

RELATIVE RISK SITE EVALUATION



Moffett Field Air National Guard Base, California

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 U.S. Environmental Protection Agency (EPA) issued drinking water lifetime Health Advisories (HAs) for PFOS and PFOA, and health-based soil-based surface soil regional screening levels (RSLs) for PFOS, PFOA, and two RSLs, surface soil and drinking water for PFBS.

The Air Force is systematically evaluating potential AFFF releases on all Installations and former Installations. It began with the Preliminary Assessments (PAs) that identified potential release areas. Historical records were reviewed, and 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, Site Inspections (SIs) were initiated to collect soil and groundwater samples and analyze those media for 16 different PFAS at the potential release areas. The intent of the SI is to determine if a release has occurred and determine if there are impacts to soil and/or groundwater. The next step in the process is the Relative Risk Site Evaluation (RRSE). The RRSE is a DoD-wide methodology to evaluate the relative risks posed by chemicals present at a site in relation to other sites. The RRSE is a tool used to sequence funding for which installations have the highest priority to begin a Remedial Investigation (RI). The DoD premise in installation sequencing is "worst first," meaning the DoD Component shall address installations that pose a relatively greater potential risk to public safety, human health, or the environment before installations posing a lesser risk.

The Moffett Field ANGB PFAS PA and SI can be found at the AFCEC Administrative Record (AR): <u>https://ar.afcec-cloud.af.mil/</u> 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 Moffett Field ANG Base, CA, then enter the AR Number 474994 in the "AR #" field for the PA. For the SI, enter the AR Number 589585. 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	PFAS - Per-and polyfluoroalkyl substances
AFFF - Aqueous Film Forming Foam	PFBS – Perfluorobutanesulfonic acid
ANG - Air National Guard	PFOA - Perfluorooctanoic acid
ANGB - Air National Guard Base	PFOS - Perfluorooctane sulfonate
CERCLA - Comprehensive Environmental Response, Compensation, and	PRL - Potential Release Location
Liability Act	RI – Remedial Investigation
DoD - Department of Defense	RRSE – Relative Risk Site Evaluation
EPA – US Environmental Protection Agency	RSL Regional Screening Level
HA – Health Advisory	SI – Site Inspection
PA - Preliminary Assessment	





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/policyguidance/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.



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 Ì. Ċ

D 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

the RRSE.



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.

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



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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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).



Overall Site Category Regulatory and Stakeholder Involvement 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. 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. Advisory Committee meetings are also announced in your local newspaper. Relative Risk Site Evaluation Summary Moffett Field ANGE, CA

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



Site Background Information				
Installation:	Moffett Field ANGB	Date:	10/14/2021	
Location (State):	California	Media Evaluated:	Groundwater, Soil	
Site Name and ID:	Hangar 4 - PRL 1	Phase of Execution (e.g., RI, Record of Decision (ROD)):	N/A	
RPM's Name:	Mark Dickerson	Agreement Status (e.g., Federal Facility Agreement date signed):	N/A	
OVERALL SITE CATEGORY: MEDIUM				

Site Summary				
Brief Site Description:	Hangar 4 was constructed in 2001 and primarily served as a maintenance hangar. The hangar is equipped with four Fire Suppression System (FFS) underwing cannons. Aqueous film forming foam (AFFF) is stored in one 1,800-gallon aboveground storage tank (AST) that is housed within the hangar. A pipe system supplies AFFF to the maintenance bay, where there are underwing cannon AFFF delivery points. Four floor drains within the maintenance bay are connected to a 100,000-gallon underground overflow tank (UOT). The outflow from the UOT discharges to a municipal sanitary sewer system. According to the preliminary assessment (PA), in 2005, 2006, 2007, and 2012 there were recorded releases of AFFF. In 2005, an unspecified amount of AFFF was accidentally released and likely washed down the sanitary sewer, storm drain, and/or grassy area adjacent to Hangar 4. In 2006 another accidental release occurred due to a malfunctioning FFS. AFFF was discharged to the sanitary sewer and the grassy area southeast of Hangar 4. Documented in 2007, an accidental release occurred and AFFF was discharged to the storm drain and sanitary sewer. In 2012 there was an accidental release whereupon AFFF was collected in the UOT and discharged to the sanitary sewer.			
Brief Description of Pathways:	Moffett Field is located at the northern end of the Santa Clara Valley Basin, which is a large, north-west trending structural depression between the Hayward and San Andreas Faults. The valley is bordered on the east by the Diablo Range and on the west by the Santa Cruz Mountains. Locally, the airfield is underlain by fluvial, alluvial, and estuarine deposits that consist of varying combinations of gravel, sand, silt, and clay. At the installation, groundwater depth ranges from 5 to 13 feet below ground surface (bgs) and varies seasonally and with location throughout the base. Groundwater flow is toward the north at PRL 1. Surface runoff from the majority of the Moffett Field ANGB flows to the north towards Jagel Slough, which is part of the southern extent of the San Francisco Bay. Soil samples at PRL 1 were collected from grassy areas adjacent to (south of) the Hangar.			
Brief Description of Receptors:	The Hetch Hetchy Reservoir in the Sierra Nevadas is the water source for the County of San Francisco Water District, which supplies potable water to Moffett Field ANGB. There are no potable water wells on the base. According to the PA Report, four wells were found to be located within a one-mile radius of the Moffett Field ANGB. As stated in the PA Report, the use of the wells are as follows: three United States Geological Survey wells and one observation well. No public water supply wells were found within a 1 mile radius of Moffett Field ANGB. According to the Regional Water Quality Control Board (RWQCB), groundwater (shallow and deep) underneath and in the vicinity of Moffett Field ANGB could be a potential source of drinking water. PRL 1 is located within the gated portion of the Base. Exposure to surface and subsurface soils would be during routine activities or construction and excavation activities by Base personnel or authorized visitors. PFAS including PFOA, PFOS, and PFBS have been detected at multiple on-site wells at varying concentrations.			

Groundwater Worksheet				
Site ID: PRI 1				
		O a man a mia		Deties
Contaminant		Compariso	on value (ug/L)	Ratios
PF03	0.000	90	0.04	0.0
PFOA	0.00	70	0.04	4.0
		Contaminat	tion Hazard Eactor (CHE)	0.0
		Containina		4.0
	M (Modium)		[Maximum Concentration of (Contaminant]
			[Comparison Value for Con	taminant]
				м
	Migratory Pathwa	ay Factor		
Evident	Analytical data or direct observation indicates th to a point of exposure (e.g., well)	at contaminatior	n in the groundwater has moved	
Potential	Contamination in the groundwater has moved b available to make a determination of Evident or	contamination in the groundwater has moved beyond the source or insufficient information vailable to make a determination of Evident or Confined		М
Confined	Analytical data or direct observation indicates th the source via groundwater is limited (possibly c	lytical data or direct observation indicates that the potential for contaminant migration from source via groundwater is limited (possibly due to geological structures or physical controls)		
Migratory Pathway Factor	DIRECTIONS: Record the single highest value f value = H).	IRECTIONS: Record the single highest value from above in the box to the right (maximum alue = H).		М
	Receptor Fa	<u>ctor</u>		
Identified	Impacted drinking water well with detected conta well within 4 miles and groundwater is current so groundwater)	aminants or exist ource of drinking	ting downgradient water supply water (EPA Class I or IIA	
Potential	Existing downgradient drinking water well beyon known drinking water wells downgradient and gr drinking water (i.e., EPA Class I or II groundwat	sting downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no wn drinking water wells downgradient and groundwater is currently or potentially usable for king water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)		
Limited	No known water supply wells downgradient and water source and is of limited beneficial use (Cla	known water supply wells downgradient and groundwater is not considered potential drinking er source and is of limited beneficial use (Class III)		
Receptor Factor	DIRECTIONS: Record the single highest value f value = H).	rom above in the	e box to the right (maximum	М
			Groundwater Category	MEDIUM

Soil Worksheet				
Installation Moffett Fie	eld ANGB			
Site ID: PRL 1	AFFF Release Area #: AFFF 1			
Contaminant	Maximum Concentration (mg/	(g) Comparis	on Value (mg/kg)	Ratios
PFOS	0.00	0035	0.126	0.0
PFOA	0.0	0066	0.126	0.1
CHF Scale	CHF Value	Contamin	ation Hazard Factor (CHF)	0.1
CHF > 100	H (High)		[Maximum Concentration of (Contaminant]
100 > CHF > 2	M (Medium)	$CHF = \sum_{i=1}^{n}$	[Comparison Value for Con	taminantl
2 > CHF	L (Low)			anmang
CHF Value			CHF VALUE	L
	Migratory Path	way Factor		
Evident	Analytical data or observable evidence that co	ontamination is pre	esent at a point of exposure	
Potential	Contamination has moved beyond the source information is not sufficient to make a determ	ontamination has moved beyond the source, could move but is not moving appreciably, or formation is not sufficient to make a determination of Evident or Confined		М
Confined	Low possibility for contamination to be preser	v possibility for contamination to be present at or migrate to a point of exposure		
Migratory Pathway Factor	DIRECTIONS: Record the single highest valu value = H).	ECTIONS: Record the single highest value from above in the box to the right (maximum ue = H).		М
Receptor Factor				
Identified	Receptors identified that have access to cont	aminated soil		
Potential	Potential for receptors to have access to cont	ential for receptors to have access to contaminated soil		М
Limited	No potential for receptors to have access to c	potential for receptors to have access to contaminated soil		
Receptor Factor	DIRECTIONS: Record the single highest valu value = H).	e from above in th	e box to the right (maximum	М
			Soil Category	LOW

Site Background Information					
Installation:	Moffett Field ANGB	Date:	10/14/2021		
Location (State):	California	Media Evaluated:	Groundwater, Soil		
Site Name and ID:	Aircraft Parking Apron - PRL 2	Phase of Execution (e.g., RI, Record of Decision (ROD)):	N/A		
RPM's Name:	Mark Dickerson	Agreement Status (e.g., Federal Facility Agreement date signed):	N/A		
OVERALL SITE CATEGORY: MEDIUM					

	Site Summary
Brief Site Description:	The Aircraft Parking Apron has considerable aircraft operations. Although there are no documented spills of AFFF to the aircraft parking apron, this area was included as a PRL in the Site Visit Report due to the potential use and discharge of AFFF associated with this type of area. Additionally, it is assumed that during some of the AFFF accidental releases, the AFFF was washed out of the hangar onto the aircraft parking apron thereby potentially impacting the apron.
Brief Description of Pathways:	Moffett Field is located at the northern end of the Santa Clara Valley Basin, which is a large, north-west trending structural depression between the Hayward and San Andreas Faults. The valley is bordered on the east by the Diablo Range and on the west by the Santa Cruz Mountains. Locally, the airfield is underlain by fluvial, alluvial, and estuarine deposits that consist of varying combinations of gravel, sand, silt, and clay. At the installation, groundwater depth ranges from 5 to 13 feet bgs and varies seasonally and with location throughout the base. Groundwater flow is toward the north at PRL 2. Surface runoff from the majority of the Moffett Field ANGB flows to the north towards Jagel Slough which is part of the southern extent of the San Francisco Bay. Soil samples at PRL 2 were collected from grassy areas adjacent to the parking apron.
Brief Description of Receptors:	The Hetch Hetchy Reservoir in the Sierra Nevadas is the water source for the County of San Francisco Water District, which supplies potable water to Moffett Field ANGB. There are no potable water wells on the base. According to the PA Report, four wells were found to be located within a one-mile radius of the Moffett Field ANGB. As stated in the PA Report, the use of the wells are as follows: three United States Geological Survey wells and one observation well. No public water supply wells were found within a 1 mile radius of Moffett Field ANGB. According to the RWQCB, groundwater (shallow and deep) underneath and in the vicinity of Moffett Field ANGB could be a potential source of drinking water. PRL 2 is located within gated portion of the Base. Exposure to surface and subsurface soils would be during routine activities or construction and excavation activities by Base personnel or authorized visitors.

Groundwater Worksheet						
Installation Moffett Fie						
Site ID: PRL 2	AFFF Release Area #: AFF	F 2				
Contaminant	Maximum Concentration	(ug/L)	Compariso	n Value (ug/L)	Ratios	
PFOS		0.0073		0.04	0.2	
PFOA		0.25		0.04	6.3	
PFBS		0.0084		0.602	0.0	
CHF Scale	CHF Value		Contaminati	on Hazard Factor (CHF)	6.4	
CHF > 100	H (High)			[Maximum Concentration of (- Contaminant1	
100 > CHF > 2	M (Medium)			[Comparison Value for Con	taminantl	
2 > CHF	L (Low)				lannnantj	
CHF Value				CHF VALUE	М	
	Migratory I	Pathway	Factor			
Evident	Analytical data or direct observation indition to a point of exposure (e.g., well)	icates that	contamination	in the groundwater has moved		
Potential	Contamination in the groundwater has n available to make a determination of Ev	ntamination in the groundwater has moved beyond the source or insufficient information ailable to make a determination of Evident or Confined		М		
Confined	Analytical data or direct observation indi the source via groundwater is limited (po	lytical data or direct observation indicates that the potential for contaminant migration from source via groundwater is limited (possibly due to geological structures or physical controls)				
Migratory Pathway Factor	DIRECTIONS: Record the single highes value = H).	RECTIONS: Record the single highest value from above in the box to the right (maximum lue = H).		М		
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 we known drinking water wells downgradier drinking water (i.e., EPA Class I or II gro	sting downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no own drinking water wells downgradient and groundwater is currently or potentially usable for this water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)			М	
Limited	No known water supply wells downgradi water source and is of limited beneficial	known water supply wells downgradient and groundwater is not considered potential drinking ter source and is of limited beneficial use (Class III)				
Receptor Factor	DIRECTIONS: Record the single highes value = H).	st value fro	m above in the	box to the right (maximum	М	
			(Groundwater Category	MEDIUM	

Soil Worksheet				
Installation Moffott Field				
Site ID: PRL 2	AFFF Release Area #: AFFF 2			
Contaminant	Maximum Concentration (mg/kg)	Compariso	on Value (mg/kg)	Ratios
PFOS	0.009		0.126	0.1
PFOA	0.0091		0.126	0.1
PFBS	0.00027		1.9	0.0
CHF Scale	CHF Value	Contamina	ation Hazard Factor (CHF)	0.1
CHF > 100	H (High)		[Maximum Concentration of (Contaminant]
100 > CHF > 2	M (Medium)		[Comparison Value for Cont	aminant]
2 > CHF	L (Low)			-
CHF Value			CHF VALUE	L
	Migratory Pathway	/ Factor	-	
Evident	Analytical data or observable evidence that conta	mination is pres	sent at a point of exposure	
Potential	Contamination has moved beyond the source, co information is not sufficient to make a determinati	tamination has moved beyond the source, could move but is not moving appreciably, or mation is not sufficient to make a determination of Evident or Confined		
Confined	Low possibility for contamination to be present at	possibility for contamination to be present at or migrate to a point of exposure		
Migratory Pathway Factor	DIRECTIONS: Record the single highest value fro value = H).	ECTIONS: Record the single highest value from above in the box to the right (maximum ue = H).		
	Receptor Fac	<u>tor</u>		
Identified	Receptors identified that have access to contamin	nated soil		
Potential	Potential for receptors to have access to contamin	ential for receptors to have access to contaminated soil		
Limited	No potential for receptors to have access to contaminated soil			
Receptor Factor	DIRECTIONS: Record the single highest value fro value = H).	om above in the	e box to the right (maximum	М
			Soil Category	LOW