HFPO-DA | 13252-13-6 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.789 | 2.28 | 4.56 |
| Adona | 919005-14-4 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.793 | 2.28 | 4.56 |
| 9Cl-PF3ONS | 756426-58-1 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.940 | 2.28 | 4.56 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.28 U | F9366-FS(0) | 1.000 | 4/2/2022 | 0.822 | 2.28 | 4.56 |

NW 8/13/22

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It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

4

| | |
|---|---|
| Client ID | VEW10-EB01-030922-SS |
| Battelle ID | F9367-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/14/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.245 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 0.932 | 2.55 | 5.10 |
| PFHpA | 375-85-9 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 0.960 | 2.55 | 5.10 |
| PFOA | 335-67-1 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 1.03 | 2.55 | 5.10 |
| PFNA | 375-95-1 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 0.850 | 2.55 | 5.10 |
| PFDA | 335-76-2 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 0.800 | 2.55 | 5.10 |
| PFUnA | 2058-94-8 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 0.767 | 2.55 | 5.10 |
| PFDoA | 307-55-1 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 0.776 | 2.55 | 5.10 |
| PFTrDA | 72629-94-8 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 0.757 | 2.55 | 5.10 |
| PFTeDA | 376-06-7 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 0.807 | 2.55 | 5.10 |
| NMeFOSAA | 2355-31-9 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 1.05 | 2.55 | 5.10 |
| NEtFOSAA | 2991-50-6 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 1.01 | 2.55 | 5.10 |
| PFBS | 375-73-5 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 0.884 | 2.55 | 5.10 |
| PFHxS | 355-46-4 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 1.02 | 2.55 | 5.10 |
| PFOS | 1763-23-1 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 1.09 | 2.55 | 5.10 |
| HFPO-DA | 13252-13-6 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 0.883 | 2.55 | 5.10 |
| Adona | 919005-14-4 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 0.887 | 2.55 | 5.10 |
| 9Cl-PF3ONS | 756426-58-1 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 1.05 | 2.55 | 5.10 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.55 U | F9367-FS(0) | 1.000 | 4/2/2022 | 0.919 | 2.55 | 5.10 |

MW 8/13/22
Analyzed by: Schumitz, Denise
Printed: 4/5/2022

BATTELLE
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5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-EB01-030922-SB |
| Battelle ID | F9368-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/14/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.264 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.865 | 2.37 | 4.73 |
| PFHpA | 375-85-9 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.891 | 2.37 | 4.73 |
| PFOA | 335-67-1 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.956 | 2.37 | 4.73 |
| PFNA | 375-95-1 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.789 | 2.37 | 4.73 |
| PFDA | 335-76-2 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.742 | 2.37 | 4.73 |
| PFUnA | 2058-94-8 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.712 | 2.37 | 4.73 |
| PFDoA | 307-55-1 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.720 | 2.37 | 4.73 |
| PFTrDA | 72629-94-8 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.703 | 2.37 | 4.73 |
| PFTeDA | 376-06-7 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.749 | 2.37 | 4.73 |
| NMeFOSAA | 2355-31-9 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.975 | 2.37 | 4.73 |
| NEtFOSAA | 2991-50-6 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.938 | 2.37 | 4.73 |
| PFBS | 375-73-5 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.820 | 2.37 | 4.73 |
| PFHxS | 355-46-4 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.944 | 2.37 | 4.73 |
| PFOS | 1763-23-1 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 1.01 | 2.37 | 4.73 |
| HFPO-DA | 13252-13-6 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.819 | 2.37 | 4.73 |
| Adona | 919005-14-4 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.823 | 2.37 | 4.73 |
| 9Cl-PF3ONS | 756426-58-1 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.975 | 2.37 | 4.73 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.37 U | F9368-FS(0) | 1.000 | 4/2/2022 | 0.853 | 2.37 | 4.73 |

MW 8/23/22

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0397
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 13, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEW10-PFAS-SS06-0001 | F9345-FS | Soil |
| 2 | VEW10-PFAS-SB06-0406 | F9346-FS | Soil |
| 3 | VEW10-PFAS-SB06D-0708 | F9347-FS | Soil |
| 4 | VEW10-PFAS-SS05-0001 | F9349-FS | Soil |
| 5 | VEW10-PFAS-SB05-0406 | F9350-FS | Soil |
| 6 | VEW10-PFAS-SB05D-2829 | F9351-FS | Soil |
| 7 | VEP4-PFAS-SS01-0001 | F9352-FS | Soil |
| 8 | VEP4-PFAS-SB01-0406 | F9353-FS | Soil |
| 9 | VEW10-PFAS-SS04-0001 | F9355-FS | Soil |
| 10 | VEW10-PFAS-SB04-0406 | F9356-FS | Soil |
| 11 | VEW10-PFAS-SB04D-2829 | F9357-FS | Soil |
| 12 | VEW10-PFAS-SS02-0001 | F9358-FS | Soil |
| 13 | VEW10-PFAS-SB02-0406 | F9359-FS | Soil |
| 14 | VEW10-PFAS-SB03D-2324 | F9360-FS | Soil |
| 15 | VEW10-PFAS-SS03-0001 | F9361-FS | Soil |
| 16 | VEW10-PFAS-SB03-0406 | F9362-FS | Soil |
| 17 | VEW10-PFAS-SS01-0001 | F9363-FS | Soil |
| 18 | VEW10-PFAS-SB01-0406 | F9364-FS | Soil |
| 19 | VEW10-PFAS-SB01D-2627 | F9365-FS | Soil |

A Stage 2B/4 data validation was performed on the analytical data for nineteen soil samples collected on March 1-9, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021,

the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

## Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

## Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VERW-EB01-022522-SB | None - ND | - | - | - |
| VEW10-EB01-030922-SS | None - ND | - | - | - |
| VEW10-EB01-030922-SB | None - ND | - | - | - |
| VEW10-FB01-030222 | None - ND | - | - | - |
| VEW10-FB01-030922 | None - ND | - | - | - |
| VE-SWMU-20-FB01-030322 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable low surrogate percent recoveries (%R) for one or two surrogates. The associated compounds were qualified as estimated (UJ). Please refer to the summary forms behind the Form Is for specific recoveries.

**Laboratory Fortified Blank (LFB)**

- The LFB samples exhibited acceptable percent recoveries (%R).

**Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries**

- MS/MSD samples were not analyzed.

**Internal Standard (IS) Area Performance**

- All internal standards met response and retention time (RT) criteria.

**Target Compound Identification**

- All mass spectra and quantitation criteria were met.

**Compound Quantitation**

- All criteria were met.

**Field Duplicate Sample Precision**

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-5506-0001 |
| Battelle ID | F9345-FS |
| Sample Type | SA |
| Collection Date | 03/01/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 13.57 |
| Matrix | SO |
| Sample Size | 4.950 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.180 | 0.505 | 1.01 |
| PFHpA | 375-85-9 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.170 | 0.505 | 1.01 |
| PFOA | 335-67-1 | 0.234 J | F9345-FS(0) | 1.000 | 4/3/2022 | 0.216 | 0.505 | 1.01 |
| PFNA | 375-95-1 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.505 | 1.01 |
| PFDA | 335-76-2 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.505 | 1.01 |
| PFUnA | 2058-94-8 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.505 | 1.01 |
| PFDoA | 307-55-1 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.505 | 1.01 |
| PFTrDA | 72629-94-8 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.163 | 0.505 | 1.01 |
| PFTeDA | 376-06-7 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.164 | 0.505 | 2.02 |
| NMeFOSAA | 2355-31-9 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.505 | 2.02 |
| NEtFOSAA | 2991-50-6 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.167 | 0.505 | 2.02 |
| PFBS | 375-73-5 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.173 | 0.505 | 1.01 |
| PFHxS | 355-46-4 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.175 | 0.505 | 1.01 |
| PFOS | 1763-23-1 | 0.440 J | F9345-FS(0) | 1.000 | 4/3/2022 | 0.177 | 0.505 | 1.01 |
| HFPO-DA | 13252-13-6 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.505 | 2.02 |
| Adona | 919005-14-4 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.505 | 2.02 |
| 9Cl-PF3ONS | 756426-58-1 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.505 | 2.02 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.505 U | F9345-FS(0) | 1.000 | 4/3/2022 | 0.152 | 0.505 | 2.02 |

SS
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NW 8/13/22

Analyzed by: Schumitz, Denise
Printed: 4/5/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS06-0001 |
| Battelle ID | F9345-FS |
| Sample Type | SA |
| Collection Date | 03/01/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 54 | F9345-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 61 | F9345-FS(0) | 4/3/2022 |
| 13C8-PFOA | 59 | F9345-FS(0) | 4/3/2022 |
| 13C9-PFNA | 63 | F9345-FS(0) | 4/3/2022 |
| 13C6-PFDA | 62 | F9345-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 61 | F9345-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 42 N | F9345-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 15 N | F9345-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 61 | F9345-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 67 | F9345-FS(0) | 4/3/2022 |
| 13C3-PFBS | 56 | F9345-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 63 | F9345-FS(0) | 4/3/2022 |
| 13C8-PFOS | 61 | F9345-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 59 | F9345-FS(0) | 4/3/2022 |

NW 8/13/22
Analyzed by: Schumitz, Denise
Printed: 4/5/2022

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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB06-0406 |
| Battelle ID | F9346-FS |
| Sample Type | SA |
| Collection Date | 03/01/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 10.55 |
| Matrix | SO |
| Sample Size | 4.980 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.179 | 0.502 | 1.00 | |
| PFHpA | 375-85-9 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.169 | 0.502 | 1.00 | |
| PFOA | 335-67-1 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.215 | 0.502 | 1.00 | |
| PFNA | 375-95-1 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.502 | 1.00 | |
| PFDA | 335-76-2 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.502 | 1.00 | |
| PFUnA | 2058-94-8 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.502 | 1.00 | |
| PFDoA | 307-55-1 | 0.502 ~~U~~ UJ | F9346-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.502 | 1.00 | SSL |
| PFTrDA | 72629-94-8 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.502 | 1.00 | |
| PFTeDA | 376-06-7 | 0.502 ~~U~~ UJ | F9346-FS(0) | 1.000 | 4/3/2022 | 0.163 | 0.502 | 2.01 | SSL |
| NMeFOSAA | 2355-31-9 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.502 | 2.01 | |
| NEtFOSAA | 2991-50-6 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.166 | 0.502 | 2.01 | |
| PFBS | 375-73-5 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.172 | 0.502 | 1.00 | |
| PFHxS | 355-46-4 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.174 | 0.502 | 1.00 | |
| PFOS | 1763-23-1 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.176 | 0.502 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.502 | 2.01 | |
| Adona | 919005-14-4 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.502 | 2.01 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.155 | 0.502 | 2.01 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.502 U | F9346-FS(0) | 1.000 | 4/3/2022 | 0.151 | 0.502 | 2.01 | |

MW 8/13/22
Analyzed by: Schumitz, Denise
Printed: 4/5/2022

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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB06-0406 |
| Battelle ID | F9346-FS |
| Sample Type | SA |
| Collection Date | 03/01/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 59 | F9346-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 62 | F9346-FS(0) | 4/3/2022 |
| 13C8-PFOA | 64 | F9346-FS(0) | 4/3/2022 |
| 13C9-PFNA | 62 | F9346-FS(0) | 4/3/2022 |
| 13C6-PFDA | 66 | F9346-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 62 | F9346-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 49 N | F9346-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 23 N | F9346-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 66 | F9346-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 72 | F9346-FS(0) | 4/3/2022 |
| 13C3-PFBS | 54 | F9346-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 67 | F9346-FS(0) | 4/3/2022 |
| 13C8-PFOS | 65 | F9346-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 62 | F9346-FS(0) | 4/3/2022 |

MW 8/13/22
Analyzed by: Schumitz, Denise
Printed: 4/5/2022

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3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB06D-0708 |
| Battelle ID | F9347-FS |
| Sample Type | SA |
| Collection Date | 03/01/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 16.34 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CASNo. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.178 | 0.500 | 1.00 |
| PFHpA | 375-85-9 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.168 | 0.500 | 1.00 |
| PFOA | 335-67-1 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.214 | 0.500 | 1.00 |
| PFNA | 375-95-1 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.500 | 1.00 |
| PFDA | 335-76-2 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.500 | 1.00 |
| PFUnA | 2058-94-8 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.500 | 1.00 |
| PFDoA | 307-55-1 | 0.500 U UJ | F9347-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.500 | 1.00 |
| PFTrDA | 72629-94-8 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.500 | 1.00 |
| PFTeDA | 376-06-7 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.500 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.500 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.165 | 0.500 | 2.00 |
| PFBS | 375-73-5 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.171 | 0.500 | 1.00 |
| PFHxS | 355-46-4 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.173 | 0.500 | 1.00 |
| PFOS | 1763-23-1 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.175 | 0.500 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.500 | 2.00 |
| Adona | 919005-14-4 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.500 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.154 | 0.500 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 U | F9347-FS(0) | 1.000 | 4/3/2022 | 0.150 | 0.500 | 2.00 |

SSL
Exclude-RE

MS 8/13/22

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3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB06D-0708 |
| Battelle ID | F9347-FS |
| Sample Type | SA |
| Collection Date | 03/01/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 64 | F9347-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 68 | F9347-FS(0) | 4/3/2022 |
| 13C8-PFOA | 69 | F9347-FS(0) | 4/3/2022 |
| 13C9-PFNA | 64 | F9347-FS(0) | 4/3/2022 |
| 13C6-PFDA | 66 | F9347-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 55 | F9347-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 38 N | F9347-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 13 N | F9347-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 60 | F9347-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 63 | F9347-FS(0) | 4/3/2022 |
| 13C3-PFBS | 63 | F9347-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 67 | F9347-FS(0) | 4/3/2022 |
| 13C8-PFOS | 68 | F9347-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 64 | F9347-FS(0) | 4/3/2022 |

MW 8/13/22
Analyzed by: Schumitz, Denise
Printed: 4/5/2022

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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS05-0001 |
| Battelle ID | F9349-FS |
| Sample Type | SA |
| Collection Date | 03/02/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 6.03 |
| Matrix | SO |
| Sample Size | 4.990 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.178 | 0.501 | 1.00 | |
| PFHpA | 375-85-9 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.168 | 0.501 | 1.00 | |
| PFOA | 335-67-1 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.214 | 0.501 | 1.00 | |
| PFNA | 375-95-1 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.501 | 1.00 | |
| PFDA | 335-76-2 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.501 | 1.00 | |
| PFUnA | 2058-94-8 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.501 | 1.00 | |
| PFDoA | 307-55-1 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.501 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.501 | 1.00 | |
| PFTeDA | 376-06-7 | 0.501 ~~U~~ UJ | F9349-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.501 | 2.00 | SSL |
| NMeFOSAA | 2355-31-9 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.501 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.165 | 0.501 | 2.00 | |
| PFBS | 375-73-5 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.171 | 0.501 | 1.00 | |
| PFHxS | 355-46-4 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.173 | 0.501 | 1.00 | |
| PFOS | 1763-23-1 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.175 | 0.501 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.501 | 2.00 | |
| Adona | 919005-14-4 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.501 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.154 | 0.501 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.501 U | F9349-FS(0) | 1.000 | 4/3/2022 | 0.150 | 0.501 | 2.00 | |

MH 8/13/22
Analyzed by: Schumitz, Denise
Printed: 4/5/2022

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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS05-0001 |
| Battelle ID | F9349-FS |
| Sample Type | SA |
| Collection Date | 03/02/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 65 | F9349-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 68 | F9349-FS(0) | 4/3/2022 |
| 13C8-PFOA | 67 | F9349-FS(0) | 4/3/2022 |
| 13C9-PFNA | 65 | F9349-FS(0) | 4/3/2022 |
| 13C6-PFDA | 61 | F9349-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 63 | F9349-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 53 | F9349-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 28 | F9349-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 70 | F9349-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 73 | F9349-FS(0) | 4/3/2022 |
| 13C3-PFBS | 59 | F9349-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 69 | F9349-FS(0) | 4/3/2022 |
| 13C8-PFOS | 67 | F9349-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 62 | F9349-FS(0) | 4/3/2022 |

NW 8/13/22

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5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB05-0406 |
| Battelle ID | F9350-FS |
| Sample Type | SA |
| Collection Date | 03/02/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 8.96 |
| Matrix | SO |
| Sample Size | 5.070 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.176 | 0.493 | 0.986 | |
| PFHpA | 375-85-9 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.166 | 0.493 | 0.986 | |
| PFOA | 335-67-1 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.211 | 0.493 | 0.986 | |
| PFNA | 375-95-1 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.155 | 0.493 | 0.986 | |
| PFDA | 335-76-2 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.493 | 0.986 | |
| PFUnA | 2058-94-8 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.154 | 0.493 | 0.986 | |
| PFDoA | 307-55-1 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.493 | 0.986 | |
| PFTrDA | 72629-94-8 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.493 | 0.986 | |
| PFTeDA | 376-06-7 | 0.493 ~~U~~ UJ | F9350-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.493 | 1.97 | SSL |
| NMeFOSAA | 2355-31-9 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.493 | 1.97 | |
| NEtFOSAA | 2991-50-6 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.163 | 0.493 | 1.97 | |
| PFBS | 375-73-5 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.169 | 0.493 | 0.986 | |
| PFHxS | 355-46-4 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.171 | 0.493 | 0.986 | |
| PFOS | 1763-23-1 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.173 | 0.493 | 0.986 | |
| HFPO-DA | 13252-13-6 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.493 | 1.97 | |
| Adona | 919005-14-4 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.493 | 1.97 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.152 | 0.493 | 1.97 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.493 U | F9350-FS(0) | 1.000 | 4/3/2022 | 0.148 | 0.493 | 1.97 | |

NW 8/13/22
Analyzed by: Schumitz, Denise

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5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB05-0406 |
| Battelle ID | F9350-FS |
| Sample Type | SA |
| Collection Date | 03/02/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 54 | F9350-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 54 | F9350-FS(0) | 4/3/2022 |
| 13C8-PFOA | 58 | F9350-FS(0) | 4/3/2022 |
| 13C9-PFNA | 55 | F9350-FS(0) | 4/3/2022 |
| 13C6-PFDA | 57 | F9350-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 56 | F9350-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 50 | F9350-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 30 | F9350-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 60 | F9350-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 69 | F9350-FS(0) | 4/3/2022 |
| 13C3-PFBS | 53 | F9350-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 58 | F9350-FS(0) | 4/3/2022 |
| 13C8-PFOS | 62 | F9350-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 56 | F9350-FS(0) | 4/3/2022 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB05D-2829 |
| Battelle ID | F9351-FS |
| Sample Type | SA |
| Collection Date | 03/02/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 20.00 |
| Matrix | SO |
| Sample Size | 5.030 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.177 | 0.497 | 0.994 | |
| PFHpA | 375-85-9 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.167 | 0.497 | 0.994 | |
| PFOA | 335-67-1 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.213 | 0.497 | 0.994 | |
| PFNA | 375-95-1 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.497 | 0.994 | |
| PFDA | 335-76-2 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.497 | 0.994 | |
| PFUnA | 2058-94-8 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.155 | 0.497 | 0.994 | |
| PFDoA | 307-55-1 | 0.497 ~~U~~ UJ | F9351-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.497 | 0.994 | SSL |
| PFTrDA | 72629-94-8 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.497 | 0.994 | |
| PFTeDA | 376-06-7 | 0.497 ~~U~~ UJ | F9351-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.497 | 1.99 | SSL |
| NMeFOSAA | 2355-31-9 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.497 | 1.99 | |
| NEtFOSAA | 2991-50-6 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.164 | 0.497 | 1.99 | |
| PFBS | 375-73-5 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.170 | 0.497 | 0.994 | |
| PFHxS | 355-46-4 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.172 | 0.497 | 0.994 | |
| PFOS | 1763-23-1 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.174 | 0.497 | 0.994 | |
| HFPO-DA | 13252-13-6 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.497 | 1.99 | |
| Adona | 919005-14-4 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.497 | 1.99 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.153 | 0.497 | 1.99 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.497 U | F9351-FS(0) | 1.000 | 4/3/2022 | 0.149 | 0.497 | 1.99 | |

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6

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB05D-2829 |
| Battelle ID | F9351-FS |
| Sample Type | SA |
| Collection Date | 03/02/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 55 | F9351-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 61 | F9351-FS(0) | 4/3/2022 |
| 13C8-PFOA | 63 | F9351-FS(0) | 4/3/2022 |
| 13C9-PFNA | 61 | F9351-FS(0) | 4/3/2022 |
| 13C6-PFDA | 57 | F9351-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 57 | F9351-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 48 N | F9351-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 40 N | F9351-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 61 | F9351-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 63 | F9351-FS(0) | 4/3/2022 |
| 13C3-PFBS | 60 | F9351-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 62 | F9351-FS(0) | 4/3/2022 |
| 13C8-PFOS | 64 | F9351-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 59 | F9351-FS(0) | 4/3/2022 |

MH 8/13/22
Analyzed by: Schumitz, Denise
Printed: 4/5/2022

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7

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-PFAS-SS01-0001 |
| Battelle ID | F9352-FS |
| Sample Type | SA |
| Collection Date | 03/03/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 9.60 |
| Matrix | SO |
| Sample Size | 4.960 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.179 | 0.504 | 1.01 | |
| PFHpA | 375-85-9 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.169 | 0.504 | 1.01 | |
| PFOA | 335-67-1 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.216 | 0.504 | 1.01 | |
| PFNA | 375-95-1 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.504 | 1.01 | |
| PFDA | 335-76-2 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.504 | 1.01 | |
| PFUnA | 2058-94-8 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.504 | 1.01 | |
| PFDoA | 307-55-1 | 0.504 U UJ | F9352-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.504 | 1.01 | SSL |
| PFTrDA | 72629-94-8 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.504 | 1.01 | |
| PFTeDA | 376-06-7 | 0.504 U UJ | F9352-FS(0) | 1.000 | 4/3/2022 | 0.163 | 0.504 | 2.02 | SSL |
| NMeFOSAA | 2355-31-9 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.504 | 2.02 | |
| NEtFOSAA | 2991-50-6 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.166 | 0.504 | 2.02 | |
| PFBS | 375-73-5 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.172 | 0.504 | 1.01 | |
| PFHxS | 355-46-4 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.174 | 0.504 | 1.01 | |
| PFOS | 1763-23-1 | 1.08 | F9352-FS(0) | 1.000 | 4/3/2022 | 0.176 | 0.504 | 1.01 | |
| HFPO-DA | 13252-13-6 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.504 | 2.02 | |
| Adona | 919005-14-4 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.504 | 2.02 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.155 | 0.504 | 2.02 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.504 U | F9352-FS(0) | 1.000 | 4/3/2022 | 0.151 | 0.504 | 2.02 | |

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7

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-PFAS-SS01-0001 |
| Battelle ID | F9352-FS |
| Sample Type | SA |
| Collection Date | 03/03/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 58 | F9352-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 58 | F9352-FS(0) | 4/3/2022 |
| 13C8-PFOA | 62 | F9352-FS(0) | 4/3/2022 |
| 13C9-PFNA | 61 | F9352-FS(0) | 4/3/2022 |
| 13C6-PFDA | 57 | F9352-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 55 | F9352-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 42 N | F9352-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 21 N | F9352-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 57 | F9352-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 60 | F9352-FS(0) | 4/3/2022 |
| 13C3-PFBS | 56 | F9352-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 60 | F9352-FS(0) | 4/3/2022 |
| 13C8-PFOS | 59 | F9352-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 56 | F9352-FS(0) | 4/3/2022 |

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8

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-PFAS-SB01-0406 |
| Battelle ID | F9353-FS |
| Sample Type | SA |
| Collection Date | 03/03/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 4.00 |
| Matrix | SO |
| Sample Size | 5.060 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.176 | 0.494 | 0.988 | |
| PFHpA | 375-85-9 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.166 | 0.494 | 0.988 | |
| PFOA | 335-67-1 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.211 | 0.494 | 0.988 | |
| PFNA | 375-95-1 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.155 | 0.494 | 0.988 | |
| PFDA | 335-76-2 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.494 | 0.988 | |
| PFUnA | 2058-94-8 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.154 | 0.494 | 0.988 | |
| PFDoA | 307-55-1 | 0.494 UJ | F9353-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.494 | 0.988 | SSL |
| PFTrDA | 72629-94-8 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.494 | 0.988 | |
| PFTeDA | 376-06-7 | 0.494 UJ | F9353-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.494 | 1.98 | SSL |
| NMeFOSAA | 2355-31-9 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.494 | 1.98 | |
| NEtFOSAA | 2991-50-6 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.163 | 0.494 | 1.98 | |
| PFBS | 375-73-5 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.169 | 0.494 | 0.988 | |
| PFHxS | 355-46-4 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.171 | 0.494 | 0.988 | |
| PFOS | 1763-23-1 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.173 | 0.494 | 0.988 | |
| HFPO-DA | 13252-13-6 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.494 | 1.98 | |
| Adona | 919005-14-4 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.494 | 1.98 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.152 | 0.494 | 1.98 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.494 U | F9353-FS(0) | 1.000 | 4/3/2022 | 0.148 | 0.494 | 1.98 | |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-PFAS-SB01-0406 |
| Battelle ID | F9353-FS |
| Sample Type | SA |
| Collection Date | 03/03/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 59 | F9353-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 63 | F9353-FS(0) | 4/3/2022 |
| 13C8-PFOA | 65 | F9353-FS(0) | 4/3/2022 |
| 13C9-PFNA | 64 | F9353-FS(0) | 4/3/2022 |
| 13C6-PFDA | 64 | F9353-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 60 | F9353-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 45 N | F9353-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 21 N | F9353-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 61 | F9353-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 67 | F9353-FS(0) | 4/3/2022 |
| 13C3-PFBS | 55 | F9353-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 62 | F9353-FS(0) | 4/3/2022 |
| 13C8-PFOS | 60 | F9353-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 63 | F9353-FS(0) | 4/3/2022 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-5504-0001 |
| Battelle ID | F9355-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 11.50 |
| Matrix | SO |
| Sample Size | 4.940 |
| Size Unit-Basis | g |

| Analyte | CASNo. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.180 | 0.506 | 1.01 | |
| PFHpA | 375-85-9 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.170 | 0.506 | 1.01 | |
| PFOA | 335-67-1 | 0.265 J | F9355-FS(0) | 1.000 | 4/3/2022 | 0.217 | 0.506 | 1.01 | |
| PFNA | 375-95-1 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.506 | 1.01 | |
| PFDA | 335-76-2 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.506 | 1.01 | |
| PFUnA | 2058-94-8 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.506 | 1.01 | |
| PFDoA | 307-55-1 | 0.506 UJ | F9355-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.506 | 1.01 | SSL |
| PFTrDA | 72629-94-8 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.163 | 0.506 | 1.01 | |
| PFTeDA | 376-06-7 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.164 | 0.506 | 2.02 | Exclude-RE |
| NMeFOSAA | 2355-31-9 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.506 | 2.02 | |
| NEtFOSAA | 2991-50-6 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.167 | 0.506 | 2.02 | |
| PFBS | 375-73-5 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.173 | 0.506 | 1.01 | |
| PFHxS | 355-46-4 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.175 | 0.506 | 1.01 | |
| PFOS | 1763-23-1 | 14.6 | F9355-FS(0) | 1.000 | 4/3/2022 | 0.177 | 0.506 | 1.01 | |
| HFPO-DA | 13252-13-6 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.506 | 2.02 | |
| Adona | 919005-14-4 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.506 | 2.02 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.506 | 2.02 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.506 U | F9355-FS(0) | 1.000 | 4/3/2022 | 0.152 | 0.506 | 2.02 | |

NW 8/13/22

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9

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS04-0001 |
| Battelle ID | F9355-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 57 | F9355-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 61 | F9355-FS(0) | 4/3/2022 |
| 13C8-PFOA | 57 | F9355-FS(0) | 4/3/2022 |
| 13C9-PFNA | 57 | F9355-FS(0) | 4/3/2022 |
| 13C6-PFDA | 59 | F9355-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 56 | F9355-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 42 N | F9355-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 14 N | F9355-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 62 | F9355-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 70 | F9355-FS(0) | 4/3/2022 |
| 13C3-PFBS | 57 | F9355-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 65 | F9355-FS(0) | 4/3/2022 |
| 13C8-PFOS | 63 | F9355-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 59 | F9355-FS(0) | 4/3/2022 |

MW 8/13/22
Analyzed by: Schumitz, Denise
Printed: 4/5/2022

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10

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB04-0406 |
| Battelle ID | F9356-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 23.50 |
| Matrix | SO |
| Sample Size | 5.090 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.175 | 0.491 | 0.982 | |
| PFHpA | 375-85-9 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.165 | 0.491 | 0.982 | |
| PFOA | 335-67-1 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.210 | 0.491 | 0.982 | |
| PFNA | 375-95-1 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.154 | 0.491 | 0.982 | |
| PFDA | 335-76-2 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.155 | 0.491 | 0.982 | |
| PFUnA | 2058-94-8 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.153 | 0.491 | 0.982 | |
| PFDoA | 307-55-1 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.491 | 0.982 | |
| PFTrDA | 72629-94-8 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.491 | 0.982 | |
| PFTeDA | 376-06-7 | 0.491 UJ | F9356-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.491 | 1.96 | SSL |
| NMeFOSAA | 2355-31-9 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.491 | 1.96 | |
| NEtFOSAA | 2991-50-6 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.491 | 1.96 | |
| PFBS | 375-73-5 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.168 | 0.491 | 0.982 | |
| PFHxS | 355-46-4 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.170 | 0.491 | 0.982 | |
| PFOS | 1763-23-1 | 0.335 J | F9356-FS(0) | 1.000 | 4/3/2022 | 0.172 | 0.491 | 0.982 | |
| HFPO-DA | 13252-13-6 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.491 | 1.96 | |
| Adona | 919005-14-4 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.491 | 1.96 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.151 | 0.491 | 1.96 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.491 U | F9356-FS(0) | 1.000 | 4/3/2022 | 0.147 | 0.491 | 1.96 | |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB04-0406 |
| Battelle ID | F9356-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 58 | F9356-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 62 | F9356-FS(0) | 4/3/2022 |
| 13C8-PFOA | 64 | F9356-FS(0) | 4/3/2022 |
| 13C9-PFNA | 61 | F9356-FS(0) | 4/3/2022 |
| 13C6-PFDA | 61 | F9356-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 60 | F9356-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 52 | F9356-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 30 ✗ | F9356-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 63 | F9356-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 67 | F9356-FS(0) | 4/3/2022 |
| 13C3-PFBS | 54 | F9356-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 66 | F9356-FS(0) | 4/3/2022 |
| 13C8-PFOS | 62 | F9356-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 63 | F9356-FS(0) | 4/3/2022 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB04D-2829 |
| Battelle ID | F9357-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 19.00 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.178 | 0.500 | 1.00 | |
| PFHpA | 375-85-9 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.168 | 0.500 | 1.00 | |
| PFOA | 335-67-1 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.214 | 0.500 | 1.00 | |
| PFNA | 375-95-1 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.500 | 1.00 | |
| PFDA | 335-76-2 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.500 | 1.00 | |
| PFUnA | 2058-94-8 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.500 | 1.00 | |
| PFDoA | 307-55-1 | 0.500 U UJ | F9357-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.500 | 1.00 | SSC |
| PFTrDA | 72629-94-8 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.500 | 1.00 | |
| PFTeDA | 376-06-7 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.500 | 2.00 | Exclude-RE |
| NMeFOSAA | 2355-31-9 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.500 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.165 | 0.500 | 2.00 | |
| PFBS | 375-73-5 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.171 | 0.500 | 1.00 | |
| PFHxS | 355-46-4 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.173 | 0.500 | 1.00 | |
| PFOS | 1763-23-1 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.175 | 0.500 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.500 | 2.00 | |
| Adona | 919005-14-4 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.500 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.154 | 0.500 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 U | F9357-FS(0) | 1.000 | 4/3/2022 | 0.150 | 0.500 | 2.00 | |

MW 8/3/22

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11

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB04D-2829 |
| Battelle ID | F9357-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 56 | F9357-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 61 | F9357-FS(0) | 4/3/2022 |
| 13C8-PFOA | 62 | F9357-FS(0) | 4/3/2022 |
| 13C9-PFNA | 59 | F9357-FS(0) | 4/3/2022 |
| 13C6-PFDA | 62 | F9357-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 50 | F9357-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 36 N | F9357-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 17 N | F9357-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 61 | F9357-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 64 | F9357-FS(0) | 4/3/2022 |
| 13C3-PFBS | 59 | F9357-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 65 | F9357-FS(0) | 4/3/2022 |
| 13C8-PFOS | 65 | F9357-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 59 | F9357-FS(0) | 4/3/2022 |

MW 8/13/22
Analyzed by: Schumitz, Denise
Printed: 4/5/2022

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12

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-5502-0001 |
| Battelle ID | F9358-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 9.09 |
| Matrix | SO |
| Sample Size | 4.980 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.502 U | F9358-FS(0) | 1.000 | 4/3/2022 | 0.179 | 0.502 | 1.00 | |
| PFHpA | 375-85-9 | 0.502 U | F9358-FS(0) | 1.000 | 4/3/2022 | 0.169 | 0.502 | 1.00 | |
| PFOA | 335-67-1 | 0.367 J | F9358-FS(0) | 1.000 | 4/3/2022 | 0.215 | 0.502 | 1.00 | |
| PFNA | 375-95-1 | 0.254 J | F9358-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.502 | 1.00 | |
| PFDA | 335-76-2 | 0.502 U | F9358-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.502 | 1.00 | |
| PFUnA | 2058-94-8 | 0.502 U | F9358-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.502 | 1.00 | |
| PFDoA | 307-55-1 | 0.502 U J | F9358-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.502 | 1.00 | SSL |
| PFTrDA | 72629-94-8 | 0.502 U | F9358-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.502 | 1.00 | |
| PFTeDA | 376-06-7 | 0.502 U | F9358-FS(0) | 1.000 | 4/3/2022 | 0.163 | 0.502 | 2.01 | Exclude-RE |
| NMeFOSAA | 2355-31-9 | 0.502 U | F9358-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.502 | 2.01 | |
| NEtFOSAA | 2991-50-6 | 0.502 U | F9358-FS(0) | 1.000 | 4/3/2022 | 0.166 | 0.502 | 2.01 | |
| PFBS | 375-73-5 | 0.502 U | F9358-FS(0) | 1.000 | 4/3/2022 | 0.172 | 0.502 | 1.00 | |
| PFHxS | 355-46-4 | 0.502 U | F9358-FS(0) | 1.000 | 4/3/2022 | 0.174 | 0.502 | 1.00 | |
| PFOS | 1763-23-1 | 24.4 | F9358-FS(0) | 1.000 | 4/3/2022 | 0.176 | 0.502 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.502 U | F9358-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.502 | 2.01 | |
| Adona | 919005-14-4 | 0.502 U | F9358-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.502 | 2.01 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.502 U | F9358-FS(0) | 1.000 | 4/3/2022 | 0.155 | 0.502 | 2.01 | |
| 11Cl-PF3OUd5 | 763051-92-9 | 0.502 U | F9358-FS(0) | 1.000 | 4/3/2022 | 0.151 | 0.502 | 2.01 | |

MW 8/13/22
Analyzed by: Schumitz, Denise
Printed: 4/5/2022

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12

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS02-0001 |
| Battelle ID | F9358-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 56 | F9358-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 55 | F9358-FS(0) | 4/3/2022 |
| 13C8-PFOA | 63 | F9358-FS(0) | 4/3/2022 |
| 13C9-PFNA | 57 | F9358-FS(0) | 4/3/2022 |
| 13C6-PFDA | 60 | F9358-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 50 | F9358-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 28 N | F9358-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 16 N | F9358-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 54 | F9358-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 57 | F9358-FS(0) | 4/3/2022 |
| 13C3-PFBS | 55 | F9358-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 63 | F9358-FS(0) | 4/3/2022 |
| 13C8-PFOS | 60 | F9358-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 59 | F9358-FS(0) | 4/3/2022 |

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It can be done

13

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB02-0406 |
| Battelle ID | F9359-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 18.00 |
| Matrix | SO |
| Sample Size | 4.980 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.179 | 0.502 | 1.00 | |
| PFHpA | 375-85-9 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.169 | 0.502 | 1.00 | |
| PFOA | 335-67-1 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.215 | 0.502 | 1.00 | |
| PFNA | 375-95-1 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.502 | 1.00 | |
| PFDA | 335-76-2 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.502 | 1.00 | |
| PFUnA | 2058-94-8 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.502 | 1.00 | |
| PFDoA | 307-55-1 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.502 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.502 | 1.00 | |
| PFTeDA | 376-06-7 | 0.502 U UJ | F9359-FS(0) | 1.000 | 4/3/2022 | 0.163 | 0.502 | 2.01 | SSL |
| NMeFOSAA | 2355-31-9 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.502 | 2.01 | |
| NEtFOSAA | 2991-50-6 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.166 | 0.502 | 2.01 | |
| PFBS | 375-73-5 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.172 | 0.502 | 1.00 | |
| PFHxS | 355-46-4 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.174 | 0.502 | 1.00 | |
| PFOS | 1763-23-1 | 1.45 | F9359-FS(0) | 1.000 | 4/3/2022 | 0.176 | 0.502 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.502 | 2.01 | |
| Adona | 919005-14-4 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.502 | 2.01 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.155 | 0.502 | 2.01 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.502 U | F9359-FS(0) | 1.000 | 4/3/2022 | 0.151 | 0.502 | 2.01 | |

Isotope Dilution

Analyzed by: Schumitz, Denise 8/13/22
Printed: 4/5/2022

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13

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB02-0406 |
| Battelle ID | F9359-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 63 | F9359-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 63 | F9359-FS(0) | 4/3/2022 |
| 13C8-PFOA | 69 | F9359-FS(0) | 4/3/2022 |
| 13C9-PFNA | 67 | F9359-FS(0) | 4/3/2022 |
| 13C6-PFDA | 63 | F9359-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 62 | F9359-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 58 | F9359-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 47 ✗ | F9359-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 63 | F9359-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 70 | F9359-FS(0) | 4/3/2022 |
| 13C3-PFBS | 60 | F9359-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 67 | F9359-FS(0) | 4/3/2022 |
| 13C8-PFOS | 64 | F9359-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 64 | F9359-FS(0) | 4/3/2022 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB03D-2324 |
| Battelle ID | F9360-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 17.50 |
| Matrix | SO |
| Sample Size | 5.070 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.176 | 0.493 | 0.986 | |
| PFHpA | 375-85-9 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.166 | 0.493 | 0.986 | |
| PFOA | 335-67-1 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.211 | 0.493 | 0.986 | |
| PFNA | 375-95-1 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.155 | 0.493 | 0.986 | |
| PFDA | 335-76-2 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.493 | 0.986 | |
| PFUnA | 2058-94-8 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.154 | 0.493 | 0.986 | |
| PFDoA | 307-55-1 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.493 | 0.986 | |
| PFTrDA | 72629-94-8 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.493 | 0.986 | |
| PFTeDA | 376-06-7 | 0.493 UJ | F9360-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.493 | 1.97 | SSL |
| NMeFOSAA | 2355-31-9 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.493 | 1.97 | |
| NEtFOSAA | 2991-50-6 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.163 | 0.493 | 1.97 | |
| PFBS | 375-73-5 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.169 | 0.493 | 0.986 | |
| PFHxS | 355-46-4 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.171 | 0.493 | 0.986 | |
| PFOS | 1763-23-1 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.173 | 0.493 | 0.986 | |
| HFPO-DA | 13252-13-6 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.493 | 1.97 | |
| Adona | 919005-14-4 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.493 | 1.97 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.152 | 0.493 | 1.97 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.493 U | F9360-FS(0) | 1.000 | 4/3/2022 | 0.148 | 0.493 | 1.97 | |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB03D-2324 |
| Battelle ID | F9360-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 65 | F9360-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 68 | F9360-FS(0) | 4/3/2022 |
| 13C8-PFOA | 68 | F9360-FS(0) | 4/3/2022 |
| 13C9-PFNA | 68 | F9360-FS(0) | 4/3/2022 |
| 13C6-PFDA | 65 | F9360-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 61 | F9360-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 52 | F9360-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 41 | F9360-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 65 | F9360-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 74 | F9360-FS(0) | 4/3/2022 |
| 13C3-PFBS | 58 | F9360-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 73 | F9360-FS(0) | 4/3/2022 |
| 13C8-PFOS | 67 | F9360-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 65 | F9360-FS(0) | 4/3/2022 |

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15

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS03-0001 |
| Battelle ID | F9361-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 9.90 |
| Matrix | SO |
| Sample Size | 5.100 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.175 | 0.490 | 0.980 | |
| PFHpA | 375-85-9 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.165 | 0.490 | 0.980 | |
| PFOA | 335-67-1 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.210 | 0.490 | 0.980 | |
| PFNA | 375-95-1 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.154 | 0.490 | 0.980 | |
| PFDA | 335-76-2 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.155 | 0.490 | 0.980 | |
| PFUnA | 2058-94-8 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.153 | 0.490 | 0.980 | |
| PFDoA | 307-55-1 | 0.490 | ~~U~~ | F9361-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.490 | 0.980 | UJ-SSL |
| PFTrDA | 72629-94-8 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.490 | 0.980 | |
| PFTeDA | 376-06-7 | 0.490 | ~~U~~ | F9361-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.490 | 1.96 | Exclude-RE |
| NMeFOSAA | 2355-31-9 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.490 | 1.96 | |
| NEtFOSAA | 2991-50-6 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.490 | 1.96 | |
| PFBS | 375-73-5 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.168 | 0.490 | 0.980 | |
| PFHxS | 355-46-4 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.170 | 0.490 | 0.980 | |
| PFOS | 1763-23-1 | 0.564 | J | F9361-FS(0) | 1.000 | 4/3/2022 | 0.172 | 0.490 | 0.980 | |
| HFPO-DA | 13252-13-6 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.490 | 1.96 | |
| Adona | 919005-14-4 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.490 | 1.96 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.151 | 0.490 | 1.96 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.490 | U | F9361-FS(0) | 1.000 | 4/3/2022 | 0.147 | 0.490 | 1.96 | |

nw 8/13/22

Analyzed by: Schumitz, Denise
Printed: 4/5/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS03-0001 |
| Battelle ID | F9361-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 58 | F9361-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 58 | F9361-FS(0) | 4/3/2022 |
| 13C8-PFOA | 62 | F9361-FS(0) | 4/3/2022 |
| 13C9-PFNA | 58 | F9361-FS(0) | 4/3/2022 |
| 13C6-PFDA | 62 | F9361-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 59 | F9361-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 47 N | F9361-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 18 N | F9361-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 60 | F9361-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 68 | F9361-FS(0) | 4/3/2022 |
| 13C3-PFBS | 63 | F9361-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 68 | F9361-FS(0) | 4/3/2022 |
| 13C8-PFOS | 65 | F9361-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 57 | F9361-FS(0) | 4/3/2022 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB03-0406 |
| Battelle ID | F9362-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 13.93 |
| Matrix | SO |
| Sample Size | 5.020 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.177 | 0.498 | 0.996 | |
| PFHpA | 375-85-9 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.167 | 0.498 | 0.996 | |
| PFOA | 335-67-1 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.213 | 0.498 | 0.996 | |
| PFNA | 375-95-1 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.498 | 0.996 | |
| PFDA | 335-76-2 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.498 | 0.996 | |
| PFUnA | 2058-94-8 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.155 | 0.498 | 0.996 | |
| PFDoA | 307-55-1 | 0.498 U UJ | F9362-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.498 | 0.996 | SSL |
| PFTrDA | 72629-94-8 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.498 | 0.996 | |
| PFTeDA | 376-06-7 | 0.498 U UJ | F9362-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.498 | 1.99 | SSL |
| NMeFOSAA | 2355-31-9 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.498 | 1.99 | |
| NEtFOSAA | 2991-50-6 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.164 | 0.498 | 1.99 | |
| PFBS | 375-73-5 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.170 | 0.498 | 0.996 | |
| PFHxS | 355-46-4 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.172 | 0.498 | 0.996 | |
| PFOS | 1763-23-1 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.174 | 0.498 | 0.996 | |
| HFPO-DA | 13252-13-6 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.498 | 1.99 | |
| Adona | 919005-14-4 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.498 | 1.99 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.153 | 0.498 | 1.99 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.498 U | F9362-FS(0) | 1.000 | 4/3/2022 | 0.149 | 0.498 | 1.99 | |

Isotope Dilution

MW 8/13/22
Analyzed by: Schumitz, Denise
Printed: 4/5/2022

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16

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB03-0406 |
| Battelle ID | F9362-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 65 | F9362-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 65 | F9362-FS(0) | 4/3/2022 |
| 13C8-PFOA | 68 | F9362-FS(0) | 4/3/2022 |
| 13C9-PFNA | 67 | F9362-FS(0) | 4/3/2022 |
| 13C6-PFDA | 61 | F9362-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 53 | F9362-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 40 N | F9362-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 29 N | F9362-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 62 | F9362-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 65 | F9362-FS(0) | 4/3/2022 |
| 13C3-PFBS | 62 | F9362-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 69 | F9362-FS(0) | 4/3/2022 |
| 13C8-PFOS | 68 | F9362-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 64 | F9362-FS(0) | 4/3/2022 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS01-0001 |
| Battelle ID | F9363-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 8.91 |
| Matrix | SO |
| Sample Size | 4.980 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.179 | 0.502 | 1.00 | |
| PFHpA | 375-85-9 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.169 | 0.502 | 1.00 | |
| PFOA | 335-67-1 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.215 | 0.502 | 1.00 | |
| PFNA | 375-95-1 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.502 | 1.00 | |
| PFDA | 335-76-2 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.502 | 1.00 | |
| PFUnA | 2058-94-8 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.502 | 1.00 | |
| PFDoA | 307-55-1 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.502 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.502 | 1.00 | |
| PFTeDA | 376-06-7 | 0.502 ~~U~~ UJ | F9363-FS(0) | 1.000 | 4/3/2022 | 0.163 | 0.502 | 2.01 | SSL |
| NMeFOSAA | 2355-31-9 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.502 | 2.01 | |
| NEtFOSAA | 2991-50-6 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.166 | 0.502 | 2.01 | |
| PFBS | 375-73-5 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.172 | 0.502 | 1.00 | |
| PFHxS | 355-46-4 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.174 | 0.502 | 1.00 | |
| PFOS | 1763-23-1 | 1.13 | F9363-FS(0) | 1.000 | 4/3/2022 | 0.176 | 0.502 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.502 | 2.01 | |
| Adona | 919005-14-4 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.502 | 2.01 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.155 | 0.502 | 2.01 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.502 U | F9363-FS(0) | 1.000 | 4/3/2022 | 0.151 | 0.502 | 2.01 | |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS01-0001 |
| Battelle ID | F9363-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 58 | F9363-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 58 | F9363-FS(0) | 4/3/2022 |
| 13C8-PFOA | 61 | F9363-FS(0) | 4/3/2022 |
| 13C9-PFNA | 60 | F9363-FS(0) | 4/3/2022 |
| 13C6-PFDA | 57 | F9363-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 56 | F9363-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 52 | F9363-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 22 | F9363-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 62 | F9363-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 66 | F9363-FS(0) | 4/3/2022 |
| 13C3-PFBS | 54 | F9363-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 66 | F9363-FS(0) | 4/3/2022 |
| 13C8-PFOS | 64 | F9363-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 59 | F9363-FS(0) | 4/3/2022 |

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18

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB01-0406 |
| Battelle ID | F9364-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 3.50 |
| Matrix | SO |
| Sample Size | 5.080 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.175 | 0.492 | 0.984 | |
| PFHpA | 375-85-9 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.165 | 0.492 | 0.984 | |
| PFOA | 335-67-1 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.211 | 0.492 | 0.984 | |
| PFNA | 375-95-1 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.155 | 0.492 | 0.984 | |
| PFDA | 335-76-2 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.492 | 0.984 | |
| PFUnA | 2058-94-8 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.154 | 0.492 | 0.984 | |
| PFDoA | 307-55-1 | 0.492 ✗ UJ | F9364-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.492 | 0.984 | SSL |
| PFTrDA | 72629-94-8 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.492 | 0.984 | |
| PFTeDA | 376-06-7 | 0.492 ✗ UJ | F9364-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.492 | 1.97 | SSL |
| NMeFOSAA | 2355-31-9 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.492 | 1.97 | |
| NEtFOSAA | 2991-50-6 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.492 | 1.97 | |
| PFBS | 375-73-5 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.168 | 0.492 | 0.984 | |
| PFHxS | 355-46-4 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.170 | 0.492 | 0.984 | |
| PFOS | 1763-23-1 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.172 | 0.492 | 0.984 | |
| HFPO-DA | 13252-13-6 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.156 | 0.492 | 1.97 | |
| Adona | 919005-14-4 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.492 | 1.97 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.152 | 0.492 | 1.97 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.492 U | F9364-FS(0) | 1.000 | 4/3/2022 | 0.148 | 0.492 | 1.97 | |

Isotope Dilution

MW 8/13/22
Analyzed by: Schumitz, Denise
Printed: 4/5/2022

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18

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB01-0406 |
| Battelle ID | F9364-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 62 | F9364-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 62 | F9364-FS(0) | 4/3/2022 |
| 13C8-PFOA | 65 | F9364-FS(0) | 4/3/2022 |
| 13C9-PFNA | 62 | F9364-FS(0) | 4/3/2022 |
| 13C6-PFDA | 58 | F9364-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 57 | F9364-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 48 N | F9364-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 34 N | F9364-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 61 | F9364-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 67 | F9364-FS(0) | 4/3/2022 |
| 13C3-PFBS | 57 | F9364-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 67 | F9364-FS(0) | 4/3/2022 |
| 13C8-PFOS | 63 | F9364-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 60 | F9364-FS(0) | 4/3/2022 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB01D-2627 |
| Battelle ID | F9365-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 17.09 |
| Matrix | SO |
| Sample Size | 4.980 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.179 | 0.502 | 1.00 | |
| PFHpA | 375-85-9 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.169 | 0.502 | 1.00 | |
| PFOA | 335-67-1 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.215 | 0.502 | 1.00 | |
| PFNA | 375-95-1 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.158 | 0.502 | 1.00 | |
| PFDA | 335-76-2 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.159 | 0.502 | 1.00 | |
| PFUnA | 2058-94-8 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.157 | 0.502 | 1.00 | |
| PFDoA | 307-55-1 | 0.502 UJ | F9365-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.502 | 1.00 | SSL |
| PFTrDA | 72629-94-8 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.162 | 0.502 | 1.00 | SSL |
| PFTeDA | 376-06-7 | 0.502 UJ | F9365-FS(0) | 1.000 | 4/3/2022 | 0.163 | 0.502 | 2.01 | |
| NMeFOSAA | 2355-31-9 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.502 | 2.01 | |
| NEtFOSAA | 2991-50-6 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.166 | 0.502 | 2.01 | |
| PFBS | 375-73-5 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.172 | 0.502 | 1.00 | |
| PFHxS | 355-46-4 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.174 | 0.502 | 1.00 | |
| PFOS | 1763-23-1 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.176 | 0.502 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.160 | 0.502 | 2.01 | |
| Adona | 919005-14-4 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.161 | 0.502 | 2.01 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.155 | 0.502 | 2.01 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.502 U | F9365-FS(0) | 1.000 | 4/3/2022 | 0.151 | 0.502 | 2.01 | |

Isotope Dilution

MW 8/13/22
Analyzed by: Schumitz, Denise
Printed: 4/5/2022

BATTELLE
It can be done

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB01D-2627 |
| Battelle ID | F9365-FS |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 03/15/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 57 | F9365-FS(0) | 4/3/2022 |
| 13C4-PFHpA | 59 | F9365-FS(0) | 4/3/2022 |
| 13C8-PFOA | 58 | F9365-FS(0) | 4/3/2022 |
| 13C9-PFNA | 59 | F9365-FS(0) | 4/3/2022 |
| 13C6-PFDA | 55 | F9365-FS(0) | 4/3/2022 |
| 13C7-PFUnA | 51 | F9365-FS(0) | 4/3/2022 |
| 13C2-PFDoA | 45 N | F9365-FS(0) | 4/3/2022 |
| 13C2-PFTeDA | 33 N | F9365-FS(0) | 4/3/2022 |
| d3-MeFOSAA | 63 | F9365-FS(0) | 4/3/2022 |
| d5-EtFOSAA | 62 | F9365-FS(0) | 4/3/2022 |
| 13C3-PFBS | 56 | F9365-FS(0) | 4/3/2022 |
| 13C3-PFHxS | 58 | F9365-FS(0) | 4/3/2022 |
| 13C8-PFOS | 59 | F9365-FS(0) | 4/3/2022 |
| 13C3-HFPO-DA | 57 | F9365-FS(0) | 4/3/2022 |

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0453
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEFS-FB01-031522 | F9584-FS | Water |
| 2 | VEW10-EB01-031522-GW | F9585-FS | Water |
| 3 | VWFS-FB01-032122 | F9590-FS | Water |
| 4 | VWFS-EB01-032222-SB | F9602-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for two aqueous equipment blank samples and two aqueous field blank samples collected on March 15-22, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation

- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

## Polyfluoroalkyl Substances (PFAS)

## Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

## Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VEFS-FB01-031522 | None - ND | - | - | - |
| VEW10-EB01-031522-GW | None - ND | - | - | - |
| VWFS-FB01-032122 | None - ND | - | - | - |
| VWFS-EB01-032222-SB | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

**Compound Quantitation**

- All criteria were met.

**Field Duplicate Sample Precision**

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEFS-FB01-031522 |
| Battelle ID | F9584-FS |
| Sample Type | SA |
| Collection Date | 03/15/2022 |
| Extraction Date | 03/28/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.263 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.868 | 2.38 | 4.75 |
| PFHpA | 375-85-9 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.894 | 2.38 | 4.75 |
| PFOA | 335-67-1 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.960 | 2.38 | 4.75 |
| PFNA | 375-95-1 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.792 | 2.38 | 4.75 |
| PFDA | 335-76-2 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.745 | 2.38 | 4.75 |
| PFUnA | 2058-94-8 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.715 | 2.38 | 4.75 |
| PFDoA | 307-55-1 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.722 | 2.38 | 4.75 |
| PFTrDA | 72629-94-8 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.705 | 2.38 | 4.75 |
| PFTeDA | 376-06-7 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.752 | 2.38 | 4.75 |
| NMeFOSAA | 2355-31-9 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.979 | 2.38 | 4.75 |
| NEtFOSAA | 2991-50-6 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.941 | 2.38 | 4.75 |
| PFBS | 375-73-5 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.823 | 2.38 | 4.75 |
| PFHxS | 355-46-4 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.948 | 2.38 | 4.75 |
| PFOS | 1763-23-1 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 1.02 | 2.38 | 4.75 |
| HFPO-DA | 13252-13-6 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.822 | 2.38 | 4.75 |
| Adona | 919005-14-4 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.826 | 2.38 | 4.75 |
| 9Cl-PF3ONS | 756426-58-1 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.979 | 2.38 | 4.75 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.38 U | F9584-FS(0) | 1.000 | 4/20/2022 | 0.856 | 2.38 | 4.75 |

MW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/20/2022

BATTELLE
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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-EB01-031522-GW |
| Battelle ID | F9585-FS |
| Sample Type | SA |
| Collection Date | 03/15/2022 |
| Extraction Date | 03/28/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.260 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.878 | 2.40 | 4.81 |
| PFHpA | 375-85-9 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.905 | 2.40 | 4.81 |
| PFOA | 335-67-1 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.971 | 2.40 | 4.81 |
| PFNA | 375-95-1 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.801 | 2.40 | 4.81 |
| PFDA | 335-76-2 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.754 | 2.40 | 4.81 |
| PFUnA | 2058-94-8 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.723 | 2.40 | 4.81 |
| PFDoA | 307-55-1 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.731 | 2.40 | 4.81 |
| PFTrDA | 72629-94-8 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.713 | 2.40 | 4.81 |
| PFTeDA | 376-06-7 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.761 | 2.40 | 4.81 |
| NMeFOSAA | 2355-31-9 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.990 | 2.40 | 4.81 |
| NEtFOSAA | 2991-50-6 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.952 | 2.40 | 4.81 |
| PFBS | 375-73-5 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.833 | 2.40 | 4.81 |
| PFHxS | 355-46-4 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.959 | 2.40 | 4.81 |
| PFOS | 1763-23-1 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 1.03 | 2.40 | 4.81 |
| HFPO-DA | 13252-13-6 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.832 | 2.40 | 4.81 |
| Adona | 919005-14-4 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.836 | 2.40 | 4.81 |
| 9Cl-PF3ONS | 756426-58-1 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.990 | 2.40 | 4.81 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.40 U | F9585-FS(0) | 1.000 | 4/20/2022 | 0.866 | 2.40 | 4.81 |

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It can be done

3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-FB01-032122 |
| Battelle ID | F9590-FS |
| Sample Type | SA |
| Collection Date | 03/21/2022 |
| Extraction Date | 03/28/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.262 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.871 | 2.39 | 4.77 |
| PFHpA | 375-85-9 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.898 | 2.39 | 4.77 |
| PFOA | 335-67-1 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.964 | 2.39 | 4.77 |
| PFNA | 375-95-1 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.795 | 2.39 | 4.77 |
| PFDA | 335-76-2 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.748 | 2.39 | 4.77 |
| PFUnA | 2058-94-8 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.718 | 2.39 | 4.77 |
| PFDoA | 307-55-1 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.725 | 2.39 | 4.77 |
| PFTrDA | 72629-94-8 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.708 | 2.39 | 4.77 |
| PFTeDA | 376-06-7 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.755 | 2.39 | 4.77 |
| NMeFOSAA | 2355-31-9 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.983 | 2.39 | 4.77 |
| NEtFOSAA | 2991-50-6 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.945 | 2.39 | 4.77 |
| PFBS | 375-73-5 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.826 | 2.39 | 4.77 |
| PFHxS | 355-46-4 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.951 | 2.39 | 4.77 |
| PFOS | 1763-23-1 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 1.02 | 2.39 | 4.77 |
| HFPO-DA | 13252-13-6 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.825 | 2.39 | 4.77 |
| Adona | 919005-14-4 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.829 | 2.39 | 4.77 |
| 9Cl-PF3ONS | 756426-58-1 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.983 | 2.39 | 4.77 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.39 U | F9590-FS(0) | 1.000 | 4/20/2022 | 0.860 | 2.39 | 4.77 |

MW 8/14/22

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It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VWFS-EB01-032222-SB |
| Battelle ID | F9602-FS |
| Sample Type | SA |
| Collection Date | 03/22/2022 |
| Extraction Date | 03/28/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.276 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.827 | 2.26 | 4.53 |
| PFHpA | 375-85-9 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.852 | 2.26 | 4.53 |
| PFOA | 335-67-1 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.915 | 2.26 | 4.53 |
| PFNA | 375-95-1 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.755 | 2.26 | 4.53 |
| PFDA | 335-76-2 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.710 | 2.26 | 4.53 |
| PFUnA | 2058-94-8 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.681 | 2.26 | 4.53 |
| PFDoA | 307-55-1 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.688 | 2.26 | 4.53 |
| PFTrDA | 72629-94-8 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.672 | 2.26 | 4.53 |
| PFTeDA | 376-06-7 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.716 | 2.26 | 4.53 |
| NMeFOSAA | 2355-31-9 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.933 | 2.26 | 4.53 |
| NEtFOSAA | 2991-50-6 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.897 | 2.26 | 4.53 |
| PFBS | 375-73-5 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.784 | 2.26 | 4.53 |
| PFHxS | 355-46-4 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.903 | 2.26 | 4.53 |
| PFOS | 1763-23-1 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.969 | 2.26 | 4.53 |
| HFPO-DA | 13252-13-6 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.784 | 2.26 | 4.53 |
| Adona | 919005-14-4 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.787 | 2.26 | 4.53 |
| 9Cl-PF3ONS | 756426-58-1 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.933 | 2.26 | 4.53 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.26 U | F9602-FS(0) | 1.000 | 4/20/2022 | 0.816 | 2.26 | 4.53 |

MW 8/14/22

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0454
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEFS-PFAS-SB02-0406 | F9582-FS | Soil |
| 2 | VEFS-PFAS-SB01-0406 | F9583-FS | Soil |
| 3 | VWFS-PFAS-SB02-0406 | F9588-FS | Soil |
| 4 | VWFS-PFAS-SB02P-0406 | F9589-FS | Soil |
| 5 | VWFS-PFAS-SB01-0406 | F9593-FS | Soil |
| 6 | VWFS-PFAS-SB04-0406 | F9595-FS | Soil |
| 7 | VWFS-PFAS-SB03-0406 | F9599-FS | Soil |
| 7MS | VWFS-PFAS-SB03-0406MS | F9600-FSMS | Soil |
| 7MSD | VWFS-PFAS-SB03-0406MSD | F9601-FSMSD | Soil |
| 8 | VWFS-PFAS-SB05-0406 | F9604-FS | Soil |
| 9 | VWFS-PFAS-SB05D-5860 | F9605-FS | Soil |

A Stage 2B/4 data validation was performed on the analytical data for nine soil samples collected on March 14-23, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VEW10-EB01-030922-SB | None - ND | - | - | - |
| VWFS-EB01-032222-SB | None - ND | - | - | - |
| VEFS-FB01-031522 | None - ND | - | - | - |
| VWFS-FB01-032122 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

| EDS Sample | Surrogate | %R | Qualifier |
|---|---|---|---|
| 9 | 13C2-PFTeDA | 45% | UJ - Associated Cmpd |

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values except for the following.

| MS/MSD Sample | Compound | MS %R/MSD %R/RPD | Qualifier | Affected Samples |
|---|---|---|---|---|
| 7 | PFOS | 164%/146%/OK | J | 7 |

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- EDS Samples 4, 5, and 6 were analyzed at a 5X dilution for PFOS. The reporting limits were adjusted accordingly. No action was required.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was unacceptable for PFOS. These results were qualified as estimated (J).

| Compound | VWFS-PFAS-SB02-0406 ng/g | VWFS-PFAS-SB02P-0406 ng/g | RPD | Qualifier |
|---|---|---|---|---|
| PFHxA | 0.663 | 0.772 | 15% | None |
| PFHpA | 0.491 | 0.654 | 28% | |
| PFOA | 0.232 | 0.331 | 35% | |
| PFNA | 2.19 | 3.55 | 47% | None - <5X LOQ |
| PFOS | 57.9 | 92.3 | 46% | J |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEFS-PFAS-SB02-0406 |
| Battelle ID | F9582-FS |
| Sample Type | SA |
| Collection Date | 03/14/2022 |
| Extraction Date | 03/28/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 5.33 |
| Matrix | SO |
| Sample Size | 4.820 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.212 J | F9582-FS(0) | 1.000 | 4/20/2022 | 0.185 | 0.519 | 1.04 |
| PFHpA | 375-85-9 | 0.327 J | F9582-FS(0) | 1.000 | 4/20/2022 | 0.174 | 0.519 | 1.04 |
| PFOA | 335-67-1 | 5.78 | F9582-FS(0) | 1.000 | 4/20/2022 | 0.222 | 0.519 | 1.04 |
| PFNA | 375-95-1 | 0.519 U | F9582-FS(0) | 1.000 | 4/20/2022 | 0.163 | 0.519 | 1.04 |
| PFDA | 335-76-2 | 0.519 U | F9582-FS(0) | 1.000 | 4/20/2022 | 0.164 | 0.519 | 1.04 |
| PFUnA | 2058-94-8 | 0.519 U | F9582-FS(0) | 1.000 | 4/20/2022 | 0.162 | 0.519 | 1.04 |
| PFDoA | 307-55-1 | 0.519 U | F9582-FS(0) | 1.000 | 4/20/2022 | 0.166 | 0.519 | 1.04 |
| PFTrDA | 72629-94-8 | 0.519 U | F9582-FS(0) | 1.000 | 4/20/2022 | 0.167 | 0.519 | 1.04 |
| PFTeDA | 376-06-7 | 0.519 U | F9582-FS(0) | 1.000 | 4/20/2022 | 0.168 | 0.519 | 2.07 |
| NMeFOSAA | 2355-31-9 | 0.519 U | F9582-FS(0) | 1.000 | 4/20/2022 | 0.165 | 0.519 | 2.07 |
| NEtFOSAA | 2991-50-6 | 0.519 U | F9582-FS(0) | 1.000 | 4/20/2022 | 0.171 | 0.519 | 2.07 |
| PFBS | 375-73-5 | 0.519 U | F9582-FS(0) | 1.000 | 4/20/2022 | 0.177 | 0.519 | 1.04 |
| PFHxS | 355-46-4 | 19.8 | F9582-FS(0) | 1.000 | 4/20/2022 | 0.179 | 0.519 | 1.04 |
| PFOS | 1763-23-1 | 26.7 | F9582-FS(0) | 1.000 | 4/20/2022 | 0.182 | 0.519 | 1.04 |
| HFPO-DA | 13252-13-6 | 0.519 U | F9582-FS(0) | 1.000 | 4/20/2022 | 0.165 | 0.519 | 2.07 |
| Adona | 919005-14-4 | 0.519 U | F9582-FS(0) | 1.000 | 4/20/2022 | 0.166 | 0.519 | 2.07 |
| 9Cl-PF3ONS | 756426-58-1 | 0.519 U | F9582-FS(0) | 1.000 | 4/20/2022 | 0.160 | 0.519 | 2.07 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.519 U | F9582-FS(0) | 1.000 | 4/20/2022 | 0.156 | 0.519 | 2.07 |

MW 8/14/22

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It can be done

2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEFS-PFAS-SB01-0406 |
| Battelle ID | F9583-FS |
| Sample Type | SA |
| Collection Date | 03/15/2022 |
| Extraction Date | 03/28/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 5.93 |
| Matrix | SO |
| Sample Size | 4.750 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.526 U | F9583-FS(0) | 1.000 | 4/20/2022 | 0.187 | 0.526 | 1.05 |
| PFHpA | 375-85-9 | 0.306 J | F9583-FS(0) | 1.000 | 4/20/2022 | 0.177 | 0.526 | 1.05 |
| PFOA | 335-67-1 | 1.10 | F9583-FS(0) | 1.000 | 4/20/2022 | 0.225 | 0.526 | 1.05 |
| PFNA | 375-95-1 | 0.526 U | F9583-FS(0) | 1.000 | 4/20/2022 | 0.165 | 0.526 | 1.05 |
| PFDA | 335-76-2 | 0.526 U | F9583-FS(0) | 1.000 | 4/20/2022 | 0.166 | 0.526 | 1.05 |
| PFUnA | 2058-94-8 | 0.526 U | F9583-FS(0) | 1.000 | 4/20/2022 | 0.164 | 0.526 | 1.05 |
| PFDoA | 307-55-1 | 0.526 U | F9583-FS(0) | 1.000 | 4/20/2022 | 0.168 | 0.526 | 1.05 |
| PFTrDA | 72629-94-8 | 0.526 U | F9583-FS(0) | 1.000 | 4/20/2022 | 0.169 | 0.526 | 1.05 |
| PFTeDA | 376-06-7 | 0.526 U | F9583-FS(0) | 1.000 | 4/20/2022 | 0.171 | 0.526 | 2.11 |
| NMeFOSAA | 2355-31-9 | 0.526 U | F9583-FS(0) | 1.000 | 4/20/2022 | 0.167 | 0.526 | 2.11 |
| NEtFOSAA | 2991-50-6 | 0.526 U | F9583-FS(0) | 1.000 | 4/20/2022 | 0.174 | 0.526 | 2.11 |
| PFBS | 375-73-5 | 0.526 U | F9583-FS(0) | 1.000 | 4/20/2022 | 0.180 | 0.526 | 1.05 |
| PFHxS | 355-46-4 | 8.44 | F9583-FS(0) | 1.000 | 4/20/2022 | 0.182 | 0.526 | 1.05 |
| PFOS | 1763-23-1 | 0.324 J | F9583-FS(0) | 1.000 | 4/20/2022 | 0.184 | 0.526 | 1.05 |
| HFPO-DA | 13252-13-6 | 0.526 U | F9583-FS(0) | 1.000 | 4/20/2022 | 0.167 | 0.526 | 2.11 |
| Adona | 919005-14-4 | 0.526 U | F9583-FS(0) | 1.000 | 4/20/2022 | 0.168 | 0.526 | 2.11 |
| 9Cl-PF3ONS | 756426-58-1 | 0.526 U | F9583-FS(0) | 1.000 | 4/20/2022 | 0.162 | 0.526 | 2.11 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.526 U | F9583-FS(0) | 1.000 | 4/20/2022 | 0.158 | 0.526 | 2.11 |

MW 8/14/22

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It can be done

3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-SB02-0406 |
| Battelle ID | F9588-FS |
| Sample Type | SA |
| Collection Date | 03/21/2022 |
| Extraction Date | 03/28/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 7.17 |
| Matrix | SO |
| Sample Size | 4.650 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.663 J | F9588-FS(0) | 1.000 | 4/20/2022 | 0.191 | 0.538 | 1.08 | |
| PFHpA | 375-85-9 | 0.491 J | F9588-FS(0) | 1.000 | 4/20/2022 | 0.181 | 0.538 | 1.08 | |
| PFOA | 335-67-1 | 0.232 J | F9588-FS(0) | 1.000 | 4/20/2022 | 0.230 | 0.538 | 1.08 | |
| PFNA | 375-95-1 | 2.19 | F9588-FS(0) | 1.000 | 4/20/2022 | 0.169 | 0.538 | 1.08 | |
| PFDA | 335-76-2 | 0.538 U | F9588-FS(0) | 1.000 | 4/20/2022 | 0.170 | 0.538 | 1.08 | |
| PFUnA | 2058-94-8 | 0.538 U | F9588-FS(0) | 1.000 | 4/20/2022 | 0.168 | 0.538 | 1.08 | |
| PFDoA | 307-55-1 | 0.538 U | F9588-FS(0) | 1.000 | 4/20/2022 | 0.172 | 0.538 | 1.08 | |
| PFTrDA | 72629-94-8 | 0.538 U | F9588-FS(0) | 1.000 | 4/20/2022 | 0.173 | 0.538 | 1.08 | |
| PFTeDA | 376-06-7 | 0.538 U | F9588-FS(0) | 1.000 | 4/20/2022 | 0.174 | 0.538 | 2.15 | |
| NMeFOSAA | 2355-31-9 | 0.538 U | F9588-FS(0) | 1.000 | 4/20/2022 | 0.171 | 0.538 | 2.15 | |
| NEtFOSAA | 2991-50-6 | 0.538 U | F9588-FS(0) | 1.000 | 4/20/2022 | 0.177 | 0.538 | 2.15 | |
| PFBS | 375-73-5 | 0.538 U | F9588-FS(0) | 1.000 | 4/20/2022 | 0.184 | 0.538 | 1.08 | |
| PFHxS | 355-46-4 | 0.538 U | F9588-FS(0) | 1.000 | 4/20/2022 | 0.186 | 0.538 | 1.08 | |
| PFOS | 1763-23-1 | 57.9 J | F9588-FS(0) | 1.000 | 4/20/2022 | 0.188 | 0.538 | 1.08 | FO |
| HFPO-DA | 13252-13-6 | 0.538 U | F9588-FS(0) | 1.000 | 4/20/2022 | 0.171 | 0.538 | 2.15 | |
| Adona | 919005-14-4 | 0.538 U | F9588-FS(0) | 1.000 | 4/20/2022 | 0.172 | 0.538 | 2.15 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.538 U | F9588-FS(0) | 1.000 | 4/20/2022 | 0.166 | 0.538 | 2.15 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.538 U | F9588-FS(0) | 1.000 | 4/20/2022 | 0.161 | 0.538 | 2.15 | |

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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-SB02P-0406 |
| Battelle ID | F9589-FS |
| Sample Type | SA |
| Collection Date | 03/21/2022 |
| Extraction Date | 03/28/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 7.23 |
| Matrix | SO |
| Sample Size | 4.650 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.772 J | F9589-FS(0) | 1.000 | 4/20/2022 | 0.191 | 0.538 | 1.08 | |
| PFHpA | 375-85-9 | 0.654 J | F9589-FS(0) | 1.000 | 4/20/2022 | 0.181 | 0.538 | 1.08 | |
| PFOA | 335-67-1 | 0.331 J | F9589-FS(0) | 1.000 | 4/20/2022 | 0.230 | 0.538 | 1.08 | |
| PFNA | 375-95-1 | 3.55 | F9589-FS(0) | 1.000 | 4/20/2022 | 0.169 | 0.538 | 1.08 | |
| PFDA | 335-76-2 | 0.538 U | F9589-FS(0) | 1.000 | 4/20/2022 | 0.170 | 0.538 | 1.08 | |
| PFUnA | 2058-94-8 | 0.538 U | F9589-FS(0) | 1.000 | 4/20/2022 | 0.168 | 0.538 | 1.08 | |
| PFDoA | 307-55-1 | 0.538 U | F9589-FS(0) | 1.000 | 4/20/2022 | 0.172 | 0.538 | 1.08 | |
| PFTrDA | 72629-94-8 | 0.538 U | F9589-FS(0) | 1.000 | 4/20/2022 | 0.173 | 0.538 | 1.08 | |
| PFTeDA | 376-06-7 | 0.538 U | F9589-FS(0) | 1.000 | 4/20/2022 | 0.174 | 0.538 | 2.15 | |
| NMeFOSAA | 2355-31-9 | 0.538 U | F9589-FS(0) | 1.000 | 4/20/2022 | 0.171 | 0.538 | 2.15 | |
| NEtFOSAA | 2991-50-6 | 0.538 U | F9589-FS(0) | 1.000 | 4/20/2022 | 0.177 | 0.538 | 2.15 | |
| PFBS | 375-73-5 | 0.538 U | F9589-FS(0) | 1.000 | 4/20/2022 | 0.184 | 0.538 | 1.08 | |
| PFHxS | 355-46-4 | 0.538 U | F9589-FS(0) | 1.000 | 4/20/2022 | 0.186 | 0.538 | 1.08 | |
| PFOS | 1763-23-1 | 92.3 D J | F9589-FS-D(3) | 5.000 | 4/20/2022 | 0.941 | 2.69 | 5.38 | FD |
| HFPO-DA | 13252-13-6 | 0.538 U | F9589-FS(0) | 1.000 | 4/20/2022 | 0.171 | 0.538 | 2.15 | |
| Adona | 919005-14-4 | 0.538 U | F9589-FS(0) | 1.000 | 4/20/2022 | 0.172 | 0.538 | 2.15 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.538 U | F9589-FS(0) | 1.000 | 4/20/2022 | 0.166 | 0.538 | 2.15 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.538 U | F9589-FS(0) | 1.000 | 4/20/2022 | 0.161 | 0.538 | 2.15 | |

MW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/20/2022

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5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-SB01-0406 |
| Battelle ID | F9593-FS |
| Sample Type | SA |
| Collection Date | 03/22/2022 |
| Extraction Date | 03/28/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 6.37 |
| Matrix | SO |
| Sample Size | 4.630 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.403 J | F9593-FS(0) | 1.000 | 4/20/2022 | 0.192 | 0.540 | 1.08 |
| PFHpA | 375-85-9 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.181 | 0.540 | 1.08 |
| PFOA | 335-67-1 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.231 | 0.540 | 1.08 |
| PFNA | 375-95-1 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.170 | 0.540 | 1.08 |
| PFDA | 335-76-2 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.171 | 0.540 | 1.08 |
| PFUnA | 2058-94-8 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.168 | 0.540 | 1.08 |
| PFDoA | 307-55-1 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.173 | 0.540 | 1.08 |
| PFTrDA | 72629-94-8 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.174 | 0.540 | 1.08 |
| PFTeDA | 376-06-7 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.175 | 0.540 | 2.16 |
| NMeFOSAA | 2355-31-9 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.172 | 0.540 | 2.16 |
| NEtFOSAA | 2991-50-6 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.178 | 0.540 | 2.16 |
| PFBS | 375-73-5 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.185 | 0.540 | 1.08 |
| PFHxS | 355-46-4 | 2.87 | F9593-FS(0) | 1.000 | 4/20/2022 | 0.187 | 0.540 | 1.08 |
| PFOS | 1763-23-1 | 102 | F9593-FS-D(3) | 5.000 | 4/20/2022 | 0.945 | 2.70 | 5.40 |
| HFPO-DA | 13252-13-6 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.172 | 0.540 | 2.16 |
| Adona | 919005-14-4 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.173 | 0.540 | 2.16 |
| 9Cl-PF3ONS | 756426-58-1 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.166 | 0.540 | 2.16 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.540 U | F9593-FS(0) | 1.000 | 4/20/2022 | 0.162 | 0.540 | 2.16 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-SB04-0406 |
| Battelle ID | F9595-FS |
| Sample Type | SA |
| Collection Date | 03/22/2022 |
| Extraction Date | 03/28/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 6.31 |
| Matrix | SO |
| Sample Size | 4.730 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.277 J | F9595-FS(0) | 1.000 | 4/20/2022 | 0.188 | 0.529 | 1.06 |
| PFHpA | 375-85-9 | 0.529 U | F9595-FS(0) | 1.000 | 4/20/2022 | 0.178 | 0.529 | 1.06 |
| PFOA | 335-67-1 | 0.529 U | F9595-FS(0) | 1.000 | 4/20/2022 | 0.226 | 0.529 | 1.06 |
| PFNA | 375-95-1 | 0.471 J | F9595-FS(0) | 1.000 | 4/20/2022 | 0.166 | 0.529 | 1.06 |
| PFDA | 335-76-2 | 0.264 J | F9595-FS(0) | 1.000 | 4/20/2022 | 0.167 | 0.529 | 1.06 |
| PFUnA | 2058-94-8 | 0.529 U | F9595-FS(0) | 1.000 | 4/20/2022 | 0.165 | 0.529 | 1.06 |
| PFDoA | 307-55-1 | 0.529 U | F9595-FS(0) | 1.000 | 4/20/2022 | 0.169 | 0.529 | 1.06 |
| PFTrDA | 72629-94-8 | 0.529 U | F9595-FS(0) | 1.000 | 4/20/2022 | 0.170 | 0.529 | 1.06 |
| PFTeDA | 376-06-7 | 0.529 U | F9595-FS(0) | 1.000 | 4/20/2022 | 0.171 | 0.529 | 2.11 |
| NMeFOSAA | 2355-31-9 | 0.529 U | F9595-FS(0) | 1.000 | 4/20/2022 | 0.168 | 0.529 | 2.11 |
| NEtFOSAA | 2991-50-6 | 0.529 U | F9595-FS(0) | 1.000 | 4/20/2022 | 0.174 | 0.529 | 2.11 |
| PFBS | 375-73-5 | 0.529 U | F9595-FS(0) | 1.000 | 4/20/2022 | 0.181 | 0.529 | 1.06 |
| PFHxS | 355-46-4 | 0.230 J | F9595-FS(0) | 1.000 | 4/20/2022 | 0.183 | 0.529 | 1.06 |
| PFOS | 1763-23-1 | 104 | F9595-FS-D(3) | 5.000 | 4/20/2022 | 0.925 | 2.64 | 5.29 |
| HFPO-DA | 13252-13-6 | 0.529 U | F9595-FS(0) | 1.000 | 4/20/2022 | 0.168 | 0.529 | 2.11 |
| Adona | 919005-14-4 | 0.529 U | F9595-FS(0) | 1.000 | 4/20/2022 | 0.169 | 0.529 | 2.11 |
| 9Cl-PF3ONS | 756426-58-1 | 0.529 U | F9595-FS(0) | 1.000 | 4/20/2022 | 0.163 | 0.529 | 2.11 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.529 U | F9595-FS(0) | 1.000 | 4/20/2022 | 0.159 | 0.529 | 2.11 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-SB03-0406 |
| Battelle ID | F9599-FS |
| Sample Type | SA |
| Collection Date | 03/22/2022 |
| Extraction Date | 03/28/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 12.14 |
| Matrix | SO |
| Sample Size | 4.360 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.204 | 0.573 | 1.15 | |
| PFHpA | 375-85-9 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.193 | 0.573 | 1.15 | |
| PFOA | 335-67-1 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.245 | 0.573 | 1.15 | |
| PFNA | 375-95-1 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.180 | 0.573 | 1.15 | |
| PFDA | 335-76-2 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.181 | 0.573 | 1.15 | |
| PFUnA | 2058-94-8 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.179 | 0.573 | 1.15 | |
| PFDoA | 307-55-1 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.183 | 0.573 | 1.15 | |
| PFTrDA | 72629-94-8 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.185 | 0.573 | 1.15 | |
| PFTeDA | 376-06-7 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.186 | 0.573 | 2.29 | |
| NMeFOSAA | 2355-31-9 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.182 | 0.573 | 2.29 | |
| NEtFOSAA | 2991-50-6 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.189 | 0.573 | 2.29 | |
| PFBS | 375-73-5 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.196 | 0.573 | 1.15 | |
| PFHxS | 355-46-4 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.198 | 0.573 | 1.15 | |
| PFOS | 1763-23-1 | 8.37 J | F9599-FS(0) | 1.000 | 4/20/2022 | 0.201 | 0.573 | 1.15 | MSH |
| HFPO-DA | 13252-13-6 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.182 | 0.573 | 2.29 | |
| Adona | 919005-14-4 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.183 | 0.573 | 2.29 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.177 | 0.573 | 2.29 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.573 U | F9599-FS(0) | 1.000 | 4/20/2022 | 0.172 | 0.573 | 2.29 | |

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Analyzed by: Griffith, Lauren
Printed: 4/20/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-SB05-0406 |
| Battelle ID | F9604-FS |
| Sample Type | SA |
| Collection Date | 03/23/2022 |
| Extraction Date | 03/28/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 12.17 |
| Matrix | SO |
| Sample Size | 4.440 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.200 | 0.563 | 1.13 |
| PFHpA | 375-85-9 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.189 | 0.563 | 1.13 |
| PFOA | 335-67-1 | 0.362 J | F9604-FS(0) | 1.000 | 4/20/2022 | 0.241 | 0.563 | 1.13 |
| PFNA | 375-95-1 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.177 | 0.563 | 1.13 |
| PFDA | 335-76-2 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.178 | 0.563 | 1.13 |
| PFUnA | 2058-94-8 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.176 | 0.563 | 1.13 |
| PFDoA | 307-55-1 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.180 | 0.563 | 1.13 |
| PFTrDA | 72629-94-8 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.181 | 0.563 | 1.13 |
| PFTeDA | 376-06-7 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.182 | 0.563 | 2.25 |
| NMeFOSAA | 2355-31-9 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.179 | 0.563 | 2.25 |
| NEtFOSAA | 2991-50-6 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.186 | 0.563 | 2.25 |
| PFBS | 375-73-5 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.193 | 0.563 | 1.13 |
| PFHxS | 355-46-4 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.195 | 0.563 | 1.13 |
| PFOS | 1763-23-1 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.197 | 0.563 | 1.13 |
| HFPO-DA | 13252-13-6 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.179 | 0.563 | 2.25 |
| Adona | 919005-14-4 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.180 | 0.563 | 2.25 |
| 9Cl-PF3ONS | 756426-58-1 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.173 | 0.563 | 2.25 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.563 U | F9604-FS(0) | 1.000 | 4/20/2022 | 0.169 | 0.563 | 2.25 |

MW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/20/2022

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9

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-SB05D-5860 |
| Battelle ID | F9605-FS |
| Sample Type | SA |
| Collection Date | 03/23/2022 |
| Extraction Date | 03/28/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 19.46 |
| Matrix | SO |
| Sample Size | 4.030 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.221 | 0.620 | 1.24 | |
| PFHpA | 375-85-9 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.208 | 0.620 | 1.24 | |
| PFOA | 335-67-1 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.266 | 0.620 | 1.24 | |
| PFNA | 375-95-1 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.195 | 0.620 | 1.24 | |
| PFDA | 335-76-2 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.196 | 0.620 | 1.24 | |
| PFUnA | 2058-94-8 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.194 | 0.620 | 1.24 | |
| PFDoA | 307-55-1 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.199 | 0.620 | 1.24 | |
| PFTrDA | 72629-94-8 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.200 | 0.620 | 1.24 | |
| PFTeDA | 376-06-7 | 0.620 UJ | F9605-FS(0) | 1.000 | 4/20/2022 | 0.201 | 0.620 | 2.48 | SSL |
| NMeFOSAA | 2355-31-9 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.197 | 0.620 | 2.48 | |
| NEtFOSAA | 2991-50-6 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.205 | 0.620 | 2.48 | |
| PFBS | 375-73-5 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.212 | 0.620 | 1.24 | |
| PFHxS | 355-46-4 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.215 | 0.620 | 1.24 | |
| PFOS | 1763-23-1 | 3.75 | F9605-FS(0) | 1.000 | 4/20/2022 | 0.217 | 0.620 | 1.24 | |
| HFPO-DA | 13252-13-6 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.197 | 0.620 | 2.48 | |
| Adona | 919005-14-4 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.199 | 0.620 | 2.48 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.191 | 0.620 | 2.48 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.620 U | F9605-FS(0) | 1.000 | 4/20/2022 | 0.186 | 0.620 | 2.48 | |

MW 8/14/22

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0455
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VWFS-PFAS-SS02-0001 | F9586-FS | Soil |
| 2 | VWFS-PFAS-SS02P-0001 | F9587-FS | Soil |
| 3 | VWFS-PFAS-SS01-0001 | F9591-FS | Soil |
| 4 | VWFS-PFAS-SS01P-0001 | F9592-FS | Soil |
| 5 | VWFS-PFAS-SS04-0001 | F9594-FS | Soil |
| 6 | VWFS-PFAS-SS03-0001 | F9596-FS | Soil |
| 6MS | VWFS-PFAS-SS03-0001MS | F9597-FSMS | Soil |
| 6MSD | VWFS-PFAS-SS03-0001MSD | F9598-FSMSD | Soil |
| 7 | VWFS-PFAS-SS05-0001 | F9603-FS | Soil |

A Stage 2B/4 data validation was performed on the analytical data for sevn soil samples collected on February 21-23, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

### LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWFS-FB01-032122 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was unacceptable for PFOS in one field duplicate pair. These results were qualified as estimated (J).

| Compound | VWFS-PFAS-SS02-0001 ng/g | VWFS-PFAS-SS02P-0001 ng/g | RPD | Qualifier |
|---|---|---|---|---|
| PFHxA | 0.710 | 0.507U | NC | None |
| PFHpA | 0.524 | 0.507U | NC | |
| PFOA | 0.552 | 0.507U | NC | |
| PFNA | 0.858 | 0.335 | 88% | None - <5X LOQ |
| PFDA | 0.655 | 0.411 | 46% | |
| PFUnA | 1.78 | 1.54 | 14% | None |
| PFDoA | 0.497U | 0.179 | NC | |
| PFOS | 13.3 | 9.87 | 30% | |

| Compound | VWFS-PFAS-SS01-0001 ng/g | VWFS-PFAS-SS01P-0001 ng/g | RPD | Qualifier |
|---|---|---|---|---|
| PFHxA | 0.709 | 1.16 | 48% | None - <5X LOQ |
| PFOA | 0.349 | 0.405 | 15% | None |
| PFNA | 0.500U | 0.467 | NC | |
| PFHxS | 0.436 | 0.445 | 2% | |
| PFOS | 27.2 | 69.4 | 87% | J |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-SS02-0001 |
| Battelle ID | F9586-FS |
| Sample Type | SA |
| Collection Date | 03/21/2022 |
| Extraction Date | 03/29/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 11.02 |
| Matrix | SO |
| Sample Size | 5.030 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.710 J | F9586-FS(0) | 1.000 | 4/20/2022 | 0.177 | 0.497 | 0.994 |
| PFHpA | 375-85-9 | 0.524 J | F9586-FS(0) | 1.000 | 4/20/2022 | 0.167 | 0.497 | 0.994 |
| PFOA | 335-67-1 | 0.552 J | F9586-FS(0) | 1.000 | 4/20/2022 | 0.213 | 0.497 | 0.994 |
| PFNA | 375-95-1 | 0.858 J | F9586-FS(0) | 1.000 | 4/20/2022 | 0.156 | 0.497 | 0.994 |
| PFDA | 335-76-2 | 0.655 J | F9586-FS(0) | 1.000 | 4/20/2022 | 0.157 | 0.497 | 0.994 |
| PFUnA | 2058-94-8 | 1.78 | F9586-FS(0) | 1.000 | 4/20/2022 | 0.155 | 0.497 | 0.994 |
| PFDoA | 307-55-1 | 0.497 U | F9586-FS(0) | 1.000 | 4/20/2022 | 0.159 | 0.497 | 0.994 |
| PFTrDA | 72629-94-8 | 0.497 U | F9586-FS(0) | 1.000 | 4/20/2022 | 0.160 | 0.497 | 0.994 |
| PFTeDA | 376-06-7 | 0.497 U | F9586-FS(0) | 1.000 | 4/20/2022 | 0.161 | 0.497 | 1.99 |
| NMeFOSAA | 2355-31-9 | 0.497 U | F9586-FS(0) | 1.000 | 4/20/2022 | 0.158 | 0.497 | 1.99 |
| NEtFOSAA | 2991-50-6 | 0.497 U | F9586-FS(0) | 1.000 | 4/20/2022 | 0.164 | 0.497 | 1.99 |
| PFBS | 375-73-5 | 0.497 U | F9586-FS(0) | 1.000 | 4/20/2022 | 0.170 | 0.497 | 0.994 |
| PFHxS | 355-46-4 | 0.497 U | F9586-FS(0) | 1.000 | 4/20/2022 | 0.172 | 0.497 | 0.994 |
| PFOS | 1763-23-1 | 13.3 | F9586-FS(0) | 1.000 | 4/20/2022 | 0.174 | 0.497 | 0.994 |
| HFPO-DA | 13252-13-6 | 0.497 U | F9586-FS(0) | 1.000 | 4/20/2022 | 0.158 | 0.497 | 1.99 |
| Adona | 919005-14-4 | 0.497 U | F9586-FS(0) | 1.000 | 4/20/2022 | 0.159 | 0.497 | 1.99 |
| 9Cl-PF3ONS | 756426-58-1 | 0.497 U | F9586-FS(0) | 1.000 | 4/20/2022 | 0.153 | 0.497 | 1.99 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.497 U | F9586-FS(0) | 1.000 | 4/20/2022 | 0.149 | 0.497 | 1.99 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-SS02P-0001 |
| Battelle ID | F9587-FS |
| Sample Type | SA |
| Collection Date | 03/21/2022 |
| Extraction Date | 03/29/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 9.96 |
| Matrix | SO |
| Sample Size | 4.930 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.507 U | F9587-FS(0) | 1.000 | 4/20/2022 | 0.181 | 0.507 | 1.01 |
| PFHpA | 375-85-9 | 0.507 U | F9587-FS(0) | 1.000 | 4/20/2022 | 0.170 | 0.507 | 1.01 |
| PFOA | 335-67-1 | 0.507 U | F9587-FS(0) | 1.000 | 4/20/2022 | 0.217 | 0.507 | 1.01 |
| PFNA | 375-95-1 | 0.335 J | F9587-FS(0) | 1.000 | 4/20/2022 | 0.159 | 0.507 | 1.01 |
| PFDA | 335-76-2 | 0.411 J | F9587-FS(0) | 1.000 | 4/20/2022 | 0.160 | 0.507 | 1.01 |
| PFUnA | 2058-94-8 | 1.54 | F9587-FS(0) | 1.000 | 4/20/2022 | 0.158 | 0.507 | 1.01 |
| PFDoA | 307-55-1 | 0.179 J | F9587-FS(0) | 1.000 | 4/20/2022 | 0.162 | 0.507 | 1.01 |
| PFTrDA | 72629-94-8 | 0.507 U | F9587-FS(0) | 1.000 | 4/20/2022 | 0.163 | 0.507 | 1.01 |
| PFTeDA | 376-06-7 | 0.507 U | F9587-FS(0) | 1.000 | 4/20/2022 | 0.164 | 0.507 | 2.03 |
| NMeFOSAA | 2355-31-9 | 0.507 U | F9587-FS(0) | 1.000 | 4/20/2022 | 0.161 | 0.507 | 2.03 |
| NEtFOSAA | 2991-50-6 | 0.507 U | F9587-FS(0) | 1.000 | 4/20/2022 | 0.167 | 0.507 | 2.03 |
| PFBS | 375-73-5 | 0.507 U | F9587-FS(0) | 1.000 | 4/20/2022 | 0.173 | 0.507 | 1.01 |
| PFHxS | 355-46-4 | 0.507 U | F9587-FS(0) | 1.000 | 4/20/2022 | 0.175 | 0.507 | 1.01 |
| PFOS | 1763-23-1 | 9.87 | F9587-FS(0) | 1.000 | 4/20/2022 | 0.177 | 0.507 | 1.01 |
| HFPO-DA | 13252-13-6 | 0.507 U | F9587-FS(0) | 1.000 | 4/20/2022 | 0.161 | 0.507 | 2.03 |
| Adona | 919005-14-4 | 0.507 U | F9587-FS(0) | 1.000 | 4/20/2022 | 0.162 | 0.507 | 2.03 |
| 9Cl-PF3ONS | 756426-58-1 | 0.507 U | F9587-FS(0) | 1.000 | 4/20/2022 | 0.156 | 0.507 | 2.03 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.507 U | F9587-FS(0) | 1.000 | 4/20/2022 | 0.152 | 0.507 | 2.03 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VWFS-PFAS-SS01-0001 |
| Battelle ID | F9591-FS |
| Sample Type | SA |
| Collection Date | 03/22/2022 |
| Extraction Date | 03/29/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 6.63 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.709 J | F9591-FS(0) | 1.000 | 4/20/2022 | 0.178 | 0.500 | 1.00 | |
| PFHpA | 375-85-9 | 0.500 U | F9591-FS(0) | 1.000 | 4/20/2022 | 0.168 | 0.500 | 1.00 | |
| PFOA | 335-67-1 | 0.349 J | F9591-FS(0) | 1.000 | 4/20/2022 | 0.214 | 0.500 | 1.00 | |
| PFNA | 375-95-1 | 0.500 U | F9591-FS(0) | 1.000 | 4/20/2022 | 0.157 | 0.500 | 1.00 | |
| PFDA | 335-76-2 | 0.500 U | F9591-FS(0) | 1.000 | 4/20/2022 | 0.158 | 0.500 | 1.00 | |
| PFUnA | 2058-94-8 | 0.500 U | F9591-FS(0) | 1.000 | 4/20/2022 | 0.156 | 0.500 | 1.00 | |
| PFDoA | 307-55-1 | 0.500 U | F9591-FS(0) | 1.000 | 4/20/2022 | 0.160 | 0.500 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.500 U | F9591-FS(0) | 1.000 | 4/20/2022 | 0.161 | 0.500 | 1.00 | |
| PFTeDA | 376-06-7 | 0.500 U | F9591-FS(0) | 1.000 | 4/20/2022 | 0.162 | 0.500 | 2.00 | |
| NMeFOSAA | 2355-31-9 | 0.500 U | F9591-FS(0) | 1.000 | 4/20/2022 | 0.159 | 0.500 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.500 U | F9591-FS(0) | 1.000 | 4/20/2022 | 0.165 | 0.500 | 2.00 | |
| PFBS | 375-73-5 | 0.500 U | F9591-FS(0) | 1.000 | 4/20/2022 | 0.171 | 0.500 | 1.00 | |
| PFHxS | 355-46-4 | 0.436 J | F9591-FS(0) | 1.000 | 4/20/2022 | 0.173 | 0.500 | 1.00 | |
| PFOS | 1763-23-1 | 27.2 J | F9591-FS(0) | 1.000 | 4/20/2022 | 0.175 | 0.500 | 1.00 | FO |
| HFPO-DA | 13252-13-6 | 0.500 U | F9591-FS(0) | 1.000 | 4/20/2022 | 0.159 | 0.500 | 2.00 | |
| Adona | 919005-14-4 | 0.500 U | F9591-FS(0) | 1.000 | 4/20/2022 | 0.160 | 0.500 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 U | F9591-FS(0) | 1.000 | 4/20/2022 | 0.154 | 0.500 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 U | F9591-FS(0) | 1.000 | 4/20/2022 | 0.150 | 0.500 | 2.00 | |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-SS01P-0001 |
| Battelle ID | F9592-FS |
| Sample Type | SA |
| Collection Date | 03/22/2022 |
| Extraction Date | 03/29/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 8.00 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 1.16 | F9592-FS(0) | 1.000 | 4/20/2022 | 0.178 | 0.500 | 1.00 | |
| PFHpA | 375-85-9 | 0.500 U | F9592-FS(0) | 1.000 | 4/20/2022 | 0.168 | 0.500 | 1.00 | |
| PFOA | 335-67-1 | 0.405 J | F9592-FS(0) | 1.000 | 4/20/2022 | 0.214 | 0.500 | 1.00 | |
| PFNA | 375-95-1 | 0.467 J | F9592-FS(0) | 1.000 | 4/20/2022 | 0.157 | 0.500 | 1.00 | |
| PFDA | 335-76-2 | 0.500 U | F9592-FS(0) | 1.000 | 4/20/2022 | 0.158 | 0.500 | 1.00 | |
| PFUnA | 2058-94-8 | 0.500 U | F9592-FS(0) | 1.000 | 4/20/2022 | 0.156 | 0.500 | 1.00 | |
| PFDoA | 307-55-1 | 0.500 U | F9592-FS(0) | 1.000 | 4/20/2022 | 0.160 | 0.500 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.500 U | F9592-FS(0) | 1.000 | 4/20/2022 | 0.161 | 0.500 | 1.00 | |
| PFTeDA | 376-06-7 | 0.500 U | F9592-FS(0) | 1.000 | 4/20/2022 | 0.162 | 0.500 | 2.00 | |
| NMeFOSAA | 2355-31-9 | 0.500 U | F9592-FS(0) | 1.000 | 4/20/2022 | 0.159 | 0.500 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.500 U | F9592-FS(0) | 1.000 | 4/20/2022 | 0.165 | 0.500 | 2.00 | |
| PFBS | 375-73-5 | 0.500 U | F9592-FS(0) | 1.000 | 4/20/2022 | 0.171 | 0.500 | 1.00 | |
| PFHxS | 355-46-4 | 0.445 J | F9592-FS(0) | 1.000 | 4/20/2022 | 0.173 | 0.500 | 1.00 | |
| PFOS | 1763-23-1 | 69.4 J | F9592-FS-D(3) | 5.000 | 4/20/2022 | 0.875 | 2.50 | 5.00 | FD |
| HFPO-DA | 13252-13-6 | 0.500 U | F9592-FS(0) | 1.000 | 4/20/2022 | 0.159 | 0.500 | 2.00 | |
| Adona | 919005-14-4 | 0.500 U | F9592-FS(0) | 1.000 | 4/20/2022 | 0.160 | 0.500 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 U | F9592-FS(0) | 1.000 | 4/20/2022 | 0.154 | 0.500 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 U | F9592-FS(0) | 1.000 | 4/20/2022 | 0.150 | 0.500 | 2.00 | |

MS 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/20/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-SS04-0001 |
| Battelle ID | F9594-FS |
| Sample Type | SA |
| Collection Date | 03/22/2022 |
| Extraction Date | 03/29/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 8.38 |
| Matrix | SO |
| Sample Size | 5.010 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 1.96 | F9594-FS(0) | 1.000 | 4/20/2022 | 0.178 | 0.499 | 0.998 |
| PFHpA | 375-85-9 | 0.423 J | F9594-FS(0) | 1.000 | 4/20/2022 | 0.168 | 0.499 | 0.998 |
| PFOA | 335-67-1 | 0.587 J | F9594-FS(0) | 1.000 | 4/20/2022 | 0.214 | 0.499 | 0.998 |
| PFNA | 375-95-1 | 0.425 J | F9594-FS(0) | 1.000 | 4/20/2022 | 0.157 | 0.499 | 0.998 |
| PFDA | 335-76-2 | 0.379 J | F9594-FS(0) | 1.000 | 4/20/2022 | 0.158 | 0.499 | 0.998 |
| PFUnA | 2058-94-8 | 1.39 | F9594-FS(0) | 1.000 | 4/20/2022 | 0.156 | 0.499 | 0.998 |
| PFDoA | 307-55-1 | 0.232 J | F9594-FS(0) | 1.000 | 4/20/2022 | 0.160 | 0.499 | 0.998 |
| PFTrDA | 72629-94-8 | 0.499 U | F9594-FS(0) | 1.000 | 4/20/2022 | 0.161 | 0.499 | 0.998 |
| PFTeDA | 376-06-7 | 0.499 U | F9594-FS(0) | 1.000 | 4/20/2022 | 0.162 | 0.499 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.499 U | F9594-FS(0) | 1.000 | 4/20/2022 | 0.159 | 0.499 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.499 U | F9594-FS(0) | 1.000 | 4/20/2022 | 0.165 | 0.499 | 2.00 |
| PFBS | 375-73-5 | 0.499 U | F9594-FS(0) | 1.000 | 4/20/2022 | 0.171 | 0.499 | 0.998 |
| PFHxS | 355-46-4 | 1.39 | F9594-FS(0) | 1.000 | 4/20/2022 | 0.173 | 0.499 | 0.998 |
| PFOS | 1763-23-1 | 36.7 | F9594-FS(0) | 1.000 | 4/20/2022 | 0.175 | 0.499 | 0.998 |
| HFPO-DA | 13252-13-6 | 0.499 U | F9594-FS(0) | 1.000 | 4/20/2022 | 0.159 | 0.499 | 2.00 |
| Adona | 919005-14-4 | 0.499 U | F9594-FS(0) | 1.000 | 4/20/2022 | 0.160 | 0.499 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.499 U | F9594-FS(0) | 1.000 | 4/20/2022 | 0.154 | 0.499 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.499 U | F9594-FS(0) | 1.000 | 4/20/2022 | 0.150 | 0.499 | 2.00 |

NW 8/14/22

BATTELLE
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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VWFS-PFAS-SS03-0001 |
| Battelle ID | F9596-FS |
| Sample Type | SA |
| Collection Date | 03/22/2022 |
| Extraction Date | 03/29/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 10.40 |
| Matrix | SO |
| Sample Size | 5.030 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.177 | 0.497 | 0.994 |
| PFHpA | 375-85-9 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.167 | 0.497 | 0.994 |
| PFOA | 335-67-1 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.213 | 0.497 | 0.994 |
| PFNA | 375-95-1 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.156 | 0.497 | 0.994 |
| PFDA | 335-76-2 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.157 | 0.497 | 0.994 |
| PFUnA | 2058-94-8 | 0.225 J | F9596-FS(0) | 1.000 | 4/20/2022 | 0.155 | 0.497 | 0.994 |
| PFDoA | 307-55-1 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.159 | 0.497 | 0.994 |
| PFTrDA | 72629-94-8 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.160 | 0.497 | 0.994 |
| PFTeDA | 376-06-7 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.161 | 0.497 | 1.99 |
| NMeFOSAA | 2355-31-9 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.158 | 0.497 | 1.99 |
| NEtFOSAA | 2991-50-6 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.164 | 0.497 | 1.99 |
| PFBS | 375-73-5 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.170 | 0.497 | 0.994 |
| PFHxS | 355-46-4 | 0.182 J | F9596-FS(0) | 1.000 | 4/20/2022 | 0.172 | 0.497 | 0.994 |
| PFOS | 1763-23-1 | 2.22 | F9596-FS(0) | 1.000 | 4/20/2022 | 0.174 | 0.497 | 0.994 |
| HFPO-DA | 13252-13-6 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.158 | 0.497 | 1.99 |
| Adona | 919005-14-4 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.159 | 0.497 | 1.99 |
| 9Cl-PF3ONS | 756426-58-1 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.153 | 0.497 | 1.99 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.497 U | F9596-FS(0) | 1.000 | 4/20/2022 | 0.149 | 0.497 | 1.99 |

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It can be done

7

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-SS05-0001 |
| Battelle ID | F9603-FS |
| Sample Type | SA |
| Collection Date | 03/23/2022 |
| Extraction Date | 03/29/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 8.38 |
| Matrix | SO |
| Sample Size | 5.050 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.176 | 0.495 | 0.990 |
| PFHpA | 375-85-9 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.166 | 0.495 | 0.990 |
| PFOA | 335-67-1 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.212 | 0.495 | 0.990 |
| PFNA | 375-95-1 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.155 | 0.495 | 0.990 |
| PFDA | 335-76-2 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.156 | 0.495 | 0.990 |
| PFUnA | 2058-94-8 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.154 | 0.495 | 0.990 |
| PFDoA | 307-55-1 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.158 | 0.495 | 0.990 |
| PFTrDA | 72629-94-8 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.159 | 0.495 | 0.990 |
| PFTeDA | 376-06-7 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.160 | 0.495 | 1.98 |
| NMeFOSAA | 2355-31-9 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.157 | 0.495 | 1.98 |
| NEtFOSAA | 2991-50-6 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.163 | 0.495 | 1.98 |
| PFBS | 375-73-5 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.169 | 0.495 | 0.990 |
| PFHxS | 355-46-4 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.171 | 0.495 | 0.990 |
| PFOS | 1763-23-1 | 0.510 J | F9603-FS(0) | 1.000 | 4/20/2022 | 0.173 | 0.495 | 0.990 |
| HFPO-DA | 13252-13-6 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.157 | 0.495 | 1.98 |
| Adona | 919005-14-4 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.158 | 0.495 | 1.98 |
| 9Cl-PF3ONS | 756426-58-1 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.152 | 0.495 | 1.98 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.495 U | F9603-FS(0) | 1.000 | 4/20/2022 | 0.149 | 0.495 | 1.98 |

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0489
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VWMP-EB01-032322 | F9817-FS | Water |
| 2 | VWMP-FB01-032322 | F9818-FS | Water |
| 3 | VWMP-EB01-032422 | F9822-FS | Water |
| 4 | VWMP-EB01-032522 | F9829-FS | Water |
| 5 | VWS7-FB01-032822 | F9832-FS | Water |
| 6 | VWS7-EB01-032822 | F9833-FS | Water |
| 7 | VWS7-EB01-032922 | F9836-FS | Water |
| 8 | VWMP-FB01-032922 | F9840-FS | Water |
| 9 | VWMP-EB01-032922 | F9841-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for six aqueous equipment blank samples and three aqueous field blank samples collected on March 23-29, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days except for the following.

| EDS Sample | Date Extracted | Date Analyzed | # of Days | Qualifier |
|---|---|---|---|---|
| All Samples | 04/04/22 | 05/17/22 | 43 | UJ |

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWMP-EB01-032322 | None - ND | - | - | - |
| VWMP-FB01-032322 | None - ND | - | - | - |
| VWMP-EB01-032422 | None - ND | - | - | - |
| VWMP-EB01-032522 | None - ND | - | - | - |
| VWS7-FB01-032822 | None - ND | - | - | - |
| VWS7-EB01-032822 | None - ND | - | - | - |
| VWS7-EB01-032922 | None - ND | - | - | - |
| VWMP-FB01-032922 | None - ND | - | - | - |
| VWMP-EB01-032922 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

**Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries**

- MS/MSD samples were not analyzed.

**Internal Standard (IS) Area Performance**

- All internal standards met response and retention time (RT) criteria.

**Target Compound Identification**

- All mass spectra and quantitation criteria were met.

**Compound Quantitation**

- All criteria were met.

**Field Duplicate Sample Precision**

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-EB01-032322 |
| Battelle ID | F9817-FS |
| Sample Type | SA |
| Collection Date | 03/23/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.277 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.26 UT uJ | F9817-FS(0) | 1.000 | 5/17/2022 | 0.824 | 2.26 | 4.51 |
| PFHpA | 375-85-9 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.849 | 2.26 | 4.51 |
| PFOA | 335-67-1 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.912 | 2.26 | 4.51 |
| PFNA | 375-95-1 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.752 | 2.26 | 4.51 |
| PFDA | 335-76-2 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.708 | 2.26 | 4.51 |
| PFUnA | 2058-94-8 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.679 | 2.26 | 4.51 |
| PFDoA | 307-55-1 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.686 | 2.26 | 4.51 |
| PFTrDA | 72629-94-8 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.670 | 2.26 | 4.51 |
| PFTeDA | 376-06-7 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.714 | 2.26 | 4.51 |
| NMeFOSAA | 2355-31-9 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.930 | 2.26 | 4.51 |
| NEtFOSAA | 2991-50-6 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.894 | 2.26 | 4.51 |
| PFBS | 375-73-5 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.782 | 2.26 | 4.51 |
| PFHxS | 355-46-4 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.900 | 2.26 | 4.51 |
| PFOS | 1763-23-1 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.966 | 2.26 | 4.51 |
| HFPO-DA | 13252-13-6 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.781 | 2.26 | 4.51 |
| Adona | 919005-14-4 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.784 | 2.26 | 4.51 |
| 9Cl-PF3ONS | 756426-58-1 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.930 | 2.26 | 4.51 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.26 UT | F9817-FS(0) | 1.000 | 5/17/2022 | 0.813 | 2.26 | 4.51 |

HT

MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/18/2022

BATTELLE
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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-FB01-032322 |
| Battelle ID | F9818-FS |
| Sample Type | SA |
| Collection Date | 03/23/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.266 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.35 UT | UJ | F9818-FS(0) | 1.000 | 5/17/2022 | 0.858 | 2.35 | 4.70 | HT |
| PFHpA | 375-85-9 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.884 | 2.35 | 4.70 | |
| PFOA | 335-67-1 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.949 | 2.35 | 4.70 | |
| PFNA | 375-95-1 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.783 | 2.35 | 4.70 | |
| PFDA | 335-76-2 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.737 | 2.35 | 4.70 | |
| PFUnA | 2058-94-8 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.707 | 2.35 | 4.70 | |
| PFDoA | 307-55-1 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.714 | 2.35 | 4.70 | |
| PFTrDA | 72629-94-8 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.697 | 2.35 | 4.70 | |
| PFTeDA | 376-06-7 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.743 | 2.35 | 4.70 | |
| NMeFOSAA | 2355-31-9 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.968 | 2.35 | 4.70 | |
| NEtFOSAA | 2991-50-6 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.930 | 2.35 | 4.70 | |
| PFBS | 375-73-5 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.814 | 2.35 | 4.70 | |
| PFHxS | 355-46-4 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.937 | 2.35 | 4.70 | |
| PFOS | 1763-23-1 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 1.01 | 2.35 | 4.70 | |
| HFPO-DA | 13252-13-6 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.813 | 2.35 | 4.70 | |
| Adona | 919005-14-4 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.817 | 2.35 | 4.70 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.968 | 2.35 | 4.70 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.35 UT | | F9818-FS(0) | 1.000 | 5/17/2022 | 0.847 | 2.35 | 4.70 | |

MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/18/2022

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It can be done

3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-EB01-032422 |
| Battelle ID | F9822-FS |
| Sample Type | SA |
| Collection Date | 03/24/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.281 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.812 | 2.22 | 4.45 | |
| PFHpA | 375-85-9 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.837 | 2.22 | 4.45 | |
| PFOA | 335-67-1 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.899 | 2.22 | 4.45 | |
| PFNA | 375-95-1 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.741 | 2.22 | 4.45 | |
| PFDA | 335-76-2 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.698 | 2.22 | 4.45 | |
| PFUnA | 2058-94-8 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.669 | 2.22 | 4.45 | |
| PFDoA | 307-55-1 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.676 | 2.22 | 4.45 | |
| PFTrDA | 72629-94-8 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.660 | 2.22 | 4.45 | |
| PFTeDA | 376-06-7 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.704 | 2.22 | 4.45 | |
| NMeFOSAA | 2355-31-9 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.916 | 2.22 | 4.45 | |
| NEtFOSAA | 2991-50-6 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.881 | 2.22 | 4.45 | |
| PFBS | 375-73-5 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.770 | 2.22 | 4.45 | |
| PFHxS | 355-46-4 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.887 | 2.22 | 4.45 | |
| PFOS | 1763-23-1 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.952 | 2.22 | 4.45 | |
| HFPO-DA | 13252-13-6 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.770 | 2.22 | 4.45 | |
| Adona | 919005-14-4 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.773 | 2.22 | 4.45 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.916 | 2.22 | 4.45 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.22 | UT | F9822-FS(0) | 1.000 | 5/17/2022 | 0.802 | 2.22 | 4.45 | |

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NW 8/14/22

Analyzed by: Bailey, Kevin

BATTELLE
It can be done

4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-EB01-032522 |
| Battelle ID | F9829-FS |
| Sample Type | SA |
| Collection Date | 03/25/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.270 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.31 UT | UJ | F9829-FS(0) | 1.000 | 5/17/2022 | 0.845 | 2.31 | 4.63 |
| PFHpA | 375-85-9 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.871 | 2.31 | 4.63 |
| PFOA | 335-67-1 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.935 | 2.31 | 4.63 |
| PFNA | 375-95-1 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.771 | 2.31 | 4.63 |
| PFDA | 335-76-2 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.726 | 2.31 | 4.63 |
| PFUnA | 2058-94-8 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.696 | 2.31 | 4.63 |
| PFDoA | 307-55-1 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.704 | 2.31 | 4.63 |
| PFTrDA | 72629-94-8 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.687 | 2.31 | 4.63 |
| PFTeDA | 376-06-7 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.732 | 2.31 | 4.63 |
| NMeFOSAA | 2355-31-9 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.954 | 2.31 | 4.63 |
| NEtFOSAA | 2991-50-6 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.917 | 2.31 | 4.63 |
| PFBS | 375-73-5 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.802 | 2.31 | 4.63 |
| PFHxS | 355-46-4 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.923 | 2.31 | 4.63 |
| PFOS | 1763-23-1 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.991 | 2.31 | 4.63 |
| HFPO-DA | 13252-13-6 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.801 | 2.31 | 4.63 |
| Adona | 919005-14-4 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.805 | 2.31 | 4.63 |
| 9Cl-PF3ONS | 756426-58-1 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.954 | 2.31 | 4.63 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.31 UT | | F9829-FS(0) | 1.000 | 5/17/2022 | 0.834 | 2.31 | 4.63 |

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MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/18/2022

5

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS7-FB01-032822 |
| Battelle ID | F9832-FS |
| Sample Type | SA |
| Collection Date | 03/28/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.263 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.868 | 2.38 | 4.75 |
| PFHpA | 375-85-9 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.894 | 2.38 | 4.75 |
| PFOA | 335-67-1 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.960 | 2.38 | 4.75 |
| PFNA | 375-95-1 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.792 | 2.38 | 4.75 |
| PFDA | 335-76-2 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.745 | 2.38 | 4.75 |
| PFUnA | 2058-94-8 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.715 | 2.38 | 4.75 |
| PFDoA | 307-55-1 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.722 | 2.38 | 4.75 |
| PFTrDA | 72629-94-8 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.705 | 2.38 | 4.75 |
| PFTeDA | 376-06-7 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.752 | 2.38 | 4.75 |
| NMeFOSAA | 2355-31-9 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.979 | 2.38 | 4.75 |
| NEtFOSAA | 2991-50-6 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.941 | 2.38 | 4.75 |
| PFBS | 375-73-5 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.823 | 2.38 | 4.75 |
| PFHxS | 355-46-4 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.948 | 2.38 | 4.75 |
| PFOS | 1763-23-1 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 1.02 | 2.38 | 4.75 |
| HFPO-DA | 13252-13-6 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.822 | 2.38 | 4.75 |
| Adona | 919005-14-4 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.826 | 2.38 | 4.75 |
| 9Cl-PF3ONS | 756426-58-1 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.979 | 2.38 | 4.75 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.38 UT | F9832-FS(0) | 1.000 | 5/17/2022 | 0.856 | 2.38 | 4.75 |

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Analyzed by: Bailey, Kevin
Printed: 5/18/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS7-EB01-032822 |
| Battelle ID | F9833-FS |
| Sample Type | SA |
| Collection Date | 03/28/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.290 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.787 | 2.16 | 4.31 |
| PFHpA | 375-85-9 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.811 | 2.16 | 4.31 |
| PFOA | 335-67-1 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.871 | 2.16 | 4.31 |
| PFNA | 375-95-1 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.718 | 2.16 | 4.31 |
| PFDA | 335-76-2 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.676 | 2.16 | 4.31 |
| PFUnA | 2058-94-8 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.648 | 2.16 | 4.31 |
| PFDoA | 307-55-1 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.655 | 2.16 | 4.31 |
| PFTrDA | 72629-94-8 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.640 | 2.16 | 4.31 |
| PFTeDA | 376-06-7 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.682 | 2.16 | 4.31 |
| NMeFOSAA | 2355-31-9 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.888 | 2.16 | 4.31 |
| NEtFOSAA | 2991-50-6 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.853 | 2.16 | 4.31 |
| PFBS | 375-73-5 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.747 | 2.16 | 4.31 |
| PFHxS | 355-46-4 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.859 | 2.16 | 4.31 |
| PFOS | 1763-23-1 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.922 | 2.16 | 4.31 |
| HFPO-DA | 13252-13-6 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.746 | 2.16 | 4.31 |
| Adona | 919005-14-4 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.749 | 2.16 | 4.31 |
| 9Cl-PF3ONS | 756426-58-1 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.888 | 2.16 | 4.31 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.16 UT | F9833-FS(0) | 1.000 | 5/17/2022 | 0.777 | 2.16 | 4.31 |

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NW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/18/2022

BATTELLE
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7

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS7-EB01-032922 |
| Battelle ID | F9836-FS |
| Sample Type | SA |
| Collection Date | 03/29/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.266 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.858 | 2.35 | 4.70 | |
| PFHpA | 375-85-9 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.884 | 2.35 | 4.70 | |
| PFOA | 335-67-1 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.949 | 2.35 | 4.70 | |
| PFNA | 375-95-1 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.783 | 2.35 | 4.70 | |
| PFDA | 335-76-2 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.737 | 2.35 | 4.70 | |
| PFUnA | 2058-94-8 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.707 | 2.35 | 4.70 | |
| PFDoA | 307-55-1 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.714 | 2.35 | 4.70 | |
| PFTrDA | 72629-94-8 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.697 | 2.35 | 4.70 | |
| PFTeDA | 376-06-7 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.743 | 2.35 | 4.70 | |
| NMeFOSAA | 2355-31-9 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.968 | 2.35 | 4.70 | |
| NEtFOSAA | 2991-50-6 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.930 | 2.35 | 4.70 | |
| PFBS | 375-73-5 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.814 | 2.35 | 4.70 | |
| PFHxS | 355-46-4 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.937 | 2.35 | 4.70 | |
| PFOS | 1763-23-1 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 1.01 | 2.35 | 4.70 | |
| HFPO-DA | 13252-13-6 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.813 | 2.35 | 4.70 | |
| Adona | 919005-14-4 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.817 | 2.35 | 4.70 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.968 | 2.35 | 4.70 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.35 | UT | F9836-FS(0) | 1.000 | 5/17/2022 | 0.847 | 2.35 | 4.70 | |

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MW 8/14/22
Analyzed by: Bailey, Kevin
Printed: 5/18/2022

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8

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-FB01-032922 |
| Battelle ID | F9840-FS |
| Sample Type | SA |
| Collection Date | 03/29/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.262 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.39 UT | UJ | F9840-FS(0) | 1.000 | 5/17/2022 | 0.871 | 2.39 | 4.77 | HT |
| PFHpA | 375-85-9 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.898 | 2.39 | 4.77 | |
| PFOA | 335-67-1 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.964 | 2.39 | 4.77 | |
| PFNA | 375-95-1 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.795 | 2.39 | 4.77 | |
| PFDA | 335-76-2 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.748 | 2.39 | 4.77 | |
| PFUnA | 2058-94-8 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.718 | 2.39 | 4.77 | |
| PFDoA | 307-55-1 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.725 | 2.39 | 4.77 | |
| PFTrDA | 72629-94-8 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.708 | 2.39 | 4.77 | |
| PFTeDA | 376-06-7 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.755 | 2.39 | 4.77 | |
| NMeFOSAA | 2355-31-9 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.983 | 2.39 | 4.77 | |
| NEtFOSAA | 2991-50-6 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.945 | 2.39 | 4.77 | |
| PFBS | 375-73-5 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.826 | 2.39 | 4.77 | |
| PFHxS | 355-46-4 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.951 | 2.39 | 4.77 | |
| PFOS | 1763-23-1 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 1.02 | 2.39 | 4.77 | |
| HFPO-DA | 13252-13-6 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.825 | 2.39 | 4.77 | |
| Adona | 919005-14-4 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.829 | 2.39 | 4.77 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.983 | 2.39 | 4.77 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.39 UT | | F9840-FS(0) | 1.000 | 5/17/2022 | 0.860 | 2.39 | 4.77 | |

MW 8/14/22

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It can be done

9

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-EB01-032922 |
| Battelle ID | F9841-FS |
| Sample Type | SA |
| Collection Date | 03/29/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.272 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.30 UT | UJ | F9841-FS(0) | 1.000 | 5/17/2022 | 0.839 | 2.30 | 4.60 | HT |
| PFHpA | 375-85-9 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.865 | 2.30 | 4.60 | |
| PFOA | 335-67-1 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.928 | 2.30 | 4.60 | |
| PFNA | 375-95-1 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.766 | 2.30 | 4.60 | |
| PFDA | 335-76-2 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.721 | 2.30 | 4.60 | |
| PFUnA | 2058-94-8 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.691 | 2.30 | 4.60 | |
| PFDoA | 307-55-1 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.699 | 2.30 | 4.60 | |
| PFTrDA | 72629-94-8 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.682 | 2.30 | 4.60 | |
| PFTeDA | 376-06-7 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.727 | 2.30 | 4.60 | |
| NMeFOSAA | 2355-31-9 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.947 | 2.30 | 4.60 | |
| NEtFOSAA | 2991-50-6 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.910 | 2.30 | 4.60 | |
| PFBS | 375-73-5 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.796 | 2.30 | 4.60 | |
| PFHxS | 355-46-4 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.916 | 2.30 | 4.60 | |
| PFOS | 1763-23-1 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.983 | 2.30 | 4.60 | |
| HFPO-DA | 13252-13-6 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.795 | 2.30 | 4.60 | |
| Adona | 919005-14-4 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.799 | 2.30 | 4.60 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.947 | 2.30 | 4.60 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.30 UT | | F9841-FS(0) | 1.000 | 5/17/2022 | 0.828 | 2.30 | 4.60 | |

NW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/18/2022

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0490
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VWMP-PFAS-SS03-0001 | F9814-FS | Soil |
| 2 | VWMP-PFAS-SB03-0406 | F9815-FS | Soil |
| 3 | VWMP-PFAS-SB03D-4850 | F9816-FS | Soil |
| 4 | VWMP-PFAS-SS01-0001 | F9819-FS | Soil |
| 5 | VWMP-PFAS-SB01-0406 | F9820-FS | Soil |
| 6 | VWMP-PFAS-SB01D-4446 | F9821-FS | Soil |
| 7 | VWMP-PFAS-SS02-0001 | F9823-FS | Soil |
| 8 | VWMP-PFAS-SS02P-0001 | F9824-FS | Soil |
| 9 | VWMP-PFAS-SB02-0406 | F9825-FS | Soil |
| 10 | VWMP-PFAS-SB02P-0406 | F9826-FS | Soil |
| 11 | VWMP-PFAS-SB02D-4850 | F9827-FS | Soil |
| 12 | VWMP-PFAS-SB02DP-4850 | F9828-FS | Soil |
| 13 | VWS7-PFAS-SS01-0001 | F9830-FS | Soil |
| 14 | VWS7-PFAS-SS01P-0001 | F9831-FS | Soil |
| 15 | VWS7-PFAS-SS02-0001 | F9834-FS | Soil |
| 16 | VWS7-PFAS-SS03-0001 | F9835-FS | Soil |
| 17 | VWMP-PFAS-SS04-0001 | F9837-FS | Soil |
| 18 | VWMP-PFAS-SB04-0406 | F9838-FS | Soil |
| 19 | VWMP-PFAS-SB04D-4749 | F9839-FS | Soil |

A Stage 2B/4 data validation was performed on the analytical data for nineteen soil samples collected on March 23-29, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021,

the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

## Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

## Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days except for the following.

| EDS Sample | Date Extracted | Date Analyzed | # of Days | Qualifier |
|---|---|---|---|---|
| 1-10 | 04/04/22 | 05/07/22 | 33 | J/UJ |
| 11-19 | 04/04/22 | 05/08/22 | 34 | J/UJ |

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWMP-EB01-032322 | None - ND | - | - | - |
| VWMP-EB01-032422 | None - ND | - | - | - |
| VWMP-EB01-032522 | None - ND | - | - | - |
| VWS7-EB01-032822 | None - ND | - | - | - |
| VWS7-EB01-032922 | None - ND | - | - | - |
| VWMP-EB01-032922 | None - ND | - | - | - |
| VWMP-FB01-032322 | None - ND | - | - | - |
| VWS7-FB01-032822 | None - ND | - | - | - |
| VWMP-FB01-032922 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- Several samples exhibited acceptable low surrogate percent recoveries (%R) for one or two surrogates; however, holding times were exceeded so further action was required.

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VWMP-PFAS-SS02-0001 ng/g | VWMP-PFAS-SS02P-0001 ng/g | RPD | Qualifier |
|---|---|---|---|---|
| PFOA | 0.534 | 1.61 | 100% | None - <5X LOQ |
| PFOS | 0.739 | 0.723 | 2% | None |

| Compound | VWMP-PFAS-SB02-0406 ng/g | VWMP-PFAS-SB02P-0406 ng/g | RPD | Qualifier |
|---|---|---|---|---|
| PFOA | 0.302 | 0.502U | NC | None |

| Compound | VWMP-PFAS-SB02D-4850 ng/g | VWMP-PFAS-SB02DP-4850 ng/g | RPD | Qualifier |
|---|---|---|---|---|
| None | ND | ND | - | - |

| Compound | VWS7-PFAS-SS01-0001 ng/g | VWS7-PFAS-SS01P-0001 ng/g | RPD | Qualifier |
|---|---|---|---|---|
| PFOS | 0.251 | 0.211 | 17% | None |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-SS03-0001 |
| Battelle ID | F9814-FS |
| Sample Type | SA |
| Collection Date | 03/23/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 11.22 |
| Matrix | SO |
| Sample Size | 4.990 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.178 | 0.501 | 1.00 |
| PFHpA | 375-85-9 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.168 | 0.501 | 1.00 |
| PFOA | 335-67-1 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.214 | 0.501 | 1.00 |
| PFNA | 375-95-1 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.157 | 0.501 | 1.00 |
| PFDA | 335-76-2 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.158 | 0.501 | 1.00 |
| PFUnA | 2058-94-8 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.156 | 0.501 | 1.00 |
| PFDoA | 307-55-1 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.501 | 1.00 |
| PFTrDA | 72629-94-8 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.161 | 0.501 | 1.00 |
| PFTeDA | 376-06-7 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.162 | 0.501 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.501 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.165 | 0.501 | 2.00 |
| PFBS | 375-73-5 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.171 | 0.501 | 1.00 |
| PFHxS | 355-46-4 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.173 | 0.501 | 1.00 |
| PFOS | 1763-23-1 | 0.410 | JT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.175 | 0.501 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.501 | 2.00 |
| Adona | 919005-14-4 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.501 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.154 | 0.501 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.501 | UT | F9814-FS(0) | 1.000 | 5/7/2022 | 0.150 | 0.501 | 2.00 |

8/14/22
Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-SB03-0406 |
| Battelle ID | F9815-FS |
| Sample Type | SA |
| Collection Date | 03/23/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 19.68 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 UT | UJ | F9815-FS(0) | 1.000 | 5/7/2022 | 0.178 | 0.500 | 1.00 | HT |
| PFHpA | 375-85-9 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.168 | 0.500 | 1.00 | |
| PFOA | 335-67-1 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.214 | 0.500 | 1.00 | |
| PFNA | 375-95-1 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.157 | 0.500 | 1.00 | |
| PFDA | 335-76-2 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.158 | 0.500 | 1.00 | |
| PFUnA | 2058-94-8 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.156 | 0.500 | 1.00 | |
| PFDoA | 307-55-1 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.500 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.161 | 0.500 | 1.00 | |
| PFTeDA | 376-06-7 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.162 | 0.500 | 2.00 | |
| NMeFOSAA | 2355-31-9 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.500 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.165 | 0.500 | 2.00 | |
| PFBS | 375-73-5 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.171 | 0.500 | 1.00 | |
| PFHxS | 355-46-4 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.173 | 0.500 | 1.00 | |
| PFOS | 1763-23-1 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.175 | 0.500 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.500 | 2.00 | |
| Adona | 919005-14-4 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.500 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.154 | 0.500 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 UT | | F9815-FS(0) | 1.000 | 5/7/2022 | 0.150 | 0.500 | 2.00 | |

MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-SB03D-4850 |
| Battelle ID | F9816-FS |
| Sample Type | SA |
| Collection Date | 03/23/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 17.87 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 UT | UJ | F9816-FS(0) | 1.000 | 5/7/2022 | 0.178 | 0.500 | 1.00 | HT |
| PFHpA | 375-85-9 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.168 | 0.500 | 1.00 | |
| PFOA | 335-67-1 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.214 | 0.500 | 1.00 | |
| PFNA | 375-95-1 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.157 | 0.500 | 1.00 | |
| PFDA | 335-76-2 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.158 | 0.500 | 1.00 | |
| PFUnA | 2058-94-8 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.156 | 0.500 | 1.00 | |
| PFDoA | 307-55-1 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.500 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.161 | 0.500 | 1.00 | |
| PFTeDA | 376-06-7 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.162 | 0.500 | 2.00 | |
| NMeFOSAA | 2355-31-9 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.500 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.165 | 0.500 | 2.00 | |
| PFBS | 375-73-5 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.171 | 0.500 | 1.00 | |
| PFHxS | 355-46-4 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.173 | 0.500 | 1.00 | |
| PFOS | 1763-23-1 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.175 | 0.500 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.500 | 2.00 | |
| Adona | 919005-14-4 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.500 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.154 | 0.500 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 UT | | F9816-FS(0) | 1.000 | 5/7/2022 | 0.150 | 0.500 | 2.00 | |

MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-SS01-0001 |
| Battelle ID | F9819-FS |
| Sample Type | SA |
| Collection Date | 03/24/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 9.66 |
| Matrix | SO |
| Sample Size | 5.010 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.499 UT | UJ | F9819-FS(0) | 1.000 | 5/7/2022 | 0.178 | 0.499 | 0.998 | HT |
| PFHpA | 375-85-9 | 0.499 UT | | F9819-FS(0) | 1.000 | 5/7/2022 | 0.168 | 0.499 | 0.998 | |
| PFOA | 335-67-1 | 0.499 UT | | F9819-FS(0) | 1.000 | 5/7/2022 | 0.214 | 0.499 | 0.998 | |
| PFNA | 375-95-1 | 0.499 UT | | F9819-FS(0) | 1.000 | 5/7/2022 | 0.157 | 0.499 | 0.998 | |
| PFDA | 335-76-2 | 0.252 JT | J | F9819-FS(0) | 1.000 | 5/7/2022 | 0.158 | 0.499 | 0.998 | |
| PFUnA | 2058-94-8 | 0.499 UT | UJ | F9819-FS(0) | 1.000 | 5/7/2022 | 0.156 | 0.499 | 0.998 | |
| PFDoA | 307-55-1 | 0.499 UT | | F9819-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.499 | 0.998 | |
| PFTrDA | 72629-94-8 | 0.499 UT | | F9819-FS(0) | 1.000 | 5/7/2022 | 0.161 | 0.499 | 0.998 | |
| PFTeDA | 376-06-7 | 0.499 UT | | F9819-FS(0) | 1.000 | 5/7/2022 | 0.162 | 0.499 | 2.00 | |
| NMeFOSAA | 2355-31-9 | 0.499 UT | | F9819-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.499 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.499 UT | | F9819-FS(0) | 1.000 | 5/7/2022 | 0.165 | 0.499 | 2.00 | |
| PFBS | 375-73-5 | 0.499 UT | | F9819-FS(0) | 1.000 | 5/7/2022 | 0.171 | 0.499 | 0.998 | |
| PFHxS | 355-46-4 | 0.499 UT | | F9819-FS(0) | 1.000 | 5/7/2022 | 0.173 | 0.499 | 0.998 | |
| PFOS | 1763-23-1 | 0.227 JT | J | F9819-FS(0) | 1.000 | 5/7/2022 | 0.175 | 0.499 | 0.998 | |
| HFPO-DA | 13252-13-6 | 0.499 UT | UJ | F9819-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.499 | 2.00 | |
| Adona | 919005-14-4 | 0.499 UT | | F9819-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.499 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.499 UT | | F9819-FS(0) | 1.000 | 5/7/2022 | 0.154 | 0.499 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.499 UT | | F9819-FS(0) | 1.000 | 5/7/2022 | 0.150 | 0.499 | 2.00 | |

MW 8/14/22
Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-SB01-0406 |
| Battelle ID | F9820-FS |
| Sample Type | SA |
| Collection Date | 03/24/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 13.80 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 UT UJ | F9820-FS(0) | 1.000 | 5/7/2022 | 0.178 | 0.500 | 1.00 |
| PFHpA | 375-85-9 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.168 | 0.500 | 1.00 |
| PFOA | 335-67-1 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.214 | 0.500 | 1.00 |
| PFNA | 375-95-1 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.157 | 0.500 | 1.00 |
| PFDA | 335-76-2 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.158 | 0.500 | 1.00 |
| PFUnA | 2058-94-8 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.156 | 0.500 | 1.00 |
| PFDoA | 307-55-1 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.500 | 1.00 |
| PFTrDA | 72629-94-8 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.161 | 0.500 | 1.00 |
| PFTeDA | 376-06-7 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.162 | 0.500 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.500 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.165 | 0.500 | 2.00 |
| PFBS | 375-73-5 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.171 | 0.500 | 1.00 |
| PFHxS | 355-46-4 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.173 | 0.500 | 1.00 |
| PFOS | 1763-23-1 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.175 | 0.500 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.500 | 2.00 |
| Adona | 919005-14-4 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.500 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.154 | 0.500 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 UT | F9820-FS(0) | 1.000 | 5/7/2022 | 0.150 | 0.500 | 2.00 |

HT

MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-SB01D-4446 |
| Battelle ID | F9821-FS |
| Sample Type | SA |
| Collection Date | 03/24/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 19.88 |
| Matrix | SO |
| Sample Size | 5.020 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.498 UT | UJ | F9821-FS(0) | 1.000 | 5/7/2022 | 0.177 | 0.498 | 0.996 |
| PFHpA | 375-85-9 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.167 | 0.498 | 0.996 |
| PFOA | 335-67-1 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.213 | 0.498 | 0.996 |
| PFNA | 375-95-1 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.156 | 0.498 | 0.996 |
| PFDA | 335-76-2 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.157 | 0.498 | 0.996 |
| PFUnA | 2058-94-8 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.155 | 0.498 | 0.996 |
| PFDoA | 307-55-1 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.498 | 0.996 |
| PFTrDA | 72629-94-8 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.498 | 0.996 |
| PFTeDA | 376-06-7 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.161 | 0.498 | 1.99 |
| NMeFOSAA | 2355-31-9 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.158 | 0.498 | 1.99 |
| NEtFOSAA | 2991-50-6 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.164 | 0.498 | 1.99 |
| PFBS | 375-73-5 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.170 | 0.498 | 0.996 |
| PFHxS | 355-46-4 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.172 | 0.498 | 0.996 |
| PFOS | 1763-23-1 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.174 | 0.498 | 0.996 |
| HFPO-DA | 13252-13-6 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.158 | 0.498 | 1.99 |
| Adona | 919005-14-4 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.498 | 1.99 |
| 9Cl-PF3ONS | 756426-58-1 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.153 | 0.498 | 1.99 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.498 UT | | F9821-FS(0) | 1.000 | 5/7/2022 | 0.149 | 0.498 | 1.99 |

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MJ 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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7

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-SS02-0001 |
| Battelle ID | F9823-FS |
| Sample Type | SA |
| Collection Date | 03/25/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 12.02 |
| Matrix | SO |
| Sample Size | 4.990 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.501 UT | UJ | F9823-FS(0) | 1.000 | 5/7/2022 | 0.178 | 0.501 | 1.00 |
| PFHpA | 375-85-9 | 0.501 UT | UJ | F9823-FS(0) | 1.000 | 5/7/2022 | 0.168 | 0.501 | 1.00 |
| PFOA | 335-67-1 | 0.534 JT | J | F9823-FS(0) | 1.000 | 5/7/2022 | 0.214 | 0.501 | 1.00 |
| PFNA | 375-95-1 | 0.501 UT | UJ | F9823-FS(0) | 1.000 | 5/7/2022 | 0.157 | 0.501 | 1.00 |
| PFDA | 335-76-2 | 0.501 UT | | F9823-FS(0) | 1.000 | 5/7/2022 | 0.158 | 0.501 | 1.00 |
| PFUnA | 2058-94-8 | 0.501 UT | | F9823-FS(0) | 1.000 | 5/7/2022 | 0.156 | 0.501 | 1.00 |
| PFDoA | 307-55-1 | 0.501 UT | | F9823-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.501 | 1.00 |
| PFTrDA | 72629-94-8 | 0.501 UT | | F9823-FS(0) | 1.000 | 5/7/2022 | 0.161 | 0.501 | 1.00 |
| PFTeDA | 376-06-7 | 0.501 UT | | F9823-FS(0) | 1.000 | 5/7/2022 | 0.162 | 0.501 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.501 UT | | F9823-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.501 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.501 UT | | F9823-FS(0) | 1.000 | 5/7/2022 | 0.165 | 0.501 | 2.00 |
| PFBS | 375-73-5 | 0.501 UT | | F9823-FS(0) | 1.000 | 5/7/2022 | 0.171 | 0.501 | 1.00 |
| PFHxS | 355-46-4 | 0.501 UT | | F9823-FS(0) | 1.000 | 5/7/2022 | 0.173 | 0.501 | 1.00 |
| PFOS | 1763-23-1 | 0.739 JT | J | F9823-FS(0) | 1.000 | 5/7/2022 | 0.175 | 0.501 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.501 UT | UJ | F9823-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.501 | 2.00 |
| Adona | 919005-14-4 | 0.501 UT | | F9823-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.501 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.501 UT | | F9823-FS(0) | 1.000 | 5/7/2022 | 0.154 | 0.501 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.501 UT | | F9823-FS(0) | 1.000 | 5/7/2022 | 0.150 | 0.501 | 2.00 |

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MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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8

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-SS02P-0001 |
| Battelle ID | F9824-FS |
| Sample Type | SA |
| Collection Date | 03/25/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 9.44 |
| Matrix | SO |
| Sample Size | 4.990 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.501 UT | UJ | F9824-FS(0) | 1.000 | 5/7/2022 | 0.178 | 0.501 | 1.00 | HT |
| PFHpA | 375-85-9 | 0.501 UT | UJ | F9824-FS(0) | 1.000 | 5/7/2022 | 0.168 | 0.501 | 1.00 | |
| PFOA | 335-67-1 | 1.61 T | J | F9824-FS(0) | 1.000 | 5/7/2022 | 0.214 | 0.501 | 1.00 | |
| PFNA | 375-95-1 | 0.501 UT | UJ | F9824-FS(0) | 1.000 | 5/7/2022 | 0.157 | 0.501 | 1.00 | |
| PFDA | 335-76-2 | 0.501 UT | | F9824-FS(0) | 1.000 | 5/7/2022 | 0.158 | 0.501 | 1.00 | |
| PFUnA | 2058-94-8 | 0.501 UT | | F9824-FS(0) | 1.000 | 5/7/2022 | 0.156 | 0.501 | 1.00 | |
| PFDoA | 307-55-1 | 0.501 UT | | F9824-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.501 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.501 UT | | F9824-FS(0) | 1.000 | 5/7/2022 | 0.161 | 0.501 | 1.00 | |
| PFTeDA | 376-06-7 | 0.501 UT | | F9824-FS(0) | 1.000 | 5/7/2022 | 0.162 | 0.501 | 2.00 | |
| NMeFOSAA | 2355-31-9 | 0.501 UT | | F9824-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.501 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.501 UT | | F9824-FS(0) | 1.000 | 5/7/2022 | 0.165 | 0.501 | 2.00 | |
| PFBS | 375-73-5 | 0.501 UT | | F9824-FS(0) | 1.000 | 5/7/2022 | 0.171 | 0.501 | 1.00 | |
| PFHxS | 355-46-4 | 0.501 UT | | F9824-FS(0) | 1.000 | 5/7/2022 | 0.173 | 0.501 | 1.00 | |
| PFOS | 1763-23-1 | 0.723 JT | J | F9824-FS(0) | 1.000 | 5/7/2022 | 0.175 | 0.501 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.501 UT | UJ | F9824-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.501 | 2.00 | |
| Adona | 919005-14-4 | 0.501 UT | | F9824-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.501 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.501 UT | | F9824-FS(0) | 1.000 | 5/7/2022 | 0.154 | 0.501 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.501 UT | | F9824-FS(0) | 1.000 | 5/7/2022 | 0.150 | 0.501 | 2.00 | |

MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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9

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-SB02-0406 |
| Battelle ID | F9825-FS |
| Sample Type | SA |
| Collection Date | 03/25/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 13.60 |
| Matrix | SO |
| Sample Size | 4.990 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.501 UT | UJ | F9825-FS(0) | 1.000 | 5/7/2022 | 0.178 | 0.501 | 1.00 | HT |
| PFHpA | 375-85-9 | 0.501 UT | UJ | F9825-FS(0) | 1.000 | 5/7/2022 | 0.168 | 0.501 | 1.00 | |
| PFOA | 335-67-1 | 0.302 JT | J | F9825-FS(0) | 1.000 | 5/7/2022 | 0.214 | 0.501 | 1.00 | |
| PFNA | 375-95-1 | 0.501 UT | UJ | F9825-FS(0) | 1.000 | 5/7/2022 | 0.157 | 0.501 | 1.00 | |
| PFDA | 335-76-2 | 0.501 UT | | F9825-FS(0) | 1.000 | 5/7/2022 | 0.158 | 0.501 | 1.00 | |
| PFUnA | 2058-94-8 | 0.501 UT | | F9825-FS(0) | 1.000 | 5/7/2022 | 0.156 | 0.501 | 1.00 | |
| PFDoA | 307-55-1 | 0.501 UT | | F9825-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.501 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.501 UT | | F9825-FS(0) | 1.000 | 5/7/2022 | 0.161 | 0.501 | 1.00 | |
| PFTeDA | 376-06-7 | 0.501 UT | | F9825-FS(0) | 1.000 | 5/7/2022 | 0.162 | 0.501 | 2.00 | |
| NMeFOSAA | 2355-31-9 | 0.501 UT | | F9825-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.501 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.501 UT | | F9825-FS(0) | 1.000 | 5/7/2022 | 0.165 | 0.501 | 2.00 | |
| PFBS | 375-73-5 | 0.501 UT | | F9825-FS(0) | 1.000 | 5/7/2022 | 0.171 | 0.501 | 1.00 | |
| PFHxS | 355-46-4 | 0.501 UT | | F9825-FS(0) | 1.000 | 5/7/2022 | 0.173 | 0.501 | 1.00 | |
| PFOS | 1763-23-1 | 0.501 UT | | F9825-FS(0) | 1.000 | 5/7/2022 | 0.175 | 0.501 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.501 UT | | F9825-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.501 | 2.00 | |
| Adona | 919005-14-4 | 0.501 UT | | F9825-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.501 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.501 UT | | F9825-FS(0) | 1.000 | 5/7/2022 | 0.154 | 0.501 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.501 UT | | F9825-FS(0) | 1.000 | 5/7/2022 | 0.150 | 0.501 | 2.00 | |

MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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10

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-SB02P-0406 |
| Battelle ID | F9826-FS |
| Sample Type | SA |
| Collection Date | 03/25/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 11.62 |
| Matrix | SO |
| Sample Size | 4.980 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.179 | 0.502 | 1.00 |
| PFHpA | 375-85-9 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.169 | 0.502 | 1.00 |
| PFOA | 335-67-1 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.215 | 0.502 | 1.00 |
| PFNA | 375-95-1 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.158 | 0.502 | 1.00 |
| PFDA | 335-76-2 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.159 | 0.502 | 1.00 |
| PFUnA | 2058-94-8 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.157 | 0.502 | 1.00 |
| PFDoA | 307-55-1 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.161 | 0.502 | 1.00 |
| PFTrDA | 72629-94-8 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.162 | 0.502 | 1.00 |
| PFTeDA | 376-06-7 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.163 | 0.502 | 2.01 |
| NMeFOSAA | 2355-31-9 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.502 | 2.01 |
| NEtFOSAA | 2991-50-6 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.166 | 0.502 | 2.01 |
| PFBS | 375-73-5 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.172 | 0.502 | 1.00 |
| PFHxS | 355-46-4 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.174 | 0.502 | 1.00 |
| PFOS | 1763-23-1 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.176 | 0.502 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.160 | 0.502 | 2.01 |
| Adona | 919005-14-4 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.161 | 0.502 | 2.01 |
| 9Cl-PF3ONS | 756426-58-1 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.155 | 0.502 | 2.01 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.502 UJ | F9826-FS(0) | 1.000 | 5/7/2022 | 0.151 | 0.502 | 2.01 |

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NW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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11

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-SB02D-4850 |
| Battelle ID | F9827-FS |
| Sample Type | SA |
| Collection Date | 03/25/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 20.76 |
| Matrix | SO |
| Sample Size | 5.020 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.177 | 0.498 | 0.996 | |
| PFHpA | 375-85-9 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.167 | 0.498 | 0.996 | |
| PFOA | 335-67-1 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.213 | 0.498 | 0.996 | |
| PFNA | 375-95-1 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.156 | 0.498 | 0.996 | |
| PFDA | 335-76-2 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.157 | 0.498 | 0.996 | |
| PFUnA | 2058-94-8 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.155 | 0.498 | 0.996 | |
| PFDoA | 307-55-1 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.498 | 0.996 | |
| PFTrDA | 72629-94-8 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.498 | 0.996 | |
| PFTeDA | 376-06-7 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.161 | 0.498 | 1.99 | |
| NMeFOSAA | 2355-31-9 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.158 | 0.498 | 1.99 | |
| NEtFOSAA | 2991-50-6 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.164 | 0.498 | 1.99 | |
| PFBS | 375-73-5 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.170 | 0.498 | 0.996 | |
| PFHxS | 355-46-4 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.172 | 0.498 | 0.996 | |
| PFOS | 1763-23-1 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.174 | 0.498 | 0.996 | |
| HFPO-DA | 13252-13-6 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.158 | 0.498 | 1.99 | |
| Adona | 919005-14-4 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.498 | 1.99 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.153 | 0.498 | 1.99 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.498 | UT | F9827-FS(0) | 1.000 | 5/8/2022 | 0.149 | 0.498 | 1.99 | |

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MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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12

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-SB02DP-4850 |
| Battelle ID | F9828-FS |
| Sample Type | SA |
| Collection Date | 03/25/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 23.12 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 UT | UJ | F9828-FS(0) | 1.000 | 5/8/2022 | 0.178 | 0.500 | 1.00 | HT |
| PFHpA | 375-85-9 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.168 | 0.500 | 1.00 | |
| PFOA | 335-67-1 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.214 | 0.500 | 1.00 | |
| PFNA | 375-95-1 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.157 | 0.500 | 1.00 | |
| PFDA | 335-76-2 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.158 | 0.500 | 1.00 | |
| PFUnA | 2058-94-8 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.156 | 0.500 | 1.00 | |
| PFDoA | 307-55-1 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.500 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.161 | 0.500 | 1.00 | |
| PFTeDA | 376-06-7 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.162 | 0.500 | 2.00 | |
| NMeFOSAA | 2355-31-9 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.500 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.165 | 0.500 | 2.00 | |
| PFBS | 375-73-5 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.171 | 0.500 | 1.00 | |
| PFHxS | 355-46-4 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.173 | 0.500 | 1.00 | |
| PFOS | 1763-23-1 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.175 | 0.500 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.500 | 2.00 | |
| Adona | 919005-14-4 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.500 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.154 | 0.500 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 UT | | F9828-FS(0) | 1.000 | 5/8/2022 | 0.150 | 0.500 | 2.00 | |

MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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|---|---|
| Client ID | VWS7-PFAS-SS01-0001 |
| Battelle ID | F9830-FS |
| Sample Type | SA |
| Collection Date | 03/28/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 11.42 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.178 | 0.500 | 1.00 |
| PFHpA | 375-85-9 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.168 | 0.500 | 1.00 |
| PFOA | 335-67-1 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.214 | 0.500 | 1.00 |
| PFNA | 375-95-1 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.157 | 0.500 | 1.00 |
| PFDA | 335-76-2 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.158 | 0.500 | 1.00 |
| PFUnA | 2058-94-8 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.156 | 0.500 | 1.00 |
| PFDoA | 307-55-1 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.500 | 1.00 |
| PFTrDA | 72629-94-8 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.161 | 0.500 | 1.00 |
| PFTeDA | 376-06-7 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.162 | 0.500 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.500 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.165 | 0.500 | 2.00 |
| PFBS | 375-73-5 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.171 | 0.500 | 1.00 |
| PFHxS | 355-46-4 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.173 | 0.500 | 1.00 |
| PFOS | 1763-23-1 | 0.251 JT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.175 | 0.500 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.500 | 2.00 |
| Adona | 919005-14-4 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.500 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.154 | 0.500 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 UT | F9830-FS(0) | 1.000 | 5/8/2022 | 0.150 | 0.500 | 2.00 |

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Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS7-PFAS-SS01P-0001 |
| Battelle ID | F9831-FS |
| Sample Type | SA |
| Collection Date | 03/28/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 14.20 |
| Matrix | SO |
| Sample Size | 5.010 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.499 UT | UJ | F9831-FS(0) | 1.000 | 5/8/2022 | 0.178 | 0.499 | 0.998 | HT |
| PFHpA | 375-85-9 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.168 | 0.499 | 0.998 | |
| PFOA | 335-67-1 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.214 | 0.499 | 0.998 | |
| PFNA | 375-95-1 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.157 | 0.499 | 0.998 | |
| PFDA | 335-76-2 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.158 | 0.499 | 0.998 | |
| PFUnA | 2058-94-8 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.156 | 0.499 | 0.998 | |
| PFDoA | 307-55-1 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.499 | 0.998 | |
| PFTrDA | 72629-94-8 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.161 | 0.499 | 0.998 | |
| PFTeDA | 376-06-7 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.162 | 0.499 | 2.00 | |
| NMeFOSAA | 2355-31-9 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.499 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.165 | 0.499 | 2.00 | |
| PFBS | 375-73-5 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.171 | 0.499 | 0.998 | |
| PFHxS | 355-46-4 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.173 | 0.499 | 0.998 | |
| PFOS | 1763-23-1 | 0.211 JT | J | F9831-FS(0) | 1.000 | 5/8/2022 | 0.175 | 0.499 | 0.998 | |
| HFPO-DA | 13252-13-6 | 0.499 UT | UJ | F9831-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.499 | 2.00 | |
| Adona | 919005-14-4 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.499 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.154 | 0.499 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.499 UT | | F9831-FS(0) | 1.000 | 5/8/2022 | 0.150 | 0.499 | 2.00 | |

NW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS7-PFAS-SS02-0001 |
| Battelle ID | F9834-FS |
| Sample Type | SA |
| Collection Date | 03/28/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 9.98 |
| Matrix | SO |
| Sample Size | 4.980 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.179 | 0.502 | 1.00 | |
| PFHpA | 375-85-9 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.169 | 0.502 | 1.00 | |
| PFOA | 335-67-1 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.215 | 0.502 | 1.00 | |
| PFNA | 375-95-1 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.158 | 0.502 | 1.00 | |
| PFDA | 335-76-2 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.502 | 1.00 | |
| PFUnA | 2058-94-8 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.157 | 0.502 | 1.00 | |
| PFDoA | 307-55-1 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.161 | 0.502 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.162 | 0.502 | 1.00 | |
| PFTeDA | 376-06-7 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.163 | 0.502 | 2.01 | |
| NMeFOSAA | 2355-31-9 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.502 | 2.01 | |
| NEtFOSAA | 2991-50-6 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.166 | 0.502 | 2.01 | |
| PFBS | 375-73-5 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.172 | 0.502 | 1.00 | |
| PFHxS | 355-46-4 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.174 | 0.502 | 1.00 | |
| PFOS | 1763-23-1 | 0.407 | JT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.176 | 0.502 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.502 | 2.01 | |
| Adona | 919005-14-4 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.161 | 0.502 | 2.01 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.155 | 0.502 | 2.01 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.502 | UT | F9834-FS(0) | 1.000 | 5/8/2022 | 0.151 | 0.502 | 2.01 | |

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Analyzed by: Bailey, Kevin

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS7-PFAS-SS03-0001 |
| Battelle ID | F9835-FS |
| Sample Type | SA |
| Collection Date | 03/29/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 6.41 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 UT | UJ | F9835-FS(0) | 1.000 | 5/8/2022 | 0.178 | 0.500 | 1.00 | HT |
| PFHpA | 375-85-9 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.168 | 0.500 | 1.00 | |
| PFOA | 335-67-1 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.214 | 0.500 | 1.00 | |
| PFNA | 375-95-1 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.157 | 0.500 | 1.00 | |
| PFDA | 335-76-2 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.158 | 0.500 | 1.00 | |
| PFUnA | 2058-94-8 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.156 | 0.500 | 1.00 | |
| PFDoA | 307-55-1 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.500 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.161 | 0.500 | 1.00 | |
| PFTeDA | 376-06-7 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.162 | 0.500 | 2.00 | |
| NMeFOSAA | 2355-31-9 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.500 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.165 | 0.500 | 2.00 | |
| PFBS | 375-73-5 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.171 | 0.500 | 1.00 | |
| PFHxS | 355-46-4 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.173 | 0.500 | 1.00 | |
| PFOS | 1763-23-1 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.175 | 0.500 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.500 | 2.00 | |
| Adona | 919005-14-4 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.500 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.154 | 0.500 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 UT | | F9835-FS(0) | 1.000 | 5/8/2022 | 0.150 | 0.500 | 2.00 | |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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|---|---|
| Client ID | VWMP-PFAS-SS04-0001 |
| Battelle ID | F9837-FS |
| Sample Type | SA |
| Collection Date | 03/29/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 6.39 |
| Matrix | SO |
| Sample Size | 4.980 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.179 | 0.502 | 1.00 | |
| PFHpA | 375-85-9 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.169 | 0.502 | 1.00 | |
| PFOA | 335-67-1 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.215 | 0.502 | 1.00 | |
| PFNA | 375-95-1 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.158 | 0.502 | 1.00 | |
| PFDA | 335-76-2 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.502 | 1.00 | |
| PFUnA | 2058-94-8 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.157 | 0.502 | 1.00 | |
| PFDoA | 307-55-1 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.161 | 0.502 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.162 | 0.502 | 1.00 | |
| PFTeDA | 376-06-7 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.163 | 0.502 | 2.01 | |
| NMeFOSAA | 2355-31-9 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.502 | 2.01 | |
| NEtFOSAA | 2991-50-6 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.166 | 0.502 | 2.01 | |
| PFBS | 375-73-5 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.172 | 0.502 | 1.00 | |
| PFHxS | 355-46-4 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.174 | 0.502 | 1.00 | |
| PFOS | 1763-23-1 | 1.01 | T | F9837-FS(0) | 1.000 | 5/8/2022 | 0.176 | 0.502 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.502 | 2.01 | |
| Adona | 919005-14-4 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.161 | 0.502 | 2.01 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.155 | 0.502 | 2.01 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.502 | UT | F9837-FS(0) | 1.000 | 5/8/2022 | 0.151 | 0.502 | 2.01 | |

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Analyzed by: Bailey, Kevin
Printed: 5/17/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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|---|---|
| Client ID | VWMP-PFAS-SB04-0406 |
| Battelle ID | F9838-FS |
| Sample Type | SA |
| Collection Date | 03/29/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 12.65 |
| Matrix | SO |
| Sample Size | 4.980 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.179 | 0.502 | 1.00 |
| PFHpA | 375-85-9 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.169 | 0.502 | 1.00 |
| PFOA | 335-67-1 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.215 | 0.502 | 1.00 |
| PFNA | 375-95-1 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.158 | 0.502 | 1.00 |
| PFDA | 335-76-2 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.502 | 1.00 |
| PFUnA | 2058-94-8 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.157 | 0.502 | 1.00 |
| PFDoA | 307-55-1 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.161 | 0.502 | 1.00 |
| PFTrDA | 72629-94-8 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.162 | 0.502 | 1.00 |
| PFTeDA | 376-06-7 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.163 | 0.502 | 2.01 |
| NMeFOSAA | 2355-31-9 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.502 | 2.01 |
| NEtFOSAA | 2991-50-6 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.166 | 0.502 | 2.01 |
| PFBS | 375-73-5 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.172 | 0.502 | 1.00 |
| PFHxS | 355-46-4 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.174 | 0.502 | 1.00 |
| PFOS | 1763-23-1 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.176 | 0.502 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.502 | 2.01 |
| Adona | 919005-14-4 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.161 | 0.502 | 2.01 |
| 9Cl-PF3ONS | 756426-58-1 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.155 | 0.502 | 2.01 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.502 UT | F9838-FS(0) | 1.000 | 5/8/2022 | 0.151 | 0.502 | 2.01 |

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Analyzed by: Balley, Kevin
Printed: 5/17/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-SB04D-4749 |
| Battelle ID | F9839-FS |
| Sample Type | SA |
| Collection Date | 03/29/2022 |
| Extraction Date | 04/04/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 20.24 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 UT | UJ | F9839-FS(0) | 1.000 | 5/8/2022 | 0.178 | 0.500 | 1.00 | HT |
| PFHpA | 375-85-9 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.168 | 0.500 | 1.00 | |
| PFOA | 335-67-1 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.214 | 0.500 | 1.00 | |
| PFNA | 375-95-1 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.157 | 0.500 | 1.00 | |
| PFDA | 335-76-2 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.158 | 0.500 | 1.00 | |
| PFUnA | 2058-94-8 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.156 | 0.500 | 1.00 | |
| PFDoA | 307-55-1 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.500 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.161 | 0.500 | 1.00 | |
| PFTeDA | 376-06-7 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.162 | 0.500 | 2.00 | |
| NMeFOSAA | 2355-31-9 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.500 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.165 | 0.500 | 2.00 | |
| PFBS | 375-73-5 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.171 | 0.500 | 1.00 | |
| PFHxS | 355-46-4 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.173 | 0.500 | 1.00 | |
| PFOS | 1763-23-1 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.175 | 0.500 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.159 | 0.500 | 2.00 | |
| Adona | 919005-14-4 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.160 | 0.500 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.154 | 0.500 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 UT | | F9839-FS(0) | 1.000 | 5/8/2022 | 0.150 | 0.500 | 2.00 | |

MW Phyl 2-2

Analyzed by: Bailey, Kevin
Printed: 5/17/2022

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0523
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEW10-PFAS-SS06-0001 | F9345-FS | Soil |
| 2 | VEW10-PFAS-SB06D-0708 | F9347-FS | Soil |
| 3 | VEW10-PFAS-SS04-0001 | F9355-FS | Soil |
| 4 | VEW10-PFAS-SB04D-2829 | F9357-FS | Soil |
| 5 | VEW10-PFAS-SS02-0001 | F9358-FS | Soil |
| 6 | VEW10-PFAS-SS03-0001 | F9361-FS | Soil |

A Stage 2B/4 data validation was performed on the analytical data for six soil samples collected on March 1-9, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

## Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

## Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days except for the following.

| EDS Sample | Date Collected | Date Extracted | # of Days | Qualifier |
|---|---|---|---|---|
| All Samples | 03/01/22 | 04/08/22 | 38 | J/UJ |

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VERW-EB01-022522-SB | None - ND | - | - | - |
| VEW10-EB01-022522-SB | None - ND | - | - | - |
| VEW10-FB01-030222 | None - ND | - | - | - |
| VEW10-EB01-030922-SS | None - ND | - | - | - |
| VEW10-FB01-030922 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- Several samples exhibited a low surrogate percent recovery for 13C2-PFTeDA; however, all samples were already qualified due to holding times and no further action was required.

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

**Internal Standard (IS) Area Performance**

- All internal standards met response and retention time (RT) criteria.

**Target Compound Identification**

- All mass spectra and quantitation criteria were met.

**Compound Quantitation**

- All samples were re-extracted outside of holding times to confirm surrogate deficiencies in the original analysis in SDG 22-0397. The original analysis results for PFTeDA should be used for reporting purposes.

**Field Duplicate Sample Precision**

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS06-0001 |
| Battelle ID | F9345-FS1 |
| Sample Type | SA |
| Collection Date | 03/01/2022 |
| Extraction Date | 04/08/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 13.57 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.178 | 0.500 | 1.00 | Exclude-RE |
| PFHpA | 375-85-9 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.168 | 0.500 | 1.00 | |
| PFOA | 335-67-1 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.214 | 0.500 | 1.00 | |
| PFNA | 375-95-1 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.157 | 0.500 | 1.00 | |
| PFDA | 335-76-2 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.158 | 0.500 | 1.00 | |
| PFUnA | 2058-94-8 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.156 | 0.500 | 1.00 | |
| PFDoA | 307-55-1 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.160 | 0.500 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.161 | 0.500 | 1.00 | |
| PFTeDA | 376-06-7 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.162 | 0.500 | 2.00 | UJ-HT |
| NMeFOSAA | 2355-31-9 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.159 | 0.500 | 2.00 | Exclude-RE |
| NEtFOSAA | 2991-50-6 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.165 | 0.500 | 2.00 | |
| PFBS | 375-73-5 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.171 | 0.500 | 1.00 | |
| PFHxS | 355-46-4 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.173 | 0.500 | 1.00 | |
| PFOS | 1763-23-1 | 0.290 JT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.175 | 0.500 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.159 | 0.500 | 2.00 | |
| Adona | 919005-14-4 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.160 | 0.500 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.154 | 0.500 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 UT | F9345-FS1(0) | 1.000 | 4/20/2022 | 0.150 | 0.500 | 2.00 | |

NW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/25/2022

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS06-0001 |
| Battelle ID | F9345-FS1 |
| Sample Type | SA |
| Collection Date | 03/01/2022 |
| Extraction Date | 04/08/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |

| ***Surrogate Recoveries (%)*** | **Recovery** | | **Extract ID** | **Analysis Date** |
|---|---|---|---|---|
| 13C5-PFHxA | 103 | | F9345-FS1(0) | 4/20/2022 |
| 13C4-PFHpA | 98 | | F9345-FS1(0) | 4/20/2022 |
| 13C8-PFOA | 105 | | F9345-FS1(0) | 4/20/2022 |
| 13C9-PFNA | 107 | | F9345-FS1(0) | 4/20/2022 |
| 13C6-PFDA | 88 | | F9345-FS1(0) | 4/20/2022 |
| 13C7-PFUnA | 81 | | F9345-FS1(0) | 4/20/2022 |
| 13C2-PFDoA | 64 | | F9345-FS1(0) | 4/20/2022 |
| 13C2-PFTeDA | 40 | N | F9345-FS1(0) | 4/20/2022 |
| d3-MeFOSAA | 84 | | F9345-FS1(0) | 4/20/2022 |
| d5-EtFOSAA | 93 | | F9345-FS1(0) | 4/20/2022 |
| 13C3-PFBS | 98 | | F9345-FS1(0) | 4/20/2022 |
| 13C3-PFHxS | 75 | | F9345-FS1(0) | 4/20/2022 |
| 13C8-PFOS | 99 | | F9345-FS1(0) | 4/20/2022 |
| 13C3-HFPO-DA | 82 | | F9345-FS1(0) | 4/20/2022 |

NW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/25/2022

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB06D-0708 |
| Battelle ID | F9347-FS1 |
| Sample Type | SA |
| Collection Date | 03/01/2022 |
| Extraction Date | 04/08/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 16.34 |
| Matrix | SO |
| Sample Size | 5.020 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.177 | 0.498 | 0.996 | Exclude-RE |
| PFHpA | 375-85-9 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.167 | 0.498 | 0.996 | |
| PFOA | 335-67-1 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.213 | 0.498 | 0.996 | |
| PFNA | 375-95-1 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.156 | 0.498 | 0.996 | |
| PFDA | 335-76-2 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.157 | 0.498 | 0.996 | |
| PFUnA | 2058-94-8 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.155 | 0.498 | 0.996 | |
| PFDoA | 307-55-1 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.159 | 0.498 | 0.996 | |
| PFTrDA | 72629-94-8 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.160 | 0.498 | 0.996 | |
| PFTeDA | 376-06-7 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.161 | 0.498 | 1.99 | UJ-HT |
| NMeFOSAA | 2355-31-9 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.158 | 0.498 | 1.99 | Exclude-RE |
| NEtFOSAA | 2991-50-6 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.164 | 0.498 | 1.99 | |
| PFBS | 375-73-5 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.170 | 0.498 | 0.996 | |
| PFHxS | 355-46-4 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.172 | 0.498 | 0.996 | |
| PFOS | 1763-23-1 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.174 | 0.498 | 0.996 | |
| HFPO-DA | 13252-13-6 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.158 | 0.498 | 1.99 | |
| Adona | 919005-14-4 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.159 | 0.498 | 1.99 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.153 | 0.498 | 1.99 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.498 | UT | F9347-FS1(0) | 1.000 | 4/20/2022 | 0.149 | 0.498 | 1.99 | |

NW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/25/2022

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB06D-0708 |
| Battelle ID | F9347-FS1 |
| Sample Type | SA |
| Collection Date | 03/01/2022 |
| Extraction Date | 04/08/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |

| ***Surrogate Recoveries (%)*** | **Recovery** | **Extract ID** | **Analysis Date** |
|---|---|---|---|
| 13C5-PFHxA | 112 | F9347-FS1(0) | 4/20/2022 |
| 13C4-PFHpA | 104 | F9347-FS1(0) | 4/20/2022 |
| 13C8-PFOA | 91 | F9347-FS1(0) | 4/20/2022 |
| 13C9-PFNA | 112 | F9347-FS1(0) | 4/20/2022 |
| 13C6-PFDA | 109 | F9347-FS1(0) | 4/20/2022 |
| 13C7-PFUnA | 79 | F9347-FS1(0) | 4/20/2022 |
| 13C2-PFDoA | 60 | F9347-FS1(0) | 4/20/2022 |
| 13C2-PFTeDA | 50 | F9347-FS1(0) | 4/20/2022 |
| d3-MeFOSAA | 88 | F9347-FS1(0) | 4/20/2022 |
| d5-EtFOSAA | 90 | F9347-FS1(0) | 4/20/2022 |
| 13C3-PFBS | 97 | F9347-FS1(0) | 4/20/2022 |
| 13C3-PFHxS | 97 | F9347-FS1(0) | 4/20/2022 |
| 13C8-PFOS | 101 | F9347-FS1(0) | 4/20/2022 |
| 13C3-HFPO-DA | 97 | F9347-FS1(0) | 4/20/2022 |

NW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/25/2022

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS04-0001 |
| Battelle ID | F9355-FS1 |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 04/08/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 11.50 |
| Matrix | SO |
| Sample Size | 5.030 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.177 | 0.497 | 0.994 | Exclude-RE |
| PFHpA | 375-85-9 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.167 | 0.497 | 0.994 | |
| PFOA | 335-67-1 | 0.217 | JT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.213 | 0.497 | 0.994 | |
| PFNA | 375-95-1 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.156 | 0.497 | 0.994 | |
| PFDA | 335-76-2 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.157 | 0.497 | 0.994 | |
| PFUnA | 2058-94-8 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.155 | 0.497 | 0.994 | |
| PFDoA | 307-55-1 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.159 | 0.497 | 0.994 | |
| PFTrDA | 72629-94-8 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.160 | 0.497 | 0.994 | |
| PFTeDA | 376-06-7 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.161 | 0.497 | 1.99 | UJ-HT |
| NMeFOSAA | 2355-31-9 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.158 | 0.497 | 1.99 | Exclude-RE |
| NEtFOSAA | 2991-50-6 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.164 | 0.497 | 1.99 | |
| PFBS | 375-73-5 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.170 | 0.497 | 0.994 | |
| PFHxS | 355-46-4 | 0.223 | JT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.172 | 0.497 | 0.994 | |
| PFOS | 1763-23-1 | 9.97 | T | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.174 | 0.497 | 0.994 | |
| HFPO-DA | 13252-13-6 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.158 | 0.497 | 1.99 | |
| Adona | 919005-14-4 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.159 | 0.497 | 1.99 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.153 | 0.497 | 1.99 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.497 | UT | F9355-FS1(0) | 1.000 | 4/20/2022 | 0.149 | 0.497 | 1.99 | |

nw 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/25/2022

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS04-0001 |
| Battelle ID | F9355-FS1 |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 04/08/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |

| ***Surrogate Recoveries (%)*** | **Recovery** | **Extract ID** | **Analysis Date** |
|---|---|---|---|
| 13C5-PFHxA | 88 | F9355-FS1(0) | 4/20/2022 |
| 13C4-PFHpA | 83 | F9355-FS1(0) | 4/20/2022 |
| 13C8-PFOA | 84 | F9355-FS1(0) | 4/20/2022 |
| 13C9-PFNA | 89 | F9355-FS1(0) | 4/20/2022 |
| 13C6-PFDA | 86 | F9355-FS1(0) | 4/20/2022 |
| 13C7-PFUnA | 82 | F9355-FS1(0) | 4/20/2022 |
| 13C2-PFDoA | 69 | F9355-FS1(0) | 4/20/2022 |
| 13C2-PFTeDA | 51 | F9355-FS1(0) | 4/20/2022 |
| d3-MeFOSAA | 84 | F9355-FS1(0) | 4/20/2022 |
| d5-EtFOSAA | 110 | F9355-FS1(0) | 4/20/2022 |
| 13C3-PFBS | 76 | F9355-FS1(0) | 4/20/2022 |
| 13C3-PFHxS | 83 | F9355-FS1(0) | 4/20/2022 |
| 13C8-PFOS | 85 | F9355-FS1(0) | 4/20/2022 |
| 13C3-HFPO-DA | 86 | F9355-FS1(0) | 4/20/2022 |

NW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/25/2022

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB04D-2829 |
| Battelle ID | F9357-FS1 |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 04/08/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 19.00 |
| Matrix | SO |
| Sample Size | 4.980 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.179 | 0.502 | 1.00 | Exclude-RE |
| PFHpA | 375-85-9 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.169 | 0.502 | 1.00 | |
| PFOA | 335-67-1 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.215 | 0.502 | 1.00 | |
| PFNA | 375-95-1 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.158 | 0.502 | 1.00 | |
| PFDA | 335-76-2 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.159 | 0.502 | 1.00 | |
| PFUnA | 2058-94-8 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.157 | 0.502 | 1.00 | |
| PFDoA | 307-55-1 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.161 | 0.502 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.162 | 0.502 | 1.00 | |
| PFTeDA | 376-06-7 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.163 | 0.502 | 2.01 | UJ-HT |
| NMeFOSAA | 2355-31-9 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.160 | 0.502 | 2.01 | Exclude-RE |
| NEtFOSAA | 2991-50-6 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.166 | 0.502 | 2.01 | |
| PFBS | 375-73-5 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.172 | 0.502 | 1.00 | |
| PFHxS | 355-46-4 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.174 | 0.502 | 1.00 | |
| PFOS | 1763-23-1 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.176 | 0.502 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.160 | 0.502 | 2.01 | |
| Adona | 919005-14-4 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.161 | 0.502 | 2.01 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.155 | 0.502 | 2.01 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.502 | UT | F9357-FS1(0) | 1.000 | 4/20/2022 | 0.151 | 0.502 | 2.01 | |

NW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/25/2022

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SB04D-2829 |
| Battelle ID | F9357-FS1 |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 04/08/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |

| ***Surrogate Recoveries (%)*** | **Recovery** | | **Extract ID** | **Analysis Date** |
|---|---|---|---|---|
| 13C5-PFHxA | 89 | | F9357-FS1(0) | 4/20/2022 |
| 13C4-PFHpA | 96 | | F9357-FS1(0) | 4/20/2022 |
| 13C8-PFOA | 98 | | F9357-FS1(0) | 4/20/2022 |
| 13C9-PFNA | 85 | | F9357-FS1(0) | 4/20/2022 |
| 13C6-PFDA | 94 | | F9357-FS1(0) | 4/20/2022 |
| 13C7-PFUnA | 89 | | F9357-FS1(0) | 4/20/2022 |
| 13C2-PFDoA | 77 | | F9357-FS1(0) | 4/20/2022 |
| 13C2-PFTeDA | 45 | N | F9357-FS1(0) | 4/20/2022 |
| d3-MeFOSAA | 89 | | F9357-FS1(0) | 4/20/2022 |
| d5-EtFOSAA | 92 | | F9357-FS1(0) | 4/20/2022 |
| 13C3-PFBS | 84 | | F9357-FS1(0) | 4/20/2022 |
| 13C3-PFHxS | 104 | | F9357-FS1(0) | 4/20/2022 |
| 13C8-PFOS | 89 | | F9357-FS1(0) | 4/20/2022 |
| 13C3-HFPO-DA | 87 | | F9357-FS1(0) | 4/20/2022 |

NEW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/25/2022

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS02-0001 |
| Battelle ID | F9358-FS1 |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 04/08/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 9.09 |
| Matrix | SO |
| Sample Size | 4.990 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.178 | 0.501 | 1.00 | Exclude-RE |
| PFHpA | 375-85-9 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.168 | 0.501 | 1.00 | |
| PFOA | 335-67-1 | 0.348 JT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.214 | 0.501 | 1.00 | |
| PFNA | 375-95-1 | 0.242 JT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.157 | 0.501 | 1.00 | |
| PFDA | 335-76-2 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.158 | 0.501 | 1.00 | |
| PFUnA | 2058-94-8 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.156 | 0.501 | 1.00 | |
| PFDoA | 307-55-1 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.160 | 0.501 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.161 | 0.501 | 1.00 | |
| PFTeDA | 376-06-7 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.162 | 0.501 | 2.00 | UJ-HT |
| NMeFOSAA | 2355-31-9 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.159 | 0.501 | 2.00 | Exclude-RE |
| NEtFOSAA | 2991-50-6 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.165 | 0.501 | 2.00 | |
| PFBS | 375-73-5 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.171 | 0.501 | 1.00 | |
| PFHxS | 355-46-4 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.173 | 0.501 | 1.00 | |
| PFOS | 1763-23-1 | 21.2 T | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.175 | 0.501 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.159 | 0.501 | 2.00 | |
| Adona | 919005-14-4 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.160 | 0.501 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.154 | 0.501 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.501 UT | F9358-FS1(0) | 1.000 | 4/20/2022 | 0.150 | 0.501 | 2.00 | |

nw 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/25/2022

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS02-0001 |
| Battelle ID | F9358-FS1 |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 04/08/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |

| ***Surrogate Recoveries (%)*** | **Recovery** | **Extract ID** | **Analysis Date** |
|---|---|---|---|
| 13C5-PFHxA | 77 | F9358-FS1(0) | 4/20/2022 |
| 13C4-PFHpA | 84 | F9358-FS1(0) | 4/20/2022 |
| 13C8-PFOA | 84 | F9358-FS1(0) | 4/20/2022 |
| 13C9-PFNA | 78 | F9358-FS1(0) | 4/20/2022 |
| 13C6-PFDA | 106 | F9358-FS1(0) | 4/20/2022 |
| 13C7-PFUnA | 93 | F9358-FS1(0) | 4/20/2022 |
| 13C2-PFDoA | 72 | F9358-FS1(0) | 4/20/2022 |
| 13C2-PFTeDA | 37 N | F9358-FS1(0) | 4/20/2022 |
| d3-MeFOSAA | 74 | F9358-FS1(0) | 4/20/2022 |
| d5-EtFOSAA | 81 | F9358-FS1(0) | 4/20/2022 |
| 13C3-PFBS | 80 | F9358-FS1(0) | 4/20/2022 |
| 13C3-PFHxS | 83 | F9358-FS1(0) | 4/20/2022 |
| 13C8-PFOS | 76 | F9358-FS1(0) | 4/20/2022 |
| 13C3-HFPO-DA | 72 | F9358-FS1(0) | 4/20/2022 |

NW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/25/2022

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS03-0001 |
| Battelle ID | F9361-FS1 |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 04/08/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 9.90 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.178 | 0.500 | 1.00 | Exclude-RE |
| PFHpA | 375-85-9 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.168 | 0.500 | 1.00 | |
| PFOA | 335-67-1 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.214 | 0.500 | 1.00 | |
| PFNA | 375-95-1 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.157 | 0.500 | 1.00 | |
| PFDA | 335-76-2 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.158 | 0.500 | 1.00 | |
| PFUnA | 2058-94-8 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.156 | 0.500 | 1.00 | |
| PFDoA | 307-55-1 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.160 | 0.500 | 1.00 | |
| PFTrDA | 72629-94-8 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.161 | 0.500 | 1.00 | |
| PFTeDA | 376-06-7 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.162 | 0.500 | 2.00 | UJ-HT |
| NMeFOSAA | 2355-31-9 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.159 | 0.500 | 2.00 | Exclude-RE |
| NEtFOSAA | 2991-50-6 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.165 | 0.500 | 2.00 | |
| PFBS | 375-73-5 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.171 | 0.500 | 1.00 | |
| PFHxS | 355-46-4 | 0.193 JT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.173 | 0.500 | 1.00 | |
| PFOS | 1763-23-1 | 2.55 T | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.175 | 0.500 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.159 | 0.500 | 2.00 | |
| Adona | 919005-14-4 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.160 | 0.500 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.154 | 0.500 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 UT | F9361-FS1(0) | 1.000 | 4/20/2022 | 0.150 | 0.500 | 2.00 | |

NW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/25/2022

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-SS03-0001 |
| Battelle ID | F9361-FS1 |
| Sample Type | SA |
| Collection Date | 03/09/2022 |
| Extraction Date | 04/08/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |

| ***Surrogate Recoveries (%)*** | **Recovery** | **Extract ID** | **Analysis Date** |
|---|---|---|---|
| 13C5-PFHxA | 92 | F9361-FS1(0) | 4/20/2022 |
| 13C4-PFHpA | 82 | F9361-FS1(0) | 4/20/2022 |
| 13C8-PFOA | 76 | F9361-FS1(0) | 4/20/2022 |
| 13C9-PFNA | 80 | F9361-FS1(0) | 4/20/2022 |
| 13C6-PFDA | 97 | F9361-FS1(0) | 4/20/2022 |
| 13C7-PFUnA | 82 | F9361-FS1(0) | 4/20/2022 |
| 13C2-PFDoA | 85 | F9361-FS1(0) | 4/20/2022 |
| 13C2-PFTeDA | 47 N | F9361-FS1(0) | 4/20/2022 |
| d3-MeFOSAA | 89 | F9361-FS1(0) | 4/20/2022 |
| d5-EtFOSAA | 105 | F9361-FS1(0) | 4/20/2022 |
| 13C3-PFBS | 86 | F9361-FS1(0) | 4/20/2022 |
| 13C3-PFHxS | 76 | F9361-FS1(0) | 4/20/2022 |
| 13C8-PFOS | 81 | F9361-FS1(0) | 4/20/2022 |
| 13C3-HFPO-DA | 82 | F9361-FS1(0) | 4/20/2022 |

NW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 4/25/2022

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0695
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VWAH-FB01-042122-SB | E1026-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for one aqueous field blank sample collected on April 21, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination

- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

## Polyfluoroalkyl Substances (PFAS)

## Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

## Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWAH-FB01-042122-SB | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-FB01-042122-SB |
| Battelle ID | E1026-FS |
| Sample Type | SA |
| Collection Date | 04/21/2022 |
| Extraction Date | 04/29/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.255 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.895 | 2.45 | 4.90 |
| PFHpA | 375-85-9 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.923 | 2.45 | 4.90 |
| PFOA | 335-67-1 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.990 | 2.45 | 4.90 |
| PFNA | 375-95-1 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.817 | 2.45 | 4.90 |
| PFDA | 335-76-2 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.769 | 2.45 | 4.90 |
| PFUnA | 2058-94-8 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.737 | 2.45 | 4.90 |
| PFDoA | 307-55-1 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.745 | 2.45 | 4.90 |
| PFTrDA | 72629-94-8 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.727 | 2.45 | 4.90 |
| PFTeDA | 376-06-7 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.775 | 2.45 | 4.90 |
| NMeFOSAA | 2355-31-9 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 1.01 | 2.45 | 4.90 |
| NEtFOSAA | 2991-50-6 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.971 | 2.45 | 4.90 |
| PFBS | 375-73-5 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.849 | 2.45 | 4.90 |
| PFHxS | 355-46-4 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.977 | 2.45 | 4.90 |
| PFOS | 1763-23-1 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 1.05 | 2.45 | 4.90 |
| HFPO-DA | 13252-13-6 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.848 | 2.45 | 4.90 |
| Adona | 919005-14-4 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.852 | 2.45 | 4.90 |
| 9Cl-PF3ONS | 756426-58-1 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 1.01 | 2.45 | 4.90 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.45 U | E1026-FS(0) | 1.000 | 5/25/2022 | 0.883 | 2.45 | 4.90 |

NW 8/14/22

Analyzed by: Schumitz, Denise
Printed: 5/31/2022

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0696
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VWAH-PFAS-SS03-0002 | E1015-FS | Soil |
| 2 | VWAH-PFAS-SB03-0406 | E1016-FS | Soil |
| 3 | VWAH-PFAS-SB03D-0709 | E1017-FS | Soil |
| 4 | VWAH-PFAS-SS04-0001 | E1018-FS | Soil |
| 5 | VWAH-PFAS-SB04-0406 | E1019-FS | Soil |
| 6 | VWAH-PFAS-SB04D-0810 | E1020-FS | Soil |
| 7 | VWAH-PFAS-SS02-0002 | E1021-FS | Soil |
| 8 | VWAH-PFAS-SB02-0406 | E1022-FS | Soil |
| 9 | VWAH-PFAS-SB02D-0810 | E1023-FS | Soil |
| 10 | VWAH-PFAS-SS01-0002 | E1024-FS | Soil |
| 11 | VWAH-PFAS-SS01P-0002 | E1025-FS | Soil |
| 12 | VWAH-PFAS-SB01-0507 | E1027-FS | Soil |
| 13 | VWAH-PFAS-SB01P-0507 | E1028-FS | Soil |

A Stage 2B/4 data validation was performed on the analytical data for thirteen soil samples collected on April 21, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;

- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWMP-EB01-032922 | None - ND | - | - | - |
| VWAH-FB01-042122-SB | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

| EDS Sample | Surrogate | %R | Qualifier |
|---|---|---|---|
| 9 | 13C2-PFTeDA | 45% | UJ - Associated Cmpd |
| 13 | 13C2-PFTeDA | 42% | UJ - Associated Cmpd |

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VWAH-PFAS-SS01-0002 ng/g | VWAH-PFAS-SS01P-0002 ng/g | RPD | Qualifier |
|---|---|---|---|---|
| PFOS | 0.496U | 0.195 | NC | None |

| Compound | VWAH-PFAS-SB01-0507 ng/g | VWAH-PFAS-SB01P-0507 ng/g | RPD | Qualifier |
|---|---|---|---|---|
| None | ND | ND | - | - |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SS03-0002 |
| Battelle ID | E1015-FS |
| Sample Type | SA |
| Collection Date | 04/21/2022 |
| Extraction Date | 05/05/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 4.52 |
| Matrix | SO |
| Sample Size | 5.040 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.177 | 0.496 | 0.992 |
| PFHpA | 375-85-9 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.167 | 0.496 | 0.992 |
| PFOA | 335-67-1 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.212 | 0.496 | 0.992 |
| PFNA | 375-95-1 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.156 | 0.496 | 0.992 |
| PFDA | 335-76-2 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.157 | 0.496 | 0.992 |
| PFUnA | 2058-94-8 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.155 | 0.496 | 0.992 |
| PFDoA | 307-55-1 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.496 | 0.992 |
| PFTrDA | 72629-94-8 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.496 | 0.992 |
| PFTeDA | 376-06-7 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.496 | 1.98 |
| NMeFOSAA | 2355-31-9 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.496 | 1.98 |
| NEtFOSAA | 2991-50-6 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.164 | 0.496 | 1.98 |
| PFBS | 375-73-5 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.170 | 0.496 | 0.992 |
| PFHxS | 355-46-4 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.172 | 0.496 | 0.992 |
| PFOS | 1763-23-1 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.174 | 0.496 | 0.992 |
| HFPO-DA | 13252-13-6 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.496 | 1.98 |
| Adona | 919005-14-4 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.496 | 1.98 |
| 9Cl-PF3ONS | 756426-58-1 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.153 | 0.496 | 1.98 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.496 U | E1015-FS(0) | 1.000 | 6/1/2022 | 0.149 | 0.496 | 1.98 |

NW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 5/31/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SB03-0406 |
| Battelle ID | E1016-FS |
| Sample Type | SA |
| Collection Date | 04/21/2022 |
| Extraction Date | 05/05/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 2.12 |
| Matrix | SO |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.178 | 0.500 | 1.00 |
| PFHpA | 375-85-9 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.168 | 0.500 | 1.00 |
| PFOA | 335-67-1 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.214 | 0.500 | 1.00 |
| PFNA | 375-95-1 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.157 | 0.500 | 1.00 |
| PFDA | 335-76-2 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.500 | 1.00 |
| PFUnA | 2058-94-8 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.156 | 0.500 | 1.00 |
| PFDoA | 307-55-1 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.500 | 1.00 |
| PFTrDA | 72629-94-8 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.500 | 1.00 |
| PFTeDA | 376-06-7 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.162 | 0.500 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.500 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.165 | 0.500 | 2.00 |
| PFBS | 375-73-5 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.171 | 0.500 | 1.00 |
| PFHxS | 355-46-4 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.173 | 0.500 | 1.00 |
| PFOS | 1763-23-1 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.175 | 0.500 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.500 | 2.00 |
| Adona | 919005-14-4 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.500 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.154 | 0.500 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 U | E1016-FS(0) | 1.000 | 6/1/2022 | 0.150 | 0.500 | 2.00 |

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3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SB03D-0709 |
| Battelle ID | E1017-FS |
| Sample Type | SA |
| Collection Date | 04/21/2022 |
| Extraction Date | 05/05/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 13.33 |
| Matrix | SO |
| Sample Size | 4.970 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.179 | 0.503 | 1.01 |
| PFHpA | 375-85-9 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.169 | 0.503 | 1.01 |
| PFOA | 335-67-1 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.215 | 0.503 | 1.01 |
| PFNA | 375-95-1 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.503 | 1.01 |
| PFDA | 335-76-2 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.503 | 1.01 |
| PFUnA | 2058-94-8 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.157 | 0.503 | 1.01 |
| PFDoA | 307-55-1 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.503 | 1.01 |
| PFTrDA | 72629-94-8 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.162 | 0.503 | 1.01 |
| PFTeDA | 376-06-7 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.163 | 0.503 | 2.01 |
| NMeFOSAA | 2355-31-9 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.503 | 2.01 |
| NEtFOSAA | 2991-50-6 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.166 | 0.503 | 2.01 |
| PFBS | 375-73-5 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.172 | 0.503 | 1.01 |
| PFHxS | 355-46-4 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.174 | 0.503 | 1.01 |
| PFOS | 1763-23-1 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.176 | 0.503 | 1.01 |
| HFPO-DA | 13252-13-6 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.503 | 2.01 |
| Adona | 919005-14-4 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.503 | 2.01 |
| 9Cl-PF3ONS | 756426-58-1 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.155 | 0.503 | 2.01 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.503 U | E1017-FS(0) | 1.000 | 6/1/2022 | 0.151 | 0.503 | 2.01 |

MW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 5/31/2022

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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SS04-0001 |
| Battelle ID | E1018-FS |
| Sample Type | SA |
| Collection Date | 04/21/2022 |
| Extraction Date | 05/05/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 3.64 |
| Matrix | SO |
| Sample Size | 5.040 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.177 | 0.496 | 0.992 |
| PFHpA | 375-85-9 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.167 | 0.496 | 0.992 |
| PFOA | 335-67-1 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.212 | 0.496 | 0.992 |
| PFNA | 375-95-1 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.156 | 0.496 | 0.992 |
| PFDA | 335-76-2 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.157 | 0.496 | 0.992 |
| PFUnA | 2058-94-8 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.155 | 0.496 | 0.992 |
| PFDoA | 307-55-1 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.496 | 0.992 |
| PFTrDA | 72629-94-8 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.496 | 0.992 |
| PFTeDA | 376-06-7 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.496 | 1.98 |
| NMeFOSAA | 2355-31-9 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.496 | 1.98 |
| NEtFOSAA | 2991-50-6 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.164 | 0.496 | 1.98 |
| PFBS | 375-73-5 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.170 | 0.496 | 0.992 |
| PFHxS | 355-46-4 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.172 | 0.496 | 0.992 |
| PFOS | 1763-23-1 | 0.258 J | E1018-FS(0) | 1.000 | 6/1/2022 | 0.174 | 0.496 | 0.992 |
| HFPO-DA | 13252-13-6 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.496 | 1.98 |
| Adona | 919005-14-4 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.496 | 1.98 |
| 9Cl-PF3ONS | 756426-58-1 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.153 | 0.496 | 1.98 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.496 U | E1018-FS(0) | 1.000 | 6/1/2022 | 0.149 | 0.496 | 1.98 |

MW 8/14/22

BATTELLE
It can be done

5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SB04-0406 |
| Battelle ID | E1019-FS |
| Sample Type | SA |
| Collection Date | 04/21/2022 |
| Extraction Date | 05/05/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 3.49 |
| Matrix | SO |
| Sample Size | 5.020 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.177 | 0.498 | 0.996 |
| PFHpA | 375-85-9 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.167 | 0.498 | 0.996 |
| PFOA | 335-67-1 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.213 | 0.498 | 0.996 |
| PFNA | 375-95-1 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.156 | 0.498 | 0.996 |
| PFDA | 335-76-2 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.157 | 0.498 | 0.996 |
| PFUnA | 2058-94-8 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.155 | 0.498 | 0.996 |
| PFDoA | 307-55-1 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.498 | 0.996 |
| PFTrDA | 72629-94-8 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.498 | 0.996 |
| PFTeDA | 376-06-7 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.498 | 1.99 |
| NMeFOSAA | 2355-31-9 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.498 | 1.99 |
| NEtFOSAA | 2991-50-6 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.164 | 0.498 | 1.99 |
| PFBS | 375-73-5 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.170 | 0.498 | 0.996 |
| PFHxS | 355-46-4 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.172 | 0.498 | 0.996 |
| PFOS | 1763-23-1 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.174 | 0.498 | 0.996 |
| HFPO-DA | 13252-13-6 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.498 | 1.99 |
| Adona | 919005-14-4 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.498 | 1.99 |
| 9Cl-PF3ONS | 756426-58-1 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.153 | 0.498 | 1.99 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.498 U | E1019-FS(0) | 1.000 | 6/1/2022 | 0.149 | 0.498 | 1.99 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SB04D-0810 |
| Battelle ID | E1020-FS |
| Sample Type | SA |
| Collection Date | 04/21/2022 |
| Extraction Date | 05/05/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 10.54 |
| Matrix | SO |
| Sample Size | 4.970 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.179 | 0.503 | 1.01 |
| PFHpA | 375-85-9 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.169 | 0.503 | 1.01 |
| PFOA | 335-67-1 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.215 | 0.503 | 1.01 |
| PFNA | 375-95-1 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.503 | 1.01 |
| PFDA | 335-76-2 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.503 | 1.01 |
| PFUnA | 2058-94-8 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.157 | 0.503 | 1.01 |
| PFDoA | 307-55-1 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.503 | 1.01 |
| PFTrDA | 72629-94-8 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.162 | 0.503 | 1.01 |
| PFTeDA | 376-06-7 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.163 | 0.503 | 2.01 |
| NMeFOSAA | 2355-31-9 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.503 | 2.01 |
| NEtFOSAA | 2991-50-6 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.166 | 0.503 | 2.01 |
| PFBS | 375-73-5 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.172 | 0.503 | 1.01 |
| PFHxS | 355-46-4 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.174 | 0.503 | 1.01 |
| PFOS | 1763-23-1 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.176 | 0.503 | 1.01 |
| HFPO-DA | 13252-13-6 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.503 | 2.01 |
| Adona | 919005-14-4 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.503 | 2.01 |
| 9Cl-PF3ONS | 756426-58-1 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.155 | 0.503 | 2.01 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.503 U | E1020-FS(0) | 1.000 | 6/1/2022 | 0.151 | 0.503 | 2.01 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SS02-0002 |
| Battelle ID | E1021-FS |
| Sample Type | SA |
| Collection Date | 04/21/2022 |
| Extraction Date | 05/05/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 13.67 |
| Matrix | SO |
| Sample Size | 4.970 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.179 | 0.503 | 1.01 |
| PFHpA | 375-85-9 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.169 | 0.503 | 1.01 |
| PFOA | 335-67-1 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.215 | 0.503 | 1.01 |
| PFNA | 375-95-1 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.503 | 1.01 |
| PFDA | 335-76-2 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.503 | 1.01 |
| PFUnA | 2058-94-8 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.157 | 0.503 | 1.01 |
| PFDoA | 307-55-1 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.503 | 1.01 |
| PFTrDA | 72629-94-8 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.162 | 0.503 | 1.01 |
| PFTeDA | 376-06-7 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.163 | 0.503 | 2.01 |
| NMeFOSAA | 2355-31-9 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.503 | 2.01 |
| NEtFOSAA | 2991-50-6 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.166 | 0.503 | 2.01 |
| PFBS | 375-73-5 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.172 | 0.503 | 1.01 |
| PFHxS | 355-46-4 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.174 | 0.503 | 1.01 |
| PFOS | 1763-23-1 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.176 | 0.503 | 1.01 |
| HFPO-DA | 13252-13-6 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.503 | 2.01 |
| Adona | 919005-14-4 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.503 | 2.01 |
| 9Cl-PF3ONS | 756426-58-1 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.155 | 0.503 | 2.01 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.503 U | E1021-FS(0) | 1.000 | 6/1/2022 | 0.151 | 0.503 | 2.01 |

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Analyzed by: Griffith, Lauren

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SB02-0406 |
| Battelle ID | E1022-FS |
| Sample Type | SA |
| Collection Date | 04/21/2022 |
| Extraction Date | 05/05/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 3.11 |
| Matrix | SO |
| Sample Size | 4.990 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.178 | 0.501 | 1.00 |
| PFHpA | 375-85-9 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.168 | 0.501 | 1.00 |
| PFOA | 335-67-1 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.214 | 0.501 | 1.00 |
| PFNA | 375-95-1 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.157 | 0.501 | 1.00 |
| PFDA | 335-76-2 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.501 | 1.00 |
| PFUnA | 2058-94-8 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.156 | 0.501 | 1.00 |
| PFDoA | 307-55-1 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.501 | 1.00 |
| PFTrDA | 72629-94-8 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.501 | 1.00 |
| PFTeDA | 376-06-7 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.162 | 0.501 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.501 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.165 | 0.501 | 2.00 |
| PFBS | 375-73-5 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.171 | 0.501 | 1.00 |
| PFHxS | 355-46-4 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.173 | 0.501 | 1.00 |
| PFOS | 1763-23-1 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.175 | 0.501 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.501 | 2.00 |
| Adona | 919005-14-4 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.501 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.154 | 0.501 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.501 U | E1022-FS(0) | 1.000 | 6/1/2022 | 0.150 | 0.501 | 2.00 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VWAH-PFAS-SB02D-0810 |
| Battelle ID | E1023-FS |
| Sample Type | SA |
| Collection Date | 04/21/2022 |
| Extraction Date | 05/05/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 9.23 |
| Matrix | SO |
| Sample Size | 5.030 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.177 | 0.497 | 0.994 | |
| PFHpA | 375-85-9 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.167 | 0.497 | 0.994 | |
| PFOA | 335-67-1 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.213 | 0.497 | 0.994 | |
| PFNA | 375-95-1 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.156 | 0.497 | 0.994 | |
| PFDA | 335-76-2 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.157 | 0.497 | 0.994 | |
| PFUnA | 2058-94-8 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.155 | 0.497 | 0.994 | |
| PFDoA | 307-55-1 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.497 | 0.994 | |
| PFTrDA | 72629-94-8 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.497 | 0.994 | |
| PFTeDA | 376-06-7 | 0.497 UJ | E1023-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.497 | 1.99 | SSL |
| NMeFOSAA | 2355-31-9 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.497 | 1.99 | |
| NEtFOSAA | 2991-50-6 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.164 | 0.497 | 1.99 | |
| PFBS | 375-73-5 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.170 | 0.497 | 0.994 | |
| PFHxS | 355-46-4 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.172 | 0.497 | 0.994 | |
| PFOS | 1763-23-1 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.174 | 0.497 | 0.994 | |
| HFPO-DA | 13252-13-6 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.497 | 1.99 | |
| Adona | 919005-14-4 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.497 | 1.99 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.153 | 0.497 | 1.99 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.497 U | E1023-FS(0) | 1.000 | 6/1/2022 | 0.149 | 0.497 | 1.99 | |

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Analyzed by: Griffith, Lauren
Printed: 5/31/2022

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1b

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SS01-0002 |
| Battelle ID | E1024-FS |
| Sample Type | SA |
| Collection Date | 04/21/2022 |
| Extraction Date | 05/05/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 5.00 |
| Matrix | SO |
| Sample Size | 5.040 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.177 | 0.496 | 0.992 |
| PFHpA | 375-85-9 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.167 | 0.496 | 0.992 |
| PFOA | 335-67-1 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.212 | 0.496 | 0.992 |
| PFNA | 375-95-1 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.156 | 0.496 | 0.992 |
| PFDA | 335-76-2 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.157 | 0.496 | 0.992 |
| PFUnA | 2058-94-8 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.155 | 0.496 | 0.992 |
| PFDoA | 307-55-1 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.496 | 0.992 |
| PFTrDA | 72629-94-8 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.496 | 0.992 |
| PFTeDA | 376-06-7 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.496 | 1.98 |
| NMeFOSAA | 2355-31-9 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.496 | 1.98 |
| NEtFOSAA | 2991-50-6 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.164 | 0.496 | 1.98 |
| PFBS | 375-73-5 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.170 | 0.496 | 0.992 |
| PFHxS | 355-46-4 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.172 | 0.496 | 0.992 |
| PFOS | 1763-23-1 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.174 | 0.496 | 0.992 |
| HFPO-DA | 13252-13-6 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.496 | 1.98 |
| Adona | 919005-14-4 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.496 | 1.98 |
| 9Cl-PF3ONS | 756426-58-1 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.153 | 0.496 | 1.98 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.496 U | E1024-FS(0) | 1.000 | 6/1/2022 | 0.149 | 0.496 | 1.98 |

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Analyzed by: Griffith, Lauren

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SS01P-0002 |
| Battelle ID | E1025-FS |
| Sample Type | SA |
| Collection Date | 04/21/2022 |
| Extraction Date | 05/05/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 5.26 |
| Matrix | SO |
| Sample Size | 4.980 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.179 | 0.502 | 1.00 |
| PFHpA | 375-85-9 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.169 | 0.502 | 1.00 |
| PFOA | 335-67-1 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.215 | 0.502 | 1.00 |
| PFNA | 375-95-1 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.502 | 1.00 |
| PFDA | 335-76-2 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.502 | 1.00 |
| PFUnA | 2058-94-8 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.157 | 0.502 | 1.00 |
| PFDoA | 307-55-1 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.502 | 1.00 |
| PFTrDA | 72629-94-8 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.162 | 0.502 | 1.00 |
| PFTeDA | 376-06-7 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.163 | 0.502 | 2.01 |
| NMeFOSAA | 2355-31-9 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.502 | 2.01 |
| NEtFOSAA | 2991-50-6 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.166 | 0.502 | 2.01 |
| PFBS | 375-73-5 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.172 | 0.502 | 1.00 |
| PFHxS | 355-46-4 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.174 | 0.502 | 1.00 |
| PFOS | 1763-23-1 | 0.195 J | E1025-FS(0) | 1.000 | 6/1/2022 | 0.176 | 0.502 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.502 | 2.01 |
| Adona | 919005-14-4 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.502 | 2.01 |
| 9Cl-PF3ONS | 756426-58-1 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.155 | 0.502 | 2.01 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.502 U | E1025-FS(0) | 1.000 | 6/1/2022 | 0.151 | 0.502 | 2.01 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SB01-0507 |
| Battelle ID | E1027-FS |
| Sample Type | SA |
| Collection Date | 04/21/2022 |
| Extraction Date | 05/05/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 14.14 |
| Matrix | SO |
| Sample Size | 5.040 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.177 | 0.496 | 0.992 |
| PFHpA | 375-85-9 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.167 | 0.496 | 0.992 |
| PFOA | 335-67-1 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.212 | 0.496 | 0.992 |
| PFNA | 375-95-1 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.156 | 0.496 | 0.992 |
| PFDA | 335-76-2 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.157 | 0.496 | 0.992 |
| PFUnA | 2058-94-8 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.155 | 0.496 | 0.992 |
| PFDoA | 307-55-1 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.496 | 0.992 |
| PFTrDA | 72629-94-8 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.496 | 0.992 |
| PFTeDA | 376-06-7 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.496 | 1.98 |
| NMeFOSAA | 2355-31-9 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.496 | 1.98 |
| NEtFOSAA | 2991-50-6 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.164 | 0.496 | 1.98 |
| PFBS | 375-73-5 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.170 | 0.496 | 0.992 |
| PFHxS | 355-46-4 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.172 | 0.496 | 0.992 |
| PFOS | 1763-23-1 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.174 | 0.496 | 0.992 |
| HFPO-DA | 13252-13-6 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.496 | 1.98 |
| Adona | 919005-14-4 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.496 | 1.98 |
| 9Cl-PF3ONS | 756426-58-1 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.153 | 0.496 | 1.98 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.496 U | E1027-FS(0) | 1.000 | 6/1/2022 | 0.149 | 0.496 | 1.98 |

MW 8/14/22

Analyzed by: Griffith, Lauren
Printed: 5/31/2022

BATTELLE
It can be done

13

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SB01P-0507 |
| Battelle ID | E1028-FS |
| Sample Type | SA |
| Collection Date | 04/21/2022 |
| Extraction Date | 05/05/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 14.31 |
| Matrix | SO |
| Sample Size | 4.950 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.180 | 0.505 | 1.01 | |
| PFHpA | 375-85-9 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.170 | 0.505 | 1.01 | |
| PFOA | 335-67-1 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.216 | 0.505 | 1.01 | |
| PFNA | 375-95-1 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.159 | 0.505 | 1.01 | |
| PFDA | 335-76-2 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.160 | 0.505 | 1.01 | |
| PFUnA | 2058-94-8 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.158 | 0.505 | 1.01 | |
| PFDoA | 307-55-1 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.162 | 0.505 | 1.01 | |
| PFTrDA | 72629-94-8 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.163 | 0.505 | 1.01 | |
| PFTeDA | 376-06-7 | 0.505 ~~U~~ UJ | E1028-FS(0) | 1.000 | 6/1/2022 | 0.164 | 0.505 | 2.02 | SSL |
| NMeFOSAA | 2355-31-9 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.505 | 2.02 | |
| NEtFOSAA | 2991-50-6 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.167 | 0.505 | 2.02 | |
| PFBS | 375-73-5 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.173 | 0.505 | 1.01 | |
| PFHxS | 355-46-4 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.175 | 0.505 | 1.01 | |
| PFOS | 1763-23-1 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.177 | 0.505 | 1.01 | |
| HFPO-DA | 13252-13-6 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.161 | 0.505 | 2.02 | |
| Adona | 919005-14-4 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.162 | 0.505 | 2.02 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.156 | 0.505 | 2.02 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.505 U | E1028-FS(0) | 1.000 | 6/1/2022 | 0.152 | 0.505 | 2.02 | |

NW 8/14/22
Analyzed by: Griffith, Lauren

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0799
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VWAB-PFAS-EB01-051122 | E1467-FS | Water |
| 2 | VWAB-PFAS-FB01-051122 | E1468-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for one aqueous equipment blank sample and one aqueous field blank sample collected on May 11, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning

- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

## Polyfluoroalkyl Substances (PFAS)

## Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

## Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWAB-PFAS-EB01-051122 | None - ND | - | - | - |
| VWAB-PFAS-FB01-051122 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAB-PFAS-EB01-051122 |
| Battelle ID | E1467-FS |
| Sample Type | SA |
| Collection Date | 05/11/2022 |
| Extraction Date | 05/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.242 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 0.943 | 2.58 | 5.17 |
| PFHpA | 375-85-9 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 0.972 | 2.58 | 5.17 |
| PFOA | 335-67-1 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 1.04 | 2.58 | 5.17 |
| PFNA | 375-95-1 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 0.861 | 2.58 | 5.17 |
| PFDA | 335-76-2 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 0.810 | 2.58 | 5.17 |
| PFUnA | 2058-94-8 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 0.777 | 2.58 | 5.17 |
| PFDoA | 307-55-1 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 0.785 | 2.58 | 5.17 |
| PFTrDA | 72629-94-8 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 0.767 | 2.58 | 5.17 |
| PFTeDA | 376-06-7 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 0.817 | 2.58 | 5.17 |
| NMeFOSAA | 2355-31-9 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 1.06 | 2.58 | 5.17 |
| NEtFOSAA | 2991-50-6 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 1.02 | 2.58 | 5.17 |
| PFBS | 375-73-5 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 0.895 | 2.58 | 5.17 |
| PFHxS | 355-46-4 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 1.03 | 2.58 | 5.17 |
| PFOS | 1763-23-1 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 1.11 | 2.58 | 5.17 |
| HFPO-DA | 13252-13-6 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 0.894 | 2.58 | 5.17 |
| Adona | 919005-14-4 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 0.898 | 2.58 | 5.17 |
| 9Cl-PF3ONS | 756426-58-1 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 1.06 | 2.58 | 5.17 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.58 U | E1467-FS(0) | 1.000 | 6/8/2022 | 0.931 | 2.58 | 5.17 |

MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 6/9/2022

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

2

| | |
|---|---|
| Client ID | VWAB-PFAS-FB01-051122 |
| Battelle ID | E1468-FS |
| Sample Type | SA |
| Collection Date | 05/11/2022 |
| Extraction Date | 05/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.268 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.852 | 2.33 | 4.66 |
| PFHpA | 375-85-9 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.878 | 2.33 | 4.66 |
| PFOA | 335-67-1 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.942 | 2.33 | 4.66 |
| PFNA | 375-95-1 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.777 | 2.33 | 4.66 |
| PFDA | 335-76-2 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.731 | 2.33 | 4.66 |
| PFUnA | 2058-94-8 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.701 | 2.33 | 4.66 |
| PFDoA | 307-55-1 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.709 | 2.33 | 4.66 |
| PFTrDA | 72629-94-8 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.692 | 2.33 | 4.66 |
| PFTeDA | 376-06-7 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.738 | 2.33 | 4.66 |
| NMeFOSAA | 2355-31-9 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.961 | 2.33 | 4.66 |
| NEtFOSAA | 2991-50-6 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.924 | 2.33 | 4.66 |
| PFBS | 375-73-5 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.808 | 2.33 | 4.66 |
| PFHxS | 355-46-4 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.930 | 2.33 | 4.66 |
| PFOS | 1763-23-1 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.998 | 2.33 | 4.66 |
| HFPO-DA | 13252-13-6 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.807 | 2.33 | 4.66 |
| Adona | 919005-14-4 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.811 | 2.33 | 4.66 |
| 9Cl-PF3ONS | 756426-58-1 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.961 | 2.33 | 4.66 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.33 U | E1468-FS(0) | 1.000 | 6/8/2022 | 0.840 | 2.33 | 4.66 |

MW 8/14/22

Analyzed by: Bailey, Kevin

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0800
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VWAB-PFAS-SB02-0406 | E1454-FS | Soil |
| 2 | VWAB-PFAS-SB01-0406 | E1456-FS | Soil |
| 3 | VWAB-PFAS-SB01P-0406 | E1458-FS | Soil |
| 4 | VWAB-PFAS-SB03-0406 | E1462-FS | Soil |
| 4MS | VWAB-PFAS-SB03-0406MS | E1463-FSMS | Soil |
| 4MSD | VWAB-PFAS-SB03-0406MSD | E1464-FSMSD | Soil |
| 5 | VWAB-PFAS-SB04-0406 | E1466-FS | Soil |

A Stage 2B/4 data validation was performed on the analytical data for five soil samples collected on May 11, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

### LC/MS Tuning

- All criteria were met.

### Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWAB-PFAS-EB01-051122 | None - ND | - | - | - |
| VWAB-PFAS-FB01-051122 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VWAB-PFAS-SB01-0406 ng/g | VWAB-PFAS-SB01P-0406 ng/g | RPD | Qualifier |
|---|---|---|---|---|
| PFOS | 1.06 | 0.659 | 47% | None - <5X LOQ |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAB-PFAS-SB02-0406 |
| Battelle ID | E1454-FS |
| Sample Type | SA |
| Collection Date | 05/11/2022 |
| Extraction Date | 05/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 4.18 |
| Matrix | SB |
| Sample Size | 4.990 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.178 | 0.501 | 1.00 |
| PFHpA | 375-85-9 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.168 | 0.501 | 1.00 |
| PFOA | 335-67-1 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.214 | 0.501 | 1.00 |
| PFNA | 375-95-1 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.157 | 0.501 | 1.00 |
| PFDA | 335-76-2 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.158 | 0.501 | 1.00 |
| PFUnA | 2058-94-8 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.156 | 0.501 | 1.00 |
| PFDoA | 307-55-1 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.160 | 0.501 | 1.00 |
| PFTrDA | 72629-94-8 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.161 | 0.501 | 1.00 |
| PFTeDA | 376-06-7 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.162 | 0.501 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.159 | 0.501 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.165 | 0.501 | 2.00 |
| PFBS | 375-73-5 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.171 | 0.501 | 1.00 |
| PFHxS | 355-46-4 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.173 | 0.501 | 1.00 |
| PFOS | 1763-23-1 | 4.95 | E1454-FS(0) | 1.000 | 6/8/2022 | 0.175 | 0.501 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.159 | 0.501 | 2.00 |
| Adona | 919005-14-4 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.160 | 0.501 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.154 | 0.501 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.501 U | E1454-FS(0) | 1.000 | 6/8/2022 | 0.150 | 0.501 | 2.00 |

MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 6/9/2022

BATTELLE
It can be done

2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAB-PFAS-SB01-0406 |
| Battelle ID | E1456-FS |
| Sample Type | SA |
| Collection Date | 05/11/2022 |
| Extraction Date | 05/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 3.75 |
| Matrix | SB |
| Sample Size | 5.010 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.178 | 0.499 | 0.998 |
| PFHpA | 375-85-9 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.168 | 0.499 | 0.998 |
| PFOA | 335-67-1 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.214 | 0.499 | 0.998 |
| PFNA | 375-95-1 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.157 | 0.499 | 0.998 |
| PFDA | 335-76-2 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.158 | 0.499 | 0.998 |
| PFUnA | 2058-94-8 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.156 | 0.499 | 0.998 |
| PFDoA | 307-55-1 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.160 | 0.499 | 0.998 |
| PFTrDA | 72629-94-8 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.161 | 0.499 | 0.998 |
| PFTeDA | 376-06-7 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.162 | 0.499 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.159 | 0.499 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.165 | 0.499 | 2.00 |
| PFBS | 375-73-5 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.171 | 0.499 | 0.998 |
| PFHxS | 355-46-4 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.173 | 0.499 | 0.998 |
| PFOS | 1763-23-1 | 1.06 | E1456-FS(0) | 1.000 | 6/8/2022 | 0.175 | 0.499 | 0.998 |
| HFPO-DA | 13252-13-6 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.159 | 0.499 | 2.00 |
| Adona | 919005-14-4 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.160 | 0.499 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.154 | 0.499 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.499 U | E1456-FS(0) | 1.000 | 6/8/2022 | 0.150 | 0.499 | 2.00 |

NW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 6/9/2022

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It can be done

3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAB-PFAS-SB01P-0406 |
| Battelle ID | E1458-FS |
| Sample Type | SA |
| Collection Date | 05/11/2022 |
| Extraction Date | 05/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 1.18 |
| Matrix | SB |
| Sample Size | 5.020 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.177 | 0.498 | 0.996 |
| PFHpA | 375-85-9 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.167 | 0.498 | 0.996 |
| PFOA | 335-67-1 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.213 | 0.498 | 0.996 |
| PFNA | 375-95-1 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.156 | 0.498 | 0.996 |
| PFDA | 335-76-2 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.157 | 0.498 | 0.996 |
| PFUnA | 2058-94-8 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.155 | 0.498 | 0.996 |
| PFDoA | 307-55-1 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.159 | 0.498 | 0.996 |
| PFTrDA | 72629-94-8 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.160 | 0.498 | 0.996 |
| PFTeDA | 376-06-7 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.161 | 0.498 | 1.99 |
| NMeFOSAA | 2355-31-9 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.158 | 0.498 | 1.99 |
| NEtFOSAA | 2991-50-6 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.164 | 0.498 | 1.99 |
| PFBS | 375-73-5 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.170 | 0.498 | 0.996 |
| PFHxS | 355-46-4 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.172 | 0.498 | 0.996 |
| PFOS | 1763-23-1 | 0.659 J | E1458-FS(0) | 1.000 | 6/8/2022 | 0.174 | 0.498 | 0.996 |
| HFPO-DA | 13252-13-6 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.158 | 0.498 | 1.99 |
| Adona | 919005-14-4 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.159 | 0.498 | 1.99 |
| 9Cl-PF3ONS | 756426-58-1 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.153 | 0.498 | 1.99 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.498 U | E1458-FS(0) | 1.000 | 6/8/2022 | 0.149 | 0.498 | 1.99 |

MW 8/14/22

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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAB-PFAS-SB03-0406 |
| Battelle ID | E1462-FS |
| Sample Type | SA |
| Collection Date | 05/11/2022 |
| Extraction Date | 05/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 5.29 |
| Matrix | SB |
| Sample Size | 5.010 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.178 | 0.499 | 0.998 |
| PFHpA | 375-85-9 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.168 | 0.499 | 0.998 |
| PFOA | 335-67-1 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.214 | 0.499 | 0.998 |
| PFNA | 375-95-1 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.157 | 0.499 | 0.998 |
| PFDA | 335-76-2 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.158 | 0.499 | 0.998 |
| PFUnA | 2058-94-8 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.156 | 0.499 | 0.998 |
| PFDoA | 307-55-1 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.160 | 0.499 | 0.998 |
| PFTrDA | 72629-94-8 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.161 | 0.499 | 0.998 |
| PFTeDA | 376-06-7 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.162 | 0.499 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.159 | 0.499 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.165 | 0.499 | 2.00 |
| PFBS | 375-73-5 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.171 | 0.499 | 0.998 |
| PFHxS | 355-46-4 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.173 | 0.499 | 0.998 |
| PFOS | 1763-23-1 | 3.32 | E1462-FS(0) | 1.000 | 6/8/2022 | 0.175 | 0.499 | 0.998 |
| HFPO-DA | 13252-13-6 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.159 | 0.499 | 2.00 |
| Adona | 919005-14-4 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.160 | 0.499 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.154 | 0.499 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.499 U | E1462-FS(0) | 1.000 | 6/8/2022 | 0.150 | 0.499 | 2.00 |

MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 6/9/2022

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5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAB-PFAS-SB04-0406 |
| Battelle ID | E1466-FS |
| Sample Type | SA |
| Collection Date | 05/11/2022 |
| Extraction Date | 05/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 5.08 |
| Matrix | SB |
| Sample Size | 5.010 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.178 | 0.499 | 0.998 |
| PFHpA | 375-85-9 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.168 | 0.499 | 0.998 |
| PFOA | 335-67-1 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.214 | 0.499 | 0.998 |
| PFNA | 375-95-1 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.157 | 0.499 | 0.998 |
| PFDA | 335-76-2 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.158 | 0.499 | 0.998 |
| PFUnA | 2058-94-8 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.156 | 0.499 | 0.998 |
| PFDoA | 307-55-1 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.160 | 0.499 | 0.998 |
| PFTrDA | 72629-94-8 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.161 | 0.499 | 0.998 |
| PFTeDA | 376-06-7 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.162 | 0.499 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.159 | 0.499 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.165 | 0.499 | 2.00 |
| PFBS | 375-73-5 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.171 | 0.499 | 0.998 |
| PFHxS | 355-46-4 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.173 | 0.499 | 0.998 |
| PFOS | 1763-23-1 | 8.83 | E1466-FS(0) | 1.000 | 6/8/2022 | 0.175 | 0.499 | 0.998 |
| HFPO-DA | 13252-13-6 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.159 | 0.499 | 2.00 |
| Adona | 919005-14-4 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.160 | 0.499 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.154 | 0.499 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.499 U | E1466-FS(0) | 1.000 | 6/8/2022 | 0.150 | 0.499 | 2.00 |

NW 8/24/22

Analyzed by: Bailey, Kevin
Printed: 6/9/2022

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0801
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VWAB-PFAS-SS02-0001 | E1453-FS | Soil |
| 2 | VWAB-PFAS-SS01-0001 | E1455-FS | Soil |
| 3 | VWAB-PFAS-SS01P-0001 | E1457-FS | Soil |
| 4 | VWAB-PFAS-SS03-0001 | E1459-FS | Soil |
| 4MS | VWAB-PFAS-SS03-0001MS | E1460-FSMS | Soil |
| 4MSD | VWAB-PFAS-SS03-0001MSD | E1461-FSMSD | Soil |
| 5 | VWAB-PFAS-SS04-0001 | E1465-FS | Soil |

A Stage 2B/4 data validation was performed on the analytical data for five soil samples collected on May 11, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

### LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWAB-PFAS-EB01-051122 | None - ND | - | - | - |
| VWAB-PFAS-FB01-051122 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

| EDS Sample | Surrogate | %R | Qualifier |
|---|---|---|---|
| 1 | 13C2-PFDoA | 47% | J - Associated Cmpd |
| | 13C2-PFTeDA | 32% | |
| 2 | 13C2-PFTeDA | 32% | J - Associated Cmpd |
| 3 | 13C2-PFTeDA | 40% | J - Associated Cmpd |
| 4 | 13C2-PFTeDA | 39% | UJ - Associated Cmpd |

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values except for the following.

| MS/MSD Sample | Compound | MS %R/MSD %R/RPD | Qualifier | Affected Samples |
|---|---|---|---|---|
| 4 | PFDoA | OK/139%/OK | J | 4 |

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VWAB-PFAS-SS01-0001 ng/g | VWAB-PFAS-SS01P-0001 ng/g | RPD | Qualifier |
|---|---|---|---|---|
| PFHxA | 0.443 | 0.486 | 9% | None |
| PFHpA | 0.277 | 0.374 | 30% | |
| PFOA | 1.08 | 1.65 | 42% | None - <5X LOQ |
| PFNA | 0.424 | 0.705 | 50% | |
| PFDA | 2.51 | 2.99 | 17% | None |
| PFUnA | 0.730 | 0.772 | 6% | |
| PFDoA | 1.80 | 2.07 | 14% | |
| PFTrDA | 0.187 | 0.229 | 20% | |
| PFTeDA | 0.655 | 0.677 | 3% | |
| NMeFOSAA | 1.99 | 2.11 | 6% | |
| PFOS | 24.5 | 32.2 | 27% | |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAB-PFAS-SS02-0001 |
| Battelle ID | E1453-FS |
| Sample Type | SA |
| Collection Date | 05/11/2022 |
| Extraction Date | 05/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 7.40 |
| Matrix | SS |
| Sample Size | 5.010 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.460 J | E1453-FS(0) | 1.000 | 6/9/2022 | 0.178 | 0.499 | 0.998 | |
| PFHpA | 375-85-9 | 0.437 J | E1453-FS(0) | 1.000 | 6/9/2022 | 0.168 | 0.499 | 0.998 | |
| PFOA | 335-67-1 | 1.24 | E1453-FS(0) | 1.000 | 6/9/2022 | 0.214 | 0.499 | 0.998 | |
| PFNA | 375-95-1 | 0.472 J | E1453-FS(0) | 1.000 | 6/9/2022 | 0.157 | 0.499 | 0.998 | |
| PFDA | 335-76-2 | 2.70 | E1453-FS(0) | 1.000 | 6/9/2022 | 0.158 | 0.499 | 0.998 | |
| PFUnA | 2058-94-8 | 1.34 | E1453-FS(0) | 1.000 | 6/9/2022 | 0.156 | 0.499 | 0.998 | |
| PFDoA | 307-55-1 | 3.31 J | E1453-FS(0) | 1.000 | 6/9/2022 | 0.160 | 0.499 | 0.998 | SSL |
| PFTrDA | 72629-94-8 | 0.416 J | E1453-FS(0) | 1.000 | 6/9/2022 | 0.161 | 0.499 | 0.998 | |
| PFTeDA | 376-06-7 | 1.30 J | E1453-FS(0) | 1.000 | 6/9/2022 | 0.162 | 0.499 | 2.00 | SSL |
| NMeFOSAA | 2355-31-9 | 1.69 J | E1453-FS(0) | 1.000 | 6/9/2022 | 0.159 | 0.499 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.294 J | E1453-FS(0) | 1.000 | 6/9/2022 | 0.165 | 0.499 | 2.00 | |
| PFBS | 375-73-5 | 0.499 U | E1453-FS(0) | 1.000 | 6/9/2022 | 0.171 | 0.499 | 0.998 | |
| PFHxS | 355-46-4 | 0.182 J | E1453-FS(0) | 1.000 | 6/9/2022 | 0.173 | 0.499 | 0.998 | |
| PFOS | 1763-23-1 | 24.8 | E1453-FS(0) | 1.000 | 6/9/2022 | 0.175 | 0.499 | 0.998 | |
| HFPO-DA | 13252-13-6 | 0.499 U | E1453-FS(0) | 1.000 | 6/9/2022 | 0.159 | 0.499 | 2.00 | |
| Adona | 919005-14-4 | 0.499 U | E1453-FS(0) | 1.000 | 6/9/2022 | 0.160 | 0.499 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.499 U | E1453-FS(0) | 1.000 | 6/9/2022 | 0.154 | 0.499 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.499 U | E1453-FS(0) | 1.000 | 6/9/2022 | 0.150 | 0.499 | 2.00 | |

MW 8/14/22

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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAB-PFAS-SS01-0001 |
| Battelle ID | E1455-FS |
| Sample Type | SA |
| Collection Date | 05/11/2022 |
| Extraction Date | 05/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 5.96 |
| Matrix | SS |
| Sample Size | 5.010 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.443 J | E1455-FS(0) | 1.000 | 6/9/2022 | 0.178 | 0.499 | 0.998 | |
| PFHpA | 375-85-9 | 0.277 J | E1455-FS(0) | 1.000 | 6/9/2022 | 0.168 | 0.499 | 0.998 | |
| PFOA | 335-67-1 | 1.08 | E1455-FS(0) | 1.000 | 6/9/2022 | 0.214 | 0.499 | 0.998 | |
| PFNA | 375-95-1 | 0.424 J | E1455-FS(0) | 1.000 | 6/9/2022 | 0.157 | 0.499 | 0.998 | |
| PFDA | 335-76-2 | 2.51 | E1455-FS(0) | 1.000 | 6/9/2022 | 0.158 | 0.499 | 0.998 | |
| PFUnA | 2058-94-8 | 0.730 J | E1455-FS(0) | 1.000 | 6/9/2022 | 0.156 | 0.499 | 0.998 | |
| PFDoA | 307-55-1 | 1.80 | E1455-FS(0) | 1.000 | 6/9/2022 | 0.160 | 0.499 | 0.998 | |
| PFTrDA | 72629-94-8 | 0.187 J | E1455-FS(0) | 1.000 | 6/9/2022 | 0.161 | 0.499 | 0.998 | |
| PFTeDA | 376-06-7 | 0.655 J | E1455-FS(0) | 1.000 | 6/9/2022 | 0.162 | 0.499 | 2.00 | SSL |
| NMeFOSAA | 2355-31-9 | 1.99 J | E1455-FS(0) | 1.000 | 6/9/2022 | 0.159 | 0.499 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.499 U | E1455-FS(0) | 1.000 | 6/9/2022 | 0.165 | 0.499 | 2.00 | |
| PFBS | 375-73-5 | 0.499 U | E1455-FS(0) | 1.000 | 6/9/2022 | 0.171 | 0.499 | 0.998 | |
| PFHxS | 355-46-4 | 0.499 U | E1455-FS(0) | 1.000 | 6/9/2022 | 0.173 | 0.499 | 0.998 | |
| PFOS | 1763-23-1 | 24.5 | E1455-FS(0) | 1.000 | 6/9/2022 | 0.175 | 0.499 | 0.998 | |
| HFPO-DA | 13252-13-6 | 0.499 U | E1455-FS(0) | 1.000 | 6/9/2022 | 0.159 | 0.499 | 2.00 | |
| Adona | 919005-14-4 | 0.499 U | E1455-FS(0) | 1.000 | 6/9/2022 | 0.160 | 0.499 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.499 U | E1455-FS(0) | 1.000 | 6/9/2022 | 0.154 | 0.499 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.499 U | E1455-FS(0) | 1.000 | 6/9/2022 | 0.150 | 0.499 | 2.00 | |

MW 8/14/22
Analyzed by: Griffith, Lauren
Printed: 6/10/2022

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3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAB-PFAS-SS01P-0001 |
| Battelle ID | E1457-FS |
| Sample Type | SA |
| Collection Date | 05/11/2022 |
| Extraction Date | 05/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 5.47 |
| Matrix | SS |
| Sample Size | 5.020 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.486 J | E1457-FS(0) | 1.000 | 6/9/2022 | 0.177 | 0.498 | 0.996 | |
| PFHpA | 375-85-9 | 0.374 J | E1457-FS(0) | 1.000 | 6/9/2022 | 0.167 | 0.498 | 0.996 | |
| PFOA | 335-67-1 | 1.65 | E1457-FS(0) | 1.000 | 6/9/2022 | 0.213 | 0.498 | 0.996 | |
| PFNA | 375-95-1 | 0.705 J | E1457-FS(0) | 1.000 | 6/9/2022 | 0.156 | 0.498 | 0.996 | |
| PFDA | 335-76-2 | 2.99 | E1457-FS(0) | 1.000 | 6/9/2022 | 0.157 | 0.498 | 0.996 | |
| PFUnA | 2058-94-8 | 0.772 J | E1457-FS(0) | 1.000 | 6/9/2022 | 0.155 | 0.498 | 0.996 | |
| PFDoA | 307-55-1 | 2.07 | E1457-FS(0) | 1.000 | 6/9/2022 | 0.159 | 0.498 | 0.996 | |
| PFTrDA | 72629-94-8 | 0.229 J | E1457-FS(0) | 1.000 | 6/9/2022 | 0.160 | 0.498 | 0.996 | |
| PFTeDA | 376-06-7 | 0.677 J | E1457-FS(0) | 1.000 | 6/9/2022 | 0.161 | 0.498 | 1.99 | SSL |
| NMeFOSAA | 2355-31-9 | 2.11 | E1457-FS(0) | 1.000 | 6/9/2022 | 0.158 | 0.498 | 1.99 | |
| NEtFOSAA | 2991-50-6 | 0.498 U | E1457-FS(0) | 1.000 | 6/9/2022 | 0.164 | 0.498 | 1.99 | |
| PFBS | 375-73-5 | 0.498 U | E1457-FS(0) | 1.000 | 6/9/2022 | 0.170 | 0.498 | 0.996 | |
| PFHxS | 355-46-4 | 0.498 U | E1457-FS(0) | 1.000 | 6/9/2022 | 0.172 | 0.498 | 0.996 | |
| PFOS | 1763-23-1 | 32.2 | E1457-FS(0) | 1.000 | 6/9/2022 | 0.174 | 0.498 | 0.996 | |
| HFPO-DA | 13252-13-6 | 0.498 U | E1457-FS(0) | 1.000 | 6/9/2022 | 0.158 | 0.498 | 1.99 | |
| Adona | 919005-14-4 | 0.498 U | E1457-FS(0) | 1.000 | 6/9/2022 | 0.159 | 0.498 | 1.99 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.498 U | E1457-FS(0) | 1.000 | 6/9/2022 | 0.153 | 0.498 | 1.99 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.498 U | E1457-FS(0) | 1.000 | 6/9/2022 | 0.149 | 0.498 | 1.99 | |

MW 8/14/22

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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAB-PFAS-SS03-0001 |
| Battelle ID | E1459-FS |
| Sample Type | SA |
| Collection Date | 05/11/2022 |
| Extraction Date | 05/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 7.44 |
| Matrix | SS |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.313 J | E1459-FS(0) | 1.000 | 6/9/2022 | 0.178 | 0.500 | 1.00 | |
| PFHpA | 375-85-9 | 0.200 J | E1459-FS(0) | 1.000 | 6/9/2022 | 0.168 | 0.500 | 1.00 | |
| PFOA | 335-67-1 | 0.514 J | E1459-FS(0) | 1.000 | 6/9/2022 | 0.214 | 0.500 | 1.00 | |
| PFNA | 375-95-1 | 0.171 J | E1459-FS(0) | 1.000 | 6/9/2022 | 0.157 | 0.500 | 1.00 | |
| PFDA | 335-76-2 | 0.250 J | E1459-FS(0) | 1.000 | 6/9/2022 | 0.158 | 0.500 | 1.00 | |
| PFUnA | 2058-94-8 | 0.500 U | E1459-FS(0) | 1.000 | 6/9/2022 | 0.156 | 0.500 | 1.00 | |
| PFDoA | 307-55-1 | 0.173 J | E1459-FS(0) | 1.000 | 6/9/2022 | 0.160 | 0.500 | 1.00 | MSH |
| PFTrDA | 72629-94-8 | 0.500 U | E1459-FS(0) | 1.000 | 6/9/2022 | 0.161 | 0.500 | 1.00 | |
| PFTeDA | 376-06-7 | 0.500 UJ | E1459-FS(0) | 1.000 | 6/9/2022 | 0.162 | 0.500 | 2.00 | SSL |
| NMeFOSAA | 2355-31-9 | 0.500 U | E1459-FS(0) | 1.000 | 6/9/2022 | 0.159 | 0.500 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.500 U | E1459-FS(0) | 1.000 | 6/9/2022 | 0.165 | 0.500 | 2.00 | |
| PFBS | 375-73-5 | 0.500 U | E1459-FS(0) | 1.000 | 6/9/2022 | 0.171 | 0.500 | 1.00 | |
| PFHxS | 355-46-4 | 0.500 U | E1459-FS(0) | 1.000 | 6/9/2022 | 0.173 | 0.500 | 1.00 | |
| PFOS | 1763-23-1 | 5.91 | E1459-FS(0) | 1.000 | 6/9/2022 | 0.175 | 0.500 | 1.00 | |
| HFPO-DA | 13252-13-6 | 0.500 U | E1459-FS(0) | 1.000 | 6/9/2022 | 0.159 | 0.500 | 2.00 | |
| Adona | 919005-14-4 | 0.500 U | E1459-FS(0) | 1.000 | 6/9/2022 | 0.160 | 0.500 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 U | E1459-FS(0) | 1.000 | 6/9/2022 | 0.154 | 0.500 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 U | E1459-FS(0) | 1.000 | 6/9/2022 | 0.150 | 0.500 | 2.00 | |

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5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAB-PFAS-SS04-0001 |
| Battelle ID | E1465-FS |
| Sample Type | SA |
| Collection Date | 05/11/2022 |
| Extraction Date | 05/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | 7.50 |
| Matrix | SS |
| Sample Size | 5.020 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.199 J | E1465-FS(0) | 1.000 | 6/9/2022 | 0.177 | 0.498 | 0.996 |
| PFHpA | 375-85-9 | 0.498 U | E1465-FS(0) | 1.000 | 6/9/2022 | 0.167 | 0.498 | 0.996 |
| PFOA | 335-67-1 | 0.546 J | E1465-FS(0) | 1.000 | 6/9/2022 | 0.213 | 0.498 | 0.996 |
| PFNA | 375-95-1 | 0.498 U | E1465-FS(0) | 1.000 | 6/9/2022 | 0.156 | 0.498 | 0.996 |
| PFDA | 335-76-2 | 0.161 J | E1465-FS(0) | 1.000 | 6/9/2022 | 0.157 | 0.498 | 0.996 |
| PFUnA | 2058-94-8 | 0.498 U | E1465-FS(0) | 1.000 | 6/9/2022 | 0.155 | 0.498 | 0.996 |
| PFDoA | 307-55-1 | 0.498 U | E1465-FS(0) | 1.000 | 6/9/2022 | 0.159 | 0.498 | 0.996 |
| PFTrDA | 72629-94-8 | 0.498 U | E1465-FS(0) | 1.000 | 6/9/2022 | 0.160 | 0.498 | 0.996 |
| PFTeDA | 376-06-7 | 0.498 U | E1465-FS(0) | 1.000 | 6/9/2022 | 0.161 | 0.498 | 1.99 |
| NMeFOSAA | 2355-31-9 | 0.245 J | E1465-FS(0) | 1.000 | 6/9/2022 | 0.158 | 0.498 | 1.99 |
| NEtFOSAA | 2991-50-6 | 0.498 U | E1465-FS(0) | 1.000 | 6/9/2022 | 0.164 | 0.498 | 1.99 |
| PFBS | 375-73-5 | 0.498 U | E1465-FS(0) | 1.000 | 6/9/2022 | 0.170 | 0.498 | 0.996 |
| PFHxS | 355-46-4 | 0.498 U | E1465-FS(0) | 1.000 | 6/9/2022 | 0.172 | 0.498 | 0.996 |
| PFOS | 1763-23-1 | 7.85 | E1465-FS(0) | 1.000 | 6/9/2022 | 0.174 | 0.498 | 0.996 |
| HFPO-DA | 13252-13-6 | 0.498 U | E1465-FS(0) | 1.000 | 6/9/2022 | 0.158 | 0.498 | 1.99 |
| Adona | 919005-14-4 | 0.498 U | E1465-FS(0) | 1.000 | 6/9/2022 | 0.159 | 0.498 | 1.99 |
| 9Cl-PF3ONS | 756426-58-1 | 0.498 U | E1465-FS(0) | 1.000 | 6/9/2022 | 0.153 | 0.498 | 1.99 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.498 U | E1465-FS(0) | 1.000 | 6/9/2022 | 0.149 | 0.498 | 1.99 |

MW 8/14/22

# Groundwater Data Validation Reports

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0189
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: October 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEW01-PFAS-MW08-0122 | F8140-FS | Water |
| 2 | VEW01-PFAS-MW02-0122 | F8141-FS | Water |
| 3 | VEW01-PFAS-MW02P-0122 | F8142-FS | Water |
| 4 | VEW01-PFAS-MW10-0122 | F8143-FS | Water |
| 5 | VEW01-PFAS-MW11-0122 | F8144-FS | Water |
| 6 | VEW01-PFAS-MW03-0122 | F8145-FS | Water |
| 7 | VEP4-PFAS-GW06-0122 | F8146-FS | Water |
| 8 | VEP4-PFAS-GW24-0122 | F8147-FS | Water |
| 9 | VE-SWMU-20-EB01-020222-AQ | F8148-FS | Water |
| 10 | EPI04-PFAS-GW26-0222 | F8149-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for nine water samples and one aqueous equipment blank sample collected on January 31-February 2, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

### LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VE-SWMU-20-EB01-020222-AQ | None - ND | - | - | - |
| VE-SWMU-1-EB01-020322 | None - ND | - | - | - |
| VE-SWMU-1-FB01-020322 | None - ND | - | - | - |
| VE-SWMU-20-FB01-020322 | None - ND | - | - | - |
| VE-SWMU-20-EB01-020322 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VEW01-PFAS-MW02-0122 ng/L | VEW01-PFAS-MW02P-0122 ng/L | RPD | Qualifier |
|---|---|---|---|---|
| None | ND | ND | - | - |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: _____ Dated: 10/19/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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1

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW01-PFAS-MW08-0122 |
| Battelle ID | F8140-FS |
| Sample Type | SA |
| Collection Date | 01/31/2022 |
| Extraction Date | 02/09/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.267 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD |
|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 1.91 J | F8140-FS(0) | 1.000 | 3/5/2022 | 0.855 | 2.34 |
| PFHpA | 375-85-9 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.881 | 2.34 |
| PFOA | 335-67-1 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.946 | 2.34 |
| PFNA | 375-95-1 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.780 | 2.34 |
| PFDA | 335-76-2 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.734 | 2.34 |
| PFUnA | 2058-94-8 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.704 | 2.34 |
| PFDoA | 307-55-1 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.712 | 2.34 |
| PFTrDA | 72629-94-8 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.695 | 2.34 |
| PFTeDA | 376-06-7 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.741 | 2.34 |
| NMeFOSAA | 2355-31-9 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.964 | 2.34 |
| NEtFOSAA | 2991-50-6 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.927 | 2.34 |
| PFBS | 375-73-5 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.811 | 2.34 |
| PFHxS | 355-46-4 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.934 | 2.34 |
| PFOS | 1763-23-1 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 1.00 | 2.34 |
| HFPO-DA | 13252-13-6 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.810 | 2.34 |
| Adona | 919005-14-4 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.814 | 2.34 |
| 9Cl-PF3ONS | 756426-58-1 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.964 | 2.34 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.34 U | F8140-FS(0) | 1.000 | 3/5/2022 | 0.844 | 2.34 |

lw 10/14/22

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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW01-PFAS-MW02-0122 |
| Battelle ID | F8141-FS |
| Sample Type | SA |
| Collection Date | 01/31/2022 |
| Extraction Date | 02/09/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.269 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD |
|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.849 | 2.32 |
| PFHpA | 375-85-9 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.875 | 2.32 |
| PFOA | 335-67-1 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.939 | 2.32 |
| PFNA | 375-95-1 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.774 | 2.32 |
| PFDA | 335-76-2 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.729 | 2.32 |
| PFUnA | 2058-94-8 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.699 | 2.32 |
| PFDoA | 307-55-1 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.706 | 2.32 |
| PFTrDA | 72629-94-8 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.690 | 2.32 |
| PFTeDA | 376-06-7 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.735 | 2.32 |
| NMeFOSAA | 2355-31-9 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.957 | 2.32 |
| NEtFOSAA | 2991-50-6 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.920 | 2.32 |
| PFBS | 375-73-5 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.805 | 2.32 |
| PFHxS | 355-46-4 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.927 | 2.32 |
| PFOS | 1763-23-1 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.994 | 2.32 |
| HFPO-DA | 13252-13-6 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.804 | 2.32 |
| Adona | 919005-14-4 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.808 | 2.32 |
| 9Cl-PF3ONS | 756426-58-1 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.957 | 2.32 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.32 U | F8141-FS(0) | 1.000 | 3/5/2022 | 0.837 | 2.32 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW01-PFAS-MW02P-0122 |
| Battelle ID | F8142-FS |
| Sample Type | SA |
| Collection Date | 01/31/2022 |
| Extraction Date | 02/09/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.257 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.888 | 2.43 | |
| PFHpA | 375-85-9 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.915 | 2.43 | |
| PFOA | 335-67-1 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.982 | 2.43 | |
| PFNA | 375-95-1 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.810 | 2.43 | |
| PFDA | 335-76-2 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.763 | 2.43 | |
| PFUnA | 2058-94-8 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.732 | 2.43 | |
| PFDoA | 307-55-1 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.739 | 2.43 | |
| PFTrDA | 72629-94-8 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.722 | 2.43 | |
| PFTeDA | 376-06-7 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.769 | 2.43 | |
| NMeFOSAA | 2355-31-9 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 1.00 | 2.43 | |
| NEtFOSAA | 2991-50-6 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.963 | 2.43 | |
| PFBS | 375-73-5 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.842 | 2.43 | |
| PFHxS | 355-46-4 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.970 | 2.43 | |
| PFOS | 1763-23-1 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 1.04 | 2.43 | |
| HFPO-DA | 13252-13-6 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.841 | 2.43 | |
| Adona | 919005-14-4 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.845 | 2.43 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 1.00 | 2.43 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.43 U | F8142-FS(0) | 1.000 | 3/5/2022 | 0.876 | 2.43 | |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW01-PFAS-MW10-0122 |
| Battelle ID | F8143-FS |
| Sample Type | SA |
| Collection Date | 01/31/2022 |
| Extraction Date | 02/09/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.265 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD |
|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 7.74 | F8143-FS(0) | 1.000 | 3/5/2022 | 0.861 | 2.36 |
| **PFHpA** | **375-85-9** | **3.71 J** | **F8143-FS(0)** | **1.000** | **3/5/2022** | **0.888** | **2.36** |
| PFOA | 335-67-1 | 2.36 U | F8143-FS(0) | 1.000 | 3/5/2022 | 0.953 | 2.36 |
| **PFNA** | **375-95-1** | **2.36 U** | **F8143-FS(0)** | **1.000** | **3/5/2022** | **0.786** | **2.36** |
| PFDA | 335-76-2 | 2.36 U | F8143-FS(0) | 1.000 | 3/5/2022 | 0.740 | 2.36 |
| **PFUnA** | **2058-94-8** | **2.36 U** | **F8143-FS(0)** | **1.000** | **3/5/2022** | **0.709** | **2.36** |
| PFDoA | 307-55-1 | 2.36 U | F8143-FS(0) | 1.000 | 3/5/2022 | 0.717 | 2.36 |
| **PFTrDA** | **72629-94-8** | **2.36 U** | **F8143-FS(0)** | **1.000** | **3/5/2022** | **0.700** | **2.36** |
| PFTeDA | 376-06-7 | 2.36 U | F8143-FS(0) | 1.000 | 3/5/2022 | 0.746 | 2.36 |
| **NMeFOSAA** | **2355-31-9** | **2.36 U** | **F8143-FS(0)** | **1.000** | **3/5/2022** | **0.972** | **2.36** |
| NEtFOSAA | 2991-50-6 | 2.36 U | F8143-FS(0) | 1.000 | 3/5/2022 | 0.934 | 2.36 |
| **PFBS** | **375-73-5** | **2.36 U** | **F8143-FS(0)** | **1.000** | **3/5/2022** | **0.817** | **2.36** |
| PFHxS | 355-46-4 | 2.36 U | F8143-FS(0) | 1.000 | 3/5/2022 | 0.941 | 2.36 |
| **PFOS** | **1763-23-1** | **2.36 U** | **F8143-FS(0)** | **1.000** | **3/5/2022** | **1.01** | **2.36** |
| HFPO-DA | 13252-13-6 | 2.36 U | F8143-FS(0) | 1.000 | 3/5/2022 | 0.816 | 2.36 |
| **Adona** | **919005-14-4** | **2.36 U** | **F8143-FS(0)** | **1.000** | **3/5/2022** | **0.820** | **2.36** |
| 9Cl-PF3ONS | 756426-58-1 | 2.36 U | F8143-FS(0) | 1.000 | 3/5/2022 | 0.972 | 2.36 |
| **11Cl-PF3OUdS** | **763051-92-9** | **2.36 U** | **F8143-FS(0)** | **1.000** | **3/5/2022** | **0.850** | **2.36** |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW01-PFAS-MW11-0122 |
| Battelle ID | F8144-FS |
| Sample Type | SA |
| Collection Date | 01/31/2022 |
| Extraction Date | 02/09/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.266 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD |
|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.858 | 2.35 |
| PFHpA | 375-85-9 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.884 | 2.35 |
| PFOA | 335-67-1 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.949 | 2.35 |
| PFNA | 375-95-1 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.783 | 2.35 |
| PFDA | 335-76-2 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.737 | 2.35 |
| PFUnA | 2058-94-8 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.707 | 2.35 |
| PFDoA | 307-55-1 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.714 | 2.35 |
| PFTrDA | 72629-94-8 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.697 | 2.35 |
| PFTeDA | 376-06-7 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.743 | 2.35 |
| NMeFOSAA | 2355-31-9 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.968 | 2.35 |
| NEtFOSAA | 2991-50-6 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.930 | 2.35 |
| PFBS | 375-73-5 | 1.02 J | F8144-FS(0) | 1.000 | 3/5/2022 | 0.814 | 2.35 |
| PFHxS | 355-46-4 | 1.28 J | F8144-FS(0) | 1.000 | 3/5/2022 | 0.937 | 2.35 |
| PFOS | 1763-23-1 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 1.01 | 2.35 |
| HFPO-DA | 13252-13-6 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.813 | 2.35 |
| Adona | 919005-14-4 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.817 | 2.35 |
| 9Cl-PF3ONS | 756426-58-1 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.968 | 2.35 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.35 U | F8144-FS(0) | 1.000 | 3/5/2022 | 0.847 | 2.35 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW01-PFAS-MW03-0222 |
| Battelle ID | F8145-FS |
| Sample Type | SA |
| Collection Date | 02/01/2022 |
| Extraction Date | 02/09/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.261 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD |
|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.875 | 2.39 |
| PFHpA | 375-85-9 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.901 | 2.39 |
| PFOA | 335-67-1 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.967 | 2.39 |
| PFNA | 375-95-1 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.798 | 2.39 |
| PFDA | 335-76-2 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.751 | 2.39 |
| PFUnA | 2058-94-8 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.720 | 2.39 |
| PFDoA | 307-55-1 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.728 | 2.39 |
| PFTrDA | 72629-94-8 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.711 | 2.39 |
| PFTeDA | 376-06-7 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.758 | 2.39 |
| NMeFOSAA | 2355-31-9 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.987 | 2.39 |
| NEtFOSAA | 2991-50-6 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.948 | 2.39 |
| PFBS | 375-73-5 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.830 | 2.39 |
| PFHxS | 355-46-4 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.955 | 2.39 |
| PFOS | 1763-23-1 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 1.02 | 2.39 |
| HFPO-DA | 13252-13-6 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.829 | 2.39 |
| Adona | 919005-14-4 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.832 | 2.39 |
| 9Cl-PF3ONS | 756426-58-1 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.987 | 2.39 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.39 U | F8145-FS(0) | 1.000 | 3/5/2022 | 0.863 | 2.39 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-PFAS-GW06-0222 |
| Battelle ID | F8146-FS |
| Sample Type | SA |
| Collection Date | 02/01/2022 |
| Extraction Date | 02/09/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.261 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD |
|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 114 | F8146-FS(0) | 1.000 | 3/5/2022 | 0.875 | 2.39 |
| **PFHpA** | **375-85-9** | **26.0** | **F8146-FS(0)** | **1.000** | **3/5/2022** | **0.901** | **2.39** |
| PFOA | 335-67-1 | 36.7 | F8146-FS(0) | 1.000 | 3/5/2022 | 0.967 | 2.39 |
| **PFNA** | **375-95-1** | **2.39 U** | **F8146-FS(0)** | **1.000** | **3/5/2022** | **0.798** | **2.39** |
| PFDA | 335-76-2 | 2.39 U | F8146-FS(0) | 1.000 | 3/5/2022 | 0.751 | 2.39 |
| **PFUnA** | **2058-94-8** | **2.39 U** | **F8146-FS(0)** | **1.000** | **3/5/2022** | **0.720** | **2.39** |
| PFDoA | 307-55-1 | 2.39 U | F8146-FS(0) | 1.000 | 3/5/2022 | 0.728 | 2.39 |
| **PFTrDA** | **72629-94-8** | **2.39 U** | **F8146-FS(0)** | **1.000** | **3/5/2022** | **0.711** | **2.39** |
| PFTeDA | 376-06-7 | 2.39 U | F8146-FS(0) | 1.000 | 3/5/2022 | 0.758 | 2.39 |
| **NMeFOSAA** | **2355-31-9** | **2.39 U** | **F8146-FS(0)** | **1.000** | **3/5/2022** | **0.987** | **2.39** |
| NEtFOSAA | 2991-50-6 | 2.39 U | F8146-FS(0) | 1.000 | 3/5/2022 | 0.948 | 2.39 |
| **PFBS** | **375-73-5** | **80.6** | **F8146-FS(0)** | **1.000** | **3/5/2022** | **0.830** | **2.39** |
| PFHxS | 355-46-4 | 563 | F8146-FS(0) | 1.000 | 3/5/2022 | 0.955 | 2.39 |
| **PFOS** | **1763-23-1** | **71.1** | **F8146-FS(0)** | **1.000** | **3/5/2022** | **1.02** | **2.39** |
| HFPO-DA | 13252-13-6 | 2.39 U | F8146-FS(0) | 1.000 | 3/5/2022 | 0.829 | 2.39 |
| **Adona** | **919005-14-4** | **2.39 U** | **F8146-FS(0)** | **1.000** | **3/5/2022** | **0.832** | **2.39** |
| 9Cl-PF3ONS | 756426-58-1 | 2.39 U | F8146-FS(0) | 1.000 | 3/5/2022 | 0.987 | 2.39 |
| **11Cl-PF3OUdS** | **763051-92-9** | **2.39 U** | **F8146-FS(0)** | **1.000** | **3/5/2022** | **0.863** | **2.39** |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-PFAS-GW24-0222 |
| Battelle ID | F8147-FS |
| Sample Type | SA |
| Collection Date | 02/01/2022 |
| Extraction Date | 02/09/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.265 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD |
|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.08 J | F8147-FS(0) | 1.000 | 3/5/2022 | 0.861 | 2.36 |
| **PFHpA** | **375-85-9** | **2.36 U** | **F8147-FS(0)** | **1.000** | **3/5/2022** | **0.888** | **2.36** |
| PFOA | 335-67-1 | 1.11 J | F8147-FS(0) | 1.000 | 3/5/2022 | 0.953 | 2.36 |
| **PFNA** | **375-95-1** | **2.36 U** | **F8147-FS(0)** | **1.000** | **3/5/2022** | **0.786** | **2.36** |
| PFDA | 335-76-2 | 2.36 U | F8147-FS(0) | 1.000 | 3/5/2022 | 0.740 | 2.36 |
| **PFUnA** | **2058-94-8** | **2.36 U** | **F8147-FS(0)** | **1.000** | **3/5/2022** | **0.709** | **2.36** |
| PFDoA | 307-55-1 | 2.36 U | F8147-FS(0) | 1.000 | 3/5/2022 | 0.717 | 2.36 |
| **PFTrDA** | **72629-94-8** | **2.36 U** | **F8147-FS(0)** | **1.000** | **3/5/2022** | **0.700** | **2.36** |
| PFTeDA | 376-06-7 | 2.36 U | F8147-FS(0) | 1.000 | 3/5/2022 | 0.746 | 2.36 |
| **NMeFOSAA** | **2355-31-9** | **2.36 U** | **F8147-FS(0)** | **1.000** | **3/5/2022** | **0.972** | **2.36** |
| NEtFOSAA | 2991-50-6 | 2.36 U | F8147-FS(0) | 1.000 | 3/5/2022 | 0.934 | 2.36 |
| **PFBS** | **375-73-5** | **19.2** | **F8147-FS(0)** | **1.000** | **3/5/2022** | **0.817** | **2.36** |
| PFHxS | 355-46-4 | 61.4 | F8147-FS(0) | 1.000 | 3/5/2022 | 0.941 | 2.36 |
| **PFOS** | **1763-23-1** | **2.92 J** | **F8147-FS(0)** | **1.000** | **3/5/2022** | **1.01** | **2.36** |
| HFPO-DA | 13252-13-6 | 2.36 U | F8147-FS(0) | 1.000 | 3/5/2022 | 0.816 | 2.36 |
| **Adona** | **919005-14-4** | **2.36 U** | **F8147-FS(0)** | **1.000** | **3/5/2022** | **0.820** | **2.36** |
| 9Cl-PF3ONS | 756426-58-1 | 2.36 U | F8147-FS(0) | 1.000 | 3/5/2022 | 0.972 | 2.36 |
| **11Cl-PF3OUdS** | **763051-92-9** | **2.36 U** | **F8147-FS(0)** | **1.000** | **3/5/2022** | **0.850** | **2.36** |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VE-SWMU-20-EB01-020222-AQ |
| Battelle ID | F8148-FS |
| Sample Type | SA |
| Collection Date | 02/02/2022 |
| Extraction Date | 02/09/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.253 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD |
|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.902 | 2.47 |
| PFHpA | 375-85-9 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.930 | 2.47 |
| PFOA | 335-67-1 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.998 | 2.47 |
| PFNA | 375-95-1 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.823 | 2.47 |
| PFDA | 335-76-2 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.775 | 2.47 |
| PFUnA | 2058-94-8 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.743 | 2.47 |
| PFDoA | 307-55-1 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.751 | 2.47 |
| PFTrDA | 72629-94-8 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.733 | 2.47 |
| PFTeDA | 376-06-7 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.782 | 2.47 |
| NMeFOSAA | 2355-31-9 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 1.02 | 2.47 |
| NEtFOSAA | 2991-50-6 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.978 | 2.47 |
| PFBS | 375-73-5 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.856 | 2.47 |
| PFHxS | 355-46-4 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.985 | 2.47 |
| PFOS | 1763-23-1 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 1.06 | 2.47 |
| HFPO-DA | 13252-13-6 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.855 | 2.47 |
| Adona | 919005-14-4 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.859 | 2.47 |
| 9Cl-PF3ONS | 756426-58-1 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 1.02 | 2.47 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.47 U | F8148-FS(0) | 1.000 | 3/5/2022 | 0.890 | 2.47 |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | EPI04-PFAS-GW26-0222 |
| Battelle ID | F8149-FS |
| Sample Type | SA |
| Collection Date | 02/02/2022 |
| Extraction Date | 02/09/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.272 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD |
|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.30 U | F8149-FS(0) | 1.000 | 3/5/2022 | 0.839 | 2.30 |
| **PFHpA** | **375-85-9** | **2.30 U** | **F8149-FS(0)** | **1.000** | **3/5/2022** | **0.865** | **2.30** |
| PFOA | 335-67-1 | 2.30 U | F8149-FS(0) | 1.000 | 3/5/2022 | 0.928 | 2.30 |
| **PFNA** | **375-95-1** | **2.30 U** | **F8149-FS(0)** | **1.000** | **3/5/2022** | **0.766** | **2.30** |
| PFDA | 335-76-2 | 2.30 U | F8149-FS(0) | 1.000 | 3/5/2022 | 0.721 | 2.30 |
| **PFUnA** | **2058-94-8** | **2.30 U** | **F8149-FS(0)** | **1.000** | **3/5/2022** | **0.691** | **2.30** |
| PFDoA | 307-55-1 | 2.30 U | F8149-FS(0) | 1.000 | 3/5/2022 | 0.699 | 2.30 |
| **PFTrDA** | **72629-94-8** | **2.30 U** | **F8149-FS(0)** | **1.000** | **3/5/2022** | **0.682** | **2.30** |
| PFTeDA | 376-06-7 | 2.30 U | F8149-FS(0) | 1.000 | 3/5/2022 | 0.727 | 2.30 |
| **NMeFOSAA** | **2355-31-9** | **2.30 U** | **F8149-FS(0)** | **1.000** | **3/5/2022** | **0.947** | **2.30** |
| NEtFOSAA | 2991-50-6 | 2.30 U | F8149-FS(0) | 1.000 | 3/5/2022 | 0.910 | 2.30 |
| **PFBS** | **375-73-5** | **6.70** | **F8149-FS(0)** | **1.000** | **3/5/2022** | **0.796** | **2.30** |
| PFHxS | 355-46-4 | 18.1 | F8149-FS(0) | 1.000 | 3/5/2022 | 0.916 | 2.30 |
| **PFOS** | **1763-23-1** | **1.10 J** | **F8149-FS(0)** | **1.000** | **3/5/2022** | **0.983** | **2.30** |
| HFPO-DA | 13252-13-6 | 2.30 U | F8149-FS(0) | 1.000 | 3/5/2022 | 0.795 | 2.30 |
| **Adona** | **919005-14-4** | **2.30 U** | **F8149-FS(0)** | **1.000** | **3/5/2022** | **0.799** | **2.30** |
| 9Cl-PF3ONS | 756426-58-1 | 2.30 U | F8149-FS(0) | 1.000 | 3/5/2022 | 0.947 | 2.30 |
| **11Cl-PF3OUdS** | **763051-92-9** | **2.30 U** | **F8149-FS(0)** | **1.000** | **3/5/2022** | **0.828** | **2.30** |

MW 10/14/22

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0220
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: October 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VE-SWMU-20-EB01-020322 | F8268-FS | Water |
| 2 | VEW01-PFAS-MW06-0222 | F8269-FS | Water |
| 2MS | VEW01-PFAS-MW06-0222MS | F8270-FSMS | Water |
| 2MSD | VEW01-PFAS-MW06-0222MSD | F8271-FSMSD | Water |
| 3 | VE-SWMU-1-FB01-020322 | F8272-FS | Water |
| 4 | VE-SWMU-20-FB01-020322 | F8273-FS | Water |
| 5 | VE-SWMU-1-EB01-020322 | F8274-FS | Water |
| 6 | VE-SWMU-20-EB02-020322 | F8275-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for one water sample, three aqueous equipment blank samples, and two aqueous field blank samples collected on February 3, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

### LC/MS Tuning

- All criteria were met.

### Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VE-SWMU-20-EB01-020322 | None - ND | - | - | - |
| VE-SWMU-1-FB01-020322 | None - ND | - | - | - |
| VE-SWMU-20-FB01-020322 | None - ND | - | - | - |
| VE-SWMU-1-EB01-020322 | None - ND | - | - | - |
| VE-SWMU-20-EB02-020322 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 10/17/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VE-SWMU-20-EB01-020322 |
| Battelle ID | F8268-FS |
| Sample Type | SA |
| Collection Date | 02/03/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.284 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD |
|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.804 | 2.20 |
| PFHpA | 375-85-9 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.828 | 2.20 |
| PFOA | 335-67-1 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.889 | 2.20 |
| PFNA | 375-95-1 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.733 | 2.20 |
| PFDA | 335-76-2 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.690 | 2.20 |
| PFUnA | 2058-94-8 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.662 | 2.20 |
| PFDoA | 307-55-1 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.669 | 2.20 |
| PFTrDA | 72629-94-8 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.653 | 2.20 |
| PFTeDA | 376-06-7 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.696 | 2.20 |
| NMeFOSAA | 2355-31-9 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.907 | 2.20 |
| NEtFOSAA | 2991-50-6 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.871 | 2.20 |
| PFBS | 375-73-5 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.762 | 2.20 |
| PFHxS | 355-46-4 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.878 | 2.20 |
| PFOS | 1763-23-1 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.942 | 2.20 |
| HFPO-DA | 13252-13-6 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.761 | 2.20 |
| Adona | 919005-14-4 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.765 | 2.20 |
| 9Cl-PF3ONS | 756426-58-1 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.907 | 2.20 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.20 U | F8268-FS(0) | 1.000 | 3/9/2022 | 0.793 | 2.20 |

MW 10/14/22

BATTELLE
It can be done

2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW01-PFAS-MW06-0222 |
| Battelle ID | F8269-FS |
| Sample Type | SA |
| Collection Date | 02/03/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.266 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.35 U | F8269-FS(0) | 1.000 | 3/9/2022 | 0.858 | 2.35 | |
| **PFHpA** | **375-85-9** | **2.35 U** | **F8269-FS(0)** | **1.000** | **3/9/2022** | **0.884** | **2.35** | |
| PFOA | 335-67-1 | 2.35 U | F8269-FS(0) | 1.000 | 3/9/2022 | 0.949 | 2.35 | |
| **PFNA** | **375-95-1** | **2.35 U** | **F8269-FS(0)** | **1.000** | **3/9/2022** | **0.783** | **2.35** | |
| PFDA | 335-76-2 | 2.35 U | F8269-FS(0) | 1.000 | 3/9/2022 | 0.737 | 2.35 | |
| **PFUnA** | **2058-94-8** | **2.35 U** | **F8269-FS(0)** | **1.000** | **3/9/2022** | **0.707** | **2.35** | |
| PFDoA | 307-55-1 | 2.35 U | F8269-FS(0) | 1.000 | 3/9/2022 | 0.714 | 2.35 | |
| **PFTrDA** | **72629-94-8** | **2.35 U** | **F8269-FS(0)** | **1.000** | **3/9/2022** | **0.697** | **2.35** | |
| PFTeDA | 376-06-7 | 2.35 U | F8269-FS(0) | 1.000 | 3/9/2022 | 0.743 | 2.35 | |
| **NMeFOSAA** | **2355-31-9** | **2.35 U** | **F8269-FS(0)** | **1.000** | **3/9/2022** | **0.968** | **2.35** | |
| NEtFOSAA | 2991-50-6 | 2.35 U | F8269-FS(0) | 1.000 | 3/9/2022 | 0.930 | 2.35 | |
| **PFBS** | **375-73-5** | **2.35 U** | **F8269-FS(0)** | **1.000** | **3/9/2022** | **0.814** | **2.35** | |
| PFHxS | 355-46-4 | 2.35 U | F8269-FS(0) | 1.000 | 3/9/2022 | 0.937 | 2.35 | |
| **PFOS** | **1763-23-1** | **2.35 U** | **F8269-FS(0)** | **1.000** | **3/9/2022** | **1.01** | **2.35** | |
| HFPO-DA | 13252-13-6 | 2.35 U | F8269-FS(0) | 1.000 | 3/9/2022 | 0.813 | 2.35 | |
| **Adona** | **919005-14-4** | **2.35 U** | **F8269-FS(0)** | **1.000** | **3/9/2022** | **0.817** | **2.35** | |
| 9Cl-PF3ONS | 756426-58-1 | 2.35 U | F8269-FS(0) | 1.000 | 3/9/2022 | 0.968 | 2.35 | |
| **11Cl-PF3OUdS** | **763051-92-9** | **2.35 U** | **F8269-FS(0)** | **1.000** | **3/9/2022** | **0.847** | **2.35** | |

MW 10/14/22

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VE-SWMU-1-FB01-020322 |
| Battelle ID | F8272-FS |
| Sample Type | SA |
| Collection Date | 02/03/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.261 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD |
|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.875 | 2.39 |
| PFHpA | 375-85-9 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.901 | 2.39 |
| PFOA | 335-67-1 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.967 | 2.39 |
| PFNA | 375-95-1 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.798 | 2.39 |
| PFDA | 335-76-2 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.751 | 2.39 |
| PFUnA | 2058-94-8 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.720 | 2.39 |
| PFDoA | 307-55-1 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.728 | 2.39 |
| PFTrDA | 72629-94-8 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.711 | 2.39 |
| PFTeDA | 376-06-7 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.758 | 2.39 |
| NMeFOSAA | 2355-31-9 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.987 | 2.39 |
| NEtFOSAA | 2991-50-6 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.948 | 2.39 |
| PFBS | 375-73-5 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.830 | 2.39 |
| PFHxS | 355-46-4 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.955 | 2.39 |
| PFOS | 1763-23-1 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 1.02 | 2.39 |
| HFPO-DA | 13252-13-6 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.829 | 2.39 |
| Adona | 919005-14-4 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.832 | 2.39 |
| 9Cl-PF3ONS | 756426-58-1 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.987 | 2.39 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.39 U | F8272-FS(0) | 1.000 | 3/9/2022 | 0.863 | 2.39 |

NW 10/14/22

BATTELLE
It can be done

4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VE-SWMU-20-FB01-020322 |
| Battelle ID | F8273-FS |
| Sample Type | SA |
| Collection Date | 02/03/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.260 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD |
|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.40 U | F8273-FS(0) | 1.000 | 3/9/2022 | 0.878 | 2.40 |
| **PFHpA** | **375-85-9** | **2.40 U** | **F8273-FS(0)** | **1.000** | **3/9/2022** | **0.905** | **2.40** |
| PFOA | 335-67-1 | 2.40 U | F8273-FS(0) | 1.000 | 3/9/2022 | 0.971 | 2.40 |
| **PFNA** | **375-95-1** | **2.40 U** | **F8273-FS(0)** | **1.000** | **3/9/2022** | **0.801** | **2.40** |
| PFDA | 335-76-2 | 2.40 U | F8273-FS(0) | 1.000 | 3/9/2022 | 0.754 | 2.40 |
| **PFUnA** | **2058-94-8** | **2.40 U** | **F8273-FS(0)** | **1.000** | **3/9/2022** | **0.723** | **2.40** |
| PFDoA | 307-55-1 | 2.40 U | F8273-FS(0) | 1.000 | 3/9/2022 | 0.731 | 2.40 |
| **PFTrDA** | **72629-94-8** | **2.40 U** | **F8273-FS(0)** | **1.000** | **3/9/2022** | **0.713** | **2.40** |
| PFTeDA | 376-06-7 | 2.40 U | F8273-FS(0) | 1.000 | 3/9/2022 | 0.761 | 2.40 |
| **NMeFOSAA** | **2355-31-9** | **2.40 U** | **F8273-FS(0)** | **1.000** | **3/9/2022** | **0.990** | **2.40** |
| NEtFOSAA | 2991-50-6 | 2.40 U | F8273-FS(0) | 1.000 | 3/9/2022 | 0.952 | 2.40 |
| **PFBS** | **375-73-5** | **2.40 U** | **F8273-FS(0)** | **1.000** | **3/9/2022** | **0.833** | **2.40** |
| PFHxS | 355-46-4 | 2.40 U | F8273-FS(0) | 1.000 | 3/9/2022 | 0.959 | 2.40 |
| **PFOS** | **1763-23-1** | **2.40 U** | **F8273-FS(0)** | **1.000** | **3/9/2022** | **1.03** | **2.40** |
| HFPO-DA | 13252-13-6 | 2.40 U | F8273-FS(0) | 1.000 | 3/9/2022 | 0.832 | 2.40 |
| **Adona** | **919005-14-4** | **2.40 U** | **F8273-FS(0)** | **1.000** | **3/9/2022** | **0.836** | **2.40** |
| 9Cl-PF3ONS | 756426-58-1 | 2.40 U | F8273-FS(0) | 1.000 | 3/9/2022 | 0.990 | 2.40 |
| **11Cl-PF3OUdS** | **763051-92-9** | **2.40 U** | **F8273-FS(0)** | **1.000** | **3/9/2022** | **0.866** | **2.40** |

MW 10/14/22

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5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VE-SWMU-1-EB01-020322 |
| Battelle ID | F8274-FS |
| Sample Type | SA |
| Collection Date | 02/03/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.274 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD |
|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.833 | 2.28 |
| PFHpA | 375-85-9 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.859 | 2.28 |
| PFOA | 335-67-1 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.922 | 2.28 |
| PFNA | 375-95-1 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.760 | 2.28 |
| PFDA | 335-76-2 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.715 | 2.28 |
| PFUnA | 2058-94-8 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.686 | 2.28 |
| PFDoA | 307-55-1 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.693 | 2.28 |
| PFTrDA | 72629-94-8 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.677 | 2.28 |
| PFTeDA | 376-06-7 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.722 | 2.28 |
| NMeFOSAA | 2355-31-9 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.940 | 2.28 |
| NEtFOSAA | 2991-50-6 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.903 | 2.28 |
| PFBS | 375-73-5 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.790 | 2.28 |
| PFHxS | 355-46-4 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.910 | 2.28 |
| PFOS | 1763-23-1 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.976 | 2.28 |
| HFPO-DA | 13252-13-6 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.789 | 2.28 |
| Adona | 919005-14-4 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.793 | 2.28 |
| 9Cl-PF3ONS | 756426-58-1 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.940 | 2.28 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.28 U | F8274-FS(0) | 1.000 | 3/9/2022 | 0.822 | 2.28 |

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6

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VE-SWMU-20-EB02-020322 |
| Battelle ID | F8275-FS |
| Sample Type | SA |
| Collection Date | 02/03/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.272 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD |
|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.839 | 2.30 |
| PFHpA | 375-85-9 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.865 | 2.30 |
| PFOA | 335-67-1 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.928 | 2.30 |
| PFNA | 375-95-1 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.766 | 2.30 |
| PFDA | 335-76-2 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.721 | 2.30 |
| PFUnA | 2058-94-8 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.691 | 2.30 |
| PFDoA | 307-55-1 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.699 | 2.30 |
| PFTrDA | 72629-94-8 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.682 | 2.30 |
| PFTeDA | 376-06-7 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.727 | 2.30 |
| NMeFOSAA | 2355-31-9 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.947 | 2.30 |
| NEtFOSAA | 2991-50-6 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.910 | 2.30 |
| PFBS | 375-73-5 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.796 | 2.30 |
| PFHxS | 355-46-4 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.916 | 2.30 |
| PFOS | 1763-23-1 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.983 | 2.30 |
| HFPO-DA | 13252-13-6 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.795 | 2.30 |
| Adona | 919005-14-4 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.799 | 2.30 |
| 9Cl-PF3ONS | 756426-58-1 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.947 | 2.30 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.30 U | F8275-FS(0) | 1.000 | 3/9/2022 | 0.828 | 2.30 |

MJ 10/14/22

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0238
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: October 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEP4-PFAS-GW15-0222 | F8367-FS | Water |
| 2 | VEP4-PFAS-GW01-0222 | F8368-FS | Water |
| 3 | VE-SWMU-20-EB01-020822 | F8369-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for two water samples and one aqueous equipment blank sample collected on February 8, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times

- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

## Polyfluoroalkyl Substances (PFAS)

## Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

## Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VE-SWMU-20-EB01-020822 | None - ND | - | - | - |
| VE-SWMU-20-FB01-020322 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

**Field Duplicate Sample Precision**

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: _____ Dated: 10/19/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-PFAS-GW15-0222 |
| Battelle ID | F8367-FS |
| Sample Type | SA |
| Collection Date | 02/08/2022 |
| Extraction Date | 02/21/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.278 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 107 | F8367-FS(0) | 1.000 | 3/11/2022 | 0.821 | 2.25 | 4.50 |
| PFHpA | 375-85-9 | 31.4 | F8367-FS(0) | 1.000 | 3/11/2022 | 0.846 | 2.25 | 4.50 |
| PFOA | 335-67-1 | 34.7 | F8367-FS(0) | 1.000 | 3/11/2022 | 0.908 | 2.25 | 4.50 |
| PFNA | 375-95-1 | 1.72 J | F8367-FS(0) | 1.000 | 3/11/2022 | 0.749 | 2.25 | 4.50 |
| PFDA | 335-76-2 | 2.25 U | F8367-FS(0) | 1.000 | 3/11/2022 | 0.705 | 2.25 | 4.50 |
| PFUnA | 2058-94-8 | 2.25 U | F8367-FS(0) | 1.000 | 3/11/2022 | 0.676 | 2.25 | 4.50 |
| PFDoA | 307-55-1 | 2.25 U | F8367-FS(0) | 1.000 | 3/11/2022 | 0.683 | 2.25 | 4.50 |
| PFTrDA | 72629-94-8 | 2.25 U | F8367-FS(0) | 1.000 | 3/11/2022 | 0.667 | 2.25 | 4.50 |
| PFTeDA | 376-06-7 | 2.25 U | F8367-FS(0) | 1.000 | 3/11/2022 | 0.711 | 2.25 | 4.50 |
| NMeFOSAA | 2355-31-9 | 2.25 U | F8367-FS(0) | 1.000 | 3/11/2022 | 0.926 | 2.25 | 4.50 |
| NEtFOSAA | 2991-50-6 | 2.25 U | F8367-FS(0) | 1.000 | 3/11/2022 | 0.890 | 2.25 | 4.50 |
| PFBS | 375-73-5 | 90.0 | F8367-FS(0) | 1.000 | 3/11/2022 | 0.779 | 2.25 | 4.50 |
| PFHxS | 355-46-4 | 592 | F8367-FS(0) | 1.000 | 3/11/2022 | 0.897 | 2.25 | 4.50 |
| PFOS | 1763-23-1 | 62.9 | F8367-FS(0) | 1.000 | 3/11/2022 | 0.962 | 2.25 | 4.50 |
| HFPO-DA | 13252-13-6 | 2.25 U | F8367-FS(0) | 1.000 | 3/11/2022 | 0.778 | 2.25 | 4.50 |
| Adona | 919005-14-4 | 2.25 U | F8367-FS(0) | 1.000 | 3/11/2022 | 0.781 | 2.25 | 4.50 |
| 9Cl-PF3ONS | 756426-58-1 | 2.25 U | F8367-FS(0) | 1.000 | 3/11/2022 | 0.926 | 2.25 | 4.50 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.25 U | F8367-FS(0) | 1.000 | 3/11/2022 | 0.810 | 2.25 | 4.50 |

MW 10/14/22

Analyzed by: Griffith, Lauren
Printed: 3/11/2022

BATTELLE
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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-PFAS-GW01-0222 |
| Battelle ID | F8368-FS |
| Sample Type | SA |
| Collection Date | 02/08/2022 |
| Extraction Date | 02/21/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.271 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 149 | F8368-FS(0) | 1.000 | 3/11/2022 | 0.842 | 2.31 | 4.61 |
| PFHpA | 375-85-9 | 29.3 | F8368-FS(0) | 1.000 | 3/11/2022 | 0.868 | 2.31 | 4.61 |
| PFOA | 335-67-1 | 35.4 | F8368-FS(0) | 1.000 | 3/11/2022 | 0.932 | 2.31 | 4.61 |
| PFNA | 375-95-1 | 2.31 U | F8368-FS(0) | 1.000 | 3/11/2022 | 0.768 | 2.31 | 4.61 |
| PFDA | 335-76-2 | 2.31 U | F8368-FS(0) | 1.000 | 3/11/2022 | 0.723 | 2.31 | 4.61 |
| PFUnA | 2058-94-8 | 2.31 U | F8368-FS(0) | 1.000 | 3/11/2022 | 0.694 | 2.31 | 4.61 |
| PFDoA | 307-55-1 | 2.31 U | F8368-FS(0) | 1.000 | 3/11/2022 | 0.701 | 2.31 | 4.61 |
| PFTrDA | 72629-94-8 | 2.31 U | F8368-FS(0) | 1.000 | 3/11/2022 | 0.685 | 2.31 | 4.61 |
| PFTeDA | 376-06-7 | 2.31 U | F8368-FS(0) | 1.000 | 3/11/2022 | 0.730 | 2.31 | 4.61 |
| NMeFOSAA | 2355-31-9 | 2.31 U | F8368-FS(0) | 1.000 | 3/11/2022 | 0.950 | 2.31 | 4.61 |
| NEtFOSAA | 2991-50-6 | 2.31 U | F8368-FS(0) | 1.000 | 3/11/2022 | 0.913 | 2.31 | 4.61 |
| PFBS | 375-73-5 | 125 | F8368-FS(0) | 1.000 | 3/11/2022 | 0.799 | 2.31 | 4.61 |
| PFHxS | 355-46-4 | 358 | F8368-FS(0) | 1.000 | 3/11/2022 | 0.920 | 2.31 | 4.61 |
| PFOS | 1763-23-1 | 41.3 | F8368-FS(0) | 1.000 | 3/11/2022 | 0.987 | 2.31 | 4.61 |
| HFPO-DA | 13252-13-6 | 2.31 U | F8368-FS(0) | 1.000 | 3/11/2022 | 0.798 | 2.31 | 4.61 |
| Adona | 919005-14-4 | 2.31 U | F8368-FS(0) | 1.000 | 3/11/2022 | 0.802 | 2.31 | 4.61 |
| 9Cl-PF3ONS | 756426-58-1 | 2.31 U | F8368-FS(0) | 1.000 | 3/11/2022 | 0.950 | 2.31 | 4.61 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.31 U | F8368-FS(0) | 1.000 | 3/11/2022 | 0.831 | 2.31 | 4.61 |

MJ 10/14/22

Analyzed by: Griffith, Lauren
Printed: 3/11/2022

BATTELLE
It can be done

3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VE-SWMU-20-EB01-020822 |
| Battelle ID | F8369-FS |
| Sample Type | SA |
| Collection Date | 02/08/2022 |
| Extraction Date | 02/21/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.261 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.875 | 2.39 | 4.79 |
| PFHpA | 375-85-9 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.901 | 2.39 | 4.79 |
| PFOA | 335-67-1 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.967 | 2.39 | 4.79 |
| PFNA | 375-95-1 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.798 | 2.39 | 4.79 |
| PFDA | 335-76-2 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.751 | 2.39 | 4.79 |
| PFUnA | 2058-94-8 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.720 | 2.39 | 4.79 |
| PFDoA | 307-55-1 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.728 | 2.39 | 4.79 |
| PFTrDA | 72629-94-8 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.711 | 2.39 | 4.79 |
| PFTeDA | 376-06-7 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.758 | 2.39 | 4.79 |
| NMeFOSAA | 2355-31-9 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.987 | 2.39 | 4.79 |
| NEtFOSAA | 2991-50-6 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.948 | 2.39 | 4.79 |
| PFBS | 375-73-5 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.830 | 2.39 | 4.79 |
| PFHxS | 355-46-4 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.955 | 2.39 | 4.79 |
| PFOS | 1763-23-1 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 1.02 | 2.39 | 4.79 |
| HFPO-DA | 13252-13-6 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.829 | 2.39 | 4.79 |
| Adona | 919005-14-4 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.832 | 2.39 | 4.79 |
| 9Cl-PF3ONS | 756426-58-1 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.987 | 2.39 | 4.79 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.39 U | F8369-FS(0) | 1.000 | 3/11/2022 | 0.863 | 2.39 | 4.79 |

MW 10/14/22

Analyzed by: Griffith, Lauren
Printed: 3/11/2022

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0547
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: October 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEW10-PFAS-GW04-0422 | E0167-FS | Water |
| 2 | VEW10-EB01-040522-GW | E0168-FS | Water |
| 3 | VEW10-FB01-040522 | E0169-FS | Water |
| 4* | VEW10-PFAS-GW03-0422 | E0170-FS | Water |
| 5 | VEW10-PFAS-GW02-0422 | E0171-FS | Water |
| 5MS | VEW10-PFAS-GW02-0422MS | E0172-FSMS | Water |
| 5MSD | VEW10-PFAS-GW02-0422MSD | E0173-FSMSD | Water |

* - Reviewer Amended Form I

A Stage 2B/4 data validation was performed on the analytical data for three water samples, one aqueous equipment blank sample, and one aqueous field blank sample collected on April 5, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

### LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VEW10-EB01-040522-GW | None - ND | - | - | - |
| VEW10-FB01-040522 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 10/17/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-GW04-0422 |
| Battelle ID | E0167-FS |
| Sample Type | SA |
| Collection Date | 04/05/2022 |
| Extraction Date | 04/15/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.276 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.827 | 2.26 | 4.53 |
| PFHpA | 375-85-9 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.852 | 2.26 | 4.53 |
| PFOA | 335-67-1 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.915 | 2.26 | 4.53 |
| PFNA | 375-95-1 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.755 | 2.26 | 4.53 |
| PFDA | 335-76-2 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.710 | 2.26 | 4.53 |
| PFUnA | 2058-94-8 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.681 | 2.26 | 4.53 |
| PFDoA | 307-55-1 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.688 | 2.26 | 4.53 |
| PFTrDA | 72629-94-8 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.672 | 2.26 | 4.53 |
| PFTeDA | 376-06-7 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.716 | 2.26 | 4.53 |
| NMeFOSAA | 2355-31-9 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.933 | 2.26 | 4.53 |
| NEtFOSAA | 2991-50-6 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.897 | 2.26 | 4.53 |
| PFBS | 375-73-5 | 3.43 J | E0167-FS(0) | 1.000 | 5/6/2022 | 0.784 | 2.26 | 4.53 |
| PFHxS | 355-46-4 | 5.02 | E0167-FS(0) | 1.000 | 5/6/2022 | 0.903 | 2.26 | 4.53 |
| PFOS | 1763-23-1 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.969 | 2.26 | 4.53 |
| HFPO-DA | 13252-13-6 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.784 | 2.26 | 4.53 |
| Adona | 919005-14-4 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.787 | 2.26 | 4.53 |
| 9Cl-PF3ONS | 756426-58-1 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.933 | 2.26 | 4.53 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.26 U | E0167-FS(0) | 1.000 | 5/6/2022 | 0.816 | 2.26 | 4.53 |

NW 10/14/22

BATTELLE
It can be done

2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-EB01-040522-GW |
| Battelle ID | E0168-FS |
| Sample Type | SA |
| Collection Date | 04/05/2022 |
| Extraction Date | 04/15/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.269 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.849 | 2.32 | 4.65 |
| PFHpA | 375-85-9 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.875 | 2.32 | 4.65 |
| PFOA | 335-67-1 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.939 | 2.32 | 4.65 |
| PFNA | 375-95-1 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.774 | 2.32 | 4.65 |
| PFDA | 335-76-2 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.729 | 2.32 | 4.65 |
| PFUnA | 2058-94-8 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.699 | 2.32 | 4.65 |
| PFDoA | 307-55-1 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.706 | 2.32 | 4.65 |
| PFTrDA | 72629-94-8 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.690 | 2.32 | 4.65 |
| PFTeDA | 376-06-7 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.735 | 2.32 | 4.65 |
| NMeFOSAA | 2355-31-9 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.957 | 2.32 | 4.65 |
| NEtFOSAA | 2991-50-6 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.920 | 2.32 | 4.65 |
| PFBS | 375-73-5 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.805 | 2.32 | 4.65 |
| PFHxS | 355-46-4 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.927 | 2.32 | 4.65 |
| PFOS | 1763-23-1 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.994 | 2.32 | 4.65 |
| HFPO-DA | 13252-13-6 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.804 | 2.32 | 4.65 |
| Adona | 919005-14-4 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.808 | 2.32 | 4.65 |
| 9Cl-PF3ONS | 756426-58-1 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.957 | 2.32 | 4.65 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.32 U | E0168-FS(0) | 1.000 | 5/6/2022 | 0.837 | 2.32 | 4.65 |

MW 10/14/22

Analyzed by: Schumitz, Denise
Printed: 5/13/2022

BATTELLE
It can be done

3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-FB01-040522 |
| Battelle ID | E0169-FS |
| Sample Type | SA |
| Collection Date | 04/05/2022 |
| Extraction Date | 04/15/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.262 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.871 | 2.39 | 4.77 |
| PFHpA | 375-85-9 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.898 | 2.39 | 4.77 |
| PFOA | 335-67-1 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.964 | 2.39 | 4.77 |
| PFNA | 375-95-1 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.795 | 2.39 | 4.77 |
| PFDA | 335-76-2 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.748 | 2.39 | 4.77 |
| PFUnA | 2058-94-8 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.718 | 2.39 | 4.77 |
| PFDoA | 307-55-1 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.725 | 2.39 | 4.77 |
| PFTrDA | 72629-94-8 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.708 | 2.39 | 4.77 |
| PFTeDA | 376-06-7 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.755 | 2.39 | 4.77 |
| NMeFOSAA | 2355-31-9 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.983 | 2.39 | 4.77 |
| NEtFOSAA | 2991-50-6 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.945 | 2.39 | 4.77 |
| PFBS | 375-73-5 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.826 | 2.39 | 4.77 |
| PFHxS | 355-46-4 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.951 | 2.39 | 4.77 |
| PFOS | 1763-23-1 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 1.02 | 2.39 | 4.77 |
| HFPO-DA | 13252-13-6 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.825 | 2.39 | 4.77 |
| Adona | 919005-14-4 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.829 | 2.39 | 4.77 |
| 9Cl-PF3ONS | 756426-58-1 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.983 | 2.39 | 4.77 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.39 U | E0169-FS(0) | 1.000 | 5/6/2022 | 0.860 | 2.39 | 4.77 |

MW 10/14/22

BATTELLE
It can be done

4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

3

NW

| | |
|---|---|
| Client ID | VEW10-PFAS-GW02-0422 |
| Battelle ID | E0170-FS |
| Sample Type | SA |
| Collection Date | 04/05/2022 |
| Extraction Date | 04/15/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.277 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.824 | 2.26 | 4.51 |
| PFHpA | 375-85-9 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.849 | 2.26 | 4.51 |
| PFOA | 335-67-1 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.912 | 2.26 | 4.51 |
| PFNA | 375-95-1 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.752 | 2.26 | 4.51 |
| PFDA | 335-76-2 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.708 | 2.26 | 4.51 |
| PFUnA | 2058-94-8 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.679 | 2.26 | 4.51 |
| PFDoA | 307-55-1 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.686 | 2.26 | 4.51 |
| PFTrDA | 72629-94-8 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.670 | 2.26 | 4.51 |
| PFTeDA | 376-06-7 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.714 | 2.26 | 4.51 |
| NMeFOSAA | 2355-31-9 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.930 | 2.26 | 4.51 |
| NEtFOSAA | 2991-50-6 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.894 | 2.26 | 4.51 |
| PFBS | 375-73-5 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.782 | 2.26 | 4.51 |
| PFHxS | 355-46-4 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.900 | 2.26 | 4.51 |
| PFOS | 1763-23-1 | 2.24 J | E0170-FS(0) | 1.000 | 5/6/2022 | 0.966 | 2.26 | 4.51 |
| HFPO-DA | 13252-13-6 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.781 | 2.26 | 4.51 |
| Adona | 919005-14-4 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.784 | 2.26 | 4.51 |
| 9Cl-PF3ONS | 756426-58-1 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.930 | 2.26 | 4.51 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.26 U | E0170-FS(0) | 1.000 | 5/6/2022 | 0.813 | 2.26 | 4.51 |

NW 10/14/22

Analyzed by: Schumitz, Denise
Printed: 5/13/2022

BATTELLE
It can be done

5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-GW02-0422 |
| Battelle ID | E0171-FS |
| Sample Type | SA |
| Collection Date | 04/05/2022 |
| Extraction Date | 04/15/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.272 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.839 | 2.30 | 4.60 |
| PFHpA | 375-85-9 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.865 | 2.30 | 4.60 |
| PFOA | 335-67-1 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.928 | 2.30 | 4.60 |
| PFNA | 375-95-1 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.766 | 2.30 | 4.60 |
| PFDA | 335-76-2 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.721 | 2.30 | 4.60 |
| PFUnA | 2058-94-8 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.691 | 2.30 | 4.60 |
| PFDoA | 307-55-1 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.699 | 2.30 | 4.60 |
| PFTrDA | 72629-94-8 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.682 | 2.30 | 4.60 |
| PFTeDA | 376-06-7 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.727 | 2.30 | 4.60 |
| NMeFOSAA | 2355-31-9 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.947 | 2.30 | 4.60 |
| NEtFOSAA | 2991-50-6 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.910 | 2.30 | 4.60 |
| PFBS | 375-73-5 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.796 | 2.30 | 4.60 |
| PFHxS | 355-46-4 | 42.2 | E0171-FS(0) | 1.000 | 5/6/2022 | 0.916 | 2.30 | 4.60 |
| PFOS | 1763-23-1 | 7.81 | E0171-FS(0) | 1.000 | 5/6/2022 | 0.983 | 2.30 | 4.60 |
| HFPO-DA | 13252-13-6 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.795 | 2.30 | 4.60 |
| Adona | 919005-14-4 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.799 | 2.30 | 4.60 |
| 9Cl-PF3ONS | 756426-58-1 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.947 | 2.30 | 4.60 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.30 U | E0171-FS(0) | 1.000 | 5/6/2022 | 0.828 | 2.30 | 4.60 |

MW 10/14/22

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0594
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-0003, Puerto Rico
Date: October 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEW10-PFAS-GW01-0422 | E0406-FS | Water |
| 2 | VEW10-PFAS-GW01P-0422 | E0407-FS | Water |
| 3 | VEP5-PFAS-GW01-0422 | E0408-FS | Water |
| 4 | VERW-PFAS-GW01-0422 | E0409-FS | Water |
| 5 | VERW-PFAS-GW02-0422 | E0410-FS | Water |
| 6 | VEP5-FB01-040822 | E0411-FS | Water |
| 7 | VERW-FB01-040822 | E0412-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for five water samples, one aqueous field blank sample, and one aqueous trip blank sample collected on April 6-8, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

### LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VEW10-EB01-040522-GW | None - ND | - | - | - |
| VEP5-FB01-040822 | None - ND | - | - | - |
| VERW-FB01-040822 | None - ND | - | - | - |
| VEW10-FB01-040522 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria except for the following.

| EDS Sample | Internal Standard | Area Count | Qualifier |
|---|---|---|---|
| 1 | 13C2-PFOA | Low | UJ |
| 2 | 13C2-PFOA | Low | |

| EDS Sample | Internal Standard | Area Count | Qualifier |
|---|---|---|---|
| 3 | 13C2-PFOA | Low | UJ |

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VEW10-PFAS-GW01-0422 ng/L | VEW10-PFAS-GW01P-0422 ng/L | RPD | Qualifier |
|---|---|---|---|---|
| PFBS | 3.71 | 3.70 | 0% | None |
| PFHxS | 8.92 | 8.07 | 10% | |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: _____ Dated: 10/19/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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1

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-GW01-0422 |
| Battelle ID | E0406-FS |
| Sample Type | SA |
| Collection Date | 04/06/2022 |
| Extraction Date | 04/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.284 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.804 | 2.20 | 4.40 | |
| PFHpA | 375-85-9 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.828 | 2.20 | 4.40 | |
| PFOA | 335-67-1 | 2.20 U UJ | E0406-FS(0) | 1.000 | 5/14/2022 | 0.889 | 2.20 | 4.40 | ISL |
| PFNA | 375-95-1 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.733 | 2.20 | 4.40 | |
| PFDA | 335-76-2 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.690 | 2.20 | 4.40 | |
| PFUnA | 2058-94-8 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.662 | 2.20 | 4.40 | |
| PFDoA | 307-55-1 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.669 | 2.20 | 4.40 | |
| PFTrDA | 72629-94-8 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.653 | 2.20 | 4.40 | |
| PFTeDA | 376-06-7 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.696 | 2.20 | 4.40 | |
| NMeFOSAA | 2355-31-9 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.907 | 2.20 | 4.40 | |
| NEtFOSAA | 2991-50-6 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.871 | 2.20 | 4.40 | |
| PFBS | 375-73-5 | 3.71 J | E0406-FS(0) | 1.000 | 5/14/2022 | 0.762 | 2.20 | 4.40 | |
| PFHxS | 355-46-4 | 8.92 | E0406-FS(0) | 1.000 | 5/14/2022 | 0.878 | 2.20 | 4.40 | |
| PFOS | 1763-23-1 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.942 | 2.20 | 4.40 | |
| HFPO-DA | 13252-13-6 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.761 | 2.20 | 4.40 | |
| Adona | 919005-14-4 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.765 | 2.20 | 4.40 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.907 | 2.20 | 4.40 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.20 U | E0406-FS(0) | 1.000 | 5/14/2022 | 0.793 | 2.20 | 4.40 | |

MW 10/14/22

Analyzed by: Griffith, Lauren
Printed: 5/16/2022

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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEW10-PFAS-GW01P-0422 |
| Battelle ID | E0407-FS |
| Sample Type | SA |
| Collection Date | 04/06/2022 |
| Extraction Date | 04/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.280 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.815 | 2.23 | 4.46 | |
| PFHpA | 375-85-9 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.840 | 2.23 | 4.46 | |
| PFOA | 335-67-1 | 2.23 UJ | E0407-FS(0) | 1.000 | 5/14/2022 | 0.902 | 2.23 | 4.46 | ISL |
| PFNA | 375-95-1 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.744 | 2.23 | 4.46 | |
| PFDA | 335-76-2 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.700 | 2.23 | 4.46 | |
| PFUnA | 2058-94-8 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.671 | 2.23 | 4.46 | |
| PFDoA | 307-55-1 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.679 | 2.23 | 4.46 | |
| PFTrDA | 72629-94-8 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.663 | 2.23 | 4.46 | |
| PFTeDA | 376-06-7 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.706 | 2.23 | 4.46 | |
| NMeFOSAA | 2355-31-9 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.920 | 2.23 | 4.46 | |
| NEtFOSAA | 2991-50-6 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.884 | 2.23 | 4.46 | |
| PFBS | 375-73-5 | 3.70 J | E0407-FS(0) | 1.000 | 5/14/2022 | 0.773 | 2.23 | 4.46 | |
| PFHxS | 355-46-4 | 8.07 | E0407-FS(0) | 1.000 | 5/14/2022 | 0.890 | 2.23 | 4.46 | |
| PFOS | 1763-23-1 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.955 | 2.23 | 4.46 | |
| HFPO-DA | 13252-13-6 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.772 | 2.23 | 4.46 | |
| Adona | 919005-14-4 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.776 | 2.23 | 4.46 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.920 | 2.23 | 4.46 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.23 U | E0407-FS(0) | 1.000 | 5/14/2022 | 0.804 | 2.23 | 4.46 | |

NW 10/14/22

Analyzed by: Griffith, Lauren
Printed: 5/16/2022

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3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP5-PFAS-GW01-0422 |
| Battelle ID | E0408-FS |
| Sample Type | SA |
| Collection Date | 04/06/2022 |
| Extraction Date | 04/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.278 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.821 | 2.25 | 4.50 | |
| PFHpA | 375-85-9 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.846 | 2.25 | 4.50 | |
| PFOA | 335-67-1 | 2.25 ~~U~~ UJ | E0408-FS(0) | 1.000 | 5/14/2022 | 0.908 | 2.25 | 4.50 | ISL |
| PFNA | 375-95-1 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.749 | 2.25 | 4.50 | |
| PFDA | 335-76-2 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.705 | 2.25 | 4.50 | |
| PFUnA | 2058-94-8 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.676 | 2.25 | 4.50 | |
| PFDoA | 307-55-1 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.683 | 2.25 | 4.50 | |
| PFTrDA | 72629-94-8 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.667 | 2.25 | 4.50 | |
| PFTeDA | 376-06-7 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.711 | 2.25 | 4.50 | |
| NMeFOSAA | 2355-31-9 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.926 | 2.25 | 4.50 | |
| NEtFOSAA | 2991-50-6 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.890 | 2.25 | 4.50 | |
| PFBS | 375-73-5 | 2.65 J | E0408-FS(0) | 1.000 | 5/14/2022 | 0.779 | 2.25 | 4.50 | |
| PFHxS | 355-46-4 | 1.44 J | E0408-FS(0) | 1.000 | 5/14/2022 | 0.897 | 2.25 | 4.50 | |
| PFOS | 1763-23-1 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.962 | 2.25 | 4.50 | |
| HFPO-DA | 13252-13-6 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.778 | 2.25 | 4.50 | |
| Adona | 919005-14-4 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.781 | 2.25 | 4.50 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.926 | 2.25 | 4.50 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.25 U | E0408-FS(0) | 1.000 | 5/14/2022 | 0.810 | 2.25 | 4.50 | |

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Analyzed by: Griffith, Lauren
Printed: 5/16/2022

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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-PFAS-GW01-0422 |
| Battelle ID | E0409-FS |
| Sample Type | SA |
| Collection Date | 04/06/2022 |
| Extraction Date | 04/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.275 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.830 | 2.27 | 4.55 |
| PFHpA | 375-85-9 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.855 | 2.27 | 4.55 |
| PFOA | 335-67-1 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.918 | 2.27 | 4.55 |
| PFNA | 375-95-1 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.757 | 2.27 | 4.55 |
| PFDA | 335-76-2 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.713 | 2.27 | 4.55 |
| PFUnA | 2058-94-8 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.684 | 2.27 | 4.55 |
| PFDoA | 307-55-1 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.691 | 2.27 | 4.55 |
| PFTrDA | 72629-94-8 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.675 | 2.27 | 4.55 |
| PFTeDA | 376-06-7 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.719 | 2.27 | 4.55 |
| NMeFOSAA | 2355-31-9 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.936 | 2.27 | 4.55 |
| NEtFOSAA | 2991-50-6 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.900 | 2.27 | 4.55 |
| PFBS | 375-73-5 | 1.19 J | E0409-FS(0) | 1.000 | 5/14/2022 | 0.787 | 2.27 | 4.55 |
| PFHxS | 355-46-4 | 5.17 | E0409-FS(0) | 1.000 | 5/14/2022 | 0.906 | 2.27 | 4.55 |
| PFOS | 1763-23-1 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.973 | 2.27 | 4.55 |
| HFPO-DA | 13252-13-6 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.786 | 2.27 | 4.55 |
| Adona | 919005-14-4 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.790 | 2.27 | 4.55 |
| 9Cl-PF3ONS | 756426-58-1 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.936 | 2.27 | 4.55 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.27 U | E0409-FS(0) | 1.000 | 5/14/2022 | 0.819 | 2.27 | 4.55 |

10/14/22

Analyzed by: Griffith, Lauren
Printed: 5/16/2022

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5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-PFAS-GW02-0422 |
| Battelle ID | E0410-FS |
| Sample Type | SA |
| Collection Date | 04/07/2022 |
| Extraction Date | 04/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.278 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.821 | 2.25 | 4.50 |
| PFHpA | 375-85-9 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.846 | 2.25 | 4.50 |
| PFOA | 335-67-1 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.908 | 2.25 | 4.50 |
| PFNA | 375-95-1 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.749 | 2.25 | 4.50 |
| PFDA | 335-76-2 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.705 | 2.25 | 4.50 |
| PFUnA | 2058-94-8 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.676 | 2.25 | 4.50 |
| PFDoA | 307-55-1 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.683 | 2.25 | 4.50 |
| PFTrDA | 72629-94-8 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.667 | 2.25 | 4.50 |
| PFTeDA | 376-06-7 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.711 | 2.25 | 4.50 |
| NMeFOSAA | 2355-31-9 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.926 | 2.25 | 4.50 |
| NEtFOSAA | 2991-50-6 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.890 | 2.25 | 4.50 |
| PFBS | 375-73-5 | 13.9 | E0410-FS(0) | 1.000 | 5/14/2022 | 0.779 | 2.25 | 4.50 |
| PFHxS | 355-46-4 | 44.2 | E0410-FS(0) | 1.000 | 5/14/2022 | 0.897 | 2.25 | 4.50 |
| PFOS | 1763-23-1 | 21.2 | E0410-FS(0) | 1.000 | 5/14/2022 | 0.962 | 2.25 | 4.50 |
| HFPO-DA | 13252-13-6 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.778 | 2.25 | 4.50 |
| Adona | 919005-14-4 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.781 | 2.25 | 4.50 |
| 9Cl-PF3ONS | 756426-58-1 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.926 | 2.25 | 4.50 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.25 U | E0410-FS(0) | 1.000 | 5/14/2022 | 0.810 | 2.25 | 4.50 |

MW 10/14/22

Analyzed by: Griffith, Lauren
Printed: 5/16/2022

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6

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP5-FB01-040822 |
| Battelle ID | E0411-FS |
| Sample Type | SA |
| Collection Date | 04/08/2022 |
| Extraction Date | 04/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.261 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.875 | 2.39 | 4.79 |
| PFHpA | 375-85-9 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.901 | 2.39 | 4.79 |
| PFOA | 335-67-1 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.967 | 2.39 | 4.79 |
| PFNA | 375-95-1 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.798 | 2.39 | 4.79 |
| PFDA | 335-76-2 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.751 | 2.39 | 4.79 |
| PFUnA | 2058-94-8 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.720 | 2.39 | 4.79 |
| PFDoA | 307-55-1 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.728 | 2.39 | 4.79 |
| PFTrDA | 72629-94-8 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.711 | 2.39 | 4.79 |
| PFTeDA | 376-06-7 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.758 | 2.39 | 4.79 |
| NMeFOSAA | 2355-31-9 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.987 | 2.39 | 4.79 |
| NEtFOSAA | 2991-50-6 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.948 | 2.39 | 4.79 |
| PFBS | 375-73-5 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.830 | 2.39 | 4.79 |
| PFHxS | 355-46-4 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.955 | 2.39 | 4.79 |
| PFOS | 1763-23-1 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 1.02 | 2.39 | 4.79 |
| HFPO-DA | 13252-13-6 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.829 | 2.39 | 4.79 |
| Adona | 919005-14-4 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.832 | 2.39 | 4.79 |
| 9Cl-PF3ONS | 756426-58-1 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.987 | 2.39 | 4.79 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.39 U | E0411-FS(0) | 1.000 | 5/14/2022 | 0.863 | 2.39 | 4.79 |

MW 10/14/22

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7

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VERW-FB01-040822 |
| Battelle ID | E0412-FS |
| Sample Type | SA |
| Collection Date | 04/08/2022 |
| Extraction Date | 04/19/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.259 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.881 | 2.41 | 4.83 |
| PFHpA | 375-85-9 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.908 | 2.41 | 4.83 |
| PFOA | 335-67-1 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.975 | 2.41 | 4.83 |
| PFNA | 375-95-1 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.804 | 2.41 | 4.83 |
| PFDA | 335-76-2 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.757 | 2.41 | 4.83 |
| PFUnA | 2058-94-8 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.726 | 2.41 | 4.83 |
| PFDoA | 307-55-1 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.734 | 2.41 | 4.83 |
| PFTrDA | 72629-94-8 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.716 | 2.41 | 4.83 |
| PFTeDA | 376-06-7 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.764 | 2.41 | 4.83 |
| NMeFOSAA | 2355-31-9 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.994 | 2.41 | 4.83 |
| NEtFOSAA | 2991-50-6 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.956 | 2.41 | 4.83 |
| PFBS | 375-73-5 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.836 | 2.41 | 4.83 |
| PFHxS | 355-46-4 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.962 | 2.41 | 4.83 |
| PFOS | 1763-23-1 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 1.03 | 2.41 | 4.83 |
| HFPO-DA | 13252-13-6 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.835 | 2.41 | 4.83 |
| Adona | 919005-14-4 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.839 | 2.41 | 4.83 |
| 9Cl-PF3ONS | 756426-58-1 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.994 | 2.41 | 4.83 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.41 U | E0412-FS(0) | 1.000 | 5/14/2022 | 0.870 | 2.41 | 4.83 |

MW 10/14/22

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-1085
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-0003, Puerto Rico
Date: October 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VWFS-PFAS-GW02-0622 | E3586-FS | Water |
| 1MS | VWFS-PFAS-GW02-0622MS | E3587-FSMS | Water |
| 1MSD | VWFS-PFAS-GW02-0622MSD | E3588-FSMSD | Water |
| 2 | VWFS-EB01-062222 | E3589-FS | Water |
| 3 | VWFS-PFAS-GW01-0622 | E3590-FS | Water |
| 4 | VWFS-PFAS-GW01P-0622 | E3591-FS | Water |
| 5 | VWFS-EB01-062322 | E3592-FS | Water |
| 6 | VWFS-FB01-062322 | E3593-FS | Water |
| 7 | VEP4-GW25-0622 | E3594-FS | Water |
| 8 | VEP4-GW25P-0622 | E3595-FS | Water |
| 9 | VEP4-GW25D-0622 | E3596-FS | Water |
| 10 | VEP4-GW29-0622 | E3597-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for seven water samples, two aqueous equipment blank samples, and one aqueous field blank sample collected on June 22-27, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;

- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

- Several compounds in several samples were flagged (T) by the laboratory indicating holding time exceedances since the extracts were analyzed outside of 28 days. However, the extracts were stored per draft EPA Method 1633 which allows for 90 days to analysis. Therefore, no action was taken on this basis.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWFS-EB01-062222 | PFOA | 3.27 | None | All Associated >5X |
| | PFHxS | 10.8 | | |
| VWFS-EB01-062322 | None - ND | - | - | - |
| VWFS-FB01-062322 | None - ND | - | - | - |
| VEW10-EB01-040522-GW | None - ND | - | - | - |
| VEP4-FB01-062722 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values except for the following.

| MS/MSD Sample | Compound | MS %R/MSD %R/RPD | Qualifier | Affected Samples |
|---|---|---|---|---|
| 1 | PFHxA | 0%/0%/0% | None | None for 4X Rule |
| | PFHpA | 46%/144%/103.2% | | |
| | PFOA | 769%/2564%/107.7% | | |
| | PFBS | 441%/282%/44% | | |
| | PFHxS | 2564%/0%/200% | | |
| | PFOS | OK/31%/94.9% | | |

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria except for the following.

| EDS Sample | Internal Standard | Area Count | Qualifier |
|---|---|---|---|
| 1 | 13C2-PFOA | Low | J - Associated Cmpds |
| 7 | 13C2-PFDA | High | None - Sample ND |

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- Several samples were analyzed at various dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VWFS-PFAS-GW01-0622 ng/L | VWFS-PFAS-GW01P-0622 ng/L | RPD | Qualifier |
|---|---|---|---|---|
| PFHxA | 50100 | 48000 | 4% | None |
| PFHpA | 5710 | 6840 | 18% | |
| PFOA | 247 | 246 | 0% | |
| PFBS | 68700 | 63100 | 8% | |
| PFHxS | 159000 | 175000 | 10% | |
| PFOS | 36.9 | 35.8 | 3% | |

| Compound | VEP4-GW25-0622 ng/L | VEP4-GW25P-0622 ng/L | RPD | Qualifier |
|---|---|---|---|---|
| PFHxS | 2.22U | 1.39 | NC | None |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 10/17/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-GW02-0622 |
| Battelle ID | E3586-FS |
| Sample Type | SA |
| Collection Date | 06/22/2022 |
| Extraction Date | 07/05/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.257 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 24800 TD | E3586-FS-D(5) | 62.500 | 8/5/2022 | 55.5 | 152 | 304 |
| PFHpA | 375-85-9 | 9290 TD | E3586-FS-D(5) | 62.500 | 8/5/2022 | 57.2 | 152 | 304 |
| PFOA | 335-67-1 | 29700 TD J | E3586-FS-D(5) | 62.500 | 8/5/2022 | 61.4 | 152 | 304 ISL |
| PFNA | 375-95-1 | 72.8 | E3586-FS(0) | 1.000 | 7/29/2022 | 0.810 | 2.43 | 4.86 |
| PFDA | 335-76-2 | 2.43 U | E3586-FS(0) | 1.000 | 7/29/2022 | 0.763 | 2.43 | 4.86 |
| PFUnA | 2058-94-8 | 2.43 U | E3586-FS(0) | 1.000 | 7/29/2022 | 0.732 | 2.43 | 4.86 |
| PFDoA | 307-55-1 | 2.43 U | E3586-FS(0) | 1.000 | 7/29/2022 | 0.739 | 2.43 | 4.86 |
| PFTrDA | 72629-94-8 | 2.43 U | E3586-FS(0) | 1.000 | 7/29/2022 | 0.722 | 2.43 | 4.86 |
| PFTeDA | 376-06-7 | 2.43 U | E3586-FS(0) | 1.000 | 7/29/2022 | 0.769 | 2.43 | 4.86 |
| NMeFOSAA | 2355-31-9 | 2.43 U | E3586-FS(0) | 1.000 | 7/29/2022 | 1.00 | 2.43 | 4.86 |
| NEtFOSAA | 2991-50-6 | 2.43 U | E3586-FS(0) | 1.000 | 7/29/2022 | 0.963 | 2.43 | 4.86 |
| PFBS | 375-73-5 | 6610 TD | E3586-FS-D(5) | 62.500 | 8/5/2022 | 52.7 | 152 | 304 |
| PFHxS | 355-46-4 | 104000 TD | E3586-FS-D(7) | 312.500 | 8/10/2022 | 303 | 760 | 1520 |
| PFOS | 1763-23-1 | 4530 TD | E3586-FS-D(5) | 62.500 | 8/5/2022 | 65.1 | 152 | 304 |
| HFPO-DA | 13252-13-6 | 2.43 U | E3586-FS(0) | 1.000 | 7/29/2022 | 0.841 | 2.43 | 4.86 |
| Adona | 919005-14-4 | 2.43 U | E3586-FS(0) | 1.000 | 7/29/2022 | 0.845 | 2.43 | 4.86 |
| 9Cl-PF3ONS | 756426-58-1 | 2.43 U | E3586-FS(0) | 1.000 | 7/29/2022 | 1.00 | 2.43 | 4.86 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.43 U | E3586-FS(0) | 1.000 | 7/29/2022 | 0.876 | 2.43 | 4.86 |

MM 10/14/22

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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-EB01-062222 |
| Battelle ID | E3589-FS |
| Sample Type | SA |
| Collection Date | 06/22/2022 |
| Extraction Date | 07/05/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.273 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.836 | 2.29 | 4.58 |
| PFHpA | 375-85-9 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.862 | 2.29 | 4.58 |
| PFOA | 335-67-1 | 3.27 J | E3589-FS(0) | 1.000 | 7/29/2022 | 0.925 | 2.29 | 4.58 |
| PFNA | 375-95-1 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.763 | 2.29 | 4.58 |
| PFDA | 335-76-2 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.718 | 2.29 | 4.58 |
| PFUnA | 2058-94-8 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.689 | 2.29 | 4.58 |
| PFDoA | 307-55-1 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.696 | 2.29 | 4.58 |
| PFTrDA | 72629-94-8 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.679 | 2.29 | 4.58 |
| PFTeDA | 376-06-7 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.724 | 2.29 | 4.58 |
| NMeFOSAA | 2355-31-9 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.943 | 2.29 | 4.58 |
| NEtFOSAA | 2991-50-6 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.907 | 2.29 | 4.58 |
| PFBS | 375-73-5 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.793 | 2.29 | 4.58 |
| PFHxS | 355-46-4 | 10.8 | E3589-FS(0) | 1.000 | 7/29/2022 | 0.913 | 2.29 | 4.58 |
| PFOS | 1763-23-1 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.980 | 2.29 | 4.58 |
| HFPO-DA | 13252-13-6 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.792 | 2.29 | 4.58 |
| Adona | 919005-14-4 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.796 | 2.29 | 4.58 |
| 9Cl-PF3ONS | 756426-58-1 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.943 | 2.29 | 4.58 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.29 U | E3589-FS(0) | 1.000 | 7/29/2022 | 0.825 | 2.29 | 4.58 |

MW 10/14/22

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3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-GW01-0622 |
| Battelle ID | E3590-FS |
| Sample Type | SA |
| Collection Date | 06/23/2022 |
| Extraction Date | 07/05/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.254 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 50100 TD | E3590-FS-D(5) | 625.000 | 8/5/2022 | 562 | 1540 | 3080 |
| PFHpA | 375-85-9 | 5710 TD | E3590-FS-D(3) | 50.000 | 8/5/2022 | 46.3 | 123 | 246 |
| PFOA | 335-67-1 | 247 | E3590-FS(0) | 1.000 | 7/29/2022 | 0.994 | 2.46 | 4.92 |
| PFNA | 375-95-1 | 2.46 U | E3590-FS(0) | 1.000 | 7/29/2022 | 0.820 | 2.46 | 4.92 |
| PFDA | 335-76-2 | 2.46 U | E3590-FS(0) | 1.000 | 7/29/2022 | 0.772 | 2.46 | 4.92 |
| PFUnA | 2058-94-8 | 2.46 U | E3590-FS(0) | 1.000 | 7/29/2022 | 0.740 | 2.46 | 4.92 |
| PFDoA | 307-55-1 | 2.46 U | E3590-FS(0) | 1.000 | 7/29/2022 | 0.748 | 2.46 | 4.92 |
| PFTrDA | 72629-94-8 | 2.46 U | E3590-FS(0) | 1.000 | 7/29/2022 | 0.730 | 2.46 | 4.92 |
| PFTeDA | 376-06-7 | 2.46 U | E3590-FS(0) | 1.000 | 7/29/2022 | 0.779 | 2.46 | 4.92 |
| NMeFOSAA | 2355-31-9 | 2.46 U | E3590-FS(0) | 1.000 | 7/29/2022 | 1.01 | 2.46 | 4.92 |
| NEtFOSAA | 2991-50-6 | 2.46 U | E3590-FS(0) | 1.000 | 7/29/2022 | 0.974 | 2.46 | 4.92 |
| PFBS | 375-73-5 | 68700 TD | E3590-FS-D(5) | 625.000 | 8/5/2022 | 533 | 1540 | 3080 |
| PFHxS | 355-46-4 | 159000 TD | E3590-FS-D(5) | 625.000 | 8/5/2022 | 613 | 1540 | 3080 |
| PFOS | 1763-23-1 | 36.9 | E3590-FS(0) | 1.000 | 7/29/2022 | 1.05 | 2.46 | 4.92 |
| HFPO-DA | 13252-13-6 | 2.46 U | E3590-FS(0) | 1.000 | 7/29/2022 | 0.851 | 2.46 | 4.92 |
| Adona | 919005-14-4 | 2.46 U | E3590-FS(0) | 1.000 | 7/29/2022 | 0.855 | 2.46 | 4.92 |
| 9Cl-PF3ONS | 756426-58-1 | 2.46 U | E3590-FS(0) | 1.000 | 7/29/2022 | 1.01 | 2.46 | 4.92 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.46 U | E3590-FS(0) | 1.000 | 7/29/2022 | 0.887 | 2.46 | 4.92 |

10/14/22

Analyzed by: Harnden, Kelsey
Printed: 8/29/2022

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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-PFAS-GW01P-0622 |
| Battelle ID | E3591-FS |
| Sample Type | SA |
| Collection Date | 06/23/2022 |
| Extraction Date | 07/05/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.260 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 48000 TD | E3591-FS-D(5) | 625.000 | 8/5/2022 | 549 | 1500 | 3000 |
| PFHpA | 375-85-9 | 6840 TD | E3591-FS-D(3) | 50.000 | 8/5/2022 | 45.2 | 120 | 240 |
| PFOA | 335-67-1 | 246 | E3591-FS(0) | 1.000 | 7/29/2022 | 0.971 | 2.40 | 4.81 |
| PFNA | 375-95-1 | 2.40 U | E3591-FS(0) | 1.000 | 7/29/2022 | 0.801 | 2.40 | 4.81 |
| PFDA | 335-76-2 | 2.40 U | E3591-FS(0) | 1.000 | 7/29/2022 | 0.754 | 2.40 | 4.81 |
| PFUnA | 2058-94-8 | 2.40 U | E3591-FS(0) | 1.000 | 7/29/2022 | 0.723 | 2.40 | 4.81 |
| PFDoA | 307-55-1 | 2.40 U | E3591-FS(0) | 1.000 | 7/29/2022 | 0.731 | 2.40 | 4.81 |
| PFTrDA | 72629-94-8 | 2.40 U | E3591-FS(0) | 1.000 | 7/29/2022 | 0.713 | 2.40 | 4.81 |
| PFTeDA | 376-06-7 | 2.40 U | E3591-FS(0) | 1.000 | 7/29/2022 | 0.761 | 2.40 | 4.81 |
| NMeFOSAA | 2355-31-9 | 2.40 U | E3591-FS(0) | 1.000 | 7/29/2022 | 0.990 | 2.40 | 4.81 |
| NEtFOSAA | 2991-50-6 | 2.40 U | E3591-FS(0) | 1.000 | 7/29/2022 | 0.952 | 2.40 | 4.81 |
| PFBS | 375-73-5 | 63100 TD | E3591-FS-D(5) | 625.000 | 8/5/2022 | 520 | 1500 | 3000 |
| PFHxS | 355-46-4 | 175000 TD | E3591-FS-D(5) | 625.000 | 8/5/2022 | 599 | 1500 | 3000 |
| PFOS | 1763-23-1 | 35.8 | E3591-FS(0) | 1.000 | 7/29/2022 | 1.03 | 2.40 | 4.81 |
| HFPO-DA | 13252-13-6 | 2.40 U | E3591-FS(0) | 1.000 | 7/29/2022 | 0.832 | 2.40 | 4.81 |
| Adona | 919005-14-4 | 2.40 U | E3591-FS(0) | 1.000 | 7/29/2022 | 0.836 | 2.40 | 4.81 |
| 9Cl-PF3ONS | 756426-58-1 | 2.40 U | E3591-FS(0) | 1.000 | 7/29/2022 | 0.990 | 2.40 | 4.81 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.40 U | E3591-FS(0) | 1.000 | 7/29/2022 | 0.866 | 2.40 | 4.81 |

MW 10/14/22

Analyzed by: Harnden, Kelsey
Printed: 8/29/2022

BATTELLE
It can be done

5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-EB01-062322 |
| Battelle ID | E3592-FS |
| Sample Type | SA |
| Collection Date | 06/23/2022 |
| Extraction Date | 07/05/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.281 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.812 | 2.22 | 4.45 |
| PFHpA | 375-85-9 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.837 | 2.22 | 4.45 |
| PFOA | 335-67-1 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.899 | 2.22 | 4.45 |
| PFNA | 375-95-1 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.741 | 2.22 | 4.45 |
| PFDA | 335-76-2 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.698 | 2.22 | 4.45 |
| PFUnA | 2058-94-8 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.669 | 2.22 | 4.45 |
| PFDoA | 307-55-1 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.676 | 2.22 | 4.45 |
| PFTrDA | 72629-94-8 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.660 | 2.22 | 4.45 |
| PFTeDA | 376-06-7 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.704 | 2.22 | 4.45 |
| NMeFOSAA | 2355-31-9 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.916 | 2.22 | 4.45 |
| NEtFOSAA | 2991-50-6 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.881 | 2.22 | 4.45 |
| PFBS | 375-73-5 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.770 | 2.22 | 4.45 |
| PFHxS | 355-46-4 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.887 | 2.22 | 4.45 |
| PFOS | 1763-23-1 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.952 | 2.22 | 4.45 |
| HFPO-DA | 13252-13-6 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.770 | 2.22 | 4.45 |
| Adona | 919005-14-4 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.773 | 2.22 | 4.45 |
| 9Cl-PF3ONS | 756426-58-1 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.916 | 2.22 | 4.45 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.22 U | E3592-FS(0) | 1.000 | 7/29/2022 | 0.802 | 2.22 | 4.45 |

MW 10/14/22

BATTELLE
It can be done

6

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWFS-FB01-062322 |
| Battelle ID | E3593-FS |
| Sample Type | SA |
| Collection Date | 06/23/2022 |
| Extraction Date | 07/05/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.265 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.861 | 2.36 | 4.72 |
| PFHpA | 375-85-9 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.888 | 2.36 | 4.72 |
| PFOA | 335-67-1 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.953 | 2.36 | 4.72 |
| PFNA | 375-95-1 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.786 | 2.36 | 4.72 |
| PFDA | 335-76-2 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.740 | 2.36 | 4.72 |
| PFUnA | 2058-94-8 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.709 | 2.36 | 4.72 |
| PFDoA | 307-55-1 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.717 | 2.36 | 4.72 |
| PFTrDA | 72629-94-8 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.700 | 2.36 | 4.72 |
| PFTeDA | 376-06-7 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.746 | 2.36 | 4.72 |
| NMeFOSAA | 2355-31-9 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.972 | 2.36 | 4.72 |
| NEtFOSAA | 2991-50-6 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.934 | 2.36 | 4.72 |
| PFBS | 375-73-5 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.817 | 2.36 | 4.72 |
| PFHxS | 355-46-4 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.941 | 2.36 | 4.72 |
| PFOS | 1763-23-1 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 1.01 | 2.36 | 4.72 |
| HFPO-DA | 13252-13-6 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.816 | 2.36 | 4.72 |
| Adona | 919005-14-4 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.820 | 2.36 | 4.72 |
| 9Cl-PF3ONS | 756426-58-1 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.972 | 2.36 | 4.72 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.36 U | E3593-FS(0) | 1.000 | 7/29/2022 | 0.850 | 2.36 | 4.72 |

MW 10/14/22
Analyzed by: Harnden, Kelsey
Printed: 8/29/2022

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BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW25-0622 |
| Battelle ID | E3594-FS |
| Sample Type | SA |
| Collection Date | 06/27/2022 |
| Extraction Date | 07/05/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.281 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.812 | 2.22 | 4.45 |
| PFHpA | 375-85-9 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.837 | 2.22 | 4.45 |
| PFOA | 335-67-1 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.899 | 2.22 | 4.45 |
| PFNA | 375-95-1 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.741 | 2.22 | 4.45 |
| PFDA | 335-76-2 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.698 | 2.22 | 4.45 |
| PFUnA | 2058-94-8 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.669 | 2.22 | 4.45 |
| PFDoA | 307-55-1 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.676 | 2.22 | 4.45 |
| PFTrDA | 72629-94-8 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.660 | 2.22 | 4.45 |
| PFTeDA | 376-06-7 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.704 | 2.22 | 4.45 |
| NMeFOSAA | 2355-31-9 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.916 | 2.22 | 4.45 |
| NEtFOSAA | 2991-50-6 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.881 | 2.22 | 4.45 |
| PFBS | 375-73-5 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.770 | 2.22 | 4.45 |
| PFHxS | 355-46-4 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.887 | 2.22 | 4.45 |
| PFOS | 1763-23-1 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.952 | 2.22 | 4.45 |
| HFPO-DA | 13252-13-6 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.770 | 2.22 | 4.45 |
| Adona | 919005-14-4 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.773 | 2.22 | 4.45 |
| 9Cl-PF3ONS | 756426-58-1 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.916 | 2.22 | 4.45 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.22 U | E3594-FS(0) | 1.000 | 7/29/2022 | 0.802 | 2.22 | 4.45 |

MW 10/14/22

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW25P-0622 |
| Battelle ID | E3595-FS |
| Sample Type | SA |
| Collection Date | 06/27/2022 |
| Extraction Date | 07/05/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.282 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.809 | 2.22 | 4.43 |
| PFHpA | 375-85-9 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.834 | 2.22 | 4.43 |
| PFOA | 335-67-1 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.895 | 2.22 | 4.43 |
| PFNA | 375-95-1 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.738 | 2.22 | 4.43 |
| PFDA | 335-76-2 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.695 | 2.22 | 4.43 |
| PFUnA | 2058-94-8 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.667 | 2.22 | 4.43 |
| PFDoA | 307-55-1 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.674 | 2.22 | 4.43 |
| PFTrDA | 72629-94-8 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.658 | 2.22 | 4.43 |
| PFTeDA | 376-06-7 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.701 | 2.22 | 4.43 |
| NMeFOSAA | 2355-31-9 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.913 | 2.22 | 4.43 |
| NEtFOSAA | 2991-50-6 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.878 | 2.22 | 4.43 |
| PFBS | 375-73-5 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.768 | 2.22 | 4.43 |
| PFHxS | 355-46-4 | 1.39 J | E3595-FS(0) | 1.000 | 7/30/2022 | 0.884 | 2.22 | 4.43 |
| PFOS | 1763-23-1 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.949 | 2.22 | 4.43 |
| HFPO-DA | 13252-13-6 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.767 | 2.22 | 4.43 |
| Adona | 919005-14-4 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.770 | 2.22 | 4.43 |
| 9Cl-PF3ONS | 756426-58-1 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.913 | 2.22 | 4.43 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.22 U | E3595-FS(0) | 1.000 | 7/30/2022 | 0.799 | 2.22 | 4.43 |

MW 10/14/22

BATTELLE
It can be done

9

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW25D-0622 |
| Battelle ID | E3596-FS |
| Sample Type | SA |
| Collection Date | 06/27/2022 |
| Extraction Date | 07/05/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.290 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.787 | 2.16 | 4.31 |
| PFHpA | 375-85-9 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.811 | 2.16 | 4.31 |
| PFOA | 335-67-1 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.871 | 2.16 | 4.31 |
| PFNA | 375-95-1 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.718 | 2.16 | 4.31 |
| PFDA | 335-76-2 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.676 | 2.16 | 4.31 |
| PFUnA | 2058-94-8 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.648 | 2.16 | 4.31 |
| PFDoA | 307-55-1 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.655 | 2.16 | 4.31 |
| PFTrDA | 72629-94-8 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.640 | 2.16 | 4.31 |
| PFTeDA | 376-06-7 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.682 | 2.16 | 4.31 |
| NMeFOSAA | 2355-31-9 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.888 | 2.16 | 4.31 |
| NEtFOSAA | 2991-50-6 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.853 | 2.16 | 4.31 |
| PFBS | 375-73-5 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.747 | 2.16 | 4.31 |
| PFHxS | 355-46-4 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.859 | 2.16 | 4.31 |
| PFOS | 1763-23-1 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.922 | 2.16 | 4.31 |
| HFPO-DA | 13252-13-6 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.746 | 2.16 | 4.31 |
| Adona | 919005-14-4 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.749 | 2.16 | 4.31 |
| 9Cl-PF3ONS | 756426-58-1 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.888 | 2.16 | 4.31 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.16 U | E3596-FS(0) | 1.000 | 7/30/2022 | 0.777 | 2.16 | 4.31 |

MW 10/14/22

BATTELLE
It can be done

10

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW29-0622 |
| Battelle ID | E3597-FS |
| Sample Type | SA |
| Collection Date | 06/27/2022 |
| Extraction Date | 07/05/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.291 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.784 | 2.15 | 4.30 |
| PFHpA | 375-85-9 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.808 | 2.15 | 4.30 |
| PFOA | 335-67-1 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.868 | 2.15 | 4.30 |
| PFNA | 375-95-1 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.716 | 2.15 | 4.30 |
| PFDA | 335-76-2 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.674 | 2.15 | 4.30 |
| PFUnA | 2058-94-8 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.646 | 2.15 | 4.30 |
| PFDoA | 307-55-1 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.653 | 2.15 | 4.30 |
| PFTrDA | 72629-94-8 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.637 | 2.15 | 4.30 |
| PFTeDA | 376-06-7 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.680 | 2.15 | 4.30 |
| NMeFOSAA | 2355-31-9 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.885 | 2.15 | 4.30 |
| NEtFOSAA | 2991-50-6 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.851 | 2.15 | 4.30 |
| PFBS | 375-73-5 | 3.30 J | E3597-FS(0) | 1.000 | 7/30/2022 | 0.744 | 2.15 | 4.30 |
| PFHxS | 355-46-4 | 14.3 | E3597-FS(0) | 1.000 | 7/30/2022 | 0.857 | 2.15 | 4.30 |
| PFOS | 1763-23-1 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.919 | 2.15 | 4.30 |
| HFPO-DA | 13252-13-6 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.743 | 2.15 | 4.30 |
| Adona | 919005-14-4 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.747 | 2.15 | 4.30 |
| 9Cl-PF3ONS | 756426-58-1 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.885 | 2.15 | 4.30 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.15 U | E3597-FS(0) | 1.000 | 7/30/2022 | 0.774 | 2.15 | 4.30 |

NW 10/14/22
Analyzed by: Harnden, Kelsey
Printed: 8/29/2022

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-1086
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-0003, Puerto Rico
Date: October 15, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEP4-FB01-062722 | E3598-FS | Water |
| 2 | VWAH-PFAS-GW01-0622 | E3599-FS | Water |
| 3 | VWAH-PFAS-GW01P-0622 | E3600-FS | Water |
| 4 | VWAH-FB01-062822 | E3601-FS | Water |
| 5 | VWAH-PFAS-GW02-0622 | E3602-FS | Water |
| 5MS | VWAH-PFAS-GW02-0622MS | E3603-FSMS | Water |
| 5MSD | VWAH-PFAS-GW02-0622MSD | E3604-FSMSD | Water |
| 6 | VEP4-GW31-0622 | E3605-FS | Water |
| 7 | VEP4-GW28D-0622 | E3606-FS | Water |
| 8 | VEP4-GW28-0622 | E3607-FS | Water |
| 9 | VEP4-GW24D-0622 | E3608-FS | Water |
| 10 | VEP4-GW24-0622 | E3609-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for eight water samples and two aqueous field blank samples collected on June 27-29, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;

- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days

- PFTeDA in two samples was flagged (T) by the laboratory indicating holding time exceedances since the extracts were analyzed outside of 28 days. However, the extracts were stored per draft EPA Method 1633 which allows for 90 days to analysis. Therefore, no action was taken on this basis.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks exhibited the following contamination.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| PI987PB-FS | PFOS | 1.76 | U | 9, 10 |

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VEP4-FB01-062722 | None - ND | - | - | - |
| VWAH-FB01-062822 | None - ND | - | - | - |
| VEW10-EB01-040522-GW | None - ND | - | - | - |
| VEP4-EB01-063022 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VWAH-PFAS-GW01-0622 ng/L | VWAH-PFAS-GW01P-0622 ng/L | RPD | Qualifier |
|---|---|---|---|---|
| None | ND | ND | - | - |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: _____ Dated: 10/19/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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1

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-FB01-062722 |
| Battelle ID | E3598-FS |
| Sample Type | SA |
| Collection Date | 06/27/2022 |
| Extraction Date | 07/08/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.261 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.875 | 2.39 | 4.79 |
| PFHpA | 375-85-9 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.901 | 2.39 | 4.79 |
| PFOA | 335-67-1 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.967 | 2.39 | 4.79 |
| PFNA | 375-95-1 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.798 | 2.39 | 4.79 |
| PFDA | 335-76-2 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.751 | 2.39 | 4.79 |
| PFUnA | 2058-94-8 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.720 | 2.39 | 4.79 |
| PFDoA | 307-55-1 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.728 | 2.39 | 4.79 |
| PFTrDA | 72629-94-8 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.711 | 2.39 | 4.79 |
| PFTeDA | 376-06-7 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.758 | 2.39 | 4.79 |
| NMeFOSAA | 2355-31-9 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.987 | 2.39 | 4.79 |
| NEtFOSAA | 2991-50-6 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.948 | 2.39 | 4.79 |
| PFBS | 375-73-5 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.830 | 2.39 | 4.79 |
| PFHxS | 355-46-4 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.955 | 2.39 | 4.79 |
| PFOS | 1763-23-1 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 1.02 | 2.39 | 4.79 |
| HFPO-DA | 13252-13-6 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.829 | 2.39 | 4.79 |
| Adona | 919005-14-4 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.832 | 2.39 | 4.79 |
| 9Cl-PF3ONS | 756426-58-1 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.987 | 2.39 | 4.79 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.39 U | E3598-FS(0) | 1.000 | 7/30/2022 | 0.863 | 2.39 | 4.79 |

MH 10/15/22

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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-GW01-0622 |
| Battelle ID | E3599-FS |
| Sample Type | SA |
| Collection Date | 06/28/2022 |
| Extraction Date | 07/08/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.282 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.809 | 2.22 | 4.43 |
| PFHpA | 375-85-9 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.834 | 2.22 | 4.43 |
| PFOA | 335-67-1 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.895 | 2.22 | 4.43 |
| PFNA | 375-95-1 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.738 | 2.22 | 4.43 |
| PFDA | 335-76-2 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.695 | 2.22 | 4.43 |
| PFUnA | 2058-94-8 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.667 | 2.22 | 4.43 |
| PFDoA | 307-55-1 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.674 | 2.22 | 4.43 |
| PFTrDA | 72629-94-8 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.658 | 2.22 | 4.43 |
| PFTeDA | 376-06-7 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.701 | 2.22 | 4.43 |
| NMeFOSAA | 2355-31-9 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.913 | 2.22 | 4.43 |
| NEtFOSAA | 2991-50-6 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.878 | 2.22 | 4.43 |
| PFBS | 375-73-5 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.768 | 2.22 | 4.43 |
| PFHxS | 355-46-4 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.884 | 2.22 | 4.43 |
| PFOS | 1763-23-1 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.949 | 2.22 | 4.43 |
| HFPO-DA | 13252-13-6 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.767 | 2.22 | 4.43 |
| Adona | 919005-14-4 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.770 | 2.22 | 4.43 |
| 9Cl-PF3ONS | 756426-58-1 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.913 | 2.22 | 4.43 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.22 U | E3599-FS(0) | 1.000 | 7/30/2022 | 0.799 | 2.22 | 4.43 |

NW 10/15/22

Analyzed by: Harnden, Kelsey
Printed: 9/28/2022

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3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-GW01P-0622 |
| Battelle ID | E3600-FS |
| Sample Type | SA |
| Collection Date | 06/28/2022 |
| Extraction Date | 07/08/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.272 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.839 | 2.30 | 4.60 |
| PFHpA | 375-85-9 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.865 | 2.30 | 4.60 |
| PFOA | 335-67-1 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.928 | 2.30 | 4.60 |
| PFNA | 375-95-1 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.766 | 2.30 | 4.60 |
| PFDA | 335-76-2 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.721 | 2.30 | 4.60 |
| PFUnA | 2058-94-8 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.691 | 2.30 | 4.60 |
| PFDoA | 307-55-1 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.699 | 2.30 | 4.60 |
| PFTrDA | 72629-94-8 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.682 | 2.30 | 4.60 |
| PFTeDA | 376-06-7 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.727 | 2.30 | 4.60 |
| NMeFOSAA | 2355-31-9 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.947 | 2.30 | 4.60 |
| NEtFOSAA | 2991-50-6 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.910 | 2.30 | 4.60 |
| PFBS | 375-73-5 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.796 | 2.30 | 4.60 |
| PFHxS | 355-46-4 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.916 | 2.30 | 4.60 |
| PFOS | 1763-23-1 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.983 | 2.30 | 4.60 |
| HFPO-DA | 13252-13-6 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.795 | 2.30 | 4.60 |
| Adona | 919005-14-4 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.799 | 2.30 | 4.60 |
| 9Cl-PF3ONS | 756426-58-1 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.947 | 2.30 | 4.60 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.30 U | E3600-FS(0) | 1.000 | 7/30/2022 | 0.828 | 2.30 | 4.60 |

NW 10/15/22

Analyzed by: Harnden, Kelsey
Printed: 9/28/2022

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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-FB01-062822 |
| Battelle ID | E3601-FS |
| Sample Type | SA |
| Collection Date | 06/28/2022 |
| Extraction Date | 07/08/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.258 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.885 | 2.42 | 4.84 |
| PFHpA | 375-85-9 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.912 | 2.42 | 4.84 |
| PFOA | 335-67-1 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.979 | 2.42 | 4.84 |
| PFNA | 375-95-1 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.807 | 2.42 | 4.84 |
| PFDA | 335-76-2 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.760 | 2.42 | 4.84 |
| PFUnA | 2058-94-8 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.729 | 2.42 | 4.84 |
| PFDoA | 307-55-1 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.736 | 2.42 | 4.84 |
| PFTrDA | 72629-94-8 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.719 | 2.42 | 4.84 |
| PFTeDA | 376-06-7 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.766 | 2.42 | 4.84 |
| NMeFOSAA | 2355-31-9 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.998 | 2.42 | 4.84 |
| NEtFOSAA | 2991-50-6 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.959 | 2.42 | 4.84 |
| PFBS | 375-73-5 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.839 | 2.42 | 4.84 |
| PFHxS | 355-46-4 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.966 | 2.42 | 4.84 |
| PFOS | 1763-23-1 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 1.04 | 2.42 | 4.84 |
| HFPO-DA | 13252-13-6 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.838 | 2.42 | 4.84 |
| Adona | 919005-14-4 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.842 | 2.42 | 4.84 |
| 9Cl-PF3ONS | 756426-58-1 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.998 | 2.42 | 4.84 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.42 U | E3601-FS(0) | 1.000 | 7/30/2022 | 0.873 | 2.42 | 4.84 |

NJ 10/15/22

Analyzed by: Harnden, Kelsey
Printed: 9/28/2022

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5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-GW02-0622 |
| Battelle ID | E3602-FS |
| Sample Type | SA |
| Collection Date | 06/28/2022 |
| Extraction Date | 07/08/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.266 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.858 | 2.35 | 4.70 |
| PFHpA | 375-85-9 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.884 | 2.35 | 4.70 |
| PFOA | 335-67-1 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.949 | 2.35 | 4.70 |
| PFNA | 375-95-1 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.783 | 2.35 | 4.70 |
| PFDA | 335-76-2 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.737 | 2.35 | 4.70 |
| PFUnA | 2058-94-8 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.707 | 2.35 | 4.70 |
| PFDoA | 307-55-1 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.714 | 2.35 | 4.70 |
| PFTrDA | 72629-94-8 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.697 | 2.35 | 4.70 |
| PFTeDA | 376-06-7 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.743 | 2.35 | 4.70 |
| NMeFOSAA | 2355-31-9 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.968 | 2.35 | 4.70 |
| NEtFOSAA | 2991-50-6 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.930 | 2.35 | 4.70 |
| PFBS | 375-73-5 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.814 | 2.35 | 4.70 |
| PFHxS | 355-46-4 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.937 | 2.35 | 4.70 |
| PFOS | 1763-23-1 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 1.01 | 2.35 | 4.70 |
| HFPO-DA | 13252-13-6 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.813 | 2.35 | 4.70 |
| Adona | 919005-14-4 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.817 | 2.35 | 4.70 |
| 9Cl-PF3ONS | 756426-58-1 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.968 | 2.35 | 4.70 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.35 U | E3602-FS(0) | 1.000 | 7/30/2022 | 0.847 | 2.35 | 4.70 |

NW 10/15/22

Analyzed by: Harnden, Kelsey
Printed: 9/28/2022

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW31-0622 |
| Battelle ID | E3605-FS |
| Sample Type | SA |
| Collection Date | 06/28/2022 |
| Extraction Date | 07/08/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.281 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.812 | 2.22 | 4.45 |
| PFHpA | 375-85-9 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.837 | 2.22 | 4.45 |
| PFOA | 335-67-1 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.899 | 2.22 | 4.45 |
| PFNA | 375-95-1 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.741 | 2.22 | 4.45 |
| PFDA | 335-76-2 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.698 | 2.22 | 4.45 |
| PFUnA | 2058-94-8 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.669 | 2.22 | 4.45 |
| PFDoA | 307-55-1 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.676 | 2.22 | 4.45 |
| PFTrDA | 72629-94-8 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.660 | 2.22 | 4.45 |
| PFTeDA | 376-06-7 | 2.22 U | E3605-FS(0) | 1.000 | 9/28/2022 | 0.704 | 2.22 | 4.45 |
| NMeFOSAA | 2355-31-9 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.916 | 2.22 | 4.45 |
| NEtFOSAA | 2991-50-6 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.881 | 2.22 | 4.45 |
| PFBS | 375-73-5 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.770 | 2.22 | 4.45 |
| PFHxS | 355-46-4 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.887 | 2.22 | 4.45 |
| PFOS | 1763-23-1 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.952 | 2.22 | 4.45 |
| HFPO-DA | 13252-13-6 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.770 | 2.22 | 4.45 |
| Adona | 919005-14-4 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.773 | 2.22 | 4.45 |
| 9Cl-PF3ONS | 756426-58-1 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.916 | 2.22 | 4.45 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.22 U | E3605-FS(0) | 1.000 | 7/30/2022 | 0.802 | 2.22 | 4.45 |

NW 10/15/22

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7

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW28D-0622 |
| Battelle ID | E3606-FS |
| Sample Type | SA |
| Collection Date | 06/29/2022 |
| Extraction Date | 07/08/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.274 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.833 | 2.28 | 4.56 |
| PFHpA | 375-85-9 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.859 | 2.28 | 4.56 |
| PFOA | 335-67-1 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.922 | 2.28 | 4.56 |
| PFNA | 375-95-1 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.760 | 2.28 | 4.56 |
| PFDA | 335-76-2 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.715 | 2.28 | 4.56 |
| PFUnA | 2058-94-8 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.686 | 2.28 | 4.56 |
| PFDoA | 307-55-1 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.693 | 2.28 | 4.56 |
| PFTrDA | 72629-94-8 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.677 | 2.28 | 4.56 |
| PFTeDA | 376-06-7 | 2.28 U | E3606-FS(0) | 1.000 | 9/28/2022 | 0.722 | 2.28 | 4.56 |
| NMeFOSAA | 2355-31-9 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.940 | 2.28 | 4.56 |
| NEtFOSAA | 2991-50-6 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.903 | 2.28 | 4.56 |
| PFBS | 375-73-5 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.790 | 2.28 | 4.56 |
| PFHxS | 355-46-4 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.910 | 2.28 | 4.56 |
| PFOS | 1763-23-1 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.976 | 2.28 | 4.56 |
| HFPO-DA | 13252-13-6 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.789 | 2.28 | 4.56 |
| Adona | 919005-14-4 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.793 | 2.28 | 4.56 |
| 9Cl-PF3ONS | 756426-58-1 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.940 | 2.28 | 4.56 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.28 U | E3606-FS(0) | 1.000 | 7/30/2022 | 0.822 | 2.28 | 4.56 |

MW 10/5/22

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8

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW28-0622 |
| Battelle ID | E3607-FS |
| Sample Type | SA |
| Collection Date | 06/29/2022 |
| Extraction Date | 07/08/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.288 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.793 | 2.17 | 4.34 |
| PFHpA | 375-85-9 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.817 | 2.17 | 4.34 |
| PFOA | 335-67-1 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.877 | 2.17 | 4.34 |
| PFNA | 375-95-1 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.723 | 2.17 | 4.34 |
| PFDA | 335-76-2 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.681 | 2.17 | 4.34 |
| PFUnA | 2058-94-8 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.653 | 2.17 | 4.34 |
| PFDoA | 307-55-1 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.660 | 2.17 | 4.34 |
| PFTrDA | 72629-94-8 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.644 | 2.17 | 4.34 |
| PFTeDA | 376-06-7 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.687 | 2.17 | 4.34 |
| NMeFOSAA | 2355-31-9 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.894 | 2.17 | 4.34 |
| NEtFOSAA | 2991-50-6 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.859 | 2.17 | 4.34 |
| PFBS | 375-73-5 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.752 | 2.17 | 4.34 |
| PFHxS | 355-46-4 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.865 | 2.17 | 4.34 |
| PFOS | 1763-23-1 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.929 | 2.17 | 4.34 |
| HFPO-DA | 13252-13-6 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.751 | 2.17 | 4.34 |
| Adona | 919005-14-4 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.754 | 2.17 | 4.34 |
| 9Cl-PF3ONS | 756426-58-1 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.894 | 2.17 | 4.34 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.17 U | E3607-FS(0) | 1.000 | 7/30/2022 | 0.782 | 2.17 | 4.34 |

MW 10/15/22

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9

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW24D-0622 |
| Battelle ID | E3608-FS |
| Sample Type | SA |
| Collection Date | 06/29/2022 |
| Extraction Date | 07/08/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.294 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.776 | 2.13 | 4.25 |
| PFHpA | 375-85-9 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.800 | 2.13 | 4.25 |
| PFOA | 335-67-1 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.859 | 2.13 | 4.25 |
| PFNA | 375-95-1 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.708 | 2.13 | 4.25 |
| PFDA | 335-76-2 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.667 | 2.13 | 4.25 |
| PFUnA | 2058-94-8 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.639 | 2.13 | 4.25 |
| PFDoA | 307-55-1 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.646 | 2.13 | 4.25 |
| PFTrDA | 72629-94-8 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.631 | 2.13 | 4.25 |
| PFTeDA | 376-06-7 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.673 | 2.13 | 4.25 |
| NMeFOSAA | 2355-31-9 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.876 | 2.13 | 4.25 |
| NEtFOSAA | 2991-50-6 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.842 | 2.13 | 4.25 |
| PFBS | 375-73-5 | 13.9 | E3608-FS(0) | 1.000 | 7/30/2022 | 0.736 | 2.13 | 4.25 |
| PFHxS | 355-46-4 | 73.2 | E3608-FS(0) | 1.000 | 7/30/2022 | 0.848 | 2.13 | 4.25 |
| PFOS | 1763-23-1 | 2.13 ~~2.07~~ U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.910 | 2.13 | 4.25 |
| HFPO-DA | 13252-13-6 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.736 | 2.13 | 4.25 |
| Adona | 919005-14-4 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.739 | 2.13 | 4.25 |
| 9Cl-PF3ONS | 756426-58-1 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.876 | 2.13 | 4.25 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.13 U | E3608-FS(0) | 1.000 | 7/30/2022 | 0.766 | 2.13 | 4.25 |

MBL

NW 10/15/22

Analyzed by: Harnden, Kelsey
Printed: 9/28/2022

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10

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW24-0622 |
| Battelle ID | E3609-FS |
| Sample Type | SA |
| Collection Date | 06/29/2022 |
| Extraction Date | 07/08/2022 |
| Analytical Instrument | Sciex 6500+ (AF) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.303 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 1.89 J | E3609-FS(0) | 1.000 | 7/30/2022 | 0.753 | 2.06 | 4.13 | |
| PFHpA | 375-85-9 | 2.06 U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.776 | 2.06 | 4.13 | |
| PFOA | 335-67-1 | 2.06 U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.833 | 2.06 | 4.13 | |
| PFNA | 375-95-1 | 2.06 U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.687 | 2.06 | 4.13 | |
| PFDA | 335-76-2 | 2.06 U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.647 | 2.06 | 4.13 | |
| PFUnA | 2058-94-8 | 2.06 U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.620 | 2.06 | 4.13 | |
| PFDoA | 307-55-1 | 2.06 U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.627 | 2.06 | 4.13 | |
| PFTrDA | 72629-94-8 | 2.06 U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.612 | 2.06 | 4.13 | |
| PFTeDA | 376-06-7 | 2.06 U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.653 | 2.06 | 4.13 | |
| NMeFOSAA | 2355-31-9 | 2.06 U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.850 | 2.06 | 4.13 | |
| NEtFOSAA | 2991-50-6 | 2.06 U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.817 | 2.06 | 4.13 | |
| PFBS | 375-73-5 | 20.5 | E3609-FS(0) | 1.000 | 7/30/2022 | 0.715 | 2.06 | 4.13 | |
| PFHxS | 355-46-4 | 69.9 | E3609-FS(0) | 1.000 | 7/30/2022 | 0.823 | 2.06 | 4.13 | |
| PFOS | 1763-23-1 | 2.22 J U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.883 | 2.06 | 4.13 | MBL |
| HFPO-DA | 13252-13-6 | 2.06 U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.714 | 2.06 | 4.13 | |
| Adona | 919005-14-4 | 2.06 U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.717 | 2.06 | 4.13 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.06 U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.850 | 2.06 | 4.13 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.06 U | E3609-FS(0) | 1.000 | 7/30/2022 | 0.743 | 2.06 | 4.13 | |

NW 10/15/22

Analyzed by: Harnden, Kelsey
Printed: 9/28/2022

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-1132
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-0003, Puerto Rico
Date: October 15, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEP4-GW15-0622 | E3794-FS | Water |
| 2 | VEP4-GW16-0622 | E3795-FS | Water |
| 3 | VEP4-GW17-0622 | E3796-FS | Water |
| 4 | VEP4-GW17D-0622 | E3797-FS | Water |
| 5 | VEP4-GW18-0622 | E3798-FS | Water |
| 6 | VEP4-EB01-063022 | E3799-FS | Water |
| 7 | VEP4-EB02-063022 | E3800-FS | Water |
| 8 | VEP4-GW30P-0722 | E3801-FS | Water |
| 9 | VEP4-GW27-0722 | E3802-FS | Water |
| 10 | VEP4-GW30-0722 | E3803-FS | Water |
| 11 | VEP4-GW26-0722 | E3804-FS | Water |
| 12 | VEP4-GW23-0722 | E3805-FS | Water |
| 13 | VEP4-GW07-0722 | E3806-FS | Water |
| 14 | VEP4-GW07P-0722 | E3807-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for twelve water samples and two aqueous equipment blank samples collected on June 30-July 4, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

## Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VEP4-EB01-063022 | None - ND | - | - | - |
| VEP4-EB02-063022 | None - ND | - | - | - |
| VEP4-EB01-070122 | None - ND | - | - | - |
| VEP4-FB01-062722 | None - ND | - | - | - |
| VEP4-FB01-071222 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable low surrogate percent recoveries (%R) for one or two surrogates. The associated compounds were qualified as estimated (UJ). Please refer to the summary forms behind the Form Is for specific recoveries.

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VEP4-GW30P-0722 ng/L | VEP4-GW30-0722 ng/L | RPD | Qualifier |
|---|---|---|---|---|
| PFBS | 41.2 | 40.3 | 2% | None |
| PFHxS | 119 | 120 | 1% | |

| Compound | VEP4-GW07-0722 ng/L | VEP4-GW07P-0722 ng/L | RPD | Qualifier |
|---|---|---|---|---|
| PFHxA | 2.45 | 2.63 | 7% | None |
| PFOA | 2.88 | 2.55 | 12% | |
| PFBS | 14.6 | 12.5 | 15% | |
| PFHxS | 76.1 | 63.3 | 18% | |
| PFOS | 3.45 | 3.32 | 4% | |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 10/17/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW15-0622 |
| Battelle ID | E3794-FS |
| Sample Type | SA |
| Collection Date | 06/30/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.277 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 105 | E3794-FS(0) | 1.000 | 8/4/2022 | 0.824 | 2.26 | 4.51 |
| PFHpA | 375-85-9 | 27.4 | E3794-FS(0) | 1.000 | 8/4/2022 | 0.849 | 2.26 | 4.51 |
| PFOA | 335-67-1 | 42.3 | E3794-FS(0) | 1.000 | 8/4/2022 | 0.912 | 2.26 | 4.51 |
| PFNA | 375-95-1 | 1.12 J | E3794-FS(0) | 1.000 | 8/4/2022 | 0.752 | 2.26 | 4.51 |
| PFDA | 335-76-2 | 2.26 U | E3794-FS(0) | 1.000 | 8/4/2022 | 0.708 | 2.26 | 4.51 |
| PFUnA | 2058-94-8 | 2.26 U | E3794-FS(0) | 1.000 | 8/4/2022 | 0.679 | 2.26 | 4.51 |
| PFDoA | 307-55-1 | 2.26 U | E3794-FS(0) | 1.000 | 8/4/2022 | 0.686 | 2.26 | 4.51 |
| PFTrDA | 72629-94-8 | 2.26 U | E3794-FS(0) | 1.000 | 8/4/2022 | 0.670 | 2.26 | 4.51 |
| PFTeDA | 376-06-7 | 2.26 U | E3794-FS(0) | 1.000 | 8/4/2022 | 0.714 | 2.26 | 4.51 |
| NMeFOSAA | 2355-31-9 | 2.26 U | E3794-FS(0) | 1.000 | 8/4/2022 | 0.930 | 2.26 | 4.51 |
| NEtFOSAA | 2991-50-6 | 2.26 U | E3794-FS(0) | 1.000 | 8/4/2022 | 0.894 | 2.26 | 4.51 |
| PFBS | 375-73-5 | 89.6 | E3794-FS(0) | 1.000 | 8/4/2022 | 0.782 | 2.26 | 4.51 |
| PFHxS | 355-46-4 | 661 | E3794-FS(0) | 1.000 | 8/4/2022 | 0.900 | 2.26 | 4.51 |
| PFOS | 1763-23-1 | 86.4 | E3794-FS(0) | 1.000 | 8/4/2022 | 0.966 | 2.26 | 4.51 |
| HFPO-DA | 13252-13-6 | 2.26 U | E3794-FS(0) | 1.000 | 8/4/2022 | 0.781 | 2.26 | 4.51 |
| Adona | 919005-14-4 | 2.26 U | E3794-FS(0) | 1.000 | 8/4/2022 | 0.784 | 2.26 | 4.51 |
| 9Cl-PF3ONS | 756426-58-1 | 2.26 U | E3794-FS(0) | 1.000 | 8/4/2022 | 0.930 | 2.26 | 4.51 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.26 U | E3794-FS(0) | 1.000 | 8/4/2022 | 0.813 | 2.26 | 4.51 |

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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW16-0622 |
| Battelle ID | E3795-FS |
| Sample Type | SA |
| Collection Date | 06/30/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.290 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 48.2 | E3795-FS(0) | 1.000 | 8/4/2022 | 0.787 | 2.16 | 4.31 |
| PFHpA | 375-85-9 | 14.3 | E3795-FS(0) | 1.000 | 8/4/2022 | 0.811 | 2.16 | 4.31 |
| PFOA | 335-67-1 | 20.6 | E3795-FS(0) | 1.000 | 8/4/2022 | 0.871 | 2.16 | 4.31 |
| PFNA | 375-95-1 | 0.821 J | E3795-FS(0) | 1.000 | 8/4/2022 | 0.718 | 2.16 | 4.31 |
| PFDA | 335-76-2 | 2.16 U | E3795-FS(0) | 1.000 | 8/4/2022 | 0.676 | 2.16 | 4.31 |
| PFUnA | 2058-94-8 | 2.16 U | E3795-FS(0) | 1.000 | 8/4/2022 | 0.648 | 2.16 | 4.31 |
| PFDoA | 307-55-1 | 2.16 U | E3795-FS(0) | 1.000 | 8/4/2022 | 0.655 | 2.16 | 4.31 |
| PFTrDA | 72629-94-8 | 2.16 U | E3795-FS(0) | 1.000 | 8/4/2022 | 0.640 | 2.16 | 4.31 |
| PFTeDA | 376-06-7 | 2.16 U | E3795-FS(0) | 1.000 | 8/4/2022 | 0.682 | 2.16 | 4.31 |
| NMeFOSAA | 2355-31-9 | 2.16 U | E3795-FS(0) | 1.000 | 8/4/2022 | 0.888 | 2.16 | 4.31 |
| NEtFOSAA | 2991-50-6 | 2.16 U | E3795-FS(0) | 1.000 | 8/4/2022 | 0.853 | 2.16 | 4.31 |
| PFBS | 375-73-5 | 50.6 | E3795-FS(0) | 1.000 | 8/4/2022 | 0.747 | 2.16 | 4.31 |
| PFHxS | 355-46-4 | 331 | E3795-FS(0) | 1.000 | 8/4/2022 | 0.859 | 2.16 | 4.31 |
| PFOS | 1763-23-1 | 40.8 | E3795-FS(0) | 1.000 | 8/4/2022 | 0.922 | 2.16 | 4.31 |
| HFPO-DA | 13252-13-6 | 2.16 U | E3795-FS(0) | 1.000 | 8/4/2022 | 0.746 | 2.16 | 4.31 |
| Adona | 919005-14-4 | 2.16 U | E3795-FS(0) | 1.000 | 8/4/2022 | 0.749 | 2.16 | 4.31 |
| 9Cl-PF3ONS | 756426-58-1 | 2.16 U | E3795-FS(0) | 1.000 | 8/4/2022 | 0.888 | 2.16 | 4.31 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.16 U | E3795-FS(0) | 1.000 | 8/4/2022 | 0.777 | 2.16 | 4.31 |

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Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW17-0622 |
| Battelle ID | E3796-FS |
| Sample Type | SA |
| Collection Date | 06/30/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.293 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 12.3 | E3796-FS(0) | 1.000 | 8/4/2022 | 0.779 | 2.13 | 4.27 |
| PFHpA | 375-85-9 | 2.49 J | E3796-FS(0) | 1.000 | 8/4/2022 | 0.803 | 2.13 | 4.27 |
| PFOA | 335-67-1 | 4.44 | E3796-FS(0) | 1.000 | 8/4/2022 | 0.862 | 2.13 | 4.27 |
| PFNA | 375-95-1 | 2.13 U | E3796-FS(0) | 1.000 | 8/4/2022 | 0.711 | 2.13 | 4.27 |
| PFDA | 335-76-2 | 2.13 U | E3796-FS(0) | 1.000 | 8/4/2022 | 0.669 | 2.13 | 4.27 |
| PFUnA | 2058-94-8 | 2.13 U | E3796-FS(0) | 1.000 | 8/4/2022 | 0.642 | 2.13 | 4.27 |
| PFDoA | 307-55-1 | 2.13 U | E3796-FS(0) | 1.000 | 8/4/2022 | 0.648 | 2.13 | 4.27 |
| PFTrDA | 72629-94-8 | 2.13 U | E3796-FS(0) | 1.000 | 8/4/2022 | 0.633 | 2.13 | 4.27 |
| PFTeDA | 376-06-7 | 2.13 U | E3796-FS(0) | 1.000 | 8/4/2022 | 0.675 | 2.13 | 4.27 |
| NMeFOSAA | 2355-31-9 | 2.13 U | E3796-FS(0) | 1.000 | 8/4/2022 | 0.879 | 2.13 | 4.27 |
| NEtFOSAA | 2991-50-6 | 2.13 U | E3796-FS(0) | 1.000 | 8/4/2022 | 0.845 | 2.13 | 4.27 |
| PFBS | 375-73-5 | 27.4 | E3796-FS(0) | 1.000 | 8/4/2022 | 0.739 | 2.13 | 4.27 |
| PFHxS | 355-46-4 | 135 | E3796-FS(0) | 1.000 | 8/4/2022 | 0.851 | 2.13 | 4.27 |
| PFOS | 1763-23-1 | 6.89 | E3796-FS(0) | 1.000 | 8/4/2022 | 0.913 | 2.13 | 4.27 |
| HFPO-DA | 13252-13-6 | 2.13 U | E3796-FS(0) | 1.000 | 8/4/2022 | 0.738 | 2.13 | 4.27 |
| Adona | 919005-14-4 | 2.13 U | E3796-FS(0) | 1.000 | 8/4/2022 | 0.741 | 2.13 | 4.27 |
| 9Cl-PF3ONS | 756426-58-1 | 2.13 U | E3796-FS(0) | 1.000 | 8/4/2022 | 0.879 | 2.13 | 4.27 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.13 U | E3796-FS(0) | 1.000 | 8/4/2022 | 0.769 | 2.13 | 4.27 |

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Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW17D-0622 |
| Battelle ID | E3797-FS |
| Sample Type | SA |
| Collection Date | 06/30/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.289 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 3.50 J | E3797-FS(0) | 1.000 | 8/4/2022 | 0.790 | 2.16 | 4.33 |
| PFHpA | 375-85-9 | 2.16 U | E3797-FS(0) | 1.000 | 8/4/2022 | 0.814 | 2.16 | 4.33 |
| PFOA | 335-67-1 | 1.41 J | E3797-FS(0) | 1.000 | 8/4/2022 | 0.874 | 2.16 | 4.33 |
| PFNA | 375-95-1 | 2.16 U | E3797-FS(0) | 1.000 | 8/4/2022 | 0.721 | 2.16 | 4.33 |
| PFDA | 335-76-2 | 2.16 U | E3797-FS(0) | 1.000 | 8/4/2022 | 0.678 | 2.16 | 4.33 |
| PFUnA | 2058-94-8 | 2.16 U | E3797-FS(0) | 1.000 | 8/4/2022 | 0.651 | 2.16 | 4.33 |
| PFDoA | 307-55-1 | 2.16 U | E3797-FS(0) | 1.000 | 8/4/2022 | 0.657 | 2.16 | 4.33 |
| PFTrDA | 72629-94-8 | 2.16 U | E3797-FS(0) | 1.000 | 8/4/2022 | 0.642 | 2.16 | 4.33 |
| PFTeDA | 376-06-7 | 2.16 U | E3797-FS(0) | 1.000 | 8/4/2022 | 0.684 | 2.16 | 4.33 |
| NMeFOSAA | 2355-31-9 | 2.16 U | E3797-FS(0) | 1.000 | 8/4/2022 | 0.891 | 2.16 | 4.33 |
| NEtFOSAA | 2991-50-6 | 2.16 ~~U~~ UJ | E3797-FS(0) | 1.000 | 8/4/2022 | 0.856 | 2.16 | 4.33 |
| PFBS | 375-73-5 | 8.81 | E3797-FS(0) | 1.000 | 8/4/2022 | 0.749 | 2.16 | 4.33 |
| PFHxS | 355-46-4 | 35.2 | E3797-FS(0) | 1.000 | 8/4/2022 | 0.862 | 2.16 | 4.33 |
| PFOS | 1763-23-1 | 1.83 J | E3797-FS(0) | 1.000 | 8/4/2022 | 0.926 | 2.16 | 4.33 |
| HFPO-DA | 13252-13-6 | 2.16 U | E3797-FS(0) | 1.000 | 8/4/2022 | 0.748 | 2.16 | 4.33 |
| Adona | 919005-14-4 | 2.16 U | E3797-FS(0) | 1.000 | 8/4/2022 | 0.752 | 2.16 | 4.33 |
| 9Cl-PF3ONS | 756426-58-1 | 2.16 U | E3797-FS(0) | 1.000 | 8/4/2022 | 0.891 | 2.16 | 4.33 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.16 U | E3797-FS(0) | 1.000 | 8/4/2022 | 0.779 | 2.16 | 4.33 |

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Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW17D-0622 |
| Battelle ID | E3797-FS |
| Sample Type | SA |
| Collection Date | 06/30/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 88 | E3797-FS(0) | 8/4/2022 |
| 13C4-PFHpA | 93 | E3797-FS(0) | 8/4/2022 |
| 13C8-PFOA | 86 | E3797-FS(0) | 8/4/2022 |
| 13C9-PFNA | 92 | E3797-FS(0) | 8/4/2022 |
| 13C6-PFDA | 93 | E3797-FS(0) | 8/4/2022 |
| 13C7-PFUnA | 84 | E3797-FS(0) | 8/4/2022 |
| 13C2-PFDoA | 76 | E3797-FS(0) | 8/4/2022 |
| 13C2-PFTeDA | 75 | E3797-FS(0) | 8/4/2022 |
| d3-MeFOSAA | 56 | E3797-FS(0) | 8/4/2022 |
| d5-EtFOSAA | 48 | E3797-FS(0) | 8/4/2022 |
| 13C3-PFBS | 80 | E3797-FS(0) | 8/4/2022 |
| 13C3-PFHxS | 83 | E3797-FS(0) | 8/4/2022 |
| 13C8-PFOS | 92 | E3797-FS(0) | 8/4/2022 |
| 13C3-HFPO-DA | 88 | E3797-FS(0) | 8/4/2022 |

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Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW18-0622 |
| Battelle ID | E3798-FS |
| Sample Type | SA |
| Collection Date | 06/30/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.290 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 26.4 | E3798-FS(0) | 1.000 | 8/4/2022 | 0.787 | 2.16 | 4.31 |
| PFHpA | 375-85-9 | 8.03 | E3798-FS(0) | 1.000 | 8/4/2022 | 0.811 | 2.16 | 4.31 |
| PFOA | 335-67-1 | 13.7 | E3798-FS(0) | 1.000 | 8/4/2022 | 0.871 | 2.16 | 4.31 |
| PFNA | 375-95-1 | 2.16 U | E3798-FS(0) | 1.000 | 8/4/2022 | 0.718 | 2.16 | 4.31 |
| PFDA | 335-76-2 | 2.16 U | E3798-FS(0) | 1.000 | 8/4/2022 | 0.676 | 2.16 | 4.31 |
| PFUnA | 2058-94-8 | 2.16 U | E3798-FS(0) | 1.000 | 8/4/2022 | 0.648 | 2.16 | 4.31 |
| PFDoA | 307-55-1 | 2.16 U | E3798-FS(0) | 1.000 | 8/4/2022 | 0.655 | 2.16 | 4.31 |
| PFTrDA | 72629-94-8 | 2.16 U | E3798-FS(0) | 1.000 | 8/4/2022 | 0.640 | 2.16 | 4.31 |
| PFTeDA | 376-06-7 | 2.16 U | E3798-FS(0) | 1.000 | 8/4/2022 | 0.682 | 2.16 | 4.31 |
| NMeFOSAA | 2355-31-9 | 2.16 U | E3798-FS(0) | 1.000 | 8/4/2022 | 0.888 | 2.16 | 4.31 |
| NEtFOSAA | 2991-50-6 | 2.16 U | E3798-FS(0) | 1.000 | 8/4/2022 | 0.853 | 2.16 | 4.31 |
| PFBS | 375-73-5 | 34.5 | E3798-FS(0) | 1.000 | 8/4/2022 | 0.747 | 2.16 | 4.31 |
| PFHxS | 355-46-4 | 249 | E3798-FS(0) | 1.000 | 8/4/2022 | 0.859 | 2.16 | 4.31 |
| PFOS | 1763-23-1 | 21.6 | E3798-FS(0) | 1.000 | 8/4/2022 | 0.922 | 2.16 | 4.31 |
| HFPO-DA | 13252-13-6 | 2.16 U | E3798-FS(0) | 1.000 | 8/4/2022 | 0.746 | 2.16 | 4.31 |
| Adona | 919005-14-4 | 2.16 U | E3798-FS(0) | 1.000 | 8/4/2022 | 0.749 | 2.16 | 4.31 |
| 9Cl-PF3ONS | 756426-58-1 | 2.16 U | E3798-FS(0) | 1.000 | 8/4/2022 | 0.888 | 2.16 | 4.31 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.16 U | E3798-FS(0) | 1.000 | 8/4/2022 | 0.777 | 2.16 | 4.31 |

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6

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-EB01-063022 |
| Battelle ID | E3799-FS |
| Sample Type | SA |
| Collection Date | 06/30/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.255 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.895 | 2.45 | 4.90 |
| PFHpA | 375-85-9 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.923 | 2.45 | 4.90 |
| PFOA | 335-67-1 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.990 | 2.45 | 4.90 |
| PFNA | 375-95-1 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.817 | 2.45 | 4.90 |
| PFDA | 335-76-2 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.769 | 2.45 | 4.90 |
| PFUnA | 2058-94-8 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.737 | 2.45 | 4.90 |
| PFDoA | 307-55-1 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.745 | 2.45 | 4.90 |
| PFTrDA | 72629-94-8 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.727 | 2.45 | 4.90 |
| PFTeDA | 376-06-7 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.775 | 2.45 | 4.90 |
| NMeFOSAA | 2355-31-9 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 1.01 | 2.45 | 4.90 |
| NEtFOSAA | 2991-50-6 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.971 | 2.45 | 4.90 |
| PFBS | 375-73-5 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.849 | 2.45 | 4.90 |
| PFHxS | 355-46-4 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.977 | 2.45 | 4.90 |
| PFOS | 1763-23-1 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 1.05 | 2.45 | 4.90 |
| HFPO-DA | 13252-13-6 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.848 | 2.45 | 4.90 |
| Adona | 919005-14-4 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.852 | 2.45 | 4.90 |
| 9Cl-PF3ONS | 756426-58-1 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 1.01 | 2.45 | 4.90 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.45 U | E3799-FS(0) | 1.000 | 8/4/2022 | 0.883 | 2.45 | 4.90 |

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7

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-EB02-063022 |
| Battelle ID | E3800-FS |
| Sample Type | SA |
| Collection Date | 06/30/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.285 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.801 | 2.19 | 4.39 |
| PFHpA | 375-85-9 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.825 | 2.19 | 4.39 |
| PFOA | 335-67-1 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.886 | 2.19 | 4.39 |
| PFNA | 375-95-1 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.731 | 2.19 | 4.39 |
| PFDA | 335-76-2 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.688 | 2.19 | 4.39 |
| PFUnA | 2058-94-8 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.660 | 2.19 | 4.39 |
| PFDoA | 307-55-1 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.667 | 2.19 | 4.39 |
| PFTrDA | 72629-94-8 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.651 | 2.19 | 4.39 |
| PFTeDA | 376-06-7 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.694 | 2.19 | 4.39 |
| NMeFOSAA | 2355-31-9 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.904 | 2.19 | 4.39 |
| NEtFOSAA | 2991-50-6 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.868 | 2.19 | 4.39 |
| PFBS | 375-73-5 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.760 | 2.19 | 4.39 |
| PFHxS | 355-46-4 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.875 | 2.19 | 4.39 |
| PFOS | 1763-23-1 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.939 | 2.19 | 4.39 |
| HFPO-DA | 13252-13-6 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.759 | 2.19 | 4.39 |
| Adona | 919005-14-4 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.762 | 2.19 | 4.39 |
| 9Cl-PF3ONS | 756426-58-1 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.904 | 2.19 | 4.39 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.19 U | E3800-FS(0) | 1.000 | 8/4/2022 | 0.790 | 2.19 | 4.39 |

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Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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8

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW30P-0722 |
| Battelle ID | E3801-FS |
| Sample Type | SA |
| Collection Date | 07/01/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.289 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.790 | 2.16 | 4.33 |
| PFHpA | 375-85-9 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.814 | 2.16 | 4.33 |
| PFOA | 335-67-1 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.874 | 2.16 | 4.33 |
| PFNA | 375-95-1 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.721 | 2.16 | 4.33 |
| PFDA | 335-76-2 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.678 | 2.16 | 4.33 |
| PFUnA | 2058-94-8 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.651 | 2.16 | 4.33 |
| PFDoA | 307-55-1 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.657 | 2.16 | 4.33 |
| PFTrDA | 72629-94-8 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.642 | 2.16 | 4.33 |
| PFTeDA | 376-06-7 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.684 | 2.16 | 4.33 |
| NMeFOSAA | 2355-31-9 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.891 | 2.16 | 4.33 |
| NEtFOSAA | 2991-50-6 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.856 | 2.16 | 4.33 |
| PFBS | 375-73-5 | 41.2 | E3801-FS(0) | 1.000 | 8/4/2022 | 0.749 | 2.16 | 4.33 |
| PFHxS | 355-46-4 | 119 | E3801-FS(0) | 1.000 | 8/4/2022 | 0.862 | 2.16 | 4.33 |
| PFOS | 1763-23-1 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.926 | 2.16 | 4.33 |
| HFPO-DA | 13252-13-6 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.748 | 2.16 | 4.33 |
| Adona | 919005-14-4 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.752 | 2.16 | 4.33 |
| 9Cl-PF3ONS | 756426-58-1 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.891 | 2.16 | 4.33 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.16 U | E3801-FS(0) | 1.000 | 8/4/2022 | 0.779 | 2.16 | 4.33 |

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9

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW27-0722 |
| Battelle ID | E3802-FS |
| Sample Type | SA |
| Collection Date | 07/01/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.364 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.627 | 1.72 | 3.43 |
| PFHpA | 375-85-9 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.646 | 1.72 | 3.43 |
| PFOA | 335-67-1 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.694 | 1.72 | 3.43 |
| PFNA | 375-95-1 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.572 | 1.72 | 3.43 |
| PFDA | 335-76-2 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.538 | 1.72 | 3.43 |
| PFUnA | 2058-94-8 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.516 | 1.72 | 3.43 |
| PFDoA | 307-55-1 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.522 | 1.72 | 3.43 |
| PFTrDA | 72629-94-8 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.510 | 1.72 | 3.43 |
| PFTeDA | 376-06-7 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.543 | 1.72 | 3.43 |
| NMeFOSAA | 2355-31-9 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.707 | 1.72 | 3.43 |
| NEtFOSAA | 2991-50-6 | 1.72 UJ | E3802-FS(0) | 1.000 | 8/4/2022 | 0.680 | 1.72 | 3.43 |
| PFBS | 375-73-5 | 0.805 J | E3802-FS(0) | 1.000 | 8/4/2022 | 0.595 | 1.72 | 3.43 |
| PFHxS | 355-46-4 | 2.73 J | E3802-FS(0) | 1.000 | 8/4/2022 | 0.685 | 1.72 | 3.43 |
| PFOS | 1763-23-1 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.735 | 1.72 | 3.43 |
| HFPO-DA | 13252-13-6 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.594 | 1.72 | 3.43 |
| Adona | 919005-14-4 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.597 | 1.72 | 3.43 |
| 9Cl-PF3ONS | 756426-58-1 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.707 | 1.72 | 3.43 |
| 11Cl-PF3OUdS | 763051-92-9 | 1.72 U | E3802-FS(0) | 1.000 | 8/4/2022 | 0.619 | 1.72 | 3.43 |

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Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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9

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW27-0722 |
| Battelle ID | E3802-FS |
| Sample Type | SA |
| Collection Date | 07/01/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 91 | E3802-FS(0) | 8/4/2022 |
| 13C4-PFHpA | 86 | E3802-FS(0) | 8/4/2022 |
| 13C8-PFOA | 80 | E3802-FS(0) | 8/4/2022 |
| 13C9-PFNA | 84 | E3802-FS(0) | 8/4/2022 |
| 13C6-PFDA | 80 | E3802-FS(0) | 8/4/2022 |
| 13C7-PFUnA | 75 | E3802-FS(0) | 8/4/2022 |
| 13C2-PFDoA | 74 | E3802-FS(0) | 8/4/2022 |
| 13C2-PFTeDA | 72 | E3802-FS(0) | 8/4/2022 |
| d3-MeFOSAA | 50 | E3802-FS(0) | 8/4/2022 |
| d5-EtFOSAA | 46 | E3802-FS(0) | 8/4/2022 |
| 13C3-PFBS | 74 | E3802-FS(0) | 8/4/2022 |
| 13C3-PFHxS | 72 | E3802-FS(0) | 8/4/2022 |
| 13C8-PFOS | 83 | E3802-FS(0) | 8/4/2022 |
| 13C3-HFPO-DA | 81 | E3802-FS(0) | 8/4/2022 |

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Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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ID

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW30-0722 |
| Battelle ID | E3803-FS |
| Sample Type | SA |
| Collection Date | 07/01/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.268 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.852 | 2.33 | 4.66 |
| PFHpA | 375-85-9 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.878 | 2.33 | 4.66 |
| PFOA | 335-67-1 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.942 | 2.33 | 4.66 |
| PFNA | 375-95-1 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.777 | 2.33 | 4.66 |
| PFDA | 335-76-2 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.731 | 2.33 | 4.66 |
| PFUnA | 2058-94-8 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.701 | 2.33 | 4.66 |
| PFDoA | 307-55-1 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.709 | 2.33 | 4.66 |
| PFTrDA | 72629-94-8 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.692 | 2.33 | 4.66 |
| PFTeDA | 376-06-7 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.738 | 2.33 | 4.66 |
| NMeFOSAA | 2355-31-9 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.961 | 2.33 | 4.66 |
| NEtFOSAA | 2991-50-6 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.924 | 2.33 | 4.66 |
| PFBS | 375-73-5 | 40.3 | E3803-FS(0) | 1.000 | 8/4/2022 | 0.808 | 2.33 | 4.66 |
| PFHxS | 355-46-4 | 120 | E3803-FS(0) | 1.000 | 8/4/2022 | 0.930 | 2.33 | 4.66 |
| PFOS | 1763-23-1 | 2.03 J | E3803-FS(0) | 1.000 | 8/4/2022 | 0.998 | 2.33 | 4.66 |
| HFPO-DA | 13252-13-6 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.807 | 2.33 | 4.66 |
| Adona | 919005-14-4 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.811 | 2.33 | 4.66 |
| 9Cl-PF3ONS | 756426-58-1 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.961 | 2.33 | 4.66 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.33 U | E3803-FS(0) | 1.000 | 8/4/2022 | 0.840 | 2.33 | 4.66 |

NLJ 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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11

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW26-0722 |
| Battelle ID | E3804-FS |
| Sample Type | SA |
| Collection Date | 07/01/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.288 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.793 | 2.17 | 4.34 | |
| PFHpA | 375-85-9 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.817 | 2.17 | 4.34 | |
| PFOA | 335-67-1 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.877 | 2.17 | 4.34 | |
| PFNA | 375-95-1 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.723 | 2.17 | 4.34 | |
| PFDA | 335-76-2 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.681 | 2.17 | 4.34 | |
| PFUnA | 2058-94-8 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.653 | 2.17 | 4.34 | |
| PFDoA | 307-55-1 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.660 | 2.17 | 4.34 | |
| PFTrDA | 72629-94-8 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.644 | 2.17 | 4.34 | |
| PFTeDA | 376-06-7 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.687 | 2.17 | 4.34 | |
| NMeFOSAA | 2355-31-9 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.894 | 2.17 | 4.34 | |
| NEtFOSAA | 2991-50-6 | 2.17 J UJ | E3804-FS(0) | 1.000 | 8/4/2022 | 0.859 | 2.17 | 4.34 | SSL |
| PFBS | 375-73-5 | 6.38 | E3804-FS(0) | 1.000 | 8/4/2022 | 0.752 | 2.17 | 4.34 | |
| PFHxS | 355-46-4 | 22.2 | E3804-FS(0) | 1.000 | 8/4/2022 | 0.865 | 2.17 | 4.34 | |
| PFOS | 1763-23-1 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.929 | 2.17 | 4.34 | |
| HFPO-DA | 13252-13-6 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.751 | 2.17 | 4.34 | |
| Adona | 919005-14-4 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.754 | 2.17 | 4.34 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.894 | 2.17 | 4.34 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.17 U | E3804-FS(0) | 1.000 | 8/4/2022 | 0.782 | 2.17 | 4.34 | |

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Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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11

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW26-0722 |
| Battelle ID | E3804-FS |
| Sample Type | SA |
| Collection Date | 07/01/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 93 | E3804-FS(0) | 8/4/2022 |
| 13C4-PFHpA | 94 | E3804-FS(0) | 8/4/2022 |
| 13C8-PFOA | 87 | E3804-FS(0) | 8/4/2022 |
| 13C9-PFNA | 84 | E3804-FS(0) | 8/4/2022 |
| 13C6-PFDA | 78 | E3804-FS(0) | 8/4/2022 |
| 13C7-PFUnA | 65 | E3804-FS(0) | 8/4/2022 |
| 13C2-PFDoA | 62 | E3804-FS(0) | 8/4/2022 |
| 13C2-PFTeDA | 61 | E3804-FS(0) | 8/4/2022 |
| d3-MeFOSAA | 50 | E3804-FS(0) | 8/4/2022 |
| d5-EtFOSAA | 43 | E3804-FS(0) | 8/4/2022 |
| 13C3-PFBS | 67 | E3804-FS(0) | 8/4/2022 |
| 13C3-PFHxS | 75 | E3804-FS(0) | 8/4/2022 |
| 13C8-PFOS | 89 | E3804-FS(0) | 8/4/2022 |
| 13C3-HFPO-DA | 91 | E3804-FS(0) | 8/4/2022 |

nw 10/5/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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12

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW23-0722 |
| Battelle ID | E3805-FS |
| Sample Type | SA |
| Collection Date | 07/01/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.281 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 6.38 | E3805-FS(0) | 1.000 | 8/4/2022 | 0.812 | 2.22 | 4.45 | |
| PFHpA | 375-85-9 | 0.964 J | E3805-FS(0) | 1.000 | 8/4/2022 | 0.837 | 2.22 | 4.45 | |
| PFOA | 335-67-1 | 2.07 J | E3805-FS(0) | 1.000 | 8/4/2022 | 0.899 | 2.22 | 4.45 | |
| PFNA | 375-95-1 | 2.22 U | E3805-FS(0) | 1.000 | 8/4/2022 | 0.741 | 2.22 | 4.45 | |
| PFDA | 335-76-2 | 2.22 U | E3805-FS(0) | 1.000 | 8/4/2022 | 0.698 | 2.22 | 4.45 | |
| PFUnA | 2058-94-8 | 2.22 U | E3805-FS(0) | 1.000 | 8/4/2022 | 0.669 | 2.22 | 4.45 | |
| PFDoA | 307-55-1 | 2.22 U | E3805-FS(0) | 1.000 | 8/4/2022 | 0.676 | 2.22 | 4.45 | |
| PFTrDA | 72629-94-8 | 2.22 U | E3805-FS(0) | 1.000 | 8/4/2022 | 0.660 | 2.22 | 4.45 | |
| PFTeDA | 376-06-7 | 2.22 U | E3805-FS(0) | 1.000 | 8/4/2022 | 0.704 | 2.22 | 4.45 | |
| NMeFOSAA | 2355-31-9 | 2.22 U | E3805-FS(0) | 1.000 | 8/4/2022 | 0.916 | 2.22 | 4.45 | |
| NEtFOSAA | 2991-50-6 | 2.22 UJ | E3805-FS(0) | 1.000 | 8/4/2022 | 0.881 | 2.22 | 4.45 | SSL |
| PFBS | 375-73-5 | 22.6 | E3805-FS(0) | 1.000 | 8/4/2022 | 0.770 | 2.22 | 4.45 | |
| PFHxS | 355-46-4 | 84.1 | E3805-FS(0) | 1.000 | 8/4/2022 | 0.887 | 2.22 | 4.45 | |
| PFOS | 1763-23-1 | 2.85 J | E3805-FS(0) | 1.000 | 8/4/2022 | 0.952 | 2.22 | 4.45 | |
| HFPO-DA | 13252-13-6 | 2.22 U | E3805-FS(0) | 1.000 | 8/4/2022 | 0.770 | 2.22 | 4.45 | |
| Adona | 919005-14-4 | 2.22 U | E3805-FS(0) | 1.000 | 8/4/2022 | 0.773 | 2.22 | 4.45 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.22 U | E3805-FS(0) | 1.000 | 8/4/2022 | 0.916 | 2.22 | 4.45 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.22 U | E3805-FS(0) | 1.000 | 8/4/2022 | 0.802 | 2.22 | 4.45 | |

MW 10/5/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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12

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW23-0722 |
| Battelle ID | E3805-FS |
| Sample Type | SA |
| Collection Date | 07/01/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 96 | E3805-FS(0) | 8/4/2022 |
| 13C4-PFHpA | 88 | E3805-FS(0) | 8/4/2022 |
| 13C8-PFOA | 90 | E3805-FS(0) | 8/4/2022 |
| 13C9-PFNA | 91 | E3805-FS(0) | 8/4/2022 |
| 13C6-PFDA | 82 | E3805-FS(0) | 8/4/2022 |
| 13C7-PFUnA | 72 | E3805-FS(0) | 8/4/2022 |
| 13C2-PFDoA | 62 | E3805-FS(0) | 8/4/2022 |
| 13C2-PFTeDA | 56 | E3805-FS(0) | 8/4/2022 |
| d3-MeFOSAA | 50 | E3805-FS(0) | 8/4/2022 |
| d5-EtFOSAA | 42 | E3805-FS(0) | 8/4/2022 |
| 13C3-PFBS | 66 | E3805-FS(0) | 8/4/2022 |
| 13C3-PFHxS | 74 | E3805-FS(0) | 8/4/2022 |
| 13C8-PFOS | 85 | E3805-FS(0) | 8/4/2022 |
| 13C3-HFPO-DA | 91 | E3805-FS(0) | 8/4/2022 |

NW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

BATTELLE
It can be done

13

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW07-0722 |
| Battelle ID | E3806-FS |
| Sample Type | SA |
| Collection Date | 07/04/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.297 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.45 J | E3806-FS(0) | 1.000 | 8/4/2022 | 0.769 | 2.10 | 4.21 | |
| PFHpA | 375-85-9 | 2.10 U | E3806-FS(0) | 1.000 | 8/4/2022 | 0.792 | 2.10 | 4.21 | |
| PFOA | 335-67-1 | 2.88 J | E3806-FS(0) | 1.000 | 8/4/2022 | 0.850 | 2.10 | 4.21 | |
| PFNA | 375-95-1 | 2.10 U | E3806-FS(0) | 1.000 | 8/4/2022 | 0.701 | 2.10 | 4.21 | |
| PFDA | 335-76-2 | 2.10 U | E3806-FS(0) | 1.000 | 8/4/2022 | 0.660 | 2.10 | 4.21 | |
| PFUnA | 2058-94-8 | 2.10 U | E3806-FS(0) | 1.000 | 8/4/2022 | 0.633 | 2.10 | 4.21 | |
| PFDoA | 307-55-1 | 2.10 U | E3806-FS(0) | 1.000 | 8/4/2022 | 0.640 | 2.10 | 4.21 | |
| PFTrDA | 72629-94-8 | 2.10 U | E3806-FS(0) | 1.000 | 8/4/2022 | 0.625 | 2.10 | 4.21 | |
| PFTeDA | 376-06-7 | 2.10 U | E3806-FS(0) | 1.000 | 8/4/2022 | 0.666 | 2.10 | 4.21 | |
| NMeFOSAA | 2355-31-9 | 2.10 U | E3806-FS(0) | 1.000 | 8/4/2022 | 0.867 | 2.10 | 4.21 | |
| NEtFOSAA | 2991-50-6 | 2.10 UJ | E3806-FS(0) | 1.000 | 8/4/2022 | 0.833 | 2.10 | 4.21 | SSL |
| PFBS | 375-73-5 | 14.6 | E3806-FS(0) | 1.000 | 8/4/2022 | 0.729 | 2.10 | 4.21 | |
| PFHxS | 355-46-4 | 76.1 | E3806-FS(0) | 1.000 | 8/4/2022 | 0.839 | 2.10 | 4.21 | |
| PFOS | 1763-23-1 | 3.45 J | E3806-FS(0) | 1.000 | 8/4/2022 | 0.901 | 2.10 | 4.21 | |
| HFPO-DA | 13252-13-6 | 2.10 U | E3806-FS(0) | 1.000 | 8/4/2022 | 0.728 | 2.10 | 4.21 | |
| Adona | 919005-14-4 | 2.10 U | E3806-FS(0) | 1.000 | 8/4/2022 | 0.731 | 2.10 | 4.21 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.10 U | E3806-FS(0) | 1.000 | 8/4/2022 | 0.867 | 2.10 | 4.21 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.10 U | E3806-FS(0) | 1.000 | 8/4/2022 | 0.758 | 2.10 | 4.21 | |

per 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

BATTELLE
It can be done

13

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW07-0722 |
| Battelle ID | E3806-FS |
| Sample Type | SA |
| Collection Date | 07/04/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 103 | E3806-FS(0) | 8/4/2022 |
| 13C4-PFHpA | 102 | E3806-FS(0) | 8/4/2022 |
| 13C8-PFOA | 96 | E3806-FS(0) | 8/4/2022 |
| 13C9-PFNA | 91 | E3806-FS(0) | 8/4/2022 |
| 13C6-PFDA | 84 | E3806-FS(0) | 8/4/2022 |
| 13C7-PFUnA | 71 | E3806-FS(0) | 8/4/2022 |
| 13C2-PFDoA | 55 | E3806-FS(0) | 8/4/2022 |
| 13C2-PFTeDA | 54 | E3806-FS(0) | 8/4/2022 |
| d3-MeFOSAA | 55 | E3806-FS(0) | 8/4/2022 |
| d5-EtFOSAA | 46 | E3806-FS(0) | 8/4/2022 |
| 13C3-PFBS | 67 | E3806-FS(0) | 8/4/2022 |
| 13C3-PFHxS | 66 | E3806-FS(0) | 8/4/2022 |
| 13C8-PFOS | 86 | E3806-FS(0) | 8/4/2022 |
| 13C3-HFPO-DA | 93 | E3806-FS(0) | 8/4/2022 |

NW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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14

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW07P-0722 |
| Battelle ID | E3807-FS |
| Sample Type | SA |
| Collection Date | 07/04/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.292 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.63 J | E3807-FS(0) | 1.000 | 8/4/2022 | 0.782 | 2.14 | 4.28 | |
| PFHpA | 375-85-9 | 0.856 J | E3807-FS(0) | 1.000 | 8/4/2022 | 0.806 | 2.14 | 4.28 | |
| PFOA | 335-67-1 | 2.55 J | E3807-FS(0) | 1.000 | 8/4/2022 | 0.865 | 2.14 | 4.28 | |
| PFNA | 375-95-1 | 2.14 U | E3807-FS(0) | 1.000 | 8/4/2022 | 0.713 | 2.14 | 4.28 | |
| PFDA | 335-76-2 | 2.14 U | E3807-FS(0) | 1.000 | 8/4/2022 | 0.671 | 2.14 | 4.28 | |
| PFUnA | 2058-94-8 | 2.14 U | E3807-FS(0) | 1.000 | 8/4/2022 | 0.644 | 2.14 | 4.28 | |
| PFDoA | 307-55-1 | 2.14 U | E3807-FS(0) | 1.000 | 8/4/2022 | 0.651 | 2.14 | 4.28 | |
| PFTrDA | 72629-94-8 | 2.14 U | E3807-FS(0) | 1.000 | 8/4/2022 | 0.635 | 2.14 | 4.28 | |
| PFTeDA | 376-06-7 | 2.14 ~~U~~ UJ | E3807-FS(0) | 1.000 | 8/4/2022 | 0.677 | 2.14 | 4.28 | SSL |
| NMeFOSAA | 2355-31-9 | 2.14 U | E3807-FS(0) | 1.000 | 8/4/2022 | 0.882 | 2.14 | 4.28 | |
| NEtFOSAA | 2991-50-6 | 2.14 ~~U~~ UJ | E3807-FS(0) | 1.000 | 8/4/2022 | 0.848 | 2.14 | 4.28 | SSL |
| PFBS | 375-73-5 | 12.5 | E3807-FS(0) | 1.000 | 8/4/2022 | 0.741 | 2.14 | 4.28 | |
| PFHxS | 355-46-4 | 63.3 | E3807-FS(0) | 1.000 | 8/4/2022 | 0.854 | 2.14 | 4.28 | |
| PFOS | 1763-23-1 | 3.32 J | E3807-FS(0) | 1.000 | 8/4/2022 | 0.916 | 2.14 | 4.28 | |
| HFPO-DA | 13252-13-6 | 2.14 U | E3807-FS(0) | 1.000 | 8/4/2022 | 0.741 | 2.14 | 4.28 | |
| Adona | 919005-14-4 | 2.14 U | E3807-FS(0) | 1.000 | 8/4/2022 | 0.744 | 2.14 | 4.28 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.14 U | E3807-FS(0) | 1.000 | 8/4/2022 | 0.882 | 2.14 | 4.28 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.14 U | E3807-FS(0) | 1.000 | 8/4/2022 | 0.771 | 2.14 | 4.28 | |

MW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

BATTELLE
It can be done

14

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW07P-0722 |
| Battelle ID | E3807-FS |
| Sample Type | SA |
| Collection Date | 07/04/2022 |
| Extraction Date | 07/12/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 103 | E3807-FS(0) | 8/4/2022 |
| 13C4-PFHpA | 95 | E3807-FS(0) | 8/4/2022 |
| 13C8-PFOA | 90 | E3807-FS(0) | 8/4/2022 |
| 13C9-PFNA | 89 | E3807-FS(0) | 8/4/2022 |
| 13C6-PFDA | 86 | E3807-FS(0) | 8/4/2022 |
| 13C7-PFUnA | 66 | E3807-FS(0) | 8/4/2022 |
| 13C2-PFDoA | 51 | E3807-FS(0) | 8/4/2022 |
| 13C2-PFTeDA | 46 M | E3807-FS(0) | 8/4/2022 |
| d3-MeFOSAA | 51 | E3807-FS(0) | 8/4/2022 |
| d5-EtFOSAA | 38 Y | E3807-FS(0) | 8/4/2022 |
| 13C3-PFBS | 70 | E3807-FS(0) | 8/4/2022 |
| 13C3-PFHxS | 76 | E3807-FS(0) | 8/4/2022 |
| 13C8-PFOS | 89 | E3807-FS(0) | 8/4/2022 |
| 13C3-HFPO-DA | 90 | E3807-FS(0) | 8/4/2022 |

MW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-1133
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-0003, Puerto Rico
Date: October 15, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEP4-GW19-0722 | E3808-FS | Water |
| 2 | VEP4-GW20-0722 | E3809-FS | Water |
| 3 | VEP4-GW21-0722 | E3810-FS | Water |
| 4 | VEP4-GW22-0722 | E3811-FS | Water |
| 5 | VEP4-GW01-0722 | E3812-FS | Water |
| 6 | VEP4-EB01-070422 | E3813-FS | Water |
| 7 | VEP4-GW14-0722 | E3814-FS | Water |
| 8 | VEP4-GW14P-0722 | E3815-FS | Water |
| 9 | VEP4-GW13D-0722 | E3816-FS | Water |
| 10 | VEP4-GW13-0722 | E3817-FS | Water |
| 11 | VEP4-GW10-0722 | E3818-FS | Water |
| 12 | VEP4-GW09-0722 | E3819-FS | Water |
| 13 | VEP4-EB01-070522 | E3820-FS | Water |
| 14 | VEP4-EB01-070122 | E3821-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for eleven water samples and three aqueous equipment blank samples collected on July 1-5, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

## Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VEP4-EB01-070422 | None - ND | - | - | - |
| VEP4-EB01-070522 | None - ND | - | - | - |
| VEP4-EB01-070122 | None - ND | - | - | - |
| VEP4-FB01-071222 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable low surrogate percent recoveries (%R) for one or two surrogates. The associated compounds were qualified as estimated (UJ). Please refer to the summary forms behind the Form Is for specific recoveries.

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VEP4-GW14-0722 ng/L | VEP4-GW14P-0722 ng/L | RPD | Qualifier |
|---|---|---|---|---|
| PFHxA | 73.0 | 74.1 | 1% | None |
| PFHpA | 19.3 | 19.1 | 1% | |
| PFOA | 33.0 | 29.7 | 11% | |
| PFBS | 77.9 | 67.6 | 14% | |
| PFHxS | 506 | 536 | 6% | |
| PFOS | 54.4 | 59.2 | 8% | |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 10/17/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

1

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW19-0722 |
| Battelle ID | E3808-FS |
| Sample Type | SA |
| Collection Date | 07/04/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.295 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 7.46 | E3808-FS(0) | 1.000 | 8/4/2022 | 0.774 | 2.12 | 4.24 |
| PFHpA | 375-85-9 | 2.38 J | E3808-FS(0) | 1.000 | 8/4/2022 | 0.797 | 2.12 | 4.24 |
| PFOA | 335-67-1 | 7.28 | E3808-FS(0) | 1.000 | 8/4/2022 | 0.856 | 2.12 | 4.24 |
| PFNA | 375-95-1 | 2.12 U | E3808-FS(0) | 1.000 | 8/4/2022 | 0.706 | 2.12 | 4.24 |
| PFDA | 335-76-2 | 2.12 U | E3808-FS(0) | 1.000 | 8/4/2022 | 0.664 | 2.12 | 4.24 |
| PFUnA | 2058-94-8 | 2.12 U | E3808-FS(0) | 1.000 | 8/4/2022 | 0.637 | 2.12 | 4.24 |
| PFDoA | 307-55-1 | 2.12 U | E3808-FS(0) | 1.000 | 8/4/2022 | 0.644 | 2.12 | 4.24 |
| PFTrDA | 72629-94-8 | 2.12 U | E3808-FS(0) | 1.000 | 8/4/2022 | 0.629 | 2.12 | 4.24 |
| PFTeDA | 376-06-7 | 2.12 U | E3808-FS(0) | 1.000 | 8/4/2022 | 0.670 | 2.12 | 4.24 |
| NMeFOSAA | 2355-31-9 | 2.12 U | E3808-FS(0) | 1.000 | 8/4/2022 | 0.873 | 2.12 | 4.24 |
| NFtFOSAA | 2991-50-6 | 2.12 U | E3808-FS(0) | 1.000 | 8/4/2022 | 0.839 | 2.12 | 4.24 |
| PFBS | 375-73-5 | 65.0 | E3808-FS(0) | 1.000 | 8/4/2022 | 0.734 | 2.12 | 4.24 |
| PFHxS | 355-46-4 | 247 | E3808-FS(0) | 1.000 | 8/4/2022 | 0.845 | 2.12 | 4.24 |
| PFOS | 1763-23-1 | 10.5 | E3808-FS(0) | 1.000 | 8/4/2022 | 0.907 | 2.12 | 4.24 |
| HFPO-DA | 13252-13-6 | 2.12 U | E3808-FS(0) | 1.000 | 8/4/2022 | 0.733 | 2.12 | 4.24 |
| Adona | 919005-14-4 | 2.12 U | E3808-FS(0) | 1.000 | 8/4/2022 | 0.736 | 2.12 | 4.24 |
| 9Cl-PF3ONS | 756426-58-1 | 2.12 U | E3808-FS(0) | 1.000 | 8/4/2022 | 0.873 | 2.12 | 4.24 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.12 U | E3808-FS(0) | 1.000 | 8/4/2022 | 0.764 | 2.12 | 4.24 |

MW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

BATTELLE
It can be done

2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW20-0722 |
| Battelle ID | E3809-FS |
| Sample Type | SA |
| Collection Date | 07/04/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.282 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 27.7 | E3809-FS(0) | 1.000 | 8/4/2022 | 0.809 | 2.22 | 4.43 |
| PFHpA | 375-85-9 | 5.43 | E3809-FS(0) | 1.000 | 8/4/2022 | 0.834 | 2.22 | 4.43 |
| PFOA | 335-67-1 | 6.82 | E3809-FS(0) | 1.000 | 8/4/2022 | 0.895 | 2.22 | 4.43 |
| PFNA | 375-95-1 | 2.22 U | E3809-FS(0) | 1.000 | 8/4/2022 | 0.738 | 2.22 | 4.43 |
| PFDA | 335-76-2 | 2.22 U | E3809-FS(0) | 1.000 | 8/4/2022 | 0.695 | 2.22 | 4.43 |
| PFUnA | 2058-94-8 | 2.22 U | E3809-FS(0) | 1.000 | 8/4/2022 | 0.667 | 2.22 | 4.43 |
| PFDoA | 307-55-1 | 2.22 U | E3809-FS(0) | 1.000 | 8/4/2022 | 0.674 | 2.22 | 4.43 |
| PFTrDA | 72629-94-8 | 2.22 U | E3809-FS(0) | 1.000 | 8/4/2022 | 0.658 | 2.22 | 4.43 |
| PFTeDA | 376-06-7 | 2.22 U | E3809-FS(0) | 1.000 | 8/4/2022 | 0.701 | 2.22 | 4.43 |
| NMeFOSAA | 2355-31-9 | 2.22 U | E3809-FS(0) | 1.000 | 8/4/2022 | 0.913 | 2.22 | 4.43 |
| NEtFOSAA | 2991-50-6 | 2.22 U | E3809-FS(0) | 1.000 | 8/4/2022 | 0.878 | 2.22 | 4.43 |
| PFBS | 375-73-5 | 37.8 | E3809-FS(0) | 1.000 | 8/4/2022 | 0.768 | 2.22 | 4.43 |
| PFHxS | 355-46-4 | 131 | E3809-FS(0) | 1.000 | 8/4/2022 | 0.884 | 2.22 | 4.43 |
| PFOS | 1763-23-1 | 12.0 | E3809-FS(0) | 1.000 | 8/4/2022 | 0.949 | 2.22 | 4.43 |
| HFPO-DA | 13252-13-6 | 2.22 U | E3809-FS(0) | 1.000 | 8/4/2022 | 0.767 | 2.22 | 4.43 |
| Adona | 919005-14-4 | 2.22 U | E3809-FS(0) | 1.000 | 8/4/2022 | 0.770 | 2.22 | 4.43 |
| 9Cl-PF3ONS | 756426-58-1 | 2.22 U | E3809-FS(0) | 1.000 | 8/4/2022 | 0.913 | 2.22 | 4.43 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.22 U | E3809-FS(0) | 1.000 | 8/4/2022 | 0.799 | 2.22 | 4.43 |

MW 10/15/22

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW21-0722 |
| Battelle ID | E3810-FS |
| Sample Type | SA |
| Collection Date | 07/04/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.294 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 148 | E3810-FS(0) | 1.000 | 8/4/2022 | 0.776 | 2.13 | 4.25 |
| PFHpA | 375-85-9 | 28.2 | E3810-FS(0) | 1.000 | 8/4/2022 | 0.800 | 2.13 | 4.25 |
| PFOA | 335-67-1 | 41.7 | E3810-FS(0) | 1.000 | 8/4/2022 | 0.859 | 2.13 | 4.25 |
| PFNA | 375-95-1 | 2.13 U | E3810-FS(0) | 1.000 | 8/4/2022 | 0.708 | 2.13 | 4.25 |
| PFDA | 335-76-2 | 2.13 U | E3810-FS(0) | 1.000 | 8/4/2022 | 0.667 | 2.13 | 4.25 |
| PFUnA | 2058-94-8 | 2.13 U | E3810-FS(0) | 1.000 | 8/4/2022 | 0.639 | 2.13 | 4.25 |
| PFDoA | 307-55-1 | 2.13 U | E3810-FS(0) | 1.000 | 8/4/2022 | 0.646 | 2.13 | 4.25 |
| PFTrDA | 72629-94-8 | 2.13 U | E3810-FS(0) | 1.000 | 8/4/2022 | 0.631 | 2.13 | 4.25 |
| PFTeDA | 376-06-7 | 2.13 U | E3810-FS(0) | 1.000 | 8/4/2022 | 0.673 | 2.13 | 4.25 |
| NMeFOSAA | 2355-31-9 | 2.13 U | E3810-FS(0) | 1.000 | 8/4/2022 | 0.876 | 2.13 | 4.25 |
| NEtFOSAA | 2991 50 6 | 2.13 U | E3810-FS(0) | 1.000 | 8/4/2022 | 0.842 | 2.13 | 4.25 |
| PFBS | 375-73-5 | 144 | E3810-FS(0) | 1.000 | 8/4/2022 | 0.736 | 2.13 | 4.25 |
| PFHxS | 355-46-4 | 469 | E3810-FS(0) | 1.000 | 8/4/2022 | 0.848 | 2.13 | 4.25 |
| PFOS | 1763-23-1 | 47.1 | E3810-FS(0) | 1.000 | 8/4/2022 | 0.910 | 2.13 | 4.25 |
| HFPO-DA | 13252-13-6 | 2.13 U | E3810-FS(0) | 1.000 | 8/4/2022 | 0.736 | 2.13 | 4.25 |
| Adona | 919005-14-4 | 2.13 U | E3810-FS(0) | 1.000 | 8/4/2022 | 0.739 | 2.13 | 4.25 |
| 9Cl-PF3ONS | 756426-58-1 | 2.13 U | E3810-FS(0) | 1.000 | 8/4/2022 | 0.876 | 2.13 | 4.25 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.13 U | E3810-FS(0) | 1.000 | 8/4/2022 | 0.766 | 2.13 | 4.25 |

Nw 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VEP4-GW22-0722 |
| Battelle ID | E3811-FS |
| Sample Type | SA |
| Collection Date | 07/04/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.291 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 163 | E3811-FS(0) | 1.000 | 8/4/2022 | 0.784 | 2.15 | 4.30 |
| PFHpA | 375-85-9 | 35.5 | E3811-FS(0) | 1.000 | 8/4/2022 | 0.808 | 2.15 | 4.30 |
| PFOA | 335-67-1 | 46.4 | E3811-FS(0) | 1.000 | 8/4/2022 | 0.868 | 2.15 | 4.30 |
| PFNA | 375-95-1 | 0.784 J | E3811-FS(0) | 1.000 | 8/4/2022 | 0.716 | 2.15 | 4.30 |
| PFDA | 335-76-2 | 2.15 U | E3811-FS(0) | 1.000 | 8/4/2022 | 0.674 | 2.15 | 4.30 |
| PFUnA | 2058-94-8 | 2.15 U | E3811-FS(0) | 1.000 | 8/4/2022 | 0.646 | 2.15 | 4.30 |
| PFDoA | 307-55-1 | 2.15 U | E3811-FS(0) | 1.000 | 8/4/2022 | 0.653 | 2.15 | 4.30 |
| PFTrDA | 72629-94-8 | 2.15 U | E3811-FS(0) | 1.000 | 8/4/2022 | 0.637 | 2.15 | 4.30 |
| PFTeDA | 376-06-7 | 2.15 U | E3811-FS(0) | 1.000 | 8/4/2022 | 0.680 | 2.15 | 4.30 |
| NMeFOSAA | 2355-31-9 | 2.15 U | E3811-FS(0) | 1.000 | 8/4/2022 | 0.885 | 2.15 | 4.30 |
| NEtFOSAA | 2991 50 6 | 2.15 U | E3811-FS(0) | 1.000 | 8/4/2022 | 0.851 | 2.15 | 4.30 |
| PFBS | 375-73-5 | 138 | E3811-FS(0) | 1.000 | 8/4/2022 | 0.744 | 2.15 | 4.30 |
| PFHxS | 355-46-4 | 600 | E3811-FS(0) | 1.000 | 8/4/2022 | 0.857 | 2.15 | 4.30 |
| PFOS | 1763-23-1 | 45.7 | E3811-FS(0) | 1.000 | 8/4/2022 | 0.919 | 2.15 | 4.30 |
| HFPO-DA | 13252-13-6 | 2.15 U | E3811-FS(0) | 1.000 | 8/4/2022 | 0.743 | 2.15 | 4.30 |
| Adona | 919005-14-4 | 2.15 U | E3811-FS(0) | 1.000 | 8/4/2022 | 0.747 | 2.15 | 4.30 |
| 9Cl-PF3ONS | 756426-58-1 | 2.15 U | E3811-FS(0) | 1.000 | 8/4/2022 | 0.885 | 2.15 | 4.30 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.15 U | E3811-FS(0) | 1.000 | 8/4/2022 | 0.774 | 2.15 | 4.30 |

MW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW01-0722 |
| Battelle ID | E3812-FS |
| Sample Type | SA |
| Collection Date | 07/04/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.275 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 168 | E3812-FS(0) | 1.000 | 8/4/2022 | 0.830 | 2.27 | 4.55 |
| PFHpA | 375-85-9 | 31.3 | E3812-FS(0) | 1.000 | 8/4/2022 | 0.855 | 2.27 | 4.55 |
| PFOA | 335-67-1 | 42.4 | E3812-FS(0) | 1.000 | 8/4/2022 | 0.918 | 2.27 | 4.55 |
| PFNA | 375-95-1 | 1.14 J | E3812-FS(0) | 1.000 | 8/4/2022 | 0.757 | 2.27 | 4.55 |
| PFDA | 335-76-2 | 2.27 U | E3812-FS(0) | 1.000 | 8/4/2022 | 0.713 | 2.27 | 4.55 |
| PFUnA | 2058-94-8 | 2.27 U | E3812-FS(0) | 1.000 | 8/4/2022 | 0.684 | 2.27 | 4.55 |
| PFDoA | 307-55-1 | 2.27 U | E3812-FS(0) | 1.000 | 8/4/2022 | 0.691 | 2.27 | 4.55 |
| PFTrDA | 72629-94-8 | 2.27 U | E3812-FS(0) | 1.000 | 8/4/2022 | 0.675 | 2.27 | 4.55 |
| PFTeDA | 376-06-7 | 2.27 U | E3812-FS(0) | 1.000 | 8/4/2022 | 0.719 | 2.27 | 4.55 |
| NMeFOSAA | 2355-31-9 | 2.27 U | E3812-FS(0) | 1.000 | 8/4/2022 | 0.936 | 2.27 | 4.55 |
| NEtFOSAA | 2991-50-6 | 2.27 U | E3812-FS(0) | 1.000 | 8/4/2022 | 0.900 | 2.27 | 4.55 |
| PFBS | 375-73-5 | 132 | E3812-FS(0) | 1.000 | 8/4/2022 | 0.787 | 2.27 | 4.55 |
| PFHxS | 355-46-4 | 512 | E3812-FS(0) | 1.000 | 8/4/2022 | 0.906 | 2.27 | 4.55 |
| PFOS | 1763-23-1 | 54.9 | E3812-FS(0) | 1.000 | 8/4/2022 | 0.973 | 2.27 | 4.55 |
| HFPO-DA | 13252-13-6 | 2.27 U | E3812-FS(0) | 1.000 | 8/4/2022 | 0.786 | 2.27 | 4.55 |
| Adona | 919005-14-4 | 2.27 U | E3812-FS(0) | 1.000 | 8/4/2022 | 0.790 | 2.27 | 4.55 |
| 9Cl-PF3ONS | 756426-58-1 | 2.27 U | E3812-FS(0) | 1.000 | 8/4/2022 | 0.936 | 2.27 | 4.55 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.27 U | E3812-FS(0) | 1.000 | 8/4/2022 | 0.819 | 2.27 | 4.55 |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VEP4-EB01-070422 |
| Battelle ID | E3813-FS |
| Sample Type | SA |
| Collection Date | 07/04/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.287 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.795 | 2.18 | 4.36 |
| PFHpA | 375-85-9 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.820 | 2.18 | 4.36 |
| PFOA | 335-67-1 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.880 | 2.18 | 4.36 |
| PFNA | 375-95-1 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.726 | 2.18 | 4.36 |
| PFDA | 335-76-2 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.683 | 2.18 | 4.36 |
| PFUnA | 2058-94-8 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.655 | 2.18 | 4.36 |
| PFDoA | 307-55-1 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.662 | 2.18 | 4.36 |
| PFTrDA | 72629-94-8 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.646 | 2.18 | 4.36 |
| PFTeDA | 376-06-7 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.689 | 2.18 | 4.36 |
| NMeFOSAA | 2355-31-9 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.897 | 2.18 | 4.36 |
| NEtFOSAA | 2991-50-6 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.862 | 2.18 | 4.36 |
| PFBS | 375-73-5 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.754 | 2.18 | 4.36 |
| PFHxS | 355-46-4 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.868 | 2.18 | 4.36 |
| PFOS | 1763-23-1 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.932 | 2.18 | 4.36 |
| HFPO-DA | 13252-13-6 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.753 | 2.18 | 4.36 |
| Adona | 919005-14-4 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.757 | 2.18 | 4.36 |
| 9Cl-PF3ONS | 756426-58-1 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.897 | 2.18 | 4.36 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.18 U | E3813-FS(0) | 1.000 | 8/4/2022 | 0.785 | 2.18 | 4.36 |

MW 10/15/22

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VEP4-GW14-0722 |
| Battelle ID | E3814-FS |
| Sample Type | SA |
| Collection Date | 07/05/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.292 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 73.0 | E3814-FS(0) | 1.000 | 8/4/2022 | 0.782 | 2.14 | 4.28 |
| PFHpA | 375-85-9 | 19.3 | E3814-FS(0) | 1.000 | 8/4/2022 | 0.806 | 2.14 | 4.28 |
| PFOA | 335-67-1 | 33.0 | E3814-FS(0) | 1.000 | 8/4/2022 | 0.865 | 2.14 | 4.28 |
| PFNA | 375-95-1 | 2.14 U | E3814-FS(0) | 1.000 | 8/4/2022 | 0.713 | 2.14 | 4.28 |
| PFDA | 335-76-2 | 2.14 U | E3814-FS(0) | 1.000 | 8/4/2022 | 0.671 | 2.14 | 4.28 |
| PFUnA | 2058-94-8 | 2.14 U | E3814-FS(0) | 1.000 | 8/4/2022 | 0.644 | 2.14 | 4.28 |
| PFDoA | 307-55-1 | 2.14 U | E3814-FS(0) | 1.000 | 8/4/2022 | 0.651 | 2.14 | 4.28 |
| PFTrDA | 72629-94-8 | 2.14 U | E3814-FS(0) | 1.000 | 8/4/2022 | 0.635 | 2.14 | 4.28 |
| PFTeDA | 376-06-7 | 2.14 U | E3814-FS(0) | 1.000 | 8/4/2022 | 0.677 | 2.14 | 4.28 |
| NMeFOSAA | 2355-31-9 | 2.14 U | E3814-FS(0) | 1.000 | 8/4/2022 | 0.882 | 2.14 | 4.28 |
| NEtFOSAA | 2991-50-6 | 2.14 U | E3814-FS(0) | 1.000 | 8/4/2022 | 0.848 | 2.14 | 4.28 |
| PFBS | 375-73-5 | 77.9 | E3814-FS(0) | 1.000 | 8/4/2022 | 0.741 | 2.14 | 4.28 |
| PFHxS | 355-46-4 | 506 | E3814-FS(0) | 1.000 | 8/4/2022 | 0.854 | 2.14 | 4.28 |
| PFOS | 1763-23-1 | 54.4 | E3814-FS(0) | 1.000 | 8/4/2022 | 0.916 | 2.14 | 4.28 |
| HFPO-DA | 13252-13-6 | 2.14 U | E3814-FS(0) | 1.000 | 8/4/2022 | 0.741 | 2.14 | 4.28 |
| Adona | 919005-14-4 | 2.14 U | E3814-FS(0) | 1.000 | 8/4/2022 | 0.744 | 2.14 | 4.28 |
| 9Cl-PF3ONS | 756426-58-1 | 2.14 U | E3814-FS(0) | 1.000 | 8/4/2022 | 0.882 | 2.14 | 4.28 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.14 U | E3814-FS(0) | 1.000 | 8/4/2022 | 0.771 | 2.14 | 4.28 |

MW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VEP4-GW14P-0722 |
| Battelle ID | E3815-FS |
| Sample Type | SA |
| Collection Date | 07/05/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.284 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 74.1 | E3815-FS(0) | 1.000 | 8/4/2022 | 0.804 | 2.20 | 4.40 |
| PFHpA | 375-85-9 | 19.1 | E3815-FS(0) | 1.000 | 8/4/2022 | 0.828 | 2.20 | 4.40 |
| PFOA | 335-67-1 | 29.7 | E3815-FS(0) | 1.000 | 8/4/2022 | 0.889 | 2.20 | 4.40 |
| PFNA | 375-95-1 | 2.20 U | E3815-FS(0) | 1.000 | 8/4/2022 | 0.733 | 2.20 | 4.40 |
| PFDA | 335-76-2 | 2.20 U | E3815-FS(0) | 1.000 | 8/4/2022 | 0.690 | 2.20 | 4.40 |
| PFUnA | 2058-94-8 | 2.20 U | E3815-FS(0) | 1.000 | 8/4/2022 | 0.662 | 2.20 | 4.40 |
| PFDoA | 307-55-1 | 2.20 U | E3815-FS(0) | 1.000 | 8/4/2022 | 0.669 | 2.20 | 4.40 |
| PFTrDA | 72629-94-8 | 2.20 U | E3815-FS(0) | 1.000 | 8/4/2022 | 0.653 | 2.20 | 4.40 |
| PFTeDA | 376-06-7 | 2.20 U | E3815-FS(0) | 1.000 | 8/4/2022 | 0.696 | 2.20 | 4.40 |
| NMeFOSAA | 2355-31-9 | 2.20 U | E3815-FS(0) | 1.000 | 8/4/2022 | 0.907 | 2.20 | 4.40 |
| NEtFOSAA | 2991-50-6 | 2.20 U | E3815-FS(0) | 1.000 | 8/4/2022 | 0.871 | 2.20 | 4.40 |
| PFBS | 375-73-5 | 67.6 | E3815-FS(0) | 1.000 | 8/4/2022 | 0.762 | 2.20 | 4.40 |
| PFHxS | 355-46-4 | 536 | E3815-FS(0) | 1.000 | 8/4/2022 | 0.878 | 2.20 | 4.40 |
| PFOS | 1763-23-1 | 59.2 | E3815-FS(0) | 1.000 | 8/4/2022 | 0.942 | 2.20 | 4.40 |
| HFPO-DA | 13252-13-6 | 2.20 U | E3815-FS(0) | 1.000 | 8/4/2022 | 0.761 | 2.20 | 4.40 |
| Adona | 919005-14-4 | 2.20 U | E3815-FS(0) | 1.000 | 8/4/2022 | 0.765 | 2.20 | 4.40 |
| 9Cl-PF3ONS | 756426-58-1 | 2.20 U | E3815-FS(0) | 1.000 | 8/4/2022 | 0.907 | 2.20 | 4.40 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.20 U | E3815-FS(0) | 1.000 | 8/4/2022 | 0.793 | 2.20 | 4.40 |

NW 10/5/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

9

| | |
|---|---|
| Client ID | VEP4-GW13D-0722 |
| Battelle ID | E3816-FS |
| Sample Type | SA |
| Collection Date | 07/05/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.291 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.893 J | E3816-FS(0) | 1.000 | 8/4/2022 | 0.784 | 2.15 | 4.30 | |
| PFHpA | 375-85-9 | 2.15 U | E3816-FS(0) | 1.000 | 8/4/2022 | 0.808 | 2.15 | 4.30 | |
| PFOA | 335-67-1 | 0.890 J | E3816-FS(0) | 1.000 | 8/4/2022 | 0.868 | 2.15 | 4.30 | |
| PFNA | 375-95-1 | 2.15 U | E3816-FS(0) | 1.000 | 8/4/2022 | 0.716 | 2.15 | 4.30 | |
| PFDA | 335-76-2 | 2.15 U | E3816-FS(0) | 1.000 | 8/4/2022 | 0.674 | 2.15 | 4.30 | |
| PFUnA | 2058-94-8 | 2.15 U | E3816-FS(0) | 1.000 | 8/4/2022 | 0.646 | 2.15 | 4.30 | |
| PFDoA | 307-55-1 | 2.15 U | E3816-FS(0) | 1.000 | 8/4/2022 | 0.653 | 2.15 | 4.30 | |
| PFTrDA | 72629-94-8 | 2.15 U | E3816-FS(0) | 1.000 | 8/4/2022 | 0.637 | 2.15 | 4.30 | |
| PFTeDA | 376-06-7 | 2.15 U | E3816-FS(0) | 1.000 | 8/4/2022 | 0.680 | 2.15 | 4.30 | |
| NMeFOSAA | 2355-31-9 | 2.15 U UJ | E3816-FS(0) | 1.000 | 8/4/2022 | 0.885 | 2.15 | 4.30 | SSL |
| NEtFOSAA | 2991-50-6 | 2.15 UJ | E3816-FS(0) | 1.000 | 8/4/2022 | 0.851 | 2.15 | 4.30 | SSL |
| PFBS | 375-73-5 | 3.59 J | E3816-FS(0) | 1.000 | 8/4/2022 | 0.744 | 2.15 | 4.30 | |
| PFHxS | 355-46-4 | 18.3 | E3816-FS(0) | 1.000 | 8/4/2022 | 0.857 | 2.15 | 4.30 | |
| PFOS | 1763-23-1 | 1.85 J | E3816-FS(0) | 1.000 | 8/4/2022 | 0.919 | 2.15 | 4.30 | |
| HFPO-DA | 13252-13-6 | 2.15 U | E3816-FS(0) | 1.000 | 8/4/2022 | 0.743 | 2.15 | 4.30 | |
| Adona | 919005-14-4 | 2.15 U | E3816-FS(0) | 1.000 | 8/4/2022 | 0.747 | 2.15 | 4.30 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.15 U | E3816-FS(0) | 1.000 | 8/4/2022 | 0.885 | 2.15 | 4.30 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.15 U | E3816-FS(0) | 1.000 | 8/4/2022 | 0.774 | 2.15 | 4.30 | |

NW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VEP4-GW13D-0722 |
| Battelle ID | E3816-FS |
| Sample Type | SA |
| Collection Date | 07/05/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 72 | E3816-FS(0) | 8/4/2022 |
| 13C4-PFHpA | 72 | E3816-FS(0) | 8/4/2022 |
| 13C8-PFOA | 74 | E3816-FS(0) | 8/4/2022 |
| 13C9-PFNA | 75 | E3816-FS(0) | 8/4/2022 |
| 13C6-PFDA | 70 | E3816-FS(0) | 8/4/2022 |
| 13C7-PFUnA | 66 | E3816-FS(0) | 8/4/2022 |
| 13C2-PFDoA | 58 | E3816-FS(0) | 8/4/2022 |
| 13C2-PFTeDA | 58 | E3816-FS(0) | 8/4/2022 |
| d3-MeFOSAA | 41 N | E3816-FS(0) | 8/4/2022 |
| d5-EtFOSAA | 38 N | E3816-FS(0) | 8/4/2022 |
| 13C3-PFBS | 64 | E3816-FS(0) | 8/4/2022 |
| 13C3-PFHxS | 74 | E3816-FS(0) | 8/4/2022 |
| 13C8-PFOS | 82 | E3816-FS(0) | 8/4/2022 |
| 13C3-HFPO-DA | 75 | E3816-FS(0) | 8/4/2022 |

MW 10/18/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VEP4-GW13-0722 |
| Battelle ID | E3817-FS |
| Sample Type | SA |
| Collection Date | 07/05/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.276 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 7.18 | E3817-FS(0) | 1.000 | 8/4/2022 | 0.827 | 2.26 | 4.53 | |
| PFHpA | 375-85-9 | 1.86 J | E3817-FS(0) | 1.000 | 8/4/2022 | 0.852 | 2.26 | 4.53 | |
| PFOA | 335-67-1 | 4.24 J | E3817-FS(0) | 1.000 | 8/4/2022 | 0.915 | 2.26 | 4.53 | |
| PFNA | 375-95-1 | 2.26 U | E3817-FS(0) | 1.000 | 8/4/2022 | 0.755 | 2.26 | 4.53 | |
| PFDA | 335-76-2 | 2.26 U | E3817-FS(0) | 1.000 | 8/4/2022 | 0.710 | 2.26 | 4.53 | |
| PFUnA | 2058-94-8 | 2.26 U | E3817-FS(0) | 1.000 | 8/4/2022 | 0.681 | 2.26 | 4.53 | |
| PFDoA | 307-55-1 | 2.26 U | E3817-FS(0) | 1.000 | 8/4/2022 | 0.688 | 2.26 | 4.53 | |
| PFTrDA | 72629-94-8 | 2.26 U | E3817-FS(0) | 1.000 | 8/4/2022 | 0.672 | 2.26 | 4.53 | |
| PFTeDA | 376-06-7 | 2.26 U | E3817-FS(0) | 1.000 | 8/4/2022 | 0.716 | 2.26 | 4.53 | |
| NMeFOSAA | 2355-31-9 | 2.26 U UJ | E3817-FS(0) | 1.000 | 8/4/2022 | 0.933 | 2.26 | 4.53 | SSL |
| NEtFOSAA | 2991-50-6 | 2.26 U UJ | E3817-FS(0) | 1.000 | 8/4/2022 | 0.897 | 2.26 | 4.53 | SSL |
| PFBS | 375-73-5 | 13.3 | E3817-FS(0) | 1.000 | 8/4/2022 | 0.784 | 2.26 | 4.53 | |
| PFHxS | 355-46-4 | 74.9 | E3817-FS(0) | 1.000 | 8/4/2022 | 0.903 | 2.26 | 4.53 | |
| PFOS | 1763-23-1 | 5.84 | E3817-FS(0) | 1.000 | 8/4/2022 | 0.969 | 2.26 | 4.53 | |
| HFPO-DA | 13252-13-6 | 2.26 U | E3817-FS(0) | 1.000 | 8/4/2022 | 0.784 | 2.26 | 4.53 | |
| Adona | 919005-14-4 | 2.26 U | E3817-FS(0) | 1.000 | 8/4/2022 | 0.787 | 2.26 | 4.53 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.26 U | E3817-FS(0) | 1.000 | 8/4/2022 | 0.933 | 2.26 | 4.53 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.26 U | E3817-FS(0) | 1.000 | 8/4/2022 | 0.816 | 2.26 | 4.53 | |

NW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW13-0722 |
| Battelle ID | E3817-FS |
| Sample Type | SA |
| Collection Date | 07/05/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 80 | E3817-FS(0) | 8/4/2022 |
| 13C4-PFHpA | 76 | E3817-FS(0) | 8/4/2022 |
| 13C8-PFOA | 79 | E3817-FS(0) | 8/4/2022 |
| 13C9-PFNA | 78 | E3817-FS(0) | 8/4/2022 |
| 13C6-PFDA | 81 | E3817-FS(0) | 8/4/2022 |
| 13C7-PFUnA | 75 | E3817-FS(0) | 8/4/2022 |
| 13C2-PFDoA | 65 | E3817-FS(0) | 8/4/2022 |
| 13C2-PFTeDA | 62 | E3817-FS(0) | 8/4/2022 |
| d3-MeFOSAA | 47 N | E3817-FS(0) | 8/4/2022 |
| d5-EtFOSAA | 43 N | E3817-FS(0) | 8/4/2022 |
| 13C3-PFBS | 66 | E3817-FS(0) | 8/4/2022 |
| 13C3-PFHxS | 68 | E3817-FS(0) | 8/4/2022 |
| 13C8-PFOS | 80 | E3817-FS(0) | 8/4/2022 |
| 13C3-HFPO-DA | 67 | E3817-FS(0) | 8/4/2022 |

MW 10/15/22

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VEP4-GW10-0722 |
| Battelle ID | E3818-FS |
| Sample Type | SA |
| Collection Date | 07/05/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.287 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 1.22 J | E3818-FS(0) | 1.000 | 8/4/2022 | 0.795 | 2.18 | 4.36 |
| PFHpA | 375-85-9 | 2.18 U | E3818-FS(0) | 1.000 | 8/4/2022 | 0.820 | 2.18 | 4.36 |
| PFOA | 335-67-1 | 2.24 J | E3818-FS(0) | 1.000 | 8/4/2022 | 0.880 | 2.18 | 4.36 |
| PFNA | 375-95-1 | 2.18 U | E3818-FS(0) | 1.000 | 8/4/2022 | 0.726 | 2.18 | 4.36 |
| PFDA | 335-76-2 | 2.18 U | E3818-FS(0) | 1.000 | 8/4/2022 | 0.683 | 2.18 | 4.36 |
| PFUnA | 2058-94-8 | 2.18 U | E3818-FS(0) | 1.000 | 8/4/2022 | 0.655 | 2.18 | 4.36 |
| PFDoA | 307-55-1 | 2.18 U | E3818-FS(0) | 1.000 | 8/4/2022 | 0.662 | 2.18 | 4.36 |
| PFTrDA | 72629-94-8 | 2.18 U | E3818-FS(0) | 1.000 | 8/4/2022 | 0.646 | 2.18 | 4.36 |
| PFTeDA | 376-06-7 | 2.18 U | E3818-FS(0) | 1.000 | 8/4/2022 | 0.689 | 2.18 | 4.36 |
| NMeFOSAA | 2355-31-9 | 2.18 U | E3818-FS(0) | 1.000 | 8/4/2022 | 0.897 | 2.18 | 4.36 |
| NEtFOSAA | 2991-50-6 | 2.18 UJ | E3818-FS(0) | 1.000 | 8/4/2022 | 0.862 | 2.18 | 4.36 |
| PFBS | 375-73-5 | 10.4 | E3818-FS(0) | 1.000 | 8/4/2022 | 0.754 | 2.18 | 4.36 |
| PFHxS | 355-46-4 | 59.6 | E3818-FS(0) | 1.000 | 8/4/2022 | 0.868 | 2.18 | 4.36 |
| PFOS | 1763-23-1 | 4.33 J | E3818-FS(0) | 1.000 | 8/4/2022 | 0.932 | 2.18 | 4.36 |
| HFPO-DA | 13252-13-6 | 2.18 U | E3818-FS(0) | 1.000 | 8/4/2022 | 0.753 | 2.18 | 4.36 |
| Adona | 919005-14-4 | 2.18 U | E3818-FS(0) | 1.000 | 8/4/2022 | 0.757 | 2.18 | 4.36 |
| 9Cl-PF3ONS | 756426-58-1 | 2.18 U | E3818-FS(0) | 1.000 | 8/4/2022 | 0.897 | 2.18 | 4.36 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.18 U | E3818-FS(0) | 1.000 | 8/4/2022 | 0.785 | 2.18 | 4.36 |

SSL

NH 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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11

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW10-0722 |
| Battelle ID | E3818-FS |
| Sample Type | SA |
| Collection Date | 07/05/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 79 | E3818-FS(0) | 8/4/2022 |
| 13C4-PFHpA | 77 | E3818-FS(0) | 8/4/2022 |
| 13C8-PFOA | 77 | E3818-FS(0) | 8/4/2022 |
| 13C9-PFNA | 79 | E3818-FS(0) | 8/4/2022 |
| 13C6-PFDA | 81 | E3818-FS(0) | 8/4/2022 |
| 13C7-PFUnA | 65 | E3818-FS(0) | 8/4/2022 |
| 13C2-PFDoA | 58 | E3818-FS(0) | 8/4/2022 |
| 13C2-PFTeDA | 56 | E3818-FS(0) | 8/4/2022 |
| d3-MeFOSAA | 50 | E3818-FS(0) | 8/4/2022 |
| d5-EtFOSAA | 43 | E3818-FS(0) | 8/4/2022 |
| 13C3-PFBS | 64 | E3818-FS(0) | 8/4/2022 |
| 13C3-PFHxS | 70 | E3818-FS(0) | 8/4/2022 |
| 13C8-PFOS | 75 | E3818-FS(0) | 8/4/2022 |
| 13C3-HFPO-DA | 67 | E3818-FS(0) | 8/4/2022 |

NW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW09-0722 |
| Battelle ID | E3819-FS |
| Sample Type | SA |
| Collection Date | 07/05/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.291 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 96.3 | E3819-FS(0) | 1.000 | 8/4/2022 | 0.784 | 2.15 | 4.30 |
| PFHpA | 375-85-9 | 21.9 | E3819-FS(0) | 1.000 | 8/4/2022 | 0.808 | 2.15 | 4.30 |
| PFOA | 335-67-1 | 35.7 | E3819-FS(0) | 1.000 | 8/4/2022 | 0.868 | 2.15 | 4.30 |
| PFNA | 375-95-1 | 2.15 U | E3819-FS(0) | 1.000 | 8/4/2022 | 0.716 | 2.15 | 4.30 |
| PFDA | 335-76-2 | 2.15 U | E3819-FS(0) | 1.000 | 8/4/2022 | 0.674 | 2.15 | 4.30 |
| PFUnA | 2058-94-8 | 2.15 U | E3819-FS(0) | 1.000 | 8/4/2022 | 0.646 | 2.15 | 4.30 |
| PFDoA | 307-55-1 | 2.15 U | E3819-FS(0) | 1.000 | 8/4/2022 | 0.653 | 2.15 | 4.30 |
| PFTrDA | 72629-94-8 | 2.15 U | E3819-FS(0) | 1.000 | 8/4/2022 | 0.637 | 2.15 | 4.30 |
| PFTeDA | 376-06-7 | 2.15 U | E3819-FS(0) | 1.000 | 8/4/2022 | 0.680 | 2.15 | 4.30 |
| NMeFOSAA | 2355-31-9 | 2.15 U | E3819-FS(0) | 1.000 | 8/4/2022 | 0.885 | 2.15 | 4.30 |
| NEtFOSAA | 2991-50-6 | 2.15 U | E3819-FS(0) | 1.000 | 8/4/2022 | 0.851 | 2.15 | 4.30 |
| PFBS | 375-73-5 | 87.1 | E3819-FS(0) | 1.000 | 8/4/2022 | 0.744 | 2.15 | 4.30 |
| PFHxS | 355-46-4 | 628 | E3819-FS(0) | 1.000 | 8/4/2022 | 0.857 | 2.15 | 4.30 |
| PFOS | 1763-23-1 | 73.6 | E3819-FS(0) | 1.000 | 8/4/2022 | 0.919 | 2.15 | 4.30 |
| HFPO-DA | 13252-13-6 | 2.15 U | E3819-FS(0) | 1.000 | 8/4/2022 | 0.743 | 2.15 | 4.30 |
| Adona | 919005-14-4 | 2.15 U | E3819-FS(0) | 1.000 | 8/4/2022 | 0.747 | 2.15 | 4.30 |
| 9Cl-PF3ONS | 756426-58-1 | 2.15 U | E3819-FS(0) | 1.000 | 8/4/2022 | 0.885 | 2.15 | 4.30 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.15 U | E3819-FS(0) | 1.000 | 8/4/2022 | 0.774 | 2.15 | 4.30 |

NW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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13

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-EB01-070522 |
| Battelle ID | E3820-FS |
| Sample Type | SA |
| Collection Date | 07/05/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.297 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.769 | 2.10 | 4.21 |
| PFHpA | 375-85-9 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.792 | 2.10 | 4.21 |
| PFOA | 335-67-1 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.850 | 2.10 | 4.21 |
| PFNA | 375-95-1 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.701 | 2.10 | 4.21 |
| PFDA | 335-76-2 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.660 | 2.10 | 4.21 |
| PFUnA | 2058-94-8 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.633 | 2.10 | 4.21 |
| PFDoA | 307-55-1 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.640 | 2.10 | 4.21 |
| PFTrDA | 72629-94-8 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.625 | 2.10 | 4.21 |
| PFTeDA | 376-06-7 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.666 | 2.10 | 4.21 |
| NMeFOSAA | 2355-31-9 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.867 | 2.10 | 4.21 |
| NEtFOSAA | 2991-50-6 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.833 | 2.10 | 4.21 |
| PFBS | 375-73-5 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.729 | 2.10 | 4.21 |
| PFHxS | 355-46-4 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.839 | 2.10 | 4.21 |
| PFOS | 1763-23-1 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.901 | 2.10 | 4.21 |
| HFPO-DA | 13252-13-6 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.728 | 2.10 | 4.21 |
| Adona | 919005-14-4 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.731 | 2.10 | 4.21 |
| 9Cl-PF3ONS | 756426-58-1 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.867 | 2.10 | 4.21 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.10 U | E3820-FS(0) | 1.000 | 8/4/2022 | 0.758 | 2.10 | 4.21 |

NW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

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14

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-EB01-070122 |
| Battelle ID | E3821-FS |
| Sample Type | SA |
| Collection Date | 07/01/2022 |
| Extraction Date | 07/13/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | GW |
| Sample Size | 0.288 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.793 | 2.17 | 4.34 |
| PFHpA | 375-85-9 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.817 | 2.17 | 4.34 |
| PFOA | 335-67-1 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.877 | 2.17 | 4.34 |
| PFNA | 375-95-1 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.723 | 2.17 | 4.34 |
| PFDA | 335-76-2 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.681 | 2.17 | 4.34 |
| PFUnA | 2058-94-8 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.653 | 2.17 | 4.34 |
| PFDoA | 307-55-1 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.660 | 2.17 | 4.34 |
| PFTrDA | 72629-94-8 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.644 | 2.17 | 4.34 |
| PFTeDA | 376-06-7 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.687 | 2.17 | 4.34 |
| NMeFOSAA | 2355-31-9 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.894 | 2.17 | 4.34 |
| NEtFOSAA | 2991-50-6 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.859 | 2.17 | 4.34 |
| PFBS | 375-73-5 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.752 | 2.17 | 4.34 |
| PFHxS | 355-46-4 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.865 | 2.17 | 4.34 |
| PFOS | 1763-23-1 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.929 | 2.17 | 4.34 |
| HFPO-DA | 13252-13-6 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.751 | 2.17 | 4.34 |
| Adona | 919005-14-4 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.754 | 2.17 | 4.34 |
| 9Cl-PF3ONS | 756426-58-1 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.894 | 2.17 | 4.34 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.17 U | E3821-FS(0) | 1.000 | 8/4/2022 | 0.782 | 2.17 | 4.34 |

NW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/4/2022

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-1198
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-0003, Puerto Rico
Date: October 15, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEP4-GW32-0722 | E4052-FS | Water |
| 2 | VEP4-GW33-0722 | E4053-FS | Water |
| 3 | VWS7-PFAS-GW01-0722 | E4054-FS | Water |
| 3MS | VWS7-PFAS-GW01-0722MS | E4055-FSMS | Water |
| 3MSD | VWS7-PFAS-GW01-0722MSD | E4056-FSMSD | Water |
| 4 | VWS7-PFAS-GW01P-0722 | E4057-FS | Water |
| 5 | VWS7-FB01-070922 | E4058-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for four water samples and one aqueous field blank sample collected on July 7-9, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

### LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWS7-FB01-070922 | None - ND | - | - | - |
| VEW10-EB01-040522-GW | None - ND | - | - | - |
| VWMP-EB01-071122 | None - ND | - | - | - |
| VEP4-FB01-071222 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable low surrogate percent recoveries (%R) for one or two surrogates. The associated compounds were qualified as estimated (UJ). Please refer to the summary forms behind the Form Is for specific recoveries.

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VWS7-PFAS-GW01-0722 ng/L | VWS7-PFAS-GW01P-0722 ng/L | RPD | Qualifier |
|---|---|---|---|---|
| PFHxA | 0.853 | 0.879 | 3% | None |
| PFBS | 1.79 | 1.63 | 9% | |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 10/17/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

1

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW32-0722 |
| Battelle ID | E4052-FS |
| Sample Type | SA |
| Collection Date | 07/07/2022 |
| Extraction Date | 07/18/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.302 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.756 | 2.07 | 4.14 |
| PFHpA | 375-85-9 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.779 | 2.07 | 4.14 |
| PFOA | 335-67-1 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.836 | 2.07 | 4.14 |
| PFNA | 375-95-1 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.690 | 2.07 | 4.14 |
| PFDA | 335-76-2 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.649 | 2.07 | 4.14 |
| PFUnA | 2058-94-8 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.623 | 2.07 | 4.14 |
| PFDoA | 307-55-1 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.629 | 2.07 | 4.14 |
| PFTrDA | 72629-94-8 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.614 | 2.07 | 4.14 |
| PFTeDA | 376-06-7 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.655 | 2.07 | 4.14 |
| NMeFOSAA | 2355-31-9 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.853 | 2.07 | 4.14 |
| NEtFOSAA | 2991-50-6 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.820 | 2.07 | 4.14 |
| PFBS | 375-73-5 | 0.987 J | E4052-FS(0) | 1.000 | 8/13/2022 | 0.717 | 2.07 | 4.14 |
| PFHxS | 355-46-4 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.825 | 2.07 | 4.14 |
| PFOS | 1763-23-1 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.886 | 2.07 | 4.14 |
| HFPO-DA | 13252-13-6 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.716 | 2.07 | 4.14 |
| Adona | 919005-14-4 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.719 | 2.07 | 4.14 |
| 9Cl-PF3ONS | 756426-58-1 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.853 | 2.07 | 4.14 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.07 U | E4052-FS(0) | 1.000 | 8/13/2022 | 0.746 | 2.07 | 4.14 |

MW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/15/2022

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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW33-0722 |
| Battelle ID | E4053-FS |
| Sample Type | SA |
| Collection Date | 07/07/2022 |
| Extraction Date | 07/18/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.289 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.790 | 2.16 | 4.33 | |
| PFHpA | 375-85-9 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.814 | 2.16 | 4.33 | |
| PFOA | 335-67-1 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.874 | 2.16 | 4.33 | |
| PFNA | 375-95-1 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.721 | 2.16 | 4.33 | |
| PFDA | 335-76-2 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.678 | 2.16 | 4.33 | |
| PFUnA | 2058-94-8 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.651 | 2.16 | 4.33 | |
| PFDoA | 307-55-1 | 2.16 UJ | E4053-FS(0) | 1.000 | 8/13/2022 | 0.657 | 2.16 | 4.33 | SSL |
| PFTrDA | 72629-94-8 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.642 | 2.16 | 4.33 | |
| PFTeDA | 376-06-7 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.684 | 2.16 | 4.33 | |
| NMeFOSAA | 2355-31-9 | 2.16 UJ | E4053-FS(0) | 1.000 | 8/13/2022 | 0.891 | 2.16 | 4.33 | SSL |
| NEtFOSAA | 2991-50-6 | 2.16 UJ | E4053-FS(0) | 1.000 | 8/13/2022 | 0.856 | 2.16 | 4.33 | SSL |
| PFBS | 375-73-5 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.749 | 2.16 | 4.33 | |
| PFHxS | 355-46-4 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.862 | 2.16 | 4.33 | |
| PFOS | 1763-23-1 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.926 | 2.16 | 4.33 | |
| HFPO-DA | 13252-13-6 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.748 | 2.16 | 4.33 | |
| Adona | 919005-14-4 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.752 | 2.16 | 4.33 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.891 | 2.16 | 4.33 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.16 U | E4053-FS(0) | 1.000 | 8/13/2022 | 0.779 | 2.16 | 4.33 | |

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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW33-0722 |
| Battelle ID | E4053-FS |
| Sample Type | SA |
| Collection Date | 07/07/2022 |
| Extraction Date | 07/18/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 72 | E4053-FS(0) | 8/13/2022 |
| 13C4-PFHpA | 73 | E4053-FS(0) | 8/13/2022 |
| 13C8-PFOA | 74 | E4053-FS(0) | 8/13/2022 |
| 13C9-PFNA | 70 | E4053-FS(0) | 8/13/2022 |
| 13C6-PFDA | 65 | E4053-FS(0) | 8/13/2022 |
| 13C7-PFUnA | 54 | E4053-FS(0) | 8/13/2022 |
| 13C2-PFDoA | 48 N | E4053-FS(0) | 8/13/2022 |
| 13C2-PFTeDA | 57 | E4053-FS(0) | 8/13/2022 |
| d3-MeFOSAA | 40 N | E4053-FS(0) | 8/13/2022 |
| d5-EtFOSAA | 44 N | E4053-FS(0) | 8/13/2022 |
| 13C3-PFBS | 71 | E4053-FS(0) | 8/13/2022 |
| 13C3-PFHxS | 76 | E4053-FS(0) | 8/13/2022 |
| 13C8-PFOS | 75 | E4053-FS(0) | 8/13/2022 |
| 13C3-HFPO-DA | 82 | E4053-FS(0) | 8/13/2022 |

MW 10/5/22

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3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS7-PFAS-GW01-0722 |
| Battelle ID | E4054-FS |
| Sample Type | SA |
| Collection Date | 07/09/2022 |
| Extraction Date | 07/18/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.272 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.853 J | E4054-FS(0) | 1.000 | 8/13/2022 | 0.839 | 2.30 | 4.60 |
| PFHpA | 375-85-9 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.865 | 2.30 | 4.60 |
| PFOA | 335-67-1 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.928 | 2.30 | 4.60 |
| PFNA | 375-95-1 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.766 | 2.30 | 4.60 |
| PFDA | 335-76-2 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.721 | 2.30 | 4.60 |
| PFUnA | 2058-94-8 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.691 | 2.30 | 4.60 |
| PFDoA | 307-55-1 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.699 | 2.30 | 4.60 |
| PFTrDA | 72629-94-8 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.682 | 2.30 | 4.60 |
| PFTeDA | 376-06-7 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.727 | 2.30 | 4.60 |
| NMeFOSAA | 2355-31-9 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.947 | 2.30 | 4.60 |
| NEtFOSAA | 2991-50-6 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.910 | 2.30 | 4.60 |
| PFBS | 375-73-5 | 1.79 J | E4054-FS(0) | 1.000 | 8/13/2022 | 0.796 | 2.30 | 4.60 |
| PFHxS | 355-46-4 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.916 | 2.30 | 4.60 |
| PFOS | 1763-23-1 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.983 | 2.30 | 4.60 |
| HFPO-DA | 13252-13-6 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.795 | 2.30 | 4.60 |
| Adona | 919005-14-4 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.799 | 2.30 | 4.60 |
| 9Cl-PF3ONS | 756426-58-1 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.947 | 2.30 | 4.60 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.30 U | E4054-FS(0) | 1.000 | 8/13/2022 | 0.828 | 2.30 | 4.60 |

NW 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/15/2022

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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS7-PFAS-GW01P-0722 |
| Battelle ID | E4057-FS |
| Sample Type | SA |
| Collection Date | 07/09/2022 |
| Extraction Date | 07/18/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.282 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.879 J | E4057-FS(0) | 1.000 | 8/13/2022 | 0.809 | 2.22 | 4.43 |
| PFHpA | 375-85-9 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.834 | 2.22 | 4.43 |
| PFOA | 335-67-1 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.895 | 2.22 | 4.43 |
| PFNA | 375-95-1 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.738 | 2.22 | 4.43 |
| PFDA | 335-76-2 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.695 | 2.22 | 4.43 |
| PFUnA | 2058-94-8 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.667 | 2.22 | 4.43 |
| PFDoA | 307-55-1 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.674 | 2.22 | 4.43 |
| PFTrDA | 72629-94-8 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.658 | 2.22 | 4.43 |
| PFTeDA | 376-06-7 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.701 | 2.22 | 4.43 |
| NMeFOSAA | 2355-31-9 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.913 | 2.22 | 4.43 |
| NEtFOSAA | 2991-50-6 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.878 | 2.22 | 4.43 |
| PFBS | 375-73-5 | 1.63 J | E4057-FS(0) | 1.000 | 8/13/2022 | 0.768 | 2.22 | 4.43 |
| PFHxS | 355-46-4 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.884 | 2.22 | 4.43 |
| PFOS | 1763-23-1 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.949 | 2.22 | 4.43 |
| HFPO-DA | 13252-13-6 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.767 | 2.22 | 4.43 |
| Adona | 919005-14-4 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.770 | 2.22 | 4.43 |
| 9Cl-PF3ONS | 756426-58-1 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.913 | 2.22 | 4.43 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.22 U | E4057-FS(0) | 1.000 | 8/13/2022 | 0.799 | 2.22 | 4.43 |

MW 10/5/22

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5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS7-FB01-070922 |
| Battelle ID | E4058-FS |
| Sample Type | SA |
| Collection Date | 07/09/2022 |
| Extraction Date | 07/18/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.253 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.902 | 2.47 | 4.94 |
| PFHpA | 375-85-9 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.930 | 2.47 | 4.94 |
| PFOA | 335-67-1 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.998 | 2.47 | 4.94 |
| PFNA | 375-95-1 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.823 | 2.47 | 4.94 |
| PFDA | 335-76-2 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.775 | 2.47 | 4.94 |
| PFUnA | 2058-94-8 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.743 | 2.47 | 4.94 |
| PFDoA | 307-55-1 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.751 | 2.47 | 4.94 |
| PFTrDA | 72629-94-8 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.733 | 2.47 | 4.94 |
| PFTeDA | 376-06-7 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.782 | 2.47 | 4.94 |
| NMeFOSAA | 2355-31-9 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 1.02 | 2.47 | 4.94 |
| NEtFOSAA | 2991-50-6 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.978 | 2.47 | 4.94 |
| PFBS | 375-73-5 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.856 | 2.47 | 4.94 |
| PFHxS | 355-46-4 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.985 | 2.47 | 4.94 |
| PFOS | 1763-23-1 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 1.06 | 2.47 | 4.94 |
| HFPO-DA | 13252-13-6 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.855 | 2.47 | 4.94 |
| Adona | 919005-14-4 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.859 | 2.47 | 4.94 |
| 9Cl-PF3ONS | 756426-58-1 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 1.02 | 2.47 | 4.94 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.47 U | E4058-FS(0) | 1.000 | 8/13/2022 | 0.890 | 2.47 | 4.94 |

MR 10/15/22

Analyzed by: Griffith, Lauren
Printed: 8/15/2022

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-1199
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-0003, Puerto Rico
Date: October 16, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VWAB-PFAS-GW01-0722 | E4059-FS | Water |
| 1MS | VWAB-PFAS-GW01-0722MS | E4060-FSMS | Water |
| 1MSD | VWAB-PFAS-GW01-0722MSD | E4061-FSMSD | Water |
| 2 | VWAB-PFAS-GW01P-0722 | E4062-FS | Water |
| 3 | VWAB-FB01-070922 | E4063-FS | Water |
| 4 | VWMP-PFAS-GW01-0722 | E4064-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for three water samples and one aqueous field blank sample collected on July 9, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

### LC/MS Tuning

- All criteria were met.

### Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWAB-FB01-070922 | None - ND | - | - | - |
| VWMP-EB01-071122 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VWAB-PFAS-GW01-0722 ng/L | VWAB-PFAS-GW01P-0722 ng/L | RPD | Qualifier |
|---|---|---|---|---|
| PFHxA | 55.7 | 54.0 | 3% | None |
| PFHpA | 25.8 | 26.1 | 1% | |
| PFOA | 93.4 | 85.9 | 8% | |
| PFNA | 1.60 | 1.85 | 14% | |
| PFBS | 36.9 | 37.2 | 1% | |
| PFHxS | 181 | 197 | 8% | |
| PFOS | 83.3 | 82.0 | 2% | |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 10/17/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAB-PFAS-GW01-0722 |
| Battelle ID | E4059-FS |
| Sample Type | SA |
| Collection Date | 07/09/2022 |
| Extraction Date | 07/18/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.290 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 55.7 | E4059-FS(0) | 1.000 | 8/13/2022 | 0.787 | 2.16 | 4.31 |
| PFHpA | 375-85-9 | 25.8 | E4059-FS(0) | 1.000 | 8/13/2022 | 0.811 | 2.16 | 4.31 |
| PFOA | 335-67-1 | 93.4 | E4059-FS(0) | 1.000 | 8/13/2022 | 0.871 | 2.16 | 4.31 |
| PFNA | 375-95-1 | 1.60 J | E4059-FS(0) | 1.000 | 8/13/2022 | 0.718 | 2.16 | 4.31 |
| PFDA | 335-76-2 | 2.16 U | E4059-FS(0) | 1.000 | 8/13/2022 | 0.676 | 2.16 | 4.31 |
| PFUnA | 2058-94-8 | 2.16 U | E4059-FS(0) | 1.000 | 8/13/2022 | 0.648 | 2.16 | 4.31 |
| PFDoA | 307-55-1 | 2.16 U | E4059-FS(0) | 1.000 | 8/13/2022 | 0.655 | 2.16 | 4.31 |
| PFTrDA | 72629-94-8 | 2.16 U | E4059-FS(0) | 1.000 | 8/13/2022 | 0.640 | 2.16 | 4.31 |
| PFTeDA | 376-06-7 | 2.16 U | E4059-FS(0) | 1.000 | 8/13/2022 | 0.682 | 2.16 | 4.31 |
| NMeFOSAA | 2355-31-9 | 2.16 U | E4059-FS(0) | 1.000 | 8/13/2022 | 0.888 | 2.16 | 4.31 |
| NEtFOSAA | 2991-50-6 | 2.16 U | E4059-FS(0) | 1.000 | 8/13/2022 | 0.853 | 2.16 | 4.31 |
| PFBS | 375-73-5 | 36.9 | E4059-FS(0) | 1.000 | 8/13/2022 | 0.747 | 2.16 | 4.31 |
| PFHxS | 355-46-4 | 181 | E4059-FS(0) | 1.000 | 8/13/2022 | 0.859 | 2.16 | 4.31 |
| PFOS | 1763-23-1 | 83.3 | E4059-FS(0) | 1.000 | 8/13/2022 | 0.922 | 2.16 | 4.31 |
| HFPO-DA | 13252-13-6 | 2.16 U | E4059-FS(0) | 1.000 | 8/13/2022 | 0.746 | 2.16 | 4.31 |
| Adona | 919005-14-4 | 2.16 U | E4059-FS(0) | 1.000 | 8/13/2022 | 0.749 | 2.16 | 4.31 |
| 9Cl-PF3ONS | 756426-58-1 | 2.16 U | E4059-FS(0) | 1.000 | 8/13/2022 | 0.888 | 2.16 | 4.31 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.16 U | E4059-FS(0) | 1.000 | 8/13/2022 | 0.777 | 2.16 | 4.31 |

MW 10/11/22

Analyzed by: Griffith, Lauren
Printed: 8/24/2022

BATTELLE
It can be done

2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAB-PFAS-GW01P-0722 |
| Battelle ID | E4062-FS |
| Sample Type | SA |
| Collection Date | 07/09/2022 |
| Extraction Date | 07/18/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.287 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 54.0 | E4062-FS(0) | 1.000 | 8/13/2022 | 0.795 | 2.18 | 4.36 |
| PFHpA | 375-85-9 | 26.1 | E4062-FS(0) | 1.000 | 8/13/2022 | 0.820 | 2.18 | 4.36 |
| PFOA | 335-67-1 | 86.9 | E4062-FS(0) | 1.000 | 8/13/2022 | 0.880 | 2.18 | 4.36 |
| PFNA | 375-95-1 | 1.85 J | E4062-FS(0) | 1.000 | 8/13/2022 | 0.726 | 2.18 | 4.36 |
| PFDA | 335-76-2 | 2.18 U | E4062-FS(0) | 1.000 | 8/13/2022 | 0.683 | 2.18 | 4.36 |
| PFUnA | 2058-94-8 | 2.18 U | E4062-FS(0) | 1.000 | 8/13/2022 | 0.655 | 2.18 | 4.36 |
| PFDoA | 307-55-1 | 2.18 U | E4062-FS(0) | 1.000 | 8/13/2022 | 0.662 | 2.18 | 4.36 |
| PFTrDA | 72629-94-8 | 2.18 U | E4062-FS(0) | 1.000 | 8/13/2022 | 0.646 | 2.18 | 4.36 |
| PFTeDA | 376-06-7 | 2.18 U | E4062-FS(0) | 1.000 | 8/13/2022 | 0.689 | 2.18 | 4.36 |
| NMeFOSAA | 2355-31-9 | 2.18 U | E4062-FS(0) | 1.000 | 8/13/2022 | 0.897 | 2.18 | 4.36 |
| NEtFOSAA | 2991-50-6 | 2.18 U | E4062-FS(0) | 1.000 | 8/13/2022 | 0.862 | 2.18 | 4.36 |
| PFBS | 375-73-5 | 37.2 | E4062-FS(0) | 1.000 | 8/13/2022 | 0.754 | 2.18 | 4.36 |
| PFHxS | 355-46-4 | 197 | E4062-FS(0) | 1.000 | 8/13/2022 | 0.868 | 2.18 | 4.36 |
| PFOS | 1763-23-1 | 82.0 | E4062-FS(0) | 1.000 | 8/13/2022 | 0.932 | 2.18 | 4.36 |
| HFPO-DA | 13252-13-6 | 2.18 U | E4062-FS(0) | 1.000 | 8/13/2022 | 0.753 | 2.18 | 4.36 |
| Adona | 919005-14-4 | 2.18 U | E4062-FS(0) | 1.000 | 8/13/2022 | 0.757 | 2.18 | 4.36 |
| 9Cl-PF3ONS | 756426-58-1 | 2.18 U | E4062-FS(0) | 1.000 | 8/13/2022 | 0.897 | 2.18 | 4.36 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.18 U | E4062-FS(0) | 1.000 | 8/13/2022 | 0.785 | 2.18 | 4.36 |

MW 10/16/22

Analyzed by: Griffith, Lauren
Printed: 8/24/2022

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

3

| | |
|---|---|
| Client ID | VWAB-FB01-070922 |
| Battelle ID | E4063-FS |
| Sample Type | SA |
| Collection Date | 07/09/2022 |
| Extraction Date | 07/18/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.260 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.878 | 2.40 | 4.81 |
| PFHpA | 375-85-9 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.905 | 2.40 | 4.81 |
| PFOA | 335-67-1 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.971 | 2.40 | 4.81 |
| PFNA | 375-95-1 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.801 | 2.40 | 4.81 |
| PFDA | 335-76-2 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.754 | 2.40 | 4.81 |
| PFUnA | 2058-94-8 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.723 | 2.40 | 4.81 |
| PFDoA | 307-55-1 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.731 | 2.40 | 4.81 |
| PFTrDA | 72629-94-8 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.713 | 2.40 | 4.81 |
| PFTeDA | 376-06-7 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.761 | 2.40 | 4.81 |
| NMeFOSAA | 2355-31-9 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.990 | 2.40 | 4.81 |
| NEtFOSAA | 2991-50-6 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.952 | 2.40 | 4.81 |
| PFBS | 375-73-5 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.833 | 2.40 | 4.81 |
| PFHxS | 355-46-4 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.959 | 2.40 | 4.81 |
| PFOS | 1763-23-1 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 1.03 | 2.40 | 4.81 |
| HFPO-DA | 13252-13-6 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.832 | 2.40 | 4.81 |
| Adona | 919005-14-4 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.836 | 2.40 | 4.81 |
| 9Cl-PF3ONS | 756426-58-1 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.990 | 2.40 | 4.81 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.40 U | E4063-FS(0) | 1.000 | 8/13/2022 | 0.866 | 2.40 | 4.81 |

MW 10/16/22

Analyzed by: Griffith, Lauren
Printed: 8/24/2022

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

4

| | |
|---|---|
| Client ID | VWMP-PFAS-GW01-0722 |
| Battelle ID | E4064-FS |
| Sample Type | SA |
| Collection Date | 07/09/2022 |
| Extraction Date | 07/18/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.260 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 1.81 J | E4064-FS(0) | 1.000 | 8/13/2022 | 0.878 | 2.40 | 4.81 |
| PFHpA | 375-85-9 | 2.40 U | E4064-FS(0) | 1.000 | 8/13/2022 | 0.905 | 2.40 | 4.81 |
| PFOA | 335-67-1 | 4.80 J | E4064-FS(0) | 1.000 | 8/13/2022 | 0.971 | 2.40 | 4.81 |
| PFNA | 375-95-1 | 2.40 U | E4064-FS(0) | 1.000 | 8/13/2022 | 0.801 | 2.40 | 4.81 |
| PFDA | 335-76-2 | 2.40 U | E4064-FS(0) | 1.000 | 8/13/2022 | 0.754 | 2.40 | 4.81 |
| PFUnA | 2058-94-8 | 2.40 U | E4064-FS(0) | 1.000 | 8/13/2022 | 0.723 | 2.40 | 4.81 |
| PFDoA | 307-55-1 | 2.40 U | E4064-FS(0) | 1.000 | 8/13/2022 | 0.731 | 2.40 | 4.81 |
| PFTrDA | 72629-94-8 | 2.40 U | E4064-FS(0) | 1.000 | 8/13/2022 | 0.713 | 2.40 | 4.81 |
| PFTeDA | 376-06-7 | 2.40 U | E4064-FS(0) | 1.000 | 8/13/2022 | 0.761 | 2.40 | 4.81 |
| NMeFOSAA | 2355-31-9 | 2.40 U | E4064-FS(0) | 1.000 | 8/13/2022 | 0.990 | 2.40 | 4.81 |
| NEtFOSAA | 2991-50-6 | 2.40 U | E4064-FS(0) | 1.000 | 8/13/2022 | 0.952 | 2.40 | 4.81 |
| PFBS | 375-73-5 | 0.958 J | E4064-FS(0) | 1.000 | 8/13/2022 | 0.833 | 2.40 | 4.81 |
| PFHxS | 355-46-4 | 2.40 U | E4064-FS(0) | 1.000 | 8/13/2022 | 0.959 | 2.40 | 4.81 |
| PFOS | 1763-23-1 | 1.65 J | E4064-FS(0) | 1.000 | 8/13/2022 | 1.03 | 2.40 | 4.81 |
| HFPO-DA | 13252-13-6 | 2.40 U | E4064-FS(0) | 1.000 | 8/13/2022 | 0.832 | 2.40 | 4.81 |
| Adona | 919005-14-4 | 2.40 U | E4064-FS(0) | 1.000 | 8/13/2022 | 0.836 | 2.40 | 4.81 |
| 9Cl-PF3ONS | 756426-58-1 | 2.40 U | E4064-FS(0) | 1.000 | 8/13/2022 | 0.990 | 2.40 | 4.81 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.40 U | E4064-FS(0) | 1.000 | 8/13/2022 | 0.866 | 2.40 | 4.81 |

MW 10/16/22

Analyzed by: Griffith, Lauren
Printed: 8/24/2022

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-1200
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-0003, Puerto Rico
Date: October 16, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VWMP-PFAS-GW02-0722 | E4065-FS | Water |
| 2 | VWMP-PFAS-GW02P-0722 | E4066-FS | Water |
| 3 | VWMP-PFAS-GW03-0722 | E4067-FS | Water |
| 3MS | VWMP-PFAS-GW03-0722MS | E4068-FSMS | Water |
| 3MSD | VWMP-PFAS-GW03-0722MSD | E4069-FSMSD | Water |
| 4 | VWMP-FB01-070922 | E4070-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for three water samples and one aqueous field blank sample collected on July 9, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

### LC/MS Tuning

- All criteria were met.

### Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWMP-FB01-070922 | None - ND | - | - | - |
| VWMP-EB01-071122 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VWMP-PFAS-GW02-0722 ng/L | VWMP-PFAS-GW02P-0722 ng/L | RPD | Qualifier |
|---|---|---|---|---|
| PFHxA | 9.58 | 9.55 | 0% | None |
| PFHpA | 4.77 | 4.06 | 16% | |
| PFOA | 19.7 | 19.4 | 2% | |
| PFBS | 3.59 | 3.42 | 5% | |
| PFHxS | 31.9 | 31.2 | 2% | |
| PFOS | 96.3 | 91.7 | 5% | |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 10/17/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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1

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-GW02-0722 |
| Battelle ID | E4065-FS |
| Sample Type | SA |
| Collection Date | 07/09/2022 |
| Extraction Date | 07/18/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.286 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 9.58 | E4065-FS(0) | 1.000 | 8/12/2022 | 0.798 | 2.19 | 4.37 |
| PFHpA | 375-85-9 | 4.77 | E4065-FS(0) | 1.000 | 8/12/2022 | 0.823 | 2.19 | 4.37 |
| PFOA | 335-67-1 | 19.7 | E4065-FS(0) | 1.000 | 8/12/2022 | 0.883 | 2.19 | 4.37 |
| PFNA | 375-95-1 | 2.19 U | E4065-FS(0) | 1.000 | 8/12/2022 | 0.728 | 2.19 | 4.37 |
| PFDA | 335-76-2 | 2.19 U | E4065-FS(0) | 1.000 | 8/12/2022 | 0.685 | 2.19 | 4.37 |
| PFUnA | 2058-94-8 | 2.19 U | E4065-FS(0) | 1.000 | 8/12/2022 | 0.697 | 2.19 | 4.37 |
| PFDoA | 307-55-1 | 2.19 U | E4065-FS(0) | 1.000 | 8/12/2022 | 0.664 | 2.19 | 4.37 |
| PFTrDA | 72629-94-8 | 2.19 U | E4065-FS(0) | 1.000 | 8/12/2022 | 0.649 | 2.19 | 4.37 |
| PFTeDA | 376-06-7 | 2.19 U | E4065-FS(0) | 1.000 | 8/12/2022 | 0.691 | 2.19 | 4.37 |
| NMeFOSAA | 2355-31-9 | 2.19 U | E4065-FS(0) | 1.000 | 8/12/2022 | 0.900 | 2.19 | 4.37 |
| NEtFOSAA | 2991-50-6 | 2.19 U | E4065-FS(0) | 1.000 | 8/12/2022 | 0.865 | 2.19 | 4.37 |
| PFBS | 375-73-5 | 3.59 J | E4065-FS(0) | 1.000 | 8/12/2022 | 0.757 | 2.19 | 4.37 |
| PFHxS | 355-46-4 | 31.9 | E4065-FS(0) | 1.000 | 8/12/2022 | 0.872 | 2.19 | 4.37 |
| PFOS | 1763-23-1 | 96.3 | E4065-FS(0) | 1.000 | 8/12/2022 | 0.935 | 2.19 | 4.37 |
| HFPO-DA | 13252-13-6 | 2.19 U | E4065-FS(0) | 1.000 | 8/12/2022 | 0.756 | 2.19 | 4.37 |
| Adona | 919005-14-4 | 2.19 U | E4065-FS(0) | 1.000 | 8/12/2022 | 0.760 | 2.19 | 4.37 |
| 9Cl-PF3ONS | 756426-58-1 | 2.19 U | E4065-FS(0) | 1.000 | 8/12/2022 | 0.900 | 2.19 | 4.37 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.19 U | E4065-FS(0) | 1.000 | 8/12/2022 | 0.788 | 2.19 | 4.37 |

MW 10/16/22

Analyzed by: Griffith, Lauren
Printed: 8/15/2022

BATTELLE
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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-GW02P-0722 |
| Battelle ID | E4066-FS |
| Sample Type | SA |
| Collection Date | 07/09/2022 |
| Extraction Date | 07/18/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.296 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 9.55 | E4066-FS(0) | 1.000 | 8/12/2022 | 0.771 | 2.11 | 4.22 |
| PFHpA | 375-85-9 | 4.06 J | E4066-FS(0) | 1.000 | 8/12/2022 | 0.795 | 2.11 | 4.22 |
| PFOA | 335-67-1 | 19.4 | E4066-FS(0) | 1.000 | 8/12/2022 | 0.853 | 2.11 | 4.22 |
| PFNA | 375-95-1 | 2.11 U | E4066-FS(0) | 1.000 | 8/12/2022 | 0.704 | 2.11 | 4.22 |
| PFDA | 335-76-2 | 2.11 U | E4066-FS(0) | 1.000 | 8/12/2022 | 0.662 | 2.11 | 4.22 |
| PFUnA | 2058-94-8 | 2.11 U | E4066-FS(0) | 1.000 | 8/12/2022 | 0.635 | 2.11 | 4.22 |
| PFDoA | 307-55-1 | 2.11 U | E4066-FS(0) | 1.000 | 8/12/2022 | 0.642 | 2.11 | 4.22 |
| PFTrDA | 72629-94-8 | 2.11 U | E4066-FS(0) | 1.000 | 8/12/2022 | 0.627 | 2.11 | 4.22 |
| PFTeDA | 376-06-7 | 2.11 U | E4066-FS(0) | 1.000 | 8/12/2022 | 0.668 | 2.11 | 4.22 |
| NMeFOSAA | 2355-31-9 | 2.11 U | E4066-FS(0) | 1.000 | 8/12/2022 | 0.870 | 2.11 | 4.22 |
| NEtFOSAA | 2991-50-6 | 2.11 U | E4066-FS(0) | 1.000 | 8/12/2022 | 0.836 | 2.11 | 4.22 |
| PFBS | 375-73-5 | 3.42 J | E4066-FS(0) | 1.000 | 8/12/2022 | 0.731 | 2.11 | 4.22 |
| PFHxS | 355-46-4 | 31.2 | E4066-FS(0) | 1.000 | 8/12/2022 | 0.842 | 2.11 | 4.22 |
| PFOS | 1763-23-1 | 91.7 | E4066-FS(0) | 1.000 | 8/12/2022 | 0.904 | 2.11 | 4.22 |
| HFPO-DA | 13252-13-6 | 2.11 U | E4066-FS(0) | 1.000 | 8/12/2022 | 0.731 | 2.11 | 4.22 |
| Adona | 919005-14-4 | 2.11 U | E4066-FS(0) | 1.000 | 8/12/2022 | 0.734 | 2.11 | 4.22 |
| 9Cl-PF3ONS | 756426-58-1 | 2.11 U | E4066-FS(0) | 1.000 | 8/12/2022 | 0.870 | 2.11 | 4.22 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.11 U | E4066-FS(0) | 1.000 | 8/12/2022 | 0.761 | 2.11 | 4.22 |

NW 10/16/22

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3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-PFAS-GW03-0722 |
| Battelle ID | E4067-FS |
| Sample Type | SA |
| Collection Date | 07/09/2022 |
| Extraction Date | 07/18/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.258 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 19.2 | E4067-FS(0) | 1.000 | 8/12/2022 | 0.885 | 2.42 | 4.84 |
| PFHpA | 375-85-9 | 6.16 | E4067-FS(0) | 1.000 | 8/12/2022 | 0.912 | 2.42 | 4.84 |
| PFOA | 335-67-1 | 10.8 | E4067-FS(0) | 1.000 | 8/12/2022 | 0.979 | 2.42 | 4.84 |
| PFNA | 375-95-1 | 2.42 U | E4067-FS(0) | 1.000 | 8/12/2022 | 0.807 | 2.42 | 4.84 |
| PFDA | 335-76-2 | 2.42 U | E4067-FS(0) | 1.000 | 8/12/2022 | 0.760 | 2.42 | 4.84 |
| PFUnA | 2058-94-8 | 2.42 U | E4067-FS(0) | 1.000 | 8/12/2022 | 0.729 | 2.42 | 4.84 |
| PFDoA | 307-55-1 | 2.42 U | E4067-FS(0) | 1.000 | 8/12/2022 | 0.736 | 2.42 | 4.84 |
| PFTrDA | 72629-94-8 | 2.42 U | E4067-FS(0) | 1.000 | 8/12/2022 | 0.719 | 2.42 | 4.84 |
| PFTeDA | 376-06-7 | 2.42 U | E4067-FS(0) | 1.000 | 8/12/2022 | 0.766 | 2.42 | 4.84 |
| NMeFOSAA | 2355-31-9 | 2.42 U | E4067-FS(0) | 1.000 | 8/12/2022 | 0.998 | 2.42 | 4.84 |
| NEtFOSAA | 2991-50-6 | 2.42 U | E4067-FS(0) | 1.000 | 8/12/2022 | 0.959 | 2.42 | 4.84 |
| PFBS | 375-73-5 | 8.06 | E4067-FS(0) | 1.000 | 8/12/2022 | 0.839 | 2.42 | 4.84 |
| PFHxS | 355-46-4 | 71.5 | E4067-FS(0) | 1.000 | 8/12/2022 | 0.966 | 2.42 | 4.84 |
| PFOS | 1763-23-1 | 87.1 | E4067-FS(0) | 1.000 | 8/12/2022 | 1.04 | 2.42 | 4.84 |
| HFPO-DA | 13252-13-6 | 2.42 U | E4067-FS(0) | 1.000 | 8/12/2022 | 0.838 | 2.42 | 4.84 |
| Adona | 919005-14-4 | 2.42 U | E4067-FS(0) | 1.000 | 8/12/2022 | 0.842 | 2.42 | 4.84 |
| 9Cl-PF3ONS | 756426-58-1 | 2.42 U | E4067-FS(0) | 1.000 | 8/12/2022 | 0.998 | 2.42 | 4.84 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.42 U | E4067-FS(0) | 1.000 | 8/12/2022 | 0.873 | 2.42 | 4.84 |

NW 10/16/22

Analyzed by: Griffith, Lauren
Printed: 8/15/2022

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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-FB01-070922 |
| Battelle ID | E4070-FS |
| Sample Type | SA |
| Collection Date | 07/09/2022 |
| Extraction Date | 07/18/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.262 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.871 | 2.39 | 4.77 |
| PFHpA | 375-85-9 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.898 | 2.39 | 4.77 |
| PFOA | 335-67-1 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.964 | 2.39 | 4.77 |
| PFNA | 375-95-1 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.795 | 2.39 | 4.77 |
| PFDA | 335-76-2 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.748 | 2.39 | 4.77 |
| PFUnA | 2058-94-8 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.718 | 2.39 | 4.77 |
| PFDoA | 307-55-1 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.725 | 2.39 | 4.77 |
| PFTrDA | 72629-94-8 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.708 | 2.39 | 4.77 |
| PFTeDA | 376-06-7 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.755 | 2.39 | 4.77 |
| NMeFOSAA | 2355-31-9 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.983 | 2.39 | 4.77 |
| NEtFOSAA | 2991-50-6 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.945 | 2.39 | 4.77 |
| PFBS | 375-73-5 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.826 | 2.39 | 4.77 |
| PFHxS | 355-46-4 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.951 | 2.39 | 4.77 |
| PFOS | 1763-23-1 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 1.02 | 2.39 | 4.77 |
| HFPO-DA | 13252-13-6 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.825 | 2.39 | 4.77 |
| Adona | 919005-14-4 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.829 | 2.39 | 4.77 |
| 9Cl-PF3ONS | 756426-58-1 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.983 | 2.39 | 4.77 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.39 U | E4070-FS(0) | 1.000 | 8/12/2022 | 0.860 | 2.39 | 4.77 |

MW 10/18/22

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-1201
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-0003, Puerto Rico
Date: October 16, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VWMP-EB01-071122 | E4071-FS | Water |
| 2 | VEFS-FB01-071122 | E4072-FS | Water |
| 3 | VEFS-PFAS-GW02-0622 | E4073-FS | Water |
| 3MS | VEFS-PFAS-GW02-0622MS | E4074-FSMS | Water |
| 3MSD | VEFS-PFAS-GW02-0622MSD | E4075-FSMSD | Water |
| 4 | VEP4-GW08-0722 | E4076-FS | Water |
| 5 | VEFS-PFAS-GW01-0722 | E4077-FS | Water |
| 6 | VEFS-PFAS-GW01P-0722 | E4078-FS | Water |
| 7 | VEP4-EB01-071122 | E4079-FS | Water |
| 8 | VEP4-GW05-0722 | E4080-FS | Water |
| 9 | VEP4-FB01-071222 | E4081-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for five water samples, two aqueous equipment blank samples, and two aqueous field blank samples collected on July 11-12, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWMP-EB01-071122 | None - ND | - | - | - |
| VEFS-FB01-071122 | None - ND | - | - | - |
| VEP4-EB01-071122 | PFHxS | 6.06 | None | All Associated >5X |
| VEP4-FB01-071222 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R) except for the following.

| LCS Sample | Compound | %R | Qualifier | Affected Samples |
|---|---|---|---|---|
| DJ235LCS-FS | PFHxA | 65% | J/UJ | All Samples |
| | PFHpA | 68% | | |

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- Several samples were analyzed at various dilutions due to high concentrations of target compounds. The reporting limits were adjusted accordingly. No action was required.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VEFS-PFAS-GW01-0722 ng/L | VEFS-PFAS-GW01P-0722 ng/L | RPD | Qualifier |
|---|---|---|---|---|
| PFHxA | 55100 | 56500 | 3% | None |
| PFHpA | 12300 | 12200 | 1% | |
| PFOA | 3100 | 2750 | 12% | |
| PFBS | 14600 | 15400 | 5% | |
| PFHxS | 110000 | 101000 | 9% | |
| PFOS | 10.2 | 17.1 | 51% | None - <5X LOQ |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 10/17/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWMP-EB01-071122 |
| Battelle ID | E4071-FS |
| Sample Type | SA |
| Collection Date | 07/11/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.291 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.15 ~~U~~ UJ | E4071-FS(0) | 1.000 | 8/12/2022 | 0.784 | 2.15 | 4.30 | BSL |
| PFHpA | 375-85-9 | 2.15 ~~U~~ UJ | E4071-FS(0) | 1.000 | 8/12/2022 | 0.808 | 2.15 | 4.30 | BSL |
| PFOA | 335-67-1 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.868 | 2.15 | 4.30 | |
| PFNA | 375-95-1 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.716 | 2.15 | 4.30 | |
| PFDA | 335-76-2 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.674 | 2.15 | 4.30 | |
| PFUnA | 2058-94-8 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.646 | 2.15 | 4.30 | |
| PFDoA | 307-55-1 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.653 | 2.15 | 4.30 | |
| PFTrDA | 72629-94-8 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.637 | 2.15 | 4.30 | |
| PFTeDA | 376-06-7 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.680 | 2.15 | 4.30 | |
| NMeFOSAA | 2355-31-9 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.885 | 2.15 | 4.30 | |
| NEtFOSAA | 2991-50-6 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.851 | 2.15 | 4.30 | |
| PFBS | 375-73-5 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.744 | 2.15 | 4.30 | |
| PFHxS | 355-46-4 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.857 | 2.15 | 4.30 | |
| PFOS | 1763-23-1 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.919 | 2.15 | 4.30 | |
| HFPO-DA | 13252-13-6 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.743 | 2.15 | 4.30 | |
| Adona | 919005-14-4 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.747 | 2.15 | 4.30 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.885 | 2.15 | 4.30 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.15 U | E4071-FS(0) | 1.000 | 8/12/2022 | 0.774 | 2.15 | 4.30 | |

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Analyzed by: Griffith, Lauren
Printed: 8/15/2022

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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEFS-FB01-071122 |
| Battelle ID | E4072-FS |
| Sample Type | SA |
| Collection Date | 07/11/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.254 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.46 ~~U~~ UJ | E4072-FS(0) | 1.000 | 8/12/2022 | 0.899 | 2.46 | 4.92 | BSL |
| PFHpA | 375-85-9 | 2.46 ~~U~~ UJ | E4072-FS(0) | 1.000 | 8/12/2022 | 0.926 | 2.46 | 4.92 | BSL |
| PFOA | 335-67-1 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 0.994 | 2.46 | 4.92 | |
| PFNA | 375-95-1 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 0.820 | 2.46 | 4.92 | |
| PFDA | 335-76-2 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 0.772 | 2.46 | 4.92 | |
| PFUnA | 2058-94-8 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 0.740 | 2.46 | 4.92 | |
| PFDoA | 307-55-1 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 0.748 | 2.46 | 4.92 | |
| PFTrDA | 72629-94-8 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 0.730 | 2.46 | 4.92 | |
| PFTeDA | 376-06-7 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 0.779 | 2.46 | 4.92 | |
| NMeFOSAA | 2355-31-9 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 1.01 | 2.46 | 4.92 | |
| NEtFOSAA | 2991-50-6 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 0.974 | 2.46 | 4.92 | |
| PFBS | 375-73-5 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 0.852 | 2.46 | 4.92 | |
| PFHxS | 355-46-4 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 0.981 | 2.46 | 4.92 | |
| PFOS | 1763-23-1 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 1.05 | 2.46 | 4.92 | |
| HFPO-DA | 13252-13-6 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 0.851 | 2.46 | 4.92 | |
| Adona | 919005-14-4 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 0.855 | 2.46 | 4.92 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 1.01 | 2.46 | 4.92 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.46 U | E4072-FS(0) | 1.000 | 8/12/2022 | 0.887 | 2.46 | 4.92 | |

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3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEFS-PFAS-GW02-0722 |
| Battelle ID | E4073-FS |
| Sample Type | SA |
| Collection Date | 07/11/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.291 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 18.8 J | E4073-FS(0) | 1.000 | 8/12/2022 | 0.784 | 2.15 | 4.30 | BSL |
| **PFHpA** | **375-85-9** | **10.5 J** | **E4073-FS(0)** | **1.000** | **8/12/2022** | **0.808** | **2.15** | **4.30** | BSL |
| PFOA | 335-67-1 | 9.89 | E4073-FS(0) | 1.000 | 8/12/2022 | 0.868 | 2.15 | 4.30 | |
| **PFNA** | **375-95-1** | **2.15 U** | **E4073-FS(0)** | **1.000** | **8/12/2022** | **0.716** | **2.15** | **4.30** | |
| PFDA | 335-76-2 | 2.15 U | E4073-FS(0) | 1.000 | 8/12/2022 | 0.674 | 2.15 | 4.30 | |
| **PFUnA** | **2058-94-8** | **2.15 U** | **E4073-FS(0)** | **1.000** | **8/12/2022** | **0.646** | **2.15** | **4.30** | |
| PFDoA | 307-55-1 | 2.15 U | E4073-FS(0) | 1.000 | 8/12/2022 | 0.653 | 2.15 | 4.30 | |
| **PFTrDA** | **72629-94-8** | **2.15 U** | **E4073-FS(0)** | **1.000** | **8/12/2022** | **0.637** | **2.15** | **4.30** | |
| PFTeDA | 376-06-7 | 2.15 U | E4073-FS(0) | 1.000 | 8/12/2022 | 0.680 | 2.15 | 4.30 | |
| **NMeFOSAA** | **2355-31-9** | **2.15 U** | **E4073-FS(0)** | **1.000** | **8/12/2022** | **0.885** | **2.15** | **4.30** | |
| NEtFOSAA | 2991-50-6 | 2.15 U | E4073-FS(0) | 1.000 | 8/12/2022 | 0.851 | 2.15 | 4.30 | |
| **PFBS** | **375-73-5** | **22.0** | **E4073-FS(0)** | **1.000** | **8/12/2022** | **0.744** | **2.15** | **4.30** | |
| PFHxS | 355-46-4 | 74.1 | E4073-FS(0) | 1.000 | 8/12/2022 | 0.857 | 2.15 | 4.30 | |
| **PFOS** | **1763-23-1** | **43.3** | **E4073-FS(0)** | **1.000** | **8/12/2022** | **0.919** | **2.15** | **4.30** | |
| HFPO-DA | 13252-13-6 | 2.15 U | E4073-FS(0) | 1.000 | 8/12/2022 | 0.743 | 2.15 | 4.30 | |
| **Adona** | **919005-14-4** | **2.15 U** | **E4073-FS(0)** | **1.000** | **8/12/2022** | **0.747** | **2.15** | **4.30** | |
| 9Cl-PF3ONS | 756426-58-1 | 2.15 U | E4073-FS(0) | 1.000 | 8/12/2022 | 0.885 | 2.15 | 4.30 | |
| **11Cl-PF3OUdS** | **763051-92-9** | **2.15 U** | **E4073-FS(0)** | **1.000** | **8/12/2022** | **0.774** | **2.15** | **4.30** | |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW08-0722 |
| Battelle ID | E4076-FS |
| Sample Type | SA |
| Collection Date | 07/11/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.282 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.75 J | E4076-FS(0) | 1.000 | 8/12/2022 | 0.809 | 2.22 | 4.43 | BSL |
| PFHpA | 375-85-9 | 2.22 UJ | E4076-FS(0) | 1.000 | 8/12/2022 | 0.834 | 2.22 | 4.43 | BSL |
| PFOA | 335-67-1 | 2.61 J | E4076-FS(0) | 1.000 | 8/12/2022 | 0.895 | 2.22 | 4.43 | |
| PFNA | 375-95-1 | 2.22 U | E4076-FS(0) | 1.000 | 8/12/2022 | 0.738 | 2.22 | 4.43 | |
| PFDA | 335-76-2 | 2.22 U | E4076-FS(0) | 1.000 | 8/12/2022 | 0.695 | 2.22 | 4.43 | |
| PFUnA | 2058-94-8 | 2.22 U | E4076-FS(0) | 1.000 | 8/12/2022 | 0.667 | 2.22 | 4.43 | |
| PFDoA | 307-55-1 | 2.22 U | E4076-FS(0) | 1.000 | 8/12/2022 | 0.674 | 2.22 | 4.43 | |
| PFTrDA | 72629-94-8 | 2.22 U | E4076-FS(0) | 1.000 | 8/12/2022 | 0.658 | 2.22 | 4.43 | |
| PFTeDA | 376-06-7 | 2.22 U | E4076-FS(0) | 1.000 | 8/12/2022 | 0.701 | 2.22 | 4.43 | |
| NMeFOSAA | 2355-31-9 | 2.22 U | E4076-FS(0) | 1.000 | 8/12/2022 | 0.913 | 2.22 | 4.43 | |
| NEtFOSAA | 2991-50-6 | 2.22 U | E4076-FS(0) | 1.000 | 8/12/2022 | 0.878 | 2.22 | 4.43 | |
| PFBS | 375-73-5 | 10.7 | E4076-FS(0) | 1.000 | 8/12/2022 | 0.768 | 2.22 | 4.43 | |
| PFHxS | 355-46-4 | 60.8 | E4076-FS(0) | 1.000 | 8/12/2022 | 0.884 | 2.22 | 4.43 | |
| PFOS | 1763-23-1 | 5.80 | E4076-FS(0) | 1.000 | 8/12/2022 | 0.949 | 2.22 | 4.43 | |
| HFPO-DA | 13252-13-6 | 2.22 U | E4076-FS(0) | 1.000 | 8/12/2022 | 0.767 | 2.22 | 4.43 | |
| Adona | 919005-14-4 | 2.22 U | E4076-FS(0) | 1.000 | 8/12/2022 | 0.770 | 2.22 | 4.43 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.22 U | E4076-FS(0) | 1.000 | 8/12/2022 | 0.913 | 2.22 | 4.43 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.22 U | E4076-FS(0) | 1.000 | 8/12/2022 | 0.799 | 2.22 | 4.43 | |

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Analyzed by: Griffith, Lauren
Printed: 8/15/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEFS-PFAS-GW01-0722 |
| Battelle ID | E4077-FS |
| Sample Type | SA |
| Collection Date | 07/11/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.287 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 55100 D | J | E4077-FS-D(7) | 781.250 | 8/15/2022 | 621 | 1700 | 3400 | BSL |
| PFHpA | 375-85-9 | 12300 D | J | E4077-FS-D(5) | 62.500 | 8/15/2022 | 51.2 | 136 | 272 | BSL |
| PFOA | 335-67-1 | 3100 D | | E4077-FS-D(3) | 5.000 | 8/15/2022 | 4.40 | 10.9 | 21.8 | |
| PFNA | 375-95-1 | 2.18 U | | E4077-FS(0) | 1.000 | 8/12/2022 | 0.726 | 2.18 | 4.36 | |
| PFDA | 335-76-2 | 2.18 U | | E4077-FS(0) | 1.000 | 8/12/2022 | 0.683 | 2.18 | 4.36 | |
| PFUnA | 2058-94-8 | 2.18 U | | E4077-FS(0) | 1.000 | 8/12/2022 | 0.655 | 2.18 | 4.36 | |
| PFDoA | 307-55-1 | 2.18 U | | E4077-FS(0) | 1.000 | 8/12/2022 | 0.662 | 2.18 | 4.36 | |
| PFTrDA | 72629-94-8 | 2.18 U | | E4077-FS(0) | 1.000 | 8/12/2022 | 0.646 | 2.18 | 4.36 | |
| PFTeDA | 376-06-7 | 2.18 U | | E4077-FS(0) | 1.000 | 8/12/2022 | 0.689 | 2.18 | 4.36 | |
| NMeFOSAA | 2355-31-9 | 2.18 U | | E4077-FS(0) | 1.000 | 8/12/2022 | 0.897 | 2.18 | 4.36 | |
| NEtFOSAA | 2991-50-6 | 2.18 U | | E4077-FS(0) | 1.000 | 8/12/2022 | 0.862 | 2.18 | 4.36 | |
| PFBS | 375-73-5 | 14600 D | | E4077-FS-D(5) | 62.500 | 8/15/2022 | 47.1 | 136 | 272 | |
| PFHxS | 355-46-4 | 110000 D | | E4077-FS-D(7) | 781.250 | 8/15/2022 | 678 | 1700 | 3400 | |
| PFOS | 1763-23-1 | 10.2 | | E4077-FS(0) | 1.000 | 8/12/2022 | 0.932 | 2.18 | 4.36 | |
| HFPO-DA | 13252-13-6 | 2.18 U | | E4077-FS(0) | 1.000 | 8/12/2022 | 0.753 | 2.18 | 4.36 | |
| Adona | 919005-14-4 | 2.18 U | | E4077-FS(0) | 1.000 | 8/12/2022 | 0.757 | 2.18 | 4.36 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.18 U | | E4077-FS(0) | 1.000 | 8/12/2022 | 0.897 | 2.18 | 4.36 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.18 U | | E4077-FS(0) | 1.000 | 8/12/2022 | 0.785 | 2.18 | 4.36 | |

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Analyzed by: Griffith, Lauren
Printed: 8/15/2022

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6

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEFS-PFAS-GW01P-0722 |
| Battelle ID | E4078-FS |
| Sample Type | SA |
| Collection Date | 07/11/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.280 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 56500 | J | E4078-FS-D(7) | 781.250 | 8/15/2022 | 637 | 1740 | 3490 | BSL |
| PFHpA | 375-85-9 | 12200 | J | E4078-FS-D(5) | 62.500 | 8/15/2022 | 52.5 | 140 | 279 | BSL |
| PFOA | 335-67-1 | 2750 | | E4078-FS-D(3) | 5.000 | 8/15/2022 | 4.51 | 11.2 | 22.3 | |
| PFNA | 375-95-1 | 2.23 | U | E4078-FS(0) | 1.000 | 8/12/2022 | 0.744 | 2.23 | 4.46 | |
| PFDA | 335-76-2 | 2.23 | U | E4078-FS(0) | 1.000 | 8/12/2022 | 0.700 | 2.23 | 4.46 | |
| PFUnA | 2058-94-8 | 2.23 | U | E4078-FS(0) | 1.000 | 8/12/2022 | 0.671 | 2.23 | 4.46 | |
| PFDoA | 307-55-1 | 2.23 | U | E4078-FS(0) | 1.000 | 8/12/2022 | 0.679 | 2.23 | 4.46 | |
| PFTrDA | 72629-94-8 | 2.23 | U | E4078-FS(0) | 1.000 | 8/12/2022 | 0.663 | 2.23 | 4.46 | |
| PFTeDA | 376-06-7 | 2.23 | U | E4078-FS(0) | 1.000 | 8/12/2022 | 0.706 | 2.23 | 4.46 | |
| NMeFOSAA | 2355-31-9 | 2.23 | U | E4078-FS(0) | 1.000 | 8/12/2022 | 0.920 | 2.23 | 4.46 | |
| NEtFOSAA | 2991-50-6 | 2.23 | U | E4078-FS(0) | 1.000 | 8/12/2022 | 0.884 | 2.23 | 4.46 | |
| PFBS | 375-73-5 | 15400 | | E4078-FS-D(5) | 62.500 | 8/15/2022 | 48.3 | 140 | 279 | |
| PFHxS | 355-46-4 | 101000 | | E4078-FS-D(7) | 781.250 | 8/15/2022 | 695 | 1740 | 3490 | |
| PFOS | 1763-23-1 | 17.1 | | E4078-FS(0) | 1.000 | 8/12/2022 | 0.955 | 2.23 | 4.46 | |
| HFPO-DA | 13252-13-6 | 2.23 | U | E4078-FS(0) | 1.000 | 8/12/2022 | 0.772 | 2.23 | 4.46 | |
| Adona | 919005-14-4 | 2.23 | U | E4078-FS(0) | 1.000 | 8/12/2022 | 0.776 | 2.23 | 4.46 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.23 | U | E4078-FS(0) | 1.000 | 8/12/2022 | 0.920 | 2.23 | 4.46 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.23 | U | E4078-FS(0) | 1.000 | 8/12/2022 | 0.804 | 2.23 | 4.46 | |

MW 10/16/22

Analyzed by: Griffith, Lauren
Printed: 8/15/2022

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7

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-EB01-071122 |
| Battelle ID | E4079-FS |
| Sample Type | SA |
| Collection Date | 07/11/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.274 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.28 U UJ | E4079-FS(0) | 1.000 | 8/12/2022 | 0.833 | 2.28 | 4.56 | BSL |
| PFHpA | 375-85-9 | 2.28 U UJ | E4079-FS(0) | 1.000 | 8/12/2022 | 0.859 | 2.28 | 4.56 | BSL |
| PFOA | 335-67-1 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.922 | 2.28 | 4.56 | |
| PFNA | 375-95-1 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.760 | 2.28 | 4.56 | |
| PFDA | 335-76-2 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.715 | 2.28 | 4.56 | |
| PFUnA | 2058-94-8 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.686 | 2.28 | 4.56 | |
| PFDoA | 307-55-1 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.693 | 2.28 | 4.56 | |
| PFTrDA | 72629-94-8 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.677 | 2.28 | 4.56 | |
| PFTeDA | 376-06-7 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.722 | 2.28 | 4.56 | |
| NMeFOSAA | 2355-31-9 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.940 | 2.28 | 4.56 | |
| NEtFOSAA | 2991-50-6 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.903 | 2.28 | 4.56 | |
| PFBS | 375-73-5 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.790 | 2.28 | 4.56 | |
| PFHxS | 355-46-4 | 6.06 | E4079-FS(0) | 1.000 | 8/12/2022 | 0.910 | 2.28 | 4.56 | |
| PFOS | 1763-23-1 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.976 | 2.28 | 4.56 | |
| HFPO-DA | 13252-13-6 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.789 | 2.28 | 4.56 | |
| Adona | 919005-14-4 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.793 | 2.28 | 4.56 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.940 | 2.28 | 4.56 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.28 U | E4079-FS(0) | 1.000 | 8/12/2022 | 0.822 | 2.28 | 4.56 | |

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW05-0722 |
| Battelle ID | E4080-FS |
| Sample Type | SA |
| Collection Date | 07/12/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.281 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 41.7 J | E4080-FS(0) | 1.000 | 8/12/2022 | 0.812 | 2.22 | 4.45 | BSL |
| PFHpA | 375-85-9 | 11.2 J | E4080-FS(0) | 1.000 | 8/12/2022 | 0.837 | 2.22 | 4.45 | BSL |
| PFOA | 335-67-1 | 15.9 | E4080-FS(0) | 1.000 | 8/12/2022 | 0.899 | 2.22 | 4.45 | |
| PFNA | 375-95-1 | 2.22 U | E4080-FS(0) | 1.000 | 8/12/2022 | 0.741 | 2.22 | 4.45 | |
| PFDA | 335-76-2 | 2.22 U | E4080-FS(0) | 1.000 | 8/12/2022 | 0.698 | 2.22 | 4.45 | |
| PFUnA | 2058-94-8 | 2.22 U | E4080-FS(0) | 1.000 | 8/12/2022 | 0.669 | 2.22 | 4.45 | |
| PFDoA | 307-55-1 | 2.22 U | E4080-FS(0) | 1.000 | 8/12/2022 | 0.676 | 2.22 | 4.45 | |
| PFTrDA | 72629-94-8 | 2.22 U | E4080-FS(0) | 1.000 | 8/12/2022 | 0.660 | 2.22 | 4.45 | |
| PFTeDA | 376-06-7 | 2.22 U | E4080-FS(0) | 1.000 | 8/12/2022 | 0.704 | 2.22 | 4.45 | |
| NMeFOSAA | 2355-31-9 | 2.22 U | E4080-FS(0) | 1.000 | 8/12/2022 | 0.916 | 2.22 | 4.45 | |
| NEtFOSAA | 2991-50-6 | 2.22 U | E4080-FS(0) | 1.000 | 8/12/2022 | 0.881 | 2.22 | 4.45 | |
| PFBS | 375-73-5 | 44.2 | E4080-FS(0) | 1.000 | 8/12/2022 | 0.770 | 2.22 | 4.45 | |
| PFHxS | 355-46-4 | 260 | E4080-FS(0) | 1.000 | 8/12/2022 | 0.887 | 2.22 | 4.45 | |
| PFOS | 1763-23-1 | 32.2 | E4080-FS(0) | 1.000 | 8/12/2022 | 0.952 | 2.22 | 4.45 | |
| HFPO-DA | 13252-13-6 | 2.22 U | E4080-FS(0) | 1.000 | 8/12/2022 | 0.770 | 2.22 | 4.45 | |
| Adona | 919005-14-4 | 2.22 U | E4080-FS(0) | 1.000 | 8/12/2022 | 0.773 | 2.22 | 4.45 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.22 U | E4080-FS(0) | 1.000 | 8/12/2022 | 0.916 | 2.22 | 4.45 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.22 U | E4080-FS(0) | 1.000 | 8/12/2022 | 0.802 | 2.22 | 4.45 | |

MW 10/16/22

Analyzed by: Griffith, Lauren
Printed: 8/15/2022

BATTELLE
It can be done

9

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-FB01-071222 |
| Battelle ID | E4081-FS |
| Sample Type | SA |
| Collection Date | 07/12/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.250 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 0.913 | 2.50 | 5.00 | BSL |
| PFHpA | 375-85-9 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 0.941 | 2.50 | 5.00 | BSL |
| PFOA | 335-67-1 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 1.01 | 2.50 | 5.00 | |
| PFNA | 375-95-1 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 0.833 | 2.50 | 5.00 | |
| PFDA | 335-76-2 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 0.784 | 2.50 | 5.00 | |
| PFUnA | 2058-94-8 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 0.752 | 2.50 | 5.00 | |
| PFDoA | 307-55-1 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 0.760 | 2.50 | 5.00 | |
| PFTrDA | 72629-94-8 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 0.742 | 2.50 | 5.00 | |
| PFTeDA | 376-06-7 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 0.791 | 2.50 | 5.00 | |
| NMeFOSAA | 2355-31-9 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 1.03 | 2.50 | 5.00 | |
| NEtFOSAA | 2991-50-6 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 0.990 | 2.50 | 5.00 | |
| PFBS | 375-73-5 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 0.866 | 2.50 | 5.00 | |
| PFHxS | 355-46-4 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 0.997 | 2.50 | 5.00 | |
| PFOS | 1763-23-1 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 1.07 | 2.50 | 5.00 | |
| HFPO-DA | 13252-13-6 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 0.865 | 2.50 | 5.00 | |
| Adona | 919005-14-4 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 0.869 | 2.50 | 5.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 1.03 | 2.50 | 5.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.50 U | E4081-FS(0) | 1.000 | 8/12/2022 | 0.901 | 2.50 | 5.00 | |

MW 10/16/22

Analyzed by: Griffith, Lauren
Printed: 8/15/2022

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-1202
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-0003, Puerto Rico
Date: October 16, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VEP4-GW12-0722 | E4082-FS | Water |
| 2 | VEP4-GW11-0722 | E4083-FS | Water |
| 3 | VEP4-GW06-0722 | E4084-FS | Water |
| 4 | VEP4-EB01-071222 | E4085-FS | Water |
| 5 | VEP4-EB01-071322 | E4086-FS | Water |
| 6 | VEP4-GW04-0722 | E4087-FS | Water |
| 7 | VEP4-GW03-0722 | E4088-FS | Water |
| 7MS | VEP4-GW03-0722MS | E4089-FSMS | Water |
| 7MSD | VEP4-GW03-0722MSD | E4090-FSMSD | Water |

A Stage 2B/4 data validation was performed on the analytical data for five water samples and two aqueous equipment blank samples collected on July 12-13, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VEP4-EB01-071222 | None - ND | - | - | - |
| VEP4-EB01-071322 | None - ND | - | - | - |
| VEP4-FB01-071222 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable low surrogate percent recoveries (%R) for one or two surrogates. The associated compounds were qualified as estimated (UJ). Please refer to the summary forms behind the Form Is for specific recoveries.

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 10/17/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

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It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW12-0722 |
| Battelle ID | E4082-FS |
| Sample Type | SA |
| Collection Date | 07/12/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.281 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 7.32 | E4082-FS(0) | 1.000 | 8/12/2022 | 0.812 | 2.22 | 4.45 |
| PFHpA | 375-85-9 | 2.34 J | E4082-FS(0) | 1.000 | 8/12/2022 | 0.837 | 2.22 | 4.45 |
| PFOA | 335-67-1 | 4.07 J | E4082-FS(0) | 1.000 | 8/12/2022 | 0.899 | 2.22 | 4.45 |
| PFNA | 375-95-1 | 2.22 U | E4082-FS(0) | 1.000 | 8/12/2022 | 0.741 | 2.22 | 4.45 |
| PFDA | 335-76-2 | 2.22 U | E4082-FS(0) | 1.000 | 8/12/2022 | 0.698 | 2.22 | 4.45 |
| PFUnA | 2058-94-8 | 2.22 U | E4082-FS(0) | 1.000 | 8/12/2022 | 0.669 | 2.22 | 4.45 |
| PFDoA | 307-55-1 | 2.22 U | E4082-FS(0) | 1.000 | 8/12/2022 | 0.676 | 2.22 | 4.45 |
| PFTrDA | 72629-94-8 | 2.22 U | E4082-FS(0) | 1.000 | 8/12/2022 | 0.660 | 2.22 | 4.45 |
| PFTeDA | 376-06-7 | 2.22 U | E4082-FS(0) | 1.000 | 8/12/2022 | 0.704 | 2.22 | 4.45 |
| NMeFOSAA | 2355-31-9 | 2.22 U | E4082-FS(0) | 1.000 | 8/12/2022 | 0.916 | 2.22 | 4.45 |
| NEtFOSAA | 2991-50-6 | 2.22 U | E4082-FS(0) | 1.000 | 8/12/2022 | 0.881 | 2.22 | 4.45 |
| PFBS | 375-73-5 | 12.1 | E4082-FS(0) | 1.000 | 8/12/2022 | 0.770 | 2.22 | 4.45 |
| PFHxS | 355-46-4 | 78.9 | E4082-FS(0) | 1.000 | 8/12/2022 | 0.887 | 2.22 | 4.45 |
| PFOS | 1763-23-1 | 9.05 | E4082-FS(0) | 1.000 | 8/12/2022 | 0.952 | 2.22 | 4.45 |
| HFPO-DA | 13252-13-6 | 2.22 U | E4082-FS(0) | 1.000 | 8/12/2022 | 0.770 | 2.22 | 4.45 |
| Adona | 919005-14-4 | 2.22 U | E4082-FS(0) | 1.000 | 8/12/2022 | 0.773 | 2.22 | 4.45 |
| 9Cl-PF3ONS | 756426-58-1 | 2.22 U | E4082-FS(0) | 1.000 | 8/12/2022 | 0.916 | 2.22 | 4.45 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.22 U | E4082-FS(0) | 1.000 | 8/12/2022 | 0.802 | 2.22 | 4.45 |

MW 10/16/22

Analyzed by: Griffith, Lauren
Printed: 8/15/2022

BATTELLE
It can be done

2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW11-0722 |
| Battelle ID | E4083-FS |
| Sample Type | SA |
| Collection Date | 07/12/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.284 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 85.9 | E4083-FS(0) | 1.000 | 8/12/2022 | 0.804 | 2.20 | 4.40 | |
| PFHpA | 375-85-9 | 26.4 | E4083-FS(0) | 1.000 | 8/12/2022 | 0.828 | 2.20 | 4.40 | |
| PFOA | 335-67-1 | 33.9 | E4083-FS(0) | 1.000 | 8/12/2022 | 0.889 | 2.20 | 4.40 | |
| PFNA | 375-95-1 | 2.20 U | E4083-FS(0) | 1.000 | 8/12/2022 | 0.733 | 2.20 | 4.40 | |
| PFDA | 335-76-2 | 2.20 U | E4083-FS(0) | 1.000 | 8/12/2022 | 0.690 | 2.20 | 4.40 | |
| PFUnA | 2058-94-8 | 2.20 U | E4083-FS(0) | 1.000 | 8/12/2022 | 0.662 | 2.20 | 4.40 | |
| PFDoA | 307-55-1 | 2.20 U | E4083-FS(0) | 1.000 | 8/12/2022 | 0.669 | 2.20 | 4.40 | |
| PFTrDA | 72629-94-8 | 2.20 U | E4083-FS(0) | 1.000 | 8/12/2022 | 0.653 | 2.20 | 4.40 | |
| PFTeDA | 376-06-7 | 2.20 UJ | E4083-FS(0) | 1.000 | 8/12/2022 | 0.696 | 2.20 | 4.40 | SSL |
| NMeFOSAA | 2355-31-9 | 2.20 U | E4083-FS(0) | 1.000 | 8/12/2022 | 0.907 | 2.20 | 4.40 | |
| NEtFOSAA | 2991-50-6 | 2.20 U | E4083-FS(0) | 1.000 | 8/12/2022 | 0.871 | 2.20 | 4.40 | |
| PFBS | 375-73-5 | 76.9 | E4083-FS(0) | 1.000 | 8/12/2022 | 0.762 | 2.20 | 4.40 | |
| PFHxS | 355-46-4 | 549 | E4083-FS(0) | 1.000 | 8/12/2022 | 0.878 | 2.20 | 4.40 | |
| PFOS | 1763-23-1 | 77.0 | E4083-FS(0) | 1.000 | 8/12/2022 | 0.942 | 2.20 | 4.40 | |
| HFPO-DA | 13252-13-6 | 2.20 U | E4083-FS(0) | 1.000 | 8/12/2022 | 0.761 | 2.20 | 4.40 | |
| Adona | 919005-14-4 | 2.20 U | E4083-FS(0) | 1.000 | 8/12/2022 | 0.765 | 2.20 | 4.40 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.20 U | E4083-FS(0) | 1.000 | 8/12/2022 | 0.907 | 2.20 | 4.40 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.20 U | E4083-FS(0) | 1.000 | 8/12/2022 | 0.793 | 2.20 | 4.40 | |

NW 10/13/22

Analyzed by: Griffith, Lauren
Printed: 8/15/2022

BATTELLE
It can be done

2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW11-0722 |
| Battelle ID | E4083-FS |
| Sample Type | SA |
| Collection Date | 07/12/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 72 | E4083-FS(0) | 8/12/2022 |
| 13C4-PFHpA | 71 | E4083-FS(0) | 8/12/2022 |
| 13C8-PFOA | 77 | E4083-FS(0) | 8/12/2022 |
| 13C9-PFNA | 70 | E4083-FS(0) | 8/12/2022 |
| 13C6-PFDA | 71 | E4083-FS(0) | 8/12/2022 |
| 13C7-PFUnA | 65 | E4083-FS(0) | 8/12/2022 |
| 13C2-PFDoA | 59 | E4083-FS(0) | 8/12/2022 |
| 13C2-PFTeDA | 42 N | E4083-FS(0) | 8/12/2022 |
| d3-MeFOSAA | 57 | E4083-FS(0) | 8/12/2022 |
| d5-EtFOSAA | 53 | E4083-FS(0) | 8/12/2022 |
| 13C3-PFBS | 75 | E4083-FS(0) | 8/12/2022 |
| 13C3-PFHxS | 74 | E4083-FS(0) | 8/12/2022 |
| 13C8-PFOS | 77 | E4083-FS(0) | 8/12/2022 |
| 13C3-HFPO-DA | 75 | E4083-FS(0) | 8/12/2022 |

MW 10/16/22

Analyzed by: Griffith, Lauren
Printed: 8/15/2022

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It can be done

3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW06-0722 |
| Battelle ID | E4084-FS |
| Sample Type | SA |
| Collection Date | 07/12/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.263 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 92.9 | E4084-FS(0) | 1.000 | 8/12/2022 | 0.868 | 2.38 | 4.75 |
| PFHpA | 375-85-9 | 27.2 | E4084-FS(0) | 1.000 | 8/12/2022 | 0.894 | 2.38 | 4.75 |
| PFOA | 335-67-1 | 34.9 | E4084-FS(0) | 1.000 | 8/12/2022 | 0.960 | 2.38 | 4.75 |
| PFNA | 375-95-1 | 2.02 J | E4084-FS(0) | 1.000 | 8/12/2022 | 0.792 | 2.38 | 4.75 |
| PFDA | 335-76-2 | 2.38 U | E4084-FS(0) | 1.000 | 8/12/2022 | 0.745 | 2.38 | 4.75 |
| PFUnA | 2058-94-8 | 2.38 U | E4084-FS(0) | 1.000 | 8/12/2022 | 0.715 | 2.38 | 4.75 |
| PFDoA | 307-55-1 | 2.38 U | E4084-FS(0) | 1.000 | 8/12/2022 | 0.722 | 2.38 | 4.75 |
| PFTrDA | 72629-94-8 | 2.38 U | E4084-FS(0) | 1.000 | 8/12/2022 | 0.705 | 2.38 | 4.75 |
| PFTeDA | 376-06-7 | 2.38 U | E4084-FS(0) | 1.000 | 8/12/2022 | 0.752 | 2.38 | 4.75 |
| NMeFOSAA | 2355-31-9 | 2.38 U | E4084-FS(0) | 1.000 | 8/12/2022 | 0.979 | 2.38 | 4.75 |
| NEtFOSAA | 2991-50-6 | 2.38 U | E4084-FS(0) | 1.000 | 8/12/2022 | 0.941 | 2.38 | 4.75 |
| PFBS | 375-73-5 | 77.0 | E4084-FS(0) | 1.000 | 8/12/2022 | 0.823 | 2.38 | 4.75 |
| PFHxS | 355-46-4 | 545 | E4084-FS(0) | 1.000 | 8/12/2022 | 0.948 | 2.38 | 4.75 |
| PFOS | 1763-23-1 | 78.2 | E4084-FS(0) | 1.000 | 8/12/2022 | 1.02 | 2.38 | 4.75 |
| HFPO-DA | 13252-13-6 | 2.38 U | E4084-FS(0) | 1.000 | 8/12/2022 | 0.822 | 2.38 | 4.75 |
| Adona | 919005-14-4 | 2.38 U | E4084-FS(0) | 1.000 | 8/12/2022 | 0.826 | 2.38 | 4.75 |
| 9Cl-PF3ONS | 756426-58-1 | 2.38 U | E4084-FS(0) | 1.000 | 8/12/2022 | 0.979 | 2.38 | 4.75 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.38 U | E4084-FS(0) | 1.000 | 8/12/2022 | 0.856 | 2.38 | 4.75 |

MW 10/16/22

Analyzed by: Griffith, Lauren
Printed: 8/15/2022

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

4

| | |
|---|---|
| Client ID | VEP4-EB01-071222 |
| Battelle ID | E4085-FS |
| Sample Type | SA |
| Collection Date | 07/12/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.299 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.763 | 2.09 | 4.18 |
| PFHpA | 375-85-9 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.787 | 2.09 | 4.18 |
| PFOA | 335-67-1 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.844 | 2.09 | 4.18 |
| PFNA | 375-95-1 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.696 | 2.09 | 4.18 |
| PFDA | 335-76-2 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.656 | 2.09 | 4.18 |
| PFUnA | 2058-94-8 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.629 | 2.09 | 4.18 |
| PFDoA | 307-55-1 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.635 | 2.09 | 4.18 |
| PFTrDA | 72629-94-8 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.620 | 2.09 | 4.18 |
| PFTeDA | 376-06-7 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.661 | 2.09 | 4.18 |
| NMeFOSAA | 2355-31-9 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.861 | 2.09 | 4.18 |
| NEtFOSAA | 2991-50-6 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.828 | 2.09 | 4.18 |
| PFBS | 375-73-5 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.724 | 2.09 | 4.18 |
| PFHxS | 355-46-4 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.834 | 2.09 | 4.18 |
| PFOS | 1763-23-1 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.895 | 2.09 | 4.18 |
| HFPO-DA | 13252-13-6 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.723 | 2.09 | 4.18 |
| Adona | 919005-14-4 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.727 | 2.09 | 4.18 |
| 9Cl-PF3ONS | 756426-58-1 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.861 | 2.09 | 4.18 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.09 U | E4085-FS(0) | 1.000 | 8/12/2022 | 0.753 | 2.09 | 4.18 |

MW 10/16/22

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-EB01-071322 |
| Battelle ID | E4086-FS |
| Sample Type | SA |
| Collection Date | 07/13/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.292 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.782 | 2.14 | 4.28 |
| PFHpA | 375-85-9 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.806 | 2.14 | 4.28 |
| PFOA | 335-67-1 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.865 | 2.14 | 4.28 |
| PFNA | 375-95-1 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.713 | 2.14 | 4.28 |
| PFDA | 335-76-2 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.671 | 2.14 | 4.28 |
| PFUnA | 2058-94-8 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.644 | 2.14 | 4.28 |
| PFDoA | 307-55-1 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.651 | 2.14 | 4.28 |
| PFTrDA | 72629-94-8 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.635 | 2.14 | 4.28 |
| PFTeDA | 376-06-7 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.677 | 2.14 | 4.28 |
| NMeFOSAA | 2355-31-9 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.882 | 2.14 | 4.28 |
| NEtFOSAA | 2991-50-6 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.848 | 2.14 | 4.28 |
| PFBS | 375-73-5 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.741 | 2.14 | 4.28 |
| PFHxS | 355-46-4 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.854 | 2.14 | 4.28 |
| PFOS | 1763-23-1 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.916 | 2.14 | 4.28 |
| HFPO-DA | 13252-13-6 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.741 | 2.14 | 4.28 |
| Adona | 919005-14-4 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.744 | 2.14 | 4.28 |
| 9Cl-PF3ONS | 756426-58-1 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.882 | 2.14 | 4.28 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.14 U | E4086-FS(0) | 1.000 | 8/12/2022 | 0.771 | 2.14 | 4.28 |

MW 10/16/22

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

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| | |
|---|---|
| Client ID | VEP4-GW04-0722 |
| Battelle ID | E4087-FS |
| Sample Type | SA |
| Collection Date | 07/13/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.293 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 79.5 | E4087-FS(0) | 1.000 | 8/12/2022 | 0.779 | 2.13 | 4.27 |
| PFHpA | 375-85-9 | 28.4 | E4087-FS(0) | 1.000 | 8/12/2022 | 0.803 | 2.13 | 4.27 |
| PFOA | 335-67-1 | 28.6 | E4087-FS(0) | 1.000 | 8/12/2022 | 0.862 | 2.13 | 4.27 |
| PFNA | 375-95-1 | 2.13 U | E4087-FS(0) | 1.000 | 8/12/2022 | 0.711 | 2.13 | 4.27 |
| PFDA | 335-76-2 | 2.13 U | E4087-FS(0) | 1.000 | 8/12/2022 | 0.669 | 2.13 | 4.27 |
| PFUnA | 2058-94-8 | 2.13 U | E4087-FS(0) | 1.000 | 8/12/2022 | 0.642 | 2.13 | 4.27 |
| PFDoA | 307-55-1 | 2.13 U | E4087-FS(0) | 1.000 | 8/12/2022 | 0.648 | 2.13 | 4.27 |
| PFTrDA | 72629-94-8 | 2.13 U | E4087-FS(0) | 1.000 | 8/12/2022 | 0.633 | 2.13 | 4.27 |
| PFTeDA | 376-06-7 | 2.13 U | E4087-FS(0) | 1.000 | 8/12/2022 | 0.675 | 2.13 | 4.27 |
| NMeFOSAA | 2355-31-9 | 2.13 U | E4087-FS(0) | 1.000 | 8/12/2022 | 0.879 | 2.13 | 4.27 |
| NEtFOSAA | 2991-50-6 | 2.13 U | E4087-FS(0) | 1.000 | 8/12/2022 | 0.845 | 2.13 | 4.27 |
| PFBS | 375-73-5 | 101 | E4087-FS(0) | 1.000 | 8/12/2022 | 0.739 | 2.13 | 4.27 |
| PFHxS | 355-46-4 | 517 | E4087-FS(0) | 1.000 | 8/12/2022 | 0.851 | 2.13 | 4.27 |
| PFOS | 1763-23-1 | 44.3 | E4087-FS(0) | 1.000 | 8/12/2022 | 0.913 | 2.13 | 4.27 |
| HFPO-DA | 13252-13-6 | 2.13 U | E4087-FS(0) | 1.000 | 8/12/2022 | 0.738 | 2.13 | 4.27 |
| Adona | 919005-14-4 | 2.13 U | E4087-FS(0) | 1.000 | 8/12/2022 | 0.741 | 2.13 | 4.27 |
| 9Cl-PF3ONS | 756426-58-1 | 2.13 U | E4087-FS(0) | 1.000 | 8/12/2022 | 0.879 | 2.13 | 4.27 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.13 U | E4087-FS(0) | 1.000 | 8/12/2022 | 0.769 | 2.13 | 4.27 |

MW 10/16/22

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7

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW03-0722 |
| Battelle ID | E4088-FS |
| Sample Type | SA |
| Collection Date | 07/13/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.250 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 119 | E4088-FS(0) | 1.000 | 8/13/2022 | 0.913 | 2.50 | 5.00 |
| PFHpA | 375-85-9 | 27.4 | E4088-FS(0) | 1.000 | 8/13/2022 | 0.941 | 2.50 | 5.00 |
| PFOA | 335-67-1 | 40.7 | E4088-FS(0) | 1.000 | 8/13/2022 | 1.01 | 2.50 | 5.00 |
| PFNA | 375-95-1 | 1.04 J | E4088-FS(0) | 1.000 | 8/13/2022 | 0.833 | 2.50 | 5.00 |
| PFDA | 335-76-2 | 2.50 U | E4088-FS(0) | 1.000 | 8/13/2022 | 0.784 | 2.50 | 5.00 |
| PFUnA | 2058-94-8 | 2.50 U | E4088-FS(0) | 1.000 | 8/13/2022 | 0.752 | 2.50 | 5.00 |
| PFDoA | 307-55-1 | 2.50 U | E4088-FS(0) | 1.000 | 8/13/2022 | 0.760 | 2.50 | 5.00 |
| PFTrDA | 72629-94-8 | 2.50 U | E4088-FS(0) | 1.000 | 8/13/2022 | 0.742 | 2.50 | 5.00 |
| PFTeDA | 376-06-7 | 2.50 U J | E4088-FS(0) | 1.000 | 8/13/2022 | 0.791 | 2.50 | 5.00 |
| NMeFOSAA | 2355-31-9 | 2.50 U | E4088-FS(0) | 1.000 | 8/13/2022 | 1.03 | 2.50 | 5.00 |
| NEtFOSAA | 2991-50-6 | 2.50 U | E4088-FS(0) | 1.000 | 8/13/2022 | 0.990 | 2.50 | 5.00 |
| PFBS | 375-73-5 | 70.0 | E4088-FS(0) | 1.000 | 8/13/2022 | 0.866 | 2.50 | 5.00 |
| PFHxS | 355-46-4 | 498 | E4088-FS(0) | 1.000 | 8/13/2022 | 0.997 | 2.50 | 5.00 |
| PFOS | 1763-23-1 | 107 | E4088-FS(0) | 1.000 | 8/13/2022 | 1.07 | 2.50 | 5.00 |
| HFPO-DA | 13252-13-6 | 2.50 U | E4088-FS(0) | 1.000 | 8/13/2022 | 0.865 | 2.50 | 5.00 |
| Adona | 919005-14-4 | 2.50 U | E4088-FS(0) | 1.000 | 8/13/2022 | 0.869 | 2.50 | 5.00 |
| 9Cl-PF3ONS | 756426-58-1 | 2.50 U | E4088-FS(0) | 1.000 | 8/13/2022 | 1.03 | 2.50 | 5.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.50 U | E4088-FS(0) | 1.000 | 8/13/2022 | 0.901 | 2.50 | 5.00 |

SSL

NW 10/16/22

Analyzed by: Griffith, Lauren
Printed: 8/15/2022

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7

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VEP4-GW03-0722 |
| Battelle ID | E4088-FS |
| Sample Type | SA |
| Collection Date | 07/13/2022 |
| Extraction Date | 07/20/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |

| *Surrogate Recoveries (%)* | Recovery | Extract ID | Analysis Date |
|---|---|---|---|
| 13C5-PFHxA | 70 | E4088-FS(0) | 8/13/2022 |
| 13C4-PFHpA | 76 | E4088-FS(0) | 8/13/2022 |
| 13C8-PFOA | 79 | E4088-FS(0) | 8/13/2022 |
| 13C9-PFNA | 74 | E4088-FS(0) | 8/13/2022 |
| 13C6-PFDA | 74 | E4088-FS(0) | 8/13/2022 |
| 13C7-PFUnA | 67 | E4088-FS(0) | 8/13/2022 |
| 13C2-PFDoA | 53 | E4088-FS(0) | 8/13/2022 |
| 13C2-PFTeDA | 35 | E4088-FS(0) | 8/13/2022 |
| d3-MeFOSAA | 59 | E4088-FS(0) | 8/13/2022 |
| d5-EtFOSAA | 57 | E4088-FS(0) | 8/13/2022 |
| 13C3-PFBS | 79 | E4088-FS(0) | 8/13/2022 |
| 13C3-PFHxS | 77 | E4088-FS(0) | 8/13/2022 |
| 13C8-PFOS | 81 | E4088-FS(0) | 8/13/2022 |
| 13C3-HFPO-DA | 74 | E4088-FS(0) | 8/13/2022 |

MW 10/18/22

Analyzed by: Griffith, Lauren
Printed: 8/15/2022

# Surface Water Data Validation Reports

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0221
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 14, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VWAH-PFAS-SW01-0222 | F8276-FS | Water |
| 2 | VWAH-PFAS-SW01P-0222 | F8277-FS | Water |
| 3 | VWAH-PFAS-SW02-0222 | F8278-FS | Water |
| 3MS | VWAH-PFAS-SW02-0222MS | F8279-FSMS | Water |
| 3MSD | VWAH-PFAS-SW02-0222MSD | F8280-FSMSD | Water |
| 4 | VWAH-PFAS-SW03-0222 | F8281-FS | Water |
| 5 | VWS6PFAS-SW02-0222 | F8282-FS | Water |
| 6 | VWS6PFAS-SW01-0222 | F8283-FS | Water |
| 7 | VWAH-EB01-020722 | F8292-FS | Water |
| 8 | VWS6EB01-020722 | F8293-FS | Water |

A Stage 2B/4 data validation was performed on the analytical data for six water samples and two aqueous equipment blank samples collected on February 3-7, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWAH-EB01-020722 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

| EDS Sample | Surrogate | %R | Qualifier |
|---|---|---|---|
| 1 | 13C5-PFHxA | 38% | UJ - Associated Cmpd |
| 2 | 13C5-PFHxA | 38% | |
| | 13C3-PFBS | 48% | |
| 3 | 13C5-PFHxA | 39% | |
| | 13C3-HFPO-DA | 49% | |
| 4 | 13C5-PFHxA | 33% | |
| | 13C3-PFBS | 43% | |
| 6 | 13C5-PFHxA | 46% | |
| | 13C3-PFBS | 49% | |

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

**Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries**

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

**Internal Standard (IS) Area Performance**

- All internal standards met response and retention time (RT) criteria.

**Target Compound Identification**

- All mass spectra and quantitation criteria were met.

**Compound Quantitation**

- All criteria were met.

**Field Duplicate Sample Precision**

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VWAH-PFAS-SW01-0222 ng/g | VWAH-PFAS-SW01P-0222 ng/g | RPD | Qualifier |
|---|---|---|---|---|
| PFHxS | 1.75 | 1.54 | 13% | None |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SW01-0222 |
| Battelle ID | F8276-FS |
| Sample Type | SA |
| Collection Date | 02/03/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.266 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.35 UJ | F8276-FS(0) | 1.000 | 3/9/2022 | 0.858 | 2.35 | 4.70 |
| PFHpA | 375-85-9 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.884 | 2.35 | 4.70 |
| PFOA | 335-67-1 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.949 | 2.35 | 4.70 |
| PFNA | 375-95-1 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.783 | 2.35 | 4.70 |
| PFDA | 335-76-2 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.737 | 2.35 | 4.70 |
| PFUnA | 2058-94-8 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.707 | 2.35 | 4.70 |
| PFDoA | 307-55-1 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.714 | 2.35 | 4.70 |
| PFTrDA | 72629-94-8 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.697 | 2.35 | 4.70 |
| PFTeDA | 376-06-7 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.743 | 2.35 | 4.70 |
| NMeFOSAA | 2355-31-9 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.968 | 2.35 | 4.70 |
| NEtFOSAA | 2991-50-6 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.930 | 2.35 | 4.70 |
| PFBS | 375-73-5 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.814 | 2.35 | 4.70 |
| PFHxS | 355-46-4 | 1.75 J | F8276-FS(0) | 1.000 | 3/9/2022 | 0.937 | 2.35 | 4.70 |
| PFOS | 1763-23-1 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 1.01 | 2.35 | 4.70 |
| HFPO-DA | 13252-13-6 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.813 | 2.35 | 4.70 |
| Adona | 919005-14-4 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.817 | 2.35 | 4.70 |
| 9Cl-PF3ONS | 756426-58-1 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.968 | 2.35 | 4.70 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.35 U | F8276-FS(0) | 1.000 | 3/9/2022 | 0.847 | 2.35 | 4.70 |

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Analyzed by: Bailey, Kevin
Printed: 3/9/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SW01P-0222 |
| Battelle ID | F8277-FS |
| Sample Type | SA |
| Collection Date | 02/03/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.272 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.30 UJ | F8277-FS(0) | 1.000 | 3/9/2022 | 0.839 | 2.30 | 4.60 | SSL |
| PFHpA | 375-85-9 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.865 | 2.30 | 4.60 | |
| PFOA | 335-67-1 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.928 | 2.30 | 4.60 | |
| PFNA | 375-95-1 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.766 | 2.30 | 4.60 | |
| PFDA | 335-76-2 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.721 | 2.30 | 4.60 | |
| PFUnA | 2058-94-8 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.691 | 2.30 | 4.60 | |
| PFDoA | 307-55-1 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.699 | 2.30 | 4.60 | |
| PFTrDA | 72629-94-8 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.682 | 2.30 | 4.60 | |
| PFTeDA | 376-06-7 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.727 | 2.30 | 4.60 | |
| NMeFOSAA | 2355-31-9 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.947 | 2.30 | 4.60 | |
| NEtFOSAA | 2991-50-6 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.910 | 2.30 | 4.60 | |
| PFBS | 375-73-5 | 2.30 UJ | F8277-FS(0) | 1.000 | 3/9/2022 | 0.796 | 2.30 | 4.60 | SSL |
| PFHxS | 355-46-4 | 1.54 J | F8277-FS(0) | 1.000 | 3/9/2022 | 0.916 | 2.30 | 4.60 | |
| PFOS | 1763-23-1 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.983 | 2.30 | 4.60 | |
| HFPO-DA | 13252-13-6 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.795 | 2.30 | 4.60 | |
| Adona | 919005-14-4 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.799 | 2.30 | 4.60 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.947 | 2.30 | 4.60 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.30 U | F8277-FS(0) | 1.000 | 3/9/2022 | 0.828 | 2.30 | 4.60 | |

NW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 3/9/2022

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3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SW02-0222 |
| Battelle ID | F8278-FS |
| Sample Type | SA |
| Collection Date | 02/03/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.267 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.34 UJ | F8278-FS(0) | 1.000 | 3/9/2022 | 0.855 | 2.34 | 4.68 | SSL |
| PFHpA | 375-85-9 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 0.881 | 2.34 | 4.68 | |
| PFOA | 335-67-1 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 0.946 | 2.34 | 4.68 | |
| PFNA | 375-95-1 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 0.780 | 2.34 | 4.68 | |
| PFDA | 335-76-2 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 0.734 | 2.34 | 4.68 | |
| PFUnA | 2058-94-8 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 0.704 | 2.34 | 4.68 | |
| PFDoA | 307-55-1 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 0.712 | 2.34 | 4.68 | |
| PFTrDA | 72629-94-8 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 0.695 | 2.34 | 4.68 | |
| PFTeDA | 376-06-7 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 0.741 | 2.34 | 4.68 | |
| NMeFOSAA | 2355-31-9 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 0.964 | 2.34 | 4.68 | |
| NEtFOSAA | 2991-50-6 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 0.927 | 2.34 | 4.68 | |
| PFBS | 375-73-5 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 0.811 | 2.34 | 4.68 | |
| PFHxS | 355-46-4 | 0.944 J | F8278-FS(0) | 1.000 | 3/9/2022 | 0.934 | 2.34 | 4.68 | |
| PFOS | 1763-23-1 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 1.00 | 2.34 | 4.68 | |
| HFPO-DA | 13252-13-6 | 2.34 UJ | F8278-FS(0) | 1.000 | 3/9/2022 | 0.810 | 2.34 | 4.68 | SSL |
| Adona | 919005-14-4 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 0.814 | 2.34 | 4.68 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 0.964 | 2.34 | 4.68 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.34 U | F8278-FS(0) | 1.000 | 3/9/2022 | 0.844 | 2.34 | 4.68 | |

MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 3/9/2022

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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SW03-0222 |
| Battelle ID | F8281-FS |
| Sample Type | SA |
| Collection Date | 02/03/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.272 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.30 UJ | F8281-FS(0) | 1.000 | 3/9/2022 | 0.839 | 2.30 | 4.60 | SSL |
| PFHpA | 375-85-9 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.865 | 2.30 | 4.60 | |
| PFOA | 335-67-1 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.928 | 2.30 | 4.60 | |
| PFNA | 375-95-1 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.766 | 2.30 | 4.60 | |
| PFDA | 335-76-2 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.721 | 2.30 | 4.60 | |
| PFUnA | 2058-94-8 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.691 | 2.30 | 4.60 | |
| PFDoA | 307-55-1 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.699 | 2.30 | 4.60 | |
| PFTrDA | 72629-94-8 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.682 | 2.30 | 4.60 | |
| PFTeDA | 376-06-7 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.727 | 2.30 | 4.60 | |
| NMeFOSAA | 2355-31-9 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.947 | 2.30 | 4.60 | |
| NEtFOSAA | 2991-50-6 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.910 | 2.30 | 4.60 | |
| PFBS | 375-73-5 | 2.30 UJ | F8281-FS(0) | 1.000 | 3/9/2022 | 0.796 | 2.30 | 4.60 | SSL |
| PFHxS | 355-46-4 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.916 | 2.30 | 4.60 | |
| PFOS | 1763-23-1 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.983 | 2.30 | 4.60 | |
| HFPO-DA | 13252-13-6 | 2.30 UJ | F8281-FS(0) | 1.000 | 3/9/2022 | 0.795 | 2.30 | 4.60 | SSL |
| Adona | 919005-14-4 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.799 | 2.30 | 4.60 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.947 | 2.30 | 4.60 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.30 U | F8281-FS(0) | 1.000 | 3/9/2022 | 0.828 | 2.30 | 4.60 | |

NW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 3/9/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS6-PFAS-SW02-0222 |
| Battelle ID | F8282-FS |
| Sample Type | SA |
| Collection Date | 02/04/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.265 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.861 | 2.36 | 4.72 |
| PFHpA | 375-85-9 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.888 | 2.36 | 4.72 |
| PFOA | 335-67-1 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.953 | 2.36 | 4.72 |
| PFNA | 375-95-1 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.786 | 2.36 | 4.72 |
| PFDA | 335-76-2 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.740 | 2.36 | 4.72 |
| PFUnA | 2058-94-8 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.709 | 2.36 | 4.72 |
| PFDoA | 307-55-1 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.717 | 2.36 | 4.72 |
| PFTrDA | 72629-94-8 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.700 | 2.36 | 4.72 |
| PFTeDA | 376-06-7 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.746 | 2.36 | 4.72 |
| NMeFOSAA | 2355-31-9 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.972 | 2.36 | 4.72 |
| NEtFOSAA | 2991-50-6 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.934 | 2.36 | 4.72 |
| PFBS | 375-73-5 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.817 | 2.36 | 4.72 |
| PFHxS | 355-46-4 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.941 | 2.36 | 4.72 |
| PFOS | 1763-23-1 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 1.01 | 2.36 | 4.72 |
| HFPO-DA | 13252-13-6 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.816 | 2.36 | 4.72 |
| Adona | 919005-14-4 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.820 | 2.36 | 4.72 |
| 9Cl-PF3ONS | 756426-58-1 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.972 | 2.36 | 4.72 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.36 U | F8282-FS(0) | 1.000 | 3/9/2022 | 0.850 | 2.36 | 4.72 |

MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 3/9/2022

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6

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS6-PFAS-SW01-0222 |
| Battelle ID | F8283-FS |
| Sample Type | SA |
| Collection Date | 02/04/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.270 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.31 UJ | F8283-FS(0) | 1.000 | 3/9/2022 | 0.845 | 2.31 | 4.63 | SSL |
| PFHpA | 375-85-9 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.871 | 2.31 | 4.63 | |
| PFOA | 335-67-1 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.935 | 2.31 | 4.63 | |
| PFNA | 375-95-1 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.771 | 2.31 | 4.63 | |
| PFDA | 335-76-2 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.726 | 2.31 | 4.63 | |
| PFUnA | 2058-94-8 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.696 | 2.31 | 4.63 | |
| PFDoA | 307-55-1 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.704 | 2.31 | 4.63 | |
| PFTrDA | 72629-94-8 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.687 | 2.31 | 4.63 | |
| PFTeDA | 376-06-7 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.732 | 2.31 | 4.63 | |
| NMeFOSAA | 2355-31-9 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.954 | 2.31 | 4.63 | |
| NEtFOSAA | 2991-50-6 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.917 | 2.31 | 4.63 | |
| PFBS | 375-73-5 | 2.31 UJ | F8283-FS(0) | 1.000 | 3/9/2022 | 0.802 | 2.31 | 4.63 | SSL |
| PFHxS | 355-46-4 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.923 | 2.31 | 4.63 | |
| PFOS | 1763-23-1 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.991 | 2.31 | 4.63 | |
| HFPO-DA | 13252-13-6 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.801 | 2.31 | 4.63 | |
| Adona | 919005-14-4 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.805 | 2.31 | 4.63 | |
| 9Cl-PF3ONS | 756426-58-1 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.954 | 2.31 | 4.63 | |
| 11Cl-PF3OUdS | 763051-92-9 | 2.31 U | F8283-FS(0) | 1.000 | 3/9/2022 | 0.834 | 2.31 | 4.63 | |

MW 8/14/22

Analyzed by: Bailey, Kevin
Printed: 3/9/2022

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7

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-EB01-020722 |
| Battelle ID | F8292-FS |
| Sample Type | SA |
| Collection Date | 02/07/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.261 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.875 | 2.39 | 4.79 |
| PFHpA | 375-85-9 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.901 | 2.39 | 4.79 |
| PFOA | 335-67-1 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.967 | 2.39 | 4.79 |
| PFNA | 375-95-1 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.798 | 2.39 | 4.79 |
| PFDA | 335-76-2 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.751 | 2.39 | 4.79 |
| PFUnA | 2058-94-8 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.720 | 2.39 | 4.79 |
| PFDoA | 307-55-1 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.728 | 2.39 | 4.79 |
| PFTrDA | 72629-94-8 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.711 | 2.39 | 4.79 |
| PFTeDA | 376-06-7 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.758 | 2.39 | 4.79 |
| NMeFOSAA | 2355-31-9 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.987 | 2.39 | 4.79 |
| NEtFOSAA | 2991-50-6 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.948 | 2.39 | 4.79 |
| PFBS | 375-73-5 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.830 | 2.39 | 4.79 |
| PFHxS | 355-46-4 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.955 | 2.39 | 4.79 |
| PFOS | 1763-23-1 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 1.02 | 2.39 | 4.79 |
| HFPO-DA | 13252-13-6 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.829 | 2.39 | 4.79 |
| Adona | 919005-14-4 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.832 | 2.39 | 4.79 |
| 9Cl-PF3ONS | 756426-58-1 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.987 | 2.39 | 4.79 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.39 U | F8292-FS(0) | 1.000 | 3/9/2022 | 0.863 | 2.39 | 4.79 |

MW 8/19/22

Analyzed by: Bailey, Kevin
Printed: 3/9/2022

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Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS6-EB01-020722 |
| Battelle ID | F8293-FS |
| Sample Type | SA |
| Collection Date | 02/07/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 5500 (AC) LC/MS/MS |
| % Moisture | NA |
| Matrix | AQ |
| Sample Size | 0.262 |
| Size Unit-Basis | L |

| Analyte | CAS No. | Result (ng/L) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.871 | 2.39 | 4.77 |
| PFHpA | 375-85-9 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.898 | 2.39 | 4.77 |
| PFOA | 335-67-1 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.964 | 2.39 | 4.77 |
| PFNA | 375-95-1 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.795 | 2.39 | 4.77 |
| PFDA | 335-76-2 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.748 | 2.39 | 4.77 |
| PFUnA | 2058-94-8 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.718 | 2.39 | 4.77 |
| PFDoA | 307-55-1 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.725 | 2.39 | 4.77 |
| PFTrDA | 72629-94-8 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.708 | 2.39 | 4.77 |
| PFTeDA | 376-06-7 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.755 | 2.39 | 4.77 |
| NMeFOSAA | 2355-31-9 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.983 | 2.39 | 4.77 |
| NEtFOSAA | 2991-50-6 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.945 | 2.39 | 4.77 |
| PFBS | 375-73-5 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.826 | 2.39 | 4.77 |
| PFHxS | 355-46-4 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.951 | 2.39 | 4.77 |
| PFOS | 1763-23-1 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 1.02 | 2.39 | 4.77 |
| HFPO-DA | 13252-13-6 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.825 | 2.39 | 4.77 |
| Adona | 919005-14-4 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.829 | 2.39 | 4.77 |
| 9Cl-PF3ONS | 756426-58-1 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.983 | 2.39 | 4.77 |
| 11Cl-PF3OUdS | 763051-92-9 | 2.39 U | F8293-FS(0) | 1.000 | 3/9/2022 | 0.860 | 2.39 | 4.77 |

AW 8/19/22

Analyzed by: Bailey, Kevin
Printed: 3/9/2022

# Sediment Data Validation Reports

ENVIRONMENTAL
Data Services, Inc.

# DATA VALIDATION SUMMARY REPORT
# FORMER VIEQUES NAVAL TRAINING RANGE, PUERTO RICO

Client: CH2M HILL, Inc., Virginia Beach, Virginia
SDG: 22-0222
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Former Vieques Naval Training Range, CTO-003, Puerto Rico
Date: August 13, 2022

| PFAS | | | |
|---|---|---|---|
| EDS ID | Client Sample ID | Laboratory Sample ID | Matrix |
| 1 | VW6SPFAS-SD02-0006 | F8284-FS | Sediment |
| 2 | VWAH-PFAS-SD01-0006 | F8285-FS | Sediment |
| 3 | VWAH-PFAS-SD01P-0006 | F8286-FS | Sediment |
| 4 | VWAH-PFAS-SD02-0006 | F8287-FS | Sediment |
| 4MS | VWAH-PFAS-SD02-0006MS | F8288-FSMS | Sediment |
| 4MSD | VWAH-PFAS-SD02-0006MSD | F8289-FSMSD | Sediment |
| 5 | VWAH-PFAS-SD03-0006 | F8290-FS | Sediment |
| 6 | VWS6PFAS-SD01-0006 | F8291-FS | Sediment |
| 7 | VWS6PFAS-SS01-0001 | F8294-FS | Soil |

A Stage 2B/4 data validation was performed on the analytical data for six sediment samples and one soil sample collected on February 3-7, 2022 by CH2M HILL at the Former Vieques Naval Training Range site in Puerto Rico. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

| *Analysis* | *Method References* |
|---|---|
| PFAS | Battelle SOP 5-369-09 |

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Final Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Former Naval Training Range, Vieques, Puerto Rico, December 2021, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

***PFAS***

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

## Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

## Polyfluoroalkyl Substances (PFAS)

### Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

### Holding Times

- All samples were extracted within 14 days for soil and sediment samples and analyzed within 28 days.

## LC/MS Tuning

- All criteria were met.

## Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

## Continuing Calibration

- All percent recovery (%R) criteria were met.

## Method Blank

- The method blanks were free of contamination.

## Field QC Blank

- Field QC results are summarized below.

| Blank ID | Compound | Conc. ng/L | Qualifier | Affected Samples |
|---|---|---|---|---|
| VWAH-EB01-020722 | None - ND | - | - | - |

## Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

| EDS Sample | Surrogate | %R | Qualifier |
|---|---|---|---|
| 6 | 13C2-PFTeDA | 48% | UJ - Associated Cmpd |
| 7 | 13C2-PFTeDA | 45% | UJ - Associated Cmpd |

## Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

## Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

## Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

## Target Compound Identification

- All mass spectra and quantitation criteria were met.

## Compound Quantitation

- All criteria were met.

## Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

| Compound | VWAH-PFAS-SD01-0006 ng/g | VWAH-PFAS-SD01P-0006 ng/g | RPD | Qualifier |
|---|---|---|---|---|
| None | ND | ND | - | - |

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver Dated: 8/14/22

Nancy Weaver
Senior Chemist

| Qualifier | Definition |
|---|---|
| U | The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample. |
| 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. |
| N | The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification." |
| NJ | The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample. |
| UJ | The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate. |
| 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.<br>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. |

BATTELLE
It can be done

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS6-PFAS-SD02-0006 |
| Battelle ID | F8284-FS |
| Sample Type | SA |
| Collection Date | 02/04/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 41.32 |
| Matrix | SD |
| Sample Size | 4.690 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.190 | 0.533 | 1.07 |
| PFHpA | 375-85-9 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.179 | 0.533 | 1.07 |
| PFOA | 335-67-1 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.228 | 0.533 | 1.07 |
| PFNA | 375-95-1 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.167 | 0.533 | 1.07 |
| PFDA | 335-76-2 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.168 | 0.533 | 1.07 |
| PFUnA | 2058-94-8 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.166 | 0.533 | 1.07 |
| PFDoA | 307-55-1 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.171 | 0.533 | 1.07 |
| PFTrDA | 72629-94-8 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.172 | 0.533 | 1.07 |
| PFTeDA | 376-06-7 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.173 | 0.533 | 2.13 |
| NMeFOSAA | 2355-31-9 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.170 | 0.533 | 2.13 |
| NEtFOSAA | 2991-50-6 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.176 | 0.533 | 2.13 |
| PFBS | 375-73-5 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.182 | 0.533 | 1.07 |
| PFHxS | 355-46-4 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.184 | 0.533 | 1.07 |
| PFOS | 1763-23-1 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.187 | 0.533 | 1.07 |
| HFPO-DA | 13252-13-6 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.170 | 0.533 | 2.13 |
| Adona | 919005-14-4 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.171 | 0.533 | 2.13 |
| 9Cl-PF3ONS | 756426-58-1 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.164 | 0.533 | 2.13 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.533 U | F8284-FS(0) | 1.000 | 3/3/2022 | 0.160 | 0.533 | 2.13 |

NW 8/13/22

Analyzed by: Bailey, Kevin
Printed: 3/9/2022

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2

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SD01-0006 |
| Battelle ID | F8285-FS |
| Sample Type | SA |
| Collection Date | 02/03/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 18.70 |
| Matrix | SD |
| Sample Size | 5.010 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.178 | 0.499 | 0.998 |
| PFHpA | 375-85-9 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.168 | 0.499 | 0.998 |
| PFOA | 335-67-1 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.214 | 0.499 | 0.998 |
| PFNA | 375-95-1 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.157 | 0.499 | 0.998 |
| PFDA | 335-76-2 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.158 | 0.499 | 0.998 |
| PFUnA | 2058-94-8 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.156 | 0.499 | 0.998 |
| PFDoA | 307-55-1 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.160 | 0.499 | 0.998 |
| PFTrDA | 72629-94-8 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.161 | 0.499 | 0.998 |
| PFTeDA | 376-06-7 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.162 | 0.499 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.159 | 0.499 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.165 | 0.499 | 2.00 |
| PFBS | 375-73-5 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.171 | 0.499 | 0.998 |
| PFHxS | 355-46-4 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.173 | 0.499 | 0.998 |
| PFOS | 1763-23-1 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.175 | 0.499 | 0.998 |
| HFPO-DA | 13252-13-6 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.159 | 0.499 | 2.00 |
| Adona | 919005-14-4 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.160 | 0.499 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.154 | 0.499 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.499 U | F8285-FS(0) | 1.000 | 3/3/2022 | 0.150 | 0.499 | 2.00 |

MW 8/13/22

Analyzed by: Balley, Kevin
Printed: 3/9/2022

BATTELLE
It can be done

3

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SD01P-0006 |
| Battelle ID | F8286-FS |
| Sample Type | SA |
| Collection Date | 02/03/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 18.22 |
| Matrix | SD |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.178 | 0.500 | 1.00 |
| PFHpA | 375-85-9 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.168 | 0.500 | 1.00 |
| PFOA | 335-67-1 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.214 | 0.500 | 1.00 |
| PFNA | 375-95-1 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.157 | 0.500 | 1.00 |
| PFDA | 335-76-2 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.158 | 0.500 | 1.00 |
| PFUnA | 2058-94-8 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.156 | 0.500 | 1.00 |
| PFDoA | 307-55-1 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.160 | 0.500 | 1.00 |
| PFTrDA | 72629-94-8 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.161 | 0.500 | 1.00 |
| PFTeDA | 376-06-7 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.162 | 0.500 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.159 | 0.500 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.165 | 0.500 | 2.00 |
| PFBS | 375-73-5 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.171 | 0.500 | 1.00 |
| PFHxS | 355-46-4 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.173 | 0.500 | 1.00 |
| PFOS | 1763-23-1 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.175 | 0.500 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.159 | 0.500 | 2.00 |
| Adona | 919005-14-4 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.160 | 0.500 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.154 | 0.500 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 U | F8286-FS(0) | 1.000 | 3/3/2022 | 0.150 | 0.500 | 2.00 |

NW 8/13/22

Analyzed by: Bailey, Kevin
Printed: 3/9/2022

BATTELLE
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4

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SD02-0006 |
| Battelle ID | F8287-FS |
| Sample Type | SA |
| Collection Date | 02/03/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 17.10 |
| Matrix | SD |
| Sample Size | 5.000 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.178 | 0.500 | 1.00 |
| PFHpA | 375-85-9 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.168 | 0.500 | 1.00 |
| PFOA | 335-67-1 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.214 | 0.500 | 1.00 |
| PFNA | 375-95-1 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.157 | 0.500 | 1.00 |
| PFDA | 335-76-2 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.158 | 0.500 | 1.00 |
| PFUnA | 2058-94-8 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.156 | 0.500 | 1.00 |
| PFDoA | 307-55-1 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.160 | 0.500 | 1.00 |
| PFTrDA | 72629-94-8 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.161 | 0.500 | 1.00 |
| PFTeDA | 376-06-7 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.162 | 0.500 | 2.00 |
| NMeFOSAA | 2355-31-9 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.159 | 0.500 | 2.00 |
| NEtFOSAA | 2991-50-6 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.165 | 0.500 | 2.00 |
| PFBS | 375-73-5 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.171 | 0.500 | 1.00 |
| PFHxS | 355-46-4 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.173 | 0.500 | 1.00 |
| PFOS | 1763-23-1 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.175 | 0.500 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.159 | 0.500 | 2.00 |
| Adona | 919005-14-4 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.160 | 0.500 | 2.00 |
| 9Cl-PF3ONS | 756426-58-1 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.154 | 0.500 | 2.00 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.500 U | F8287-FS(0) | 1.000 | 3/3/2022 | 0.150 | 0.500 | 2.00 |

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It can be done

5

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWAH-PFAS-SD03-0006 |
| Battelle ID | F8290-FS |
| Sample Type | SA |
| Collection Date | 02/03/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 14.72 |
| Matrix | SD |
| Sample Size | 4.980 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ |
|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.179 | 0.502 | 1.00 |
| PFHpA | 375-85-9 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.169 | 0.502 | 1.00 |
| PFOA | 335-67-1 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.215 | 0.502 | 1.00 |
| PFNA | 375-95-1 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.158 | 0.502 | 1.00 |
| PFDA | 335-76-2 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.159 | 0.502 | 1.00 |
| PFUnA | 2058-94-8 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.157 | 0.502 | 1.00 |
| PFDoA | 307-55-1 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.161 | 0.502 | 1.00 |
| PFTrDA | 72629-94-8 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.162 | 0.502 | 1.00 |
| PFTeDA | 376-06-7 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.163 | 0.502 | 2.01 |
| NMeFOSAA | 2355-31-9 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.160 | 0.502 | 2.01 |
| NEtFOSAA | 2991-50-6 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.166 | 0.502 | 2.01 |
| PFBS | 375-73-5 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.172 | 0.502 | 1.00 |
| PFHxS | 355-46-4 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.174 | 0.502 | 1.00 |
| PFOS | 1763-23-1 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.176 | 0.502 | 1.00 |
| HFPO-DA | 13252-13-6 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.160 | 0.502 | 2.01 |
| Adona | 919005-14-4 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.161 | 0.502 | 2.01 |
| 9Cl-PF3ONS | 756426-58-1 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.155 | 0.502 | 2.01 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.502 U | F8290-FS(0) | 1.000 | 3/3/2022 | 0.151 | 0.502 | 2.01 |

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6

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS6-PFAS-SD01-0006 |
| Battelle ID | F8291-FS |
| Sample Type | SA |
| Collection Date | 02/04/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 50.30 |
| Matrix | SD |
| Sample Size | 3.980 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.224 | 0.628 | 1.26 | |
| PFHpA | 375-85-9 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.211 | 0.628 | 1.26 | |
| PFOA | 335-67-1 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.269 | 0.628 | 1.26 | |
| PFNA | 375-95-1 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.197 | 0.628 | 1.26 | |
| PFDA | 335-76-2 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.198 | 0.628 | 1.26 | |
| PFUnA | 2058-94-8 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.196 | 0.628 | 1.26 | |
| PFDoA | 307-55-1 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.201 | 0.628 | 1.26 | |
| PFTrDA | 72629-94-8 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.202 | 0.628 | 1.26 | |
| PFTeDA | 376-06-7 | 0.628 UJ | F8291-FS(0) | 1.000 | 3/3/2022 | 0.204 | 0.628 | 2.51 | SSL |
| NMeFOSAA | 2355-31-9 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.200 | 0.628 | 2.51 | |
| NEtFOSAA | 2991-50-6 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.207 | 0.628 | 2.51 | |
| PFBS | 375-73-5 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.215 | 0.628 | 1.26 | |
| PFHxS | 355-46-4 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.217 | 0.628 | 1.26 | |
| PFOS | 1763-23-1 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.220 | 0.628 | 1.26 | |
| HFPO-DA | 13252-13-6 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.200 | 0.628 | 2.51 | |
| Adona | 919005-14-4 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.201 | 0.628 | 2.51 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.193 | 0.628 | 2.51 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.628 U | F8291-FS(0) | 1.000 | 3/3/2022 | 0.188 | 0.628 | 2.51 | |

MW 8/13/22

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7

Project Client: CH2M
Project Name: CTO-0003: Former Vieques Naval Training Range, Puerto Rico
Project No.: G25161.X1.XX.0047.000001

| | |
|---|---|
| Client ID | VWS6-PFAS-SS01-0001 |
| Battelle ID | F8294-FS |
| Sample Type | SA |
| Collection Date | 02/07/2022 |
| Extraction Date | 02/17/2022 |
| Analytical Instrument | Sciex 6500+ (AE) LC/MS/MS |
| % Moisture | 25.50 |
| Matrix | SS |
| Sample Size | 5.010 |
| Size Unit-Basis | g |

| Analyte | CAS No. | Result (ng/g_Dry) | Extract ID | DF | Analysis Date | DL | LOD | LOQ | |
|---|---|---|---|---|---|---|---|---|---|
| PFHxA | 307-24-4 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.178 | 0.499 | 0.998 | |
| PFHpA | 375-85-9 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.168 | 0.499 | 0.998 | |
| PFOA | 335-67-1 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.214 | 0.499 | 0.998 | |
| PFNA | 375-95-1 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.157 | 0.499 | 0.998 | |
| PFDA | 335-76-2 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.158 | 0.499 | 0.998 | |
| PFUnA | 2058-94-8 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.156 | 0.499 | 0.998 | |
| PFDoA | 307-55-1 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.160 | 0.499 | 0.998 | |
| PFTrDA | 72629-94-8 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.161 | 0.499 | 0.998 | |
| PFTeDA | 376-06-7 | 0.499 U ug | F8294-FS(0) | 1.000 | 3/3/2022 | 0.162 | 0.499 | 2.00 | SSL |
| NMeFOSAA | 2355-31-9 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.159 | 0.499 | 2.00 | |
| NEtFOSAA | 2991-50-6 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.165 | 0.499 | 2.00 | |
| PFBS | 375-73-5 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.171 | 0.499 | 0.998 | |
| PFHxS | 355-46-4 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.173 | 0.499 | 0.998 | |
| PFOS | 1763-23-1 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.175 | 0.499 | 0.998 | |
| HFPO-DA | 13252-13-6 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.159 | 0.499 | 2.00 | |
| Adona | 919005-14-4 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.160 | 0.499 | 2.00 | |
| 9Cl-PF3ONS | 756426-58-1 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.154 | 0.499 | 2.00 | |
| 11Cl-PF3OUdS | 763051-92-9 | 0.499 U | F8294-FS(0) | 1.000 | 3/3/2022 | 0.150 | 0.499 | 2.00 | |

NW 8/13/22

Analyzed by: Bailey, Kevin
Printed: 3/9/2022

# Appendix H
# Data Quality Evaluation

# Data Quality Evaluation
# Site Inspection for Per- and Polyfluoroalkyl Substances

## Atlantic Fleet Weapons Training Area – Vieques
## Former Naval Ammunition Support Detachment and
## Former Vieques Naval Training Range
## Vieques, Puerto Rico

Prepared for

Department of the Navy
Naval Facilities Engineering Systems Command
Atlantic

Under the

NAVFAC CLEAN Program
Contract N62470-16-D-9000
Contract Task Order 0003

Prepared by
CH2M HILL, Inc.
Virginia Beach, Virginia

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# Acronyms and Abbreviations

| | |
|---|---|
| DOD | Department of Defense |
| DQE | Data Quality Evaluation |
| EPA | Environmental Protection Agency |
| GW | groundwater |
| LCS | laboratory control sample |
| LOD | limit of detection |
| LOQ | limit of quantitation |
| MS | matrix spike |
| MSD | matrix spike duplicate |
| PARCC | Precision, Accuracy, Representativeness, Comparability, and Completeness |
| PFAS | per- and polyfluoroalkyl substances |
| QA | quality assurance |
| QC | quality control |
| QSM | Quality System Manual |
| RSL | Regional Screening Level |
| SAP | Sampling and Analysis Plan |
| SB | subsurface soil |
| SD | sediment |
| SI | Site Inspection |
| SIM | selected ion monitoring |
| SL | screening level |
| SOP | Standard Operating Procedure |
| SS | surface soil |
| SW | surface water |
| TCE | trichloroethylene |

SECTION 1

# Data Quality Assessment

This Data Quality Evaluation (DQE) assesses the effect of the overall analytical process on the "availability" of the analytical data. "Availability" in this context refers to whether results can be used by the project team based on their analytical soundness. If a result is analytically sound, it is available for use for evaluating the potential releases, nature and extent of impacts, and estimating potentially associated human health and ecological risks. However, a particular result or group of results may not be "usable" for these purposes if other conditions apply. For example, if there were a hypothetical site where a trichloroethene (TCE) spill had occurred and the TCE data for many or all of the samples were rejected, the data may not be usable for making site-specific determinations even if all the non-TCE data were analytically sound and available for use by the project team. In order to avoid confusion of terms, this DQE differentiates the "availability" of results from "usability" of results. "Available" results are analytically sound and available for use by the project team to make decisions, even if they are not usable for a particular purpose.

The three major categories of data evaluation are laboratory performance, field collection performance (i.e., blank contamination), and matrix interferences. Evaluation of laboratory performance is a check for compliance with the method requirements; in other words, a check of whether the laboratory analyzed the samples within the limits of the analytical method. Additionally, a third-party validator, Environmental Data Services, Inc., conducted a review of the laboratory data to assess whether the analytical methods were within required control limits at the time of analysis. Evaluation of potential matrix interferences involves the review of several areas of results, including surrogate spike recoveries, matrix spike recoveries, and duplicate sample results. Evaluation of field collection performance, such as blank contamination and field duplicates, involves the review of field quality control (QC) and the determination of their effect on the sample results.

The data evaluation and validation are a multi-tiered approach. The process begins with an internal laboratory review, continues with a review by a third-party data validator, and ends with an overall review by the Navy contractor project chemistry team. The process provides a medium for essential communication between the laboratory, validator, and project team, and allows for data quality to be thoroughly evaluated.

This document presents the results of the data quality evaluation performed on four data sets:

- Vieques CTO 0003 Per- and Polyfluoroalkyl Substances GW Site Inspection Report
  - Activity: Vieques Former Vieques Naval Training Range
  - Site: CTO 0003 GW Site Inspection
  - Matrices: groundwater (GW)
  - Date Range: January 31, 2022, through July 13, 2022
  - Data Use: Definitive
- Vieques CTO 0003 Per- and Polyfluoroalkyl Substances SW Site Inspection Report
  - Activity: Vieques Former Vieques Naval Training Range
  - Site: CTO 0003 SW Site Inspection
  - Matrices: surface water (SW)
  - Date Range: February 3, 2022, through February 7, 2022
  - Data Use: Definitive
- Vieques CTO 0003 Per- and Polyfluoroalkyl Substances Soil Site Inspection Report
  - Activity: Vieques Former Vieques Naval Training Range

- Site: CTO 0003 Soil Site Inspection
- Matrices: subsurface soils (SB), surface soils (SS), and sediment (SD)
- Date Range: February 3, 2022, through May 11, 2022
- Data Use: Definitive

## 1.1 Laboratory Internal Quality Control Review

Prior to releasing the analytical data, the laboratory, Battelle, reviewed both the sample and QC data to verify sample identity, instrument calibration, limits of quantitation (LOQs), dilution factors, numerical computations, accuracy of transcriptions, and chemical interpretations. In addition, the QC data were tabulated, and the results were reviewed to ascertain whether they were within the contract-required or laboratory-defined limits for accuracy and precision. Any non-conforming data were discussed in the data package cover letter and case narrative. The case narrative was then reviewed by the data validator and incorporated into the data validation report. If necessary, the exceedances were verified, and qualifiers were applied based on this information.

## 1.2 Data Validation

Third-party data validators reviewed all data packages using the validation criteria outlined in the site-specific Uniform Federal Policy Sampling and Analysis Plan (SAP) Worksheets #34-36 (CH2M, 2021). The data were reviewed, verified, and validated consistent with the procedures presented in the following documents:

- For per- and polyfluoroalkyl substances (PFAS) via Quality Systems Manual (QSM) Table B-15:
  - Department of Defense (DoD) "Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15" (May 2020)
  - Department of Defense "Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3" (May 2019)
  - SAP limits for accuracy/precision (CH2M, 2021)

As stated previously, the data validation process was separate from the laboratory's internal review. The process was specifically focused on the effects of the laboratory's performance and sample matrix on the analytical results. Example areas of review include holding time compliance, surrogate recovery accuracy, matrix spiked sample precision and accuracy, blank contamination, initial and continuing calibration accuracy and precision, laboratory control sample accuracy, internal standard response and retention time accuracy, instrument tune criteria accuracy, and duplicate sample precision (laboratory replicates and field duplicates). Please refer to the complete data validation report for full areas of review.

Multiple analyses are most often the result of concentrations exceeding the calibration range or QC results outside of control limits. When multiple analyses were performed, the "best result" was selected for purposes of this DQE. Among multiple valid and/or invalid results, the "best result" is:

1. The non-rejected result
2. The result from the appropriate concentration range (dilution factor)
3. The detect when one or more result is detected, and one or more result is non-detect
4. The greater of detects, and
5. The lesser of non-detects (U-Values)

Qualification of data is not an unusual occurrence. To define a laboratory QC exceedance and when a laboratory QC exceedance occurs, the laboratory refers to its in-house Standard Operating Procedures (SOPs). The SOPs are based on DoD QSM requirements, the requested analytical method, and accumulated laboratory experience.

When a laboratory QC exceedance occurs, the situation may be acceptable, or it may require further action by the laboratory, such as application of a laboratory qualifier or re-extraction and/or re-analysis of the sample. The data validator uses a separate set of QC criteria, based on guidance from DoD Data Validation Guidelines that applies to the samples. A laboratory QC exceedance may not constitute a data validation exceedance and a data validation exceedance may not constitute a laboratory QC exceedance. Data validation criteria exceedances may result in the qualification of or rejection of data, as deemed appropriate by the data validator.

The data validator examines each data point and determines any effects that QC exceedances have had. Most often, these effects dictate that the result or limit of detection (LOD) should be considered estimated but is still available for use. The J-qualification, J+-qualification, UJ-qualification, and U-qualification of results are common occurrences and have no adverse effect on the availability of that result to the project team for making decisions. J-qualified and J+-qualified results are available, at the reported result, for use as detects as long as they are considered "estimated" by the project team. Human health risk assessment guidance suggests that these qualifiers "indicate uncertainty in the reported concentration of the chemical, but not in its assigned identity.

Therefore, these data can be used just as positive data with no qualifiers or codes." In addition, the same risk assessment guidance (EPA, 1989) suggests that one should use "J-qualified concentrations the same way as positive data that do not have this qualifier." U-qualified and UJ-qualified results are available, at the reported LOD or level, for use as non-detects as long as they are considered "non-detect or not detected at significantly greater than that in an associated blank" or "non-detect, estimated LOD," as appropriate.

In extreme cases, a result is rejected and deemed to be unusable. "Unusable" in this instance is defined as a result that is not analytically sound and is not generally considered available for use by the project team. In some cases, the project team may still decide to use a rejected result. An example of this occurrence would be if a result is rejected because it is biased extremely high, yet it is still less than the screening level (SL). A conservative decision may be made to consider this result a non-exceedance, even if its concentration was rejected. For that reason, it is important to examine why a result was rejected. For the most part, however, rejected results are not usable, and the R-qualifier is the only qualifier that has an adverse effect on the availability of data.

In large data sets, rejected results are often inconsequential because there are sufficient non-rejected data available to the project team. If there are enough non-rejected data or the project team is able to infer results from adjacent sampling locations or there is other site-specific information that can provide additional lines of evidence, it may not be necessary to know the concentrations of some rejected constituents. It may also not be necessary to prove a constituent's absence if there are sufficient additional lines of evidence.

## 1.3 Primary Data Validation Qualifiers

The following data validation qualifiers were applied to one or more analytical results:

- U – Not detected. Sample was analyzed for this parameter, but it was not detected at greater than the reported LOD. The data validator may also apply this qualifier to indicate that a concentration was not detected at significantly greater than that in an associated blank. Thus, this qualifier does not necessarily indicate a quality control exceedance.
- UJ – Not detected, LOD estimated. Sample was analyzed for this parameter, but it was not detected above the reported LOD. The LOD for this parameter is estimated due to a quality control exceedance.
- J – Concentration estimated. The parameter was positively identified, and the associated numerical value is the approximate concentration of the parameter in the sample. Often, a J-qualifier is applied simply because the result was less than the limit of quantitation and thus does not necessarily indicate a quality control exceedance.
- [none] – Detected. Qualification was not warranted.

# 1.4 Impact of Data Quality on Project Data Quality Objectives and Data Usability

The laboratory analyzed the samples in accordance with the respective analysis methods and SOP. The data packages were reviewed by a data validator taking guidance from DoD data validation guidelines. Field QC samples were collected and analyzed at the planned frequencies.

The laboratory utilized various qualifiers to represent "below reporting limit," "non-detect," and "detected." Any other extraneous laboratory qualifiers were superseded by data validation qualifiers. The data validator utilized J-qualifiers and U-qualifiers to represent "estimated," and "non-detect," respectively. The only time the data validator changed a result's detect status was when J-qualifiers were changed to U-qualifiers (detect to non-detect) as a result of blank contamination.

The J-qualifiers indicate that some results are estimated. These qualifiers indicate that data are available for use as detects. These qualifiers do not necessarily indicate a problem that adversely affects the availability of data. For example, J-qualifiers are often applied simply because results are below the quantitation limit.

If a result is attributable to blank contamination, it is U-qualified and is no longer distinguishable from results that are simply non-detect. The U-qualified value is elevated to the LOD if necessary. This supports the practice that J-qualified results, while estimated, are available for use as detects at their qualified concentration and U- and UJ-qualifiers are available for use as non-detects at their qualified LOD or level. In general, J-, $J^+$-, $J^-$-, UJ-, and U-qualified results are available for use as qualified for evaluating potential releases, the nature and extent of impacts, and estimating potentially associated human health and ecological risks.

It is a common occurrence for achieved LODs to be greater than SLs or for LODs to be elevated above what was expected or requested. In many cases, SLs are simply unreasonably low, or the laboratory was forced, by the analytical method or sample matrices, to raise limits for various reasons. In the instance where non-detect LODs are greater than SLs, the results are available for use as non-detects, but their use adds uncertainty to the conclusions drawn. There are a variety of typical and potentially unavoidable reasons why the reporting limits of non-detect results may exceed SLs:

- If an SL is unreasonably low, current instrumentation technology may not be able to achieve an LOD less than the SL.
- The laboratory-specific limits may have been established at a time when the SL was higher (less stringent) or not present, but the reporting is being done using new (more stringent) criteria. Published screening levels, such as Environmental Protection Agency (EPA) Regional Screening Levels (RSLs), may change periodically as toxicity values are updated.
- If a target compound or analyte is present at an elevated level, the laboratory will dilute the entire sample in order to report that concentration within the instrument's linear calibration range. It may not be possible to analyze the sample at a lesser dilution if the target compound's high concentration is likely to damage or saturate the instrument. The high concentration of a non-target compound or analyte may also necessitate initial dilution for the same reason.
- If matrix effects mask low concentrations, the laboratory may be forced to elevate their limits to demonstrate the fact that low concentrations cannot be detected.
- If matrix effects are particularly strong, the laboratory may be forced to analyze the sample at an initial dilution in an attempt to dilute the matrix effects.
- If historical concentrations warrant, the laboratory detects an odor, or the field team designates a sample as "expected high concentration," the laboratory may pre-screen the sample and initially dilute it.

- If the sample appearance indicates possible high concentrations, the laboratory may be forced to analyze the sample at a concentration range different from what is requested. For example, if a sample is designated as "groundwater," but is actually an emulsion or sludge, the laboratory may be forced to analyze the sample using the "medium" instead of the "low" or selected ion monitoring (SIM) concentration range.
- If the field team cannot provide the full sample volume, the laboratory may be forced to dilute the sample by adding water until the minimum volume is achieved.
- If a soil or sediment sample is characterized by high percent moisture, the reporting limits will be elevated such that the concentrations and quantitation limits are reported on a dry-weight basis.

## 1.5 Comparison of Non-detects to Screening Levels

When evaluating the data and making decisions, the project team compares detected sample results to SLs in order to determine exceedances. For this project, the SLs are as follows:

- Groundwater (GW) and Surface Water (SW) samples are compared to Tapwater RSLs (HQ=0.1) (November 2022)
- Subsurface soil (SB), Surface soil (SS), and Sediment (SD) samples are compared to the Residential Soil RSLs (HQ=0.1) (November 2022)

Non-detect results are also compared to SLs, typically during a risk assessment or exceedance screening, by comparing one-half the LOD to the SL. However, this is only done when the same constituent was detected in another sample of the same matrix at the same site. The assumption is that, if the constituent is present in a given sample of a particular matrix at a site, then it may also be present at low concentrations (less than the LOD) in a non-detect sample of the same matrix from the same site. However, when a constituent was not detected in any samples of a particular matrix at a site, then it is considered not present at the site in that matrix. In this instance, it is important to compare the non-detect results to the SL. If the non-detect results (LODs) are not low enough when compared to the SL, then it may be possible that the constituent is present in a sample at greater than the SL but not detected or reported by the laboratory instrumentation. This situation is a common occurrence and is not cause for alarm. There are various typical reasons why this occurs and is expected. Please refer to Section 1.4.

The following discussion was generated for U-values versus SL exceedances:

- The laboratory met the reporting limit requirements. There was no blank contamination which significantly affected data usability.
- There are no non-detect U-results at greater than a screening level. The non-rejected data are fully usable for this purpose, to demonstrate presence or absence at the screening level.

## 1.6 Laboratory Qualifications, Data Validation Qualifiers, Data Validation Reason Codes, Data Availability, and Data Use

This DQE focuses on any issues identified regarding the data and their potential impact on the project team's ability to use the data as intended. Overall, the DQOs for this project were met and there were no impacts on data quality. The reader should note that the DQE focuses on data quality issues and, therefore, if there is no discussion regarding a particular data feature, an issue was not identified with the data and the associated DQO(s) provided in the SAP document(s) were met.

Please refer to Tables 1 through 4, which are summaries of qualifiers grouped by site and matrix. For the complete data set, all combinations of final qualifier and reason code are provided for each sample matrix. To help identify trends, for each combination, the count (number of results that possess this combination) is

provided as well as the determination of whether such a result is affected by a bias, is available for use as reported, is available for use as qualified, or is not available for use (rejected). Totals for each are provided.

For the PFAS SI Soil Sampling Event, a total of 77.72% of the data are available for use as reported by the laboratory. Another 22.27% of the data are available for use as qualified by the data validator. The data set is 100% complete and the UFP-SAP project completeness goal of "95% available data" was met.

For the PFAS Site Inspection (SI) Sediment Sampling Event, a total of 99.07% of the data are available for use as reported by the laboratory. Another 0.93% of the data are available for use as qualified by the data validator. The data set is 100% complete and the SAP project completeness goal of "95% available data" was met.

For the PFAS SI Groundwater Sampling Event, a total of 97.70% of the data are available for use as reported by the laboratory. Another 2.3% of the data are available for use as qualified by the data validator. The data set is 100% complete and the SAP project completeness goal of "95% available data" was met.

For the PFAS SI Surface Water Sampling Event, a total of 90.74% of the data are available for use as reported by the laboratory. Another 9.26% of the data are available for use as qualified by the data validator. The data set is 100% complete and the SAP project completeness goal of "95% available data" was met.

- For analytes qualified with J-BSL, UJ-BSL, J-SSL, or UJ-SSL, results or quantitation limits are estimated and potentially biased low due to the associated blank spike (LCS)/blank spike duplicate (LCSD) or spike surrogate not meeting recovery acceptance criteria.
- For analytes qualified with UJ-ISL or J-ISL, the quantitation limits or results are estimated and potentially biased low because the associated internal standard sample did not meet acceptance criteria.
- Results with J-MSH or J-SSH are estimated with potential high bias due, respectively, to either the associated matrix spike (MS)/matrix spike duplicate (MSD) sample or spike surrogate exceeding recovery acceptance criteria.
- Results with J-HT or UJ-HT are estimated because the sample was either extracted or analyzed outside of hold time.
- For analytes qualified with J-FD, results are estimated due to the field duplicate not meeting precision acceptance criteria.
- Analyte results qualified with U-MBL as not detected, are not discernably different from the concentrations associated with the contaminated method blanks.

# 1.7 Data Quality Evaluation

The purpose of this data quality evaluation is to summarize the findings of the data validation and any effects it found concerning the availability of the data for the PFAS SI sampling event.

## 1.7.1 PFAS Site Inspection Soil Sampling Data

PFAS were analyzed by QSM Table B-15. 1,782 distinct data points were generated. The PFAS data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results:

| DV Qual | DV Qual Code | Count | Percent | Available as Reported | Available as Qualified |
|---|---|---|---|---|---|
| U | | 1260 | 70.71% | X | |
| UJ | HT | 330 | 18.52% | | X |
| J | | 77 | 4.32% | X | |

| DV Qual | DV Qual Code | Count | Percent | Available as Reported | Available as Qualified |
|---|---|---|---|---|---|
| None | | 48 | 2.69% | X | |
| UJ | SSL | 45 | 2.53% | | X |
| J | HT | 12 | 0.67% | | X |
| J | SSL | 4 | 0.22% | | X |
| J | FD | 4 | 0.22% | | X |
| J | MSH | 2 | 0.11 | | X |
| | | 1782 | 100.00% | 77.72% | 22.27% |

Please see Table 1 for an explanation of qualifications and their impact on data usability.

## 1.7.2 PFAS Site Inspection Sediment Sampling Data

PFAS were analyzed by QSM Table B-15. 108 distinct data points were generated. The PFAS data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results:

| DV Qual | DV Qual Code | Count | Percent | Available as Reported | Available as Qualified |
|---|---|---|---|---|---|
| U | | 107 | 99.07% | X | |
| UJ | SSL | 1 | 0.93% | | X |
| | | 108 | 100.00% | 99.07% | 0.93% |

Please see Table 2 for an explanation of qualifications and their impact on data usability.

## 1.7.3 PFAS Site Inspection Groundwater Sampling Data

PFAS were analyzed by QSM Table B-15. 1,439 distinct data points were generated. The PFAS data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results:

| DV Qual | DV Qual Code | Count | Percent | Available as Reported | Available as Qualified |
|---|---|---|---|---|---|
| U | | 1095 | 76.09% | X | |
| None | | 242 | 16.82% | X | |
| J | | 69 | 4.79% | X | |
| UJ | SSL | 17 | 1.18% | | X |
| J | BSL | 9 | 0.63% | | X |
| UJ | ISL | 3 | 0.21% | | X |
| U | MBL | 2 | 0.14% | | X |
| J | ISL | 1 | 0.07% | | X |
| UJ | BSL | 1 | 0.07% | | X |
| | | 1,439 | 100.00% | 97.70% | 2.3% |

Please see Table 3 for an explanation of qualifications and their impact on data usability.

## 1.7.4 PFAS Site Inspection Surface Water Sampling Data

PFAS were analyzed by QSM Table B-15. 108 distinct data points were generated. The PFAS data set is 100% complete; all results are available for use as reported or as qualified. The validation process issued the following qualifiers for results:

| DV Qual | DV Qual Code | Count | Percent | Available as Reported | Available as Qualified |
|---|---|---|---|---|---|
| U | | 95 | 87.96% | X | |
| UJ | SSL | 10 | 9.26% | | X |
| J | | 3 | 2.78% | X | |
| | | 108 | 100.00% | 90.74% | 9.26% |

Please see Table 4 for an explanation of qualifications and their impact on data usability.

SECTION 2

# PARCC Considerations

## 2.1 Precision

Precision is measured via percent difference or relative percent difference. Percent difference is typically used when one value is considered theoretically correct and relative percent difference is typically used when both values are experimental. Percent difference is calculated by taking the absolute value of the difference divided by the theoretical value. This is also expressed as:

$$((|X_1 - X_2|) / X_1) * 100\%$$

where $X_1$ is the theoretical value and $X_2$ is the experimental value. If it is necessary to imply the direction of a bias, such as for percent drift, the absolute value need not be considered. Relative percent difference is calculated by taking the absolute value of the difference divided by the mean. This is also expressed as:

$$((|X_1 - X_2|) / ((X_1 + X_2)/2)) * 100\%$$

where $X_1$ and $X_2$ are both measured values. Percent difference and relative percent difference often have upper control limits for precision.

Precision is defined as the agreement between duplicate results and was characterized by comparing duplicate MS recoveries, laboratory replicates, and field duplicate sample results. There is no negative impact on precision because no data points were deemed unusable (rejected) due to precision exceedances. Additionally, 0.22% of the PFAS SI Soil data were J-qualified due to field duplicate precision exceedances.

## 2.2 Accuracy

Accuracy is measured via percent recovery. This is calculated by taking the measured value divided by the theoretical value. This is also expressed as:

$$(X_2 / X_1) * 100\%$$

where $X_1$ is the theoretical value and $X_2$ is the experimental value, both positive numbers because they are 'amounts' or concentrations. Percent recovery can be negative, such as for MS and MSD recovery, if $X_2$ is calculated by subtracting a parent concentration from an experimental recovery. Percent recovery often has upper and lower control limits for accuracy.

For organic analyses, each sample was spiked with surrogate compounds; and for organic and inorganic analyses, an MS/MSD and laboratory control samples (LCS) were spiked with a known parameter concentration before preparation. Internal standards also provide a measure of accuracy. Internal standards, surrogates, and MS/MSD provide a measure of the matrix effects on the analytical accuracy. LCS demonstrates accuracy of the method and the laboratory's ability to meet the method criteria. Accuracy is also assessed by calibration recoveries. Potential biases and trends were evaluated by first determining whether a quality assurance (QA)/QC exceedance may indicate a potential bias or trend. If so, then the exceedance was examined to determine whether the bias or trend was significant enough to warrant rejection of data. Overall, 2.86% of the PFAS SI soil data points were J/UJ-qualified due to surrogate and MS/MSD exceedances, 0.93% of the PFAS SI sediment data points were UJ-qualified due to surrogate exceedances, 2.16% of the PFAS SI groundwater data points were qualified as J/UJ due to LCS, internal standard, and surrogate exceedances, and 9.26% of the PFAS SI surface water data points were UJ-qualified due surrogate exceedances.

## 2.3 Representativeness

Representativeness is a qualitative measure of the degree to which sample data accurately and precisely represent a characteristic environmental condition (in this case, nature and extent of impacts). Representativeness is a subjective parameter and is used to evaluate the efficacy of the sample planning design. In terms of data quality, representativeness was assured because the sampling team followed approved standard operating procedures for sample collection and handling, and the laboratory followed approved standard operating procedures for sample handling, preparation, and analysis. Therefore, all field samples were collected and analyzed as proposed in the SAP.

## 2.4 Completeness

Completeness is calculated by taking the number of available results divided by the total number of results. This is also expressed as:

$$(X_2 / X_1) * 100\%$$

where $X_2$ is the number of distinct results deemed "available for use" (not rejected) and $X_1$ is the total number of distinct results (not excluded). Completeness is calculated for the entire data set, for each matrix, and for each combination of matrix and analysis group. If patterns of rejection are evident in the data set, completeness may also be calculated for select combinations of matrix, analysis group, and analyte or other combinations as applicable for the data quality evaluation. Completeness has a lower control limit (completeness goal) and cannot exceed 100 percent.

The data validation guidance documents referenced in Section 1.2 designate all results except those R-qualified as "rejected" to be available for use as analytically-sound results. The R-qualifier is the only qualifier that negatively affects a data point's availability. Completeness is detailed in Section 1.6.

All samples, as described in the SAP (CH2M, 2021), were collected as planned. For those samples collected, all planned results were generated.

## 2.5 Comparability

Comparability is a qualitative measure designed to express the confidence with which one data set may be compared to another. Factors that affect comparability are sample collection and handling techniques, sample matrix, and analytical methods. In this case, because approved standard operating procedures were used for sample collection and handling, a common sample matrix was evaluated (groundwater, surface water, subsurface soil, surface water, and sediment) and EPA SW-846 methods were utilized, the data user may express confidence in the fact that this data set is comparable to others of acceptable data quality. Comparability is controlled by the other Precision, Accuracy, Representativeness, Comparability, and Completeness (PARCC) parameters because data sets can be compared with confidence only when precision and accuracy are known. Precision and accuracy were demonstrated to be acceptable, and the data user may be confident that this data set is comparable to others of high data quality.

## 2.6 Sensitivity

Refer to Sections 1.4 and 1.5.

SECTION 3

# References

CH2M HILL, Inc. (CH2M). 2021. *Site Inspection Sampling and Analysis Plan for Per- and Polyfluoroalkyl Substances, Atlantic Fleet Weapons Training Area – Vieques, Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range, Vieques, Puerto Rico.* December.

Department of Defense (DOD). 2019. *Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3.* May.

DoD. 2020. *Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15*. May.

United States Environmental Protection Agency (EPA). 1989. *Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A).* Interim Final. EPA/540/1-89-002. December.

# Tables

**TABLE 1**
**Qualifiers and Availability for PFAS SI Soil Sampling**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range*
*Vieques, Puerto Rico*

| Flag | Reason Code | Count | Available as Reported | Available as Qualified | Treat As | Potential Bias |
|---|---|---|---|---|---|---|
| U | | 1260 | 70.71% | | Non-Detect | |
| UJ | HT | 330 | | 18.52% | Non-Detect | |
| J | | 77 | 4.32% | | Detect | |
| None | | 48 | 2.69% | | Detect | |
| UJ | SSL | 45 | | 2.53% | Non-Detect | Low |
| J | HT | 12 | | 0.67% | Detect | |
| J | SSL | 4 | | 0.22% | Detect | Low |
| J | FD | 4 | | 0.22% | Detect | |
| J | MSH | 2 | | 0.11% | Detect | High |
| | Total: | 1782 | 77.72% | 22.27% | | |

Notes:

FD = Field duplicate precision limit was not met

HT = Holding time exceedance

MSH = MS and/or MSD recoveries were outside the QC limits (potential high bias)

SSL = Surrogate recoveries were outside the QC limits (potential low bias)

TABLE 2
**Qualifiers and Availability for PFAS SI Sediment Sampling**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range*
*Vieques, Puerto Rico*

| Flag | Reason Code | Count | Available as Reported | Available as Qualified | Treat As | Potential Bias | Comments |
|---|---|---|---|---|---|---|---|
| U | | 107 | 99.07% | | Non-detect | | |
| UJ | SSL | 1 | | 0.93% | Non-Detect | Low | |
| | Total: | 108 | 99.07% | 0.93% | | | |

Notes:

SSL = Surrogate recoveries were outside the QC limits (potential low bias)

**TABLE 3**
**Qualifiers and Availability for PFAS SI Groundwater Sampling**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range*
*Vieques, Puerto Rico*

| Flag | Reason Code | Count | Available as Reported | Available as Qualified | Treat As | Potential Bias |
|---|---|---|---|---|---|---|
| U | | 1095 | 76.09% | | Non-Detect | |
| None | | 242 | 16.82% | | Detect | |
| J | | 69 | 4.79% | | Detect | |
| UJ | SSL | 17 | | 1.18% | Non-Detect | Low |
| J | BSL | 9 | | 0.63% | Detect | Low |
| UJ | ISL | 3 | | 0.21% | Non-Detect | Low |
| U | MBL | 2 | | 0.14% | Non-Detect | |
| J | ISL | 1 | | 0.07% | Detect | Low |
| UJ | BSL | 1 | | 0.07% | Non-Detect | Low |
| | Total: | 1439 | 97.7% | 2.3% | | |

Notes:

BSL = Blank Spike recovery was outside the QC limits (potential low bias)

ISL = Internal standard recoveries were outside the QC limits (potential low bias)

MBL = Method blank contamination

SSL = Surrogate recoveries were outside the QC limits (potential low bias)

**TABLE 4**
**Qualifiers and Availability for PFAS SI Surface Water Sampling**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range*
*Vieques, Puerto Rico*

| Flag | Reason Code | Count | Available as Reported | Available as Qualified | Treat As | Potential Bias |
|---|---|---|---|---|---|---|
| U | | 95 | 87.96% | | Non-Detect | |
| UJ | SSL | 10 | | 9.26% | Non-Detect | Low |
| J | | 3 | 2.78% | | Detect | |
| | Total: | 108 | 90.74% | 9.26% | | |

Notes:

SSL = Surrogate recoveries were outside the QC limits (potential low bias)

**TABLE 5**
**Summary of Qualified Data for PFAS SI Sampling Events**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range*
*Vieques, Puerto Rico*

| Matrix | Sample ID | Analysis Group | Analyte Name | CAS Number | Result Value | DV Qualifier | Qualification Code | Units |
|---|---|---|---|---|---|---|---|---|
| GW | VEW10-PFAS-GW01-0422 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 2.2 | UJ | ISL | NG_L |
| GW | VEW10-PFAS-GW01P-0422 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 2.23 | UJ | ISL | NG_L |
| GW | VEP5-PFAS-GW01-0422 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 2.25 | UJ | ISL | NG_L |
| GW | VWFS-PFAS-GW02-0622 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 29700 | J | ISL | NG_L |
| GW | VEP4-GW24D-0622 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 2.13 | U | MBL | NG_L |
| GW | VEP4-GW24-0622 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 2.22 | U | MBL | NG_L |
| GW | VEP4-GW17D-0622 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 2.16 | UJ | SSL | NG_L |
| GW | VEP4-GW27-0722 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 1.72 | UJ | SSL | NG_L |
| GW | VEP4-GW26-0722 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 2.17 | UJ | SSL | NG_L |
| GW | VEP4-GW23-0722 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 2.22 | UJ | SSL | NG_L |
| GW | VEP4-GW07-0722 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 2.1 | UJ | SSL | NG_L |
| GW | VEP4-GW07P-0722 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 2.14 | UJ | SSL | NG_L |
| GW | VEP4-GW07P-0722 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 2.14 | UJ | SSL | NG_L |
| GW | VEP4-GW13D-0722 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 2.15 | UJ | SSL | NG_L |
| GW | VEP4-GW13D-0722 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 2.15 | UJ | SSL | NG_L |
| GW | VEP4-GW13-0722 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 2.26 | UJ | SSL | NG_L |
| GW | VEP4-GW13-0722 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 2.26 | UJ | SSL | NG_L |
| GW | VEP4-GW10-0722 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 2.18 | UJ | SSL | NG_L |
| GW | VEP4-GW33-0722 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 2.16 | UJ | SSL | NG_L |
| GW | VEP4-GW33-0722 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 2.16 | UJ | SSL | NG_L |
| GW | VEP4-GW33-0722 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 2.16 | UJ | SSL | NG_L |
| GW | VEFS-PFAS-GW02-0722 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 18.8 | J | BSL | NG_L |
| GW | VEFS-PFAS-GW02-0722 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 10.5 | J | BSL | NG_L |
| GW | VEP4-GW08-0722 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 2.75 | J | BSL | NG_L |
| GW | VEP4-GW08-0722 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 2.22 | UJ | BSL | NG_L |
| GW | VEFS-PFAS-GW01-0722 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 55100 | J | BSL | NG_L |
| GW | VEFS-PFAS-GW01-0722 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 12300 | J | BSL | NG_L |
| GW | VEFS-PFAS-GW01P-0722 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 56500 | J | BSL | NG_L |
| GW | VEFS-PFAS-GW01P-0722 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 12200 | J | BSL | NG_L |
| GW | VEP4-GW05-0722 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 41.7 | J | BSL | NG_L |
| GW | VEP4-GW05-0722 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 11.2 | J | BSL | NG_L |
| GW | VEP4-GW11-0722 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 2.2 | UJ | SSL | NG_L |
| GW | VEP4-GW03-0722 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 2.5 | UJ | SSL | NG_L |
| SW | VWAH-PFAS-SW01-0222 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 2.35 | UJ | SSL | NG_L |
| SW | VWAH-PFAS-SW01P-0222 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 2.3 | UJ | SSL | NG_L |
| SW | VWAH-PFAS-SW01P-0222 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 2.3 | UJ | SSL | NG_L |
| SW | VWAH-PFAS-SW02-0222 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 2.34 | UJ | SSL | NG_L |
| SW | VWAH-PFAS-SW02-0222 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 2.34 | UJ | SSL | NG_L |
| SW | VWAH-PFAS-SW03-0222 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 2.3 | UJ | SSL | NG_L |
| SW | VWAH-PFAS-SW03-0222 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 2.3 | UJ | SSL | NG_L |
| SW | VWAH-PFAS-SW03-0222 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 2.3 | UJ | SSL | NG_L |
| SW | VWS6-PFAS-SW01-0222 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 2.31 | UJ | SSL | NG_L |
| SW | VWS6-PFAS-SW01-0222 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 2.31 | UJ | SSL | NG_L |
| SD | VWS6-PFAS-SD01-0006 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.628 | UJ | SSL | NG_G |
| SB | VWAH-PFAS-SB02D-0810 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.497 | UJ | SSL | NG_G |
| SB | VWAH-PFAS-SB01P-0507 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.505 | UJ | SSL | NG_G |
| SS | VWAB-PFAS-SS02-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 3.31 | J | SSL | NG_G |
| SS | VWAB-PFAS-SS02-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 1.3 | J | SSL | NG_G |
| SS | VWAB-PFAS-SS01-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.655 | J | SSL | NG_G |
| SS | VWAB-PFAS-SS01P-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.677 | J | SSL | NG_G |
| SS | VWAB-PFAS-SS03-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.173 | J | MSH | NG_G |
| SS | VWAB-PFAS-SS03-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.5 | UJ | SSL | NG_G |
| SS | VEP5-PFAS-SS01-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.5 | UJ | SSL | NG_G |
| SS | VEP5-PFAS-SS02-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.507 | UJ | SSL | NG_G |
| SS | VERW-PFAS-SS04-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.503 | UJ | SSL | NG_G |
| SS | VERW-PFAS-SS02-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.506 | UJ | SSL | NG_G |
| SB | VERW-PFAS-SB02-0406 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.493 | UJ | SSL | NG_G |
| SB | VERW-PFAS-SB02D-3132 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.498 | UJ | SSL | NG_G |
| SS | VERW-PFAS-SS05-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.497 | UJ | SSL | NG_G |
| SB | VERW-PFAS-SB05D-1920 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.504 | UJ | SSL | NG_G |
| SS | VEW10-PFAS-SS06-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.505 | UJ | SSL | NG_G |
| SS | VEW10-PFAS-SS06-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.505 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB06-0406 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.502 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB06-0406 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.502 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB06D-0708 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.5 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB06D-0708 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.5 | UJ | SSL | NG_G |
| SS | VEW10-PFAS-SS05-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.501 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB05-0406 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.493 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB05D-2829 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.497 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB05D-2829 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.497 | UJ | SSL | NG_G |
| SS | VEP4-PFAS-SS01-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.504 | UJ | SSL | NG_G |
| SS | VEP4-PFAS-SS01-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.504 | UJ | SSL | NG_G |
| SB | VEP4-PFAS-SB01-0406 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.494 | UJ | SSL | NG_G |
| SB | VEP4-PFAS-SB01-0406 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.494 | UJ | SSL | NG_G |
| SS | VEW10-PFAS-SS04-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.506 | UJ | SSL | NG_G |
| SS | VEW10-PFAS-SS04-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.506 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB04-0406 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.491 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB04D-2829 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.5 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB04D-2829 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.5 | UJ | SSL | NG_G |
| SS | VEW10-PFAS-SS02-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.502 | UJ | SSL | NG_G |
| SS | VEW10-PFAS-SS02-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.502 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB02-0406 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.502 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB03D-2324 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.493 | UJ | SSL | NG_G |
| SS | VEW10-PFAS-SS03-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.49 | UJ | SSL | NG_G |

**TABLE 5**
**Summary of Qualified Data for PFAS SI Sampling Events**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range*
*Vieques, Puerto Rico*

| Matrix | Sample ID | Analysis Group | Analyte Name | CAS Number | Result Value | DV Qualifier | Qualification Code | Units |
|---|---|---|---|---|---|---|---|---|
| SS | VEW10-PFAS-SS03-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.49 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB03-0406 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.498 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB03-0406 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.498 | UJ | SSL | NG_G |
| SS | VEW10-PFAS-SS01-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.502 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB01-0406 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.492 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB01-0406 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.492 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB01D-2627 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.502 | UJ | SSL | NG_G |
| SB | VEW10-PFAS-SB01D-2627 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.502 | UJ | SSL | NG_G |
| SB | VWFS-PFAS-SB02-0406 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 57.9 | J | FD | NG_G |
| SB | VWFS-PFAS-SB02P-0406 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 92.3 | J | FD | NG_G |
| SS | VWFS-PFAS-SS01-0001 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 27.2 | J | FD | NG_G |
| SS | VWFS-PFAS-SS01P-0001 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 69.4 | J | FD | NG_G |
| SB | VWFS-PFAS-SB03-0406 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 8.37 | J | MSH | NG_G |
| SB | VWFS-PFAS-SB05D-5860 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.62 | UJ | SSL | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.41 | J | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS03-0001 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03-0406 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB03D-4850 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.5 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.499 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.499 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.499 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.499 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.252 | J | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.499 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.499 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.499 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.499 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.499 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.499 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.499 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.499 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.227 | J | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.499 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.499 | UJ | HT | NG_G |

**TABLE 5**
**Summary of Qualified Data for PFAS SI Sampling Events**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range*
*Vieques, Puerto Rico*

| Matrix | Sample ID | Analysis Group | Analyte Name | CAS Number | Result Value | DV Qualifier | Qualification Code | Units |
|---|---|---|---|---|---|---|---|---|
| SS | VWMP-PFAS-SS01-0001 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.499 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS01-0001 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.499 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01-0406 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB01D-4446 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.498 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.534 | J | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.739 | J | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02-0001 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 1.61 | J | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.723 | J | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.501 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS02P-0001 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.302 | J | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.501 | UJ | HT | NG_G |

**TABLE 5**
**Summary of Qualified Data for PFAS SI Sampling Events**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range*
*Vieques, Puerto Rico*

| Matrix | Sample ID | Analysis Group | Analyte Name | CAS Number | Result Value | DV Qualifier | Qualification Code | Units |
|---|---|---|---|---|---|---|---|---|
| SB | VWMP-PFAS-SB02-0406 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02-0406 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.501 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02P-0406 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02D-4850 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.498 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB02DP-4850 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.251 | J | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01-0001 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.499 | UJ | HT | NG_G |

**TABLE 5**
**Summary of Qualified Data for PFAS SI Sampling Events**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range*
*Vieques, Puerto Rico*

| Matrix | Sample ID | Analysis Group | Analyte Name | CAS Number | Result Value | DV Qualifier | Qualification Code | Units |
|---|---|---|---|---|---|---|---|---|
| SS | VWS7-PFAS-SS01P-0001 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.211 | J | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS01P-0001 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.499 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.407 | J | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS02-0001 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.502 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.5 | UJ | HT | NG_G |
| SS | VWS7-PFAS-SS03-0001 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.5 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 1.01 | J | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.502 | UJ | HT | NG_G |
| SS | VWMP-PFAS-SS04-0001 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.502 | UJ | HT | NG_G |

**TABLE 5**
**Summary of Qualified Data for PFAS SI Sampling Events**
*Site Inspection for Per- and Polyfluoroalkyl Substances*
*Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range*
*Vieques, Puerto Rico*

| Matrix | Sample ID | Analysis Group | Analyte Name | CAS Number | Result Value | DV Qualifier | Qualification Code | Units |
|---|---|---|---|---|---|---|---|---|
| SB | VWMP-PFAS-SB04-0406 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04-0406 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.502 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | Perfluorohexanoic Acid (PFHxA) | 307-24-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | Perfluoroheptanoic acid (PFHpA) | 375-85-9 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | Perfluorooctanoic acid (PFOA) | 335-67-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | Perfluorononanoic acid (PFNA) | 375-95-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | Perfluorodecanoic Acid (PFDA) | 335-76-2 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | Perfluoroundecanoic Acid (PFUnA) | 2058-94-8 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | Perfluorododecanoic Acid (PFDoA) | 307-55-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | Perfluorotridecanoic Acid (PFTrDA) | 72629-94-8 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA) | 2355-31-9 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA) | 2991-50-6 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | Perfluorobutanesulfonic acid (PFBS) | 375-73-5 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | Perfluorohexanesulfonic acid (PFHxS) | 355-46-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | Perfluorooctane Sulfonate (PFOS) | 1763-23-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | Perfluoro-2-methyl-3-oxahexanoic acid (HFPO-DA) | 13252-13-6 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | 4,8-dioxa-3H-perfluorononanoic acid (ADONA) | 919005-14-4 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) | 756426-58-1 | 0.5 | UJ | HT | NG_G |
| SB | VWMP-PFAS-SB04D-4749 | SVOA | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) | 763051-92-9 | 0.5 | UJ | HT | NG_G |
| SS | VWS6-PFAS-SS01-0001 | SVOA | Perfluorotetradecanoic Acid (PFTeDA) | 376-06-7 | 0.499 | UJ | SSL | NG_G |

Reason Codes (Qualification Code)
BSL = Blank Spike - Low Recovery
FD = Field Duplicate precision was not met
HT = Holding Time Exceedance
ISL = Internal Standard - Low Recovery
MBL = Method Blank Contamination
MSH = Matrix Spike/Matrix Spike Duplicate - High Recovery
SSL = Surrogate - Low Recovery

# Appendix I
# Human Health Risk Screening Evaluation

TECHNICAL MEMORANDUM

# Human Health Risk Screening, Site Inspection for Per- and Polyfluoroalkyl Substances at

## Atlantic Fleet Weapons Training Area – Vieques
## Former Naval Ammunition Support Detachment and
## Former Vieques Naval Training Range
## Vieques, Puerto Rico

| | |
|---|---|
| **PREPARED FOR:** | Naval Facilities Engineering Systems Command Atlantic |
| **COPY TO:** | Environmental Protection Agency Region 2<br>Puerto Rico Department of Natural and Environmental Resources |
| **PREPARED BY:** | CH2M HILL, Inc. |
| **DATE:** | May 2023 |

This Technical Memorandum has been prepared to document the human health risk screenings using results of the field investigation activities in support of the Site Inspection (SI) for per- and polyfluoroalkyl substances (PFAS) at the former Naval Ammunition Support Detachment (NASD) and former Vieques Naval Training Range (VNTR) in Vieques, Puerto Rico. It has been prepared under the Department of the Navy (Navy), Naval Facilities Engineering Systems Command (NAVFAC) Comprehensive Long-Term Environmental Action—Navy (CLEAN) Contract No. N62470-16-D-9000, Contract Task Order 0003.

## Overview

Risk estimates were prepared for a future residential and industrial scenario (if applicable) for potential exposures to PFAS. Although multiple PFAS were analyzed in soil, groundwater, surface water, and/or sediment, for screening purposes, only PFAS with available November 2022 regional screening levels (RSLs) for soil (residential and industrial) and residential tap water were retained for the screening.

For assessment of soil, an iterative approach was used whereby if the maximum detected concentration in soil exceeded the residential RSL and caused a cumulative exceedance of USEPA's target risk range ($10^{-6}$ to $10^{-4}$) and/or target hazard index (HI) of 1, USEPA's ProUCL software (EPA 2016. ProUCL, Version 5.1.00, prepared by Lockheed Martin Environmental Services (March), was used to calculate the 95 percent upper confidence limit (95% UCL) on the mean concentration if 8 or more analytical results were available for the chemical in an environmental medium and if the chemical was detected more than four times. The lesser value of the 95% UCL on the mean or maximum detected concentration was then used as the exposure point concentration (EPC) for quantitative risk estimates. For groundwater, surface water, and sediment, maximum detected concentrations were used as the EPCs.

If the cumulative excess lifetime cancer risk (ELCR) exceeded $1\times10^{-4}$ or a target organ-specific hazard index (HI) exceeded 1, chemicals of potential concern (COPCs) were identified. A chemical was identified as a COPC if it contributed an ELCR above $1\times10^{-6}$ to a medium with a cumulative ELCR above $1\times10^{-4}$ or if it contributed a hazard quotient (HQ) above 0.1 to a medium with a target organ-specific HI above 1. All non-detected concentrations had reporting limits below soil residential and tap water screening levels, as shown in Tables 4-1 through 4-45 of the SI Report.

## Scope of the Risk Screenings

Risk screenings were conducted at areas where the concentrations of PFAS exceeded the RSLs (HQ=0.1). If PFAS concentrations were below the RSLs (HQ=0.1), no risk screening was conducted. Table 1 lists the areas at Vieques evaluated during the SI field investigation and whether a risk screening was performed. Risk screenings were conducted at seven areas and are presented as Attachments A through G.

**Table 1. Areas Evaluated for Potential PFAS Releases**

| Area | Area Assessed | Human Health Risk Screening Conducted? |
|---|---|---|
| Former NASD | NASD AOC B | Yes, see Attachment A. |
| | NASD Former Fire Station Building 2046 at the Public Works Area | Yes, see Attachment B. |
| | Potential Former NASD Motor Pool Area | Yes, see Attachment C. |
| | NASD AOC H | No, PFAS concentrations were below the RSLs. |
| | NASD SWMU 6 | No, PFAS concentrations were below the RSLs. |
| | NASD SWMU 7 | No, PFAS concentrations were below the RSLs. |
| Former VNTR | VNTR Former Camp Garcia Runway | Yes, see Attachment D. |
| | VNTR PI 5 | No, PFAS concentrations were below the RSLs. |
| | VNTR SWMU 20 | Yes, see Attachment E. |
| | Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330 | Yes, see Attachment F. |
| | VNTR SWMU 10 and AOC G | Yes, see Attachment G. |
| | VNTR SWMU 1 | No, PFAS concentrations were below the RSLs. |

AOC = area of concern
PFAS = per- and polyfluoroalkyl substances
PI = photo identified (site)
SWMU = solid waste management unit

# Attachment A
# NASD AOC B: Former Wastewater Treatment Plant at the Public Works Area

# NASD AOC B: Former Wastewater Treatment Plant at the Public Works Area Human Health Risk Screening

Risk estimates were prepared for future residential and industrial scenarios for potential exposures to per- and polyfluoroalkyl substances (PFAS) at NASD AOC B. Although multiple PFAS were analyzed in soil and groundwater, for screening purposes, only PFAS with available November 2022 USEPA Regional Screening Levels (RSLs) were retained for the screening. The soil and groundwater samples used in the risk screening are presented in **Table 1**.

Maximum detected concentrations of chemicals were initially compared against November 2022 USEPA RSLs based upon an excess lifetime cancer risk (ELCR) of $1x10^{-6}$ and a hazard quotient (HQ) of 0.1. Residential scenario soil concentrations were compared to residential RSLs; industrial scenario soil concentrations were compared to industrial RSLs; groundwater concentrations were compared to tapwater RSLs.

For assessment of soil, an iterative approach was used where if use of the maximum detected concentration in soil exceeded the RSL and caused a cumulative exceedance of USEPA's target risk range ($10^{-6}$ to $10^{-4}$) and/or target hazard index (HI) of 1, USEPA's ProUCL software would be used to calculate the 95 percent upper confidence limit (95% UCL) on the mean concentration if 8 or more analytical results were available for the chemical in an environmental medium and if the chemical was detected more than four times. The lesser value of the 95% UCL on the mean or maximum detected concentration would then be used as the exposure point concentration (EPC) for quantitative risk estimates.

For groundwater, maximum detected concentrations were used as the EPCs.

If the cumulative ELCR exceeded $1x10^{-4}$ or a target organ-specific HI exceeded 1 for an environmental medium, chemicals of potential concern (COPCs) were identified. A chemical was identified as a COPC if it contributed an ELCR above $1x10^{-6}$ to a medium with a cumulative ELCR above $1x10^{-4}$, or if it contributed an HQ above 0.1 to a medium with a target organ-specific HI above 1.

## Soil - Residential Scenario (Table 2)

Two soil zones were evaluated separately: surface soil (0-1 foot below ground surface [ft-bgs]) and total soil (0-6 ft-bgs).

***Surface Soil - Residential***

- *Chemicals Detected Above RSLs* – One PFAS (perfluorooctane sulfonic acid [PFOS]) was detected in surface soil above the residential RSL. Since less than 8 samples were available for PFOS in surface soil, the maximum detected concentration was used as the EPC. Risk screening estimates for PFOS in surface soil are presented in **Table 2** and summarized below.

  Surface Soil Risk Estimates for Chemicals > Residential RSLs

| Chemical | EPC Type | ELCR | HQ | COPC? |
|---|---|---|---|---|
| PFOS | maximum | n/a | 0.3 | No |

  Notes:
  n/a – toxicity value not available to calculate an ELCR or HQ estimate

- *HHRS Results for Surface Soil, Residential Scenario* – No potential unacceptable risks were identified for surface soil.

***Total Soil - Residential***

- *Chemicals Detected Above RSLs* – One PFAS (PFOS) was detected in total soil above the residential RSL. Since sufficient samples (eight samples) and a sufficient quantity of detected results were available for PFOS a 95% UCL was calculated to determine an EPC (**Table 4**). Risk screening estimates for PFOS in total soil are presented in **Table 2** and summarized below.

Total Soil Risk Estimates for Chemicals > Residential RSLs

| Chemical | EPC Type | ELCR | HQ | COPC? |
|---|---|---|---|---|
| PFOS | 95% UCL | n/a | 0.1 | No |

Notes:
95% UCL = 95% UCL on the mean
n/a – toxicity value not available to calculate an ELCR or HQ estimate

- *HHRS Results for Total Soil, Residential Scenario* – No potential unacceptable risks were identified for total soil.

## Soil - Industrial Scenario (Table 3)[1]

Two soil zones were evaluated separately: surface soil (0-1 ft-bgs) and total soil (0-6 ft-bgs).

***Surface Soil - Industrial***

- *Chemicals Detected Above RSLs* – No PFAS were detected in site surface soil above industrial RSLs.
- *HHRS Results for Surface Soil (Industrial)* – No potential unacceptable risks were identified for surface soil.

***Total Soil – Industrial***

- *Chemicals Detected Above RSLs* – No PFAS were detected in total soil above industrial RSLs.
- *HHRS Results for Total Soil (Industrial)* – No potential unacceptable risks were identified for total soil.

## Groundwater – Residential and Industrial

- *Chemicals Detected Above RSLs* – The same RSLs (tapwater) were used in the residential and industrial scenario risk screenings. Three PFAS (perfluorohexanesulfonic acid [PFHxS], PFOS, and perfluorooctanoic acid [PFOA]) were detected in groundwater above tapwater RSLs. Risk screening estimates for the three PFAS detected above RSLs are presented in Tables 1 and 2, and summarized below.

Groundwater Risk Estimates for Chemicals > Tapwater RSLs

| Chemical | EPC Type | ELCR | HQ | COPC? |
|---|---|---|---|---|
| PFHxS | maximum | n/a | 0.5 | No |
| PFOS | maximum | n/a | 2 | Yes (HI > 1) |
| PFOA | maximum | $8x10^{-8}$ | 2 | Yes (HI > 1) |

Notes:
n/a – toxicity value not available to calculate an ELCR estimate

[1] No soil data are presented on Table 2 since no maximum detected concentrations exceed industrial soil RSLs.

- *Cumulative ELCR and HI* – Although the cumulative ELCR is less than the EPA acceptable risk range, the maximum target HI is greater than 1.
- *HHRS Results for Groundwater* – Potential unacceptable risks were identified for PFOS and PFOA in groundwater for both the residential and industrial scenarios.

**Table 1**
**Samples Used in the Risk Screening**
AOC B
Former NASD
Vieques, Puerto Rico

| Location ID | Sample ID | Sample Date | Sample Medium | Upper Depth (feet) | Lower Depth (feet) | Sample Type |
|---|---|---|---|---|---|---|
| VWAB-PFAS-MW01 | VWAB-PFAS-GW01-0722 | 7/9/2022 | GROUNDWATER | -- | -- | REG |
| VWAB-PFAS-MW01 | VWAB-PFAS-GW01P-0722 | 7/9/2022 | GROUNDWATER | -- | -- | FD |
| VWAB-PFAS-SO01 | VWAB-PFAS-SS01P-0001 | 5/11/2022 | SOIL | 0 | 1 | FD |
| VWAB-PFAS-SO02 | VWAB-PFAS-SS02-0001 | 5/11/2022 | SOIL | 0 | 1 | REG |
| VWAB-PFAS-SO03 | VWAB-PFAS-SS03-0001 | 5/11/2022 | SOIL | 0 | 1 | REG |
| VWAB-PFAS-SO04 | VWAB-PFAS-SS04-0001 | 5/11/2022 | SOIL | 0 | 1 | REG |
| VWAB-PFAS-SO01 | VWAB-PFAS-SB01P-0406 | 5/11/2022 | SOIL | 4 | 6 | FD |
| VWAB-PFAS-SO01 | VWAB-PFAS-SB01-0406 | 5/11/2022 | SOIL | 4 | 6 | REG |
| VWAB-PFAS-SO02 | VWAB-PFAS-SB02-0406 | 5/11/2022 | SOIL | 4 | 6 | REG |
| VWAB-PFAS-SO03 | VWAB-PFAS-SB03-0406 | 5/11/2022 | SOIL | 4 | 6 | REG |
| VWAB-PFAS-SO04 | VWAB-PFAS-SB04-0406 | 5/11/2022 | SOIL | 4 | 6 | REG |

Notes:

Per Vieques HHRA Protocol, if a sample has a field duplicate (FD) and both the FD and regular sample (REG) are detected, the higher value is used as the sample concentration. If an FD and REG sample are both non-detected, the lower non-detected concentration is used as the detection limit concentration. If a sample has an FD or REG that is not detected, but the corresponding sample has a detected concentration, the detected concentration is used as the sample concentration.

**Table 2**
**HHRA COPC Summary Table - Residential**
AOC B
Former NASD
Vieques, Puerto Rico

| | | | | | | | Screening Level (1) | | RBC (2) | | EPC (3) | Estimated Risk (3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | CAS Number | Analyte Name (1) | Result Unit | MinDet | MaxDet | FOD | RSL (TR=$10^{-6}$ or HQ=0.1) | basis | Carc. (TR=$10^{-6}$) | Non Carc. (THQ=1) | EPC | EPC Basis | ELCR | HQ | Target Organ |
| Surface Soil | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | mg/kg | 0.00591 | 0.0322 | 4/4 | 0.0126 | nc | - | 0.126 | 0.0322 | Max | -- | 0.3 | Developmental |
| Total Soil | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | mg/kg | 0.00106 | 0.0322 | 8/8 | 0.0126 | nc | - | 0.126 | 0.0186 | UCL | -- | 0.1 | Developmental |
| Groundwater | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | µg/L | 0.197 | 0.197 | 1/1 | 0.0394 | nc | - | 0.394 | 0.197 | Max | -- | 0.5 | Endocrine |
| | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | µg/L | 0.0833 | 0.0833 | 1/1 | 0.00401 | nc | - | 0.0401 | 0.0833 | Max | -- | 2 | Developmental |
| | 335-67-1 | Perfluorooctanoic acid (PFOA) | µg/L | 0.0934 | 0.0934 | 1/1 | 0.00602 | nc | 1.11 | 0.0602 | 0.0934 | Max | 8.E-08 | 2 | Developmental |

ELCR - excess lifetime cancer risk
EPC - exposure point concentration
FOD - frequency of detection
HI - hazard index
HQ - hazard quotient
Max - maximum detected concentration
RBC - risk-based concentration
RSL - Regional Screening Level
TR - target risk
UCL - upper confidence limit

**Cumulative ELCR**

| Surface Soil | Total Soil | Groundwater |
|---|---|---|
| NA | NA | 8.E-08 |

**Hazard Index**

| | Surface Soil | Total Soil | Groundwater |
|---|---|---|---|
| Total Developmental HI Across Media = | 0.3 | 0.1 | **4** |
| Total Endocrine HI Across Media = | NA | NA | 0.5 |

Notes:
(1) Chemicals whose maximum detected concentration (MaxDet) exceeds RSL in the exposure medium are presented on the table.
- RSLs for soil and groundwater are based on an Excess Lifetime Cancer Risk (ELCR) of $10^{-6}$ and a Hazard Quotient (HQ)=0.1 (USEPA, November 2022).
- RSLs for residential soil are used for surface soil and total soil.
- RSLs for tapwater are used for groundwater

(2) Risk-based Concentrations (RBCs) are RSLs (November 2022) based on an ELCR of $10^{-6}$ and an HQ=1.
- RSLs for residential soil are used for surface soil and total soil.
- RSLs for tapwater are used for groundwater

(3) The Maximum detected concentration was initially used as exposure point concentration (EPC).
- When the cumulative risk estimate based on MaxDet exceeds ELCR of $1x10^{-4}$ and/or target organ-specific Hazard Index (HI) of 1 for an exposure medium, upper confidence limit (UCL) on mean is used as EPC if there are enough samples (8 or more) and enough detections $4 or more).
- Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RBC and EPC.
  - HQ = EPC / Noncarcinogenic RBC (based on HQ=1)
  - ELCR = EPC x $1x10^{-6}$ / Carcinogenic RBC (based on ELCR=$1x10^{-6}$)

RSL Basis: ca - carcinogenic, nc - non-carcinogenic

**Table 3**
**HHRA COPC Summary Table - Industrial**
AOC B
Former NASD
Vieques, Puerto Rico

| | | | | | | | Screening Level (1) | | RBC (2) | | EPC (3) | | Estimated Risk | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | CAS Number | Analyte Name (1) | Result Unit | MinDet | MaxDet | FOD | RSL (TR=$10^{-6}$ or HQ=0.1) | basis | Carc. (TR=$10^{-6}$) | Non Carc. (THQ=1) | EPC | EPC Basis | ELCR | HQ | Target Organ |
| Groundwater | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | µg/L | 0.197 | 0.197 | 1/1 | 0.0394 | nc | - | 0.394 | 0.197 | Max | -- | 0.5 | Endocrine |
| | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | µg/L | 0.0833 | 0.0833 | 1/1 | 0.00401 | nc | - | 0.0401 | 0.0833 | Max | -- | 2 | Developmental |
| | 335-67-1 | Perfluorooctanoic acid (PFOA) | µg/L | 0.0934 | 0.0934 | 1/1 | 0.00602 | nc | 1.11 | 0.0602 | 0.0934 | Max | 8.E-08 | 2 | Developmental |

ELCR - excess lifetime cancer risk
EPC - exposure point concentration
FOD - frequency of detection
HI - hazard index
HQ - hazard quotient
Max - maximum detected concentration
RBC - risk-based concentration
RSL - Regional Screening Level
TR - target risk

| **Cumulative ELCR** |
|---|
| **Groundwater** |
| 8.E-08 |

| | **Hazard Index** |
|---|---|
| | **Groundwater** |
| Total Developmental HI Across Media = | **4** |
| Total Endocrine HI Across Media = | 0.5 |

Notes:
(1) Chemicals whose maximum detected concentration (MaxDet) exceeds RSL in the exposure medium are presented on the table.
- RSLs for tapwater are used for groundwater

(2) Risk-based Concentrations (RBCs) are RSLs (November 2022) based on an ELCR of $10^{-6}$ and an HQ=1.
- RSLs for tapwater are used for groundwater

(3) The Maximum detected concentration was used as the exposure point concentration (EPC).
- Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RBC and EPC.
  - HQ = EPC / Noncarcinogenic RBC (based on HQ=1)
  - ELCR = EPC x $1x10^{-6}$ / Carcinogenic RBC (based on ELCR=$1x10^{-6}$)

RSL Basis: ca - carcinogenic, nc - non-carcinogenic

**Table 4**
**Calculated Upper Confidence Limits**
AOC B
Former NASD
Vieques, Puerto Rico

**UCL Statistics for Data Sets with Non-Detects**

| | |
|---|---|
| User Selected Options | |
| Date/Time of Computation | ProUCL 5.2 1/10/2023 12:49:05 PM |
| From File | WorkSheet.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

**PFOS (mg/kg) Total Soil**

**General Statistics**

| | | | |
|---|---|---|---|
| Total Number of Observations | 8 | Number of Distinct Observations | 8 |
| | | Number of Missing Observations | 0 |
| Minimum | 0.00106 | Mean | 0.0111 |
| Maximum | 0.0322 | Median | 0.00688 |
| SD | 0.0112 | Std. Error of Mean | 0.00395 |
| Coefficient of Variation | 1.006 | Skewness | 1.367 |

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach,
refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance,
but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).
The Chebyshev UCL often results in gross overestimates of the mean.
Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

**Normal GOF Test**

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.798 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk Critical Value | 0.749 | Data appear Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.331 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.333 | Data appear Normal at 1% Significance Level |

Data appear Normal at 1% Significance Level
Note GOF tests may be unreliable for small sample sizes

**Assuming Normal Distribution**

| | | | |
|---|---|---|---|
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 0.0186 | 95% Adjusted-CLT UCL (Chen-1995) | 0.0197 |
| | | 95% Modified-t UCL (Johnson-1978) | 0.0189 |

**Gamma GOF Test**

| | | |
|---|---|---|
| A-D Test Statistic | 0.331 | **Anderson-Darling Gamma GOF Test** |
| 5% A-D Critical Value | 0.732 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.224 | **Kolmogorov-Smirnov Gamma GOF Test** |
| 5% K-S Critical Value | 0.3 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level
Note GOF tests may be unreliable for small sample sizes

**Gamma Statistics**

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.218 | k star (bias corrected MLE) | 0.844 |
| Theta hat (MLE) | 0.00913 | Theta star (bias corrected MLE) | 0.0132 |
| nu hat (MLE) | 19.48 | nu star (bias corrected) | 13.51 |
| MLE Mean (bias corrected) | 0.0111 | MLE Sd (bias corrected) | 0.0121 |
| | | Approximate Chi Square Value (0.05) | 6.237 |
| Adjusted Level of Significance | 0.0195 | Adjusted Chi Square Value | 5.043 |

**Assuming Gamma Distribution**

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL | 0.0241 | 95% Adjusted Gamma UCL | 0.0298 |

**Lognormal GOF Test**

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.962 | **Shapiro Wilk Lognormal GOF Test** |
| 10% Shapiro Wilk Critical Value | 0.851 | Data appear Lognormal at 10% Significance Level |
| Lilliefors Test Statistic | 0.165 | **Lilliefors Lognormal GOF Test** |
| 10% Lilliefors Critical Value | 0.265 | Data appear Lognormal at 10% Significance Level |

Data appear Lognormal at 10% Significance Level
Note GOF tests may be unreliable for small sample sizes

**Lognormal Statistics**

| | | | |
|---|---|---|---|
| Minimum of Logged Data | -6.849 | Mean of logged Data | -4.963 |

**Table 4**
**Calculated Upper Confidence Limits**
AOC B
Former NASD
Vieques, Puerto Rico

| | | | |
|---|---|---|---|
| Maximum of Logged Data | -3.436 | SD of logged Data | 1.087 |

**Assuming Lognormal Distribution**

| | | | |
|---|---|---|---|
| 95% H-UCL | 0.0563 | 90% Chebyshev (MVUE) UCL | 0.0248 |
| 95% Chebyshev (MVUE) UCL | 0.0309 | 97.5% Chebyshev (MVUE) UCL | 0.0394 |
| 99% Chebyshev (MVUE) UCL | 0.0559 | | |

**Nonparametric Distribution Free UCL Statistics**
**Data appear to follow a Discernible Distribution**

**Nonparametric Distribution Free UCLs**

| | | | |
|---|---|---|---|
| 95% CLT UCL | 0.0176 | 95% BCA Bootstrap UCL | 0.0188 |
| 95% Standard Bootstrap UCL | 0.0172 | 95% Bootstrap-t UCL | 0.0361 |
| 95% Hall's Bootstrap UCL | 0.0692 | 95% Percentile Bootstrap UCL | 0.0175 |
| 90% Chebyshev(Mean, Sd) UCL | 0.023 | 95% Chebyshev(Mean, Sd) UCL | 0.0283 |
| 97.5% Chebyshev(Mean, Sd) UCL | 0.0358 | 99% Chebyshev(Mean, Sd) UCL | 0.0504 |

**Suggested UCL to Use**
95% Student's-t UCL 0.0186

**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**
**Please verify the data were collected from random locations.**
**If the data were collected using judgmental or other non-random methods,**
**then contact a statistician to correctly calculate UCLs.**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

# Attachment B
# NASD Former Fire Station Building 2046 at the Public Works Area

# NASD Former Fire Station Building 2046 at the Public Works Area Human Health Risk Screening

Risk estimates were prepared for future residential and industrial scenarios for potential exposures to per- and polyfluoroalkyl substances (PFAS) at the NASD Former Fire Station Building 2046. Although multiple PFAS were analyzed in soil and groundwater, for screening purposes, only PFAS with available November 2022 USEPA Regional Screening Levels (RSLs) were retained for the screening. The soil and groundwater samples used in the risk screening are presented in **Table 1**.

Maximum detected concentrations of chemicals were initially compared against November 2022 USEPA RSLs based upon an excess lifetime cancer risk (ELCR) of $1x10^{-6}$ and a hazard quotient (HQ) of 0.1. Residential scenario soil concentrations were compared to residential RSLs; industrial scenario soil concentrations were compared to industrial RSLs; groundwater concentrations were compared to tapwater RSLs.

For assessment of soil, an iterative approach was used where if use of the maximum detected concentration in soil exceeded the RSL and caused a cumulative exceedance of USEPA's target risk range ($10^{-6}$ to $10^{-4}$) and/or target hazard index (HI) of 1, USEPA's ProUCL software would be used to calculate the 95 percent upper confidence limit (95% UCL) on the mean concentration if 8 or more analytical results were available for the chemical in an environmental medium and if the chemical was detected more than four times. The lesser value of the 95% UCL on the mean or maximum detected concentration would then be used as the exposure point concentration (EPC) for quantitative risk estimates.

For groundwater, maximum detected concentrations were used as the EPCs.

If the cumulative ELCR exceeded $1x10^{-4}$ or a target organ-specific HI exceeded 1 for an environmental medium, chemicals of potential concern (COPCs) were identified. A chemical was identified as a COPC if it contributed an ELCR above $1x10^{-6}$ to a medium with a cumulative ELCR above $1x10^{-4}$, or if it contributed an HQ above 0.1 to a medium with a target organ-specific HI above 1.

## Soil - Residential Scenario (Table 2)

Two soil zones were evaluated separately: surface soil (0-1 foot below ground surface [ft-bgs]) and total soil (0-6 ft-bgs).

***Surface Soil - Residential***

- *Chemicals Detected Above RSLs* – One PFAS (perfluorooctane sulfonic acid [PFOS]) was detected in surface soil above the residential RSL. Since less than 8 samples were available for PFOS in surface soil, the maximum detected concentration was used as the EPC. Risk screening estimates for PFOS in surface soil are presented in **Table 2** and summarized below.

  Surface Soil Risk Estimates for Chemicals > Residential RSLs

| Chemical | EPC Type | ELCR | HQ | COPC? |
|---|---|---|---|---|
| PFOS | maximum | n/a | 0.6 | No |

  Notes:
  n/a – toxicity value not available to calculate an ELCR or HQ estimate

- *HHRS Findings for Surface Soil, Residential Scenario* – No potential unacceptable risks were identified for surface soil.

***Total Soil - Residential***

- *Chemicals Detected Above RSLs* – One PFAS (PFOS) was detected in total soil above the residential RSL. Since sufficient samples (10 samples) and a sufficient quantity of detected results were

available for PFOS a 95% UCL was calculated to determine an EPC (**Table 4**). Risk screening estimates for PFOS in total soil are presented in Table 1 and summarized below.

Total Soil Risk Estimates for Chemicals > Residential RSLs

| Chemical | EPC Type | ELCR | HQ | COPC? |
|---|---|---|---|---|
| PFOS | 95% UCL | n/a | 0.5 | No |

Notes:
95% UCL = 95% UCL on the mean
n/a – toxicity value not available to calculate an ELCR or HQ estimate

- *HHRS Findings for Total Soil, Residential Scenario* – No potential unacceptable risks were identified for total soil.

## Soil - Industrial Scenario (Table 3)[1]

Two soil zones were evaluated separately: surface soil (0-1 ft-bgs) and total soil (0-6 ft-bgs).

***Surface Soil - Industrial***

- *Chemicals Detected Above RSLs* – No PFAS were detected in site surface soil above industrial RSLs.
- *HHRS Findings for Surface Soil (Industrial)* – No potential unacceptable risks were identified for surface soil.

***Total Soil – Industrial***

- *Chemicals Detected Above RSLs* – No PFAS were detected in total soil above industrial RSLs.
- *HHRS Findings for Total Soil (Industrial)* – No potential unacceptable risks were identified for total soil.

## Groundwater – Residential and Industrial

- *Chemicals Detected Above RSLs* – The same RSLs (tapwater) were used in the residential and industrial scenario risk screenings. Five PFAS (perfluorobutanesulfonic acid [PFBS], perfluorohexanesulfonic acid [PFHxS], perfluorononanoic acid (PFNA), PFOS, and perfluorooctanoic acid [PFOA]) were detected in groundwater above tapwater RSLs. Risk screening estimates for the five PFAS detected above RSLs are presented in Tables 1 and 2, and summarized below.

Groundwater Risk Estimates for Chemicals > Tapwater RSLs

| Chemical | EPC Type | ELCR | HQ | COPC? |
|---|---|---|---|---|
| PFBS | maximum | n/a | 11 | Yes (HI > 1) |
| PFHxS | maximum | n/a | 444 | Yes (HI > 1) |
| PFNA | maximum | n/a | 1 | Yes (HQ contributes to HI>1) |
| PFOS | maximum | n/a | 113 | Yes (HI > 1) |
| PFOA | maximum | $3x10^{-5}$ | 493 | Yes (HI > 1) |

Notes:
n/a – toxicity value not available to calculate an ELCR estimate

[1] No soil data are presented on Table 2 since no maximum detected concentrations exceed industrial soil RSLs.

- *Cumulative ELCR and HI* – Although the cumulative ELCR is less than the EPA acceptable risk range, the maximum target HI is greater than 1.
- *HHRS Findings for Groundwater* – Potential unacceptable risks were identified from PFBS, PFHxS, PFNA, PFOS, and PFOA in groundwater for the residential and industrial scenarios.

**Table 1**
**Samples Used in the Risk Screening**
Former Fire Station Building 2046
Former NASD
Vieques, Puerto Rico

| Location ID | Sample ID | Sample Date | Sample Medium | Upper Depth (feet) | Lower Depth (feet) | Sample Type |
|---|---|---|---|---|---|---|
| VWFS-PFAS-MW01 | VWFS-PFAS-GW01-0622 | 6/23/2022 | GROUNDWATER | -- | -- | REG |
| VWFS-PFAS-MW01 | VWFS-PFAS-GW01P-0622 | 6/23/2022 | GROUNDWATER | -- | -- | FD |
| VWFS-PFAS-MW02 | VWFS-PFAS-GW02-0622 | 6/22/2022 | GROUNDWATER | -- | -- | REG |
| VWFS-PFAS-SO01 | VWFS-PFAS-SS01-0001 | 3/22/2022 | SOIL | 0 | 1 | REG |
| VWFS-PFAS-SO01 | VWFS-PFAS-SS01P-0001 | 3/22/2022 | SOIL | 0 | 1 | FD |
| VWFS-PFAS-SO02 | VWFS-PFAS-SS02-0001 | 3/21/2022 | SOIL | 0 | 1 | REG |
| VWFS-PFAS-SO03 | VWFS-PFAS-SS03-0001 | 3/22/2022 | SOIL | 0 | 1 | REG |
| VWFS-PFAS-SO04 | VWFS-PFAS-SS04-0001 | 3/22/2022 | SOIL | 0 | 1 | REG |
| VWFS-PFAS-SO05 | VWFS-PFAS-SS05-0001 | 3/23/2022 | SOIL | 0 | 1 | REG |
| VWFS-PFAS-SO01 | VWFS-PFAS-SB01-0406 | 3/22/2022 | SOIL | 4 | 6 | REG |
| VWFS-PFAS-SO02 | VWFS-PFAS-SB02-0406 | 3/21/2022 | SOIL | 4 | 6 | REG |
| VWFS-PFAS-SO02 | VWFS-PFAS-SB02P-0406 | 3/21/2022 | SOIL | 4 | 6 | FD |
| VWFS-PFAS-SO03 | VWFS-PFAS-SB03-0406 | 3/22/2022 | SOIL | 4 | 6 | REG |
| VWFS-PFAS-SO04 | VWFS-PFAS-SB04-0406 | 3/22/2022 | SOIL | 4 | 6 | REG |
| VWFS-PFAS-SO05 | VWFS-PFAS-SB05-0406 | 3/23/2022 | SOIL | 4 | 6 | REG |

Notes:

Per Vieques HHRA Protocol, if a sample has a field duplicate (FD) and both the FD and regular sample (REG) are detected, the higher value is used as the sample concentration. If an FD and REG sample are both non-detected, the lower non-detected concentration is used as the detection limit concentration. If a sample has an FD or REG that is not detected, but the corresponding sample has a detected concentration, the detected concentration is used as the sample concentration.

**Table 2**
**HHRA COPC Summary Table - Residential**
Former Fire Station Building 2046
Former NASD
Vieques, Puerto Rico

| | | | | | | | Screening Level (1) | | RBC (2) | | EPC (3) | Estimated Risk (3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | CAS Number | Analyte Name (1) | Result Unit | MinDet | MaxDet | FOD | RSL (TR=$10^{-6}$ or HQ=0.1) | basis | Carc. (TR=$10^{-6}$) | Non Carc. (THQ=1) | EPC | EPC Basis | ELCR | HQ | Target Organ |
| Surface Soil | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | mg/kg | 0.00051 | 0.0694 | 5/5 | 0.0126 | nc | - | 0.126 | 0.0694 | Max | -- | 0.6 | Developmental |
| Total Soil | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | mg/kg | 0.00051 | 0.104 | 9/10 | 0.0126 | nc | - | 0.126 | 0.0688 | UCL | -- | 0.5 | Developmental |
| Groundwater | 375-73-5 | Perfluorobutanesulfonic acid (PFBS) | µg/L | 6.61 | 68.7 | 2/2 | 0.601 | nc | - | 6.01 | 68.7 | Max | -- | 11 | Endocrine |
| | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | µg/L | 104 | 175 | 2/2 | 0.0394 | nc | - | 0.394 | 175 | Max | -- | 444 | Endocrine |
| | 375-95-1 | Perfluorononanoic acid (PFNA) | µg/L | 0.0728 | 0.0728 | 1/2 | 0.00589 | nc | - | 0.0589 | 0.0728 | Max | -- | 1 | Developmental |
| | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | µg/L | 0.0369 | 4.53 | 2/2 | 0.00401 | nc | - | 0.0401 | 4.53 | Max | -- | 113 | Developmental |
| | 335-67-1 | Perfluorooctanoic acid (PFOA) | µg/L | 0.247 | 29.7 | 2/2 | 0.00602 | nc | 1.11 | 0.0602 | 29.7 | Max | 3.E-05 | 493 | Developmental |

ELCR - excess lifetime cancer risk
EPC - exposure point concentration
FOD - frequency of detection
HI - hazard index
HQ - hazard quotient
Max - maximum detected concentration
RBC - risk-based concentration
RSL - Regional Screening Level
TR - target risk
UCL - upper confidence limit

**Cumulative ELCR**

| Surface Soil | Total Soil | Groundwater |
|---|---|---|
| NA | NA | 3.E-05 |

**Hazard Index**

| | Surface Soil | Total Soil | Groundwater |
|---|---|---|---|
| Total Developmental HI Across Media = | 0.6 | 0.5 | **608** |
| Total Endocrine HI Across Media = | NA | NA | **456** |

Notes:
(1) Chemicals whose maximum detected concentration (MaxDet) exceeds RSL in the exposure medium are presented on the table.
- RSLs for soil and groundwater are based on an Excess Lifetime Cancer Risk (ELCR) of $10^{-6}$ and a Hazard Quotient (HQ)=0.1 (USEPA, November 2022).
- RSLs for residential soil are used for surface soil and total soil.
- RSLs for tapwater are used for groundwater

(2) Risk-based Concentrations (RBCs) are RSLs (November 2022) based on an ELCR of $10^{-6}$ and an HQ=1.
- RSLs for residential soil are used for surface soil and total soil.
- RSLs for tapwater are used for groundwater

(3) The Maximum detected concentration was initially used as exposure point concentration (EPC).
- When the cumulative risk estimate based on MaxDet exceeds ELCR of $1x10^{-4}$ and/or target organ-specific Hazard Index (HI) of 1 for an exposure medium, upper confidence limit (UCL) on mean is used as EPC if there are enough samples (8 or more) and enough detections (4 or more).
- Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RBC and EPC.
  - HQ = EPC / Noncarcinogenic RBC (based on HQ=1)
  - ELCR = EPC x $1x10^{-6}$ / Carcinogenic RBC (based on ELCR=$1x10^{-6}$)

RSL Basis: ca - carcinogenic, nc - non-carcinogenic

**Table 3**
**HHRA COPC Summary Table - Industrial**
Former Fire Station Building 2046
Former NASD
Vieques, Puerto Rico

| | | | | | | | Screening Level (1) | | RBC (2) | | EPC (3) | Estimated Risk (3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | CAS Number | Analyte Name (1) | Result Unit | MinDet | MaxDet | FOD | RSL ($TR=10^{-6}$ or HQ=0.1) | basis | Carc. ($TR=10^{-6}$) | Non Carc. (THQ=1) | EPC | EPC Basis | ELCR | HQ | Target Organ |
| Groundwater | 375-73-5 | Perfluorobutanesulfonic acid (PFBS) | µg/L | 6.61 | 68.7 | 2/2 | 0.601 | nc | - | 6.01 | 68.7 | Max | -- | 11 | Endocrine |
| | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | µg/L | 104 | 175 | 2/2 | 0.0394 | nc | - | 0.394 | 175 | Max | -- | 444 | Endocrine |
| | 375-95-1 | Perfluorononanoic acid (PFNA) | µg/L | 0.0728 | 0.0728 | 1/2 | 0.00589 | nc | - | 0.0589 | 0.0728 | Max | -- | 1 | Developmental |
| | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | µg/L | 0.0369 | 4.53 | 2/2 | 0.00401 | nc | - | 0.0401 | 4.53 | Max | -- | 113 | Developmental |
| | 335-67-1 | Perfluorooctanoic acid (PFOA) | µg/L | 0.247 | 29.7 | 2/2 | 0.00602 | nc | 1.11 | 0.0602 | 29.7 | Max | 3.E-05 | 493 | Developmental |

ELCR - excess lifetime cancer risk
EPC - exposure point concentration
FOD - frequency of detection
HI - hazard index
HQ - hazard quotient
Max - maximum detected concentration
RBC - risk-based concentration
RSL - Regional Screening Level
TR - target risk

**Cumulative ELCR**

| Groundwater |
|---|
| 3.E-05 |

**Hazard Index**

| | Groundwater |
|---|---|
| Total Developmental HI Across Media = | **608** |
| Total Endocrine HI Across Media = | **456** |

Notes:
(1) Chemicals whose maximum detected concentration (MaxDet) exceeds RSL in the exposure medium are presented on the table.
- RSLs for groundwater are based on an Excess Lifetime Cancer Risk (ELCR) of $10^{-6}$ and a Hazard Quotient (HQ)=0.1 (USEPA, November 2022).
- RSLs for tapwater are used for groundwater

(2) Risk-based Concentrations (RBCs) are RSLs (November 2022) based on an ELCR of $10^{-6}$ and an HQ=1.
- RSLs for tapwater are used for groundwater

(3) The Maximum detected concentration was used as the exposure point concentration (EPC).
- Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RBC and EPC.
  - HQ = EPC / Noncarcinogenic RBC (based on HQ=1)
  - ELCR = EPC x $1x10^{-6}$ / Carcinogenic RBC (based on ELCR=$1x10^{-6}$)

RSL Basis: ca - carcinogenic, nc - non-carcinogenic

**Table 4**
**Calculated Upper Confidence Limits**
Former Fire Station Building 2046
Former NASD
Vieques, Puerto Rico

**UCL Statistics for Data Sets with Non-Detects**

| | |
|---|---|
| User Selected Options | |
| Date/Time of Computation | ProUCL 5.2 1/13/2023 8:33:15 AM |
| From File | WorkSheet.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

**PFOS (mg/kg) Total Soil**

**General Statistics**

| | | | |
|---|---|---|---|
| Total Number of Observations | 10 | Number of Distinct Observations | 10 |
| Number of Detects | 9 | Number of Non-Detects | 1 |
| Number of Distinct Detects | 9 | Number of Distinct Non-Detects | 1 |
| Minimum Detect | 5.1000E-4 | Minimum Non-Detect | 5.6300E-4 |
| Maximum Detect | 0.104 | Maximum Non-Detect | 5.6300E-4 |
| Variance Detects | 0.00197 | Percent Non-Detects | 10% |
| Mean Detects | 0.0476 | SD Detects | 0.0443 |
| Median Detects | 0.0367 | CV Detects | 0.931 |
| Skewness Detects | 0.255 | Kurtosis Detects | -2.076 |
| Mean of Logged Detects | -3.966 | SD of Logged Detects | 1.898 |

**Normal GOF Test on Detects Only**

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.844 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk Critical Value | 0.764 | Detected Data appear Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.225 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.316 | Detected Data appear Normal at 1% Significance Level |

**Detected Data appear Normal at 1% Significance Level**
**Note GOF tests may be unreliable for small sample sizes**

**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**

| | | | |
|---|---|---|---|
| KM Mean | 0.0429 | KM Standard Error of Mean | 0.0141 |
| 90KM SD | 0.0421 | 95% KM (BCA) UCL | 0.0649 |
| 95% KM (t) UCL | 0.0688 | 95% KM (Percentile Bootstrap) UCL | 0.0651 |
| 95% KM (z) UCL | 0.0662 | 95% KM Bootstrap t UCL | 0.0748 |
| 90% KM Chebyshev UCL | 0.0853 | 95% KM Chebyshev UCL | 0.104 |
| 97.5% KM Chebyshev UCL | 0.131 | 99% KM Chebyshev UCL | 0.183 |

**Gamma GOF Tests on Detected Observations Only**

| | | |
|---|---|---|
| A-D Test Statistic | 0.442 | **Anderson-Darling GOF Test** |
| 5% A-D Critical Value | 0.758 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.212 | **Kolmogorov-Smirnov GOF** |
| 5% K-S Critical Value | 0.291 | Detected data appear Gamma Distributed at 5% Significance Level |

**Detected data appear Gamma Distributed at 5% Significance Level**
**Note GOF tests may be unreliable for small sample sizes**

**Gamma Statistics on Detected Data Only**

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.661 | k star (bias corrected MLE) | 0.515 |
| Theta hat (MLE) | 0.0721 | Theta star (bias corrected MLE) | 0.0926 |
| nu hat (MLE) | 11.89 | nu star (bias corrected) | 9.261 |
| Mean (detects) | 0.0476 | | |

**Gamma ROS Statistics using Imputed Non-Detects**

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 5.1000E-4 | Mean | 0.0439 |
| Maximum | 0.104 | Median | 0.025 |
| SD | 0.0435 | CV | 0.99 |
| k hat (MLE) | 0.672 | k star (bias corrected MLE) | 0.537 |
| Theta hat (MLE) | 0.0653 | Theta star (bias corrected MLE) | 0.0817 |
| nu hat (MLE) | 13.45 | nu star (bias corrected) | 10.75 |
| Adjusted Level of Significance (β) | 0.0267 | | |
| Approximate Chi Square Value (10.75, α) | 4.414 | Adjusted Chi Square Value (10.75, β) | 3.735 |
| 95% Gamma Approximate UCL | 0.107 | 95% Gamma Adjusted UCL | 0.126 |

**Table 4**
**Calculated Upper Confidence Limits**
Former Fire Station Building 2046
Former NASD
Vieques, Puerto Rico

**Estimates of Gamma Parameters using KM Estimates**

| | | | |
|---|---|---|---|
| Mean (KM) | 0.0429 | SD (KM) | 0.0421 |
| Variance (KM) | 0.00177 | SE of Mean (KM) | 0.0141 |
| k hat (KM) | 1.04 | k star (KM) | 0.795 |
| nu hat (KM) | 20.8 | nu star (KM) | 15.89 |
| theta hat (KM) | 0.0413 | theta star (KM) | 0.054 |
| 80% gamma percentile (KM) | 0.0702 | 90% gamma percentile (KM) | 0.105 |
| 95% gamma percentile (KM) | 0.14 | 99% gamma percentile (KM) | 0.222 |

**Gamma Kaplan-Meier (KM) Statistics**

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (15.89, α) | 7.886 | Adjusted Chi Square Value (15.89, β) | 6.928 |
| 95% KM Approximate Gamma UCL | 0.0865 | 95% KM Adjusted Gamma UCL | 0.0985 |

**Lognormal GOF Test on Detected Observations Only**

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.869 | **Shapiro Wilk GOF Test** |
| 10% Shapiro Wilk Critical Value | 0.859 | Detected Data appear Lognormal at 10% Significance Level |
| Lilliefors Test Statistic | 0.197 | **Lilliefors GOF Test** |
| 10% Lilliefors Critical Value | 0.252 | Detected Data appear Lognormal at 10% Significance Level |

Detected Data appear Lognormal at 10% Significance Level
Note GOF tests may be unreliable for small sample sizes

**Lognormal ROS Statistics Using Imputed Non-Detects**

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.043 | Mean in Log Scale | -4.284 |
| SD in Original Scale | 0.0443 | SD in Log Scale | 2.052 |
| 95% t UCL (assumes normality of ROS data) | 0.0687 | 95% Percentile Bootstrap UCL | 0.0656 |
| 95% BCA Bootstrap UCL | 0.066 | 95% Bootstrap t UCL | 0.0725 |
| 95% H-UCL (Log ROS) | 4.953 | | |

**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**

| | | | |
|---|---|---|---|
| KM Mean (logged) | -4.328 | KM Geo Mean | 0.0132 |
| KM SD (logged) | 2.014 | 95% Critical H Value (KM-Log) | 5.431 |
| KM Standard Error of Mean (logged) | 0.676 | 95% H-UCL (KM -Log) | 3.851 |
| KM SD (logged) | 2.014 | 95% Critical H Value (KM-Log) | 5.431 |
| KM Standard Error of Mean (logged) | 0.676 | | |

**DL/2 Statistics**

| **DL/2 Normal** | | **DL/2 Log-Transformed** | |
|---|---|---|---|
| Mean in Original Scale | 0.0429 | Mean in Log Scale | -4.387 |
| SD in Original Scale | 0.0444 | SD in Log Scale | 2.23 |
| 95% t UCL (Assumes normality) | 0.0686 | 95% H-Stat UCL | 12.53 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

**Nonparametric Distribution Free UCL Statistics**
Detected Data appear Normal Distributed at 1% Significance Level

**Suggested UCL to Use**
95% KM (t) UCL 0.0688

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

# Attachment C
# Potential Former NASD Motor Pool Area

# Potential Former Motor Pool Area Human Health Risk Screening

Risk estimates were prepared for future residential and industrial scenarios for potential exposures to per- and polyfluoroalkyl substances (PFAS) at NASD Potential Former Motor Pool. Although multiple PFAS were analyzed in soil and groundwater, for screening purposes, only PFAS with available November 2022 USEPA Regional Screening Levels (RSLs) were retained for the screening. The soil and groundwater samples used in the risk screening are presented in **Table 1**.

Maximum detected concentrations of chemicals were initially compared against November 2022 USEPA RSLs based upon an excess lifetime cancer risk (ELCR) of $1x10^{-6}$ and a hazard quotient (HQ) of 0.1. Residential scenario soil concentrations were compared to residential RSLs; industrial scenario soil concentrations were compared to industrial RSLs; groundwater concentrations were compared to tapwater RSLs.

For assessment of soil, an iterative approach was used where if use of the maximum detected concentration in soil exceeded the RSL and caused a cumulative exceedance of USEPA's target risk range ($10^{-6}$ to $10^{-4}$) and/or target hazard index (HI) of 1, USEPA's ProUCL software would be used to calculate the 95 percent upper confidence limit (95% UCL) on the mean concentration if 8 or more analytical results were available for the chemical in an environmental medium and if the chemical was detected more than four times. The lesser value of the 95% UCL on the mean or maximum detected concentration would then be used as the exposure point concentration (EPC) for quantitative risk estimates.

For groundwater, maximum detected concentrations were used as the EPCs.

If the cumulative ELCR exceeded $1x10^{-4}$ or a target organ-specific HI exceeded 1 for an environmental medium, chemicals of potential concern (COPCs) were identified. A chemical was identified as a COPC if it contributed an ELCR above $1x10^{-6}$ to a medium with a cumulative ELCR above $1x10^{-4}$, or if it contributed an HQ above 0.1 to a medium with a target organ-specific HI above 1.

## Soil - Residential Scenario (Table 2)[1]

Two soil zones were evaluated separately: surface soil (0-1 foot below ground surface [ft-bgs]) and total soil (0-6 ft-bgs).

***Surface Soil - Residential***

- *Chemicals Detected Above RSLs* – No PFAS were detected in surface soil above the residential soil RSLs.
- *HHRS Findings for Surface Soil, Residential Scenario* – No potential unacceptable risks were identified for surface soil.

***Total Soil - Residential***

- *Chemicals Detected Above RSLs* – No PFAS were detected in total soil above the residential soil RSLs.
- *HHRS Findings for Total Soil, Residential Scenario* – No potential unacceptable risks were identified for total soil.

[1] No soil data are presented on Table 1 since no maximum detected concentrations exceed residential soil RSLs.

## Soil - Industrial Scenario (Table 3)

Two soil zones were evaluated separately: surface soil (0-1 ft-bgs) and total soil (0-6 ft-bgs).

***Surface Soil - Industrial***

- *Chemicals Detected Above RSLs* – No PFAS were detected in site surface soil above industrial RSLs.
- *HHRS Findings for Surface Soil (Industrial)* – No potential unacceptable risks were identified for surface soil.

***Total Soil – Industrial***

- *Chemicals Detected Above RSLs* – No PFAS were detected in total soil above industrial RSLs.
- *HHRS Findings for Total Soil (Industrial)* – No potential unacceptable risks were identified for total soil.

## Groundwater – Residential and Industrial

- *Chemicals Detected Above RSLs* – The same RSLs (tapwater) were used in the residential and industrial scenario risk screenings. Three PFAS (perfluorohexanesulfonic acid [PFHxS], perfluorooctane sulfonic acid [PFOS], and perfluorooctanoic acid [PFOA]) were detected in groundwater above tapwater RSLs. Risk screening estimates for the three PFAS detected above RSLs are presented in **Tables 2 and 3**, and summarized below.

  Groundwater Risk Estimates for Chemicals > Tapwater RSLs

| Chemical | EPC Type | ELCR | HQ | COPC? |
|---|---|---|---|---|
| PFHxS | maximum | n/a | 0.2 | No |
| PFOS | maximum | n/a | 2 | Yes (HI > 1) |
| PFOA | maximum | $2x10^{-8}$ | 0.3 | Yes (HQ contributes to HI > 1) |

  Notes:
  n/a – toxicity value not available to calculate an ELCR estimate

- *Cumulative ELCR and HI* – Although the cumulative ELCR is less than the EPA acceptable risk range, the maximum target HI is greater than 1.
- *HHRS Findings for Groundwater* – Potential unacceptable risks were identified from PFOS and PFOA in groundwater for the residential and industrial scenarios.

**Table 1**
**Samples Used in the Risk Screening**
Potential Former Motor Pool Area
Former NASD
Vieques, Puerto Rico

| Location ID | Sample ID | Sample Date | Sample Medium | Upper Depth (feet) | Lower Depth (feet) | Sample Type |
|---|---|---|---|---|---|---|
| VWMP-PFAS-MW01 | VWMP-PFAS-GW01-0722 | 7/9/2022 | GROUNDWATER | -- | -- | REG |
| VWMP-PFAS-MW02 | VWMP-PFAS-GW02-0722 | 7/9/2022 | GROUNDWATER | -- | -- | REG |
| VWMP-PFAS-MW02 | VWMP-PFAS-GW02P-0722 | 7/9/2022 | GROUNDWATER | -- | -- | FD |
| VWMP-PFAS-MW03 | VWMP-PFAS-GW03-0722 | 7/9/2022 | GROUNDWATER | -- | -- | REG |
| VWMP-PFAS-SO01 | VWMP-PFAS-SS01-0001 | 3/24/2022 | SOIL | 0 | 1 | REG |
| VWMP-PFAS-SO02 | VWMP-PFAS-SS02P-0001 | 3/25/2022 | SOIL | 0 | 1 | FD |
| VWMP-PFAS-SO02 | VWMP-PFAS-SS02-0001 | 3/25/2022 | SOIL | 0 | 1 | REG |
| VWMP-PFAS-SO03 | VWMP-PFAS-SS03-0001 | 3/23/2022 | SOIL | 0 | 1 | REG |
| VWMP-PFAS-SO04 | VWMP-PFAS-SS04-0001 | 3/29/2022 | SOIL | 0 | 1 | REG |
| VWMP-PFAS-SO01 | VWMP-PFAS-SB01-0406 | 3/24/2022 | SOIL | 4 | 6 | REG |
| VWMP-PFAS-SO02 | VWMP-PFAS-SB02-0406 | 3/25/2022 | SOIL | 4 | 6 | REG |
| VWMP-PFAS-SO03 | VWMP-PFAS-SB03-0406 | 3/23/2022 | SOIL | 4 | 6 | REG |

Notes:

Per Vieques HHRA Protocol, if a sample has a field duplicate (FD) and both the FD and regular sample (REG) are detected, the higher value is used as the sample concentration. If an FD and REG sample are both non-detected, the lower non-detected concentration is used as the detection limit concentration. If a sample has an FD or REG that is not detected, but the corresponding sample has a detected concentration, the detected concentration is used as the sample concentration.

**Table 2**
**HHRA COPC Summary Table - Residential**
Potential Former Motor Pool Area
Former NASD
Vieques, Puerto Rico

| | | | | | | | Screening Level (1) | | RBC (2) | | EPC (3) | Estimated Risk (3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | CAS Number | Analyte Name (1) | Result Unit | MinDet | MaxDet | FOD | RSL ($TR=10^{-6}$ or HQ=0.1) | basis | Carc. ($TR=10^{-6}$) | Non Carc. (THQ=1) | EPC | EPC Basis | ELCR | HQ | Target Organ |
| Groundwater | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | µg/L | 0.0319 | 0.0715 | 2/3 | 0.0394 | nc | - | 0.394 | 0.0715 | Max | -- | 0.2 | Endocrine |
| | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | µg/L | 0.00165 | 0.0963 | 3/3 | 0.00401 | nc | - | 0.0401 | 0.0963 | Max | -- | 2 | Developmental |
| | 335-67-1 | Perfluorooctanoic acid (PFOA) | µg/L | 0.0048 | 0.0197 | 3/3 | 0.00602 | nc | 1.11 | 0.0602 | 0.0197 | Max | 2.E-08 | 0.3 | Developmental |

ELCR - excess lifetime cancer risk
EPC - exposure point concentration
FOD - frequency of detection
HI - hazard index
HQ - hazard quotient
Max - maximum detected concentration
RBC - risk-based concentration
RSL - Regional Screening Level
TR - target risk

**Cumulative ELCR**

| Groundwater |
|---|
| 2.E-08 |

**Hazard Index**

| | Groundwater |
|---|---|
| Total Developmental HI Across Media = | **3** |
| Total Endocrine HI Across Media = | 0.2 |

Notes:
(1) Chemicals whose maximum detected concentration (MaxDet) exceeds RSL in the exposure medium are presented on the table.
- RSLs for groundwater are based on an Excess Lifetime Cancer Risk (ELCR) of $10^{-6}$ and a Hazard Quotient (HQ)=0.1 (USEPA, November 2022).
- RSLs for tapwater are used for groundwater

(2) Risk-based Concentrations (RBCs) are RSLs (November 2022) based on an ELCR of $10^{-6}$ and an HQ=1.
- RSLs for tapwater are used for groundwater

(3) The Maximum detected concentration was used as the exposure point concentration (EPC).
- Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RBC and EPC.
  - HQ = EPC / Noncarcinogenic RBC (based on HQ=1)
  - ELCR = EPC x $1x10^{-6}$ / Carcinogenic RBC (based on ELCR=$1x10^{-6}$)

RSL Basis: ca - carcinogenic, nc - non-carcinogenic

**Table 3**
**HHRA COPC Summary Table - Industrial**
Potential Former Motor Pool Area
Former NASD
Vieques, Puerto Rico

| | | | | | | | Screening Level (1) | | RBC (2) | | EPC (3) | Estimated Risk (3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | CAS Number | Analyte Name (1) | Result Unit | MinDet | MaxDet | FOD | RSL (TR=$10^{-6}$ or HQ=0.1) | basis | Carc. (TR=$10^{-6}$) | Non Carc. (THQ=1) | EPC | EPC Basis | ELCR | HQ | Target Organ |
| Groundwater | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | µg/L | 0.0319 | 0.0715 | 2/3 | 0.0394 | nc | - | 0.394 | 0.0715 | Max | -- | 0.2 | Endocrine |
| | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | µg/L | 0.00165 | 0.0963 | 3/3 | 0.00401 | nc | - | 0.0401 | 0.0963 | Max | -- | 2 | Developmental |
| | 335-67-1 | Perfluorooctanoic acid (PFOA) | µg/L | 0.0048 | 0.0197 | 3/3 | 0.00602 | nc | 1.11 | 0.0602 | 0.0197 | Max | 2.E-08 | 0.3 | Developmental |

ELCR - excess lifetime cancer risk
EPC - exposure point concentration
FOD - frequency of detection
HI - hazard index
HQ - hazard quotient
Max - maximum detected concentration
RBC - risk-based concentration
RSL - Regional Screening Level
TR - target risk

**Cumulative ELCR**

| Groundwater |
|---|
| 2.E-08 |

**Hazard Index**

| | Groundwater |
|---|---|
| Total Developmental HI Across Media = | **3** |
| Total Endocrine HI Across Media = | 0.2 |

Notes:
(1) Chemicals whose maximum detected concentration (MaxDet) exceeds RSL in the exposure medium are presented on the table.
- RSLs for groundwater are based on an Excess Lifetime Cancer Risk (ELCR) of $10^{-6}$ and a Hazard Quotient (HQ)=0.1 (USEPA, November 2022).
- RSLs for tapwater are used for groundwater

(2) Risk-based Concentrations (RBCs) are RSLs (November 2022) based on an ELCR of $10^{-6}$ and an HQ=1.
- RSLs for tapwater are used for groundwater

(3) The Maximum detected concentration was used as the exposure point concentration (EPC).
- Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RBC and EPC.
  - HQ = EPC / Noncarcinogenic RBC (based on HQ=1)
  - ELCR = EPC x $1x10^{-6}$ / Carcinogenic RBC (based on ELCR=$1x10^{-6}$)

RSL Basis: ca - carcinogenic, nc - non-carcinogenic
RSL Basis: ca - carcinogenic, nc - non-carcinogenic

# Attachment D
# VNTR Former Camp Garcia Runway

# VNTR Former Camp Garcia Runway Human Health Risk Screening

Risk estimates were prepared for future residential and industrial scenarios for potential exposures to per- and polyfluoroalkyl substances (PFAS) at VNTR Former Camp Garcia Runway. Although multiple PFAS were analyzed in soil and groundwater, for screening purposes, only PFAS with available November 2022 USEPA Regional Screening Levels (RSLs) were retained for the screening. The soil and groundwater samples used in the risk screening are presented in **Table 1**.

Maximum detected concentrations of chemicals were initially compared against November 2022 USEPA RSLs based upon an excess lifetime cancer risk (ELCR) of $1x10^{-6}$ and a hazard quotient (HQ) of 0.1. Residential scenario soil concentrations were compared to residential RSLs; industrial scenario soil concentrations were compared to industrial RSLs; groundwater concentrations were compared to tapwater RSLs.

For assessment of soil, an iterative approach was used where if use of the maximum detected concentration in soil exceeded the RSL and caused a cumulative exceedance of USEPA's target risk range ($10^{-6}$ to $10^{-4}$) and/or target hazard index (HI) of 1, USEPA's ProUCL software would be used to calculate the 95 percent upper confidence limit (95% UCL) on the mean concentration if 8 or more analytical results were available for the chemical in an environmental medium and if the chemical was detected four or more times. The lesser value of the 95% UCL on the mean or maximum detected concentration would then be used as the exposure point concentration (EPC) for quantitative risk estimates.

For groundwater, maximum detected concentrations were used as the EPCs.

If the cumulative ELCR exceeded $1x10^{-4}$ or a target organ-specific HI exceeded 1 for an environmental medium, chemicals of potential concern (COPCs) were identified. A chemical was identified as a COPC if it contributed an ELCR above $1x10^{-6}$ to a medium with a cumulative ELCR above $1x10^{-4}$, or if it contributed an HQ above 0.1 to a medium with a target organ-specific HI above 1.

## Soil - Residential Scenario (Table 2)[1]

Two soil zones were evaluated separately: surface soil (0-1 foot below ground surface [ft-bgs]) and total soil (0-6 ft-bgs).

***Surface Soil - Residential***

- *Chemicals Detected Above RSLs* – No PFAS were detected in surface soil above the residential soil RSLs.
- *HHRS Findings for Surface Soil, Residential Scenario* – No potential unacceptable risks were identified for surface soil.

***Total Soil - Residential***

- *Chemicals Detected Above RSLs* – No PFAS were detected in total soil above the residential soil RSLs.
- *HHRS Findings for Total Soil, Residential Scenario* – No potential unacceptable risks were identified for total soil.

[1] No soil data are presented on Table 1 since no maximum detected concentrations exceed residential soil RSLs.

## Soil - Industrial Scenario (Table 3)[2]

Two soil zones were evaluated separately: surface soil (0-1 ft-bgs) and total soil (0-6 ft-bgs).

***Surface Soil - Industrial***

- *Chemicals Detected Above RSLs* – No PFAS were detected in site surface soil above industrial RSLs.
- *HHRS Findings for Surface Soil, Industrial Scenario* – No potential unacceptable risks were identified for surface soil.

***Total Soil – Industrial***

- *Chemicals Detected Above RSLs* – No PFAS were detected in total soil above industrial RSLs.
- *HHRS Findings for Total Soil, Industrial Scenario* – No potential unacceptable risks were identified for total soil.

## Groundwater – Residential and Industrial Scenarios

- *Chemicals Detected Above RSLs* – The same RSLs (tapwater) were used in the residential and industrial scenario risk screenings. Two PFAS (perfluorohexanesulfonic acid [PFHxS] and perfluorooctane sulfonic acid [PFOS]) were detected in groundwater above tapwater RSLs. Risk screening estimates for the two PFAS detected above RSLs are presented in **Tables 2 and 3**, and summarized below.

  Groundwater Risk Estimates for Chemicals > Tapwater RSLs

| Chemical | EPC Type | ELCR | HQ | COPC? |
|---|---|---|---|---|
| PFHxS | maximum | n/a | 0.1 | No |
| PFOS | maximum | n/a | 0.5 | No |

  Notes:

  n/a – toxicity value not available to calculate an ELCR estimate

- *Cumulative ELCR and HI* – Both detected PFAS do not have available carcinogenic RSLs, and the maximum target organ/system HI is less than 1.
- *HHRS Findings for Groundwater* – No potential unacceptable risks were identified for groundwater.

[2] No soil data are presented on Table 2 since no maximum detected concentrations exceed industrial soil RSLs.

**Table 1**
**Samples Used in the Risk Screening**
Former Camp Garcia Runway
Former VNTR
Vieques, Puerto Rico

| Location ID | Sample ID | Sample Date | Sample Medium | Upper Depth (feet) | Lower Depth (feet) | Sample Type |
|---|---|---|---|---|---|---|
| VERW-PFAS-SO01 | VERW-PFAS-SS01-0001 | 2/24/2022 | SOIL | 0 | 1 | REG |
| VERW-PFAS-SO02 | VERW-PFAS-SS02-0001 | 2/28/2022 | SOIL | 0 | 1 | REG |
| VERW-PFAS-SO03 | VERW-PFAS-SS03-0001 | 2/25/2022 | SOIL | 0 | 1 | REG |
| VERW-PFAS-SO04 | VERW-PFAS-SS04-0001 | 2/25/2022 | SOIL | 0 | 1 | REG |
| VERW-PFAS-SO05 | VERW-PFAS-SS05-0001 | 3/1/2022 | SOIL | 0 | 1 | REG |
| VERW-PFAS-SO01 | VERW-PFAS-SB01-0406 | 2/24/2022 | SOIL | 4 | 6 | REG |
| VERW-PFAS-SO02 | VERW-PFAS-SB02-0406 | 2/28/2022 | SOIL | 4 | 6 | REG |
| VERW-PFAS-SO03 | VERW-PFAS-SB03-0406 | 2/25/2022 | SOIL | 4 | 6 | REG |
| VERW-PFAS-SO04 | VERW-PFAS-SB04-0406 | 2/25/2022 | SOIL | 4 | 6 | REG |
| VERW-PFAS-SO05 | VERW-PFAS-SB05-0406 | 3/1/2022 | SOIL | 4 | 6 | REG |
| VERW-PFAS-MW01 | VERW-PFAS-GW01-0422 | 4/6/2022 | GROUNDWATER | -- | -- | REG |
| VERW-PFAS-MW02 | VERW-PFAS-GW02-0422 | 4/7/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW26 | EPI04-PFAS-GW26-0222 | 2/2/2022 | GROUNDWATER | -- | -- | REG |

Notes:

Per Vieques HHRA Protocol, if a sample has a field duplicate (FD) and both the FD and regular sample (REG) are detected, the higher value is used as the sample concentration. If an FD and REG sample are both non-detected, the lower non-detected concentration is used as the detection limit concentration. If a sample has an FD or REG that is not detected, but the corresponding sample has a detected concentration, the detected concentration is used as the sample concentration.

**Table 2**
**HHRA COPC Summary Table - Residential**
Former Camp Garcia Runway
Former VNTR
Vieques, Puerto Rico

| | | | | | | | Screening Level (1) | | RBC (2) | | EPC (3) | Estimated Risk (3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | CAS Number | Analyte Name (1) | Result Unit | MinDet | MaxDet | FOD | RSL (TR=$10^{-6}$ or HQ=0.1) | basis | Carc. (TR=$10^{-6}$) | Non Carc. (THQ=1) | EPC | EPC Basis | ELCR | HQ | Target Organ |
| Groundwater | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | µg/L | 0.00517 | 0.0442 | 3/3 | 0.0394 | nc | - | 0.394 | 0.0442 | Max | -- | 0.1 | Endocrine |
| | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | µg/L | 0.0011 | 0.0212 | 2/3 | 0.00401 | nc | - | 0.0401 | 0.0212 | Max | -- | 0.5 | Developmental |

ELCR - excess lifetime cancer risk
EPC - exposure point concentration
FOD - frequency of detection
HI - hazard index
HQ - hazard quotient
Max - maximum detected concentration
RBC - risk-based concentration
RSL - Regional Screening Level
TR - target risk
UCL - upper confidence limit

**Cumulative ELCR**

| Groundwater |
|---|
| NA |

**Hazard Index**

| | Groundwater |
|---|---|
| Total Developmental HI Across Media = | 0.5 |
| Total Endocrine HI Across Media = | 0.1 |

Notes:
(1) Chemicals whose maximum detected concentration (MaxDet) exceeds RSL in the exposure medium are presented on the table.
- RSLs for groundwater are based on an Excess Lifetime Cancer Risk (ELCR) of $10^{-6}$ and a Hazard Quotient (HQ)=0.1 (USEPA, November 2022).
- RSLs for tapwater are used for groundwater

(2) Risk-based Concentrations (RBCs) are RSLs (November 2022) based on an ELCR of $10^{-6}$ and an HQ=1.
- RSLs for tapwater are used for groundwater

(3) The maximum detected concentration was used as the exposure point concentration (EPC).
- Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RBC and EPC.
  - HQ = EPC / Noncarcinogenic RBC (based on HQ=1)
  - ELCR = EPC x $1x10^{-6}$ / Carcinogenic RBC (based on ELCR=$1x10^{-6}$)

RSL Basis: ca - carcinogenic, nc - non-carcinogenic

**Table 3**
**HHRA COPC Summary Table - Industrial**
Former Camp Garcia Runway
Former VNTR
Vieques, Puerto Rico

| | | | | | | | Screening Level (1) | | RBC (2) | | EPC (3) | Estimated Risk (3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | CAS Number | Analyte Name (1) | Result Unit | MinDet | MaxDet | FOD | RSL (TR=$10^{-6}$ or HQ=0.1) | basis | Carc. (TR=$10^{-6}$) | Non Carc. (THQ=1) | EPC | EPC Basis | ELCR | HQ | Target Organ |
| Groundwater | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | µg/L | 0.00517 | 0.0442 | 3/3 | 0.0394 | nc | - | 0.394 | 0.0442 | Max | -- | 0.1 | Endocrine |
| | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | µg/L | 0.0011 | 0.0212 | 2/3 | 0.00401 | nc | - | 0.0401 | 0.0212 | Max | -- | 0.5 | Developmental |

ELCR - excess lifetime cancer risk
EPC - exposure point concentration
FOD - frequency of detection
HI - hazard index
HQ - hazard quotient
Max - maximum detected concentration
RBC - risk-based concentration
RSL - Regional Screening Level
TR - target risk
UCL - upper confidence limit

**Cumulative ELCR**

| Groundwater |
|---|
| NA |

**Hazard Index**

| | Groundwater |
|---|---|
| Total Developmental HI Across Media = | 0.5 |
| Total Endocrine HI Across Media = | 0.1 |

Notes:
(1) Chemicals whose maximum detected concentration (MaxDet) exceeds RSL in the exposure medium are presented on the table.
- RSLs for groundwater are based on an Excess Lifetime Cancer Risk (ELCR) of $10^{-6}$ and a Hazard Quotient (HQ)=0.1 (USEPA, November 2022).
- RSLs for tapwater are used for groundwater

(2) Risk-based Concentrations (RBCs) are RSLs (November 2022) based on an ELCR of $10^{-6}$ and an HQ=1.
- RSLs for tapwater are used for groundwater

(3) The maximum detected concentration was used as the exposure point concentration (EPC).
- Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RBC and EPC.
  - HQ = EPC / Noncarcinogenic RBC (based on HQ=1)
  - ELCR = EPC x $1x10^{-6}$ / Carcinogenic RBC (based on ELCR=$1x10^{-6}$)

RSL Basis: ca - carcinogenic, nc - non-carcinogenic

# Attachment E
# VNTR SWMU 20: Former Helicopter Maintenance Area

# VNTR SWMU 20: Former Helicopter Maintenance Area Human Health Risk Screening

Risk estimates were prepared for future residential and industrial scenarios for potential exposures to per- and polyfluoroalkyl substances (PFAS) at VNTR SWMU 20. Although multiple PFAS were analyzed in soil and groundwater, for screening purposes, only PFAS with available November 2022 USEPA Regional Screening Levels (RSLs) were retained for the screening. The soil and groundwater samples used in the risk screening are presented in **Table 1**.

Maximum detected concentrations of chemicals were initially compared against November 2022 USEPA RSLs based upon an excess lifetime cancer risk (ELCR) of $1x10^{-6}$ and a hazard quotient (HQ) of 0.1. Residential scenario soil concentrations were compared to residential RSLs; industrial scenario soil concentrations were compared to industrial RSLs; groundwater concentrations were compared to tapwater RSLs.

For assessment of soil, an iterative approach was used where if use of the maximum detected concentration in soil exceeded the RSL and caused a cumulative exceedance of USEPA's target risk range ($10^{-6}$ to $10^{-4}$) and/or target hazard index (HI) of 1, USEPA's ProUCL software would be used to calculate the 95 percent upper confidence limit (95% UCL) on the mean concentration if 8 or more analytical results were available for the chemical in an environmental medium and if the chemical was detected more than four times. The lesser value of the 95% UCL on the mean or maximum detected concentration would then be used as the exposure point concentration (EPC) for quantitative risk estimates.

For groundwater, maximum detected concentrations were used as the EPCs.

If the cumulative ELCR exceeded $1x10^{-4}$ or a target organ-specific HI exceeded 1 for an environmental medium, chemicals of potential concern (COPCs) were identified. A chemical was identified as a COPC if it contributed an ELCR above $1x10^{-6}$ to a medium with a cumulative ELCR above $1x10^{-4}$, or if it contributed an HQ above 0.1 to a medium with a target organ-specific HI above 1.

## Soil - Residential Scenario (Table 2)[1]

Two soil zones were evaluated separately: surface soil (0-1 foot below ground surface [ft-bgs]) and total soil (0-6 ft-bgs).

***Surface Soil - Residential***

- *Chemicals Detected Above RSLs* – No PFAS were detected in surface soil above the residential soil RSLs.
- *HHRS Findings for Surface Soil, Residential Scenario* – No potential unacceptable risks were identified for surface soil.

***Total Soil - Residential***

- *Chemicals Detected Above RSLs* – No PFAS were detected in total soil above the residential soil RSLs.
- *HHRS Findings for Total Soil, Residential Scenario* – No potential unacceptable risks were identified for total soil.

[1] No soil data are presented on Table 1 since no maximum detected concentrations exceed residential soil RSLs.

## Soil - Industrial Scenario (Table 3)[2]

Two soil zones were evaluated separately: surface soil (0-1 ft-bgs) and total soil (0-6 ft-bgs).

***Surface Soil - Industrial***

- *Chemicals Detected Above RSLs* – No PFAS were detected in surface soil above the industrial RSLs.
- *HHRS Findings for Surface Soil, Industrial Scenario* – No potential unacceptable risks were identified for surface soil.

***Total Soil – Industrial***

- *Chemicals Detected Above RSLs* – No PFAS were detected in total soil above the industrial RSLs.
- *HHRS Findings for Total Soil, Industrial Scenario* – No potential unacceptable risks were identified for total soil.

## Groundwater – Residential and Industrial Scenarios

- *Chemicals Detected Above RSLs* – The same RSLs (tapwater) were used in the residential and industrial scenario risk screenings. Three PFAS (perfluorohexanesulfonic acid [PFHxS], perfluorooctane sulfonic acid [PFOS], and perfluorooctanoic acid [PFOA]) were detected in groundwater above tapwater RSLs. Risk screening estimates for the three PFAS detected above RSLs are presented in **Tables 2 and 3**, and summarized below.

  Groundwater Risk Estimates for Chemicals > Tapwater RSLs

| Chemical | EPC Type | ELCR | HQ | COPC? |
|---|---|---|---|---|
| PFHxS | maximum | n/a | 2 | Yes (HI > 1) |
| PFOS | maximum | n/a | 3 | Yes (HI > 1) |
| PFOA | maximum | $4x10^{-8}$ | 0.8 | Yes (HQ contributes to HI > 1) |

  Notes:
  n/a – toxicity value not available to calculate an ELCR estimate

- *Cumulative ELCR and HI* – Although the cumulative ELCR is less than the EPA acceptable risk range, the maximum target organ HI is greater than 1.
- *HHRS Findings for Groundwater* – Potential unacceptable risks were identified due to PFHxS, PFOS, and PFOA in groundwater for the residential and industrial scenarios.

[2] No soil data are presented on Table 2 since no maximum detected concentrations exceed industrial soil RSLs.

**Table 1**
**Samples Used in the Risk Screening**
SWMU 20
Former VNTR
Vieques, Puerto Rico

| Location ID | Sample ID | Sample Date | Sample Medium | Upper Depth (feet) | Lower Depth (feet) | Sample Type |
|---|---|---|---|---|---|---|
| EPI04-MW01 | VEP4-GW01-0722 | 7/4/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW03 | VEP4-GW03-0722 | 7/13/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW04 | VEP4-GW04-0722 | 7/13/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW05 | VEP4-GW05-0722 | 7/12/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW06 | VEP4-GW06-0722 | 7/12/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW07 | VEP4-GW07-0722 | 7/4/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW08 | VEP4-GW08-0722 | 7/11/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW09 | VEP4-GW09-0722 | 7/5/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW10 | VEP4-GW10-0722 | 7/5/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW11 | VEP4-GW11-0722 | 7/12/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW12 | VEP4-GW12-0722 | 7/12/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW13 | VEP4-GW13-0722 | 7/5/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW13D | VEP4-GW13D-0722 | 7/5/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW14 | VEP4-GW14-0722 | 7/5/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW14 | VEP4-GW14P-0722 | 7/5/2022 | GROUNDWATER | -- | -- | FD |
| EPI04-MW15 | VEP4-GW15-0622 | 6/30/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW16 | VEP4-GW16-0622 | 6/30/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW17 | VEP4-GW17-0622 | 6/30/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW17D | VEP4-GW17D-0622 | 6/30/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW18 | VEP4-GW18-0622 | 6/30/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW19 | VEP4-GW19-0722 | 7/4/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW20 | VEP4-GW20-0722 | 7/4/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW21 | VEP4-GW21-0722 | 7/4/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW22 | VEP4-GW22-0722 | 7/4/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW23 | VEP4-GW23-0722 | 7/1/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW24 | VEP4-GW24-0622 | 6/29/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW24D | VEP4-GW24D-0622 | 6/29/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW25 | VEP4-GW25-0622 | 6/27/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW25D | VEP4-GW25D-0622 | 6/27/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW25 | VEP4-GW25P-0622 | 6/27/2022 | GROUNDWATER | -- | -- | FD |
| EPI04-MW26 | VEP4-GW26-0722 | 7/1/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW27 | VEP4-GW27-0722 | 7/1/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW28 | VEP4-GW28-0622 | 6/29/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW28D | VEP4-GW28D-0622 | 6/29/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW29 | VEP4-GW29-0622 | 6/27/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW30 | VEP4-GW30-0722 | 7/1/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW30 | VEP4-GW30P-0722 | 7/1/2022 | GROUNDWATER | -- | -- | FD |
| EPI04-MW31 | VEP4-GW31-0622 | 6/28/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW32 | VEP4-GW32-0722 | 7/7/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW33 | VEP4-GW33-0722 | 7/7/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW01 | VEP4-PFAS-GW01-0222 | 2/8/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW06 | VEP4-PFAS-GW06-0222 | 2/1/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW15 | VEP4-PFAS-GW15-0222 | 2/8/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-MW24 | VEP4-PFAS-GW24-0222 | 2/1/2022 | GROUNDWATER | -- | -- | REG |
| EPI04-SO01 | VEP4-PFAS-SS01-0001 | 3/3/2022 | SOIL | 0 | 1 | REG |
| EPI04-SO01 | VEP4-PFAS-SB01-0406 | 3/3/2022 | SOIL | 4 | 6 | REG |

Notes:

Per Vieques HHRA Protocol, if a sample has a field duplicate (FD) and both the FD and regular sample (REG) are detected, the higher value is used as the sample concentration. If an FD and REG sample are both non-detected, the lower non-detected concentration is used as the detection limit concentration. If a sample has an FD or REG that is not detected, but the corresponding sample has a detected concentration, the detected concentration is used as the sample concentration.

**Table 2**
**HHRA COPC Summary Table - Residential**
SWMU 20
Former VNTR
Vieques, Puerto Rico

| | | | | | | | Screening Level (1) | | RBC (2) | | EPC (3) | Estimated Risk (3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | CAS Number | Analyte Name (1) | Result Unit | MinDet | MaxDet | FOD | RSL (TR=$10^{-6}$ or HQ=0.1) | basis | Carc. (TR=$10^{-6}$) | Non Carc. (THQ=1) | EPC | EPC Basis | ELCR | HQ | Target Organ |
| Groundwater | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | µg/L | 0.00139 | 0.661 | 35/41 | 0.0394 | nc | - | 0.394 | 0.661 | Max | -- | 2 | Endocrine |
| Groundwater | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | µg/L | 0.00183 | 0.107 | 29/41 | 0.00401 | nc | - | 0.0401 | 0.107 | Max | -- | 3 | Developmental |
| Groundwater | 335-67-1 | Perfluorooctanoic acid (PFOA) | µg/L | 0.00089 | 0.0464 | 28/41 | 0.00602 | nc | 1.11 | 0.0602 | 0.0464 | Max | 4.E-08 | 0.8 | Developmental |

ELCR - excess lifetime cancer risk
EPC - exposure point concentration
FOD - frequency of detection
HI - hazard index
HQ - hazard quotient
Max - maximum detected concentration
RBC - risk-based concentration
RSL - Regional Screening Level
TR - target risk
UCL - upper confidence limit

**Cumulative ELCR**

| Groundwater |
|---|
| 4.E-08 |

**Hazard Index**

| | Groundwater |
|---|---|
| Total Developmental HI Across Media = | **3** |
| Total Endocrine HI Across Media = | **2** |

Notes:
(1) Chemicals whose maximum detected concentration (MaxDet) exceeds RSL in the exposure medium are presented on the table.
- RSLs for groundwater are based on an Excess Lifetime Cancer Risk (ELCR) of $10^{-6}$ and a Hazard Quotient (HQ)=0.1 (USEPA, November 2022).
- RSLs for tapwater are used for groundwater

(2) Risk-based Concentrations (RBCs) are RSLs (November 2022) based on an ELCR of $10^{-6}$ and an HQ=1.
- RSLs for tapwater are used for groundwater

(3) The maximum detected concentration was used as the exposure point concentration (EPC).
- Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RBC and EPC.
  - HQ = EPC / Noncarcinogenic RBC (based on HQ=1)
  - ELCR = EPC x $1x10^{-6}$ / Carcinogenic RBC (based on ELCR=$1x10^{-6}$)

RSL Basis: ca - carcinogenic, nc - non-carcinogenic

**Table 3**
**HHRA COPC Summary Table - Industrial**
SWMU 20
Former VNTR
Vieques, Puerto Rico

| | | | | | | | Screening Level (1) | | RBC (2) | | EPC (3) | Estimated Risk (3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | CAS Number | Analyte Name (1) | Result Unit | MinDet | MaxDet | FOD | RSL (TR=$10^{-6}$ or HQ=0.1) | basis | Carc. (TR=$10^{-6}$) | Non Carc. (THQ=1) | EPC | EPC Basis | ELCR | HQ | Target Organ |
| Groundwater | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | µg/L | 0.00139 | 0.661 | 35/41 | 0.0394 | nc | - | 0.394 | 0.661 | Max | -- | 2 | Endocrine |
| Groundwater | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | µg/L | 0.00183 | 0.107 | 29/41 | 0.00401 | nc | - | 0.0401 | 0.107 | Max | -- | 3 | Developmental |
| Groundwater | 335-67-1 | Perfluorooctanoic acid (PFOA) | µg/L | 0.00089 | 0.0464 | 28/41 | 0.00602 | nc | 1.11 | 0.0602 | 0.0464 | Max | 4.E-08 | 0.8 | Developmental |

ELCR - excess lifetime cancer risk
EPC - exposure point concentration
FOD - frequency of detection
HI - hazard index
HQ - hazard quotient
Max - maximum detected concentration
RBC - risk-based concentration
RSL - Regional Screening Level
TR - target risk
UCL - upper confidence limit

**Cumulative ELCR**

| Groundwater |
|---|
| 4.E-08 |

**Hazard Index**

| | Groundwater |
|---|---|
| Total Developmental HI Across Media = | **3** |
| Total Endocrine HI Across Media = | **2** |

Notes:
(1) Chemicals whose maximum detected concentration (MaxDet) exceeds RSL in the exposure medium are presented on the table.
- RSLs for groundwater are based on an Excess Lifetime Cancer Risk (ELCR) of $10^{-6}$ and a Hazard Quotient (HQ)=0.1 (USEPA, November 2022).
- RSLs for tapwater are used for groundwater

(2) Risk-based Concentrations (RBCs) are RSLs (November 2022) based on an ELCR of $10^{-6}$ and an HQ=1.
- RSLs for tapwater are used for groundwater

(3) The maximum detected concentration was used as the exposure point concentration (EPC).
- Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RBC and EPC.
  - HQ = EPC / Noncarcinogenic RBC (based on HQ=1)
  - ELCR = EPC x $1x10^{-6}$ / Carcinogenic RBC (based on ELCR=$1x10^{-6}$)

RSL Basis: ca - carcinogenic, nc - non-carcinogenic

# Attachment F
# Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330

# Potential Former VNTR Motor Pool Area (Including Building 340) and the Former Fire Department Building 330 Human Health Risk Screening

Risk estimates were prepared for future residential and industrial scenarios for potential exposures to per- and polyfluoroalkyl substances (PFAS) at the Potential Former Motor Pool (Including Building 340) and the Former Fire Department Building 330. Although multiple PFAS were analyzed in soil and groundwater, for screening purposes, only PFAS with available November 2022 USEPA Regional Screening Levels (RSLs) were retained for the screening. The soil and groundwater samples used in the risk screening are presented in **Table 1**.

Maximum detected concentrations of chemicals were initially compared against November 2022 USEPA RSLs based upon an excess lifetime cancer risk (ELCR) of $1x10^{-6}$ and a hazard quotient (HQ) of 0.1. Residential scenario soil concentrations were compared to residential RSLs; industrial scenario soil concentrations were compared to industrial RSLs; groundwater concentrations were compared to tapwater RSLs.

For assessment of soil, an iterative approach was used where if use of the maximum detected concentration in soil exceeded the RSL and caused a cumulative exceedance of USEPA's target risk range ($10^{-6}$ to $10^{-4}$) and/or target hazard index (HI) of 1, USEPA's ProUCL software would be used to calculate the 95 percent upper confidence limit (95% UCL) on the mean concentration if 8 or more analytical results were available for the chemical in soil and if the chemical was detected at least four times. The lesser value of the 95% UCL on the mean or maximum detected concentration would then be used as the exposure point concentration (EPC) for quantitative risk estimates.

For groundwater, maximum detected concentrations were used as the EPCs.

If the cumulative ELCR exceeded $1x10^{-4}$ or a target organ-specific HI exceeded 1 for an environmental medium, chemicals of potential concern (COPCs) were identified. A chemical was identified as a COPC if it contributed an ELCR above $1x10^{-6}$ to a medium with a cumulative ELCR above $1x10^{-4}$, or if it contributed an HQ above 0.1 to a medium with a target organ-specific HI above 1.

## Soil - Residential Scenario (Table 2)

Two soil samples, both collected at 4 to 6 feet below ground surface (ft bgs) were available for the human health risk screen (HHRS). As a result, only the total soil zone (soil from 0 to 6 ft bgs) was evaluated.

***Total Soil - Residential***

- *Chemicals Detected Above RSLs* – One PFAS (perfluorooctane sulfonic acid [PFOS]) was detected in total soil above the residential RSL. Since less than 8 samples were available for PFOS in total soil, the maximum detected concentration was used as the EPC. Risk screening estimates for PFOS in surface soil are presented in **Table 2** and summarized below.

  Total Soil Risk Estimates for Chemicals > Residential RSLs

| Chemical | EPC Type | ELCR | HQ | COPC? |
|---|---|---|---|---|
| PFOS | maximum | n/a | 0.2 | No |

  Notes:
  n/a – toxicity value not available to calculate an ELCR estimate

- *HHRS Findings for Total Soil, Residential Scenario* – No potential unacceptable risks were identified for total soil.

## Soil - Industrial Scenario (Table 3) [1]

Two soil samples, both collected at 4 to 6 feet below ground surface (ft bgs) were available for the HHRS. As a result, only the total soil zone (soil from 0 to 6 ft bgs) was evaluated.

***Total Soil - Industrial***

- *Chemicals Detected Above RSLs* – No PFAS were detected in total soil above industrial RSLs.
- *HHRS Findings for Total Soil, Industrial Scenario* – No potential unacceptable risks were identified for total soil.

## Groundwater – Residential and Industrial

- *Chemicals Detected Above RSLs* – The same RSLs (tapwater) were used in the residential and industrial scenario risk screenings. Four PFAS (perfluorobutanesulfonic acid [PFBS] perfluorohexanesulfonic acid [PFHxS], PFOS, and perfluorooctanoic acid [PFOA]) were detected in groundwater above tapwater RSLs. Risk screening estimates for the four PFAS detected above RSLs are presented in **Tables 2 and 3**, and summarized below.

  Groundwater Risk Estimates for Chemicals > Tapwater RSLs

| Chemical | EPC Type | ELCR | HQ | COPC? |
|---|---|---|---|---|
| PFBS | maximum | n/a | 3 | Yes (HI > 1) |
| PFHxS | maximum | n/a | 279 | Yes (HI > 1) |
| PFOS | maximum | n/a | 1 | Yes (HQ contributes to HI > 1) |
| PFOA | maximum | $3x10^{-6}$ | 51 | Yes (HI > 1) |

  Notes:

  n/a – toxicity value not available to calculate an ELCR estimate

- *Cumulative ELCR and HI* – Although the cumulative ELCR is less than the EPA acceptable risk range, the maximum target organ HI is greater than 1.
- *HHRS for Groundwater* – Potential unacceptable risks were identified due to PFBS, PFHxS, PFOS, and PFOA in groundwater for the residential and industrial scenarios.

[1] No soil data are presented on Table 2 since no maximum detected concentrations exceed industrial soil RSLs.

**Table 1**
**Samples Used in the Risk Screening**
Potential Former Motor Pool (Including Building 340), Former Fire Dept. Bldg 330
Former VNTR
Vieques, Puerto Rico

| Location ID | Sample ID | Sample Date | Sample Medium | Upper Depth (ft) | Lower Depth (ft) | Sample Type |
|---|---|---|---|---|---|---|
| VEFS-PFAS-MW01 | VEFS-PFAS-GW01-0722 | 7/11/2022 | GROUNDWATER | -- | -- | REG |
| VEFS-PFAS-MW01 | VEFS-PFAS-GW01P-0722 | 7/11/2022 | GROUNDWATER | -- | -- | FD |
| VEFS-PFAS-MW02 | VEFS-PFAS-GW02-0722 | 7/11/2022 | GROUNDWATER | -- | -- | REG |
| VEFS-PFAS-SO01 | VEFS-PFAS-SB01-0406 | 3/15/2022 | SOIL | 4 | 6 | REG |
| VEFS-PFAS-SO02 | VEFS-PFAS-SB02-0406 | 3/14/2022 | SOIL | 4 | 6 | REG |

Notes:

Per Vieques HHRA Protocol, if a sample has a field duplicate (FD) and both the FD and regular sample (REG) are detected, the higher value is used as the sample concentration. If an FD and REG sample are both non-detected, the lower non-detected concentration is used as the detection limit concentration. If a sample has an FD or REG that is not detected, but the corresponding sample has a detected concentration, the detected concentration is used as the sample concentration.

**Table 2**

**HHRA COPC Summary Table - Residential**

Potential Former Motor Pool (Including Building 340), Former Fire Dept. Bldg 330

Former VNTR

Vieques, Puerto Rico

| | | | | | | | Screening Level (1) | | RBC (2) | | EPC (3) | Estimated Risk (3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | CAS Number | Analyte Name (1) | Result Unit | MinDet | MaxDet | FOD | RSL (TR=$10^{-6}$ or HQ=0.1) | basis | Carc. (TR=$10^{-6}$) | Non Carc. (THQ=1) | EPC | EPC Basis | ELCR | HQ | Target Organ |
| Total Soil | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | mg/kg | 0.000324 | 0.0267 | 2/2 | 0.0126 | nc | - | 0.126 | 0.0267 | Max | -- | 0.2 | Developmental |
| Groundwater | 375-73-5 | Perfluorobutanesulfonic acid (PFBS) | µg/L | 0.022 | 15.4 | 2/2 | 0.601 | nc | - | 6.01 | 15.4 | Max | -- | 3 | Endocrine |
| | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | µg/L | 0.0741 | 110 | 2/2 | 0.0394 | nc | - | 0.394 | 110 | Max | -- | 279 | Endocrine |
| | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | µg/L | 0.0171 | 0.0433 | 2/2 | 0.00401 | nc | - | 0.0401 | 0.0433 | Max | -- | 1 | Developmental |
| | 335-67-1 | Perfluorooctanoic acid (PFOA) | µg/L | 0.00989 | 3.1 | 2/2 | 0.00602 | nc | 1.11 | 0.0602 | 3.1 | Max | 3.E-06 | 51 | Developmental |

ELCR - excess lifetime cancer risk
EPC - exposure point concentration
FOD - frequency of detection
HI - hazard index
HQ - hazard quotient
Max - maximum detected concentration
RBC - risk-based concentration
RSL - Regional Screening Level
TR - target risk

**Cumulative ELCR**

| Total Soil | Groundwater |
|---|---|
| NA | 3.E-06 |

**Hazard Index**

| | Total Soil | Groundwater |
|---|---|---|
| Total Developmental HI Across Media = | 0.2 | **53** |
| Total Endocrine HI Across Media = | NA | **282** |

Notes:

(1) Chemicals whose maximum detected concentration (MaxDet) exceeds RSL in the exposure medium are presented on the table.
- RSLs for soil and groundwater are based on an Excess Lifetime Cancer Risk (ELCR) of $10^{-6}$ and a Hazard Quotient (HQ)=0.1 (USEPA, November 2022).
- RSLs for residential soil are used for total soil.
- RSLs for tapwater are used for groundwater

(2) Risk-based Concentrations (RBCs) are RSLs (November 2022) based on an ELCR of $10^{-6}$ and an HQ=1.
- RSLs for residential soil are used for total soil.
- RSLs for tapwater are used for groundwater

(3) The Maximum detected concentration was used as the exposure point concentration (EPC).
- Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RBC and EPC.
  - HQ = EPC / Noncarcinogenic RBC (based on HQ=1)
  - ELCR = EPC x $1x10^{-6}$ / Carcinogenic RBC (based on ELCR=$1x10^{-6}$)

RSL Basis: ca - carcinogenic, nc - non-carcinogenic

**Table 3**

**HHRA COPC Summary Table - Industrial**

Potential Former Motor Pool (Including Building 340), Former Fire Dept. Bldg 330

Former VNTR

Vieques, Puerto Rico

| | | | | | | | Screening Level (1) | | RBC (2) | | EPC (3) | Estimated Risk (3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | CAS Number | Analyte Name (1) | Result Unit | MinDet | MaxDet | FOD | RSL ($TR=10^{-6}$ or HQ=0.1) | basis | Carc. ($TR=10^{-6}$) | Non Carc. (THQ=1) | EPC | EPC Basis | ELCR | HQ | Target Organ |
| Groundwater | 375-73-5 | Perfluorobutanesulfonic acid (PFBS) | µg/L | 0.022 | 15.4 | 2/2 | 0.601 | nc | - | 6.01 | 15.4 | Max | -- | 3 | Endocrine |
| | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | µg/L | 0.0741 | 110 | 2/2 | 0.0394 | nc | - | 0.394 | 110 | Max | -- | 279 | Endocrine |
| | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | µg/L | 0.0171 | 0.0433 | 2/2 | 0.00401 | nc | - | 0.0401 | 0.0433 | Max | -- | 1 | Developmental |
| | 335-67-1 | Perfluorooctanoic acid (PFOA) | µg/L | 0.00989 | 3.1 | 2/2 | 0.00602 | nc | 1.11 | 0.0602 | 3.1 | Max | 3.E-06 | 51 | Developmental |

ELCR - excess lifetime cancer risk
EPC - exposure point concentration
FOD - frequency of detection
HI - hazard index
HQ - hazard quotient
Max - maximum detected concentration
RBC - risk-based concentration
RSL - Regional Screening Level
TR - target risk

| **Cumulative ELCR** |
|---|
| **Groundwater** |
| 3.E-06 |

| | **Hazard Index** |
|---|---|
| | **Groundwater** |
| Total Developmental HI Across Media = | **53** |
| Total Endocrine HI Across Media = | **282** |

Notes:

(1) Chemicals whose maximum detected concentration (MaxDet) exceeds RSL in the exposure medium are presented on the table.
- RSLs for tapwater are used for groundwater

(2) Risk-based Concentrations (RBCs) are RSLs (November 2022) based on an ELCR of $10^{-6}$ and an HQ=1.
- RSLs for tapwater are used for groundwater

(3) The Maximum detected concentration was used as the exposure point concentration (EPC).
- Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RBC and EPC.
  - HQ = EPC / Noncarcinogenic RBC (based on HQ=1)
  - ELCR = EPC x $1x10^{-6}$ / Carcinogenic RBC (based on ELCR=$1x10^{-6}$)

RSL Basis: ca - carcinogenic, nc - non-carcinogenic

# Attachment G
# VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building

# VNTR SWMU 10 and VNTR AOC G: Former Sewage Treatment Lagoons and Chlorination Building Human Health Risk Screening

Risk estimates were prepared for future residential and industrial scenarios for potential exposures to per- and polyfluoroalkyl substances (PFAS) at VNTR SWMU 10 and AOC G. Although multiple PFAS were analyzed in soil and groundwater, for screening purposes, only PFAS with available November 2022 USEPA Regional Screening Levels (RSLs) were retained for the screening. The soil and groundwater samples used in the risk screening are presented in **Table 1**.

Maximum detected concentrations of chemicals were initially compared against November 2022 USEPA RSLs based upon an excess lifetime cancer risk (ELCR) of $1x10^{-6}$ and a hazard quotient (HQ) of 0.1. Residential scenario soil concentrations were compared to residential RSLs; industrial scenario soil concentrations were compared to industrial RSLs; groundwater concentrations were compared to tapwater RSLs.

For assessment of soil, an iterative approach was used where if use of the maximum detected concentration in soil exceeded the RSL and caused a cumulative exceedance of USEPA's target risk range ($10^{-6}$ to $10^{-4}$) and/or target hazard index (HI) of 1, USEPA's ProUCL software would be used to calculate the 95 percent upper confidence limit (95% UCL) on the mean concentration if 8 or more analytical results were available for the chemical in soil and if the chemical was detected at least four times. The lesser value of the 95% UCL on the mean or maximum detected concentration would then be used as the exposure point concentration (EPC) for quantitative risk estimates.

For groundwater, maximum detected concentrations were used as the EPCs.

If the cumulative ELCR exceeded $1x10^{-4}$ or a target organ-specific HI exceeded 1 for an environmental medium, chemicals of potential concern (COPCs) were identified. A chemical was identified as a COPC if it contributed an ELCR above $1x10^{-6}$ to a medium with a cumulative ELCR above $1x10^{-4}$, or if it contributed an HQ above 0.1 to a medium with a target organ-specific HI above 1.

## Soil - Residential Scenario (Table 2)

Two soil zones were evaluated separately: 6 surface soil samples (0-1 foot below ground surface [ft-bgs]) and 12 total soil samples (0-6 ft-bgs).

***Surface Soil - Residential***

- *Chemicals Detected Above RSLs* – One PFAS (perfluorooctane sulfonic acid [PFOS]) was detected in surface soil above the residential RSL. Since less than 8 samples were available for PFOS in surface soil, the maximum detected concentration was used as the EPC. Risk screening estimates for PFOS in surface soil are presented in **Table 2** and summarized below.

  Surface Soil Risk Estimates for Chemicals > Residential RSLs

| Chemical | EPC Type | ELCR | HQ | COPC? |
|---|---|---|---|---|
| PFOS | maximum | n/a | 0.2 | No |

  Notes:
  n/a – toxicity value not available to calculate an ELCR estimate

- *HHRS Findings for Surface Soil, Residential Scenario* – No potential unacceptable risks were identified for surface soil.

***Total Soil - Residential***

- *Chemicals Detected Above RSLs* – One PFAS (PFOS) was detected in total soil above the residential RSL. Since sufficient samples (twelve samples) and a sufficient quantity of detected results were available for PFOS, a 95% UCL on the mean concentration was calculated to determine an EPC (**Table 4**). Risk screening estimates for PFOS in total soil are presented in **Table 2** and summarized below.

  Total Soil Risk Estimates for Chemicals > Residential RSLs

| Chemical | EPC Type | ELCR | HQ | COPC? |
|---|---|---|---|---|
| PFOS | 95% UCL | n/a | 0.06 | No |

  Notes:
  95% UCL = 95% UCL on the mean
  n/a – toxicity value not available to calculate an ELCR estimate

- *HHRS Findings for Total Soil, Residential Scenario* – No potential unacceptable risks were identified for total soil.

## Soil - Industrial Scenario (Table 3)[1]

Two soil zones were evaluated separately: six surface soil samples (0-1 ft-bgs) and 12 total soil samples (0-6 ft-bgs).

***Surface Soil - Industrial***

- *Chemicals Detected Above RSLs* – No PFAS were detected in surface soil above industrial RSLs.
- *HHRS Findings for Surface Soil, Industrial Scenario* – No potential unacceptable risks were identified for surface soil.

***Total Soil – Industrial***

- *Chemicals Detected Above RSLs* – No PFAS were detected in total soil above industrial RSLs.
- *HHRS Findings for Total Soil, Industrial Scenario* – No potential unacceptable risks were identified for total soil.

## Groundwater – Residential and Industrial

- *Chemicals Detected Above RSLs* – The same RSLs (tapwater) were used in the residential and industrial scenario risk screenings. Two PFAS (perfluorohexanesulfonic acid [PFHxS], and PFOS) were detected in groundwater above tapwater RSLs. Risk screening estimates for the two PFAS detected above RSLs are presented in **Tables 2 and 3**, and summarized below.

  Groundwater Risk Estimates for Chemicals > Tapwater RSLs

| Chemical | EPC Type | ELCR | HQ | COPC? |
|---|---|---|---|---|
| PFHxS | maximum | n/a | 0.1 | No |
| PFOS | maximum | n/a | 0.2 | No |

  Notes:
  n/a – toxicity value not available to calculate an ELCR estimate

[1] No soil data are presented on Table 2 since no maximum detected concentrations exceed industrial soil RSLs.

- *Cumulative ELCR and HI* – A cumulative ELCR is not applicable, and the maximum target organ HI is less than 1.
- *HHRS Findings for Groundwater* – No potential unacceptable risks were identified for groundwater.

**Table 1**
**Samples Used in the Risk Screening**
SWMU 10 and AOC G
Former VNTR
Vieques, Puerto Rico

| Location ID | Sample ID | Sample Date | Sample Medium | Upper Depth (feet) | Lower Depth (feet) | Sample Type |
|---|---|---|---|---|---|---|
| VEW10-PFAS-MW01 | VEW10-PFAS-GW01-0422 | 4/6/2022 | GROUNDWATER | -- | -- | REG |
| VEW10-PFAS-MW01 | VEW10-PFAS-GW01P-0422 | 4/6/2022 | GROUNDWATER | -- | -- | FD |
| VEW10-PFAS-MW02 | VEW10-PFAS-GW02-0422 | 4/5/2022 | GROUNDWATER | -- | -- | REG |
| VEW10-PFAS-MW03 | VEW10-PFAS-GW03-0422 | 4/5/2022 | GROUNDWATER | -- | -- | REG |
| VEW10-PFAS-MW04 | VEW10-PFAS-GW04-0422 | 4/5/2022 | GROUNDWATER | -- | -- | REG |
| VEW10-PFAS-SO01 | VEW10-PFAS-SS01-0001 | 3/9/2022 | SOIL | 0 | 1 | REG |
| VEW10-PFAS-SO02 | VEW10-PFAS-SS02-0001 | 3/9/2022 | SOIL | 0 | 1 | REG |
| VEW10-PFAS-SO03 | VEW10-PFAS-SS03-0001 | 3/9/2022 | SOIL | 0 | 1 | REG |
| VEW10-PFAS-SO04 | VEW10-PFAS-SS04-0001 | 3/9/2022 | SOIL | 0 | 1 | REG |
| VEW10-PFAS-SO05 | VEW10-PFAS-SS05-0001 | 3/2/2022 | SOIL | 0 | 1 | REG |
| VEW10-PFAS-SO06 | VEW10-PFAS-SS06-0001 | 3/1/2022 | SOIL | 0 | 1 | REG |
| VEW10-PFAS-SO01 | VEW10-PFAS-SB01-0406 | 3/9/2022 | SOIL | 4 | 6 | REG |
| VEW10-PFAS-SO02 | VEW10-PFAS-SB02-0406 | 3/9/2022 | SOIL | 4 | 6 | REG |
| VEW10-PFAS-SO03 | VEW10-PFAS-SB03-0406 | 3/9/2022 | SOIL | 4 | 6 | REG |
| VEW10-PFAS-SO04 | VEW10-PFAS-SB04-0406 | 3/9/2022 | SOIL | 4 | 6 | REG |
| VEW10-PFAS-SO05 | VEW10-PFAS-SB05-0406 | 3/2/2022 | SOIL | 4 | 6 | REG |
| VEW10-PFAS-SO06 | VEW10-PFAS-SB06-0406 | 3/1/2022 | SOIL | 4 | 6 | REG |

Notes:

Per Vieques HHRA Protocol, if a sample has a field duplicate (FD) and both the FD and regular sample (REG) are detected, the higher value is used as the sample concentration. If an FD and REG sample are both non-detected, the lower non-detected concentration is used as the detection limit concentration. If a sample has an FD or REG that is not detected, but the corresponding sample has a detected concentration, the detected concentration is used as the sample concentration.

**Table 2**
**HHRA COPC Summary Table - Residential**
SWMU 10 and AOC G
Former VNTR
Vieques, Puerto Rico

| | | | | | | | Screening Level (1) | | RBC (2) | | EPC (3) | Estimated Risk (3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | CAS Number | Analyte Name (1) | Result Unit | MinDet | MaxDet | FOD | RSL (TR=$10^{-6}$ or HQ=0.1) | basis | Carc. (TR=$10^{-6}$) | Non Carc. (THQ=1) | EPC | EPC Basis | ELCR | HQ | Target Organ |
| Surface Soil | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | mg/kg | 0.00044 | 0.0244 | 5/6 | 0.0126 | nc | - | 0.126 | 0.0244 | Max | -- | 0.2 | Developmental |
| Total Soil | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | mg/kg | 0.000335 | 0.0244 | 7/12 | 0.0126 | nc | - | 0.126 | 0.00785 | UCL | -- | 0.06 | Developmental |
| Groundwater | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | µg/L | 0.00502 | 0.0422 | 3/4 | 0.0394 | nc | - | 0.394 | 0.0422 | Max | -- | 0.1 | Endocrine |
| Groundwater | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | µg/L | 0.00224 | 0.00781 | 2/4 | 0.00401 | nc | - | 0.0401 | 0.00781 | Max | -- | 0.2 | Developmental |

ELCR - excess lifetime cancer risk
EPC - exposure point concentration
FOD - frequency of detection
HI - hazard index
HQ - hazard quotient
Max - maximum detected concentration
RBC - risk-based concentration
RSL - Regional Screening Level
TR - target risk
UCL - upper confidence limit

**Cumulative ELCR**

| Surface Soil | Total Soil | Groundwater |
|---|---|---|
| NA | NA | NA |

**Hazard Index**

| | Surface Soil | Total Soil | Groundwater |
|---|---|---|---|
| Total Developmental HI Across Media = | 0.2 | 0.06 | 0.2 |
| Total Endocrine HI Across Media = | NA | NA | 0.1 |

Notes:
(1) Chemicals whose maximum detected concentration (MaxDet) exceeds RSL in the exposure medium are presented on the table.
- RSLs for soil and groundwater are based on an Excess Lifetime Cancer Risk (ELCR) of $10^{-6}$ and a Hazard Quotient (HQ)=0.1 (USEPA, November 2022).
- RSLs for residential soil are used for surface soil and total soil.
- RSLs for tapwater are used for groundwater

(2) Risk-based Concentrations (RBCs) are RSLs (November 2022) based on an ELCR of $10^{-6}$ and an HQ=1.
- RSLs for residential soil are used for surface soil and total soil.
- RSLs for tapwater are used for groundwater

(3) The Maximum detected concentration was initially used as exposure point concentration (EPC).
- When the cumulative risk estimate based on MaxDet exceeds ELCR of $1x10^{-4}$ and/or target organ-specific Hazard Index (HI) of 1 for an exposure medium, upper confidence limit (UCL) on mean is used as EPC if there are enough samples (8 or more) and enough detections (4 or more).
- Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RBC and EPC.
- HQ = EPC / Noncarcinogenic RBC (based on HQ=1)
- ELCR = EPC x $1x10^{-6}$ / Carcinogenic RBC (based on ELCR=$1x10^{-6}$)

RSL Basis: ca - carcinogenic, nc - non-carcinogenic

**Table 3**
**HHRA COPC Summary Table - Industrial**
SWMU 10 and AOC G
Former VNTR
Vieques, Puerto Rico

| | | | | | | | Screening Level (1) | | RBC (2) | | EPC (3) | Estimated Risk (3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium | CAS Number | Analyte Name (1) | Result Unit | MinDet | MaxDet | FOD | RSL (TR=$10^{-6}$ or HQ=0.1) | basis | Carc. (TR=$10^{-6}$) | Non Carc. (THQ=1) | EPC | EPC Basis | ELCR | HQ | Target Organ |
| Groundwater | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | µg/L | 0.00502 | 0.0422 | 3/4 | 0.0394 | nc | - | 0.394 | 0.0422 | Max | -- | 0.1 | Endocrine |
| Groundwater | 1763-23-1 | Perfluorooctane sulfonic acid (PFOS) | µg/L | 0.00224 | 0.00781 | 2/4 | 0.00401 | nc | - | 0.0401 | 0.00781 | Max | -- | 0.2 | Developmental |

ELCR - excess lifetime cancer risk
EPC - exposure point concentration
FOD - frequency of detection
HI - hazard index
HQ - hazard quotient
Max - maximum detected concentration
RBC - risk-based concentration
RSL - Regional Screening Level
TR - target risk

**Cumulative ELCR**

| Groundwater |
|---|
| NA |

**Hazard Index**

| | Groundwater |
|---|---|
| Total Developmental HI Across Media = | 0.2 |
| Total Endocrine HI Across Media = | 0.1 |

Notes:
(1) Chemicals whose maximum detected concentration (MaxDet) exceeds RSL in the exposure medium are presented on the table.
- RSLs for groundwater are based on an Excess Lifetime Cancer Risk (ELCR) of $10^{-6}$ and a Hazard Quotient (HQ)=0.1 (USEPA, November 2022).
- RSLs for tapwater are used for groundwater

(2) Risk-based Concentrations (RBCs) are RSLs (November 2022) based on an ELCR of $10^{-6}$ and an HQ=1.
- RSLs for tapwater are used for groundwater

(3) The Maximum detected concentration was used as the exposure point concentration (EPC).
- Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RBC and EPC.
  - HQ = EPC / Noncarcinogenic RBC (based on HQ=1)
  - ELCR = EPC x $1x10^{-6}$ / Carcinogenic RBC (based on ELCR=$1x10^{-6}$)

RSL Basis: ca - carcinogenic, nc - non-carcinogenic

**Table 4**
**Calculated Upper Confidence Limits**
SWMU 10 and AOC G
Former VNTR
Vieques, Puerto Rico

**UCL Statistics for Data Sets with Non-Detects**

| | |
|---|---|
| User Selected Options | |
| Date/Time of Computation | ProUCL 5.2 1/31/2023 1:38:47 PM |
| From File | WorkSheet.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

**PFOS Total Soil (mg/kg)**

**General Statistics**

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 12 |
| Number of Detects | 7 | Number of Non-Detects | 5 |
| Number of Distinct Detects | 7 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 3.3500E-4 | Minimum Non-Detect | 4.9200E-4 |
| Maximum Detect | 0.0244 | Maximum Non-Detect | 5.0200E-4 |
| Variance Detects | 9.1562E-5 | Percent Non-Detects | 41.67% |
| Mean Detects | 0.00613 | SD Detects | 0.00957 |
| Median Detects | 0.00113 | CV Detects | 1.561 |
| Skewness Detects | 1.578 | Kurtosis Detects | 1.323 |
| Mean of Logged Detects | -6.353 | SD of Logged Detects | 1.712 |

**Normal GOF Test on Detects Only**

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.686 | **Shapiro Wilk GOF Test** |
| 1% Shapiro Wilk Critical Value | 0.73 | Detected Data Not Normal at 1% Significance Level |
| Lilliefors Test Statistic | 0.402 | **Lilliefors GOF Test** |
| 1% Lilliefors Critical Value | 0.35 | Detected Data Not Normal at 1% Significance Level |

Detected Data Not Normal at 1% Significance Level

**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**

| | | | |
|---|---|---|---|
| KM Mean | 0.00374 | KM Standard Error of Mean | 0.00229 |
| 90KM SD | 0.00733 | 95% KM (BCA) UCL | 0.00803 |
| 95% KM (t) UCL | 0.00785 | 95% KM (Percentile Bootstrap) UCL | 0.00764 |
| 95% KM (z) UCL | 0.0075 | 95% KM Bootstrap t UCL | 0.069 |
| 90% KM Chebyshev UCL | 0.0106 | 95% KM Chebyshev UCL | 0.0137 |
| 97.5% KM Chebyshev UCL | 0.018 | 99% KM Chebyshev UCL | 0.0265 |

**Gamma GOF Tests on Detected Observations Only**

| | | |
|---|---|---|
| A-D Test Statistic | 0.781 | **Anderson-Darling GOF Test** |
| 5% A-D Critical Value | 0.751 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.343 | **Kolmogorov-Smirnov GOF** |
| 5% K-S Critical Value | 0.327 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

**Gamma Statistics on Detected Data Only**

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.504 | k star (bias corrected MLE) | 0.383 |
| Theta hat (MLE) | 0.0122 | Theta star (bias corrected MLE) | 0.016 |
| nu hat (MLE) | 7.056 | nu star (bias corrected) | 5.365 |
| Mean (detects) | 0.00613 | | |

**Gamma ROS Statistics using Imputed Non-Detects**

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 3.3500E-4 | Mean | 0.00774 |
| Maximum | 0.0244 | Median | 0.01 |
| SD | 0.00734 | CV | 0.948 |
| k hat (MLE) | 0.78 | k star (bias corrected MLE) | 0.64 |
| Theta hat (MLE) | 0.00993 | Theta star (bias corrected MLE) | 0.0121 |
| nu hat (MLE) | 18.71 | nu star (bias corrected) | 15.37 |
| Adjusted Level of Significance (β) | 0.029 | | |
| Approximate Chi Square Value (15.37, α) | 7.517 | Adjusted Chi Square Value (15.37, β) | 6.695 |
| 95% Gamma Approximate UCL | 0.0158 | 95% Gamma Adjusted UCL | 0.0178 |

**Table 4**
**Calculated Upper Confidence Limits**
SWMU 10 and AOC G
Former VNTR
Vieques, Puerto Rico

**Estimates of Gamma Parameters using KM Estimates**

| | | | |
|---|---|---|---|
| Mean (KM) | 0.00374 | SD (KM) | 0.00733 |
| Variance (KM) | 5.3801E-5 | SE of Mean (KM) | 0.00229 |
| k hat (KM) | 0.26 | k star (KM) | 0.25 |
| nu hat (KM) | 6.233 | nu star (KM) | 6.008 |
| theta hat (KM) | 0.0144 | theta star (KM) | 0.0149 |
| 80% gamma percentile (KM) | 0.00543 | 90% gamma percentile (KM) | 0.0112 |
| 95% gamma percentile (KM) | 0.0181 | 99% gamma percentile (KM) | 0.0364 |

**Gamma Kaplan-Meier (KM) Statistics**

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (6.01, α) | 1.644 | Adjusted Chi Square Value (6.01, β) | 1.322 |
| 95% KM Approximate Gamma UCL | 0.0137 | 95% KM Adjusted Gamma UCL | 0.017 |

**Lognormal GOF Test on Detected Observations Only**

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.85 | **Shapiro Wilk GOF Test** | |
| 10% Shapiro Wilk Critical Value | 0.838 | Detected Data appear Lognormal at 10% Significance Level | |
| Lilliefors Test Statistic | 0.257 | **Lilliefors GOF Test** | |
| 10% Lilliefors Critical Value | 0.28 | Detected Data appear Lognormal at 10% Significance Level | |

Detected Data appear Lognormal at 10% Significance Level
Note GOF tests may be unreliable for small sample sizes

**Lognormal ROS Statistics Using Imputed Non-Detects**

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.00369 | Mean in Log Scale | -7.131 |
| SD in Original Scale | 0.00768 | SD in Log Scale | 1.589 |
| 95% t UCL (assumes normality of ROS data) | 0.00767 | 95% Percentile Bootstrap UCL | 0.00768 |
| 95% BCA Bootstrap UCL | 0.00889 | 95% Bootstrap t UCL | 0.0664 |
| 95% H-UCL (Log ROS) | 0.0199 | | |

**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**

| | | | |
|---|---|---|---|
| KM Mean (logged) | -6.983 | KM Geo Mean | 9.2740E-4 |
| KM SD (logged) | 1.425 | 95% Critical H Value (KM-Log) | 3.739 |
| KM Standard Error of Mean (logged) | 0.447 | 95% H-UCL (KM -Log) | 0.0127 |
| KM SD (logged) | 1.425 | 95% Critical H Value (KM-Log) | 3.739 |
| KM Standard Error of Mean (logged) | 0.447 | | |

**DL/2 Statistics**

| **DL/2 Normal** | | **DL/2 Log-Transformed** | |
|---|---|---|---|
| Mean in Original Scale | 0.00368 | Mean in Log Scale | -7.164 |
| SD in Original Scale | 0.00769 | SD in Log Scale | 1.614 |
| 95% t UCL (Assumes normality) | 0.00767 | 95% H-Stat UCL | 0.0212 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

**Nonparametric Distribution Free UCL Statistics**
Detected Data appear Lognormal Distributed at 10% Significance Level

**Suggested UCL to Use**
KM (t) UCL 0.00785

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

# Appendix J
# Responses to Regulator Comments

APPENDIX J

# Responses to Regulator Comments

**Navy Responses to EPA Comments on Draft Site Inspection for Per- and Polyfluoroalkyl Substances**
**Atlantic Fleet Weapons Training Area – Vieques**
**Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range**
**Vieques, Puerto Rico, dated May 2023**

**GENERAL COMMENTS**

1. The SI Report states that the November 2022 EPA Regional Screening Levels (RSLs) for per- and polyfluoroalkyl substances (PFAS) were used for screening. However, it is recommended that current RSLs issued in May 2023, which include screening levels for eight PFAS (perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), perfluorobutanesulfonic acid (PFBS), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA), and hexafluoropropylene oxide dimer acid (HFPO-DA), perfluorobutanoic acid [PFBA], and PFHxS, perfluorohexanoic acid [PFHxA]), be used. The text should include a comparison of the November 2022 RSLs to the May 2023 RSLs and state what potential impacts on the site evaluation any updated screening levels might have.

   **Navy Response:** The third paragraph in Section 4 has been revised to read: "In accordance with the Final SI SAP and as shown in Section 3.11, all samples were analyzed for 18 PFAS. At the time of the SAP preparation, there were RSLs only for PFOA, PFOS, and PFBS. At the time the Draft SI Report was prepared, the current EPA RSLs were the November 2022 RSLs for PFOA, PFOS, PFBS, PFNA, PFHxS, and HFPO-DA. Therefore, the SI analytical results were screened against EPA November 2022 residential tap water and/or residential soil RSLs (HQ = 0.1) for PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA in the Draft SI Report. Subsequent to preparing the Draft SI Report, EPA established an RSL in May 2023 for one additional PFAS (PFHxA) included in the SI analytical suite and one additional PFAS (PFBA) not included in the SI analytical suite; the RSLs for the six PFAS with RSLs when the draft version was being prepared remained unchanged in the May 2023 RSLs.

   As standard practice for Vieques reports, the RSLs current at the time of draft document preparation are those used in the report preparation. If newer RSLs are then released between the draft and draft final preparation and/or between the draft final and final preparation, the newer RSLs are compared to the RSLs used in the report and if newer RSLs differ from the ones used in the report, a discussion is added that summarizes any impact on screening results, data evaluation, conclusions, and recommendations. Therefore, this standard practice was applied to PFHxA.

   At an HQ = 0.1, the May 2023 RSLs for PFHxA are 3,200 ng/g (soil) and 990 ng/L (tap water). When site-specific PFHxA concentrations are compared to these RSLs, groundwater concentrations at NASD Former Fire Station Building 2046 at the Public Works Area and the Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330 represent the only exceedances. These two sites were already recommended for a RI in the Draft SI Report based on the concentrations of other PFAS, so the additional information regarding PFHxA RSL exceedances does not alter the recommended path forward for these sites. Because there were no exceedances of the PFHxA RSLs at any of the other sites, there is no impact on the path forward recommendations for those sites. In addition, although PFBA was not included in the SI analytical suite, at the numerous sites where the Navy has collected PFBA data, there have not been instances where the analytical results exceeded the RSL for PFBA but did not exceed for any of the other PFAS. Therefore, PFBA data would have been unlikely to change any of the report conclusions."

2. The SI was performed under an approved SAP which indicated additional investigations would be performed if a site had an exceedance of an RSL. The proposed deviation from the SAP to perform an HHRS during the SI to determine whether to conduct additional investigations is not consistent with EPA guidance and is not approved by EPA. In accordance with the SAP, the three sites where PFAS were detected above RSLs but no additional investigation/action was recommended at this time based on results of the HHRS should be retained for additional investigation as part of the RI. These sites are discussed in more detail in other comments.

   **Navy Response:** Text associated with the three referenced sites has been updated to recommend RI based on RSL exceedances, consistent with the approach included in the regulatory-approved SAP. The HHRS information has been retained, but annotated to be included for informational purposes, to provide additional perspective.

3. For areas recommended for further investigation, it is unclear if the investigations will include only groundwater or all media. Soils in target areas with RSL exceedances were screened out using the HHRS approach, however, an RI for groundwater also needs to consider the soil as potential source material.

   **Navy Response:** The specific RI approach will be based on consensus among the Navy and regulatory agencies via the inter-agency RI QAPP scoping process and subsequent regulatory review of the draft QAPP.

4. The deviations between the samples collected and those proposed to be collected in the Final SI SAP are not adequately addressed in the SI Report. Neither Section 3.1, Deviations from the SI SAP, nor the respective CSM sections explicitly state that such deviations occurred. Apparent deviations from well development and sampling protocols are not addressed in this section nor in the applicable Sections 3.5.2 and 3.6 where the protocols are discussed. Please revise the Section 3.1 text and the affected CSMs to clearly identify and explain any deviations from the program. Also, please revise the text to assess the impact of any well development issues on data quality and usability.

   **Navy Response:** While not a deviation, it is understandable there may be a perception that not all samples proposed in the SAP were collected based on a comparison of planned samples in the SAP and actual samples in the SI Report. However, as stated in the SAP, deeper subsurface soil samples were to be collected only if the saturated zone was found in the unconsolidated interval. For a number of sites, the saturated zone was encountered in bedrock, a condition that precluded the requirement for a deeper subsurface soil sample. Therefore, fewer soil samples were collected at these sites than shown in the SAP tables, but this was not a deviation given that this was accounted for in the SAP sampling protocol.

   To provide additional clarity, Section 3.1 has been deleted and a summary of any difference in the number and location of samples presented in the SAP versus those actually collected (whether a deviation or not) has been added to each site's discussion in Section 4, together with the reason for the difference and including any impact on the CSMs and SI objectives.

   Similarly, well development and sampling logs have been re-evaluated to confirm there were no deviations from the associated protocols (or identify deviations) and the sections updated accordingly.

5. The SI Report is generally focused on the potential source areas and does not address the fate and transport of contaminants, including source depletion and PFAS migration. The lack of hydrogeological data and the resulting uncertainties in groundwater flow directions and rates represent data gaps in the CSM that affect the ability to assess the migration patterns and downgradient impacts of PFAS. PFAS contamination may have migrated from the original source areas and created secondary sources over the elapsed decades since releases occurred.

   These data gaps draw recommendations made in the SI Report into question and indicate the need for resolution in the subsequent RI. It is recommended that any applicable information from previous investigations and/or other available sources be incorporated into the SI Report to aid in addressing the noted data gaps and better support SI conclusions and recommendations.

**Navy Response:** The SI approach was consistent with EPA guidance and specifically designed and concurred upon by the regulatory agencies as appropriate for determining whether releases have occurred and, if so, whether they warranted further investigation or action. Evaluation of nature and extent, fate and transport, etc., which are RI objectives, will be performed for those sites that proceed to an RI.

6. It is recommended that all CSM tables in the text showing SI results be revised to include columns showing the RSL with which the results were compared. This will facilitate an understanding of the magnitude of potential exceedances.

   **Navy Response:** There are no PFAS concentration data in the CSM tables; therefore, including the RSLs would not provide for understanding the magnitude of exceedances. The RSLs are provided in all the concentration data tables in Section 4 where the magnitude of exceedances is readily observable.

7. There are a number of locations in the document where statements are made that constitute risk management decisions. For example, Section 4.1.4, NASD AOC H: Abandoned power Plant/Former Fire Training Area, Page 4-11 states, "Therefore, no further investigation or action is warranted for NASD AOC H at this time." Please revise the SI Report to state that no further investigation or action is recommended.

   **Navy Response:** The terminology is consistent with the evaluation process that is presented in the SI QAPP and is consistent with terminology EPA uses in comments below that concur with these conclusions.

8. The SI Report indicates that samples were analyzed by EPA Method 537.1 compliant with Quality Systems Manual 5.1.1 (Executive Summary, Page iv) and Quality Systems Manual 5.1 (Section 3.11, Laboratory Analysis and Data Usability Assessment, Page 3-6). However, according to Appendix G, Data Validation Reports, samples were analyzed by EPA Method 537.1 compliant with Quality Systems Manual 5.3, which is consistent with the SAP. Please revise the SI Report to reference the correct version of the Quality Systems Manual.

   **Navy Response:** The SI Report has been revised to reference Quality Systems Manual 5.3.

SPECIFIC COMMENTS

1. **Section 1.1 Objectives and Approach, Page 1-2:** The introductory paragraph describes the identification of potential releases based on historical activities associated with PFAS containing materials, but it is unclear in this paragraph whether PFAS-containing materials other than AFFF were considered. Please add text to clarify that other PFAS-containing materials were considered in the PA and evaluated as a part of the SI.

   **Navy Response:** The last sentence of the first paragraph of Section 1.1 has been revised to read: "A total of 13 of the 56 locations were recommended for additional investigation based on known or suspected releases during historical operations, 6 within the former NASD and 7 within the former VNTR, as shown below. Information from the PA Report that describes how each site was selected for inclusion in the SI, including potential PFAS sources considered, is summarized in Section 2."

2. **Section 2.4, Drinking Water Exposure Evaluation, Page 2-9:** If the existence of the well at Sun Bay has been confirmed, EPA suggests modifying the following sentence to read: "Groundwater is not currently used as a potable water source at the former NASD, or former VNTR, or by the residents of Vieques, Puerto Rico and there are no known private wells used for drinking water purposes."

   **Navy Response:** The text recommended for deletion is not necessary to convey the intended information in Section 2.4 and has been deleted as requested.

3. **Section 3.1, Deviations from the SI SAP, NASD Former Fire Station Building 2046 at the Public Works Area, Page 3-2, Bullet 1:** The proposed soil sampling locations were placed adjacent to the Fire Station Ramp in an effort to characterize any discharges that might have occurred there. It is not likely that the revised sample locations could capture any discharges adjacent to the ramp. This site has been recommended for further

investigation, and it should be considered that there may still be a potential source adjacent to the Fire Station Ramp.

**Navy Response:** The information will be considered during development of the RI approach.

4. **Section 4, Investigation Results and Evaluation, Page 4-1:** This section states that Analytical results were screened against EPA November 2022 RSLs (HQ = 0.1) for PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA; however, it does not specify whether the residential or industrial criteria were used; please include in this section the SI Report accordingly.

   **Navy Response:** Please see the response to General Comment 1. The text has been updated to indicate the residential tap water and residential soil RSLs were utilized.

5. **Section 4.1.1, NASD AOC B:** Former Wastewater Treatment Plant at the Public Works Area: EPA concurs with the recommendation to perform an RI at this site and to jointly consider AOC B and the Former Fire Station in developing the RI approach.

   **Navy Response:** Comment noted.

6. **Section 4.1.2, NASD Former Fire Station Building 2046 at the Public Works Area:**

   a. EPA concurs with the recommendation to perform an RI at this site and to jointly consider AOC B and the Former Fire Station in developing the RI approach.

      **Navy Response:** Comment noted.

   b. On Page 4-5, Bullet 2, the text states, “soil samples nearest to the former fire station had PFOS detections below the RSL.” In the RI, soil samples should be collected closer to the fire station ramp where a PFAS discharge would be most likely.

      **Navy Response:** As indicated in the SI Report, the samples were relocated due to the presence of a permanent structure at the planned sample locations. To the extent possible, collecting samples closer to the former fire station ramp will be considered during RI planning.

7. **Section 4.1.3, Potential Former NASD Motor Pool Area:**

   a. EPA concurs with the recommendation to perform an RI at this site.

      **Navy Response:** Comment noted.

   b. The last sentence in the second paragraph of Section 2.2.3 states, “Since the area may have been used as a motor pool that may have serviced fire trucks carrying AFFF, there is potential for AFFF or other PFAS-containing material to have been released at this location.” In Table 4-12, only AFFF is discussed as a potential source for this area. Please confirm other PFAS-containing materials associated with vehicle maintenance activities were considered as sources and include in this section.

      **Navy Response:** There is no direct evidence of any PFAS release at the former NASD motor pool area nor is there any indication of PFAS other than those derived from AFFF to be potentially present. Therefore, the referenced sentence in Section 2.2.3 has been revised to read: “Since the area may have been used as a motor pool that may have serviced fire trucks carrying AFFF, there is potential for AFFF to have been released at this location.”

   c. On Page 4-8, the text states, “…considering the possibility of the Former Fire Station being a potential source area for groundwater PFAS at the Potential Former NASD Motor Pool Area is recommended…”. This may be the case, but please note that no soil source has been identified yet at the Former Fire Station.

      **Navy Response:** Comment noted.

8. **Section 4.1.4, NASD AOC H:** Abandoned power Plant/Former Fire Training Area: EPA concurs that no further investigation or action is needed at this time.

   **Navy Response:** Comment noted.

9. **Table 4-18. NASD AOC H:** Abandoned Power Plant/Former Fire Training Area Conceptual Site Model, Page 4-10; Table 4-22. NASD SWMU 6: Former Mangrove Disposal Site Conceptual Site Model, Page 4-11: The RSLs used to compare surface water and sediment data were not specified; because there are no RSLs for these media, please state which RSLs were used for comparative purposes.

   **Navy Response:** Where detected in surface water and sediment, PFAS results were to be compared to tap water RSLs and residential soil RSLs. Of note, no PFAS were detected in surface water or sediment at SWMU 6 and no PFAS were detected in sediment at AOC H. Therefore, Table 4-18 was revised to indicate the concentrations of PFHxS detected in AOC H surface water samples were compared to the tap water RSL.

10. **Section 4.1.5, NASD SWMU 6:** Former Mangrove Disposal Site: EPA concurs that no further investigation or action is needed at this time.

    **Navy Response:** Comment noted.

11. **Section 4.1.6, NASD SWMU 7:** Former Quebrada Disposal Site: EPA concurs that no further investigation or action is needed at this time.

    **Navy Response:** Comment noted.

12. **Section 4.2.1, VNTR Former Camp Garcia Runway:** EPA disagrees that this site does not warrant additional investigation at this time. Per the approved SAP, sites would be proposed for further characterization if concentrations exceed RSLs. PFOS and PFHxS were detected in groundwater at VERW-PFAS-MW02 at concentrations above the RSLs and therefore additional investigation (at least in this area of the Runway) is warranted.

    **Navy Response:** Please see the response to General Comment #2.

13. **Section 4.2.2, VNTR PI 5:** Surface Water Drainage Area from Former Camp Garcia Runway: EPA concurs that no further investigation or action is needed at this time.

    **Navy Response:** Comment noted.

14. **Section 4.2.3, VNTR SWMU 20:** Former Helicopter Maintenance Area: EPA concurs with the recommendation to perform an RI at this site.

    **Navy Response:** Comment noted.

15. **Section 4.2.4, Potential Former VNTR Motor Pool Area (including Building 340) and Former Fire Department Building 330:** EPA concurs with the recommendation to perform an RI at this site.

    **Navy Response:** Comment noted.

16. **Section 4.2.5, VNTR SWMU 10 and AOC G:** Former Sewage Treatment Lagoons and Chlorination Building: EPA disagrees that these sites do not warrant additional investigation at this time. Per the approved SAP, sites would be proposed for further characterization if concentrations exceed RSLs. PFOS in surface soils and PFOS and PFHxS in groundwater were detected at concentrations above their RSLs and therefore additional investigation is warranted.

    **Navy Response:** Please see the response to General Comment #2.

17. **Section 4.2.6, VNTR SWMU 1:** Former Camp Garcia Municipal Waste Management Unit (Landfill): EPA concurs that no further investigation or action is needed at this time.

    **Navy Response:** Comment noted.

18. **Section 5, Conclusions and Recommendations, Page 5-1:**

a. The five areas that are recommended for no further investigation/action at this time because PFAS concentrations in all associated media are below RSLs should be re- screened against May 2023 RSLs.

   **Navy Response:** Please see the response to General Comment #1.

b. As stated in earlier comments, the three sites that are recommended for no further investigation/action at this time based on results of the HHRS should be retained for additional investigation as part of the RI.

   **Navy Response:** Please see the response to General Comment #2.

19. **Table 5-1. Summary of Basewide PFAS Site Inspection Findings and Recommendations:** Please update this table (and other occurrences) consistent with EPA comments (i.e., retain VNTR Sites AOC G, SWMU 10, and Camp Garcia Runway for RI).

    **Navy Response:** Please see the response to General Comment #2.

20. **Appendix G, Data Validation Reports:** The data validation reports (DVRs) appear to be insufficiently detailed and do not meet the requirements of DoD Module 3 – Data Validation Guidelines: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020 (DoD Module 3). Examples of insufficient information include, but may not be limited to, the following:

    a. It is unclear if a minimum of two ion transitions (precursor to quantitative ion and precursor to confirmation ion) were used for identification of target analytes and whether DoD QSM ion transition was used per Worksheet #24 in the SAP.

       **Navy Response:** The data validator confirmed a minimum of two ion transitions were used for identification and DOD QSM ion transition was used. Using work order 22-0238 as an example, the ion transitions can be found on page 349 of 412.

    b. It is unclear if the Instrument Sensitivity Check (ISC) was analyzed at the correct frequency and within criteria.

       **Navy Response:** The data validator confirmed that ISCs were analyzed at the correct frequency and within criteria. Using work order 22-0238 as an example, the calibration concentration to sample equivalency table that indicates which calibration point would be equivalent to a concentration in a sample is located on page 50 of 412. If an initial calibration point is run with a sequence, the calibration point equivalent to the ISC is used for the first 24 hours of a calibration (sequence showing the calibration standard ID [under the laboratory sample ID] and level number [under client sample] – see page 292 of 412.

    c. It is unclear if both branched and linear isomers were used as applicable.

       **Navy Response:** The data validator confirmed that the branched checklist indicates which samples were detected with branched and linear isomers (see page 40 of 412 in workorder 22-0238 as an example). The sequence shows that the branched check was run for any analytes that branch which were not also branched in the calibration curve (see page 292 of 412 in work order 22-0238 as an example). The calibration concentration page indicates which analytes were in this calibration curve as branched (commercial available when these samples ran) – see page 319 of 412 in work order 22-0238 as an example.

    d. It is unclear if ion ratios for the detected results were within the laboratory acceptance criteria.

       **Navy Response:** The data validator confirmed that the quant report for each sample shows the MRM transitions run for each primary (analyte_1) and secondary (analyte_2) transition. The area ratio group, ion ratio for the analyte in the sample, the expected ion ratio, and a checkmark if the analyte passes are also included on each quant report (see page 351 of 412 in workorder 22-0238 as an example).

e. Please ensure that data validation was performed in accordance with DoD Module 3, and revise the DVRs accordingly.

**Navy Response:** The data validator confirmed that the data validation was performed in accordance with the DoD Module 3. The data validator only noted nonconformances in the data validation reports if discrepancies or exceedances were noted in the laboratory data. For all future DVRs, the data validator will also state when criteria were achieved in the report for the ISC, ion transition, branch and linear isomers, and etc.

21. **Appendix G, Data Validation Reports:** No data were rejected during data validation; however, several extracted internal standard analyte recoveries (reported as surrogate recoveries) were less than 20% (see PDF Pages 590, 602, and 606 for examples). According to Section 4.2 (Extracted Internal Standard (EIS) Recovery) of DoD Module 3, for extremely low area counts (< 20%), detects and non-detects should be qualified as X or considered potentially not usable. Please clarify why these results were not qualified as rejected and discuss how these results impact data usability.

**Navy Response:** The data validator went back and reviewed all data and found one workorder (22-0397) that contained subsurface soil and surface soil samples that had one extracted internal standard recovery below 20% for 13C2-PFTeDA only. The data validator noted that the incorrect non-detect results for PFTeDA in samples VEW10-PFAS-SS06-0001, VEW10-PFAS-SB06D-0708, VEW10-PFAS-SS04-0001, VEW10-PFAS-SB04D-2829, VEW10-PFAS-SS02-0001, and VEW10-PFAS-SS03-0001 were reported, which would have resulted in a rejection as stated, and the non-detect results for PFTeDA should have been reported from the original analysis and qualified as estimated "UJ" due to holding time exceedance. This revision has been made in the DVR.

**22. Appendix I, Human Health Risk Screening Evaluation:**

a. The HHRS would benefit from an uncertainty analysis to contextualize the results, particularly in light of the small number of samples collected at each location.

**Navy Response:** As indicated in the response to General Comment 2, the HHRS text has been updated to indicate the HHRS results are provided for informational purposes only and that determining whether sites are recommended for RI is based on whether any constituent concentration exceeded its RSL. Therefore, including an uncertainty analysis in the SI Report would not alter the path forward recommendation for any site and as such will not be included. However, for each site carried forward to an RI, a baseline HHRA will be prepared as part of the RI Report and, consistent with the Vieques HHRA protocol, an uncertainty analysis will be provided as a component of the baseline HHRA.

b. There is no indication of data sensitivity, and whether detection/reporting limits were compared to screening criteria, as applicable.

**Navy Response:** A sentence was added to the end of the "Overview" section of Appendix I stating that all non-detected concentrations had reporting limits below residential soil and tap water screening levels, as shown in Tables 4-1 through 4-45 of the Site Inspection Report.

c. There is no mention of how non-detected data (i.e., NDs) were evaluated.

**Navy Response:** Please see the response to Specific Comment 22b.

d. A reference to the Pro UCL guide should be provided where the calculation of the 95 percent upper confidence limit (95% UCL) is mentioned.

**Navy Response:** The "Overview" section of Appendix I was revised to indicate that for assessment of soil an iterative approach was used whereby if the maximum detected concentration in soil exceeded the residential RSL and caused a cumulative exceedance of USEPA's target risk range (10-6 to 10-4) and/or target hazard index (HI) of 1, USEPA's ProUCL software (EPA 2016. ProUCL, Version 5.1.00, prepared by Lockheed Martin Environmental Services (March), was used to calculate the 95 percent upper

confidence limit (95% UCL) on the mean concentration if 8 or more analytical results were available for the chemical in an environmental medium and if the chemical was detected more than four times.

The lesser value of the 95% UCL on the mean or maximum detected concentration was then used as the exposure point concentration (EPC) for quantitative risk estimates. For groundwater, maximum detected concentrations were used as the EPCs.

e. The newest version of EPA's ProUCL (v 5.2) issued in June 2022 recommends 10 observations to calculate a robust 95UCL, not 8 as in previous versions. It is recommended that this be incorporated into the uncertainty analysis mentioned above.

**Navy Response:** Please see the response to Specific Comment 22a.

f. For clarity, the document should specify that the tapwater RSLs used for screening are residential tapwater RSLs.

**Navy Response:** The second sentence of the "Overview" section was modified to indicate that PFAS with available November 2022 RSLs for soil (residential and industrial) and residential tap water were retained for the screening.

g. Please state how the ELCRs/HQs were calculated and what exposure parameters were used for the calculations. Industrial risk calculations should only consider adult exposure parameters, and residential calculations should either separate calculations into adult/child or state that the highest risk estimate is presented for both age groups. Currently, the highest risk estimate is presented for all scenarios (though it is not specified) and this is not appropriate.

**Navy Response:** The information added to the text in response to Specific Comment 22d describes how the ELCRs/HQs were calculated. This approach uses the exposure parameters incorporated into the RSLs to calculate ELCRs/HQs.

h. For attachment C, please revise the Result Unit column in Tables 2 and 3 from mg/L to ug/L.

**Navy Response:** The units were changed to µg/L in Tables 2 and 3.

**Navy Responses to PRDNER Comment on the**
**Draft Site Inspection for Per- and Polyfluoroalkyl Substances**
**Atlantic Fleet Weapons Training Area – Vieques**
**Dated May 2023**

After reviewing the above-mentioned document, DNER recommends a Remedial Investigation for the following sites in both media (soil and groundwater):

1. AOC B: Former Wastewater Treatment Plant
2. VNTR SWMU 1: Former Camp Garcia Municipal Solid Waste Management Unit
3. NASD Former Fire Station Building 2046
4. Fire Department Building 330
5. NASD Former Motor Pool Area,
6. VNTR Motor Pool Area Building 340
7. VNTR SWMU 20: Former Helicopter Maintenance Area
8. VNTR Camp Garcia Runway
9. VNTR SWMU 10 and AOC G: Former Sewage Treatment Lagoons and Chlorination Building

**Navy Response:**

All of the areas of interest above will move forward to the RI, except for the VNTR SWMU 1: Former Camp Garcia Municipal Solid Waste Management Unit. SWMU 1 was in operation up until 1978 and the potential for a release has been over 45 years. Only PFBS (1.02 J ng/L) and PFHxS (1.28 J ng/L) were detected in groundwater at one monitoring well, which are two orders of magnitude below their respective RSLs (600 and 39 ng/L), from the six monitoring wells used as part of the SWMU 1 long-term monitoring; HFPO-DA, PFNA, PFOS, and PFOA were not detected and PFBS and PFHxS were not detected in the other monitoring wells. In accordance with the regulatory approved SI SAP, if PFAS compounds are either not detected or detected at or below screening levels, the recommendation for no further investigation or action will be warranted at this time. Therefore, SWMU 1 is not warranted to move to a RI at this time.

**Navy Responses to USFWS Comment on the**
**Draft Site Inspection for Per- and Polyfluoroalkyl Substances**
**Atlantic Fleet Weapons Training Area – Vieques**
**Dated May 2023**

The U.S. Fish and Wildlife Service (USFWS) has reviewed the document and participated in the PFAS site visits that pertained to the Vieques National Wildlife Refuge (VNWR). During the last visit to SWMU 20 and the former airstrip road, both PFAS sampling areas, the Navy explained the needs to place additional sampling wells. The USFWS support the Navy's plan to install additional sampling wells at the VNWR. In addition, we notified the Regulators and the Navy the future VNWR's land use plans, that include the opening section of road to the public. The team agreed that sampling methodology would be not affected and also agreed to move the wells a few feet further north to avoid possible vehicle hits on the edge of the road.

**Navy Response:** The wells referenced in the comment are for the SWMU 20 TCE pilot study and are not associated with PFAS investigation. Nevertheless, the wells will be installed such that they will not interfere with USFWS' plans for the public access road.