

# RELATIVE RISK SITE EVALUATION CERTIFICATION

Installation Name: Moffett ANGB

AFFF Areas: PRLs 1 and 2, Base Boundary Wells

**1. Migration Pathway Factor (MPF) Certification**

I have reviewed site information and have recommended the Migration Pathway Factor (MPF) that best fits the site based on my expertise and evidence provided at the site level.

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MPF Professional Signature

**2. Receptor Factor (RF) Certification**

I have reviewed site information and have recommended the Receptor Factor (RF) that best fits the site based on my expertise and evidence provided at the site level.

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RF Professional Signature

**3. Internal Quality Control (QC) Certification**

I have reviewed the Worksheet for data entry errors, calculation errors, and grammatical errors and certify that the Worksheet has been completed accurately.

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QC Professional Signature

**4. Final Worksheet Certification**

Under the direction of the Air Force, I have reviewed the Worksheet and certify that it has been completed as a Final product.

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NGB/A4V Restoration Project Manager Signature

# RELATIVE RISK SITE EVALUATION WORKSHEET

## Human Endpoint

### 1. SITE BACKGROUND INFORMATION

<b>Installation Name:</b> <u>Moffett ANGB</u>	<b>Date Entered:</b> <u>6/May/20</u>
<b>Location (City, Cnty, State):</b> <u>Mountain View, Santa Clara, CA</u>	<b>Media Evaluated:</b> <u>GW,Soil</u>
<b>Site Name:</b> <u>Hangar 4</u>	<b>Execution Phase:</b> <u>PA/SI</u>
<b>Site ID:</b> <u>PRL-1</u>	<b>Point of Contact:</b> <u>Mark Dickerson</u>

### 2. SITE SUMMARY

#### a. Brief site description (site type, dates of operation, mission use):

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. 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 overflow tank discharges to a municipal sanitary sewer system. According to the 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, the 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. 2012 witnessed an accidental release whereupon AFFF was collected in the UOT and discharged to sanitary.

Four surface soil samples, four subsurface soil samples, and one groundwater sample were collected from PRL-1. No surface water or sediment samples were collected during the SI.

#### b. Brief description of pathways (groundwater, soil, surface water, sediment):

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, which consist of varying combinations of gravel, sand, silt, and clay. At the installation, groundwater depth ranges from 5 to 13 feet below ground surface (ft bgs) which varies seasonally and with location throughout the base. Groundwater flow is toward the north at PRL-1 (Figure 3-1, AECOM 2019).

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.

#### c. 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 (BB&E, 2016). 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-1 is located within gated portion of the Base, but is otherwise unrestricted.

# RELATIVE RISK SITE EVALUATION WORKSHEET

## Human Endpoint

### 3. GROUNDWATER

#### a. Contaminant Hazard Factor (CHF)

Contaminant	Maximum Conc. (µg/L)	Comparison Value (µg/L; DoD 2019)	Ratio Maximum Conc./ Comparison Value
PFOA	0.16	0.04	4.00
PFOS	0.00096	0.04	0.02
PFBS	0.0079	40	0.00
			4.02

**Sum of All Ratios  
Check One Below**

Significant (>100)

Moderate (2–100)

Minimal (<2)

#### b. Migration Pathway Factor (MPF)

- Evident**
- Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure, such as a drinking water source.
- Potential**
- Contamination in the groundwater has moved beyond the source, **OR**
- There is 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; **OR**
- Is non-detect.

**Brief rationale for selection:**

PFAS were detected at concentrations in the downgradient monitoring well (APA-MW-01). Additionally, monitoring wells associated with PRL-2, but more proximal to PRL-1 soil sampling locations have concentrations above the screening values. The downgradient base boundary well also has PFAS concentrations above the comparison values.

Note that the base boundary well is downgradient of PRL-1 and PFAS concentrations exceeded those of this PRL.

#### c. Receptor Factor (RF)

- 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 IIa groundwater) **OR**
- Is a source of water for other beneficial use (e.g., agricultural).
- Limited**
- No known water supply wells downgradient **OR**
- Groundwater is not considered a potential drinking water source and is of limited beneficial use (EPA Class III).

**Brief rationale for selection:**

There were not public or private drinking water wells within 1 mile of the base. According to the RWQCB (as referenced in the AECOM 2019), groundwater (shallow and deep) underneath and in the vicinity of Moffett Field ANGB could be a potential source of drinking water.

# RELATIVE RISK SITE EVALUATION WORKSHEET

## Human Endpoint

### 4. SURFACE SOIL

#### a. Contaminant Hazard Factor (CHF)

Contaminant	Maximum Conc. (mg/kg)	Comparison Value (mg/kg; DoD 2019)	Ratio Maximum Conc./ Comparison Value
PFOA	0.0066	0.126	0.05
PFOS	0.00035	0.126	0.00
PFBS	ND	126	NA
			0.06

**Sum of All Ratios  
Check One Below**

Significant (>100)

Moderate (2–100)

Minimal (<2)

#### b. Migration Pathway Factor (MPF)

- Evident**
- Analytical data or observable evidence that contamination above the comparison value is present at a point of exposure.
- Potential**
- Contamination is above the detection limit but below the comparison value and has either moved beyond the source or 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 due to barriers such as buildings, maintained berms, pavement, or caps; **OR**
- Is non-detect.

**Brief rationale for selection:**

PFAS concentrations in exposed soils adjacent to PRL-1 were detected below the comparison values.

#### c. Receptor Factor (RF)

- Identified**
- Receptors with unrestricted access to contaminated soil.
- Potential**
- Receptors with controlled or restricted frequency of access to contaminated soil, such as commercial/industrial areas; **OR**
- Insufficient data exists to make a determination of Identified or Limited.
- Limited**
- Receptors with limited access to contaminated soil, such as restricted access areas, fenced areas, or other controlled access areas; or migration pathway is Confined; **OR**
- Surface soil samples are non-detect.

**Brief rationale for selection:**

Soil samples were collected from a location within the base boundary but is not otherwise restricted. The area is accessible by base personnel.

# RELATIVE RISK SITE EVALUATION WORKSHEET

## Human Endpoint

### 5. REFERENCES USED

AECOM. 2019. Final Site Inspection Report Air National Guard Phase II Regional Site Inspections for Per- and Polyfluoroalkyl Substances, Moffett Field Air National Guard Base. Mountain View, California. June.

BB&E, Inc.. 2016. Perfluorinated Compounds Preliminary Assessment Site Visit Report. Moffett Field Air National Guard Base, 129th Rescue Wing, California Air National Guard, Mountain View, CA. May.

Department of Defense (DoD). 1997. *Relative Risk Site Evaluation Primer, Revised Edition*. Summer.

U.S. Department of Defense (DoD). 2019. Investigating Per- and Polyfluoroalkyl Substances with the Department of Defense Cleanup Program. October.

### 6. GENERAL NOTES

# RELATIVE RISK SITE EVALUATION WORKSHEET

## Human Endpoint

### 1. SITE BACKGROUND INFORMATION

<b>Installation Name:</b> <u>Moffett ANGB</u>	<b>Date Entered:</b> <u>6/May/20</u>
<b>Location (City, Cnty, State):</b> <u>Mountain View, Santa Clara, CA</u>	<b>Media Evaluated:</b> <u>GW,Soil</u>
<b>Site Name:</b> <u>Aircraft Parking Apron</u>	<b>Execution Phase:</b> <u>PA/SI</u>
<b>Site ID:</b> <u>PRL-2</u>	<b>Point of Contact:</b> <u>Mark Dickerson</u>

### 2. SITE SUMMARY

#### a. Brief site description (site type, dates of operation, mission use):

The Aircraft Parking Apron has considerable aircraft operations. Although there are not any 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 impacting the apron.

Five surface soil samples, six subsurface soil samples, three groundwater samples, and one sediment sample were collected from PRL-1. No surface water samples were collected during the SI.

#### b. Brief description of pathways (groundwater, soil, surface water, sediment):

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, which consist of varying combinations of gravel, sand, silt, and clay. At the installation, groundwater depth ranges from 5 to 13 feet below ground surface (ft bgs) which varies seasonally and with location throughout the base. Groundwater flow is toward the north at PRL-2 (Figure 3-1, AECOM 2019).

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.

#### c. 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 (BB&E, 2016). 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, but is otherwise unrestricted.

# RELATIVE RISK SITE EVALUATION WORKSHEET

## Human Endpoint

### 3. GROUNDWATER

#### a. Contaminant Hazard Factor (CHF)

Contaminant	Maximum Conc. (µg/L)	Comparison Value (µg/L)	Ratio Maximum Conc./ Comparison Value
PFOA	0.25	0.04	6.25
PFOS	0.0073	0.04	0.18
PFBS	0.0084	40	0.00
			6.43

**Sum of All Ratios**  
**Check One Below**

Significant (>100)

Moderate (2–100)

Minimal (<2)

#### b. Migration Pathway Factor (MPF)

- Evident**
- Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure, such as a drinking water source.
- Potential**
- Contamination in the groundwater has moved beyond the source, **OR**
- There is 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; **OR**
- Is non-detect.

**Brief rationale for selection:**

PFAS were detected at concentrations above the comparison value in monitoring wells associated with PRL-2 (MF-APA-MW-02 and MF-004-MW-01), which are side gradient to PRL-2. PFAS were also detected at concentrations above the comparison value in the downgradient monitoring well (APA-MW-01) and the downgradient base boundary well.

#### c. Receptor Factor (RF)

- 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 IIa groundwater) **OR**
- Is a source of water for other beneficial use (e.g., agricultural).
- Limited**
- No known water supply wells downgradient **OR**
- Groundwater is not considered a potential drinking water source and is of limited beneficial use (EPA Class III).

**Brief rationale for selection:**

There were not public or private drinking water wells within 1 mile of the base. According to the RWQCB (as referenced in the AECOM 2019), groundwater (shallow and deep) underneath and in the vicinity of Moffett Field ANGB could be a potential source of drinking water.

# RELATIVE RISK SITE EVALUATION WORKSHEET

## Human Endpoint

### 4. SURFACE SOIL

#### a. Contaminant Hazard Factor (CHF)

Contaminant	Maximum Conc. (mg/kg)	Comparison Value (mg/kg; DoD 2019)	Ratio Maximum Conc./ Comparison Value
PFOA	0.0091	0.126	0.07
PFOS	0.009	0.126	0.07
PFBS	0.00027	126	0.00
			0.14

**Sum of All Ratios**  
**Check One Below**

Significant (>100)

Moderate (2–100)

Minimal (<2)

#### b. Migration Pathway Factor (MPF)

- Evident**
  - Analytical data or observable evidence that contamination above the comparison value is present at a point of exposure.
- Potential**
  - Contamination is above the detection limit but below the comparison value and has either moved beyond the source or 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 due to barriers such as buildings, maintained berms, pavement, or caps; **OR**
  - Is non-detect.

**Brief rationale for selection:**

PFAS were detected in surface soils at concentrations below the comparison value. Soils were collected in grassy areas adjacent to the Aircraft Parking Apron.

#### c. Receptor Factor (RF)

- Identified**
  - Receptors with unrestricted access to contaminated soil.
- Potential**
  - Receptors with controlled or restricted frequency of access to contaminated soil, such as commercial/industrial areas; **OR**
  - Insufficient data exists to make a determination of Identified or Limited.
- Limited**
  - Receptors with limited access to contaminated soil, such as restricted access areas, fenced areas, or other controlled access areas; or migration pathway is Confined; **OR**
  - Surface soil samples are non-detect.

**Brief rationale for selection:**

Soils were collected from locations on base, but in an area otherwise unrestricted - the area is accessible by base personnel.



# RELATIVE RISK SITE EVALUATION WORKSHEET

## Human Endpoint

### 5. REFERENCES USED

AECOM. 2019. Final Site Inspection Report Air National Guard Phase II Regional Site Inspections for Per- and Polyfluoroalkyl Substances, Moffett Field Air National Guard Base. Mountain View, California. June.

BB&E, Inc.. 2016. Perfluorinated Compounds Preliminary Assessment Site Visit Report. Moffett Field Air National Guard Base, 129th Rescue Wing, California Air National Guard, Mountain View, CA. May.

Department of Defense (DoD). 1997. Relative Risk Site Evaluation Primer, Revised Edition. Summer.

U.S. Department of Defense (DoD). 2019. Investigating Per- and Polyfluoroalkyl Substances with the Department of Defense Cleanup Program. October.

### 6. GENERAL NOTES

Sediment sample

PFOA- 0.0019 mg/kg

PFOS- 0.0028 mg/kg

PFBS- ND

# RELATIVE RISK SITE EVALUATION WORKSHEET

## Human Endpoint

### 1. SITE BACKGROUND INFORMATION

<b>Installation Name:</b>	Moffett ANGB	<b>Date Entered:</b>	6/May/20
<b>Location (City, Cnty, State):</b>	Mountain View, Santa Clara, C	<b>Media Evaluated:</b>	GW,Soil
<b>Site Name:</b>	Base Boundary Wells	<b>Execution Phase:</b>	PA/SI
<b>Site ID:</b>	NA	<b>Point of Contact:</b>	Mark Dickerson

### 2. SITE SUMMARY

#### a. Brief site description (site type, dates of operation, mission use):

One base boundary well sample was collected from the northern boundary of the base. While this boundary well is not ranked as a PRL, it may be indicative of PFAS contamination at the base.

#### b. Brief description of pathways (groundwater, soil, surface water, sediment):

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, which consist of varying combinations of gravel, sand, silt, and clay. At the installation, groundwater depth ranges from 5 to 13 feet below ground surface (ft bgs) which varies seasonally and with location throughout the base. Groundwater flow is toward the north at PRL-2 (Figure 3-1, AECOM 2019).

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.

#### c. 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 (BB&E, 2016). 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.

# RELATIVE RISK SITE EVALUATION WORKSHEET

## Human Endpoint

### 3. GROUNDWATER

#### a. Contaminant Hazard Factor (CHF)

Contaminant	Maximum Conc. (µg/L)	Comparison Value (µg/L; DoD 2019)	Ratio Maximum Conc./ Comparison Value
PFOA	0.58	0.04	14.5
PFOS	0.044	0.04	1.10
PFBS	0.0087	40	0.00
			15.6

**Sum of All Ratios  
Check One Below**

Significant (>100)

Moderate (2–100)

Minimal (<2)

#### b. Migration Pathway Factor (MPF)

- Evident**
- Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure, such as a drinking water source.
- Potential**
- Contamination in the groundwater has moved beyond the source, **OR**
- There is 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; **OR**
- Is non-detect.

**Brief rationale for selection:**

Not Applicable - not a potential release area. However, the Base Boundary well had the highest PFAS concentrations on the base.

#### c. Receptor Factor (RF)

- 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 IIa groundwater) **OR**
- Is a source of water for other beneficial use (e.g., agricultural).
- Limited**
- No known water supply wells downgradient **OR**
- Groundwater is not considered a potential drinking water source and is of limited beneficial use (EPA Class III).

**Brief rationale for selection:**

Not Applicable - not a potential release area.

# RELATIVE RISK SITE EVALUATION WORKSHEET

## Human Endpoint

### 4. SURFACE SOIL

#### a. Contaminant Hazard Factor (CHF)

Contaminant	Maximum Conc. (mg/kg)	Comparison Value (mg/kg; DoD 2019)	Ratio Maximum Conc./ Comparison Value
PFOA		0.126	0.00
PFOS		0.126	0.00
PFBS		126	0.00
			0.00

Sum of All Ratios  
Check One Below

- Significant (>100)
- Moderate (2-100)
- Minimal (<2)

#### b. Migration Pathway Factor (MPF)

- Evident**
- Analytical data or observable evidence that contamination above the comparison value is present at a point of exposure.
- Potential**
- Contamination is above the detection limit but below the comparison value and has either moved beyond the source or 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 due to barriers such as buildings, maintained berms, pavement, or caps; **OR**
- Is non-detect.

**Brief rationale for selection:**

Not Applicable - no sample collected.

#### c. Receptor Factor (RF)

- Identified**
- Receptors with unrestricted access to contaminated soil.
- Potential**
- Receptors with controlled or restricted frequency of access to contaminated soil, such as commercial/industrial areas; **OR**
- Insufficient data exists to make a determination of Identified or Limited.
- Limited**
- Receptors with limited access to contaminated soil, such as restricted access areas, fenced areas, or other controlled access areas; or migration pathway is Confined; **OR**
- Surface soil samples are non-detect.

**Brief rationale for selection:**

Not Applicable - no sample collected.

# RELATIVE RISK SITE EVALUATION WORKSHEET

## Human Endpoint

### 5. REFERENCES USED

AECOM. 2019. Final Site Inspection Report Air National Guard Phase II Regional Site Inspections for Per- and Polyfluoroalkyl Substances, Moffett Field Air National Guard Base. Mountain View, California. June.

BB&E, Inc.. 2016. Perfluorinated Compounds Preliminary Assessment Site Visit Report. Moffett Field Air National Guard Base, 129th Rescue Wing, California Air National Guard, Mountain View, CA. May.

Department of Defense (DoD). 1997. Relative Risk Site Evaluation Primer, Revised Edition. Summer.

U.S. Department of Defense (DoD). 2019. Investigating Per- and Polyfluoroalkyl Substances with the Department of Defense Cleanup Program. October.

### 6. GENERAL NOTES