Naval Facilities Engineering Command Washington
Washington, D.C.

Final

Preliminary Assessment for Per- and Polyfluoroalkyl Substances

Navy Recreation Center Solomons
Solomons, Maryland

September 2021

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Prepared for NAVFAC Washington
by CH2M HILL, Inc.
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Acronyms and Abbreviations

AFFF	aqueous film-forming foam
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CH2M	CH2M HILL, Inc.
DASN	Deputy Assistant Secretary of the Navy
DoD	Department of Defense
EC	emerging chemical
EDR	Environmental Data Resources, Inc.
EI&E	Energy, Installations and Environment
ER,N	Environmental Restoration, Navy
FY	fiscal year
iNFADS	internet Navy Facilities Asset Store
MIL-SPEC	military specification
MWR	Morale, Welfare and Recreation Department
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NIRIS	Naval Installation Restoration Solution
NOLTF	Naval Ordnance Laboratory Test Facility
NRC	Navy Recreation Center
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutane sulfonate
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
ppt	parts per trillion
PWS	public water system
RfD	reference dose
RPM	Remedial Project Manager
SI	Site Inspection
UCMR3	Third Unregulated Contaminant Monitoring Rule
UCMR4	Fourth Unregulated Contaminant Monitoring Rule
UCMR5	Fifth Unregulated Contaminant Monitoring Rule
USEPA	United States Environmental Protection Agency

SECTION 1

Introduction

This Preliminary Assessment (PA) report of potential sources of per- and polyfluoroalkyl substances (PFAS) at Navy Recreation Center (NRC) Solomons, Solomons, Maryland, was prepared by CH2M HILL, Inc. (CH2M) for the Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC) Washington under Comprehensive Long-term Environmental Action—Navy Contract N62470-16-D-9000, Contract Task Order JU14.

This report focuses on identifying locations where PFAS-containing materials may have been released into the environment, provides an initial assessment of possible migration pathways and receptors of potential contamination, and recommends a path forward for sampling.

1.1 Preliminary Assessment Objectives

This installation-specific PA for PFAS is part of a Navy-wide installation assessment of potential historical sources and use of PFAS. The objectives of this PFAS PA for NRC Solomons are to:

- Identify and catalog all potential or actual historical and current PFAS sources.
- Eliminate from further consideration those areas where there is no evidence of a PFAS release or suspected release, and document the rationale for elimination.
- Identify areas requiring further PFAS investigation.
- Identify potential receptors and likely contaminant migration pathways (both on and off the installation).
- Determine whether an expediated response action is warranted because of current complete exposure pathways (for example, on-Base or off-Base drinking water source within 1 mile downgradient of a potential PFAS source area).
- Set priorities for a Basewide Site Inspection (SI).

To accomplish these objectives, the following activities were completed:

- A review of existing information to identify and characterize potential PFAS releases.
- A review of existing information to identify potential off-Base receptors within 1 mile of the installation boundary.
- Interviews conducted with relevant site personnel to validate and verify data collected during the data review, and to provide supplemental information.
- A site reconnaissance of the installation to identify any evidence of PFAS releases and potential receptors and migration pathways, to identify all areas of concern, and to fill data gaps identified in the data review and personnel interviews.
- Identification of any need for initiation of an expedited response drinking water investigation in accordance with Deputy Assistant Secretary of the Navy (DASN) June 2016 policy.

1.2 PFAS Background

PFAS have been identified by the Department of Defense (DoD) as “emerging chemicals”[1] (ECs). PFAS are of environmental concern because of persistence in the environment and in the organisms, migration potential in aqueous systems (for example, groundwater), their historically widespread use in commercial products, and

[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.”

possible health effects at low levels of exposure. PFAS are anthropogenic compounds with multiple strong carbon-fluorine bonds.

1.2.1 General Uses of PFAS

The chemical properties of PFAS make these useful for many commercial products because the compounds are heat-resistant and can repel oil, grease, and water. PFAS have been manufactured for use in a wide variety of products including firefighting foam, nonstick cookware, fiber and fabric stain protection, food packaging, and personal care products. The pervasive use of PFAS in commercial and industrial products has led to the discovery of PFAS in soil, air, and groundwater worldwide.

1.2.2 Key PFAS Sources at Naval Installations

PFAS have been used in a variety of military applications, including as a component of aqueous film-forming foam (AFFF), which was routinely used at firefighting training areas and firefighting equipment test areas[2]. In addition, current and historical AFFF storage and transfer areas are of potential concern for releases to the environment. As such, identification of areas where AFFF was released to the environment, either as repeated small releases or as a significant one-time release, is key to determining potential PFAS sources to environmental media.

PFAS from AFFF used in firefighting, firefighting training, and fire suppression systems are considered to have the greatest potential for release of PFAS to the environment in terms of mass/concentration at Navy installations. Other potential sources of PFAS to the environment include operations wastes (for example, from chromium electroplating), historical on-Base land disposal areas and landfills that received PFAS-containing materials, and wastewater treatment sludges and effluents. Areas of interest for this PFAS PA include those where AFFF may have been applied, released, or stored. These include current and former fire training areas, equipment test and cleanout areas, buildings with firefighting infrastructure (for example, hangars, AFFF storage/handling areas, and pump houses), unplanned release areas (for example, crash sites), and fire suppression systems located at fuel storage area(s).

For these operational and waste areas, it is important to develop a conceptual site model that considers the following to determine if a reasonable basis exists for PFAS use, and if there is potentially for the PFAS to be release into the environment:

- Type of operations
- Timeline of operational activity
- Material/ product development and usage
- Material storage and management practices
- Quantities of material used
- Historical information/data from similar operations in the assessment

AFFF in Firefighting Training and Fire Suppression

AFFF containing PFAS was developed in the 1960s for use on Class B fires (that is, fires in flammable liquids or vapors), and was put into routine use by the early 1970s. In November 1969, a military specification (MIL-SPEC) was issued that described characteristics which AFFF needed to demonstrate in order to be used by the military, including a requirement for formulations containing PFAS (DoD, 1969). As such, most AFFF used at military installations after the 1970s likely included some combination of PFAS.

Typically, AFFF concentrate was proportionally mixed into water lines using in-line eductors or other proportioning devices to create the necessary foam solution ranging from 3 percent to 6 percent of the

[2] AFFF is a type of Class B firefighting foam but is not the only type of Class B firefighting foam available. While AFFF contains PFAS, not all Class B foams do (ITRC, 2020). Consequently, use of foam to extinguish a Class B fire is not a reliable indicator PFAS were released to the environment.

concentrate. Class A firefighting foams, which do not contain PFAS, were used to extinguish wood and grass fires, and do not contain PFAS. Therefore, Class A firefighting foams are not a concern for this PFAS PA.

Electroplating

Electroplating, specifically hard chromium plating, is an industrial activity where PFAS-containing mist suppressants may have been used. Electroplating consists of creating an electrolytic cell that enables a thin layer of metal to be deposited onto an electrically conductive metal surface. PFAS were sometimes used during the chromium electroplating process as a surfactant in chromic acid baths. As a surfactant, PFAS lowered the surface tension (adhesion of materials) by creating a thin, foamy layer on the surface of the chrome bath for mist suppression. This mist suppressant reduced the formation of airborne chromium aerosols during the plating process, which are known to be carcinogenic and allergenic. Areas where non-chromium electroplating operations were carried out would not be expected to have used PFAS-containing mist suppressants. Although fluorinated mist suppressants were available as early as the 1950s, they were not commonly used due to problems with porosity and cracking during the plating process. Technical improvements to fluorinated mist suppressants were made in the 1980s and 1990s which made their use more common; therefore, operations that ceased before this time likely would not have included PFAS material in plating bath solutions (USEPA, 1998).

Landfill Operations, Waste Disposal Areas, and Wastewater Treatment Plants

Historically, landfills received wastes generated from military installations, including waste streams from operational areas (such as machine shops and electroplating operations), housing areas, and waste from wastewater treatment plants and/or homeported ships. These waste streams may contain industrial and/or consumer products that were either manufactured with PFAS or contain PFAS. Additionally, waste material biosolids and sludge from wastewater treatment plants can contain PFAS.

Other Potential Sources

Because of the widespread use of PFAS, there may be activities other than the ones previously mentioned where PFAS were used. PFAS have been included in some antifouling and stain-resistant paint formulations. It is possible that in significant amounts, these could also be sources of PFAS to the environment.

1.2.3 PFAS in the Environment

PFAS are a class of anthropogenic compounds characterized by carbon chains of varying lengths containing carbon-fluorine bonds. The strong electronegative force of the carbon-fluorine bond requires a large amount of energy to break, which makes PFAS extremely resistant to biodegradation, photo-oxidation, direct photolysis, and hydrolysis. In addition to their environmental persistence, PFAS are readily soluble in aqueous solutions and therefore, have potential for migration to groundwater from soil and with groundwater flow to off-site locations. Due to their persistence and mobility, releases of PFAS to the environment present a unique set of challenges and concerns.

1.2.4 PFAS Potential Health Effects

Additional research is needed to more clearly understand the potential health effects that may be caused by exposure to PFAS. There is limited information available on only a few out of the thousands of total PFAS. To date, there are no Tier 1 toxicity values for any PFAS. Tier 1 toxicity values are the preferred source for toxicity factors in Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation and Recovery Act human health risk assessments.

United States Environmental Protection Agency's (USEPA's) Superfund Health Risk Technical Support Center has estimated a Tier 2 noncarcinogenic toxicity value for perfluorobutane sulfonate (PFBS) (USEPA, 2014). The oral reference dose (RfD) is based on kidney effects observed in female rats. Due to a lack of information in the current literature, toxicity values for inhalation exposure and cancer endpoints could not be estimated for PFBS.

The USEPA Office of Water developed an RfD for perfluorooctanoic acid (PFOA), which is based on a developmental toxicity study using mice. The critical effects included reduced ossification in parts of the hands

and feet and accelerated puberty in male pups following exposure during gestation and lactation (USEPA, 2016a). The USEPA Office of Water also determined that PFOA should be classified as "suggestive evidence of carcinogenic potential" and estimated an oral cancer slope factor based on tumor development in rat testes.

The USEPA Office of Water estimated an RfD for perfluorooctane sulfonate (PFOS) based on a developmental toxicity study in rats; the critical effect was decreased pup body weight following exposure during gestation and lactation (USEPA, 2016b).

PFOA and PFOS are known to be transmitted to the fetus in cord blood and to the newborn in breast milk. Because the developing fetus and newborn seem particularly sensitive to PFOA- and PFOS-induced toxicity, the RfDs based on developmental effects also are protective of adverse effects in adults.

1.3 Regulatory Background and History

1.3.1 PFOA Stewardship Program

In 2006, USEPA initiated the 2010/2015 PFOA Stewardship Program in which eight major companies in the United States committed to reduce facility emissions and product contents of PFOA and related chemicals on a global basis by 95 percent no later than 2010, and to work toward eliminating emissions and product content of these chemicals by 2015. All companies have met the program goals. To meet the program goals, most companies stopped the manufacture and import of long-chained PFAS, and then transitioned to alternative chemicals. On January 21, 2015, USEPA proposed a Significant New Use Rule under the Toxic Substances Control Act to require manufacturers (including importers) of PFOA- and PFOA-related chemicals to notify USEPA at least 90 days before starting or resuming new uses of these chemicals in any process.

1.3.2 Unregulated Contaminant Monitoring Rule

USEPA issued the Third Unregulated Contaminant Monitoring Rule (UCMR3)[3] in May 2012. The UCMR3 required monitoring, between 2013 and 2015, for 30 substances in all large public water systems (PWSs) serving more than 10,000 people and 800 representative PWSs serving 10,000 or fewer people. Six PFAS compounds were included in the UCMR3 contaminant list. Of these six PFAS, USEPA issued health advisory levels for only two: PFOA and PFOS. The UCMR3 results found these two chemicals were present in less than 1 percent of the nearly 5,000 PWSs that were sampled per UCMR3 (USEPA, 2017).

In December 2016, USEPA issued the Fourth Unregulated Contaminant Monitoring Rule (UCMR4). UCMR4 requires all large PWSs serving more than 10,000 people and 800 representative PWSs serving 10,000 or fewer people to sample for 30 chemicals between 2018 and 2020. There are no PFAS compounds included on the UCMR4 list of contaminants that require sampling and analysis.

USEPA is currently proposing development of a Fifth Unregulated Contaminant Monitoring Rule (UCMR5). It is anticipated that a proposal for the rule will be developed in summer 2020 and the final rule is expected to be released in late 2021. It is currently unknown whether PFAS will be included as part of the UCMR5; however, several PFAS have been proposed for inclusion (USEPA, 2019a).

1.3.3 USEPA Lifetime Health Advisories

In May 2016, USEPA Office of Water issued a drinking water lifetime health advisory for PFOA and PFOS. Health advisories are not enforceable regulatory levels; rather, these are levels that would provide humans, including sensitive populations, with a margin of protection from a lifetime of exposure to PFOA and PFOS in drinking water. The lifetime health advisory is 70 parts per trillion (ppt) for PFOA and 70 ppt for PFOS. When both PFOA

[3] The 1996 Safe Drinking Water Act amendments require that once every five years USEPA issue a new list of no more than 30 unregulated contaminants to be monitored by public water systems.

and PFOS are found in drinking water, the combined concentrations of PFOA and PFOS should be compared with the 70 ppt health advisory level.

1.3.4 USEPA Action Plan

In February 2019, the USEPA issued an Action Plan outlining the steps the agency is taking to address PFAS and to protect public health (USEPA, 2019b). The Action Plan identifies USEPA-led short-term actions, longer-term research, and potential regulatory approaches designed to reduce the risks associated with PFAS in the environment. The Action Plan notes that USEPA plans to propose a national drinking water regulatory determination for PFOA and PFOS and include PFAS analysis in the next UCMR monitoring cycle (i.e., UCMR5 anticipated for release in late 2021). Other steps include further research into improving analytical methods, understanding remediation options, and obtaining more information about the potential toxicity of a broader set of PFAS, along with numerous additional actions. An update to the Action Plan was issued by USEPA in February 2020.

1.3.5 USEPA Guidance, 20 December 2019

In December 2019, USEPA issued Interim Recommendations for Addressing Groundwater Contaminated with PFOA and PFOS under federal cleanup programs. The guidance recommends using a screening level of 40 ppt to determine if PFOA and/or PFOS is present at a site and may warrant further attention. The guidance also recommends using USEPA's PFOA and PFOS Lifetime Drinking Water Health Advisory level of 70 ppt as the preliminary goal for contaminated groundwater that is a current or potential source of drinking water, where no state or tribal maximum contaminant level or other applicable or relevant and appropriate requirements are available or sufficiently protective.

1.3.6 State-specific Action Levels

Maryland has not established a state-specific action level for PFAS.

1.4 Navy Policy

1.4.1 Deputy Assistant Secretary of the Navy (EI&E) Policy Memo, 21 October 2014

Because of Navy releases impacting PWSs tested under the UCMR3, the Navy issued a policy requiring on-Base drinking water sampling for PFOA and PFOS for installations where groundwater was used as a drinking water source and PFAS could have been released near the source in the past. Installations that were not required to sample treated drinking water under UCMR3, but that produce drinking water from on-Base groundwater sources and have an identified or suspected PFAS release within approximately 1 mile upgradient of the drinking water source were also required to sample finished drinking water by December 2015.

1.4.2 Chief of Naval Operations Policy Memo, 14 September 2015

This policy memo largely echoed the requirements laid out in the October 2014 DASN (E) policy memo. However, this memo specified that if levels of PFOS and/or PFOA in drinking water exceeded the current USEPA health advisory (that is, the 2009 provisional short-term health advisories), then alternative drinking water must be supplied until the PFOA and/or PFOS levels were reduced to below USEPA health advisories.

1.4.3 Deputy Assistant Secretary of the Navy (E) Policy Memo, 14 June 2016

This policy expanded the sampling for PFOA and PFOS at all Navy installations where such sampling was not previously completed under USEPA's UCMR3 or the Navy's October 2014 policy. This memo also specified that for instances where drinking water from an installation is purchased from a PWS, but was not tested under UCMR3, the installation must sample the finished drinking water to comply with this policy. Additionally, this policy included reporting requirements to the DASN (E) office for all PFOA and/or PFOS drinking water results.

The Aquia aquifer is the principal source of potable and industrial water for both NRC Solomons and local PWS facilities (Navy, 2009). NRC Solomons has two wells, screened at depths of 557 feet and 567 feet depth, respectively, and are located near Building 6041. In October 2016, one composite potable groundwater sample from both wells was collected and analyzed for six PFAS at NRC Solomons. No PFAS were detected (**Appendix A**). In December 2020, the Navy sampled the potable wells at NRC Solomons for 18 PFAS and no PFAS were detected.

1.4.4 Deputy Assistant Secretary of the Navy (E) Policy Memo, 17 June 2016

This policy defines the Navy's intention to remove, dispose, and replace legacy AFFF that contains PFOS and PFOA once environmentally suitable substitutes are identified and certified to meet MIL-SPEC requirements. This policy directs the following actions be taken until suitable replacements are certified:

- Immediately cease the uncontrolled environmental release of AFFF for shoreside installations, with the exception of emergency responses.
- Update and implement Navy and Marine Corps firefighting system requirements, as needed, to ensure fire and emergency service vehicles and equipment at Navy installations and facilities are tested and certified in a manner that does not allow the release of AFFF to the environment.
- By the end of Fiscal Year 2017 (FY17), remove and dispose of uninstalled PFOS-containing AFFF in drums and cans from local stored supplies for shore installations and ships to prevent future environmental releases.

Currently, Naval District Washington Fire Department, which owns the AFFF at NRC Solomons, does not have the funds to obtain replacement AFFF stock meeting MIL-SPEC requirements. Replacement operations will begin when adequate funds and stock are available to replace what is currently stored at NRC Solomons. It is unknown when the funds will be available.

1.4.5 Deputy Assistant Secretary of the Navy (E) Policy Memo, 20 June 2016

This policy required the Navy to identify and prioritize sites for investigation if drinking water resources, on- or off-Base, are thought to be vulnerable to PFAS contamination from past Navy and Marine Corps PFAS releases. Sites with drinking water sources within 1 mile downgradient of known or potential releases of PFAS were assigned the highest priority. This policy directed the sampling of off-Base drinking water at these high-priority (Priority 1) sites within FY17. NRC Solomons did not contain any Priority 1 sites. Therefore, no off-Base drinking water sampling at NRC Solomons was performed.

The primary mechanism to identify potential PFAS release sites and areas of concern was review of Environmental Restoration (ER), Navy records. To ensure that all potential PFAS release mechanisms were identified, installations were directed to review and identify areas that are not already part of the ER Navy program.

1.4.6 Chief of Naval Operations Policy Memo, 6 April 2020

This policy clarifies that operational ranges on Navy and Marine Corps bases will not be included in basewide PFAS PAs, but will be investigated for PFAS releases separately.

1.5 Department of Defense Policy

1.5.1 Secretary of Defense Memo, 23 July 2019

This memo established a PFAS task force to ensure a coordinated, aggressive, and holistic approach to DoD-wide efforts to proactively address PFAS. The goals of the task force are mitigating and eliminating the use of current AFFF, understanding the impacts of PFAS on human health, and fulfilling cleanup responsibility related to PFAS. The task force is coordinating and collaborating with other federal agencies to achieve these goals.

1.5.2 Assistance Secretary of Defense Guidance Memo, 15 October 2019

This guidance memorandum provided clarification of toxicity values for PFOA and PFOS that can be used to estimate screening levels used in the CERCLA program to determine whether further investigation is warranted or if a site can proceed to site closeout.

1.5.3 Assistance Secretary of Defense Guidance Memo, 23 October 2019

This memo revised quarterly progress reporting requirements for installation with known or suspected PFAS releases.

1.5.4 Assistance Secretary of Defense Guidance Memo, 22 November 2019

This memo established requirements for installation commanders to conduct community engagement with respect to PFAS issues, report on their progress in so doing, and to provide feedback on community questions and concerns.

1.5.5 Assistance Secretary of Defense Guidance Memo, 22 November 2019

This memo established a consistent methodology for analysis of PFAS in media other than drinking water and requires DoD Components to use analytical methods meeting the DoD/DOE Quality Systems Manual for Environmental Laboratories, Appendix B, Table B-15.

1.5.6 Assistance Secretary of Defense Guidance Memo, 2 March 2020

This memo identifies requirements for PFAS drinking water sampling on DoD installations where DoD is the drinking water purveyor. The requirements include initial and routine monitoring, actions necessary if results exceed the lifetime health advisory, laboratory analysis and record keeping requirements, and notification of results.

1.6 Report Organization

The NRC Solomons PFAS PA report is organized in the following sections and appendixes:

- **Section 1 –** Introduction
- **Section 2 –** Base Background and Environmental Setting
- **Section 3 –** Assessment Methodology
- **Section 4 –** Findings and Recommendations
- **Section 5 –** Conclusions
- **Section 6 –** References
- **Appendix A –** On-Base Drinking Water PFAS Results
- **Appendix B –** Summary of Records Reviewed
- **Appendix C –** Interview Records

SECTION 2

Base Background and Environmental Setting

2.1 Base Background

NRC Solomons is located 70 miles southeast of Washington D.C. in Calvert County, Maryland, near the confluence of the Patuxent River and Chesapeake Bay. NRC Solomons, which encompasses approximately 300 acres, is the largest outdoor recreational facility in the Navy. The facility is under the administrative control of Naval Air Station (NAS) Patuxent River. NAS Patuxent River covers approximately 6,400 acres with an additional 850 acres at the Webster Field Annex. **Figure 2-1** illustrates the general location of NRC Solomons. **Figure 2-2** contains a general map of the installation.

NRC Solomons is a vacation location for military members and their families. The facility provides lodging and recreational activities to eligible military personnel and civilians. Monetary funds from the operation of this facility support other Navy Morale, Welfare and Recreation Department (MWR) activities.

Lodging facilities consist of apartments, cottages, log cabins, trailer camps, and camp sites. Recreational facilities consist of swimming and diving pools, a putt-putt golf course, ballfields, and picnic areas. NRC Solomons also contains an industrial area with workshops, offices, and maintenance facilities that support NAS Patuxent River (ERG, 2014).

Before Navy activity at NRC Solomons, the area consisted of residential parcels which were mostly undeveloped. Navy activity began in 1927 by the United States Shipping Board (Maritime Commission), which used NRC Solomons, including Third Cove, as anchorage for interned German ships from World War I (NDW Public Works Center, 2003). The Navy established NRC Solomons (then called Solomons Complex) in 1941. The facility added occupants first with the Naval Ordnance Laboratory then the Naval Mine Warfare Test Station. Development continued with the Naval Ordnance Laboratory Test Facility (NOLTF) in 1947, which conducted aircraft drops, torpedo shots in the river, and other explosives tests until 1950. Between 1948 and 1950, the Navy acquired the Naval Civil Engineering Laboratory with additional buildings and open spaces. Torpedo work was phased out in 1958 when the torpedo shop was converted into amphibious assembly areas (NAVFAC Washington, 2009).

In 1969, the Navy began converting the northern portion of the facility to a recreational facility while NOLTF maintained the southern portion of the facility as an industrial site. NOTLF deactivated in 1982 and today the industrial area supports the Naval Air Systems Command Support Equipment Facility (ERG, 2014).

2.2 Environmental Setting

NRC Solomons is a 296-acre complex approximately 70 miles southeast of Washington D.C., located in a semi-rural setting surrounded by the Patuxent River on the western and southern sides, Maryland Route 4 on the eastern side, and private property on the northern side. NRC Solomons is operated by MWR to provide recreational activities, but approximately 20 percent of the facility, located in the southwestern corner, is used to support nonrecreational activities. A warehouse. maintenance facilities, and a dive locker are located here (ERG, 2014).

2.2.1 Climate

NRC Solomons lies within in the Humid Temperate, Semi-Continental Climate Zone. Calvert County is located 30 miles southeast of Washington, D.C. It is bounded by the Chesapeake Bay on the east and the Patuxent River on the west (Maryland State Office of Climatology, 2020). The atmospheric flow in this area is from west to east and there are four distinct seasons. Average wind speeds are approximately 9 miles per hour with the windiest periods in this area in late winter and early spring (ERG, 2014).

Typical temperatures for this area are moderate, from an average winter low of 29 degrees Fahrenheit to an average summer high of 86 degrees Fahrenheit. Precipitation occurs evenly throughout the year with slight

increases in July and August (ERG, 2014). The average yearly precipitation is approximately 43 inches and average yearly snowfall is 19.4 inches (Maryland State Office of Climatology, 2020).

2.2.2 Geologic and Hydrogeologic Setting

Thick unconsolidated beds of sand, silt, clay, and gravel underlie NRC Solomons. They are sedimentary in nature and therefore, vulnerable to erosion. Sediment layers are underlain by bedrock which is approximately 2,500 feet below sea level. Soil series at NRC Solomons include Coastal Beaches, Evesboro Matapeake, Mixed Alluvial, Othello, Sassafras, Tidal Marsh, and Westphalia, Gravel Pits and Man Made Land (ERG, 2014).

There are three principal groundwater aquifers beneath Calvert County: Piney Point-Nanjemoy aquifer, Aquia aquifer, and Magothy aquifer. The Piney Point-Nanjemoy aquifer is the source of potable water for residential users in southern Maryland. The Aquia aquifer is the principal source of potable and industrial water for both NRC Solomons and local PWSs. The elevation of the water table beneath NRC Solomons ranges from sea level along the coastal areas to approximately 80 feet above the mean sea level in the southwestern portion of the facility (Navy, 2009). Several drainage areas collect precipitation runoff from NRC Solomons with the runoff going directly to one of the three hydraulic sinks: Patuxent River, estuary areas, or freshwater creeks and ponds associated with wetland areas. Ultimately, the runoff from the Base flows to the Chesapeake Bay (ERG, 2014).

2.2.3 Hydrologic Setting

Several major drainage areas collect precipitation runoff from NRC Solomons; Patuxent River, estuary areas, or freshwater creeks and ponds and wetland areas (ERG, 2014). Surface water is not used for irrigation at NRC Solomons or for drinking within at least 15 miles of the facility. Surface water is used for irrigation and industrial cooling water in other sections of Calvert County (Tetra Tech NUS, 2010).

2.3 Migration Pathways and Potential Receptors

This section discusses hypothetical exposure scenarios (that is, environment media, receptors, and exposure routes) if a PFAS release occurred.

2.3.1 Migration Pathways

Because of their chemical structure, PFAS are chemically and biologically stable and resist typical degradation processes. As a result, PFAS persist in the environment. PFAS are water soluble and migrate readily from soil to groundwater, where they can be transported long distances (USEPA, 2014). Additionally, although PFAS are water soluble and tend to be relatively mobile in groundwater, complex partitioning mechanisms influence fate and transport. For example, a tendency for some PFAS, particularly the sulfonates, to associate with organic carbon in soil and sediment can result in persistent concentrations in these media (Navy, 2017).

Potential migration pathways for PFAS at NRC Solomons include:

- Direct release of PFAS to surface and/or subsurface soil
- Overland flow of PFAS in runoff to downgradient areas, including soil, drainage ditches, and streams and tributaries, eventually discharging to the Potomac River
- Direct release of PFAS to drainages, streams, and low-lying areas
- Leaching of PFAS from soil to groundwater
- Discharge of groundwater to surface water
- Transport via advection in groundwater to downgradient areas

2.3.2 Human Receptors

For the general population, human receptors include people who may use groundwater for drinking water on or off the Base, with ingestion of groundwater considered the primary exposure pathway to PFAS. Additionally, people on-Base, which include construction workers and other people who work or live on-Base, could be exposed to PFAS in soil at any source area. Migration pathways from PFAS source areas to potential exposure points include:

Current receptors (including maintenance workers, industrial workers, and trespassers/visitors), as well as potential future receptors (residents, maintenance workers, industrial workers, trespassers/visitors, and construction workers) could be exposed to PFAS, if present in groundwater, soil, sediment, and surface water.

One residential retirement community, two daycares, and one nursing center are located within 1 mile of NRC Solomons (EDR, 2020a and GoogleMaps, 2020) (**Figure 2-2**).

Groundwater

The drinking water at NRC Solomons is pumped from the Aquia aquifer, the primary groundwater source below Calvert County. The Aquia aquifer is the principal source of potable and industrial water for both NRC Solomons and local PWSs. The elevation of the water table beneath NRC Solomons ranges from sea level along the coastal areas to approximately 80 feet above mean sea level in the southwestern portion of the facility (Navy, 2009). Workers could be exposed to PFAS, if present in groundwater, through ingestion and dermal contact while bathing, although there are currently no screening values or other criteria for dermal contact with PFAS in groundwater. Similarly, if the site is developed for future residential use, future residents could be exposed to PFAS, if present in groundwater, through ingestion and dermal contact while bathing. In areas where groundwater is within the potential depth of construction activities (within about 10 to 15 feet below ground surface), construction workers could be exposed to PFAS, if present, through dermal contact during excavation activities. However, currently there are no permitted public supply wells within the 1-mile buffer.

A detailed assessment of parcels with potential use of groundwater as drinking water was not completed for this PA because all sites identified in Section 4 are located adjacent to the Patuxent River and groundwater discharges to the river. Consequently, there is no complete exposure pathway to private properties surrounding the base.

Soil

Current and future maintenance workers, industrial workers, office workers, trespassers and visitors, and future residents and construction workers could be exposed to PFAS, if present in soil, through incidental ingestion of soil, dermal contact with soil, and inhalation of particulate emissions from surface and subsurface soil. There are no screening levels or other criteria for inhalation of PFAS.

Sediment

Current and future maintenance workers, trespassers and visitors, and future residents and construction workers could be exposed to PFAS, if present in sediment in drainage ditches onsite, and current and future recreational users could be exposed to PFAS, if present in sediment in the Patuxent River, through incidental ingestion of and dermal contact with sediment.

Surface Water

Surface water is not used for irrigation at NRC Solomons or for drinking water at lease within 15 miles if the base (Tetra Tech NUS, 2010). Current and future maintenance workers, trespassers and visitors, and future residents and construction workers could be exposed to PFAS, if present in surface water in drainage ditches onsite, and current and future recreational users could be exposed to PFAS, if present in surface water in the Patuxent River, through incidental ingestion of and dermal contact with surface water. Currently, there are no regulatory screening levels or other criteria for dermal contact with PFAS in surface water.

Biota

PFAS have the potential to bioaccumulate. PFAS, if present in fish and shellfish from the Patuxent River may be ingested by human receptors.

2.3.3 Ecological Receptors

Ecological receptors include any living organisms other than humans, the habitats that support those organisms, and the natural resources that could be adversely affected by environmental contaminants resulting from a release at or migration from a site.

Given the environmental setting and the habitats present, a wide variety of terrestrial, and wetland and aquatic ecological receptors may reside within or use areas of NRC Solomons. In terrestrial habitats, these receptors include terrestrial plants, soil invertebrates, reptiles, birds, and mammals. In areas located directly adjacent to wetland and aquatic habitats, receptors include aquatic and wetland plants, aquatic and benthic invertebrates, reptiles, amphibians, fish, birds, and mammals.

More than 70 plant species have been identified at NRC Solomons. High level disturbance and development at the installation have allowed invasive species to enter the natural areas. More than 30 invasive and non-native plant species have been surveyed at NRC Solomons. Multiflora Rose (*Rosa multiflora*), Common Reed (*Pragmitesaustralis*), Japanese Honeysuckle (*Lonicera japonica*), and privet (*Ligustrum* spp.) are the most wide-spread and problematic invasive species on the installation.

Natural vegetative communities are limited at NRC Solomons with improved lands with mowed lawns and ornamental trees and shrubs as the dominant vegetative cover. The largest natural area, approximately 13 acres, consists of a mixed shrub/woodland located in a wet depression in the central part of the installation. Black Willow (*Salix nigra*), Black Cherry (*Prunus serotina*), Eastern Red Cedar (*Juniperus virginiana*), and Red Maple (*Acer rubrum*) are the dominant tree species. Common shrubs at the site are privet, Multiflora Rose, Winged Sumac (*Rhus copallina*), Groundsel Tree (*Baccharus halimifolia*), and Silky Dogwood (*Cornus amomum*). Japanese Honeysuckle covers much of the vegetation on this site and a wetland swale that passes through is dominated by Common Reed. Grasses, forbs, and herbaceous species are present along the nature trail and throughout the area as well. A second natural area, approximately 7 acres, includes a small pine stand in the southeast portion of the installation, east of Second Cove. Loblolly Pine (*Pinus taeda*) is the dominant canopy tree with little understory or herb layer in this stand. The beach area and small areas of emergent and forested wetlands are other ecological communities at NRC Solomons.

While there are no federally listed species known to occur at NRC Solomons, several species have the potential to be found in waters bordering the installation. The Shortnose Sturgeon (*Acipenser brevirostrum*) is found in the lower Chesapeake Bay and is capable of sustaining populations in the Patuxent River, where it may use adjacent bays for foraging. The Atlantic Sturgeon (*A. oxyrhynchus*) occurs throughout the Bay and has been confirmed from the waters surrounding NAS Patuxent River. Both species are listed as federally endangered (Navy, 2017).

The Leatherback (*Dermochelys coriacea*) and Kemp's Ridley (*Lepidochelys kempii*) are transient sea turtles within the Chesapeake Bay and may use the open waters adjacent to NRC Solomons while in the area. Kemp's Ridley carcasses have been found on NAS beaches. These species are also listed as federally endangered. The Atlantic Loggerhead sea turtle (*Caretta caretta*), which is federally threatened, also transients the Bay and the Patuxent and Potomac Rivers. Loggerhead carcasses have also been found on NAS Patuxent River beaches. NAS Patuxent River biologists coordinate with NOAA Fisheries Service and the Maryland Cooperative Oxford Laboratory and collect data and samples from all dead, stranded sea turtles. All live sea turtle or marine mammal sightings or strandings are reported to the Marine Mammal/Sea Turtle Stranding Network (Navy, 2017).

SECTION 3

Assessment Methodology

This section describes activities performed in support of this PA to identify and characterize potential PFAS releases and identify potential off-Base receptors.

3.1 Data Review

Existing information was gathered and reviewed to identify and characterize locations of potential PFAS use or disposal. A summary of the information reviewed is provided as **Appendix B**. The following document types were evaluated during the data review.

3.1.1 Environmental Restoration Program Records

Environmental Restoration Program records from the administrative record and Naval Installation Restoration Information Solution (NIRIS) database were reviewed to identify potential PFAS release areas and to obtain information on physical investigations and identification of potential pathways and receptors at those areas. Relevant information about historical operations and potential PFAS storage, use, or disposal at NRC Solomons was identified and is included in **Section 4**.

3.1.2 Internet Records

Internet search engines were used to find supplementary records and historical information on fires, crashes, use of AFFF, and spills at NRC Solomons. Search terms included “NRC Solomons,” “Solomons,” “NAS Patuxent River,” “Fire Solomons,” “Crash Solomons,” “Firefighting Foam Solomons,” and “AFFF Solomons.” Limited information relevant to this PA was located during the internet records search. No information relating to PFAS storage, use, or disposal at NRC Solomons was identified in these records.

3.1.3 Navy Archives Records

The Navy Archives online catalog was reviewed using the search terms “Solomons” and “fire.” Search results did not return anything related to PFAS materials/AFFF use or storage.

3.1.4 National Archives Catalog

The National Archives Online Catalog was reviewed using the search terms “Solomons” and “fire.” No information relevant to AFFF or PFAS storage, use, or disposal at NRC Solomons was obtained.

3.1.5 Maps and Aerial Photographs

Aerial photographs of NRC Solomons from Historic Aerials by Netronline, and EDR were reviewed for the following years: 1982, 1993, 1998, 2005, 2006, 2007, 2009, 2011, 2013, and 2015 (Netronline, 2020): 1952, 1960, 1970, 1978, 1982, 1993, 1998, 2005, 2009, 2013, and 2017 (EDR, 2020c). No obvious indication of PFAS storage, use, or disposal was identified during this review.

3.1.6 Environmental Data Resources Reports

The following Environmental Data Resources, Inc. (EDR) reports were obtained and reviewed for NRC Solomons and the immediate adjacent area:

- GeoCheck Report (EDR, 2016)
- Offsite Receptor Report (EDR, 2020a)
- NEPASearch Map Report (EDR, 2020b)
- Aerials (EDR, 2020c)

Sensitive receptors, flood hazard areas, wildlife area information, and historical aerial photographs were obtained from these reports. No permitted public supply wells were identified within the 1-mile buffer. No information relating to PFAS storage, use, or disposal at NRC Solomons was identified in these reports.

3.2 Interviews

CH2M provided the Base with a list of employees to interview based on Navy guidance, and the Base identified individuals to interview based on that list and availability. CH2M conducted interviews by contacting Base personnel with information regarding the history and operations at NRC Solomons with potential PFAS storage, use, or release through emails and if needed, follow-up phone calls starting in August 2014. The goal of these interviews was to validate and verify data collected during document and record reviews, and to identify other information related to PFAS not previously found in historical documents.

Information relating to PFAS storage and use at NRC Solomons was identified in these interviews. Relevant information is included in **Section 4**, and additional details of the listed interviews are presented in **Appendix C**.

3.3 Site Reconnaissance

A site reconnaissance event was completed in January 2017 at NRC Solomons. During the site reconnaissance, accessible areas were visited to identify any evidence of PFAS use and disposal and document physical site characteristics (such as surface flow and drainage conditions) for areas with potential PFAS releases.

SECTION 4

Findings and Recommendations

Table 4-1 provides a list of typical PFAS release areas at Navy facilities, summarizes whether those areas are present at NRC Solomons, and for those that are present, identifies whether evidence suggests the area is a potential PFAS source area. Areas evaluated in this PA are shown in **Figure 4-1** and **4-2**. The one area identified in **Table 4-1** as potential PFAS source areas is further evaluated in **Section 4.1**.

4.1 Potential PFAS Source Areas

One area identified as a potential PFAS source area in **Table 4-1** was further evaluated, and the findings are presented below.

4.1.1 Building 6454 – Hazardous Storage Facility

Description and Operational History

Building 6454 - Hazardous Storage Facility is located in the southern portion of NRC Solomons (**Figures 4-1 and 4-2**). This building has a fire suppression system which has contained 3M 3% AFFF (Morgan, pers. comm., 2017; Yannayon, pers. comm., 2014; Burandt, pers. comm., 2014). Building 6454 was built in the late 1990s and had AFFF until approximately 2014 which was later replaced with PFAS-containing alcohol resistant foam.

Potential for PFAS Use or Release

In January 2017, approximately 100 gallons of PFAS-containing, alcohol-resistant-AFFF concentrate exited the mechanical room and entered a grassy area and storm swale behind the building. There was no cleanup or remediation of any soil (Manningas, pers. comm., 2017).

Migration Pathway and Exposure Assessment

Alcohol-resistant foam which entered the drainage swale would follow the stormwater system and discharge to the Second Cove . Foam which entered the grassy area may have leached into groundwater. Groundwater flow in the vicinity of Building 6454 is expected to be to the Southeast toward Second Cove, but there could also be a component of flow to the south toward the Patuxent River. PFAS which has leached into to groundwater would be expected to migrate through advection into adjacent surface water bodies, discharging to surface water or partitioning to sediment. Any information found on off-Base drinking water sources and adjacent to NRC Solomons will be reported in the SI report.

Site Conclusions

Because PFAS-containing, alcohol-resistant foam was released at Building 6454, further investigation in the form of an SI should be considered.

Table 4-1. Areas Evaluated for Potential PFAS Releases

Area	Potential PFAS Source Area (Yes/No)	Rationale
Fire Training Areas		
None identified		
Fire Stations		
None identified		
Hangars and Other Structures with Possible Foam Fire Suppression Systems		
Building 6454 – Hazardous Storage Facility	Yes	Building 6454 - Hazardous Storage Facility is located in the southern portion of NRC Solomons (**Figures 4-1 and 4-2**). This building has a fire suppression system which has contained 3M 3% AFFF (Morgan, pers. comm., 2017; Yannayon, pers. comm., 2014; Burandt, pers. comm., 2014). Building 6454 was built in the late 1990s and had AFFF until approximately 2014. In January 2017, approximately 100 gallons of PFAS-containing, alcohol-resistant-AFFF concentrate exited the mechanical room and entered a grassy area and storm swale behind the building. There was no cleanup or remediation of any soil (Manningas, pers. comm., 2017). Because PFAS-containing, alcohol-resistant foam was released at Building 6454 and entered the drainage swale behind the building which eventually leads to the Second Cove, further investigation of these areas should be considered in the SI. This includes Second Cove.
Foam Retention Ponds		
None identified		
AFFF Spray Test Areas		
None identified		
AFFF Storage Areas		
None identified		
Plane or Drone Crashes		
None identified		
Stormwater Drainage Ditches and Retention Basins where PFAS-containing Materials were Released		
None identified		
Crash Debris and Storage Areas		
None identified		
Aircraft Fuel Purge Stations		
None identified		
Bulk Fuel Storage Areas		
None identified		
Refueler and Fire Truck Maintenance Ramps		
None identified		
Pesticide and Paint Storage/Usage/Release		
None identified		
Sanitary Wastewater Treatment Plant/Industrial Water Treatment Plant and associated Drying Beds/Spray Fields/Sludge Lagoons		
None identified		
Car Washes and Auto Body Shops		
None identified		
Disposal Areas/ Landfills		
Site 1 – Cove 1 Disposal Area	No	Site 1 – Cove 1 Disposal Area is located along the Patuxent River, near the Thomas Johnson Memorial Bridge **(Figure 4-1**). Site 1 was originally used as the station dump from World War II until the mid-1980s. Activities at this site included sensors and land mine testing, static firing of high explosive charges, and pyrotechnic charges buried at depth. All waste generated at the facility was reportedly sent to Site 1, including household refuse, domestic trash, scrap lumber and metal, industrial waste such as paints, solvents, polychlorinated biphenyls, and contaminated oil (Navy, 1987; MDE, 2019). Drum liners were routinely burned at the site; however, the timeframe of the burning operations conducted at this site are not known (NEESA, 1990). The Ordnance Literature Search for Cove 1, Site 1 (Dolph, 2000) stated that there were no official records that specifically documented what was deposited in or burned at this disposal area (Malcolm Pirnie, 2006). A removal action for Site 1 began mobilization in 2007 and included the excavation and offsite disposal of metals, debris, suspect material potentially presenting an explosives hazard, and soil potentially contaminated with semivolatile organic compounds. A final closeout report for the removal action was completed in 2008 (Shaw, 2008). There is no evidence of disposal, use, or release of PFAS-containing materials at Site 1; therefore, no additional action is warranted.

Table 4-1. Areas Evaluated for Potential PFAS Releases

Area	Potential PFAS Source Area (Yes/No)	Rationale
Site 3 – Suspected Landfill	No	Site 3 – Suspected Landfill is located on the western side of NRC Solomons along the Patuxent River (**Figure 4-1**). Little is known about the history of this site. Visual inspection revealed various refuse and debris partially uncovered around the bank; however, subsequent field surveys completed in 1991 concluded that there was no evidence of disposal at this site (MDE, 2019). It was the Navy's assertion that the debris previously observed was placed there for shoreline erosion control purposes (MDE, 2003). There is no evidence of disposal of PFAS-containing material at Site 3; therefore, no additional action is warranted.
Site 4 – Cabin Disposal Area	No	Site 4 – Cabin Disposal Area is located in the east-central portion of the facility near cabin rental units (**Figure 4-1**). Waste was burned around the rental cabins from the mid-1940s to the early 1970s. Waste may have included mine and torpedo casings, batteries, and paint cans beneath what is now rental cabins and playground areas (MDE, 2019). The timeframe in which these burning activities occurred generally predates use of PFAS-containing AFFF. Additionally, there is no indication fire requiring emergency response ever occurred; therefore, no additional action is warranted.
Building/ Structure Fires		
None identified		
Government and Personal Vehicle Fires		
None identified		
Chrome Plating/ Bath Mist Suppressant		
None identified		
Open Burn Areas/ Burn Structures		
None identified		
Other		
None identified		
Active Ranges where PFAS-Containing Materials may have been released		
None identified		

Notes:
Potential PFAS Source Area
No Additional Action is Warranted

SECTION 5

Conclusions

This PA evaluated the potential for PFAS sources at NRC Solomons. **Table 4-1** identifies the evaluation of four potential PFAS source areas. No additional action is warranted for three areas. One area at NRC Solomons is recommended for further investigation as part of an SI.

DoD Instruction 4715.18, *Emerging Chemicals of Environmental Concern*, requires that: "Risks to people, the environment, and DoD missions, programs, and resources shall be assessed and, when appropriate, actions shall be taken to reduce risks related to ECs [emerging contaminants] development, use, or release." Additionally, the Navy *Interim Per- and Polyfluoroalkyl Substances (PFAS) Site Guidance for NAVFAC Remedial Project Managers (RPMs)/September 2017 Update* (2017) recommends:

> "RPMs should consider investigating ER sites for PFAS when the conceptual site model indicates:
>
> a. Historical release or use of aqueous film forming foam (AFFF), or
>
> b. Historical use of an area for other industrial activities (e.g., plating operations) that may have released PFAS."

Based on recent Navy experience, areas at Naval and Marine Corps Air Stations, including outlying or auxiliary landing fields, or other applicable installations with potential repeated (for example, former firefighting training areas) or significant (for example, crashes) AFFF use, releases should be prioritized for investigation.

This PA has identified one location meeting the first criterion, triggering the need for further investigation to determine whether a release to the environment at levels that warrant remedial actions. Building 6454, Hazardous Storage Facility, is the one location recommended for additional PFAS SI (**Figure 4-2**).

SECTION 6

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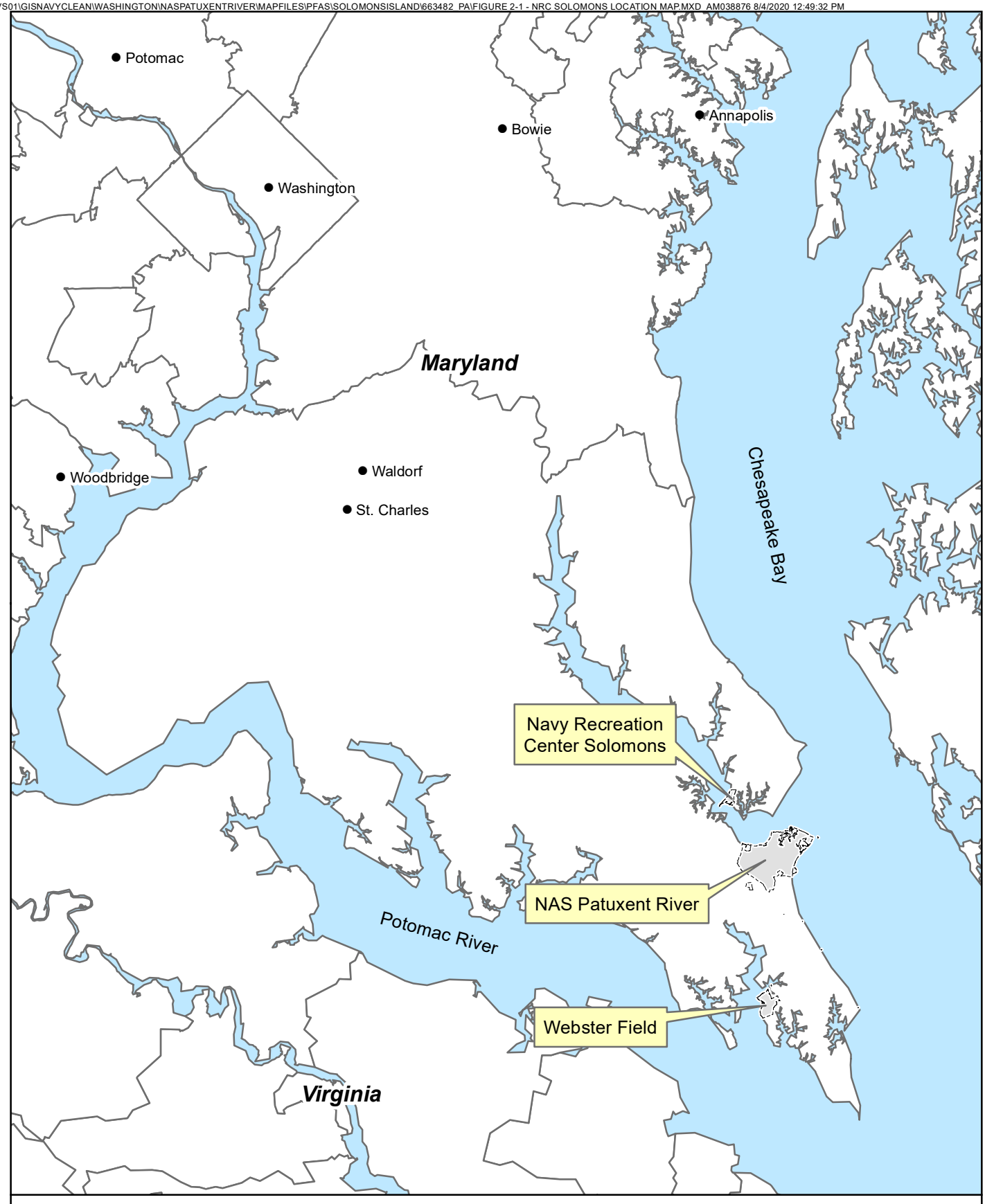
Figures



Legend
- Cities
- Installation Boundary

N

0 22,500 45,000
Feet

Figure 2-1
Navy Recreation Center Solomons Location Map
Preliminary Assessment For PFAS
Navy Recreation Center Solomons
Solomons, Maryland

ch2m

\\DC1VS01\GISNAVYCLEAN\WASHINGTON\NASPATUXENTRIVER\MAPFILES\PFAS\SOLOMONSISLAND\663482_PA\FIGURE 2-2 - SOLOMONS BASEMAP.MXD AM038876 8/31/2020 4:21:35 PM

Legend
- Retirement Community
- Nursing
- Daycare
- 1 mile buffer
- Installation Boundary

N

0 850 1,700 3,400

Feet

1 inch = 1,700 feet

Imagery Source: Esri 2018

Figure 2-2
Navy Recreation Center Solomons Basemap
Preliminary Assessment For PFAS
Navy Recreation Center Solomons
Solomons, Maryland

ch2m.

\\DC1VS01\GISNAVYCLEAN\WASHINGTON\NASPATUXENTRIVER\MAPFILES\PFAS\SOLOMONSISLAND\663482_PA\FIGURE 4-1 - AREAS EVALUATED FOR PFAS.MXD AM038876 3/10/2021 10:56:26 AM

Legend

- Potable Well Location
- Potential PFAS Source Area
- No Additional Action is Warranted
- RoadCenterline
- Building Area
- Installation Boundary

N

0 300 600 1,200 Feet

1 inch = 600 feet

Figure 4-1
Areas Evaluated for Potential PFAS Releases
Preliminary Assessment For PFAS
Navy Recreation Center Solomons
Solomons, Maryland

ch2m

\\DC1VS01\GISNAVYCLEAN\WASHINGTON\NASPATUXENTRIVER\MAPFILES\PFAS\SOLOMONSISLAND\663482_PA\FIGURE 4-2 - BUILDING 6454.MXD AM038876 8/31/2020 2:18:38 PM

Legend

- Potential PFAS Source Area
- No Additional Action is Warranted
- Estimated Groundwater Flow Direction
- Surface Water Flow Direction
- Drainage Swale
- RoadCenterline
- Installation Boundary

N

0 50 100 200 Feet

1 inch = 100 feet

Figure 4-2
Building 6454 - Hazardous Storage Facility
Preliminary Assessment For PFAS
Navy Recreation Center Solomons
Solomons, Maryland

ch2m

Appendix A
On-Base Drinking Water PFAS Results

eurofins | Lancaster Laboratories Environmental

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Analysis Report

ANALYTICAL RESULTS

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Inspection Experts, Inc.
9220 Rumsey Road
Bay #5
Columbia MD 21045

Report Date: December 21, 2016

Project: NAVFAC - Pax River Sampling

Submittal Date: 10/07/2016
Group Number: 1718862
PO Number: 15-0011-219
State of Sample Origin: MD

Client Sample Description	Lancaster Labs (LL) #
Soloman-6041 Grab Potable Water	8635204
Webster Field-8130 Grab Potable Water	8635206
Webster Field-8195 Grab Potable Water	8635208

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Regulatory agencies do not accredit laboratories for all methods, analytes, and matrices. Our current scopes of accreditation can be viewed at http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ . To request copies of prior scopes of accreditation, contact your project manager.

Electronic Copy To Inspection Experts Inc. Attn: Kosala De Silva

Respectfully Submitted,

Stacy L. Hess
Project Manager

(717) 556-7236

Sample Description: Soloman-6041 Grab Potable Water
NAVFAC-Pax River Sampling

LL Sample # PW 8635204
LL Group # 1718862
Account # 38771

Project Name: NAVFAC - Pax River Sampling

Collected: 10/06/2016 07:50 by GK

Submitted: 10/07/2016 18:45
Reported: 12/21/2016 14:11

Inspection Experts, Inc.
9220 Rumsey Road
Bay #5
Columbia MD 21045

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Misc. Organics	**EPA 537 Rev. 1.1 modified**		ng/l	ng/l	ng/l	
10954	Perfluorooctanoic acid	335-67-1	N.D.	1	2	1
10954	Perfluorononanoic acid	375-95-1	N.D.	1	2	1
10954	Perfluoroheptanoic acid	375-85-9	N.D.	1	2	1
10954	Perfluorobutanesulfonate	375-73-5	N.D.	4	10	1
10954	Perfluorohexanesulfonate	355-46-4	N.D.	4	10	1
10954	Perfluoro-octanesulfonate	1763-23-1	N.D.	5	10	1

The stated QC limits are advisory only until sufficient data points can be obtained to calculate statistical limits.

Sample Comments

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10954	PFAAs in Water by LC/MS/MS	EPA 537 Rev. 1.1 modified	1	16291011	10/22/2016 01:09	Jason W Knight	1
14091	PFAA Water Prep	EPA 537 Rev. 1.1 modified	1	16291011	10/18/2016 19:00	Devon M Whooley	1

*=This limit was used in the evaluation of the final result

Sample Description: Webster Field-8130 Grab Potable Water
NAVFAC-Pax River Sampling

LL Sample # PW 8635206
LL Group # 1718862
Account # 38771

Project Name: NAVFAC - Pax River Sampling

Collected: 10/06/2016 08:50 by GK

Submitted: 10/07/2016 18:45
Reported: 12/21/2016 14:11

Inspection Experts, Inc.
9220 Rumsey Road
Bay #5
Columbia MD 21045

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Misc. Organics	**EPA 537 Rev. 1.1 modified**		**ng/l**	**ng/l**	**ng/l**	
10954	Perfluorooctanoic acid	335-67-1	N.D.	1	2	1
10954	Perfluorononanoic acid	375-95-1	N.D.	1	2	1
10954	Perfluoroheptanoic acid	375-85-9	N.D.	1	2	1
10954	Perfluorobutanesulfonate	375-73-5	N.D.	4	10	1
10954	Perfluorohexanesulfonate	355-46-4	N.D.	4	10	1
10954	Perfluoro-octanesulfonate	1763-23-1	N.D.	5	10	1

The stated QC limits are advisory only until sufficient data points can be obtained to calculate statistical limits.

Sample Comments

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10954	PFAAs in Water by LC/MS/MS	EPA 537 Rev. 1.1 modified	1	16291011	10/22/2016 01:42	Jason W Knight	1
14091	PFAA Water Prep	EPA 537 Rev. 1.1 modified	1	16291011	10/18/2016 19:00	Devon M Whooley	1

*=This limit was used in the evaluation of the final result

Sample Description: Webster Field-8195 Grab Potable Water
NAVFAC-Pax River Sampling

LL Sample # PW 8635208
LL Group # 1718862
Account # 38771

Project Name: NAVFAC - Pax River Sampling

Collected: 10/06/2016 09:12 by GK

Submitted: 10/07/2016 18:45
Reported: 12/21/2016 14:11

Inspection Experts, Inc.
9220 Rumsey Road
Bay #5
Columbia MD 21045

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Misc. Organics	**EPA 537 Rev. 1.1 modified**		ng/l	ng/l	ng/l	
10954	Perfluorooctanoic acid	335-67-1	N.D.	1	2	1
10954	Perfluorononanoic acid	375-95-1	N.D.	1	2	1
10954	Perfluoroheptanoic acid	375-85-9	N.D.	1	2	1
10954	Perfluorobutanesulfonate	375-73-5	N.D.	4	10	1
10954	Perfluorohexanesulfonate	355-46-4	N.D.	4	10	1
10954	Perfluoro-octanesulfonate	1763-23-1	N.D.	5	10	1

The stated QC limits are advisory only until sufficient data points can be obtained to calculate statistical limits.

Sample Comments

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10954	PFAAs in Water by LC/MS/MS	EPA 537 Rev. 1.1 modified	1	16291011	10/22/2016 01:58	Jason W Knight	1
14091	PFAA Water Prep	EPA 537 Rev. 1.1 modified	1	16291011	10/18/2016 19:00	Devon M Whooley	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Inspection Experts, Inc. Group Number: 1718862
Reported: 12/21/2016 14:11

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	MDL**	LOQ
	ng/l	ng/l	ng/l
Batch number: 16291011	Sample number(s): 8635204,8635206,8635208		
Perfluorooctanoic acid	N.D.	1	2
Perfluorononanoic acid	N.D.	1	2
Perfluoroheptanoic acid	N.D.	1	2
Perfluorobutanesulfonate	N.D.	4	10
Perfluorohexanesulfonate	N.D.	4	10
Perfluoro-octanesulfonate	N.D.	5	10

LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 16291011	Sample number(s): 8635204,8635206,8635208								
Perfluorooctanoic acid	200	167.38	200	149.06	84	75	70-130	12	30
Perfluorononanoic acid	200	148.47	200	141.11	74	71	70-130	5	30
Perfluoroheptanoic acid	200	164.76	200	136.34	82	68*	70-130	19	30
Perfluorobutanesulfonate	177	145.6	177	140.39	82	79	70-130	4	30
Perfluorohexanesulfonate	189	166.34	189	158.46	88	84	70-130	5	30
Perfluoro-octanesulfonate	191	159.48	191	158.25	83	83	70-130	1	30

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ng/l	MS Spike Added ng/l	MS Conc ng/l	MSD Spike Added ng/l	MSD Conc ng/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 16291011	Sample number(s): 8635204,8635206,8635208 UNSPK: 8635204									
Perfluorooctanoic acid	N.D.	199.52	153.25			77		70-130		
Perfluorononanoic acid	N.D.	199.52	137.65			69*		70-130		
Perfluoroheptanoic acid	N.D.	199.52	139.65			70		70-130		
Perfluorobutanesulfonate	N.D.	176.58	154.33			87		70-130		
Perfluorohexanesulfonate	N.D.	188.55	165.41			88		70-130		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Quality Control Summary

Client Name: Inspection Experts, Inc. Group Number: 1718862
Reported: 12/21/2016 14:11

MS/MSD (continued)

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ng/l	MS Spike Added ng/l	MS Conc ng/l	MSD Spike Added ng/l	MSD Conc ng/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Perfluoro-octanesulfonate	N.D.	190.54	159.18			84		70-130		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Environmental Analysis Request/Chain of Custody

eurofins | Lancaster Laboratories Environmental

Acct. # 38771 Group # 1718862 Sample # 8635203-08

Client: Inspection Experts Inc.	
Project Name/#: NAVFAC - Pax River Sampling	Site ID #:
Project Manager: Kosala De Silva	P.O. #: 15-0011-219
Sampler: Gayan Kularatne	PWSID #:
Phone #: 410-715-3939	Quote #:
State where samples were collected: ____	For Compliance: Yes ☐ No ☐

Matrix: Soil ☐ Sediment ☐ Tissue ☐ | Water: Potable ☐ Ground ☑ NPDES ☐ Surface ☐ | Other:

Analyses Requested / Preservation Codes

Sample Identification	Collection Date	Collection Time	Grab	Composite	Soil	Water	Other	Total # of Containers	PFOS/PFOA (EPA 537)	Remarks
Soloman - 6041 - FB	10/06	0746	X						1	Field Reagent Blank to be
Soloman - 6041	10/06	0750	X						3	analyzed only with confirmed
Webster field - 8130 - FB	10/06	0845	X						1	positive result of respective
Webster Field - 8130	10/06	0850	X						3	sample
webster Field - 8195 - FB	10/06	0908	X						1	
webster Field - 8195	10/06	0912	X						3	

For Lab Use Only
SF #: ____
SCR #: ____

Preservation Codes
H = HCl T = Thiosulfate
N = HNO_3 B = NaOH
S = H_2SO_4 P = H_3PO_4
O = Other

Turnaround Time Requested (TAT) (please check): Standard ☑ Rush ☐
(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed:

Rush results requested by (please check): E-Mail ☑ Phone ☐

E-mail Address: kosala@ieinc.net

Phone:

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	10/06/16		[signature]	10/6/16	1200
[signature]	10/7/16		[signature]	10-7-16	10:35
[signature]	10-7-16	2100			
			[signature]	10/7/16	18:45

Relinquished by Commercial Carrier:
UPS ____ FedEx ____ Other ____

Temperature upon receipt 1.3°C °C

Data Package Options (please check if required)

Type I (Validation/non-CLP)	☐	MA MCP	☐
Type III (Reduced non-CLP)	☐	CT RCP	☐
Type VI (Raw Data Only)	☐	TX TRRP-13	☐
NJ DKQP	☐	NYSDEC Category ☐ A or ☐ B	

EDD Required? Yes ☐ No ☐ If yes, format: ____

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Sample Administration Receipt Documentation Log

Doc Log ID: 164629

Group Number(s): 1718862

Client: Inspection Experts Inc.

Delivery and Receipt Information

Delivery Method:	ELLE Courier	Arrival Timestamp:	10/07/2016 18:48
Number of Packages:	1	Number of Projects:	1

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Cathy Murphy (10960) at 22:55 on 10/07/2016

Samples Chilled Details

Thermometer Types: *DT = Digital (Temp. Bottle)* *IR = Infrared (Surface Temp)* *All Temperatures in °C.*

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT121	1.3	DT	Wet	Y	Bagged	N

2425 New Holland Pike
Lancaster, PA 17605-2425

T | 717-656-2300
F | 717-656-2681
www.LancasterLabs.com

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mg**	milligram(s)
C	degrees Celsius	**mL**	milliliter(s)
cfu	colony forming units	**MPN**	Most Probable Number
CP Units	cobalt-chloroplatinate units	**N.D.**	none detected
F	degrees Fahrenheit	**ng**	nanogram(s)
g	gram(s)	**NTU**	nephelometric turbidity units
IU	International Units	**pg/L**	picogram/liter
kg	kilogram(s)	**RL**	Reporting Limit
L	liter(s)	**TNTC**	Too Numerous To Count
lb.	pound(s)	**µg**	microgram(s)
m3	cubic meter(s)	**µL**	microliter(s)
meq	milliequivalents	**umhos/cm**	micromhos/cm

< less than

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Laboratory Data Qualifiers:

C - Result confirmed by reanalysis
E - Concentration exceeds the calibration range
J (or G, I, X) - estimated value ≥ the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P - Concentration difference between the primary and confirmation column >40%. The lower result is reported.
U - Analyte was not detected at the value indicated
V - Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference…
W - The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

Appendix B
Summary of Records Reviewed

Appendix B. Summary of Records Reviewed

Date	Title	Author Affiliation
Environmental Restoration Program Records and Other Environmental Records		
November 1969	MIL-F-24385, Military Specification: Fire Extinguishing Agent, Aqueous Film Forming Foam (AFFF) Liquid Concentrate, Six Percent, for Fresh and Sea Water	Department of Defense
July 1986	Memorandum Regarding Results from Sand Blasting Area at Solomons Annex and Recommendations for Future Blasting NRECC Solomons, Maryland.	Department of the Navy
January 1987	Memorandum Regarding Investigation of Past Disposal at Solomons Island Annex NRECC Solomons, Maryland.	Department of the Navy
August 1990	Preliminary Assessment Report for Naval Recreation Center Solomons Annex (Naval Air Station Patuxent River Annex), Solomons, Maryland 20688	Naval Energy and Environmental Support Activity
September 1991	Guidance for Performing Preliminary Assessments under CERCLA. EPA/540/G-91/013	United States Environmental Protection Agency
April 1995	Final Engineering Evaluation/ Cost Analysis for Site 2, The Former Open-Air Sandblast Area, Naval Recreation Center, Solomons, Maryland.	Baker Environmental, Inc.
September 1996	Solomons Complex Old Landfill Site Preliminary Site Assessment NRC, Solomons, Maryland.	Department of the Navy
December 19998	Capsule Report, Hard Chromium fume Suppressants and Control Technologies. EPA/625/R-98/002. Office of Research and Development.	United States Environmental Protection Agency
March 2006	Final Preliminary Assessment Solomons Complex, Maryland.	Malcolm Pirnie
December 2000	Cove 1- Site 1 Ordnance Literature Search, Solomons Island Complex (Former US Naval Mine Warfare Station), Solomons, Maryland	James E. Dolph, Department of the Navy
July 2003	Closeout Letter and Summary Report, Site 3- Suspected Disposal Area, Naval Recreation Center Solomons, Maryland. Dated July 2003.	Maryland Department of the Environment
September 2003	Technical Memorandum: Revised Update to the Human Health Risk Assessment for the Final Expanded Site Inspection report for Cabin Disposal Area, NAVSTAWASH Solomons Complex.	NAVSTA WASH Solomons Complex- David Steckler
December 2003	General Management Plan for NDW Solomons Complex.	Naval District Washington (NDW) Public Works Center
February 2007	Technical Memorandum: Wetlands Delineation Pistol Range and Cove 1 Areas, NRC Solomons, Maryland.	Tetra Tech NUS Inc.
April 2007	Removal Action Work Plan for Cove 1 Disposal Area, NRC Solomons, Maryland	Tetra Tech NUS Inc.
April 2007	Preliminary Conceptual Mitigation Plan, Cove 1 Disposal Area, NRC Solomons, Maryland.	NAVFAC Washington
July 2007	Stormwater Management/ Erosion and Sediment Control Area for Cove 1 Area. Naval Recreation Center Solomons Complex, Solomon, Maryland.	Tetra Tech NUS Inc.
July 2007	Quality Assurance Project Plan, Cove 1 Removal Action, Naval Recreation Center, Solomons Complex, Solomons, Maryland.	Tetra Tech NUS Inc.
July 2007	Sampling and Analysis Plan, Range Anomaly Removal Action, Naval Recreation Center Solomons Complex, NRECC Solomons, Maryland.	Tetra Tech NUS Inc.
August 2008	Final Closeout Report- Removal Action for Cove 1 and Surrounding Areas, Naval Recreation Center, Solomons Complex	Shaw Environmental, Inc.
August 2008	Site Inspection Report for Pistol Range, East Land Range, and East Land Range No.1, Solomons Complex, Solomons, Maryland.	Tetra Tech NUS Inc.
February 2009	Final Naval Recreation Center Solomons Integrated Natural Resource Management Plan.	NAVFAC Washington and Geo-Marine, Inc.
October 2009	Site Management Plan, 2009 Update. Prepared by CH2M HILL.	Department of the Navy
August 2010	Draft Request for Qualifications No. N40080LO10338. Enhanced Use Lease Navy Recreation Center Solomons, Solomons, Maryland	NAVFAC Washington
September 2010	Preliminary Assessment for Munitions Response Program, Naval Air Station Patuxent/Solomons Complex Patuxent River, Maryland. September.	Tetra Tech NUS, Inc.
September 2013	Draft Technical Memorandum Multiple Munitions Response Sites Expanded Preliminary Assessment, Naval Air Station Patuxent River, St. Mary's County, Maryland. September.	CH2M HILL
November 2013	Expanded Preliminary Assessment for Munitions Response Program, Water Ranges at Solomons Complex Patuxent River, Calvert County, Maryland. November.	CH2M HILL
June 2014	Final Enhanced Use Lease Environmental Condition of Property Report, Naval Recreation Center Solomons, Solomons, Maryland. June	Eastern Research Group, Inc.
July 2014	"Provisional Peer-Reviewed Toxicity Values for Perfluorobutane Sulfonate (CASRN 375-73-5) and Related Compound Potassium Perfluorobutane Sulfonate (CASRN 29420-49-3)." Superfund Health Risk Technical Support Center, National Center for Environmental Assessment, Office of Research and Development.	United States Environmental Protection Agency
May 2016	Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA). EPA 822-R-16-005. Office of Water	United States Environmental Protection Agency
May 2016	Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS). EPA 822-R-16-004. Office of Water	United States Environmental Protection Agency
November 2016	Fact Sheet: PFOA and PFOS Drinking Water Health Advisories. EPA 800-F-16-003	United States Environmental Protection Agency
January 2017	The Third Unregulated Contaminant Monitoring Rule (UCMR3) Data Summary	United States Environmental Protection Agency
July 2017	Integrated Natural Resources Management Plan, Naval Air Station Patuxent River Complex's, Naval Recreation Center Solomons, Maryland	Department of the Navy
September 2017	Interim Per- and Polyfluoroalkyl Substances (PFAS) Site Guidance for NAVFAC Remedial Project Managers (RPMs)/September 2017 Update. Office of the Assistant Secretary of the Navy, Energy, Installations, and Environment.	Department of the Navy
February 2019	EPA's Per- and Polyfluoroalkyl Substances Action Plan	United States Environmental Protection Agency
July 2019	Development of the Proposed Unregulated Contaminant Monitoring Rule for the Fifth Monitoring Cycle (UCMR 5): Public Meeting and Webinar. Held July 16, 2019. USEPA Office of Ground Water and Drinking Water.	United States Environmental Protection Agency
iNFADS		
July 2020	Information not available for access/ queries	
Internet Records		
April 2009	Naval Recreation Center Solomons April 28, 2009 Pier Fire. https://www.youtube.com/watch?v=UW4IDWhu2-w Accessed June 2020	kah177: https://www.youtube.com/watch?v=UW4IDWhu2-w
October 2017	Department of Defense. 2017. Aqueous Film Forming Foam Report to Congress: https://www.denix.osd.mil/derp/home/documents/aqueous-film-forming-foam-report-to-congress/	Department of Defense
February 2019	EPA's Per- and Polyfluoroalkyl Substance (PFAS) Action Plan: https://www.epa.gov/sites/production/files/2019-02/documents/pfas_action_plan_021319_508compliant_1.pdf	United States Environmental Protection Agency

Appendix B. Summary of Records Reviewed

Date	Title	Author Affiliation
December 2019	Naval Recreation Center Solomons (MD-058). Solomons, Maryland, Calvert County (Federal Facility) https://mde.state.md.us/programs/LAND/MarylandBrownfieldVCP/Documents/www.mde.state.md.us/assets/document/brownfields/Naval_Rec_Solomons.pdf	Maryland Department of the Environment
January 2020	ITRC PFAS Regulations, Guidance, and Advisories, Section 4 tables https://pfas-1.itrcweb.org/wp-content/uploads/2020/02/ITRCPFASFactSheetSect4Tables_January2020.xlsx	Interstate Technology Regulatory Council
February 2020	ASN Aviation Safety Database: https://aviation-safety.net/database/	Aviation Safety Network- Flight Safety Foundation
February 2020	https://www.secnav.navy.mil/eie/Pages/PFC-PFAS.aspx	Assistant Secretary of the Navy (Energy, Installation, and Environment)
February 2020	America's Navy- Forged By The Sea: https://www.navy.mil/	Department of the Navy
February 2020	Accident Archives 1960- 2020: http://www.baaa-acro.com/crash-archives	Bureau of Aircraft Accidents Archives
February 2020	Aviation Accident Database and Synopses: https://www.faa.gov/data_research/accident_incident/	Department of Transportation; Federal Aviation Administration
February 2020	Navy Archives: https://www.history.navy.mil/research/histories.html	Naval History and Heritage Command
February 2020	National Archives Catalog: Search for Solomons and Fire https://catalog.archives.gov/search?q=fire%20and%20Solomon	National Archives Online
February 2020	Installation History and Profile: Search for Solomons and Fire https://www.dcmilitary.com	www.dc.military.com
March 2020	Consumer Confidence Report on the Quality of Drinking water NAS Patuxent River 2018. https://www.cnic.navy.mil/regions/ndw/installations/nas_patuxent_river/om/environmental_support.html	Naval Air Station Patuxent River
March 2020	Public Health- PFAS: https://www.publichealth.va.gov/exposures/pfas.asp	U.S. Department of Veterans Affairs
March 2020	America's Navy. Naval Sea Systems Command. https://search.usa.gov	Department of the Navy
March 2020	National Transportation Safety Board: https://www.ntsb.gov : Search for Solomons, Maryland. Dates between January 1960 and March 27, 2020.	National Transportation Board
March 2020	Accident Archives 1960- 2020: http://www.baaa-acro.com/crash-archives	Bureau of Aircraft Accidents Archives
March 2020	Federal Aviation Administration. Accident & Incident Data: Solomons.https://www.faa.gov/data_research/accident_incident/	Department of Transportation - Federal Aviation Administration
March 2020	USFWS-Calvert County, Maryland-iPAC Resource List: https://ecos.fws.gov/ipac/location/BPRYDE4KVBEDBMXNDY2KWDPH6U/resources	U.S. Fish and Wildlife Service
March 2020	Military Installations- Naval Air Station Patuxent River.https://installations.militaryonesource.mil/military-installation/naval-air-station-Patuxent-river	Military Installations Website
March 2020	National Archives Catalog: Research Our Records - NRC Solomons https://catalog.archives.gov	National Archives On-line
March 2020	NAS Patuxent River- Tester: Fire Damaged Pier at NRC Slated for Demo: https://www.dcmilitary.com/tester/news/local/fire-damaged-pier-at-nrc-slated-for-demo/article_d2aac38b-8ab1-560a-b645-61ee0a41e803.html.	Naval Air Station Patuxent River- Tester
March 2020	Navy MWR Solomons. https://www.navymwrsolomons.com/ . Accessed March 2020	Navy MWR Solomons
Maps and Aerial Photographs		
2020 (access)	https://www.historicaerials.com/topomap/Maryland/Calvert/24000/1962/5367264/USGS-1:24000-SCALE-QUADRANGLE-FOR-SOLOMONS-ISLAND,-MD-1944	Historic Topography and Aerials by Netronline
Environmental Data Research. Inc.		
June 2016	Solomons MD NRECC, Solomons MD 20688. EDR GeoCheck Report. 4656377.37s	Environmental Data Resources, Inc.
February 2020	NRC Solomons, Solomons, MD 20688. EDR Offsite Receptor Report. 5984024.3s	
	NRC Solomons, Solomons, MD 20688. EDR NEPA Search Report. 5984024.2s	
	NRC Solomons, Solomons, MD 20688. EDR Aerials_Solomons 5984024.1.	
Laboratory Reports		
December 2016	NAVFAC - PAX River Sampling. Analytical Results Report. Group Number: 1718862	Eurofins. Lancaster Laboratories Environmental

Appendix C
Interview Record

Communication Record	
Date: 08/14/2014	
Name of Base, State: Navy Recreation Center Solomons, Maryland	
Interviewer: John Ledbetter	
Organization: CH2M	Phone: 703-376-5172
Position/role on this project: Interviewer	Email: John.Ledbetter1@jacobs.com
Interviewee: Gerald Burandt	
Position/Job Title: NAS Patuxent River Public Works- Environmental Spills Manager	
General Discussion Notes and Information:	
Mr. Burandt identified Building 6454 as a site that was outfitted with an AFFF type fire suppression system. Mr. Burandt requests more information about the AFFF fire suppression system from John Caulder (DOD NAS Patuxent River/ NDW Fire and Emergency Services), who he believes has information about these systems.	

Communication Record	
Date: 01/18/2017	
Name of Base, State: Navy Recreation Center Solomons, Maryland	
Interviewer: John Ledbetter	
Organization: CH2M	Phone: 703-376-5172
Position/role on this project: Interviewer	Email: John.Ledbetter1@jacobs.com
Interviewee: Heidi Morgan	
Position/Job Title: NAVFAC Washington NAS Patuxent River- Public Works Department	
General Discussion Notes and Information:	
Ms. Morgan provides a presentation with photos and notes on the January 2017 spill of AFFF from Building 6454. This building has a fire suppression system which has contained 3M 3% AFFF. A frozen pipe part of the fire suppression system ruptured and released the foam in the AFFF room. A majority of the AFFF concentration was flushed out with water and released under the door and out of the back of the building. An estimated 100 gallons of PFAS-containing, alcohol-resistant-AFFF concentrate was released. It is possible the water/ AFFF coming from the AFFF room may have been initially absorbed by snow, which eventually melted; the ground behind Building 6454 was wet and soft. It is possible the AFFF did not make it into the storm swale directly behind Building 6454 and was absorbed by the snow and ground.	

Communication Record	
Date: 11/13/2014	
Name of Base, State: Navy Recreation Center Solomons, Maryland	
Interviewer: John Ledbetter	
Organization: CH2M	Phone: 703-376-5172
Position/role on this project: Interviewer	Email: John.Ledbetter1@jacobs.com
Interviewee: Glen Yannayon	
Position/Job Title: Operation, Fire and Emergency Services- Battalion Chief	
General Discussion Notes and Information:	
Mr. Yannayon identified Building 6454 – Haz-Mat Storage Facility as containing 3M AFFF 3% Concentrate.	