



RELATIVE RISK SITE EVALUATION



McLaughlin Air National Guard Base, West Virginia

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. 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 U.S. 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 McLaughlin Air National Guard Base (ANGB) (Yaeger Airport) PFAS PA and SI can be found at the Air Force 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 (e.g., Active, ANG, BRAC), scroll down the Installation List and click on Charleston Airport (Yeager), WV, then enter the AR Number 469948 in the "AR #" field for the PA. For the SI, enter the AR Number 588751 (1 of 6). 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

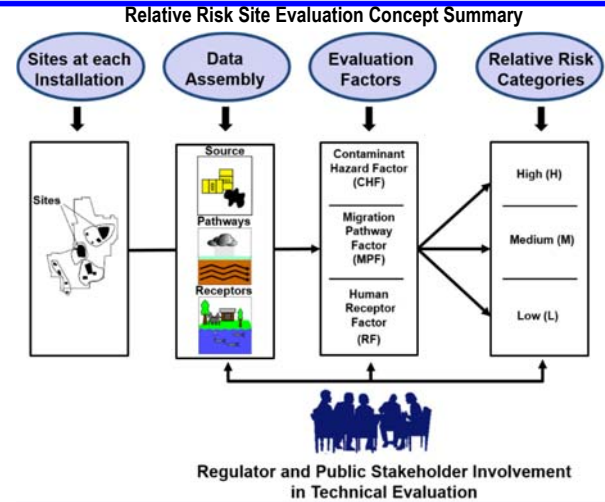
ANG - Air National Guard	PA – Preliminary Assessment
ANGB - Air National Guard Bureau	PFAS - Per-and polyfluoroalkyl substances
AFFF - Aqueous Film Forming Foam	PFBS – Perfluorobutanesulfonic acid
AST – Aboveground Storage Tank	PFOA - Perfluorooctanoic acid
bgs - below ground surface	PFOS - Perfluorooctane sulfonate
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act	PRL - Potential Release Location
CHF – Contaminant Hazard Factor	RCRA – Resource Conservation and Recovery Act
DoD - Department of Defense	RF – Receptor Factor
EPA – US Environmental Protection Agency	RI – Remedial Investigation
FTA – Fire Training Area	RRSE – Relative Risk Site Evaluation
HA – Health Advisory	SI – Site Inspection
MPF – Migration Pathway Factor	

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

A. RRSE is a methodology to sequence environmental restoration work used by the 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 Comprehensive Environmental Response, Compensation, and Liability Act (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.



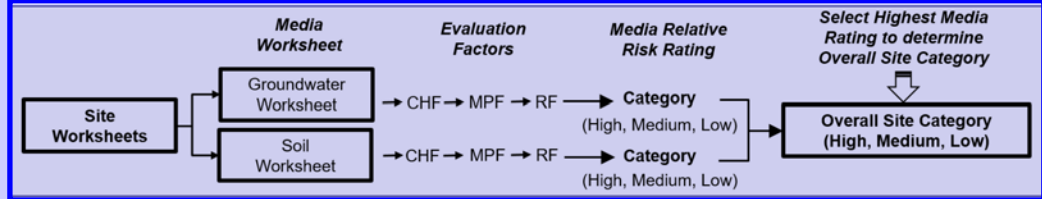
Sites at Each Installation

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

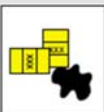


A. Restoration sites in CERCLA phases prior to remedy-in-place are evaluated in the process. Worksheets are developed for environmental media at each site. For consistency across all the Installations, only surface soil (0-1 foot deep) and groundwater media were evaluated in the RRSE.

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.



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/>

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

A. The movement of contamination at a site is evaluated and assigned an 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.

POINT OF CONTACT

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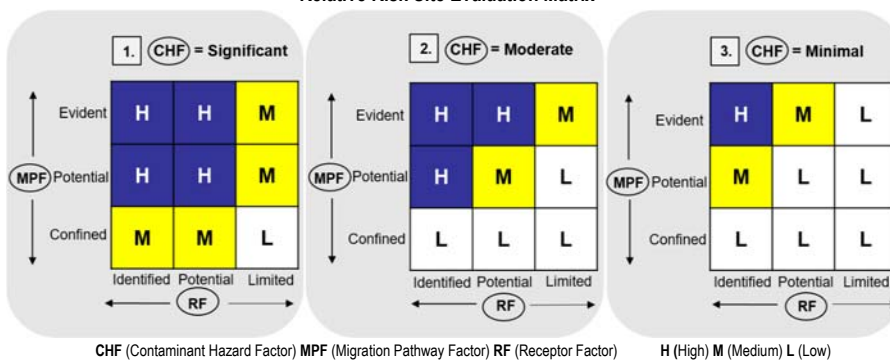
RELATIVE RISK SITE EVALUATION, cont.

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



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**.

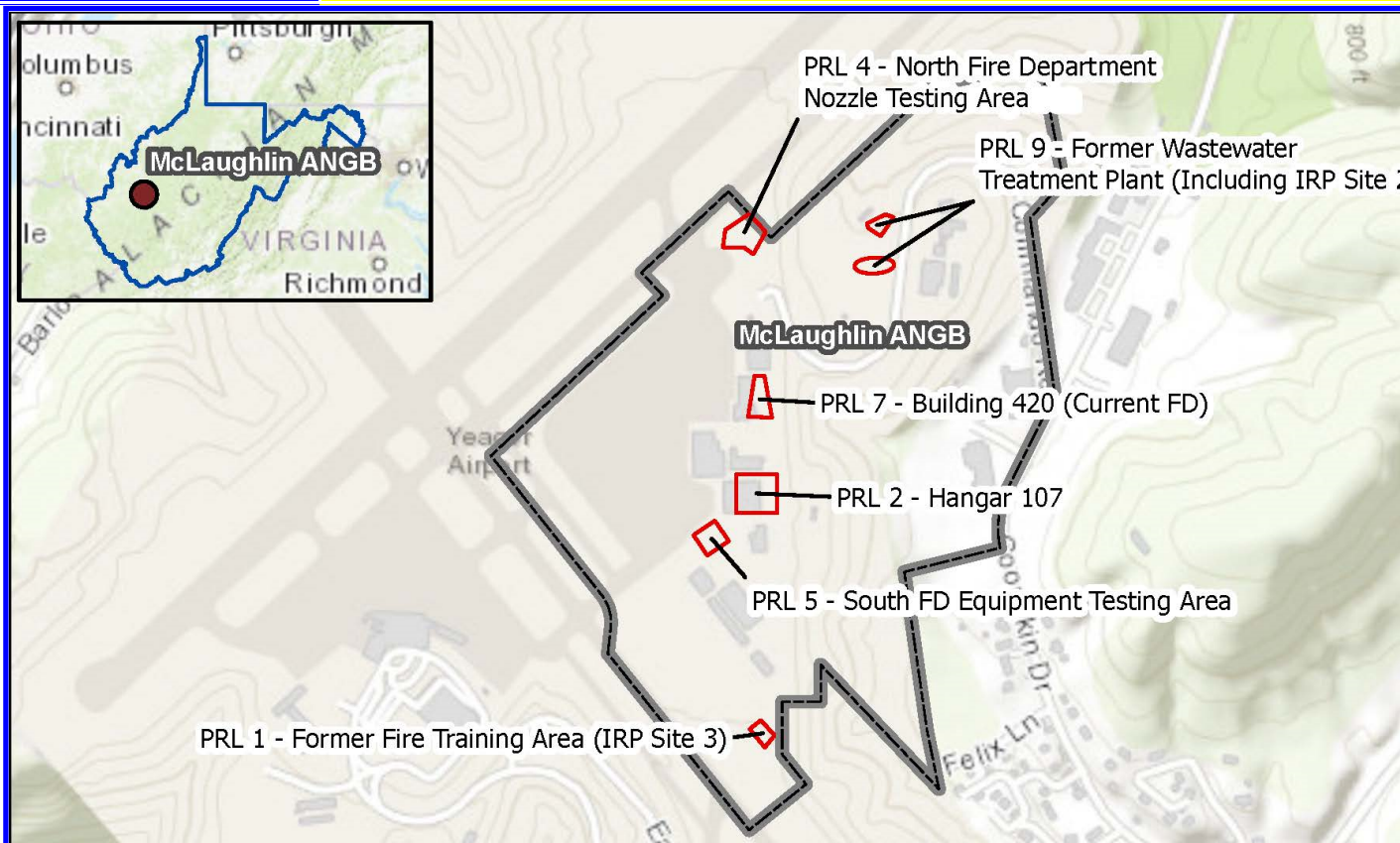
Regulatory and Stakeholder Involvement

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 McLaughlin ANGB, WV

Overall Site Category	Site Name (Sites are shown on the map below and RRSE Worksheets are attached)
HIGH	PRL 4, PRL 5, PRL 9
MEDIUM	
LOW	PRL 1, PRL 2, PRL 7



<p>McLaughlin ANGB Relative Risk Site Evaluation (RRSE) Figure National Guard Bureau McLaughlin Air National Guard Base, West Virginia</p>	<p>Legend</p> <ul style="list-style-type: none"> AFFF Release Areas McLaughlin ANGB Installation Boundary 	<p>0 250 500 1,000 Feet</p>	<p>National Guard Bureau/A4VR Environmental Restoration 3500 Fetchet Ave Joint Base Andrews, MD 20762</p>
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Site Background Information

Installation:	McLaughlin ANGB	Date:	08/03/2022
Location (State):	West Virginia	Media Evaluated:	Soil
Site Name and ID:	PRL 1 - Former FTA (IRP Site 3)	Phase of Execution (e.g., RI, Record of Decision)	N/A
RPM's Name:	Jenna Laube	Agreement Status (e.g., Federal Facility Agreement date)	N/A
OVERALL SITE CATEGORY: LOW			

Site Summary

Brief Site Description:	<p>PRL 1 consists of IRP Site 3, a former fire training area (FTA) which was used from 1970 to 1979. A 1996 Site Investigation Report stated that foam was used at this FTA, but it did not indicate the type of foam. The former FTA was located approximately 100 ft. south of former Building 126, Munitions Storage. The site consisted of a round pit with a dike around the perimeter. The pit was approximately 50 ft. in diameter and 1 ft. deep with an approximate area of 1,960 square ft. The bottom of the pit was lined with crushed stone/gravel and contained a drain pipe which drained to an oil water separator (OWS) that discharged to the east over the nearby hillside. The former location of the OWS and the drain pipe are unknown. Runoff from the former FTA flows east overland toward the plateau escarpment and ultimately into Elk Two Mile Creek. Fire training exercises were conducted about four times a year. Roughly 3,000 gallons of flammable liquids were reportedly applied to the pit per year.</p>
Brief Description of Pathways:	<p>The groundwater exposure pathway at McLaughlin Air National Guard Base (MANGB) includes an unconfined aquifer, generally within 5 to 10 ft. below ground surface (bgs). This shallow aquifer likely occurs both as an unconsolidated aquifer zone composed of fill materials and as the weathered upper 100 to 200 ft. of bedrock. Generally, groundwater on Base and the immediate vicinity recharges to shallow surface water drainage features and likely follows the general pre-airport construction flow routes where original topography was the dominant flow factor. Where the depth of fill material is restricted by the presence of the less permeable Conemaugh sandstone "bedrock" aquifers, the water table is within 5 ft. bgs. These areas discharge laterally northwest toward the Elk River in the form of springs at a maximum estimated rate of 5 gallons per minute. Groundwater flows from the hilltops to the valleys through horizontal and vertical tensile fractures. Deeper groundwater eventually reaches bedding planes in the valley floor. It is likely that groundwater flow direction tends to follow topography in unconsolidated fill, but is dominantly controlled by fracture orientation/bedding planes in bedrock. PRL 1 is located in the southwest portion of the Base and appears to be primarily covered in vegetation with some paved areas/buildings located within the source area; which would limit exposure via direct contact. The soil boring was dry at the time of the site investigation (SI) so a groundwater worksheet is not included for this PRL.</p>
Brief Description of Receptors:	<p>MANGB personnel indicated that no drinking water supply wells are located at the Base. The Environmental Data Resources Radius Map™ Report with Geospatial® dated 20 July 2015, identified 24 United States Geological Survey wells within a 1-mile radius of the MANGB. Additionally, a 2001 Environmental Baseline Survey identified a total of 23 domestic, industrial, irrigation, recreation, commercial, and public water supply wells located within a 1-mile radius of the McLaughlin ANG site boundary. One of these wells, G19, was reported to be a public supply well. This well is 1,863 ft. deep, and the depth to groundwater is recorded at 12 ft. bgs. The closest downgradient (northeast) water well is located 1/4 to 1/2 miles from the Base. The depth of the well is unknown.</p> <p>PRL 1 is located within the Base boundary fence with controlled access. Surface soil detections at this PRL are below screening levels and therefore, this PRL has no surface soil receptor concerns.</p>

Soil Worksheet

Installation: McLaughlin ANGB

Site ID: PRL 1

AFFF Release Area #: AFFF 1

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.0847	0.126	0.7
PFOA	0.00607	0.126	0.0
PFBS	0.00116	1.9	0.0
CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	0.7
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
<u>Migration Pathway Factor</u>			
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
Migration Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).		L
<u>Receptor Factor</u>			
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:	McLaughlin ANGB	Date:	08/03/2022
Location (State):	West Virginia	Media Evaluated:	Soil
Site Name and ID:	PRL 2 - Hangar 107	Phase of Execution (e.g., RI, Record of Decision)	N/A
RPM's Name:	Jenna Laube	Agreement Status (e.g., Federal Facility Agreement date)	N/A
OVERALL SITE CATEGORY: LOW			

Site Summary

Brief Site Description:	<p>PRL 2 consists of Hangar 107, which was constructed in 1951 and was believed to be equipped with an aqueous film forming foam (AFFF) Fire Suppression System (FSS) from 1986 until 2014. The exact date of the AFFF system installation is not known by Base personnel and it is possible that installation predates 1986. The FSS was designed to contain, store, and in the case of system engagement, ultimately discharge the AFFF inside the hangar. The AFFF system was removed from Hangar 107 in 2014. There were no known releases of AFFF from Hangar 107 except to the floor drains during AFFF system testing approximately every 3 to 5 years. Approximately 100 to 200 gallons of AFFF was estimated to be released during each test. From 1972 until 1989, the floor drains from Hangar 107 discharged to an OWS and then to the on-Base waste-water treatment plant (WWTP). Effluent discharges from the Base WWTP traveled to an on-Base unnamed intermittent tributary of the Coonskin Branch. After 1989, the Base connected to the city sewer system and discharged their wastewater to the Charleston WWTP.</p>
Brief Description of Pathways:	<p>The groundwater exposure pathway at MANGB includes an unconfined aquifer, generally within 5 to 10 ft. bgs. This shallow aquifer likely occurs both as an unconsolidated aquifer zone composed of fill materials and as the weathered upper 100 to 200 ft. of bedrock. Generally, groundwater on Base and the immediate vicinity recharges to shallow surface water drainage features and likely follows the general pre-airport construction flow routes where original topography was the dominant flow factor. Where the depth of fill material is restricted by the presence of the less permeable Conemaugh sandstone "bedrock" aquifers, the water table is within 5 ft. bgs. These areas discharge laterally northwest toward the Elk River in the form of springs at a maximum estimated rate of 5 gallons per minute. Groundwater flows from the hilltops to the valleys through horizontal and vertical tensile fractures. Deeper groundwater eventually reaches bedding planes in the valley floor. It is likely that groundwater flow direction tends to follow topography in unconsolidated fill, but is dominantly controlled by fracture orientation/bedding planes in bedrock. PRL 2 is located in the central portion of the Base and appears to be primarily covered in pavement/asphalt with landscaped areas present to the south; which would limit the surface soil exposure pathway. The soil boring was dry at the time of the SI so a groundwater worksheet is not included for this PRL.</p>
Brief Description of Receptors:	<p>MANGB personnel indicated that no drinking water supply wells are located at the Base. Review of the Environmental Data Resources Radius Map™ Report with Geospatial® dated 20 July 2015, identified 24 United States Geological Survey wells within a 1-mile radius of the MANGB. Additionally, a 2001 Environmental Baseline Survey identified a total of 23 domestic, industrial, irrigation, recreation, commercial, and public water supply wells located within a 1-mile radius of the McLaughlin ANG site boundary. One of these wells, G19, was reported to be a public supply well. This well is 1,863 ft. deep, and the depth to groundwater is recorded at 12 ft. bgs. The closest downgradient (northeast) water well is located 1/4 to 1/2 miles from the Base. The depth of the well is unknown.</p> <p>PRL 2 is located within the Base boundary fence with controlled access. Surface soil detections at this PRL are below screening levels and therefore, this PRL has no surface soil receptor concerns.</p>

Soil Worksheet

Installation McLaughlin ANGB

Site ID: PRL 2

AFFF Release Area #: AFFF 2

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.00724	0.126	0.1
CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	0.1
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		L
<u>Migration Pathway Factor</u>			
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
Migration Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).		L
<u>Receptor Factor</u>			
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:	McLaughlin ANGB	Date:	08/03/2022
Location (State):	West Virginia	Media Evaluated:	Soil
Site Name and ID:	PRL 4 - North FD Nozzle Testing Area	Phase of Execution (e.g., RI, Record of Decision)	N/A
RPM's Name:	Jenna Laube	Agreement Status (e.g., Federal Facility Agreement date)	N/A
OVERALL SITE CATEGORY: HIGH			

Site Summary

Brief Site Description:	<p>PRL 4 consists of the North Fire Department (FD) Nozzle Testing Area located south of Taxiway "A" and north of Building 125. According to the Fire Chief, nozzle tests were performed at the Base annually. No specific date could be given as to when nozzle tests using AFFF began and it is assumed that they began in the 1970s or 1980s when AFFF was introduced at the Base. Foam discharged in this testing area was either allowed to naturally dissipate/evaporate or an anti-foam agent was applied. Nozzle tests using AFFF ended at the Base prior to the Building 120 demolition in 2006/2007.</p>
Brief Description of Pathways:	<p>The groundwater exposure pathway at MANGB includes an unconfined aquifer, generally within 5 to 10 ft. bgs. This shallow aquifer likely occurs both as an unconsolidated aquifer zone composed of fill materials and as the weathered upper 100 to 200 ft. of bedrock. Generally, groundwater on Base and the immediate vicinity recharges to shallow surface water drainage features and likely follows the general pre-airport construction flow routes where original topography was the dominant flow factor. Where the depth of fill material is restricted by the presence of the less permeable Conemaugh sandstone "bedrock" aquifers, the water table is within 5 ft. bgs. These areas discharge laterally northwest toward the Elk River in the form of springs at a maximum estimated rate of 5 gallons per minute. Groundwater flows from the hilltops to the valleys through horizontal and vertical tensile fractures. Deeper groundwater eventually reaches bedding planes in the valley floor. It is likely that groundwater flow direction tends to follow topography in unconsolidated fill, but is dominantly controlled by fracture orientation/bedding planes in bedrock. PRL 4 is located in the northern portion of the Base and appears to be primarily covered in vegetation; which would limit the surface soil exposure pathway. While exposure would be limited, detections of PFAS constituents did exceed comparison values. The soil boring was dry at the time of the SI so a groundwater worksheet is not included for this PRL.</p>
Brief Description of Receptors:	<p>MANGB personnel indicated that no drinking water supply wells are located at the Base. Review of the Environmental Data Resources Radius Map™ Report with Geospatial® dated 20 July 2015, identified 24 United States Geological Survey wells within a 1-mile radius of the MANGB. Additionally, a 2001 Environmental Baseline Survey identified a total of 23 domestic, industrial, irrigation, recreation, commercial, and public water supply wells located within a 1-mile radius of the McLaughlin ANG site boundary. One of these wells, G19, was reported to be a public supply well. This well is 1,863 ft. deep, and the depth to groundwater is recorded at 12 ft. bgs. The closest downgradient (northeast) water well is located 1/4 to 1/2 miles from the Base. The depth of the well is unknown.</p> <p>PRL 4 is located within the Base boundary fence with controlled access. Soil receptors would be limited to civilian and military personnel or authorized visitors with access to the Base.</p>

Soil Worksheet

Installation: McLaughlin ANGB

Site ID: PRL 4

AFFF Release Area #: AFFF 4

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	2.16	0.126	17.1
PFOA	0.0136	0.126	0.1
PFBS	0.0186	1.9	0.0
CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	17.3
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
<u>Migratory Pathway Factor</u>			
Evident	Analytical data or observable evidence that contamination is present at a point of exposure		H
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).		H
<u>Receptor Factor</u>			
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			HIGH

Site Background Information

Installation:	McLaughlin ANGB	Date:	08/03/2022
Location (State):	West Virginia	Media Evaluated:	Soil
Site Name and ID:	PRL 5 - South FD Equipment Testing Area	Phase of Execution (e.g., RI, Record of Decision):	N/A
RPM's Name:	Jenna Laube	Agreement Status (e.g., Federal Facility Agreement date)	N/A
OVERALL SITE CATEGORY: HIGH			

Site Summary

Brief Site Description:	<p>PRL 5 consists of the South FD Equipment Testing Area located north-northwest of the former FD, Building 120 (now Building 407) in the grassy area beyond the Run-up Pad. According to the Fire Chief, nozzle tests were performed at the Base annually. No specific date could be given as to when nozzle tests using AFFF began and it is assumed that they began in the 1970s or 1980s when AFFF was introduced at the Base. Foam discharged in this area was either allowed to naturally dissipate/evaporate or an anti-foam agent was applied. Nozzle tests using AFFF ended at the Base prior to the Building 120 demolition in 2006/2007.</p>
Brief Description of Pathways:	<p>The groundwater exposure pathway at MANGB includes an unconfined aquifer, generally within 5 to 10 ft. bgs. This shallow aquifer likely occurs both as an unconsolidated aquifer zone composed of fill materials and as the weathered upper 100 to 200 ft. of bedrock. Generally, groundwater on Base and the immediate vicinity recharges to shallow surface water drainage features and likely follows the general pre-airport construction flow routes where original topography was the dominant flow factor. Where the depth of fill material is restricted by the presence of the less permeable Conemaugh sandstone "bedrock" aquifers, the water table is within 5 ft. bgs. These areas discharge laterally northwest toward the Elk River in the form of springs at a maximum estimated rate of 5 gallons per minute. Groundwater flows from the hilltops to the valleys through horizontal and vertical tensile fractures. Deeper groundwater eventually reaches bedding planes in the valley floor. It is likely that groundwater flow direction tends to follow topography in unconsolidated fill, but is dominantly controlled by fracture orientation/bedding planes in bedrock. PRL 5 is located in the central portion of the Base and appears to be primarily covered in vegetation; which would limit the surface soil exposure pathway. While exposure would be limited, detections of PFAS constituents did exceed comparison values. The soil boring was dry at the time of the SI so a groundwater worksheet is not included for this PRL..</p>
Brief Description of Receptors:	<p>MANGB personnel indicated that no drinking water supply wells are located at the Base. Review of the Environmental Data Resources Radius Map™ Report with Geospatial® dated 20 July 2015, identified 24 United States Geological Survey wells within a 1-mile radius of the MANGB. Additionally, a 2001 Environmental Baseline Survey identified a total of 23 domestic, industrial, irrigation, recreation, commercial, and public water supply wells located within a 1-mile radius of the McLaughlin ANG site boundary. One of these wells, G19, was reported to be a public supply well. This well is 1,863 ft. deep, and the depth to groundwater is recorded at 12 ft. bgs. The closest downgradient (northeast) water well is located 1/4 to 1/2 miles from the Base. The depth of the well is unknown.</p> <p>PRL 5 is located within the Base boundary fence with controlled access. Soil receptors would be limited to civilian and military personnel or authorized visitors with access to the Base.</p>

Soil Worksheet

Installation McLaughlin ANGB

Site ID: PRL 5

AFFF Release Area #: AFFF 5

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.958	0.126	7.6
PFOA	0.00332	0.126	0.0
PFBS	0.000922	1.9	0.0

CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	7.6
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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
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Migration Pathway Factor

Evident	Analytical data or observable evidence that contamination is present at a point of exposure	H
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	
Migration Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	H

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	HIGH
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Site Background Information

Installation:	McLaughlin ANGB	Date:	08/03/2022
Location (State):	West Virginia	Media Evaluated:	Soil
Site Name and ID:	PRL 7 - Building 420 (Current FD)	Phase of Execution (e.g., RI, Record of Decision)	N/A
RPM's Name:	Jenna Laube	Agreement Status (e.g., Federal Facility Agreement date)	N/A
OVERALL SITE CATEGORY: LOW			

Site Summary

Brief Site Description:	<p>PRL 7 consists of Building 420, which houses the Base's current fire station and was constructed in 2006/2007. According to the 2019 SI report, this is the only building on Base that currently stores AFFF. AFFF is stored in 5-gallon containers that are manually loaded into fire trucks equipped with a bayonet system that punctures the container within the fire truck's containment tank. There is an overhead fill system which is rarely used. A trench drain connected to the storm drain system within the concrete floor has a valve kept in the closed position to act as containment should there be a spill of AFFF. There have been no documented releases of AFFF from this building.</p>
Brief Description of Pathways:	<p>The groundwater exposure pathway at MANGB includes an unconfined aquifer, generally within 5 to 10 ft. bgs. This shallow aquifer likely occurs both as an unconsolidated aquifer zone composed of fill materials and as the weathered upper 100 to 200 ft. of bedrock. Generally, groundwater on Base and the immediate vicinity recharges to shallow surface water drainage features and likely follows the general pre-airport construction flow routes where original topography was the dominant flow factor. Where the depth of fill material is restricted by the presence of the less permeable Conemaugh sandstone "bedrock" aquifers, the water table is within 5 ft. bgs. These areas discharge laterally northwest toward the Elk River in the form of springs at a maximum estimated rate of 5 gallons per minute. Groundwater flows from the hilltops to the valleys through horizontal and vertical tensile fractures. Deeper groundwater eventually reaches bedding planes in the valley floor. It is likely that groundwater flow direction tends to follow topography in unconsolidated fill, but is dominantly controlled by fracture orientation/bedding planes in bedrock. PRL 7 is covered entirely in pavement; which would limit the surface soil exposure pathway. The soil boring was dry at the time of the SI so a groundwater worksheet is not included for this PRL.</p>
Brief Description of Receptors:	<p>MANGB personnel indicated that no drinking water supply wells are located at the Base. Review of the Environmental Data Resources Radius Map™ Report with Geospatial® dated 20 July 2015, identified 24 United States Geological Survey wells within a 1-mile radius of the MANGB. Additionally, a 2001 Environmental Baseline Survey identified a total of 23 domestic, industrial, irrigation, recreation, commercial, and public water supply wells located within a 1-mile radius of the McLaughlin ANG site boundary. One of these wells, G19, was reported to be a public supply well. This well is 1,863 ft. deep, and the depth to groundwater is recorded at 12 ft. bgs. The closest downgradient (northeast) water well is located 1/4 to 1/2 miles from the Base. The depth of the well is unknown.</p> <p>PRL 7 is located within the Base boundary fence with controlled access. Surface soil detections at this PRL are below screening levels and therefore, this PRL has no surface soil receptor concerns.</p>

Soil Worksheet

Installation McLaughlin ANGB

Site ID: PRL 7

AFFF Release Area #: AFFF 7

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.00266	0.126	0.0
CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	0.0
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
<u>Migration Pathway Factor</u>			
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
Migration Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).		L
<u>Receptor Factor</u>			
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:	McLaughlin ANGB	Date:	08/03/2022
Location (State):	West Virginia	Media Evaluated:	Groundwater, Soil
Site Name and ID:	PRL 9 - Former WWTP (Including IRP Site 2)	Phase of Execution (e.g., RI, Record of Decision)	N/A
RPM's Name:	Jenna Laube	Agreement Status (e.g., Federal Facility Agreement date)	N/A
OVERALL SITE CATEGORY: HIGH			

Site Summary

Brief Site Description:	<p>PRL 9 is the former WWTP (Building 123) and includes IRP Site 2. The former WWTP was constructed in 1972 and ceased operation in 1989 when the Base connected to the City of Charleston's sanitary sewer system. The WWTP consisted of two wastewater package plants at Building 123 which were used to treat sanitary and industrial wastewater from the Base. The effluent discharged to an on-Base unnamed intermittent tributary of the Coonskin Branch. Discharges of AFFF into the sanitary sewer prior to 1989 from hangars or fire stations would have been treated through this system and discharged to this unnamed intermittent tributary of the Coonskin Branch. The integrity of the sewer conveyance pipe at the time of the WWTP operation is unknown. The two WWTPs were demolished in 2007/2008. Sludge generated from the WWTP was disposed of on-Base at the former Waste Disposal Site 2 (which became IRP Site 2, which is now closed).</p>
Brief Description of Pathways:	<p>The groundwater exposure pathway at MANGB includes an unconfined aquifer, generally within 5 to 10 ft. bgs. This shallow aquifer likely occurs both as an unconsolidated aquifer zone composed of fill materials and as the weathered upper 100 to 200 ft. of bedrock. Generally, groundwater on Base and the immediate vicinity recharges to shallow surface water drainage features and likely follows the general pre-airport construction flow routes where original topography was the dominant flow factor. Where the depth of fill material is restricted by the presence of the less permeable Conemaugh sandstone "bedrock" aquifers, the water table is within 5 ft. bgs. These areas discharge laterally northwest toward the Elk River in the form of springs at a maximum estimated rate of 5 gallons per minute. Groundwater flows from the hilltops to the valleys through horizontal and vertical tensile fractures. Deeper groundwater eventually reaches bedding planes in the valley floor. It is likely that groundwater flow direction tends to follow topography in unconsolidated fill, but is dominantly controlled by fracture orientation/bedding planes in bedrock. PRL 9 is located in the northern portion of the Base and appears to be primarily covered in pavement/buildings with limited landscaped areas within the source areas (WWTP and IRP Site); which would limit the surface soil exposure pathway.</p>
Brief Description of Receptors:	<p>MANGB personnel indicated that no drinking water supply wells are located at the Base. Review of the Environmental Data Resources Radius Map™ Report with Geospatial® dated 20 July 2015, identified 24 United States Geological Survey wells within a 1-mile radius of the MANGB. Additionally, a 2001 Environmental Baseline Survey identified a total of 23 domestic, industrial, irrigation, recreation, commercial, and public water supply wells located within a 1-mile radius of the McLaughlin ANG site boundary. One of these wells, G19, was reported to be a public supply well. This well is 1,863 ft. deep, and the depth to groundwater is recorded at 12 ft. bgs. The closest downgradient (northeast) water well is located 1/4 to 1/2 miles from the Base. The depth of the well is unknown.</p> <p>PRL 9 is located within the Base boundary fence with controlled access. Surface soil detections at this PRL are below screening levels and therefore, this PRL has no surface soil receptor concerns.</p>

Groundwater Worksheet

Installation McLaughlin ANGB

Site ID: PRL 9

AFFF Release Area #: AFFF 9

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFOS	6.93	0.04	173.2
PFOA	1.17	0.04	29.2
PFBS	1.99	0.602	3.3

CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	205.8
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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
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Migration 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)	
Migration 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 McLaughlin ANGB

Site ID: PRL 9

AFFF Release Area #: AFFF 9

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.0146	0.126	0.1
PFOA	0.00046	0.126	0.0
CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	0.1
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		L
<u>Migration Pathway Factor</u>			
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
Migration Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).		L
<u>Receptor Factor</u>			
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