RELATIVE RISK SITE EVALUATION

New Castle Air National Guard Base, Delaware

Introduction

The Department of Defense (DoD) identified certain per- and polyfluoroalkyl substances (PFAS) as emerging contaminants of concern which affected installations across the Air Force. When the term "Air Force" is used in this fact sheet, it includes Air National Guard (ANG). Specifically, perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS) are components of legacy Aqueous Film Forming Foam (AFFF) that the Air Force began using in the 1970s as a firefighting agent to extinguish petroleum fires. The United States Environmental Protection Agency (EPA) issued lifetime drinking water Health Advisories (HA) for PFOS and PFOA, and health-based regional screening levels for PFBS.

The Air Force has systematically evaluated potential AFFF releases on all Installations and former Installations. It began with the Preliminary Assessments, or PAs, that identified potential release areas. First responders, fire chiefs, and hangar staff were interviewed to determine where a release or a spill may have occurred on an Installation (for example, aircraft crash site or an accidental hangar AFFF release). Once the information in the PA was collected, we began Site Inspections, or SIs, to take soil and water samples and analyzed the media for PFAS compounds at the potential release areas. The intention of the SI was to determine if a release had occurred and to determine the impacts to soil and/or groundwater. The next step in the process is called the Relative Risk Site Evaluation, or RRSE, which is a tool used to sequence Sites/Installations to begin a Remedial Investigation, or RI. Air Force Installations are at the beginning of the more detailed investigative stage, the RI, to determine, where action is needed and to identify remedial technologies.

The New Castle Air National Guard Base (ANGB) PFAS PA and SI can be found at the Air Force Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Administrative Record (AR): https://ar.afcec-cloud.af.mil/ Scroll to the bottom of the page and click on “Continue to site”, then select Air National Guard, scroll down the Installation List and click on New Castle APT (Wilmington), DE, then enter the AR Number 470203 in the “AR #” field for the PA. For the SI, enter the AR Number 586257. Then click “Search” at the bottom of the page. Click on the spy glass to view the document.

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

Acronyms

AFFF - Aqueous Film Forming Foam

ANG - Air National Guard

ANGB - Air National Guard Base

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

MPF – Migration Pathway Factor

PA – Preliminary Assessment

PFAS - Per-and polyfluoroalkyl substances

PFBS – Perfluorobutanesulfonic acid

PFOA - Perfluorooctanoic acid

PFOS - Perfluorooctane sulfonate

RCRA – Resource Conservation and Recovery

RF – Receptor Factor

RI – Remedial Investigation

RRSE – Relative Risk Site Evaluation

PRL - Potential Release Location

SI – Site Inspection

SWMU – Solid Waste Management Unit

RELATIVE RISK SITE EVALUATION, cont.

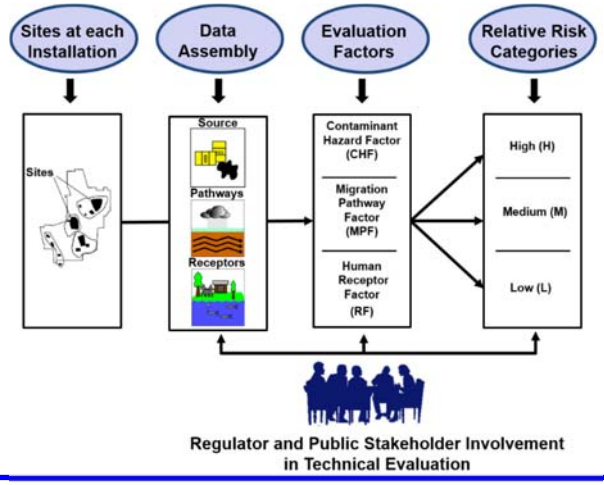
Q. What is the Relative Risk Site Evaluation (RRSE)?

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

Q. What is the RRSE framework?

A. The RRSE framework provides a DoD-wide approach for evaluating the relative risk to human health and the environment posed by contamination present at sites. 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 assessment: sources, pathways, and receptors to sequence restoration work. The RRSE is not a baseline risk assessment or health assessment in the CERCLA process. Regulators and public stakeholders in the environmental restoration process are provided the opportunity to participate in the process in accordance with the DoD Defense Environmental Restoration Program.

Relative Risk Site Evaluation Concept Summary

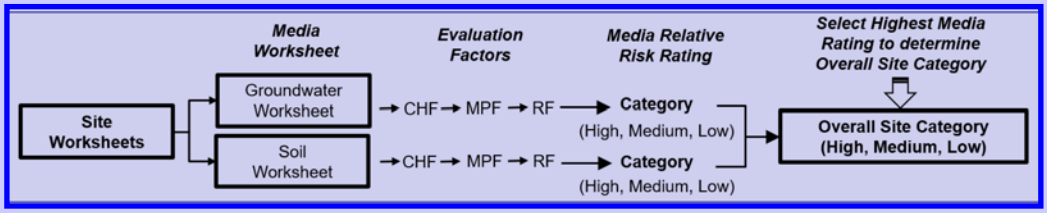


Sites at Each Installation

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 process. Worksheets are developed for environmental media at each site. For consistency across all the Installations, only surface soil (0-1 foot deep) and groundwater media were evaluated in the RRSE.

The figure shows the process for a media to be 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 rating determines the Overall Site Category.



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

A. The CHF is determined by dividing the maximum level for a contaminant at each site by the approved screening values (i.e., risk-based comparison values). Contaminant concentration ratios are totaled to arrive at a **CHF.** A CHF sum of greater than 100 earns a **Significant (High)** ranking. **Moderate (Medium)** is when the total is 2 to 100. **Minimal (Low)** is when a CHF is less than two.

FOR MORE INFORMATION

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

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

POINT OF CONTACT

Chris Brown NGB/A4VR
(240) 612-7275
christopher.brown.261@us.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.

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 EVALUTION, cont.

Media Relative Risk Rating

Q. How is the media relative risk rating determined?
A. Use the chart to determine the relative risk rating for each media evaluated. Start by choosing the **CHF** result of the evaluation. If the **CHF** is **Significant**, use **box 1.**; if **Moderate**, use **box 2.**; if **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 relative risk rating. For example, if the **CHF** is **Significant (go to box 1.)**, the **MPF** is **Potential** and the **RF** is **Identified**, then the rating is High (**H**).

Relative Risk Site Evaluation Matrix

1. CHF = Significant

MPF \ RF	Identified	Potential	Limited
Evident	H	H	M
Potential	H	H	M
Confined	M	M	L

2. CHF = Moderate

MPF \ RF	Identified	Potential	Limited
Evident	H	H	M
Potential	H	M	L
Confined	L	L	L

3. CHF = Minimal

MPF \ RF	Identified	Potential	Limited
Evident	H	M	L
Potential	M	L	L
Confined	L	L	L

CHF (Contaminant Hazard Factor) **MPF** (Migration Pathway 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**.

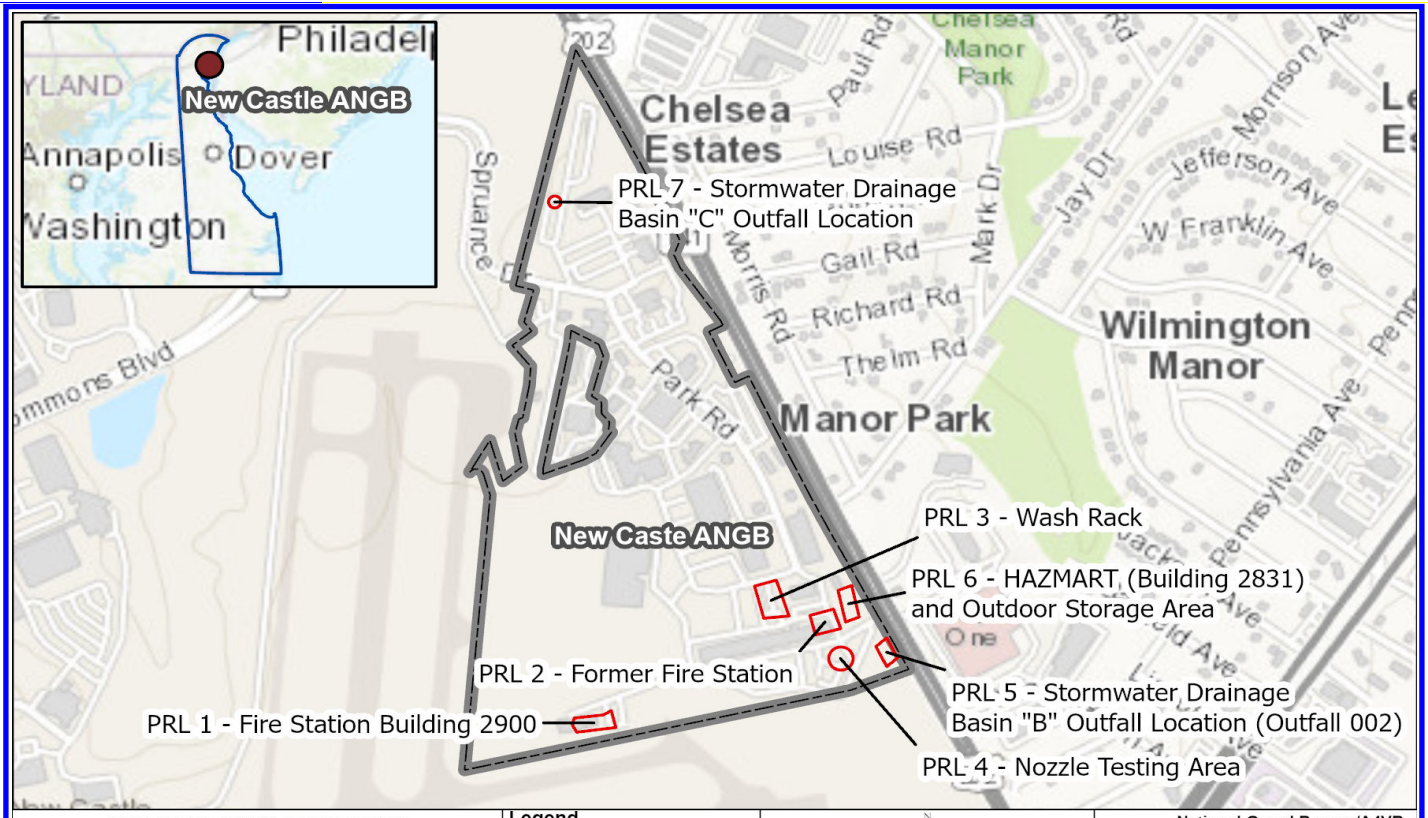
Regulatory and Stakeholder Involvement

Q. **How do I participate as Stakeholder?**

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

Relative Risk Site Evaluation Summary New Castle ANGB, DE

Overall Site Category	Site Name (Sites are shown on the map below and RRSE Worksheets are attached)
HIGH	PRL 1, PRL 2, PRL 4, PRL 5, PRL 6, PRL 7
MEDIUM	
LOW	PRL 3



AFFF Area is another term for Potential Release Location (PRL).

Site Background Information			
Installation:	New Castle ANGB	**Date:**	10/4/2021
Location (State):	Delaware	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	Fire Station (Bldg 2900) - PRL 1	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Chris Brown	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	The New Castle Air National Guard Base (NCANGB) is located adjacent and east of the New Castle County Airport (NCCA), which is also known as the Wilmington Airport, and the Wilmington-Philadelphia Airport, in New Castle County, New Castle, Delaware. The NCANGB and NCCA are approximately five miles south of downtown Wilmington. The NCANGB occupies approximately 57 acres at the northeast corner of the NCCA and includes 44 buildings. Building 2900 was constructed in approximately 2000 and is the current fire station. According to facility personnel, the Air National Guard stores 3% aqueous film forming foam (AFFF) in both 55-gallon drums and 5-gallon containers in a storage building near Building 2900. Vehicles and a foam trailer containing AFFF are stored and washed in the engine bay. AFFF is loaded with transfer pumps in the engine bay of the fire station and can involve minor spills that would be washed into interior trench drains. The building has several trench drains that discharge to the sanitary sewer system via an oil water separator (OWS). All base wastewater is treated offsite at the municipal waste water treatment system.
Brief Description of Pathways:	The Potomac Formation is the principal water-producing zone in New Castle County and is composed of lenticular and discontinuous permeable sand units and interbedded, less permeable units of finer sediments. The hydrologic conditions in the Potomac Group are variable and flow direction is influenced by groundwater extraction from production wells. Direct recharge from the surficial Columbia Aquifer is only to the youngest aquifer sands of the Potomac with limited or no recharge to lower Potomac Aquifer sands as they tend to be intermittent or contain little water. A 60-80 feet thick layer separating the Upper Potomac from the Middle Potomac water-bearing sands (deep water bearing-zone) is present at elevations between 120 and 135 feet below mean sea level (bmsl) (shallowest public supply well 72 ft. below ground surface (bgs), deepest public supply well 221 ft. bgs, average depth 124 ft. bgs). Groundwater in the lower drinking water zone (i.e., within the Middle Potomac Aquifer consisting of the deeper groundwater bearing zones) may be locally confined as indicated by groundwater levels in the deep monitoring wells being approximately five to ten ft. bmsl. Water level measurements from deep monitoring wells and Artesian Water Company supply wells located on Base indicate a south-southeasterly flow (the shallower overlying water zones have a west to southwest flow direction). The discrepancy may be explained by the fact that the groundwater flow direction in the area is influenced by withdrawal from public supply wells (located to the east of the Base) as well as the presence of a groundwater divide at the New Castle County Airport.Stormwater runoff generated on the Base is collected by a network of stormwater inlets and underground drain pipes that direct discharge to earthen drainage ditches offsite. Three outfalls from the Base direct stormwater to Nonesuch Creek, which eventually flows to the Christina River. This PRL is the building which is surrounded by the apron, taxiway and grassy areas. There is a drainage swale on the south side of the parking area located east of the building.
Brief Description of Receptors:	The airport is surrounded by properties zoned for industrial, residential, and business use. The public supply wells have all been installed to the east and south of the of the New Castle County Airport. There are approximately 14 active public drinking water supply wells within the area of influence of the East Basin Road Groundwater Site. This site is approximately seven miles square and the Base is located in the western quadrant. The Artesian public drinking water well is located on the Base and has been offline due to contamination. The on-base Artesian drinking water wells have been sampled and found not to be impacted by PFAS. Delaware Natural Resources and Environmental Control (DNREC), EPA, Artesian, and the City of New Castle conducted a survey of suspected domestic wells within a 5-mile radius of the Base and found that the parcels with suspected permitted domestic wells are verified to be on public water or located incorrectly. At the time of the SI report, a review of the EDR Radius Map™ Report showed many water wells within a 1-mile radius of the Base. No public water supply wells are identified within one mile of the Base possibly because the Artesian well located on Base property is not in use. A total of 1,450 wells were identified in the State Database within two miles of the Base. Of these, 3 are identified as being downgradient 0.5-2 miles from the Base and are listed as domestic standard but do not provide drinking water. One domestic well was located and sampled by EPA for PFAS. Access to the Base is through a controlled gate and it has a perimeter fence. This PRL is located in a secondary restricted area between the Apron and Runway 27. PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation: New Castle ANGB

Site ID: PRL 1 **AFFF Release Area #:** AFFF 1

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFOS	12	0.04	300.0
PFOA	3.95	0.04	98.8
PFBS	5.92	0.602	9.8

CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	408.6
CHF > 100	H (High)		
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		

$$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$$

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)	H
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).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation New Castle ANGB

Site ID: PRL 1 **AFFF Release Area #:** AFFF 1

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.261	0.126	2.1
PFOA	0.00716	0.126	0.1
PFBS	0.00118	1.9	0.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**2.1**
CHF > 100	**H (High)**		
100 > CHF > 2	**M (Medium)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
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	
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:	New Castle ANGB	**Date:**	10/4/2021
Location (State):	Delaware	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	Building 2818 Former FS - PRL 2	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Chris Brown	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	The former Building 2818 was in the southeastern corner of the NCANGB and was used as a fire station until 1999. In 2014, the building was reported to be demolished. The Google Earth images show that prior to 2016, the entire area was buildings surrounded by asphalt and concrete paving areas (no 2014 aerial). A trench drain was reported to have extended along the northern side of the former building, probably where bay doors had been located, and discharged to Stormwater Drainage Basin Outfall 002. According to fire department personnel, AFFF was likely discharged to the trench drain. A 2019 Google Earth image shows a large discharge in the center of the now grassy area originating approximately 150 feet south of the area from an asphalt parking area.
Brief Description of Pathways:	The Potomac Formation is the principal water-producing zone in New Castle County and is composed of lenticular and discontinuous permeable sand units and interbedded, less permeable units of finer sediments. The hydrologic conditions in the Potomac Group are variable and flow direction is influenced by groundwater extraction from production wells. Direct recharge from the surficial Columbia Aquifer is only to the youngest aquifer sands of the Potomac with limited or no recharge to lower Potomac Aquifer sands as they tend to be intermittent or contain little water. A 60-80 feet thick layer separating the Upper Potomac from the Middle Potomac water-bearing sands (deep water bearing-zone) is present at elevations between 120 and 135 feet below mean sea level (bmsl) (shallowest public supply well 72 ft. below ground surface (bgs), deepest public supply well 221 ft. bgs, average depth 124 ft. bgs). Groundwater in the lower drinking water zone (i.e., within the Middle Potomac Aquifer consisting of the deeper groundwater bearing zones) may be locally confined as indicated by groundwater levels in the deep monitoring wells being approximately five to ten ft. bmsl. Water level measurements from deep monitoring wells and Artesian Water Company supply wells located on Base indicate a south-southeasterly flow (the shallower overlying water zones have a west to southwest flow direction). The discrepancy may be explained by the fact that the groundwater flow direction in the area is influenced by withdrawal from public supply wells (located to the east of the Base) as well as the presence of a groundwater divide at the New Castle County Airport.Stormwater runoff generated on the Base is collected by a network of stormwater inlets and underground drain pipes that direct discharge to earthen drainage ditches offsite. Three outfalls from the Base direct stormwater to Nonesuch Creek, which eventually flows to the Christina River.This PRL is the former building footprint but now is a grassy area where a row of buildings were removed. Both soil samples were advanced through asphalt in the area adjacent to the PRL footprint.
Brief Description of Receptors:	The airport is surrounded by properties zoned for industrial, residential, and business use. The public supply wells have all been installed to the east and south of the of the New Castle County Airport. There are approximately 14 active public drinking water supply wells within the area of influence of the East Basin Road Groundwater Site. This site is approximately seven miles square and the Base is located in the western quadrant. The Artesian public drinking water well is located on the Base and has been offline due to contamination. The on-base Artesian drinking water wells have been sampled and found not to be impacted by PFAS. DNREC, EPA, Artesian, and the City of New Castle conducted a survey of suspected domestic wells within a 5-mile radius of the Base and found that the parcels with suspected permitted domestic wells are verified to be on public water or located incorrectly. At the time of the SI report, a review of the EDR Radius Map™ Report showed many water wells within a 1-mile radius of the Base. No public water supply wells are identified within one mile of the Base possibly because the Artesian well located on Base property is not in use. A total of 1,450 wells were identified in the State Database within two miles of the Base. Of these, 3 are identified as being downgradient 0.5-2 miles from the Base and are listed as domestic standard but do not provide drinking water. One domestic well was located and sampled by EPA for PFAS. Access to the Base is through a controlled gate and it has a perimeter fence. PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation New Castle ANGB

Site ID: PRL 2 **AFFF Release Area #:** AFFF 2

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFOS	0.326	0.04	8.2
PFOA	0.0421	0.04	1.1
PFBS	0.023	0.602	0.0

CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	9.2
CHF > 100	H (High)		
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		

$$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$$

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)	H
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).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation New Castle ANGB

Site ID: PRL 2 **AFFF Release Area #:** AFFF 2

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.00397	0.126	0.0
PFOA	0.00034	0.126	0.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.0**
CHF > 100	**H (High)**		
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**L**

$$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$$

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	**LOW**

Site Background Information			
Installation:	New Castle ANGB	**Date:**	10/4/2021
Location (State):	Delaware	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	Wash Rack - PRL 3	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Chris Brown	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: LOW			

Site Summary	
Brief Site Description:	The Wash Rack is in the southeastern corner of the Base south of Building 2819 and west of Building 2827 and is a concrete area that is approximately 175 ft. by 120 ft. Cracks and larger gaps between the concrete were observed in the area at the time of the August 2015 preliminary assessment (PA). According to the fire department personnel, annual nozzle testing using AFFF was conducted there until approximately 2015. The Wash Rack has one central drain that is equipped with a valve that can divert drainage to either the stormwater system or the sanitary sewer. AFFF was likely diverted into the sanitary system but had the potential to drain to Stormwater Drainage Basin Outfall 002, if the valve in the drain was not diverted.
Brief Description of Pathways:	The Potomac Formation is the principal water-producing zone in New Castle County and is composed of lenticular and discontinuous permeable sand units and interbedded, less permeable units of finer sediments. The hydrologic conditions in the Potomac Group are variable and flow direction is influenced by groundwater extraction from production wells. Direct recharge from the surficial Columbia Aquifer is only to the youngest aquifer sands of the Potomac with limited or no recharge to lower Potomac Aquifer sands as they tend to be intermittent or contain little water. A 60-80 feet thick layer separating the Upper Potomac from the Middle Potomac water-bearing sands (deep water bearing-zone) is present at elevations between 120 and 135 feet below mean sea level (bmsl) (shallowest public supply well 72 ft. below ground surface (bgs), deepest public supply well 221 ft. bgs, average depth 124 ft. bgs). Groundwater in the lower drinking water zone (i.e., within the Middle Potomac Aquifer consisting of the deeper groundwater bearing zones) may be locally confined as indicated by groundwater levels in the deep monitoring wells being approximately five to ten ft. bmsl. Water level measurements from deep monitoring wells and Artesian Water Company supply wells located on Base indicate a south-southeasterly flow (the shallower overlying water zones have a west to southwest flow direction). The discrepancy may be explained by the fact that the groundwater flow direction in the area is influenced by withdrawal from public supply wells (located to the east of the Base) as well as the presence of a groundwater divide at the New Castle County Airport.Stormwater runoff generated on the Base is collected by a network of stormwater inlets and underground drain pipes that direct discharge to earthen drainage ditches offsite. Three outfalls from the Base direct stormwater to Nonesuch Creek, which eventually flows to the Christina River. This PRL is the concrete parking area and does not have any grassy areas.
Brief Description of Receptors:	The airport is surrounded by properties zoned for industrial, residential, and business use. The public supply wells have all been installed to the east and south of the of the New Castle County Airport. There are approximately 14 active public drinking water supply wells within the area of influence of the East Basin Road Groundwater Site. This site is approximately seven miles square and the Base is located in the western quadrant. The Artesian public drinking water well is located on the Base and has been offline due to contamination. The on-base Artesian drinking water wells have been sampled and found not to be impacted by PFAS. DNREC, EPA, Artesian, and the City of New Castle conducted a survey of suspected domestic wells within a 5-mile radius of the Base and found that the parcels with suspected permitted domestic wells are verified to be on public water or located incorrectly. At the time of the SI report, a review of the EDR Radius Map™ Report showed many water wells within a 1-mile radius of the Base. No public water supply wells are identified within one mile of the Base possibly because the Artesian well located on Base property is not in use. A total of 1,450 wells were identified in the State Database within two miles of the Base. Of these, 3 are identified as being downgradient 0.5-2 miles from the Base and are listed as domestic standard but do not provide drinking water. One domestic well was located and sampled by EPA for PFAS. Access to the Base is through a controlled gate and it has a perimeter fence. PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation New Castle ANGB

Site ID: PRL 3 **AFFF Release Area #:** AFFF 3

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFOS	0.855	0.04	21.4
PFOA	0.152	0.04	3.8
PFBS	0.0966	0.602	0.2

CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	25.3
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	
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)	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	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)	H
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).	H
	Groundwater Category	**LOW**

Soil Worksheet

Installation New Castle ANGB

Site ID: PRL 3 **AFFF Release Area #:** AFFF 3

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.00373	0.126	0.0
PFOA	0.000683	0.126	0.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.0**
CHF > 100	**H (High)**		
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**L**

$$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$$

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:	New Castle ANGB	**Date:**	11/1/2021
Location (State):	Delaware	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	Nozzle Testing Area - PRL 4	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Chris Brown	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	The Nozzle Testing Area was a paved parking area located in the southeastern corner of the Base southeast of former Building 2818, where the nozzle testing of fire truck equipment was conducted with water. Nozzle testing with AFFF was conducted in the Wash Rack so that the AFFF could be rinsed. This area was reported in the DNREC as a former FTA. According to a 1996 RI, spent fuels were ignited in a pan and extinguished as part of training exercises conducted in this area. Base personnel, were reportedly unaware of these training practices.
Brief Description of Pathways:	The Potomac Formation is the principal water-producing zone in New Castle County and is composed of lenticular and discontinuous permeable sand units and interbedded, less permeable units of finer sediments. The hydrologic conditions in the Potomac Group are variable and flow direction is influenced by groundwater extraction from production wells. Direct recharge from the surficial Columbia Aquifer is only to the youngest aquifer sands of the Potomac with limited or no recharge to lower Potomac Aquifer sands as they tend to be intermittent or contain little water. A 60-80 feet thick layer separating the Upper Potomac from the Middle Potomac water-bearing sands (deep water bearing-zone) is present at elevations between 120 and 135 feet below mean sea level (bmsl) (shallowest public supply well 72 ft. below ground surface (bgs), deepest public supply well 221 ft. bgs, average depth 124 ft. bgs). Groundwater in the lower drinking water zone (i.e., within the Middle Potomac Aquifer consisting of the deeper groundwater bearing zones) may be locally confined as indicated by groundwater levels in the deep monitoring wells being approximately five to ten ft. bmsl. Water level measurements from deep monitoring wells and Artesian Water Company supply wells located on Base indicate a south-southeasterly flow (the shallower overlying water zones have a west to southwest flow direction). The discrepancy may be explained by the fact that the groundwater flow direction in the area is influenced by withdrawal from public supply wells (located to the east of the Base) as well as the presence of a groundwater divide at the New Castle County Airport.Stormwater runoff generated on the Base is collected by a network of stormwater inlets and underground drain pipes that direct discharge to earthen drainage ditches offsite. Three outfalls from the Base direct stormwater to Nonesuch Creek, which eventually flows to the Christina River. This PRL is located within a secondary fence.
Brief Description of Receptors:	The airport is surrounded by properties zoned for industrial, residential, and business use. The public supply wells have all been installed to the east and south of the of the New Castle County Airport. There are approximately 14 active public drinking water supply wells within the area of influence of the East Basin Road Groundwater Site. This site is approximately seven miles square and the Base is located in the western quadrant. The Artesian public drinking water well is located on the Base and has been offline due to contamination. The on-base Artesian drinking water wells have been sampled and found not to be impacted by PFAS. DNREC, EPA, Artesian, and the City of New Castle conducted a survey of suspected domestic wells within a 5-mile radius of the Base and found that the parcels with suspected permitted domestic wells are verified to be on public water or located incorrectly. At the time of the SI report, a review of the EDR Radius Map™ Report showed many water wells within a 1-mile radius of the Base. No public water supply wells are identified within one mile of the Base possibly because the Artesian well located on Base property is not in use. A total of 1,450 wells were identified in the State Database within two miles of the Base. Of these, 3 are identified as being downgradient 0.5-2 miles from the Base and are listed as domestic standard but do not provide drinking water. One domestic well was located and sampled by EPA for PFAS. Access to the Base is through a controlled gate and it has a perimeter fence. The Nozzle Testing Area is a paved parking area located in the southeastern portion of the Base.

Groundwater Worksheet

Installation: New Castle ANGB

Site ID: PRL 4 **AFFF Release Area #:** AFFF 4

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.17	0.602	0.3
PFOS	4.11	0.04	102.8
PFOA	0.711	0.04	17.8

CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	120.8
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	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)	H
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).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation: New Castle ANGB

Site ID: PRL 4 **AFFF Release Area #:** AFFF 4

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS	0	1.9	0.0
PFOA	0.00196	0.126	0.0
PFOS	0.099	0.126	0.8
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.8**
CHF > 100	**H (High)**		
100 > CHF > 2	**M (Medium)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
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	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	
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:	New Castle ANGB	**Date:**	10/4/2021
Location (State):	Delaware	**Media Evaluated:**	Groundwater
Site Name and ID:	Stormwater Drainage Basin "B" Outfall 002 - PRL 5	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Chris Brown	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	Stormwater Drainage Basin B Outfall 002 is in the southeast corner of the Base. Drainage Basin B encompasses the Main Hangar and the buildings to the southeast of it. Stormwater in this basin generally flows to the southeast through a combination of open ditches and underground stormwater conveyances. Surface runoff flow joins the stormwater and enters an earthen ditch which flows through a concrete catch basin (South Stormwater Retention Basin) equipped with a baffle wall structure that retains floatables and acts as a velocity inhibitor. The combined stormwater flows via the riprap lined earthen ditch offsite in a southerly direction crossing Basin Road where it flows north to Nonesuch Creek. The South Stormwater Retention Basin (Outfall 002) potentially received stormwater impacted with AFFF from the previous fire station and/or the wash rack. It should be noted that this basin receives stormwater drainage from the New Castle Airport.
Brief Description of Pathways:	The Potomac Formation is the principal water-producing zone in New Castle County and is composed of lenticular and discontinuous permeable sand units and interbedded, less permeable units of finer sediments. The hydrologic conditions in the Potomac Group are variable and flow direction is influenced by groundwater extraction from production wells. Direct recharge from the surficial Columbia Aquifer is only to the youngest aquifer sands of the Potomac with limited or no recharge to lower Potomac Aquifer sands as they tend to be intermittent or contain little water. A 60-80 feet thick layer separating the Upper Potomac from the Middle Potomac water-bearing sands (deep water bearing-zone) is present at elevations between 120 and 135 feet below mean sea level (bmsl) (shallowest public supply well 72 ft. below ground surface (bgs), deepest public supply well 221 ft. bgs, average depth 124 ft. bgs). Groundwater in the lower drinking water zone (i.e., within the Middle Potomac Aquifer consisting of the deeper groundwater bearing zones) may be locally confined as indicated by groundwater levels in the deep monitoring wells being approximately five to ten ft. bmsl. Water level measurements from deep monitoring wells and Artesian Water Company supply wells located on Base indicate a south-southeasterly flow (the shallower overlying water zones have a west to southwest flow direction). The discrepancy may be explained by the fact that the groundwater flow direction in the area is influenced by withdrawal from public supply wells (located to the east of the Base) as well as the presence of a groundwater divide at the New Castle County Airport.Stormwater runoff generated on the Base is collected by a network of stormwater inlets and underground drain pipes that direct discharge to earthen drainage ditches offsite. Three outfalls from the Base direct stormwater to Nonesuch Creek, which eventually flows to the Christina River.This PRL covers the concrete drainage basin and the surrounding riprap lined banks. It does not include the riprap swale going off the Base.
Brief Description of Receptors:	The airport is surrounded by properties zoned for industrial, residential, and business use. The public supply wells have all been installed to the east and south of the of the New Castle County Airport. There are approximately 14 active public drinking water supply wells within the area of influence of the East Basin Road Groundwater Site. This site is approximately seven miles square and the Base is located in the western quadrant. The Artesian public drinking water well is located on the Base and has been offline due to contamination. The on-base Artesian drinking water wells have been sampled and found not to be impacted by PFAS. DNREC, EPA, Artesian, and the City of New Castle conducted a survey of suspected domestic wells within a 5-mile radius of the Base and found that the parcels with suspected permitted domestic wells are verified to be on public water or located incorrectly. At the time of the SI report, a review of the EDR Radius Map™ Report showed many water wells within a 1-mile radius of the Base. No public water supply wells are identified within one mile of the Base possibly because the Artesian well located on Base property is not in use. A total of 1,450 wells were identified in the State Database within two miles of the Base. Of these, 3 are identified as being downgradient 0.5-2 miles from the Base and are listed as domestic standard but do not provide drinking water. One domestic well was located and sampled by EPA for PFAS. Access to the Base is through a controlled gate and it has a perimeter fence. PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation New Castle ANGB

Site ID: PRL 5 **AFFF Release Area #:** AFFF 5

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFOS	16.9	0.04	422.5
PFOA	1.24	0.04	31.0
PFBS	0.228	0.602	0.4
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**453.9**
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)	H
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).	H
	Groundwater Category	**HIGH**

Site Background Information			
Installation:	New Castle ANGB	**Date:**	10/4/2021
Location (State):	Delaware	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	Hazmart Bldg and Outdoor Storage Area - PRL 6	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Chris Brown	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	Building 2831, the HAZMART, is in the southeastern corner of the Base north of former Building 2919, the Former Fire Station, and the Nozzle Testing Area, and east of the Wash Rack. This building had a HEF fire suppression system, with two 220-gallon tanks in 2015. According to available documentation and Base personnel, two full releases of foam occurred in this building. Although the first release may have been washed out of the building into Stormwater Basin B Outfall 002, HEF does not contain PFAS. Drums of AFFF were reported by Base personnel to have been stored in the Outside Storage Area prior to 1999 when the Former Fire Station was still in use and Base personnel were not aware of any releases of AFFF in this area.
Brief Description of Pathways:	The Potomac Formation is the principal water-producing zone in New Castle County and is composed of lenticular and discontinuous permeable sand units and interbedded, less permeable units of finer sediments. The hydrologic conditions in the Potomac Group are variable and flow direction is influenced by groundwater extraction from production wells. Direct recharge from the surficial Columbia Aquifer is only to the youngest aquifer sands of the Potomac with limited or no recharge to lower Potomac Aquifer sands as they tend to be intermittent or contain little water. A 60-80 feet thick layer separating the Upper Potomac from the Middle Potomac water-bearing sands (deep water bearing-zone) is present at elevations between 120 and 135 feet below mean sea level (bmsl) (shallowest public supply well 72 ft. below ground surface (bgs), deepest public supply well 221 ft. bgs, average depth 124 ft. bgs). Groundwater in the lower drinking water zone (i.e., within the Middle Potomac Aquifer consisting of the deeper groundwater bearing zones) may be locally confined as indicated by groundwater levels in the deep monitoring wells being approximately five to ten ft. bmsl. Water level measurements from deep monitoring wells and Artesian Water Company supply wells located on Base indicate a south-southeasterly flow (the shallower overlying water zones have a west to southwest flow direction). The discrepancy may be explained by the fact that the groundwater flow direction in the area is influenced by withdrawal from public supply wells (located to the east of the Base) as well as the presence of a groundwater divide at the New Castle County Airport.Stormwater runoff generated on the Base is collected by a network of stormwater inlets and underground drain pipes that direct discharge to earthen drainage ditches offsite. Three outfalls from the Base direct stormwater to Nonesuch Creek, which eventually flows to the Christina River.This PRL is the building and a secondarily secured fenced outdoor storage area which is asphalt paved. Soil samples collected in this area were collected through 4 feet of asphalt.
Brief Description of Receptors:	The airport is surrounded by properties zoned for industrial, residential, and business use. The public supply wells have all been installed to the east and south of the of the New Castle County Airport. There are approximately 14 active public drinking water supply wells within the area of influence of the East Basin Road Groundwater Site. This site is approximately seven miles square and the Base is located in the western quadrant. The Artesian public drinking water well is located on the Base and has been offline due to contamination. The on-base Artesian drinking water wells have been sampled and found not to be impacted by PFAS. DNREC, EPA, Artesian, and the City of New Castle conducted a survey of suspected domestic wells within a 5-mile radius of the Base and found that the parcels with suspected permitted domestic wells are verified to be on public water or located incorrectly. At the time of the SI report, a review of the EDR Radius Map™ Report showed many water wells within a 1-mile radius of the Base. No public water supply wells are identified within one mile of the Base possibly because the Artesian well located on Base property is not in use. A total of 1,450 wells were identified in the State Database within two miles of the Base. Of these, 3 are identified as being downgradient 0.5-2 miles from the Base and are listed as domestic standard but do not provide drinking water. One domestic well was located and sampled by EPA for PFAS. Access to the Base is through a controlled gate and it has a perimeter fence. PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation New Castle ANGB

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

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFOS	1.85	0.04	46.3
PFOA	0.253	0.04	6.3
PFBS	0.0268	0.602	0.0

CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	52.6
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)	H
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).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation New Castle ANGB

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

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.000313	0.126	0.0

CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	0.0
CHF > 100	H (High)		
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		
CHF Value		CHF VALUE	L

$$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$$

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:	New Castle ANGB	**Date:**	10/4/2021
Location (State):	Delaware	**Media Evaluated:**	Groundwater
Site Name and ID:	Stormwater Drainage Basin C - PRL 7	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Chris Brown	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	Stormwater Drainage Basin C is a small area located in the northwestern part of the Base. No industrial activity was reported to occur in Drainage Basin C. Stormwater exits the Base via surface flow (that does not infiltrate the soil) and enters stormwater inlets and underground piping. The Stormwater Drainage Basin C outfall is located outside the northwestern Base boundary (just west of MW113) and flows northerly to Nonesuch Creek. This area was included in the Illicit Discharge Survey but is not covered by the Base's stormwater permit, as confirmed by state regulators.
Brief Description of Pathways:	The Potomac Formation is the principal water-producing zone in New Castle County and is composed of lenticular and discontinuous permeable sand units and interbedded, less permeable units of finer sediments. The hydrologic conditions in the Potomac Group are variable and flow direction is influenced by groundwater extraction from production wells. Direct recharge from the surficial Columbia Aquifer is only to the youngest aquifer sands of the Potomac with limited or no recharge to lower Potomac Aquifer sands as they tend to be intermittent or contain little water. A 60-80 feet thick layer separating the Upper Potomac from the Middle Potomac water-bearing sands (deep water bearing-zone) is present at elevations between 120 and 135 feet below mean sea level (bmsl) (shallowest public supply well 72 ft. below ground surface (bgs), deepest public supply well 221 ft. bgs, average depth 124 ft. bgs). Groundwater in the lower drinking water zone (i.e., within the Middle Potomac Aquifer consisting of the deeper groundwater bearing zones) may be locally confined as indicated by groundwater levels in the deep monitoring wells being approximately five to ten ft. bmsl. Water level measurements from deep monitoring wells and Artesian Water Company supply wells located on Base indicate a south-southeasterly flow (the shallower overlying water zones have a west to southwest flow direction). The discrepancy may be explained by the fact that the groundwater flow direction in the area is influenced by withdrawal from public supply wells (located to the east of the Base) as well as the presence of a groundwater divide at the New Castle County Airport.Stormwater runoff generated on the Base is collected by a network of stormwater inlets and underground drain pipes that direct discharge to earthen drainage ditches offsite. Three outfalls from the Base direct stormwater to Nonesuch Creek, which eventually flows to the Christina River. This PRL discharges outside the controlled fence onto airport property. The outfall is a concrete structure filled with riprap. The discharge swale was part of the historic creek bed before being buried sometime between 2008 and 2009.
Brief Description of Receptors:	The airport is surrounded by properties zoned for industrial, residential, and business use. The public supply wells have all been installed to the east and south of the of the New Castle County Airport. There are approximately 14 active public drinking water supply wells within the area of influence of the East Basin Road Groundwater Site. This site is approximately seven miles square and the Base is located in the western quadrant. The Artesian public drinking water well is located on the Base and has been offline due to contamination. The on-base Artesian drinking water wells have been sampled and found not to be impacted by PFAS. DNREC, EPA, Artesian, and the City of New Castle conducted a survey of suspected domestic wells within a 5-mile radius of the Base and found that the parcels with suspected permitted domestic wells are verified to be on public water or located incorrectly. At the time of the SI report, a review of the EDR Radius Map™ Report showed many water wells within a 1-mile radius of the Base. No public water supply wells are identified within one mile of the Base possibly because the Artesian well located on Base property is not in use. A total of 1,450 wells were identified in the State Database within two miles of the Base. Of these, 3 are identified as being downgradient 0.5-2 miles from the Base and are listed as domestic standard but do not provide drinking water. One domestic well was located and sampled by EPA for PFAS. Access to the Base is through a controlled gate and it has a perimeter fence. This PRL is located in the northern portion of the Installation and the samples were collected outside the controlled fence on airport property. PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.

Groundwater Worksheet

Installation New Castle ANGB

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

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFOS	0.594	0.04	14.8
PFOA	0.72	0.04	18.0
PFBS	0.127	0.602	0.2

CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	33.1
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)	H
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).	H
	Groundwater Category	**HIGH**