RELATIVE RISK SITE EVALUATION

Warfield Air National Guard Base, MD

Introduction

The Department of Defense (DoD) has identified certain per- and polyfluoroalkyl substances (PFAS) as emerging contaminants of concern which affected installations across the Air Force, which for these fact sheets includes the Air National Guard. These PFAS are perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexane sulfonate (PFHxS)are components of Aqueous Film Forming Foam (AFFF) that the Air Force began using in the 1970s as a firefighting agent to extinguish petroleum fires. The U.S. Environmental Protection Agency (EPA) has issued health based site specific Regional Screening Levels (RSLs) for surface soil and groundwater (drinking water)) for PFOS, PFOA, PFBS, PFNA, PFHxS and hexafluoropropylene oxide dimer acid (HFPO-DA, or Gen-X).

Site Inspections (SIs) were initiated to collect soil and groundwater samples and analyze those media for 16 different PFAS at the potential AFFF release areas that were identified in the PA. The intent of the SI is to determine if a release has occurred and determine if there are impacts to soil and/or groundwater. The next step in the process is the Relative Risk Site Evaluation (RRSE). The RRSE is a DoD-wide methodology to evaluate the relative risks posed by PFAS present at an installation in relation to other installations. The RRSE is a tool used to sequence funding for which installations have the highest priority to begin a Remedial Investigation (RI). The DoD premise in installation sequencing is “worst first,” meaning the DoD Component shall address installations that pose a relatively greater potential risk to public safety, human health, or the environment before installations posing a lesser risk.

The results of Warfield Air National Guard Base remedial investigations PA and SI can be found at AFCEC Administrative Record (AR): ar.afcec-cloud.af.mil. Scroll to the bottom of the page and click on “Continue to site,” then select “Active,” scroll down the Installation List and click on Warfield Air National Guard Base, then enter Not Applicable in the “AR #” field for the SI. For the Expanded Site Inspection (ESI) enter Not Applicable or the RI, enter Not Applicable, then click “Search” at the bottom of the page.

More information on the Air Force response to PFAS can be found at:
https://www.afcec.af.mil/WhatWeDo/Environment/Perfluorinated-Compounds/

Acronyms

AR – Administrative Record

AFFF - Aqueous Film Forming Foam

AST – Aboveground Storage Tank

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act

CHF – Contaminant Hazard Factor

DoD – Department of Defense

EPA – US Environmental Protection Agency

FTA – Fire Training Area

HA – Health Advisory

HFPO-DA - hexafluoropropylene oxide dimer acid (HFPO-DA, or Gen-X)

MPF – Migration Pathway Factor

PA – Preliminary Assessment

PFAS - Per- and poly-fluoroalkyl substances

PFBS - Perfluorobutane sulfonate

PFHxS - perfluorohexane sulfonate (PFHxS)

PFNA - perfluorononanoic acid (PFNA)

PFOS - Perfluorooctane sulfonate

PFOA - Perfluorooctanoic acid

RCRA – Resource Conservation and Recovery Act

RF – Reception Factor

RI – Remedial Investigation

RRSE – Relative Risk Site Evaluation

RSL – Regional Screening Level

SI – Site Inspection

SWMU – Solid Waste Management Unit

RELATIVE RISK SITE EVALUATION

Warfield Air National Guard Base, MD

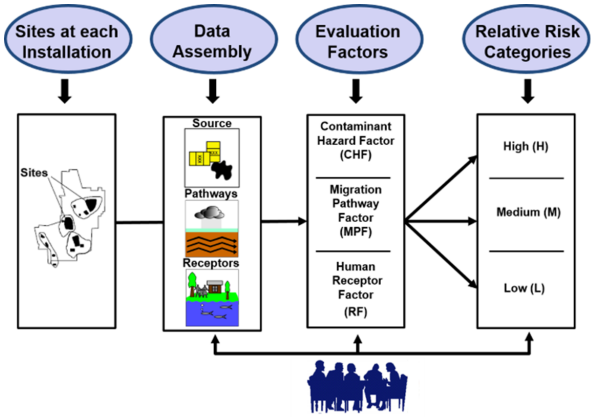
Q. What is the Relative Risk Site Evaluation (RRSE)?

A. RRSE is a methodology used by the Department of Defense (DoD) to sequence environmental restoration work . The DoD fundamental premise is "worst first," meaning the DoD Component shall address installations that pose a relatively greater potential risk to public safety, human health, or the environment before installations posing a lesser potential risk. Relative risk is not the sole factor in determining the sequence of environmental restoration work, but it is an important consideration in the sequencing process. The methodology is described in the DoD, Relative Risk Site Evaluation Primer, Summer 1997 Revised Edition denix.osd.mil/references/dod/policy-guidance/relative-risk-site-evaluation-primer/RRSE_Primer_Summer1997.pdf.

Q. What is the RRSE framework?

A. The RRSE framework provides a DoD-wide approach for evaluating the relative risks to human health and the environment posed by contamination present at component installations. The **Relative Risk Site Evaluation Concept Summary** (shown in the figure) illustrates the selection of sites, evaluation of the site data using three evaluation factors, and placement into high, medium, and low categories. The relative risk site evaluation framework is based on information fundamental to risk assessments: sources, pathways, and receptors, to sequence restoration work. However, the RRSE is not a baseline risk assessment or in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process. Regulators and public stakeholders are provided the opportunity to participate in the process in accordance with the DoD Defense Environmental Restoration Program.

Relative Risk Site Evaluation Concept Summary

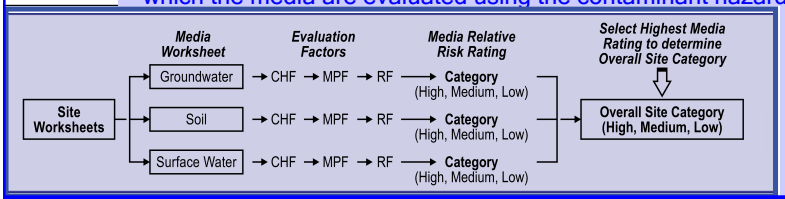


Regulator and Public Stakeholder Involvement in Technical Evaluation

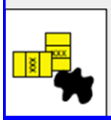
Sites at Each Installation

Q. What restoration sites are required to be evaluated in the RRSE process?

A. Restoration sites in CERCLA phases prior to remedy-in-place are evaluated in the RRSE process. Worksheets are developed for environmental media (such as, groundwater and surface soil) at each site. Environmental media lacking sufficient information to conduct a RRSE are assigned a "Not Evaluated" designation. The figure shows the process for which the media are evaluated using the contaminant hazard factor (CHF), the migration pathway factor (MPF), and the receptor factor (RF). Each media is scored to obtain a relative risk rating of High, Medium, or Low. The highest media-specific relative risk rating determines the Overall Site Category.



Q. How is the Contaminant Hazard Factor (CHF) calculated?



A. The **CHF** is calculated by dividing the maximum concentration of a contaminant by the approved screening value, or comparison value. Contaminant concentration ratios are totaled to arrive at the **CHF.** A CHF of greater than 100 earns a **High** rating. If the CHF is 2 to 100 it earns a **Moderate** rating. A **Minimal** rating is assigned when a CHF is less than **2.**

FOR MORE INFORMATION

Air Force Civil Engineer Center Environmental Restoration Program
www.afcec.af.mil

AFCEC CERCLA Administrative Record (AR)
ar.afcec-cloud.af.mil/

Q. How is the Migration Pathway Factor (MPF) determined?

A. The movement of contamination at a site is evaluated and assigned a **MPF** rating. Ratings for MPFs are designated as: **evident**, **potential**, or **confined** (for **High, Medium, and Low**). **Evident** exposure means the contamination is at a point where exposure to humans or the environment can occur, such as at a drinking water well. **Potential** ratings are given to sites where exposure may happen. A **confined** rating is given to sites where a low possibility for exposure may occur.

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Q. How is the Receptor Factor (RF) determined?

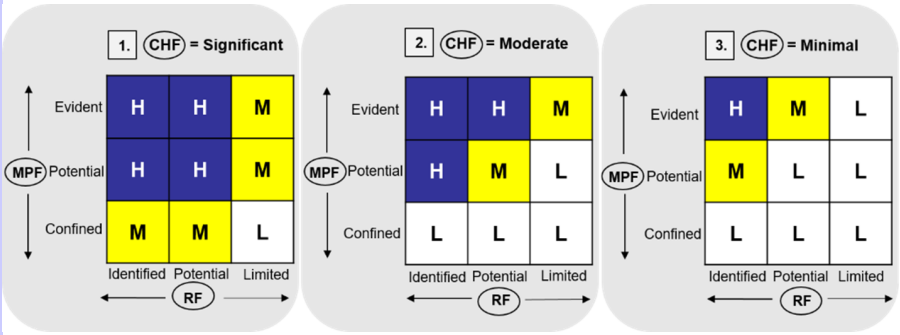
A. The **RF** is determined by a receptor's, such as humans, potential to come into contact with contaminated media. **RFs** are designated as: identified, potential, or limited **(High, Medium, and Low). Identified** rating is given when receptors are in contact or threat of contact with contaminated media. **Potential** is given when receptor may contact contaminated media. **Limited** is given when there is little or no contact with contaminated media.

RELATIVE RISK SITE EVALUATION PROCESS, cont.

Media Relative Risk Rating

Q. How is the media-specific relative risk rating determined?
A. Use the charts on the right to determine the media-specific relative risk rating. Start by choosing the **CHF** result in the evaluation. If the **CHF** is **Significant**, use **box 1.** If the CHF is **Moderate**, use **box 2.** if the CHF is **Minimal**, use **box 3.** Then find the **MPF** and **RF** results and move to the square where the results meet. That square indicates the media-specific relative risk rating. For example, if the **CHF** is **Significant** - go to box 1**,** if the **MPF** is **Potential,** and the **RF** is **Identified**, then the rating is High (**H**).

Relative Risk Site Evaluation Concept Summary



CHF (Contaminant Hazard Factor) **MPF** (Migration Potential Factor) **RF** (Receptor Factor) **H** (High) **M** (Medium) **L** (Low)

Overall Site Category

Q. How do I determine the Overall Site Category?
A. The highest relative risk media rating becomes the **Overall Site Category** for the site. For example, if a site has a groundwater relative risk rating of **High**, and soil relative risk rating of **Low**, then the Overall Site Category rating for the site is **High**.

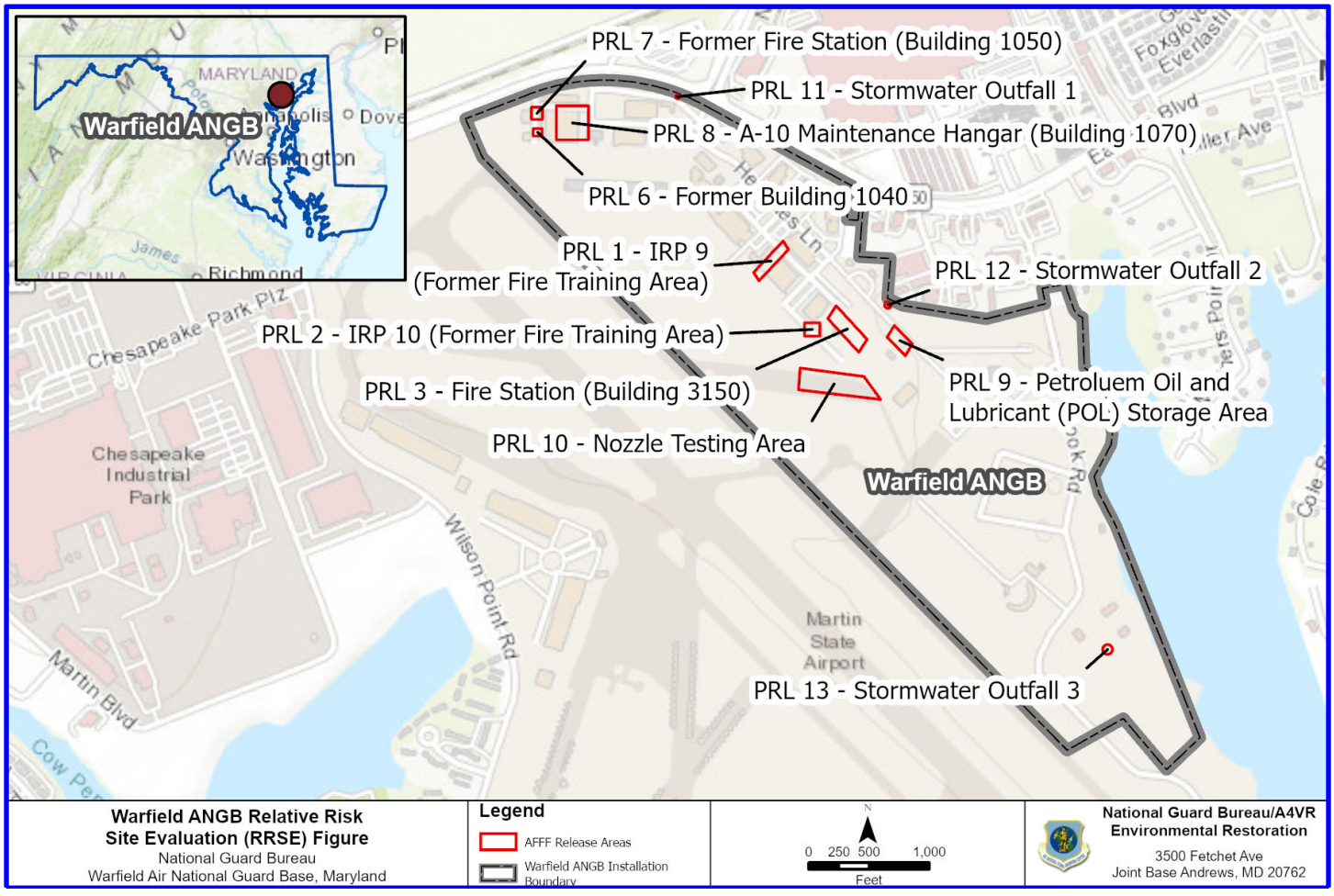
Regulatory and Stakeholder Involvement

Q. How do I participate as Stakeholder?

A. To offer opportunities to participate in the RRSE process, the Air Force announces a public comment period in your local newspaper. There is also opportunity to participate during installation Restoration Advisory Boards, where active. Installation Restoration Advisory Board meetings are announced in your local newspaper.

Relative Risk Site Evaluation Summary Warfield Air National Guard Base

Overall Site Category	Site Name (Sites are shown on the map below and RRSE Worksheets are attached)
HIGH	PRL 3, PRL 6
MEDIUM	PRL 1, PRL 2, PRL 7, PRL 9, PRL 11, PRL 12
LOW	PRL 8, PRL 10, PRL 13



Site Background Information			
Installation:	Warfield Air National Guard Base	**Date:**	2/16/2024
Location:	MD	**Media Evaluated:**	GW, SS
Site Name and ID:	AFFF 1 - IRP 9 (Former FTA) - FT009P-SUB	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Macrina Xavier	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: MEDIUM			

Site Summary	
Brief Site Description:	PRL 1 consists of IRP Site 9, a former fire training area (FTA) approximately 250 ft. by 160 ft. in size which was utilized from 1975 through 1979. The FTA was unlined and is suspected to now lie between or partially under Buildings 2060 and 2070. An estimated 2,970 gallons of spent solvents, waste oils, slop wastes, and other flammable substances were released in this area for training purposes, as well as the fire extinguishing agents. The types of fire extinguishing agents utilized are unknown. At the time of the PA, Base personnel had no knowledge of disposal or fire training exercises conducted at this FTA.
Brief Description of Pathways:	The PRL 1 area has been redeveloped and now contains buildings, pavement, and maintained grassy areas which would limit exposure pathways. A drainage ditch that intermittently contains surface water is present north and adjacent to the PRL. Surface water in the central portions of the Base drain into ditches and underground storm sewers which discharge into the large oil/water separator (OWS) and Outfall 2 which discharges east into Frog Mortar Creek. Depth to the surficial aquifer is 3 to 8 feet below ground surface (bgs). The direction of groundwater flow beneath the installation is in general east-southeast toward Frog Mortar Creek.
Brief Description of Receptors:	Based on information in the 2019 Site Inspection (SI) report, the direction of groundwater flow was found to be in a general east-southeast direction. A review of the Environmental Data Resources (EDR) Radius Map™ Report with Geocheck® dated July 21, 2015 shows multiple water wells within a one-mile radius of the Base. According to the 2016 Preliminary Assessment (PA) report, 379 wells were identified in the State Database within 1 mile of the Base. The 2001 Remedial Investigation (RI) also reported two water supply wells located on Base that were not used for drinking water. These wells were abandoned in 2013. The City of Baltimore supplies the base and the surrounding community with both water and sewer services. Since this PRL is located within the Base boundary with controlled access, most receptors would fall into the category of commercial/industrial workers (e.g., firefighters/landscapers, office workers). PFAS including PFOA, PFOS, and PFBS have been detected at multiple monitoring wells at varying concentrations.

Groundwater Worksheet

Installation: Warfield Air National Guard Base

Site ID: FT009P-SUB **AFFF Release Area #:** PRL 1

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.0916	0.6	0.153
PFOA	0.205	0.040	5.12
PFOS	1.25	0.040	31.3
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**36.6**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

Migratory Pathway Factor

Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M

Receptor Factor

Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	M
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
	Groundwater Category	**MEDIUM**

Soil Worksheet

Installation: Warfield Air National Guard Base

Site ID: FT009P-SUB **AFFF Release Area #:** PRL 1

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS		1.9	
PFOA	0.000716	0.13	0.00551
PFOS	0.0318	0.13	0.245
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.251**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**L**

Migratory Pathway Factor		
Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	L
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Warfield Air National Guard Base	**Date:**	2/16/2024
Location:	MD	**Media Evaluated:**	GW, SS
Site Name and ID:	AFFF 2 - IRP 10 (FTA) - FT010P-SUB	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Macrina Xavier	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: MEDIUM			

Site Summary	
Brief Site Description:	PRL 2 consists of IRP Site 10, a former FTA with an area approximately 100 ft. by 110 ft. in size which was utilized from 1957 to 1975. This FTA was reportedly unlined. An estimated 10,100 gallons of spent solvents, waste oils, slop wastes, and other flammable substances were released in this area for training purposes, as well as the fire extinguishing agents. The types of fire extinguishing agents utilized are unknown. At the time of the PA, Base personnel had no knowledge of disposal or fire training exercises conducted at this FTA.
Brief Description of Pathways:	The PRL 2 area is maintained grass and paved areas which would limit exposure pathways. A drainage ditch that intermittently contains surface water is present east of the PRL. Surface water in the central portions of the Base drain into ditches and underground storm sewers which discharge into the large OWS and Outfall 2 which discharges east into Frog Mortar Creek. Depth to the surficial aquifer is 3 to 8 feet bgs. The direction of groundwater flow beneath the installation is in general east-southeast toward Frog Mortar Creek.
Brief Description of Receptors:	Based on information in the 2019 SI report, the direction of groundwater flow was found to be in a general east-southeast direction. A review of the EDR Radius Map™ Report with Geocheck® dated July 21, 2015 shows multiple water wells within a one-mile radius of the Base. According to the 2016 PA report, 379 wells were identified in the State Database within 1 mile of the Base. The 2001 Remedial Investigation (RI) also reported two water supply wells located on Base that were not used for drinking water. These wells were abandoned in 2013. The City of Baltimore supplies the base and the surrounding community with both water and sewer services. Since this PRL is located within the Base boundary with controlled access, most receptors would fall into the category of commercial/industrial workers (e.g., firefighters/landscapers, office workers). PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation: Warfield Air National Guard Base

Site ID: FT010P-SUB **AFFF Release Area #:** PRL 2

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.292	0.6	0.487
PFOA	1.06	0.040	26.5
PFOS	1.11	0.040	27.8
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**54.8**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

Migratory Pathway Factor

Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M

Receptor Factor

Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	M
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
	Groundwater Category	**MEDIUM**

Soil Worksheet

Installation: Warfield Air National Guard Base

Site ID: FT010P-SUB **AFFF Release Area #:** PRL 2

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS		1.9	
PFOA	0.000447	0.13	0.00344
PFOS	0.0228	0.13	0.175
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.178**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**L**

Migratory Pathway Factor		
Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	L
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Warfield Air National Guard Base	**Date:**	2/16/2024
Location:	MD	**Media Evaluated:**	GW, SS
Site Name and ID:	AFFF 3 - Fire Station (Building 3150) - FT010P-SUB	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Macrina Xavier	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	PRL 3 consists of Building 3150, the current fire station which was constructed in 2010. At the time of the 2016 PA site visit, the ANG stored 3 percent (%) aqueous film forming foam (AFFF) in both 55-gallon drums and 5-gallon containers in Building 3150. The containers of AFFF were stored in the engine bay in an area where the floor trench drain had been plugged. These containers were used to resupply fire trucks with AFFF which was transferred with an electric pump. At the time of the PA, the fire station utilized two trucks that contained AFFF, with capacities of 210-gallons and 500-gallons. Transfers to and from the vehicles were conducted within Building 3150. Vehicle washing would also be conducted within the engine bay of Building 3150. Facility personnel stated that the fire station does not conduct nozzle testing using AFFF. However, they had no knowledge of past nozzle testing practices or any releases of AFFF at the fire station. Building 3150 had several trench drains that discharged to the sanitary sewer system via an OWS. Base water was treated offsite by the Baltimore County Department of Public Works.
Brief Description of Pathways:	The fire station buildingis surrounded by pavement and mowed grass. The grassy area could represent a complete exposure pathway since surface soil detections exceeded the comparison value for PFOS. A drainage ditch that intermittently contains surface water is present east of the PRL. Surface water in the central portions of the Base drain into ditches and underground storm sewers which discharge into the large OWS and Outfall 2 which discharges east into Frog Mortar Creek. Depth to the surficial aquifer is 3 to 8 feet bgs. The direction of groundwater flow beneath the installation is in general east-southeast toward Frog Mortar Creek.
Brief Description of Receptors:	Based on information in the 2019 SI report, the direction of groundwater flow was found to be in a general east-southeast direction. A review of the EDR Radius Map™ Report with Geocheck® dated July 21, 2015 shows multiple water wells within a one-mile radius of the Base. According to the 2016 PA report, 379 wells were identified in the State Database within 1 mile of the Base. The 2001 Remedial Investigation (RI) also reported two water supply wells located on Base that were not used for drinking water. These wells were abandoned in 2013. The City of Baltimore supplies the base and the surrounding community with both water and sewer services. Since this PRL is located within the Base boundary with controlled access, most receptors would fall into the category of commercial/industrial workers (e.g., firefighters/landscapers, office workers). PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation: Warfield Air National Guard Base

Site ID: FT010P-SUB **AFFF Release Area #:** PRL 3

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS		0.6	
PFOA	1.66	0.040	41.5
PFOS	9.46	0.040	237
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**279**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**H**

Migratory Pathway Factor

Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M

Receptor Factor

Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	M
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
	Groundwater Category	**HIGH**

Soil Worksheet

Installation: Warfield Air National Guard Base

Site ID: FT010P-SUB **AFFF Release Area #:** PRL 3

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS	0.00188	1.9	0.000989
PFOA	0.0397	0.13	0.305
PFOS	0.555	0.13	4.27
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**4.58**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

Migratory Pathway Factor		
Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	M
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	M
Limited	No potential for receptors to have access to contaminated soil	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
	Soil Category	**MEDIUM**

Site Background Information			
Installation:	Warfield Air National Guard Base	**Date:**	2/16/2024
Location:	MD	**Media Evaluated:**	GW, SS
Site Name and ID:	AFFF 6 - Former Building 1040 - SS025P	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Macrina Xavier	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	PRL 6 consists of former Building 1040, which was used as part of the previous fire station from the date of construction (unknown) through 2010. This building was reportedly used for equipment storage. The building was demolished in 2012. The foundation of the building was still visible at the time of the 2016 PA site visit, and a trench drain was observed. According to Base personnel, the trench drain flowed to the sanitary sewer. Personnel were not aware of any releases of AFFF to the environment that occurred at this location.
Brief Description of Pathways:	The former building location is pavement surrounded by mowed grass and buildings which would limit exposure pathways. Surface water and sediment are not present at the PRL. Surface water in the central portions of the Base drain into ditches and underground storm sewers which discharge into the large OWS and Outfall 2 which discharges east into Frog Mortar Creek. Depth to the surficial aquifer is 3 to 8 feet bgs. The direction of groundwater flow beneath the installation is in general east-southeast toward Frog Mortar Creek.
Brief Description of Receptors:	Based on information in the 2019 SI report, the direction of groundwater flow was found to be in a general east-southeast direction. A review of the EDR Radius Map™ Report with Geocheck® dated July 21, 2015 shows multiple water wells within a one-mile radius of the Base. According to the 2016 PA report, 379 wells were identified in the State Database within 1 mile of the Base. The 2001 Remedial Investigation (RI) also reported two water supply wells located on Base that were not used for drinking water. These wells were abandoned in 2013. The City of Baltimore supplies the base and the surrounding community with both water and sewer services. Since this PRL is located within the Base boundary with controlled access, most receptors would fall into the category of commercial/industrial workers (e.g., firefighters/landscapers, office workers). PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation: Warfield Air National Guard Base

Site ID: SS025P **AFFF Release Area #:** PRL 6

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.138	0.6	0.230
PFOA	0.872	0.040	21.8
PFOS	13.7	0.040	342
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**364**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**H**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	M
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
	Groundwater Category	**HIGH**

Soil Worksheet

Installation: Warfield Air National Guard Base

Site ID: SS025P **AFFF Release Area #:** PRL 6

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS		1.9	
PFOA	0.00168	0.13	0.0129
PFOS	0.0379	0.13	0.292
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.305**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**L**

Migratory Pathway Factor

Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	L
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L

Receptor Factor

Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Warfield Air National Guard Base	**Date:**	2/16/2024
Location:	MD	**Media Evaluated:**	GW, SS
Site Name and ID:	AFFF 7 - Former Fire Station (Building 1050) - SS025P	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Macrina Xavier	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: MEDIUM			

Site Summary	
Brief Site Description:	PRL 7 consists of the former fire station (Building 1050), which operated from the date of construction (unknown) through 2010. At the time of the PA, the building was occupied by the Aerospace Ground Equipment facility. No floor drains were observed in the engine bay. Facility personnel had no knowledge of past AFFF storage or work practices when this building was used as the fire station.
Brief Description of Pathways:	Building 1050 is surrounded by pavement and mowed grass which would limit exposure pathways. Surface water and sediment are not present at the PRL. Surface water in the central portions of the Base drain into ditches and underground storm sewers which discharge into the large OWS and Outfall 2 which discharges east into Frog Mortar Creek. Depth to the surficial aquifer is 3 to 8 feet bgs. The direction of groundwater flow beneath the installation is in general east-southeast toward Frog Mortar Creek
Brief Description of Receptors:	Based on information in the 2019 SI report, the direction of groundwater flow was found to be in a general east-southeast direction. A review of the EDR Radius Map™ Report with Geocheck® dated July 21, 2015 shows multiple water wells within a one-mile radius of the Base. According to the 2016 PA report, 379 wells were identified in the State Database within 1 mile of the Base. The 2001 Remedial Investigation (RI) also reported two water supply wells located on Base that were not used for drinking water. These wells were abandoned in 2013. The City of Baltimore supplies the base and the surrounding community with both water and sewer services. Since this PRL is located within the Base boundary with controlled access, most receptors would fall into the category of commercial/industrial workers (e.g., firefighters/landscapers, office workers). PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation: Warfield Air National Guard Base

Site ID: SS025P **AFFF Release Area #:** PRL 7

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.0620	0.6	0.103
PFOA	0.184	0.040	4.60
PFOS	0.276	0.040	6.90
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**11.6**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

Migratory Pathway Factor

Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M

Receptor Factor

Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	M
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
	Groundwater Category	**MEDIUM**

Soil Worksheet

Installation: Warfield Air National Guard Base

Site ID: SS025P **AFFF Release Area #:** PRL 7

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS		1.9	
PFOA	0.000412	0.13	0.00317
PFOS	0.0212	0.13	0.163
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.166**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**L**

Migratory Pathway Factor		
Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	L
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Warfield Air National Guard Base	**Date:**	2/16/2024
Location:	MD	**Media Evaluated:**	SS
Site Name and ID:	AFFF 8 - A-10 Maintenance Hangar (Building 1070) - SS025P	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Macrina Xavier	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: LOW			

Site Summary	
Brief Site Description:	PRL 8 consists of the A-10 Maintenance Hangar (Building 1070), which had an AFFF fire suppression system in place. According to Base personnel interviewed during the 2015 PA, the suppression system had no flow during the initial testing, has never been operational, and the AFFF was removed; however, no documentation was available. The AFFF was located in a room on the north side of the building, and the AFFF tank was filled using a loading port outside of the building. There are trench drains located in the hangar area of Building 1070, which lead directly to the sanitary system.
Brief Description of Pathways:	Building 1070 is surrounded by pavement and mowed grass which would limit exposure pathways. Surface water and sediment are not present at the PRL. Surface water in the central portions of the Base drain into ditches and underground storm sewers which discharge into the large OWS and Outfall 2 which discharges east into Frog Mortar Creek. Depth to the surficial aquifer is 3 to 8 feet bgs. The direction of groundwater flow beneath the installation is in general east-southeast toward Frog Mortar Creek. A temporary monitoring well installed at 20 feet bgs during the SI was dry at the time of sampling; therefore, a groundwater worksheet was not completed for this RRSE.
Brief Description of Receptors:	Based on information in the 2019 SI report, the direction of groundwater flow was found to be in a general east-southeast direction. A review of the EDR Radius Map™ Report with Geocheck® dated July 21, 2015 shows multiple water wells within a one-mile radius of the Base. According to the 2016 PA report, 379 wells were identified in the State Database within 1 mile of the Base. The 2001 Remedial Investigation (RI) also reported two water supply wells located on Base that were not used for drinking water. These wells were abandoned in 2013. The City of Baltimore supplies the base and the surrounding community with both water and sewer services. Since this PRL is located within the Base boundary with controlled access, most receptors would fall into the category of commercial/industrial workers (e.g., firefighters/landscapers, office workers). PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation: Warfield Air National Guard Base

Site ID: SS025P **AFFF Release Area #:** PRL 8

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFOS		0.040	
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**NS**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	
	Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)		
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined		
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)		
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).		
	Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)		
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)		
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)		
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).		
		Groundwater Category	**NS**

Soil Worksheet

Installation: Warfield Air National Guard Base

Site ID: SS025P **AFFF Release Area #:** PRL 8

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.000512	0.13	0.00394
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.00394**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**L**

Migratory Pathway Factor

Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	L
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L

Receptor Factor

Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Warfield Air National Guard Base	**Date:**	2/16/2024
Location:	MD	**Media Evaluated:**	GW, SS
Site Name and ID:	AFFF 9 - Petroleum Oil & Lubricant Above Ground Storage Tank - SS011P-SUB	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Macrina Xavier	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: MEDIUM			

Site Summary	
Brief Site Description:	PRL 9 consists of IRP Site 11, which is the location of a one-time emergency response incident where AFFF was used. One of the Petroleum Oil and Lubricant (POL) above-ground storage tanks released its contents into the secondary containment area during the early 1990s. AFFF was applied to the area as a precautionary measure, and the released materials were reclaimed. A review of environmental reports available on the ANG Administrative Records online database showed that multiple rounds of soil and groundwater investigations took place in the POL area, with respect to the JP4 jet-fuel which was originally spilled. The POL area is located up-gradient of Stormwater Outfall 2 (PRL 12).
Brief Description of Pathways:	The above ground POL storage tank is one of two tanks surrounded by pavement and grassy areas which would limit exposure pathways. Each is within a spill containment wall. Surface water and sediment are not present at the PRL. Surface water in the central portions of the Base drain into ditches and underground storm sewers which discharge into the large OWS and Outfall 2 which discharges east into Frog Mortar Creek. Depth to the surficial aquifer is 3 to 8 feet bgs. The direction of groundwater flow beneath the installation is in general east-southeast toward Frog Mortar Creek.
Brief Description of Receptors:	Based on information in the 2019 SI report, the direction of groundwater flow was found to be in a general east-southeast direction. A review of the EDR Radius Map™ Report with Geocheck® dated July 21, 2015 shows multiple water wells within a one-mile radius of the Base. According to the 2016 PA report, 379 wells were identified in the State Database within 1 mile of the Base. The 2001 Remedial Investigation (RI) also reported two water supply wells located on Base that were not used for drinking water. These wells were abandoned in 2013. The City of Baltimore supplies the base and the surrounding community with both water and sewer services. Since this PRL is located within the Base boundary with controlled access, most receptors would fall into the category of commercial/industrial workers (e.g., firefighters/landscapers, office workers). PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation: Warfield Air National Guard Base

Site ID: SS011P-SUB **AFFF Release Area #:** PRL 9

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.337	0.6	0.562
PFOA	0.0929	0.040	2.32
PFOS	0.155	0.040	3.88
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**6.76**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

Migratory Pathway Factor

Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M

Receptor Factor

Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	M
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
	Groundwater Category	**MEDIUM**

Soil Worksheet

Installation: Warfield Air National Guard Base

Site ID: SS011P-SUB **AFFF Release Area #:** PRL 9

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS		1.9	
PFOA	0.000609	0.13	0.00468
PFOS	0.0940	0.13	0.723
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.728**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**L**

Migratory Pathway Factor		
Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	L
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Warfield Air National Guard Base	**Date:**	2/16/2024
Location:	MD	**Media Evaluated:**	GW, SS
Site Name and ID:	AFFF 10 - Nozzle Testing Area - FT010P-SUB	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Macrina Xavier	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: LOW			

Site Summary	
Brief Site Description:	PRL 10 consists of an inactive runway/gravel parking area where nozzle testing was reportedly conducted prior to the mid-1990s. Dates and volumes of the tests are unknown.
Brief Description of Pathways:	The nozzle testing area is paved or gravel used for open storage with adjacent open grass covered area. The pavement and gravel covered areas would limit exposure pathways.Surface water and sediment are not present at the PRL. Surface water in the central portions of the Base drain into ditches and underground storm sewers which discharge into the large OWS and Outfall 2 which discharges east into Frog Mortar Creek. Depth to the surficial aquifer is 3 to 8 feet bgs. The direction of groundwater flow beneath the installation is in general east-southeast toward Frog Mortar Creek.
Brief Description of Receptors:	Based on information in the 2019 SI report, the direction of groundwater flow was found to be in a general east-southeast direction. A review of the EDR Radius Map™ Report with Geocheck® dated July 21, 2015 shows multiple water wells within a one-mile radius of the Base. According to the 2016 PA report, 379 wells were identified in the State Database within 1 mile of the Base. The 2001 Remedial Investigation (RI) also reported two water supply wells located on Base that were not used for drinking water. These wells were abandoned in 2013. The City of Baltimore supplies the base and the surrounding community with both water and sewer services. PRL 10 is located within the Base boundary in an open area in the south-central portion of the Base. Since this PRL is located in an area with controlled access, most receptors would fall into the category of commercial/industrial workers (e.g., firefighters/landscapers, office workers). PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation: Warfield Air National Guard Base

Site ID: FT010P-SUB **AFFF Release Area #:** PRL 10

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.0115	0.6	0.0192
PFOA	0.0240	0.040	0.600
PFOS	0.0145	0.040	0.362
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.981**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**L**

Migratory Pathway Factor

Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M

Receptor Factor

Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	M
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
	Groundwater Category	**LOW**

Soil Worksheet

Installation: Warfield Air National Guard Base

Site ID: FT010P-SUB **AFFF Release Area #:** PRL 10

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS		1.9	
PFOA	0.000367	0.13	0.00282
PFOS	0.0171	0.13	0.132
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.135**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**L**

Migratory Pathway Factor

Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	L
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L

Receptor Factor

Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Warfield Air National Guard Base	**Date:**	2/16/2024
Location:	MD	**Media Evaluated:**	GW
Site Name and ID:	AFFF 11 - Storm-Water Outfall 1 - PRL 11	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Macrina Xavier	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: MEDIUM			

Site Summary	
Brief Site Description:	PRL 11 consists of a concrete outfall located north of Taxiway A (Outfall 1), which collects drainage from former Building 1040 (PRL 6) and the former Fire Station (Building 1050) (PRL 7).The majority of facilities on the northern (older) portion of the Base feed to drainage ditches and underground storm sewers which empty into an open drainage ditch located along the south side of Eastern Boulevard. This ditch travels less than a mile to its discharge point into Frog Mortar Creek.
Brief Description of Pathways:	The PRL is a stormwater drainage ditch located near the northern base boundary. The outfall is covered with vegetation and surrounded by paved lots and roads and buildings. The outfall is not an area expected to have significant exposure pathways. Surface water in the central portions of the Base drain into ditches and underground storm sewers which discharge into the large OWS and Outfall 2 which discharges east into Frog Mortar Creek. Depth to the surficial aquifer is 3 to 8 feet bgs. The direction of groundwater flow beneath the installation is in general east-southeast toward Frog Mortar Creek.
Brief Description of Receptors:	Based on information in the 2019 SI report, the direction of groundwater flow was found to be in a general east-southeast direction. A review of the EDR Radius Map™ Report with Geocheck® dated July 21, 2015 shows multiple water wells within a one-mile radius of the Base. According to the 2016 PA report, 379 wells were identified in the State Database within 1 mile of the Base. The 2001 Remedial Investigation (RI) also reported two water supply wells located on Base that were not used for drinking water. These wells were abandoned in 2013. The City of Baltimore supplies the base and the surrounding community with both water and sewer services. PRL 11 is located within the Base boundarywith controlled access so most receptors would fall into the category of commercial/industrial workers (e.g., firefighters/landscapers, office workers). PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation: Warfield Air National Guard Base

Site ID: PRL 11 **AFFF Release Area #:** PRL 11

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.0133	0.6	0.0222
PFOA	0.0182	0.040	0.455
PFOS	0.131	0.040	3.27
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**3.75**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	M
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
	Groundwater Category	**MEDIUM**

Soil Worksheet

Installation: Warfield Air National Guard Base

Site ID: PRL 11 **AFFF Release Area #:** PRL 11

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS		1.9	
PFOA		0.13	
PFOS		0.13	
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**NS**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	

Migratory Pathway Factor		
Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	
Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	
	Soil Category	**NS**

Site Background Information			
Installation:	Warfield Air National Guard Base	**Date:**	2/16/2024
Location:	MD	**Media Evaluated:**	GW, SS
Site Name and ID:	AFFF 12 - Stormwater Outfall 2 - PRL 12	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Macrina Xavier	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: MEDIUM			

Site Summary	
Brief Site Description:	PRL 12 consists of a stormwater outfall covered with vegetation, which collects drainage from the newer facilities at the Base. These facilities, which include most of the aircraft parking ramp, the current Fire Station (PRL 3), and potentially the Nozzle Testing Area (PRL 10), drain into the large OWS and drainage ditch that runs from just north of the POL storage area east into Frog Mortar Creek. The drainage in and around the POL storage area also discharges into this OWS and the drainage ditch.
Brief Description of Pathways:	The PRL is the location of a stormwater outfall where surface water drains into a ditch located near the east base boundary. The outfall is covered with vegetation and surrounded by paved lots, roads, and buildings. The outfall is not an area expected to have significant exposure pathways. This PRL receives surface water from the large OWS which eventually discharges into Frog Mortar Creek. Depth to the surficial aquifer is 3 to 8 feet bgs. The direction of groundwater flow beneath the installation is in general east-southeast toward Frog Mortar Creek.
Brief Description of Receptors:	Based on information in the 2019 SI report, the direction of groundwater flow was found to be in a general east-southeast direction. A review of the EDR Radius Map™ Report with Geocheck® dated July 21, 2015 shows multiple water wells within a one-mile radius of the Base. According to the 2016 PA report, 379 wells were identified in the State Database within 1 mile of the Base. The 2001 Remedial Investigation (RI) also reported two water supply wells located on Base that were not used for drinking water. These wells were abandoned in 2013. The City of Baltimore supplies the base and the surrounding community with both water and sewer services. PRL 12 is located within the Base boundary in an area with controlled access so most receptors would fall into the category of commercial/industrial workers (e.g., firefighters/landscapers, office workers). PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation: Warfield Air National Guard Base

Site ID: PRL 12 **AFFF Release Area #:** PRL 12

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.0385	0.6	0.0642
PFOA	0.0611	0.040	1.53
PFOS	1.42	0.040	35.5
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**37.1**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	M
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
	Groundwater Category	**MEDIUM**

Soil Worksheet

Installation: Warfield Air National Guard Base

Site ID: PRL 12 **AFFF Release Area #:** PRL 12

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS		1.9	
PFOA	0.000549	0.13	0.00422
PFOS	0.0201	0.13	0.155
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.159**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**L**

Migratory Pathway Factor		
Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	L
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Warfield Air National Guard Base	**Date:**	2/16/2024
Location:	PRL 13	**Media Evaluated:**	GW
Site Name and ID:	AFFF 13 - Stormwater Outfall 3 - PRL 13	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Macrina Xavier	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: LOW			

Site Summary	
Brief Site Description:	PRL 13 consists of a surface drainage pathway covering the southeastern portion of the Base. This drainage area includes those portions of the Base that are south and east of the POL storage area (PRL 9) and extends to the southern-most boundary of the Base. The surface water in this area drains via both sheet flow and storm water sewers to a storm water outfall channel that empties into Frog Mortar Creek by the Munitions Maintenance Area (Building 5110) of the Base.
Brief Description of Pathways:	The PRL is the location of a stormwater outfall where surface water drains into a ditch located near the east base boundary. The outfall is covered with vegetation and surrounded by paved lots, roads, and buildings. The outfall is not an area expected to have significant exposure pathways. This PRL receives surface water from the large OWS which eventually discharges into Frog Mortar Creek. Depth to the surficial aquifer is 3 to 8 feet bgs. The direction of groundwater flow beneath the installation is in general east-southeast toward Frog Mortar Creek. A sediment sample was collected at this PRL instead of a surface soil sample. Therefore, no surface soil worksheet is included for this PRL.
Brief Description of Receptors:	Based on information in the 2019 SI report, the direction of groundwater flow was found to be in a general east-southeast direction. A review of the EDR Radius Map™ Report with Geocheck® dated July 21, 2015 shows multiple water wells within a one-mile radius of the Base. According to the 2016 PA report, 379 wells were identified in the State Database within 1 mile of the Base. The 2001 Remedial Investigation (RI) also reported two water supply wells located on Base that were not used for drinking water. These wells were abandoned in 2013. The City of Baltimore supplies the base and the surrounding community with both water and sewer services. PRL 13 is located within the Base boundary in an area with controlled access so most receptors would fall into the category of commercial/industrial workers (e.g., firefighters/landscapers, office workers). PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation: Warfield Air National Guard Base

Site ID: PRL 13 **AFFF Release Area #:** PRL 13

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.00921	0.6	0.0153
PFOA	0.0132	0.040	0.330
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.345**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**L**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	M
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
	Groundwater Category	**LOW**

Soil Worksheet

Installation: Warfield Air National Guard Base

Site ID: PRL 13 **AFFF Release Area #:** PRL 13

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS		1.9	
PFOA		0.13	
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**NS**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	

Migratory Pathway Factor		
Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	
Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	
	Soil Category	**NS**