RELATIVE RISK SITE EVALUATION

New London Air National Guard Base (Stanly County), North Carolina

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 New London ANGB (Stanly County) 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, scroll down the Installation List and click on Stanly County (New London ANG), NC, then enter the AR Number 470209 in the “AR #” field for the PA. For the SI, enter the AR Number 585624. 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

ANGB - Air National Guard Base

AFFF - Aqueous Film Forming Foam

ARFF - Air Rescue Fire Fighting

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act

CHF – Contaminant Hazard Factor

DoD - Department of Defense

EDR - Environmental Data Resources

EPA – US Environmental Protection Agency

HA – Health Advisory

MPF – Migration Pathway Factor

PA – Preliminary Assessment

PFAS - Per-and polyfluoroalkyl substances

PFBS – Perfluorobutanesulfonic acid

PFOA - Perfluorooctanoic acid

PFOS - Perfluorooctane sulfonate

PRL - Potential Release Location

RF – Receptor Factor

RI – Remedial Investigation

RRSE – Relative Risk Site Evaluation

SI – Site Inspection

RELATIVE RISK SITE EVALUATION, cont.

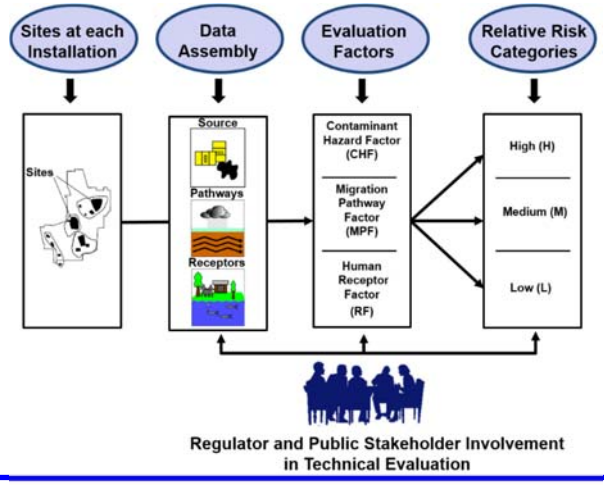
Q. What is the Relative Risk Site Evaluation (RRSE)?

A. RRSE is a methodology to sequence environmental restoration work used by the 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.

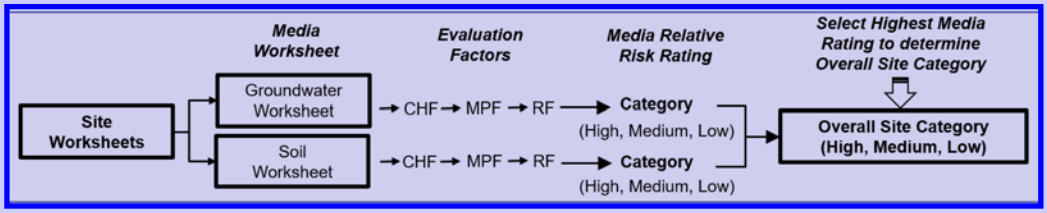
Relative Risk Site Evaluation Concept Summary



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/

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.

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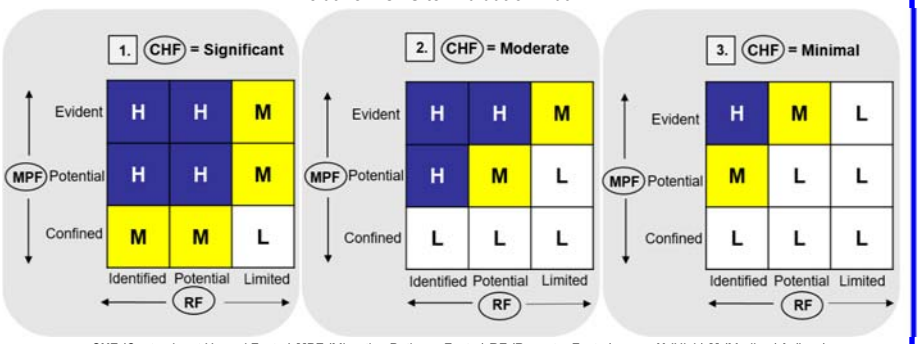
RELATIVE RISK SITE EVALUTION, cont.

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



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**.

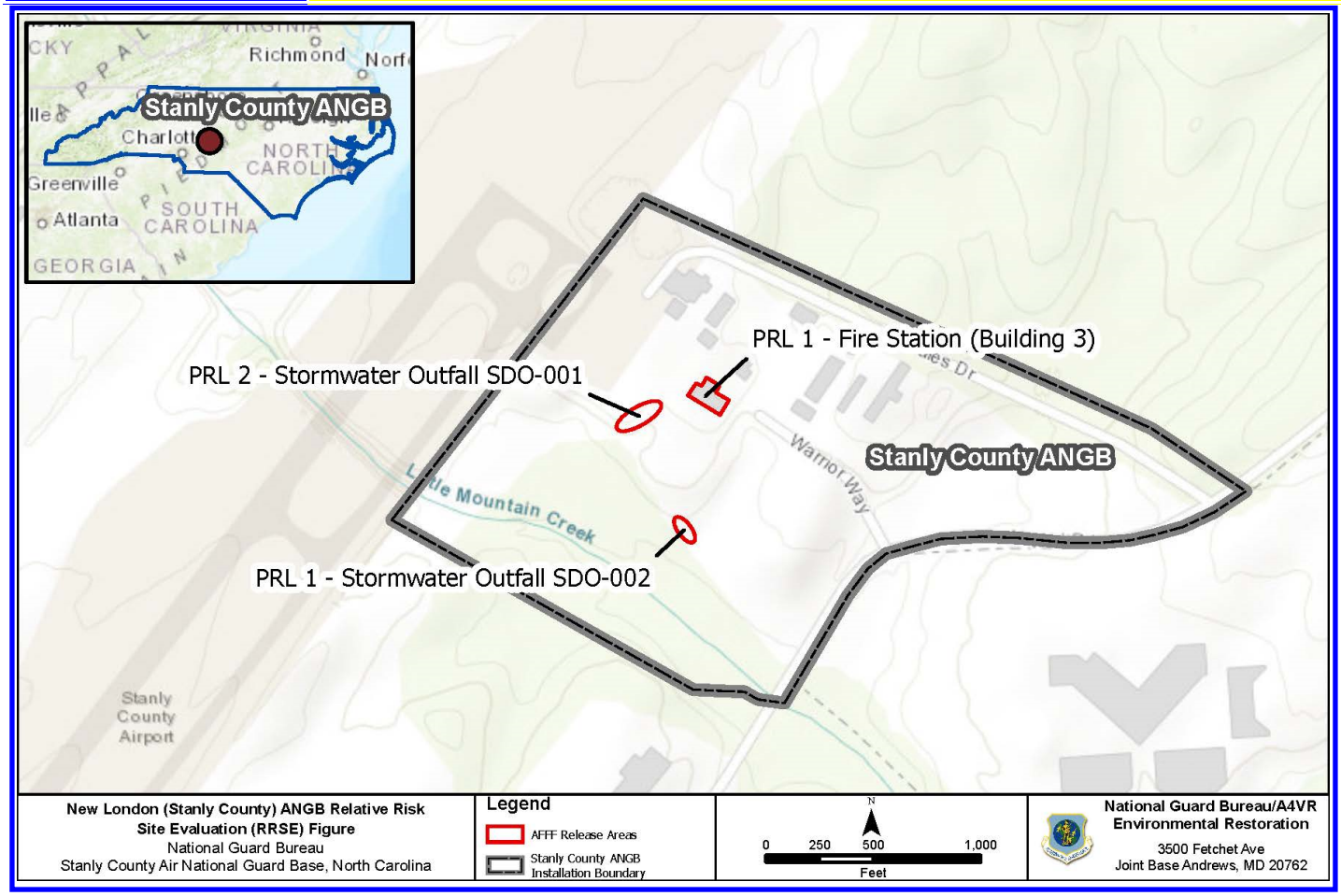
Regulatory and Stakeholder Involvement

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 London ANGB (Stanly County), NC

Overall Site Category	Site Name (Sites are shown on the map below and RRSE Worksheets are attached)
HIGH	N/A
MEDIUM	PRL 2
LOW	PRL 1



Site Background Information			
Installation:	New London ANGB (Stanly County)	**Date:**	08/01/2022
Location (State):	North Carolina	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	PRL 1, Fire Station (Building 3)/ Stormwater Outfall SDO-002	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Jenna Laube	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: LOW			

Site Summary	
Brief Site Description:	PRL 1 consists of Building 3, the current Fire Station which houses administrative areas and the Crash Truck Bays, and Stormwater Outfall SDO-002. According to facility personnel, the Air National Guard (ANG) stores a total of approximately 1500 gallons of 3% aqueous film forming foam (AFFF). AFFF is stored in three Aircraft Rescue Fire Fighting (ARFF) vehicles, two totes, and 5-gallon containers in Building 3. Transfer of AFFF into ARFF vehicles occurs inside the Fire Station. Floor drains within the Fire Station are connected to the sanitary sewer system. No known releases of AFFF have occurred. Any vehicle washing would be conducted on the apron. Facility personnel stated that the Fire Station does not conduct nozzle testing or other fire training activities at the facility. The north side of the fire station is used to wash the fire engines that carry the AFFF. Surface runoff from the paved areas north of the fire station discharges into Stormwater Outfall SDO-002. Stormwater Outfall SDO-002 eventually discharges to Little Mountain Creek.
Brief Description of Pathways:	The hydrogeology of the area consists of a complex, two-part, regolith and fractured crystalline rock aquifer system. The regolith beneath the area consists of an unconsolidated or semi-consolidated mixture of clay and fragmental material ranging in grain size from silt to boulders. Because porosity of this material can range from 35 to 55 percent, the regolith provides the bulk of the water storage within the Piedmont groundwater system. At the base of the regolith is the transition zone where saprolite grades into unweathered bedrock. The transition zone has been identified as a potential conduit for rapid groundwater flow. The water table is relatively flat, and groundwater flows at an average gradient of approximately 0.024 foot per foot. Groundwater was encountered at approximately 17 feet below ground surface in the shallow groundwater monitoring wells. Groundwater flow direction is to the southeast. PRL 1 consists primarily of the building and surrounding paved areas with grassy areas east and south of the building. Paved areas limit the soil pathway.
Brief Description of Receptors:	Based on the 2019 Site Inspection (SI) report, a review of the Environmental Data Resources (EDR) Radius Map™ Report with Geocheck® dated August 12, 2015 shows no water wells within a one-mile radius of the Stanly County ANGB. No public water supply system wells were identified within 1 mile of the New London ANGB. The New London ANGB receives drinking water from Stanly County. The source of the drinking water originates from the Tuckertown Reservoir and the Narrows (Badin Lake) Reservoir approximately 8 miles north (upgradient) of New London ANGB. Receptors for soil include construction or on-base personnel during construction activities.

Groundwater Worksheet

Installation: New London ANGB (Stanly County)

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

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFOS	0.0135	0.04	0.3
PFOA	0.00338	0.04	0.1
PFBS	0.0919	0.602	0.2

CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	0.6
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	L

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	
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)	
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)	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Groundwater Category	**LOW**

Soil Worksheet

Installation New London ANGB (Stanly County)

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

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.0768	0.126	0.6
PFOA	0.000841	0.126	0.0
PFBS	0.000977	1.9	0.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.6**
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	
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 London ANGB (Stanly County)	**Date:**	08/01/2022
Location (State):	North Carolina	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	PRL 2, Stormwater Outfall SDO-001	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	N/A
RPM's Name:	Jenna Laube	**Agreement Status (e.g., Federal Facility Agreement date signed):**	N/A
OVERALL SITE CATEGORY: MEDIUM			

Site Summary	
Brief Site Description:	PRL 2 consists of a stormwater oufall (SDO-001). According to the 2016 Preliminary Assessment report, SDO-001 receives runoff from Basin 001 (DA-001) which has a drainage area of approximately 1.7 acres that is approximately 95% impervious. Surface runoff from the paved areas south of the Fire Station (Building 3) (PRL 1) discharges onto a riprap apron at PRL 2, which in turn discharges toward Little Mountain Creek. Based on historical practices, PFAS impacts could be present in surface water in locations that have received drainage from the site, including the Stormwater Outfall SDO-001 (PRL 2).
Brief Description of Pathways:	The hydrogeology of the area consists of a complex, two-part, regolith and fractured crystalline rock aquifer system. The regolith beneath the area consists of an unconsolidated or semi-consolidated mixture of clay and fragmental material ranging in grain size from silt to boulders. Because porosity of this material can range from 35 to 55 percent, the regolith provides the bulk of the water storage within the Piedmont groundwater system. At the base of the regolith is the transition zone where saprolite grades into unweathered bedrock. The transition zone has been identified as a potential conduit for rapid groundwater flow. The water table is relatively flat, and groundwater flows at an average gradient of approximately 0.024 foot per foot. Groundwater was encountered at approximately 15 feet below ground surface in the shallow groundwater monitoring wells. Groundwater flow direction at the site is to the southeast. PRL 2 consists entirely of a vegetated outfall. Soil pathways would include mechanical processes and wind blown migration for areas with sparse vegetation.
Brief Description of Receptors:	Based on the 2019 SI report, a review of the EDR Radius Map™ Report with Geocheck® dated August 12, 2015 shows no water wells within a one-mile radius of the New London ANGB. No public water supply system wells were identified within 1 mile of the New London ANGB. The New London ANGB receives drinking water from Stanly County. The source of the drinking water originates from the Tuckertown Reservoir and the Narrows (Badin Lake) Reservoir approximately 8 miles north (upgradient) of New London ANGB. Receptors for soil include construction or on-base personnel during construction activities.

Groundwater Worksheet

Installation: New London ANGB (Stanly County)

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

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFOS	0.852	0.04	21.3
PFOA	0.133	0.04	3.3
PFBS	0.628	0.602	1.0

CHF Scale	CHF Value	Contamination Hazard Factor (CHF)	25.7
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	M

Migratory Pathway Factor

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

Receptor Factor

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

Soil Worksheet

Installation: New London ANGB (Stanly County)

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

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.0216	0.126	0.2
PFOA	0.000486	0.126	0.0
PFBS	0.00161	1.9	0.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.2**
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	
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**