RELATIVE RISK SITE EVALUATION
Travis AFB, Fairfield, CA

Q. You are responsible for hundreds of Air Force contaminated sites that have limited amounts of field data. How do you determine the order in which their field work will be funded (so that the site with the worst contaminant conditions is funded first)?

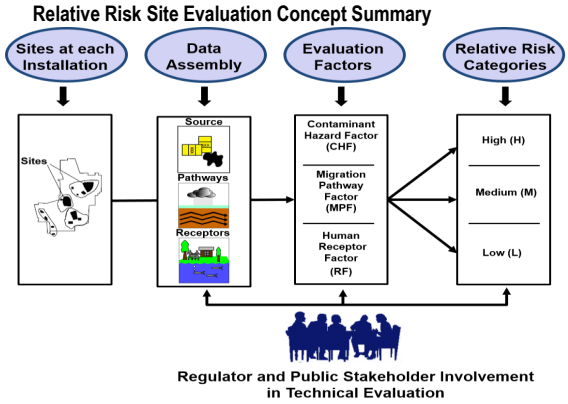
A. You use a Relative Risk Site Evaluation to arrange your sites from highest relative risk to lowest relative risk.

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

A. RRSE is a methodology to sequence environmental restoration work used by the Department of Defense (DoD). The RRSE process is used to evaluate the relative risk posed by an environmental restoration site in relation to other sites. The DoD fundamental premise in site prioritization is "worst first," meaning the DoD Component shall address sites that pose a relatively greater potential risk to public safety, human health, or the environment before sites posing a lesser risk. Relative risk is not the sole factor in determining the sequence of environmental restoration work, but it is an important consideration in the priority setting process. The methodology is described in the DoD, Relative Risk Site Evaluation Primer, Summer 1997 Revised Edition https://www.denix.osd.mil/references/dod/policy-guidance/relative-risk-site-evaluation-primer/RRSE_Primer_Summer1997.pdf.

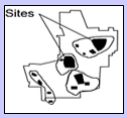
Q. What is the RRSE framework?

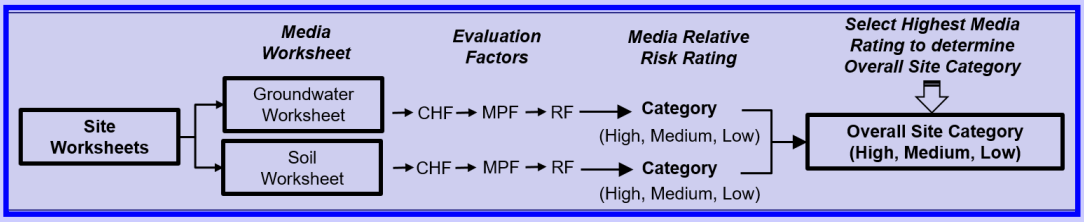
A. The RRSE framework provides a DoD-wide approach for evaluating the relative risk to human health and the environment posed by contamination present at sites. The **Relative Risk Site Evaluation Concept Summary** (shown in the figure) illustrates the selection of sites, evaluation of the site data 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.



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

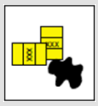
A. Restoration sites in CERCLA phases prior to remedy-in-place are evaluated in the process. Worksheets are developed for all environmental media (such as groundwater and surface soil) at each site. Environmental media lacking sufficient information to conduct a relative risk evaluation are designated as "Not Evaluated". The Travis AFB map shows 17 AFFF sites. However, AFFF sites 15 and 16 are sediment sites where PFOS/PFOA were not detected, and AFFF site 17 is a groundwater treatment plant that treats groundwater from multiple sites and that does not receive a RRSE. So, the Travis RRSE covered 14 sites. The figure shows the process for 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.





Data Assembly and Evaluation Factors

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



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

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

A. The movement of contamination at a site is evaluated and assigned a **Migration Pathway Factor (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 **Receptor Factor (RF)** is determined by a receptor's, such as humans, potential to come into contact with contaminated media. **RFs** are designated as: identified, potential, or limited **(High, Medium, and Low). Identified** rating is given when receptors are in contact or threat of contact with contaminated media. **Potential** is given when receptor may contact contaminated media. **Limited** is given when there is little or no contact with contaminated media.

RELATIVE RISK SITE EVALUTION, cont.

Media Relative Risk Rating

Q. How is the media relative risk rating determined?
A. Use the chart to determine the relative risk rating for each media evaluated. Start by choosing the **CHF** result of the evaluation. If the **CHF** is **Significant**, use **box 1.**; if **Moderate**, use **box 2.**; if **Minimal**, use **box 3.** Then find the **MPF** and **RF** results and move to the square where the results meet. That square indicates the media relative risk rating. For example, if the **CHF** is **Significant (go to box 1.)**, the **MPF** is **Potential** and the **RF** is **Identified**, then the rating is High (**H**).

Relative Risk Site Evaluation Matrix

1. CHF = Significant

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

2. CHF = Moderate

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

3. CHF = Minimal

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

CHF (Contaminant Hazard Factor) **MPF** (Migration Potential 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 a Stakeholder?
A. As a member of the local community, your thoughts on the Travis AFB RRSE are important to the decision-making process. You have several options available to ensure that your voice is heard:

(1) Talk to us. The phone number for the Travis AFB Environmental Restoration Program (ERP) Manager is listed below. You can also contact Mr. Louis Briscese, the Travis AFB Public Affairs Specialist. His phone number is (707) 424-5743.
(2) Write to us. The address for the Travis AFB ERP office is AFCEC/CZOW, 550 Hickam Avenue, Building 248, Travis AFB, CA 94535.
(3) Send us an email. Mr. Briscese also responses to email from the public. His email address is louis.briscese.1@us.af.mil. You can also send a message with your feedback to the Travis AFB environmental office at enviropa@travis.af.mil.

Relative Risk Site Evaluation Summary for Travis AFB, California

Overall Site Category	Site Name (Sites are shown on the attached map)
HIGH	AFFF Area 1, AFFF Area 2, AFFF Area 3, AFFF Area 4, AFFF Area 5, AFFF Area 6, AFFF Area 7, AFFF Area 8, AFFF Area 9, AFFF Area 10, AFFF Area 11, AFFF Area 12, AFFF Area 13, AFFF Area 14
MEDIUM	No Sites at Medium Relative Risk
LOW	No Sites at Low Relative Risk

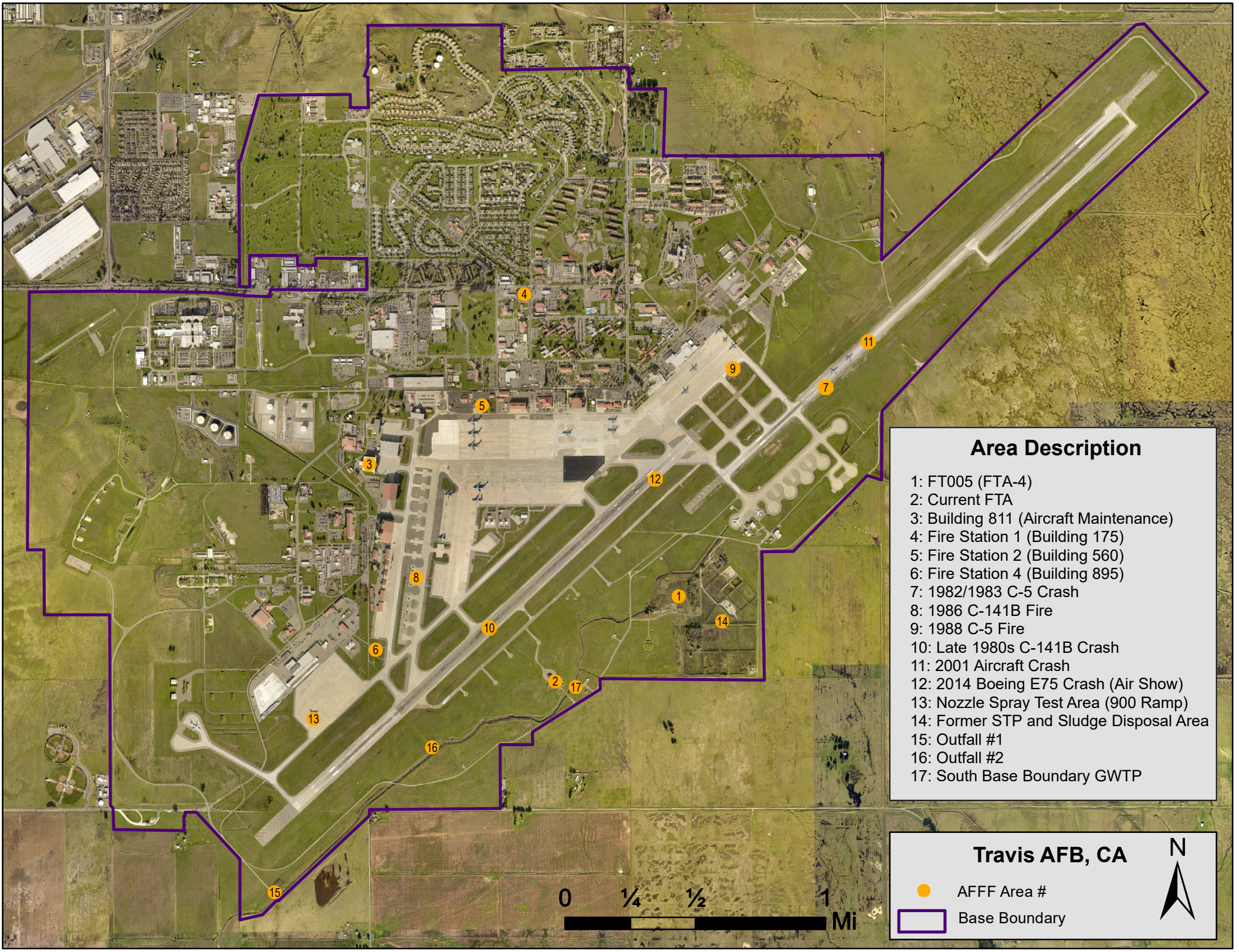
FOR MORE INFORMATION

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

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

TO LEARN ABOUT INVESTIGATION AND CLEANUP ACTIVITIES ON TRAVIS AFB, PLEASE VISIT THE BASE ENVIRONMENTAL WEBSITE:
https://www.travis.af.mil/Information/Environment/News/

POINT OF CONTACT
Lonnie Duke
Travis AFB Environmental Restoration Program Manager
Phone (707) 424-7520
lonnie.duke@us.af.mil


Area Description
1: FT005 (FTA-4)
2: Current FTA
3: Building 811 (Aircraft Maintenance)
4: Fire Station 1 (Building 175)
5: Fire Station 2 (Building 560)
6: Fire Station 4 (Building 895)
7: 1982/1983 C-5 Crash
8: 1986 C-141B Fire
9: 1988 C-5 Fire
10: Late 1980s C-141B Crash
11: 2001 Aircraft Crash
12: 2014 Boeing E75 Crash (Air Show)
13: Nozzle Spray Test Area (900 Ramp)
14: Former STP and Sludge Disposal Area
15: Outfall #1
16: Outfall #2
17: South Base Boundary GWTP
Travis AFB, CA
AFFF Area #
Base Boundary
N
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Mi

Site Background Information			
Installation:	Travis Air Force Base	**Date:**	7/8/2020
Location (State):	California	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	AFFF Area 1 Former FTA-4/FT005 - FT005	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	Remedial Investigation (RI)
RPM's Name:	Lonnie Duke	**Agreement Status (e.g., Federal Facility Agreement date signed):**	Federal Facility Agreement, 1990
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	Site FT005 (Former FTA 4) is located on the southeastern portion of the Base, and south of Runway 03R-21L (Figure 2-1 and 3-1, OTIE 2018). The site covers approximately 30 acres and is bounded by Union Creek to the north and west, the decommissioned sewage treatment plant (STP) to the east, and an undeveloped grass field to the south. Site FT005 is unpaved and partially covered with vegetation. AFFF, protein foam, and water were used during training activities from 1962 until the early 1970s. Contamination at Site FT005 is the result of fire training exercises conducted between 1962 and approximately 1986. Historical photographs indicate that the area may have been used for munitions storage before 1958. From 1962 until the early 1970s, waste fuels, oils, and solvents were used as ignitable materials during fire training exercises. In the early 1970s, the use of oil and solvent was discontinued, and only contaminated fuel was used in the training. As late as 1988, airplane mockups and an airplane fuselage were observed at the site. From 1990 to 1994, the area was used as a dump site for miscellaneous wastes such as concrete, fencing, and street sweepings. These activities ceased in 1994, and the site is currently inactive. The amount of AFFF used at this site is unknown (OTIE 2018).
Brief Description of Pathways:	Groundwater is present at AFFF Area 1 (FTA4/FT005) at approximately 10 to 19 feet bgs. The regional groundwater flow direction in the vicinity of AFFF Area 1 is toward the south. Three groundwater samples were taken. Both PFOA and PFOS concentrations are greater than the comparison value. Groundwater recharge occurs from direct infiltration of rainfall on the valley surface, and from the infiltration of runoff through local streambeds and creek beds. The groundwater flow system at Travis AFB is influenced by the configuration of alluvium and bedrock. Flow within the alluvium is consistently to the south; however, three groundwater mounds exist on Base. Groundwater in the immediate vicinity of a mound flows radially away from the mound and then rejoins the regional southerly flow (OTIE, 2018). Three surface soil samples were collected. Both PFOA and PFOS were detected above the comparison value in the surface soil (Table 5.1, OTIE 2018). The site had no berms or dikes to contain runoff, and surface runoff may have flowed into Union Creek, located north and west of the site, or to the low - lying seasonal wetlands to the east. No surface water or sediment samples were collected for the area.
Brief Description of Receptors:	AFFF Area 1 is currently an ERP site and has LUC's in place to prevent access to and development of groundwater at the site. The nearest potential drinking well (residential well) is located approximately 7,700 feet cross-gradient (southeast) of the site. The potential exists that within 4 miles downgradient of the site, there are several off-Base potential receptors because of their use of groundwater. The downgradient groundwater wells include four residential/ commercial wells, one irrigation well, one well for stock, and two monitoring wells. The commercial well serves approximately 375 people; none of the other downgradient wells have reported populations served (CH2M Hill 2015). The Travis AFB drinking water is purchased from the City of Vallejo Water Department and California State Water Project that originates in Lake Oroville, flows through the Sacramento River to the North Bay Aqueduct pumping facility, and then to the Base water treatment plant. The treatment plant also receives surface water from the Solano Project, which provides water from Lake Berryessa that is transported via the Putah South Canal to the terminal reservoir (CH2M Hill, 2015). Commercial/Industrial workers would be the most likely surface soil receptor.

Groundwater Worksheet

Installation: Travis Air Force Base

Site ID: FT005 **AFFF Release Area #:** AFFF 1

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	5.1	40	0.1
PFOA	32	0.04	800.0
PFOS	26	0.04	650.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**1450.1**
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**	**H**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	H
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation: Travis Air Force Base

Site ID: FT005 **AFFF Release Area #:** AFFF 1

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS	0.0037	126	0.0
PFOA	0.14	0.126	1.1
PFOS	0.69	0.126	5.5
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**6.6**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

Migratory Pathway Factor		
Evident	Analytical data or 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
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**

Site Background Information			
Installation:	Travis Air Force Base	**Date:**	7/8/2020
Location (State):	California	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	AFFF Area 2 Current FTA - NA	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	Remedial Investigation (RI)
RPM's Name:	Lonnie Duke	**Agreement Status (e.g., Federal Facility Agreement date signed):**	Federal Facility Agreement, 1990
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	The Current FTA is located to the northwest of Union Creek and Perimeter Road (Figures 2-1 and 3-2, OTIE 2018). From 1987 to 1996, fire training exercises were performed at this location within a pit using an old aircraft engine container for the fuselage and four engines. The fuel was put in the pit from a tank to the mockup via an old fire hose/ pump. Diesel was the likely fuel source, and water and AFFF were likely used as extinguishing agents. In 1996, the current FTA was built and contains a mock aircraft located within a concrete berm. A four-story structural trainer was constructed in 2004. Both the pit and structural trainer were built with propane burning systems. Additionally, the pit area of the training facility is outfitted with a closed water recirculation system consisting of a flexible dual lining system for containment. That runoff is gravity fed to three step-down holding and filtration tanks before it reaches a main sump tank. The structural trainer also contains floor drains in the slab floor, which discharge into the pit's main sump tank. The main sump is outfitted with two pumps that can lift the water back to the existing system for pit water fill or use in the emergency fire sprinkler and mockup cooling system. Extinguishing agents used at the FTA include AFFF, dry chemical, and water. When the waste tanks are full, the water goes through an oil-water separator (OWS) before being discharged to the sanitary sewer (CH2M Hill 2015).
Brief Description of Pathways:	Groundwater is present at approximately 14 to 18 feet bgs (CH2M Hill 2015). The groundwater flows to the south and is captured by the South Base Boundary Groundwater Treatment Plant. Three groundwater samples were collected. Both PFOA and PFOS concentrations are greater than the comparison value and the contamination in the groundwater has moved beyond the source. Groundwater recharge occurs from direct infiltration of rainfall on the valley surface, and from the infiltration of runoff through local streambeds and creek beds. The groundwater flow system at Travis AFB is influenced by the configuration of alluvium and bedrock. Flow within the alluvium is consistently to the south; however, three groundwater mounds exist on Base. Groundwater in the immediate vicinity of a mound flows radially away from the mound and then rejoins the regional southerly flow (OTIE, 2018). Three surface soil samples were collected. PFOA was detected, but the concentration did not exceed the comparison value. PFOS was detected (0.18 mg/kg) and slightly exceeded the comparison value of 0.126 mg/kg (Table 5.1, OTIE 2018). No surface water or sediment samples were collected for the area.
Brief Description of Receptors:	The nearest potential drinking well (residential well) is located approximately 8,900 feet cross-gradient (southeast) of the current FTA. The potential exists that within 4 miles downgradient of this location, there are several off-Base potential receptors because of their use of groundwater. The downgradient groundwater wells include four residential/commercial wells, one irrigation well, one well for stock, and two monitoring wells. The commercial well serves approximately 375 people; none of the other downgradient wells have reported populations served (CH2M Hill 2015). The Travis AFB drinking water is purchased from the City of Vallejo Water Department and California State Water Project that originates in Lake Oroville, flows through the Sacramento River to the North Bay Aqueduct pumping facility, and then to the Base water treatment plant. The treatment plant also receives surface water from the Solano Project, which provides water from Lake Berryessa that is transported via the Putah South Canal to the terminal reservoir (CH2M Hill, 2015). The current FTA at Travis AFB was constructed with a berm and liner. Other workers are within 0.25 miles of the site. Both the pit and structural trainer are considered closed systems, capturing and re‑using the extinguishing agents (CH2M Hill, 2015).

Groundwater Worksheet

Installation: Travis Air Force Base

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

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	1.1	40	0.0
PFOA	0.52	0.04	13.0
PFOS	2.3	0.04	57.5
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**70.5**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	H
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation: Travis Air Force Base

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

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS	0.001	126	0.0
PFOA	0.0013	0.126	0.0
PFOS	0.18	0.126	1.4
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**1.4**
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 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
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	**MEDIUM**

Site Background Information			
Installation:	Travis Air Force Base	**Date:**	7/8/2020
Location (State):	California	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	AFFF Area 3 Hangar Building 811/SD034 - SD034	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	Remedial Investigation (RI)
RPM's Name:	Lonnie Duke	**Agreement Status (e.g., Federal Facility Agreement date signed):**	Federal Facility Agreement, 1990
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	Hangar Building 811 is located east of the intersection of Ellis Drive and Ragsdale Street. The building was constructed in 1979 with an AFFF fire suppression system consisting of two 1,500-gallon plastic tanks, which is currently still in use. Building 811 is located near Ellis Drive and Boyles Street at Travis AFB. It is bordered by small strips of landscaped grassy areas/ asphalt roads on all sides except for the concrete Tow Way W on the east side. Several other buildings are in the area. In 2011, an accidental discharge of AFFF occurred in Building 811. The AFFF cannon punctured the side of the hangar and released AFFF onto the grass and concrete-covered areas west, south, and southwest of the building. In addition, the facility manager, Mr. LaPlante, recalls several AFFF discharges in the past, with the most recent being in November/December 2014. The amount of AFFF discharged is unknown. The mechanical room was also used to store empty AFFF drums. The trench drains in the hangar are connected to the OWS on the northwest corner of the building, which then drain to the sanitary sewer. However, when the fire suppression system activates, some water likely flows to a concrete overflow reservoir located west of the building. The overflow reservoir has been used several times in the past, indicating discharges from the fire suppression system. It is also likely that the concrete overflow reservoir may be cracked, and the content may be slowly draining out into the ground. Once the reservoir is partially full, a water sample is collected and then pumped into the sanitary sewer (OTIE 2018).
Brief Description of Pathways:	Groundwater is present at approximately 9 to 11 feet bgs and flows to the south-southwest. Two groundwater samples were collected. Both PFOA and PFOS concentrations are greater than the comparison value in the groundwater. Groundwater recharge occurs from direct infiltration of rainfall on the valley surface, and from the infiltration of runoff through local streambeds and creek beds. The groundwater flow system at Travis AFB is influenced by the configuration of alluvium and bedrock. Flow within the alluvium is consistently to the south; however, three groundwater mounds exist on Base. Groundwater in the immediate vicinity of a mound flows radially away from the mound and then rejoins the regional southerly flow (OTIE, 2018). Three (two normal and one field duplicate) surface soil samples were collected. PFOA was detected in only one surface soil sample, but the concentration did not exceed the comparison value. PFOS was detected in one of the surface soil samples and the field duplicate of the second sample, but none of the concentrations exceeded the comparison value (Table 5.1, OTIE 2018). No surface water samples were collected for the area and one sediment sample was collected.
Brief Description of Receptors:	Within 4 miles downgradient of this location are several off-Base potential receptors because of their use of groundwater. There are five potential water supply wells within a 4-mile radius and downgradient of AFFF Area 3 as shown on Figure 4-3 (OTIE 2018). The nearest potential drinking well (residential well) is located approximately 10,000 feet downgradient of Hangar 811. The Travis AFB drinking water is purchased from the City of Vallejo Water Department and California State Water Project that originates in Lake Oroville, flows through the Sacramento River to the North Bay Aqueduct pumping facility, and then to the Base water treatment plant. The treatment plant also receives surface water from the Solano Project, which provides water from Lake Berryessa that is transported via the Putah South Canal to the terminal reservoir (CH2M Hill, 2015). Building 811 is located in a heavily populated area at Travis AFB, with both workers and residents within 1 mile. Most likely receptors are commercial/industrial workers.

Groundwater Worksheet

Installation: Travis Air Force Base

Site ID: SD034 **AFFF Release Area #:** AFFF 3

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.43	40	0.0
PFOA	0.49	0.04	12.3
PFOS	5.8	0.04	145.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**157.3**
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**	**H**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	H
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation: Travis Air Force Base

Site ID: SD034 **AFFF Release Area #:** AFFF 3

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOA	0.00085	0.126	0.0
PFOS	0.019	0.126	0.2
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.2**
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 observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	M
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M

Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	M
Limited	No potential for receptors to have access to contaminated soil	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
	Soil Category	**LOW**

Site Background Information			
Installation:	Travis Air Force Base	**Date:**	7/8/2020
Location (State):	California	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	AFFF Area 4 Fire Station 1 (FS1) - SS209P	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	Remedial Investigation (RI)
RPM's Name:	Lonnie Duke	**Agreement Status (e.g., Federal Facility Agreement date signed):**	Federal Facility Agreement, 1990
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	Fire Station 1 (FS1) was constructed in 1956. It is located on the southwest corner of Travis Avenue and First Street (Figure 3-4, OTIE 2018). The building is surrounded by landscaped grass to the north, west, and southwest. The remaining surrounding areas are paved with asphalt and concrete. FS1 serves as the structural fire station (non-airfield related) for Travis AFB and houses one fire engine that carries approximately 56 gallons of AFFF. Tank resupplying occurs at the main Fire Station 5, and formerly at Fire Station 2. Cleaning of the fire engine is performed outside the fire station, and because there are no floor drains, any remnant AFFF on the truck or potential spills would be washed out the bay doors to the east or west of the building. After a response requiring the application of AFFF, the worker primarily flushed the nozzle at the scene. The fire engines are then re-serviced from stock supply held at Fire Stations 2 and 5 (CH2M Hill 2015).
Brief Description of Pathways:	Groundwater is present at approximately 10-15 feet bgs and groundwater flow is generally to the south-southeast. Three groundwater samples were collected. Both PFOA and PFOS concentrations are greater than the comparison value in groundwater samples. Groundwater recharge occurs from direct infiltration of rainfall on the valley surface, and from the infiltration of runoff through local streambeds and creek beds. The groundwater flow system at Travis AFB is influenced by the configuration of alluvium and bedrock. Flow within the alluvium is consistently to the south; however, three groundwater mounds exist on Base. Groundwater in the immediate vicinity of a mound flows radially away from the mound and then rejoins the regional southerly flow (OTIE, 2018). Three surface soil samples were collected. PFOS was detected above the comparison value in one of the surface soil samples collected from FS1 (Table 5.1, OTIE 2018). No surface water or sediment samples were collected for the area.
Brief Description of Receptors:	The potential exists that within 4 miles downgradient of Building 175, there are several off-Base groundwater receptors. The downgradient groundwater wells include four residential wells, one irrigation well, one well for stock, and two monitoring wells. None of the downgradient wells have reported populations served (CH2M Hill 2015). The Travis AFB drinking water is purchased from the City of Vallejo Water Department and California State Water Project that originates in Lake Oroville, flows through the Sacramento River to the North Bay Aqueduct pumping facility, and then to the Base water treatment plant. The treatment plant also receives surface water from the Solano Project, which provides water from Lake Berryessa that is transported via the Putah South Canal to the terminal reservoir (CH2M Hill 2015). FS1 is located in a populated area of Travis AFB and is mostly paved with some landscaped grassy areas. Since it is a fire station the most likely receptors are firefighters and commercial/industrial workers.

Groundwater Worksheet

Installation: Travis Air Force Base

Site ID: SS209P **AFFF Release Area #:** AFFF 4

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	1.3	40	0.0
PFOA	0.87	0.04	21.8
PFOS	28	0.04	700.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**721.8**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**H**

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

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

Soil Worksheet

Installation: Travis Air Force Base

Site ID: SS209P **AFFF Release Area #:** AFFF 4

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS	0.0084	126	0.0
PFOA	0.044	0.126	0.3
PFOS	0.78	0.126	6.2
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**6.5**
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 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

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**

Site Background Information			
Installation:	Travis Air Force Base	**Date:**	7/8/2020
Location (State):	California	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	AFFF Area 5 Fire Station 2 (FS2) - NA	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	Remedial Investigation (RI)
RPM's Name:	Lonnie Duke	**Agreement Status (e.g., Federal Facility Agreement date signed):**	Federal Facility Agreement, 1990
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	Fire Station 2 (FS2) was constructed in 1956 and located south of the intersection of Hangar Avenue and Airman Drive on Travis AFB. FS2 was the main station that housed the most fire engines that held AFFF and also housed the AFFF trailer, contained a storage yard for AFFF drums, performed a majority of the vehicle washing, and was the principal location for refilling all fire engines. The building was the main airfield fire station until 2011 when the new Fire Station 5 was built. Small patches of landscaped grass were located in the northeast and southeast corners. The remaining surrounding areas are paved with asphalt and concrete. During its operation, FS2 housed up to seven fire engines that carried from 50 to 500 gallons each of AFFF. In addition, AFFF was stored in 55‑gallon drums on the west side of the building. FS2 was demolished in 2011-2012; however, the wash rack on the west side remains in place. The amount of AFFF stored onsite is unknown; however, based on the number of fire engines, it is assumed that at least 1,000 gallons of AFFF was present during its operation. The vehicles were cleaned in the wash rack adjacent to the fire station where floor drains are present to capture any runoff and feed into the sanitary sewer system. Refilling of vehicle AFFF tanks occurred outdoors near the drum storage area west of the building. The location of FS2 is shown on Figures 1.1 and 3.2 (CH2M Hill 2015).
Brief Description of Pathways:	Groundwater is present at approximately 7 to 15 feet bgs, generally flows southeast, and is captured by the Central Groundwater Treatment Plant (CGWTP) (CH2M Hill 2015). Three groundwater samples were collected. Both PFOA and PFOS concentrations are greater than the comparison value. Groundwater recharge occurs from direct infiltration of rainfall on the valley surface, and from the infiltration of runoff through local streambeds and creek beds. The groundwater flow at Travis AFB is influenced by the configuration of alluvium and bedrock. Flow within the alluvium is consistently to the south; however, three groundwater mounds exist on Base and in the immediate vicinity of a mound groundwater flows radially away from the mound and then rejoins the regional southerly flow (OTIE, 2018). FS2 has been demolished and only the concrete foundation and wash rack remain. This area is mostly paved with some grassy areas. Three surface soil samples were collected. Both PFOA and PFOS were detected above the comparison value in two surface soil samples (FS2-1 and FS2-2) but these samples seem to be from under the paved area. The surface soil sample from the grassy area (FS2-3) contains both PFOA and PFOS that are above the detection limit but below the comparison value (Table 5.1, OTIE 2018). No surface water or sediment samples were collected for the area.
Brief Description of Receptors:	The potential exists that within 4 miles downgradient of this location, there are several off-Base groundwater receptors. The downgradient groundwater wells include five residential/commercial wells, one irrigation well, one well for stock, and one monitoring well. The commercial well serves approximately 375 people; none of the other downgradient wells have reported populations served (CH2M Hill 2015). The Travis AFB drinking water is purchased from the City of Vallejo Water Department and California State Water Project that originates in Lake Oroville, flows through the Sacramento River to the North Bay Aqueduct pumping facility, and then to the Base water treatment plant. The treatment plant also receives surface water from the Solano Project, which provides water from Lake Berryessa that is transported via the Putah South Canal to the terminal reservoir (CH2M Hill 2015). Most likely receptors would be commercial/industrial workers.

Groundwater Worksheet

Installation: Travis Air Force Base

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

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	31	40	0.8
PFOA	29	0.04	725.0
PFOS	690	0.04	17250.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**17975.8**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**H**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	H
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation: Travis Air Force Base

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

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS	0.0079	126	0.0
PFOA	0.17	0.126	1.3
PFOS	2.1	0.126	16.7
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**18.0**
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**	**M**

Migratory Pathway Factor		
Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	M
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M

Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Travis Air Force Base	**Date:**	7/8/2020
Location (State):	California	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	AFFF Area 6 Fire Station 4 (FS4)/SD033 - NA	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	Remedial Investigation (RI)
RPM's Name:	Lonnie Duke	**Agreement Status (e.g., Federal Facility Agreement date signed):**	Federal Facility Agreement, 1990
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	Fire Station 4 (FS4) was constructed in 1999. It is located near the southern runway and east of the southern tip of Ragsdale Street on Travis AFB. This fire station was closed in the early 2010s. The building is surrounded by grass except for the asphalt access road, driveway, and parking lot. FS4 served as the fire responder for the southern runway for Travis AFB and housed one fire engine that carried approximately 500 gallons of AFFF. Tank resupplying occurred at the main Fire Station 5, and formerly at Fire Station 2. Cleaning of the fire engine was performed outside the fire station, and because there are no floor drains, any remnant AFFF on the truck or potential spills would be washed out of the carport and would flow into the surrounding grassy area. After a response that required the application of AFFF, the worker primarily flushed the nozzle at the scene. Nozzle spray tests where AFFF is sprayed from fire trucks have been routinely performed on the 900 ramp located southeast of Building 895. In addition, AFFF has been routinely sprayed from fire trucks for training purposes and system tests onto a grass-covered area northeast of the 900 ramp and 500 feet southwest of Building 895. The 900 ramp is evaluated separately as AFFF Area 13. The location of FS4 is shown on Figures 1.1 and 3.2 (CH2M Hill 2015).
Brief Description of Pathways:	Groundwater is present between 8 and 12 feet bgs and generally flows to the south. Four (three normal and one field duplicate) groundwater samples were collected. Both PFOA and PFOS concentrations are greater than the comparison value in groundwater. Groundwater recharge occurs from direct infiltration of rainfall on the valley surface, and from the infiltration of runoff through local streambeds and creek beds. The groundwater flow at Travis AFB is influenced by the configuration of alluvium and bedrock. Flow within the alluvium is consistently to the south; however, three groundwater mounds exist on Base and in the immediate vicinity of a mound groundwater flows radially away from the mound and then rejoins the regional southerly flow (OTIE, 2018). Four (three normal and one field duplicate) surface soil samples were collected. Both PFOA and PFOS were detected in the surface soil, but none of the samples exceeded the comparison value (Table 5.1, OTIE 2018). FS4 is mostly paved and has some landscaped grassy areas. FS4 has no floor drains, it is assumed that any AFFF that made contact with the ground was washed away to the surrounding grassy field. No surface water samples were taken, but one sediment sample was.
Brief Description of Receptors:	The nearest potential drinking well (residential well) is located approximately 6,000 feet downgradient (south) of this location. The potential exists that within 4 miles downgradient of this location, there are several other off-Base potential groundwater receptors. The downgradient groundwater wells include four residential/commercial wells, one irrigation well, one well for stock, and one monitoring well. The commercial well serves approximately 375 people; none of the other downgradient wells have reported populations served (CH2M Hill 2015). The Travis AFB drinking water is purchased from the City of Vallejo Water Department and California State Water Project that originates in Lake Oroville, flows through the Sacramento River to the North Bay Aqueduct pumping facility, and then to the Base water treatment plant. The treatment plant also receives surface water from the Solano Project, which provides water from Lake Berryessa that is transported via the Putah South Canal to the terminal reservoir (CH2M Hill 2015). FS4 is mostly paved and has some landscaped grassy areas. The most likely receptors are commercial/industrial workers.

Groundwater Worksheet

Installation: Travis Air Force Base

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

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	1.1	40	0.0
PFOA	0.8	0.04	20.0
PFOS	32	0.04	800.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**820.0**
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**	**H**

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

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

Soil Worksheet

Installation: Travis Air Force Base

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

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOA	0.00027	0.126	0.0
PFOS	0.075	0.126	0.6
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 observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	M
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M

Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Travis Air Force Base	**Date:**	7/8/2020
Location (State):	California	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	AFFF Area 7 1982/1983 C-5 Crash - NA	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	Remedial Investigation (RI)
RPM's Name:	Lonnie Duke	**Agreement Status (e.g., Federal Facility Agreement date signed):**	Federal Facility Agreement, 1990
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	In the early 1980s, likely around 1982 or 1983, a C-5 crashed on the south side of the northern runway (Runway 03R-21L) bellyup (Figures 2-1 and 3-7, OTIE 2018). The aircraft caught on fire and caused a small grass fire off the side of the runway. Fewer than 100 gallons of AFFF were needed to extinguish the aircraft fire. The grass fire was extinguished with water. Concrete joints on the runway are sealed; however, any AFFF applied would have likely migrated off the runway into the grassy areas. The location of the fire is shown on Figures 1.1 and 3.3 (CH2M Hill 2015).
Brief Description of Pathways:	Groundwater is present between 12 and 13 feet bgs and generally flows to the south-southeast. Four (three normal and one field duplicate) groundwater samples were collected. Both PFOA and PFOS concentrations are greater than the comparison value in groundwater. Groundwater recharge occurs from direct infiltration of rainfall on the valley surface, and from the infiltration of runoff through local streambeds and creek beds. The groundwater flow system at Travis AFB is influenced by the configuration of alluvium and bedrock. Flow within the alluvium is consistently to the south; however, three groundwater mounds exist on Base. Groundwater in the immediate vicinity of a mound flows radially away from the mound and then rejoins the regional southerly flow (OTIE, 2018). Three surface soil samples were collected. PFBS and PFOA were both not detected in any of the surface soil samples. PFOS contamination is above the detection limit, but below the comparison value (Table 5.1, OTIE 2018). No surface water or sediment samples were collected for the area.
Brief Description of Receptors:	The nearest potential drinking well (residential well) is located approximately 10,400 feet downgradient (south) of the crash location. The potential exists that within 4 miles downgradient of this location, there are several other off-Base potential groundwater receptors. The downgradient groundwater wells include four residential/commercial wells, one irrigation well, one well for stock, and two monitoring wells. The commercial well serves approximately 375 people; none of the other downgradient wells have reported populations served (CH2M Hill 2015). The Travis AFB drinking water is purchased from the City of Vallejo Water Department and California State Water Project that originates in Lake Oroville, flows through the Sacramento River to the North Bay Aqueduct pumping facility, and then to the Base water treatment plant. The treatment plant also receives surface water from the Solano Project, which provides water from Lake Berryessa that is transported via the Putah South Canal to the terminal reservoir (CH2M Hill 2015). Due to the crash area being approximately 100 feet adjacent to the runway and flight line implies that receptors would have limited access to contaminated soil because this would most likely be a restricted access area.

Groundwater Worksheet

Installation: Travis Air Force Base

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

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.17	40	0.0
PFOA	0.1	0.04	2.5
PFOS	1.2	0.04	30.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**32.5**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	H
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation: Travis Air Force Base

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

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.0036	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**

Migratory Pathway Factor		
Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	M
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Travis Air Force Base	**Date:**	7/8/2020
Location (State):	California	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	AFFF Area 8 1986 C-141B Crash - NA	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	Remedial Investigation (RI)
RPM's Name:	Lonnie Duke	**Agreement Status (e.g., Federal Facility Agreement date signed):**	Federal Facility Agreement, 1990
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	On 15 October 1986, a C-141B made an emergency landing at night due to a bomb threat at the passenger terminal. While being marshalled into a parking spot with walkers near each wing, the aircraft made a hard right turn and the left wing struck a light pole, rupturing the number 1 main tank. Fuel ran down the light pole and into a high-voltage junction box at the base of the pole, igniting a fire that spread back up the pole and onto the wing. Approximately 500 to 1,000 gallons of AFFF were used to extinguish the fire. The fire was fully contained on the airfield near parking spots 608 and 609; however, two small grassy strips are near the fire location. Concrete joints on the ramp are sealed so any AFFF used may have migrated off the ramp into the grassy areas. The location of the fire is shown on Figures 1.1 and 3.4 (CH2M Hill 2015).
Brief Description of Pathways:	Groundwater is present between 9 and 10 feet bgs and generally flows to the south-southeast. One groundwater sample was collected. Both PFOA and PFOS concentrations are greater than the comparison value in groundwater. Groundwater recharge occurs from direct infiltration of rainfall on the valley surface, and from the infiltration of runoff through local streambeds and creek beds. The groundwater flow system at Travis AFB is influenced by the configuration of alluvium and bedrock. Flow within the alluvium is consistently to the south; however, three groundwater mounds exist on Base. Groundwater in the immediate vicinity of a mound flows radially away from the mound and then rejoins the regional southerly flow (OTIE, 2018). One soil sample was collected. Both PFOA and PFOS contamination is above the detection limit but below the comparison value in the surface soil sample (Table 5.1, OTIE 2018). No surface water or sediment samples were collected for the area.
Brief Description of Receptors:	The nearest potential drinking well (residential well) is located approximately 7,000 feet downgradient (south) of this location. The potential exists that within 4 miles downgradient of this location, there are several other off-Base potential receptors because of their use of groundwater. The downgradient groundwater wells include four residential/ commercial wells, one irrigation well, one well for stock, and one monitoring well. The commercial well serves approximately 375 people; none of the other downgradient wells have reported populations served (CH2M Hill 2015). The Travis AFB drinking water is purchased from the City of Vallejo Water Department and California State Water Project that originates in Lake Oroville, flows through the Sacramento River to the North Bay Aqueduct pumping facility, and then to the Base water treatment plant. The treatment plant also receives surface water from the Solano Project, which provides water from Lake Berryessa that is transported via the Putah South Canal to the terminal reservoir (CH2M Hill 2015). Due to the accidental fire area being adjacent to the taxiway and flight line implies that receptors would have limited access to contaminated soil because this would most likely be a restricted access area.

Groundwater Worksheet

Installation: Travis Air Force Base

Site ID: NA **AFFF Release Area #:** AFFF 8

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.21	40	0.0
PFOA	0.12	0.04	3.0
PFOS	3.1	0.04	77.5
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**80.5**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	H
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation: Travis Air Force Base

Site ID: NA **AFFF Release Area #:** AFFF 8

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOA	0.00047	0.126	0.0
PFOS	0.024	0.126	0.2
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.2**
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 observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	M
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M

Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Travis Air Force Base	**Date:**	7/8/2020
Location (State):	California	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	AFFF Area 9 1988 C-5 Fire - NA	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	Remedial Investigation (RI)
RPM's Name:	Lonnie Duke	**Agreement Status (e.g., Federal Facility Agreement date signed):**	Federal Facility Agreement, 1990
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	On 31 January 1988, a C-5 was on a local training flight when it was forced to make an emergency landing after a malfunctioning light warned the crew of trouble. After the C-5 landed and taxied to Taxiway D to south of parking spots 282 and 292, the crew realized that there was a fire onboard the aircraft. Fire crews responded and used water to extinguish the fire inside the aircraft. It is unknown whether AFFF was used. A fire engine carrying AFFF responded to the fire. If AFFF were used, it is likely that only a small amount would have been used. Water from the fire would have traveled through the aircraft and spilled on the ground. The aircraft location was just off the side of a grassy area. The location of the fire is shown on Figures 1.1 and 3.3 (CH2M Hill 2015).
Brief Description of Pathways:	Groundwater is present between 5 and 7 feet bgs and generally flows to the south-southeast. Four (three normal and one field duplicate) groundwater samples were collected. Both PFOA and PFOS concentrations are greater than the comparison value in groundwater. Groundwater recharge occurs from direct infiltration of rainfall on the valley surface, and from the infiltration of runoff through local streambeds and creek beds. The groundwater flow at Travis AFB is influenced by the configuration of alluvium and bedrock. Flow within the alluvium is consistently to the south. Three groundwater mounds exist on Base and in the immediate vicinity of a mound, groundwater flows radially away from the mound and then rejoins the regional southerly flow (OTIE, 2018). Four (three normal and one field duplicate) surface soil samples were collected. Both PFOA and PFOS contamination was detected above the detection limit but below the comparison value in the surface soil (Table 5.1, OTIE 2018). The location is mostly paved and has some grassy areas. Any AFFF would have most likely migrated off the ramp into the grassy area. No surface water or sediment samples were collected for the area.
Brief Description of Receptors:	The nearest potential drinking well (residential well) is located approximately 11,200 feet downgradient (south) of this location. The potential exists that within 4 miles downgradient of this location, there are several other off-Base potential receptors because of their use of groundwater. The downgradient groundwater wells include four residential/ commercial wells, one irrigation well, one well for stock, and two monitoring wells. The commercial well serves approximately 375 people; none of the other downgradient wells have reported populations served (CH2M Hill 2015). The Travis AFB drinking water is purchased from the City of Vallejo Water Department and California State Water Project that originates in Lake Oroville, flows through the Sacramento River to the North Bay Aqueduct pumping facility, and then to the Base water treatment plant. The treatment plant also receives surface water from the Solano Project, which provides water from Lake Berryessa that is transported via the Putah South Canal to the terminal reservoir (CH2M Hill 2015). Due to the fire area being adjacent to the taxiway and flight line implies that receptors would have limited access to contaminated soil because this would most likely be a restricted access area.

Groundwater Worksheet

Installation: Travis Air Force Base

Site ID: NA **AFFF Release Area #:** AFFF 9

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	2.8	40	0.1
PFOA	3	0.04	75.0
PFOS	0.8	0.04	20.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**95.1**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	H
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation: Travis Air Force Base

Site ID: NA **AFFF Release Area #:** AFFF 9

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOA	0.0004	0.126	0.0
PFOS	0.024	0.126	0.2
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.2**
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 observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	M
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M

Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Travis Air Force Base	**Date:**	7/8/2020
Location (State):	California	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	AFFF Area 10 Late 1980s C-141B Crash - NA	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	Remedial Investigation (RI)
RPM's Name:	Lonnie Duke	**Agreement Status (e.g., Federal Facility Agreement date signed):**	Federal Facility Agreement, 1990
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	In the late 1980s, a C-141B crash landed due to a nose gear problem on the south end of Runway 03L-21R, near Taxiway J and Taxiway S. Approximately 60 gallons of AFFF may have been used to extinguish the fire. Concrete joints on the runway are sealed; however, any AFFF applied would have likely migrated off the runway into the grassy areas. The location of the fire is shown on Figures 1.1 and 3.4 (CH2M Hill 2015).
Brief Description of Pathways:	Groundwater is present between 9 and 13 feet bgs and generally flows to the south. Four (three normal and one field duplicate) groundwater samples were collected. Both PFOA and PFOS concentrations are greater than the comparison value in groundwater. Groundwater recharge occurs from direct infiltration of rainfall on the valley surface, and from the infiltration of runoff through local streambeds and creek beds. The groundwater flow at Travis AFB is influenced by the configuration of alluvium and bedrock. Flow within the alluvium is consistently to the south; however, three groundwater mounds exist on Base and in the immediate vicinity of a mound groundwater flows radially away from the mound and then rejoins the regional southerly flow (OTIE, 2018). Five (four normal and one field duplicate) surface soil samples were collected. PFOS contamination was detected above the detection limit, but below the comparison value in the surface soil (Table 5.1, OTIE 2018). The location is mostly paved and has some grassy areas. Any AFFF would have most likely migrated off the ramp into the grassy area. No surface water or sediment samples were collected for the area.
Brief Description of Receptors:	The nearest potential drinking well (residential well) is located approximately 10,400 feet cross-gradient (southeast) of this location. The potential exists that within 4 miles downgradient of this location, there are several off-Base potential receptors because of their use of groundwater. The downgradient groundwater wells include three residential/ commercial wells, one irrigation well, one well for stock, and one monitoring well. The commercial well serves approximately 375 people; none of the other downgradient wells have reported populations served (CH2M Hill 2015). The Travis AFB drinking water is purchased from the City of Vallejo Water Department and California State Water Project that originates in Lake Oroville, flows through the Sacramento River to the North Bay Aqueduct pumping facility, and then to the Base water treatment plant. The treatment plant also receives surface water from the Solano Project, which provides water from Lake Berryessa that is transported via the Putah South Canal to the terminal reservoir (CH2M Hill 2015). Due to the crash area being located on and adjacent to runway, and flight line, implies that receptors would have limited access to contaminated soil because this would most likely be a restricted access area.

Groundwater Worksheet

Installation: Travis Air Force Base

Site ID: NA **AFFF Release Area #:** AFFF 10

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.93	40	0.0
PFOA	0.37	0.04	9.3
PFOS	8.1	0.04	202.5
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**211.8**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**H**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	H
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation: Travis Air Force Base

Site ID: NA **AFFF Release Area #:** AFFF 10

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.032	0.126	0.3
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**0.3**
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**	**L**

Migratory Pathway Factor		
Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	M
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M

Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Travis Air Force Base	**Date:**	7/8/2020
Location (State):	California	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	AFFF Area 11 2001 Aircraft Crash - NA	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	Remedial Investigation (RI)
RPM's Name:	Lonnie Duke	**Agreement Status (e.g., Federal Facility Agreement date signed):**	Federal Facility Agreement, 1990
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	In 2001, a small aircraft crash landed on the Northern Runway 03R-21L. The aircraft caught on fire; however, fewer than 5 gallons of AFFF were needed to extinguish the fire. Concrete joints on the runway are sealed; however, any AFFF applied would have likely migrated off the runway into the grassy areas. The location of the fire is shown on Figures 1.1 and 3.3 (CH2M Hill 2015) and Figures 2-1 and 3-11 (OTIE 2018).
Brief Description of Pathways:	Groundwater is present between 9 and 12 feet bgs and generally flows to the south-southeast. Three (two normal and ield duplicate) groundwater samples were collected. PFOS concentrations are greater than the comparison value in groundwater. Groundwater recharge occurs from direct infiltration of rainfall on the valley surface, and from the infiltration of runoff through local streambeds and creek beds. The groundwater flow at Travis AFB is influenced by the configuration of alluvium and bedrock. Flow within the alluvium is consistently to the south; however, three groundwater mounds exist on Base and in the immediate vicinity of a mound groundwater flows radially away from the mound and then rejoins the regional southerly flow (OTIE, 2018). Five (four normal and one field duplicate) surface soil samples were collected. PFOS contamination was detected above the detection limit, but below the comparison value in the surface soil (Table 5.1, OTIE 2018). The crash area is mostly paved and has some grassy areas. Any AFFF would have most likely migrated off the ramp into the grassy area. No surface water or sediment samples were collected for the area.
Brief Description of Receptors:	The nearest potential drinking well (residential well) is located approximately 11,000 feet downgradient (south) of this location. The potential exists that within 4 miles downgradient of this location, there are several off-Base potential receptors because of their use of groundwater. The downgradient groundwater wells include three residential wells, one irrigation well, three wells for stock, and two monitoring wells. None of the downgradient wells have reported populations served (CH2M Hill 2015). The Travis AFB drinking water is purchased from the City of Vallejo Water Department and California State Water Project that originates in Lake Oroville, flows through the Sacramento River to the North Bay Aqueduct pumping facility, and then to the Base water treatment plant. The treatment plant also receives surface water from the Solano Project, which provides water from Lake Berryessa that is transported via the Putah South Canal to the terminal reservoir (CH2M Hill 2015). Due to the crash area being located on and adjacent to runway, and flight line, implies that receptors would have limited access to contaminated soil because this would most likely be a restricted access area.

Groundwater Worksheet

Installation: Travis Air Force Base

Site ID: NA **AFFF Release Area #:** AFFF 11

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.033	40	0.0
PFOA	0.021	0.04	0.5
PFOS	0.12	0.04	3.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**3.5**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	H
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation: Travis Air Force Base

Site ID: NA **AFFF Release Area #:** AFFF 11

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOS	0.0017	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**

Migratory Pathway Factor		
Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	M
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Travis Air Force Base	**Date:**	7/8/2020
Location (State):	California	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	AFFF Area 12 2014 E75 Air Show Crash - NA	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	Remedial Investigation (RI)
RPM's Name:	Lonnie Duke	**Agreement Status (e.g., Federal Facility Agreement date signed):**	Federal Facility Agreement, 1990
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	On 4 May 2014, a Boeing E75 Stearman was performing an aerial demonstration at the Travis Air Show. The aircraft contacted the runway, slid inverted, and came to a stop several hundred feet later. Preliminary examination of the wreckage indicated that most of the fabric covering on the fuselage was damaged or consumed by fire. The right wing and cockpit furnishings were almost completely consumed by fire, as were some of the aluminum flight control tubes. The aircraft fire was extinguished with less than 5 gallons of AFFF. Concrete joints on the runway are sealed; however, any AFFF applied would have likely migrated off the runway into the grassy areas. The location of the fire is shown on Figures 1.1 and 3.3 (CH2M Hill 2015) and Figures 2-1 and 3-12 (OTIE 2018).
Brief Description of Pathways:	Groundwater is present between 11 and 14 feet bgs and generally flows to the south. Three groundwater samples were collected. Both PFOA and PFOS concentrations are greater than the comparison value in groundwater. Groundwater recharge occurs from direct infiltration of rainfall on the valley surface, and from the infiltration of runoff through local streambeds and creek beds. The groundwater flow at Travis AFB is influenced by the configuration of alluvium and bedrock. Flow within the alluvium is consistently to the south; however, three groundwater mounds exist on Base and in the immediate vicinity of a mound groundwater flows radially away from the mound and then rejoins the regional southerly flow (OTIE, 2018). Four (three normal and one duplicate) surface soil samples were collected. Both PFOA and PFOS contamination was detected above the detection limit, but below the comparison value in the surface soil (Table 5.1, OTIE 2018). The crash location is mostly paved and has some grassy areas. Any AFFF would have most likely migrated off the ramp into the grassy area. No surface water or sediment samples were collected for the area.
Brief Description of Receptors:	The nearest potential drinking well (residential well) is located approximately 10,000 feet downgradient (south) of this location. The potential exists that within 4 miles downgradient of this location, there are several off-Base potential receptors because of their use of groundwater. The downgradient groundwater wells include three residential wells, one irrigation well, three wells for stock, and two monitoring wells. None of the downgradient wells have reported populations served (CH2M Hill 2015). The Travis AFB drinking water is purchased from the City of Vallejo Water Department and California State Water Project that originates in Lake Oroville, flows through the Sacramento River to the North Bay Aqueduct pumping facility, and then to the Base water treatment plant. The treatment plant also receives surface water from the Solano Project, which provides water from Lake Berryessa that is transported via the Putah South Canal to the terminal reservoir (CH2M Hill 2015). Due to the crash area being located on and adjacent to runway, and flight line, implies that receptors would have limited access to contaminated soil because this would most likely be a restricted access area.

Groundwater Worksheet

Installation: Travis Air Force Base

Site ID: NA **AFFF Release Area #:** AFFF 12

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.12	40	0.0
PFOA	0.2	0.04	5.0
PFOS	1	0.04	25.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**30.0**
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**	**M**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	H
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation: Travis Air Force Base

Site ID: NA **AFFF Release Area #:** AFFF 12

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFBS	0.00032	126	0.0
PFOA	0.0029	0.126	0.0
PFOS	0.0043	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**

Migratory Pathway Factor		
Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	M
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M

Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	
Limited	No potential for receptors to have access to contaminated soil	L
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	L
	Soil Category	**LOW**

Site Background Information			
Installation:	Travis Air Force Base	**Date:**	7/8/2020
Location (State):	California	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	AFFF Area 13 Nozzle Spray Test Area (900 Ramp) - NA	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	Remedial Investigation (RI)
RPM's Name:	Lonnie Duke	**Agreement Status (e.g., Federal Facility Agreement date signed):**	Federal Facility Agreement, 1990
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	The 900 Ramp is a paved aircraft parking areas surrounded by grass on the south, east, and west sides. An annual nozzle spray test is performed to check equipment and evaluate the chemical balance of the AFFF. Typically, fire engines are parked on space 903 and AFFF is sprayed toward space 904. Approximately 10 to 15 gallons of AFFF are used per test per fire engine. The AFFF and water are left in place on the 900 ramp and allowed to dry up. The spray test area was used for many years; therefore, the volume of AFFF applied to the area cannot be estimated. The location of the 900 Ramp is shown on Figures 1.1 and 3.6 (CH2M Hill 2015) and Figures 2-1 and 3-13 (OTIE 2018).
Brief Description of Pathways:	Groundwater is present between 13 and 16 feet bgs and generally flows to the south. Three groundwater samples were collected. Both PFOA and PFOS concentrations are greater than the comparison value in groundwater. Groundwater recharge occurs from direct infiltration of rainfall on the valley surface, and from the infiltration of runoff through local streambeds and creek beds. The groundwater flow at Travis AFB is influenced by the configuration of alluvium and bedrock. Flow within the alluvium is consistently to the south; however, three groundwater mounds exist on Base and in the immediate vicinity of a mound groundwater flows radially away from the mound and then rejoins the regional southerly flow (OTIE, 2018). Three surface soil samples were collected. PFOS concentrations exceeded the comparison value in the surface soil (Table 5.1, OTIE 2018). The AFFF nozzle testing area, Ramp 900, is mostly paved and has some grassy areas. Any AFFF would have most likely migrated off the ramp into the grassy area. No surface water or sediment samples were collected for the area.
Brief Description of Receptors:	The nearest potential drinking well (residential well) is located approximately 11,700 feet downgradient (south) of this location. The potential exists that within 4 miles downgradient of this location, there are several off-Base potential receptors because of their use of groundwater. The downgradient groundwater wells include three residential wells, one irrigation well, three wells for stock, and two monitoring wells. None of the downgradient wells have reported populations served (CH2M Hill 2015). The Travis AFB drinking water is purchased from the City of Vallejo Water Department and California State Water Project that originates in Lake Oroville, flows through the Sacramento River to the North Bay Aqueduct pumping facility, and then to the Base water treatment plant. The treatment plant also receives surface water from the Solano Project, which provides water from Lake Berryessa that is transported via the Putah South Canal to the terminal reservoir (CH2M Hill 2015). Due to the Nozzle Testing Area, Ramp 900, being located on the taxiway, and adjacent to runway, and flight line, implies that receptors would have limited access to contaminated soil because this would most likely be a restricted access area.

Groundwater Worksheet

Installation: Travis Air Force Base

Site ID: NA **AFFF Release Area #:** AFFF 13

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	140	40	3.5
PFOA	88	0.04	2200.0
PFOS	200	0.04	5000.0
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**7203.5**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**H**

Migratory Pathway Factor		
Evident	Analytical data or direct observation indicates that contamination in the groundwater has moved to a point of exposure (e.g., well)	
Potential	Contamination in the groundwater has moved beyond the source or insufficient information available to make a determination of Evident or Confined	M
Confined	Analytical data or direct observation indicates that the potential for contaminant migration from the source via groundwater is limited (possibly due to geological structures or physical controls)	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
Receptor Factor		
Identified	Impacted drinking water well with detected contaminants or existing downgradient water supply well within 4 miles and groundwater is current source of drinking water (EPA Class I or IIA groundwater)	H
Potential	Existing downgradient drinking water well beyond 4 miles with no contaminant detection(s) or no known drinking water wells downgradient and groundwater is currently or potentially usable for drinking water (i.e., EPA Class I or II groundwater) or other beneficial use (e.g., agricultural)	
Limited	No known water supply wells downgradient and groundwater is not considered potential drinking water source and is of limited beneficial use (Class III)	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	H
	Groundwater Category	**HIGH**

Soil Worksheet

Installation: Travis Air Force Base

Site ID: NA **AFFF Release Area #:** AFFF 13

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOA	0.00063	0.126	0.0
PFOS	2	0.126	15.9
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**15.9**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

Migratory 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	
Migratory 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	
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	**MEDIUM**

Site Background Information			
Installation:	Travis Air Force Base	**Date:**	7/8/2020
Location (State):	California	**Media Evaluated:**	Groundwater, Soil
Site Name and ID:	AFFF Area 14 Former STP/SDA - FT005	**Phase of Execution (e.g., RI, Record of Decision (ROD)):**	Remedial Investigation (RI)
RPM's Name:	Lonnie Duke	**Agreement Status (e.g., Federal Facility Agreement date signed):**	Federal Facility Agreement, 1990
OVERALL SITE CATEGORY: HIGH			

Site Summary	
Brief Site Description:	The Former Sewage Treatment Plant (STP) and Sludge Disposal Area (SDA) are located in the southeastern portion of Travis AFB east of FT005 and Carson Road. The STP operated from the early 1950s until the late 1970s. The STP included a settling basin, oxidation ponds, and a chlorine contact chamber. The oxidation ponds were constructed of soils with a high clay content and reportedly retained water without any apparent losses. The STP was used to treat primarily domestic and some industrial waste generated at the Base. Although no AFFF was released directly to the ground at the STP, any AFFF that may have entered the floor drains/sewer would likely have been treated at the STP. If the fire engines leaked/spilled AFFF within the fire station, the AFFF would have entered the floor drains and the sanitary sewer and eventually reached the STP. The effluent from the STP was discharged to Union Creek. Sludge from the settling basin was pumped to a digester system. Digested sludge was spread over areas located adjacent to the STP. It is estimated that approximately 100 cubic yards of digested sludge were disposed of annually. During the late 1970s, Travis AFB began pumping its domestic waste to the Fairfield‐Susiun Sewer District Treatment Plant. Since a majority of the STP was lined, the sludge disposal areas, the oxidation ponds, and the outfall from the STP to Union Creek are the likely locations contaminated with AFFF. The location of the former STP is shown on Figures 1.1 and 3.6 (CH2M Hill 2018) and Figures 2-1 and 3-14 (OTIE 2018).
Brief Description of Pathways:	Groundwater is present between 10 and 18 feet bgs and generally flows to the south. Three groundwater samples were collected. Both PFOA and PFOS concentrations are greater than the comparison value in groundwater. Groundwater recharge occurs from direct infiltration of rainfall on the valley surface, and from the infiltration of runoff through local streambeds and creek beds. The groundwater flow at Travis AFB is influenced by the configuration of alluvium and bedrock. Flow within the alluvium is consistently to the south; however, three groundwater mounds exist on Base and in the immediate vicinity of a mound groundwater flows radially away from the mound and then rejoins the regional southerly flow (OTIE, 2018). Two surface soil samples were collected. Both PFOA and PFOS contamination were detected above the detection limit, but below the comparison value in the surface soil (Table 5.1, OTIE 2018). The digested sludge from the STP was land spread around the STP. If any of the AFFF was bound to soil, it may also be found in the digested sludge. No surface water samples were collected for the area. One sediment sample was collected from the area.
Brief Description of Receptors:	The two nearest potential drinking wells (residential well) are located approximately 7,000 feet downgradient (south) of this location. The potential exists that within 4 miles downgradient of this location, there are several off‐Base potential receptors because of their use of groundwater. The downgradient groundwater wells include three residential wells, one irrigation well, three wells for stock, and two monitoring wells. None of the downgradient wells have reported populations served (CH2M Hill 2015). The Travis AFB drinking water is purchased from the City of Vallejo Water Department and California State Water Project that originates in Lake Oroville, flows through the Sacramento River to the North Bay Aqueduct pumping facility, and then to the Base water treatment plant. The treatment plant also receives surface water from the Solano Project, which provides water from Lake Berryessa that is transported via the Putah South Canal to the terminal reservoir (CH2M Hill 2015). Commercial/Industrial workers would be the most likely receptors as this area is not in use anymore and in an isolated area of the base.

Groundwater Worksheet

Installation: Travis Air Force Base

Site ID: FT005 **AFFF Release Area #:** AFFF 14

Contaminant	Maximum Concentration (ug/L)	Comparison Value (ug/L)	Ratios
PFBS	0.027	40	0.0
PFOA	0.043	0.04	1.1
PFOS	0.15	0.04	3.8
CHF Scale	**CHF Value**	**Contamination Hazard Factor (CHF)**	**4.8**
CHF > 100	**H (High)**	$CHF = \sum \frac{\text{[Maximum Concentration of Contaminant]}}{\text{[Comparison Value for Contaminant]}}$	
100 > CHF > 2	**M (Medium)**		
2 > CHF	**L (Low)**		
CHF Value		**CHF VALUE**	**M**

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

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

Soil Worksheet

Installation: Travis Air Force Base

Site ID: FT005 **AFFF Release Area #:** AFFF 14

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
PFOA	0.0018	0.126	0.0
PFOS	0.0019	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**

Migratory Pathway Factor		
Evident	Analytical data or observable evidence that contamination is present at a point of exposure	
Potential	Contamination has moved beyond the source, could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined	M
Confined	Low possibility for contamination to be present at or migrate to a point of exposure	
Migratory Pathway Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M

Receptor Factor		
Identified	Receptors identified that have access to contaminated soil	
Potential	Potential for receptors to have access to contaminated soil	M
Limited	No potential for receptors to have access to contaminated soil	
Receptor Factor	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).	M
	Soil Category	**LOW**