

# Restoration Advisory Board

## Meeting Minutes

March 30<sup>th</sup>, 2023, 15:00 to 16:30 (PST)

### **RAB Members in Attendance:**

- Steve Smith (Community Member)
- Chris Carver (Community Member)
- John Hancock (Community Member)
- Doug Greenlund (Community Member)
- Jon Welge (Community Member)
- Maurice “Mo” Noder (Community Member)
- Michael LaScuola (Spokane Regional Health District)
- Col. Fletcher (U.S. Air Force)
- Charles Gruenenfelder (Community Member)
- Jaclyn Satira (U.S. Environmental Protection Agency, Region X)
- Richard Francis (U.S. Environmental Protection Agency, Region X)
- Jason Cook (Washington Department of Ecology)

### **People in Attendance at the RAB:**

- Mark Loucks (AFCEC)
- Megan Riccobono (AFCEC)
- Jack Mapes (AGEISS)
- Abigail Power (AGEISS)
- Kristine Weber (AECOM)
- Elizabeth (Liz) Drake (AECOM)
- John Peper (Bay West)
- Jacob Bradley (Bay West)
- 11 Other members of the public not listed here

## **RAB Meeting**

### **Opening of the Restoration Advisory Board (RAB) and RAB Business**

**Liz Drake** led the Pledge of Allegiance for the RAB and community members who were present.

**Liz Drake made the following statement on behalf of the Air Force.** We would like all comments to be respectful. If you would like to make a comment or question on the presentations, we will have a comment form that should be filled out during the 5 minute break after the presentations. The comment period will be 10 minutes at the end of all presentations and to make a comment you must fill out the form. I have the forms and will make them available after the presentations during the break.

**Liz Drake:** I would now like to go over the expectations of our RAB members. The expectation of the RAB members are that they attend the RAB meetings and provide advice to the Air Force (AF) on remediation strategies.

**Liz Drake** asked for a motion to approve the meeting minutes from the 2022 November RAB.

**Jason Cook** motioned to approve and **Col. Fletcher** seconded the motion to approve the 2022 November RAB meeting minutes.

**Liz Drake** Introduced **Mark Loucks**.

### **PFOS/PFOA Overview and Changes to the EPA Standard**

**Mark Loucks** discussed the maximum contaminant level (MCL) for perfluorooctanesulfonic acid (PFOS) / Perfluorooctanoic acid (PFOA). The level is down to 4 parts per trillion (PPT) from the Lifetime health advisory of 70 PPT.

**Mark Loucks** talked about the additional constituents or contaminants of concern (COCs) and how their level will be the same concentration at 4 PPT MCL. More types of per- and polyfluoroalkyl substances (PFAS) will become regulated under the new MCL once it is finalized.

**Mark Loucks** continued saying there will be a risk level that will be calculated out of the new MCL level when it is finalized. The AF is preparing for a larger effort that will be associated with the new MCL. At what point the MCL becomes final, the AF will clean up contamination to the level - to that standard.

**Mark Loucks** asked if there were any questions?

**Doug Greenlund:** If the MCL is for drinking water how does that relate to soil?

**Mark Loucks:** The MCL is for all groundwater, not just for drinking water. For cleaning up soil we would use the United States Environmental Protection Agency (USEPA) Regional Screening Level (RSL).

**Richard Francis (EPA):** Yes, the EPA has established regional screening levels for soil for PFOS and PFOA.

**Maurice Noder:** I am curious about the other chemicals? What are they?

**Mark Loucks:** I have a list that I can give to you of the additional regulated chemicals, but I do not have them off the top of my head. They are all related to PFOS/PFOA and in the same group of chemicals called PFAS chemicals.

**Jon Welge:** How did the EPA come up with the level of 4 PPT in groundwater?

**Mark Loucks:** I am sure they looked at the science of it, but my assumption is they looked at how the level needs to be protective of human health.

**Richard Francis:** The MCL was decided by USEPA headquarters based on current research and scientific evidence.

**Doug Greenlund:** The USEPA has given a presentation on how they developed the numbers, and you can view the presentation online.

**Mike LaScuola:** Are the people whose wells were already sampled going to be notified of the new level and be resampled for PFOS/PFOA?

**Mark Loucks:** Yes, we will be resampling anyone who the AF has previously sampled when the MCL goes final. And we have previously sampled 234 residences for PFOS/PFOA. We will also be adding step-out sampling as necessary.

**Maurice “Mo” Noder:** What was the 234 Residents?

**Mark Loucks:** That was 234 Residents who have previously been sampled for PFOS/PFOA.

#### **PFOS / PFOA Plan Review and Remedial Investigation (RI) Agenda**

**Mark Loucks** explains the on base wells for the AF and the map showing groundwater flow directions.

**Mark Loucks** explains the current area of PFOS/PFOA sampling. Currently there are 89 residents that have wells that are above the lifetime health advisory contaminant level of 70 PPT and have treatment systems. Seven homes have been connected to the City of Airway Heights municipal water and 19 are getting bottled water delivered. There are six homes that need filtration systems installed on them.

**Mark Loucks:** We continue to monitor the community and we have seen contamination concentrations increase in the current sampling area. There are 89 homes that have concentrations below the Lifetime Health Advisory (70 ppt) concentrations of PFOS/PFOA.

**Mark Loucks:** we are starting to look at the source areas and how we found very high concentrations of PFOS/PFOA in the soil on base as high as 1890 PPT.

**John Hancock:** – Has AF determined a trend in wells increasing?

**Mark Loucks:** We don't have a trend line on that concentration yet. We need eight quarters or two years of data to establish trend lines and we do not have that much data yet. AF is continuing to sample to establish trend lines.

**Maurice “Mo” Noder:** Why don't they just excavate that dirt?

**Mark Loucks:** Because we have not defined the area of where the contamination exists yet. We need to determine the nature and extent of the contamination so that we can calculate how much money and effort we need to complete the excavation and so that we get the extent of the contamination and fully remediate the source area. We also need to figure out where to dispose of the contaminated soil.

**Maurice “Mo” Noder:** It's been six years - I don't see what is taking so long. Why is it taking so long?

**Mark Loucks:** We have spent our resources preventing contamination and we are still trying to find the nature and extent. And believe me we all wish that this process was faster. But I will say in the past that we have jumped at trying the first solution we thought of to clean up contamination and have made the

situation worse or taken longer to clean up than necessary. The process is slow, but it is methodical so that the contamination gets remediated properly.

**Maurice “Mo” Noder:** Is there a timeline or a guess as to how much longer it will take on the soil?

**Mark Loucks:** We are hopeful for 1-2 years to have the removal action started. That is our best estimate at this time.

**Jon Welge:** Mo, I would also say that the industry does not have a good idea of where to put that contaminated soil yet. There are a bunch of emerging technologies that are coming about how to treat the contaminated soil. Reverse osmosis, soil washing, and resin filtering are all being tested currently to see if they are viable solutions to clean the contamination.

**Maurice “Mo” Noder:** Am I thinking too simplistically with just excavating the soil and putting it in temporary storage with plastic lining?

**Mark Loucks:** No, you are not thinking too simplistically.

**Jon Welge:** That action is being carried out on several other bases.

**Charles Gruenenfelder:** I am curious to the extent of the map and planned investigation area. Will the planned investigation include source investigation and are there possible other sources besides the base? What tools would you use to define those sources?

**Mark Loucks:** There are many sources that have PFOS/PFOA contamination. We know that car washes and landfills are two other common sources of PFOS/PFOA, as well as other airports and fire stations that used aqueous film-forming foam (AFFF) like the AF did. Every type of PFAS has a different chemical makeup where there are different amounts of the chemicals that give us a signature of where that chemical most likely came from. For example, the AFFF that was used has a definitive ratio of PFAS chemicals.

**Mark Loucks:** The City of Airway Heights had a granular activated carbon (GAC) treatment system installed on their municipal well by the AF. The City of Airway Heights is working to get a municipal well outside of the contaminated area. The main water that supplies the City of Airway Heights is now from Spokane municipal supply. The AF is offsetting the cost of the water to the City of Airway Heights as they purchase it from the city of Spokane.

#### **Residential GAC Filtration Systems for PFAS:**

**Mark Loucks:** The systems for residents are sampled quarterly and when break through of contamination is detected the GAC units are switched out for new GAC. I would like to point out that there is a 24-hour number to call for systems issues on personal wells for water filtration. If there is a problem with the system, the resident can call this number at any time and get help for their system.

**Mark Loucks:** I would also like to note that we have had challenges with the GAC systems. Odor has been a big challenge. Carbon grows bacteria and the bacteria needs to be cleaned out of the canisters. To do this, the canisters need to be bleached and have new GAC put into them. This usually handles the odor issue. I would note that this bacterium is not harmful to people, but the odor was an issue, so we dealt with it. We also had another unique issue that was a homeowner having odor in the water from manganese that was in the water and so we used a water softener to fix that issue. In addition to odor issues, we have had other issues when the filtration systems are installed. Homes plug up with the addition of the systems. As the systems are installed rust or other debris can be knocked loose and the



house can get plugged up plumbing. The Air Force has fixed homes that have had complications from the installation of these personal filtrations systems.

#### **AFFF On-Base Releases:**

**Mark Loucks:** At site FT004, everywhere we have sampled there is PFOS. At site WP003 everywhere we have looked there is PFOS. At the CK135 crash, everywhere we have looked there is PFOS and at the B-52 crash site there is a delineated crash where we have found most of the extents of PFOS/PFOA.

**Mark Loucks:** There are 16 wells that are going into Spokane County property and 10 wells going into property in the City of Airway Heights as part of the first stage (PFOS/PFOA) Remedial Investigation (RI), and more wells are planned in the future.

**Mark Loucks:** 108 borings were completed with soil samples for PFOS/PFOA for the on-base sites to try to determine the nature and extent of the contamination. By May there will be a memo that comes out to include the information for this initial RI investigation. At that time, we would encourage the public to comment on the report.

#### **Early Action Projects for PFOS/PFOA**

**Mark Loucks:** We are going to start a Focused Feasibly Study after the RI is complete so that we can come to understand the best way to clean up the PFOS/PFOA contamination; however, prior to that we want to complete early actions including:

- Stopping water from leaving the base perennially through No Name Ditch
- Treating the water and sediment of the water within the lagoons themselves.

**Charles Gruenenfelder:** You have highlighted the ponds and No Name Ditch. I assume there is wildlife around those areas. Are there any ecological cleanup levels that have been established for wildlife?

**Mark Loucks:** At this time, I do not know of any ecological cleanup levels that have been established but we will be looking into that.

**Steve Smith:** Is it possible that the ditch is taking water off base with contamination?

**Mark Loucks:** Yes. The AF is very concerned about contamination leaving base in this fashion and that is why the time-critical early action is focused on this area.

**Maurice “Mo” Noder:** How high were the concentrations seen in the ponds and the creek?

**Mark Loucks:** The concentrations were above 57,000 PPT - they were very high.

**Mark Loucks** notes that he is out of time.

**Liz Drake** thanks **Mark Loucks** and reminds the public of the community comment period and when they will be able to submit questions.

**Liz Drake** introduced the next RAB presentations.

#### **Performance-Based Remediation Contract**

**John Peper** and **Kristine Weber** present the Performance-Based Remediation (PBR) contract data, progress, and maps for all PBR sites at Fairchild Air Force Base. Clean ups are being conducted under the

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process. The ultimate goal is to achieve Unlimited Use/Unrestricted Exposure (UU/UE) for each site.

**Kristine Weber** talked about SS039 orphan trichloroethylene (TCE) plumes and focused on the Distal and Proximal plumes.

**Kristine Weber** talked about the  $\text{MNO}_4$  injections on base at SDO37 in the pilot study injection and the performance monitoring sampling.

**Kristine Weber** said We have submitted a Feasibility Study for review and now we are working to write the Proposed Plan for SD037.

**John Peper** talked about the site LF002 and how over 99 percent of the mass of the COC TCE has been removed from LF002. He touched on the soil vapor extraction systems and the engineered landfill cap. He spoke about how the system was shut down on a trial basis to evaluate the plume with no active remediation.

**Doug Greenlund:** How do you know that you have depleted 99.7 percent of the contaminant plume?

**John Peper:** When you define nature and extent you have a concentration that is measured and using that and the extents of concentration you can estimate the source area. Once you have that and you monitor that over the treatment and see the concentrations decrease you can calculate the mass removal.

**Jon Welge:** Is there a plan to sample for PFOS/PFOA at LF002?

**John Peper:** I do not work on PFOS/PFOA for this contract so I would like to defer the question to Mark Loucks.

**Mark Loucks:** Yes, there is a plan to sample LF002. LF002 is a landfill and landfills are known sources of PFOS/PFOA, so we are planning on sampling this site.

**John Peper** spoke about the site WP003 - the contaminants TCE and arsenic and the pilot study Bay West completed starting in 2020 with monitoring in 2021 and 2022 for effectiveness of the pilot study. John spoke about the submitted Proposed Plan for WP003.

**Jon Welge:** What is the source of the arsenic?

**John Peper:** It could be some that was naturally occurring, and it could also be associated with the drums that were disposed of at the site. We suspect it is naturally occurring.

**Mark Loucks:** Reducing conditions around the lagoons that decompose will mobilize iron and arsenic in the water which is how it could be occurring naturally.

**John Peper** continued on to describe the other sites in the contract and how they were closed through the Voluntary Cleanup Program with the Washington State Department of Ecology.

**John Hancock:** Can you explain what Voluntary means?

**Jason Cook:** It is a program that is not regulated through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and it is called the Voluntary Cleanup Program because it is regulated by the Washington Department of Ecology.

**Mark Loucks:** Because POL petroleum oil and gas sites are exempted from the CERCLA process, that makes this the best program through the state that we have found to clean up those sites.

**Kristine Weber:** At TU506 we did a soil excavation where we removed contaminated soil and performed quarterly sampling for natural attenuation analysis in groundwater. At TU500 we did a soil excavation to remove remaining contamination from oil/water separators and completed quarterly sampling for natural attenuation. I like to call these two sites sister sites since they are being worked on for the same reasons and contamination.

**John Peper** listed the expected public comment period opportunities in 2023 for the contract:

- DP064 Proposed Plan will likely be available for public comment in the May/June time frame.
- WP003 Proposed Plan will be available for public comments this late summer of 2023.
- SD037 Proposed Plan will be available for public comments in late-summer/early-fall 2023.

#### **Site LF002 Questions:**

**Charles Gruenenfelder:** What is being done in terms of measuring the rebound that could be happening from the shutdown of the groundwater extraction treatment system?

**John Peper:** We are monitoring, and we have triggers that will have the system turn back on if the concentrations of certain wells exceed the MCL.

#### **General Questions and Comments:**

**John Hancock:** I would like to suggest a summary of the sites with no acronyms?

**Mark Loucks:** Yes, I will try to do that with a RAB cheat sheet that we have done at other AF bases.

**John Hancock:** I would like to see the completed sites taken away after they are talked about once.

**Mark Loucks:** Yes, we can try to do that.

**Liz Drake:** 5-minute break

#### **Conclusion of RAB Business and Public Comment Period:**

**Liz Drake** is bringing the RAB back to session.

**Doug Greenlund:** Can you go over all the people who work under you?

**Mark Loucks:** Yes, I have the Bay West Team and Megan and myself. Abbie and Jack are direct support and are embedded with us. Then we have EA who work on our RI Contract, and we have EPA liaisons that work with the regulators directly and in the back, we have our legal team. And finally, we have the on-base personnel represented by Col. Fletcher.

**John Hancock:** If the minutes came out earlier, they would be more useful.

**Mark Loucks:** We can try to get that done, yes.

**Col. Fletcher:** Thank you to all the RAB members and the public comments - they were very helpful and insightful. Thank you to Liz for doing such a great job mediating the meeting.

**John Hancock:** Moved to adjourn the meeting.

**Other Members:** Seconded the movement.

**Liz Drake:** The meeting is adjourned.

**Welcome**

**Fairchild Air Force Base (AFB)  
Restoration  
Advisory Board (RAB)  
Meeting**

**30 March, 2023**

**Fairchild AFB**  
**Restoration Advisory Board (RAB) Meeting**  
Date: March 30, 2023 - Time: 3:00 pm

**RAB Meeting Agenda**

3:00-3:05 p.m.	<b>Welcome &amp; Introductions</b> .....Col. Charles Fletcher, RAB Installation Co-Chair
	<b>Pledge of Allegiance</b> .....Liz Drake, AECOM RAB Facilitator
	<b>RAB Mission Statement</b> .....Liz Drake, AECOM RAB Facilitator
3:05-3:15	<b>RAB Business</b> .....Liz Drake, AECOM RAB Facilitator
	<ul style="list-style-type: none"><li>• RAB Code of Conduct &amp; RAB Meeting Ground Rules</li><li>• Nov. 17, 2022 meeting minutes</li><li>• Standard Operating Procedures</li><li>• Draft MCL and what does it mean</li></ul>
3:15-3:45	<b>Perfluorooctane Sulfonate and Perfluorooctanoic Acid (PFOS/PFOA)</b>
	<b>Investigation and Ongoing PFOS/PFOA Projects</b>
20 minutes	Presentation.....Mark Loucks, AFCEC
3:45-4:15	<b>Update on sites Managed Under the Performance-Based Remediation (PBR) Contract</b>
10 minutes	Presentation.....John Peper, Bay West
10 minutes	Presentation.....Kristine Weber, AECOM
4:15-4:25	<b>Public Comment Opportunity</b> .....Liz Drake, AECOM, RAB Facilitator
4:25-4:30	<b>Agenda Items for September 2023 RAB Meeting</b>
4:30 p.m.	<b>Adjourn Until 5:30 p.m. for Fairchild AFB Open House</b>

**Fairchild Air Force Base Open House**  
**5:30 to 8:00 p.m.**

Fairchild AFB leadership and project managers available to speak with the public about the environmental cleanup program.



# ***RAB Mission Statement***

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**“The purpose of the Restoration Advisory Board is to promote community awareness and obtain constructive community review and comment on environmental restoration actions in the overall cleanup of Fairchild Air Force Base.”**



# ***Public Code of Conduct***

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- **Commentors shall be courteous and respectful at all times.**
- **Interruptions will not be tolerated during the RAB presentations or while another person is speaking.**
- **Profanity or any use of inappropriate language during the presentations or public comment period is prohibited.**
- **Instigating any type of mass outbursts by the public will not be tolerated.**
- **The RAB facilitator may limit length of comments to manage meeting and presentation times. Public comments during the public comment opportunity will be limited to ten minutes.**
- **The RAB facilitator will moderate the meeting to ensure the meeting stays on schedule and focused on the topics at hand.**
- **All members of the public are asked to remain seated in the area designated for the public during the RAB presentation.**
- **Racist, sexist, or homophobic comments will not be tolerated.**





# ***RAB Member Expectations***

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- **Attend all regular meetings. If the member is unable to attend, it is the member's responsibility to ensure the alternate attends the meeting in his or her place.**
- **Participate actively and appropriately at meetings and other activities. Behavioral norms can be found on the back of the member's name tents.**
- **All RAB members, including alternates, are invited and encouraged to attend training sessions and participate on work groups.**
- **Read all RAB meeting minutes.**
- **Be available to communicate with local community residents and interest groups concerned with specific base cleanup issues. This may include attendance at Info Fairs, responding to direct contacts and taking the initiative to establish contact with community residents.**
- **Identify all actual, potential, and perceived conflicts of interest, as defined in Section IV.G., before any discussion that may affect the conflicting interest, and recusal from participating in such discussion.**



# ***Draft MCL and What does it Mean?***

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USEPA has proposed a Draft Maximum Contaminate Level (MCL) of 4 parts per trillion (ppt)

“DoD respects and values the public comment process on this proposed nationwide drinking water rule and looks forward to the clarity that a final regulatory drinking water standard for PFAS will provide.”

“In anticipation of the final standard that EPA expects to publish by the end of 2023, the Department is assessing what actions DoD can take to be prepared to incorporate EPA's final regulatory standard into our current cleanup process, such as reviewing our existing data and conducting additional sampling where necessary.”

“In addition, DoD will incorporate nationwide PFAS cleanup guidance, issued by EPA and applicable to all owners and operators under the federal cleanup law, as to when to provide alternate water when PFAS are present.”



# ***Air Force Civil Engineer Center***

**U.S. AIR FORCE**

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*Integrity - Service - Excellence*



## ***March 2023 Restoration Advisory Board (RAB)***

**Mark Loucks,  
AFCEC Hill ISS Chief**

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March 30, 2023



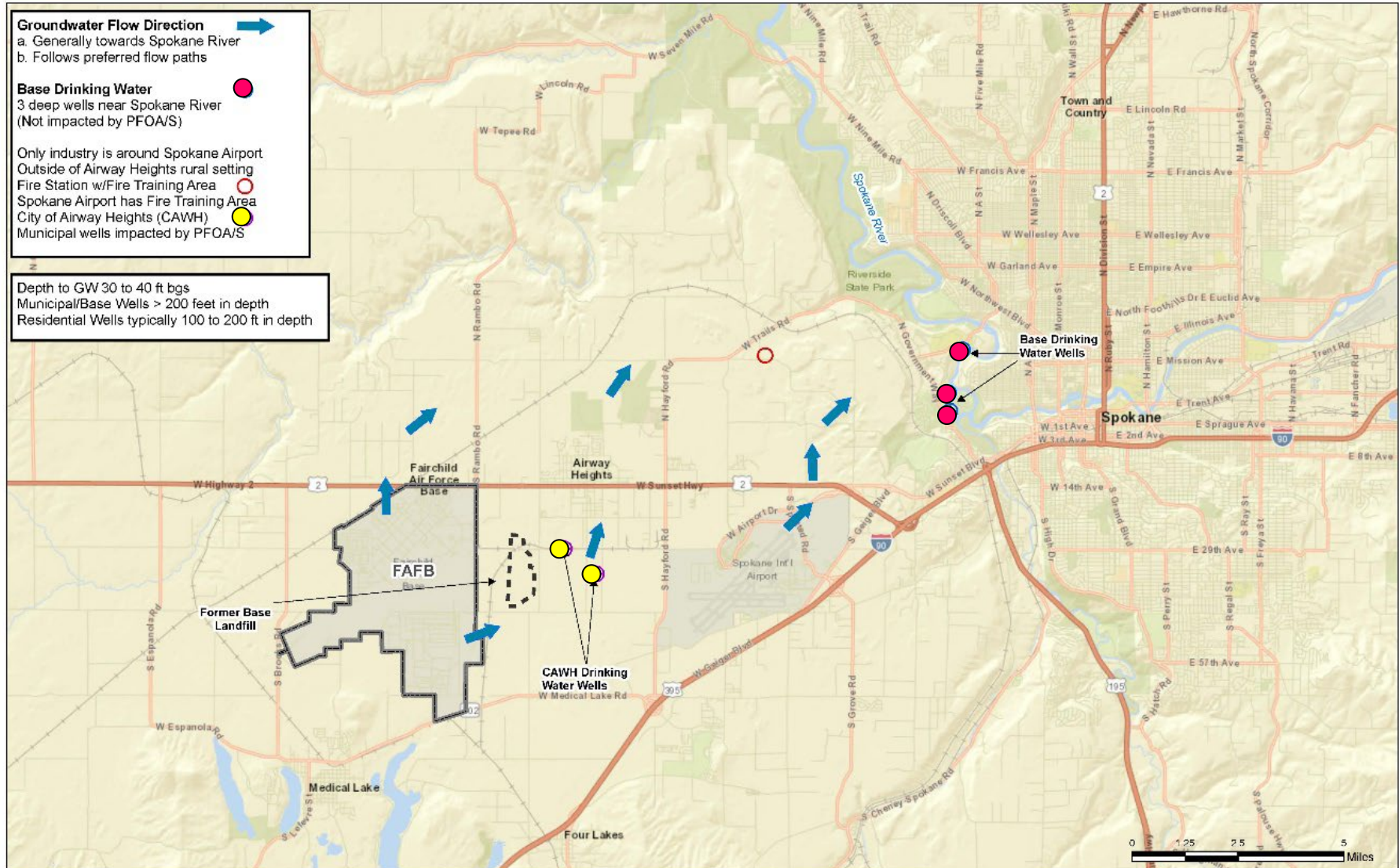
# ***Agenda***

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- **Background**
- **What have we accomplished so far?**
  - Mitigation efforts
- **Current challenges**
- **Remedial Investigation (RI) update**
- **Engineering Evaluation/Cost Analysis (EE/CA) action for the City of Airway Heights (CAWH)**
- **New early actions under consideration**

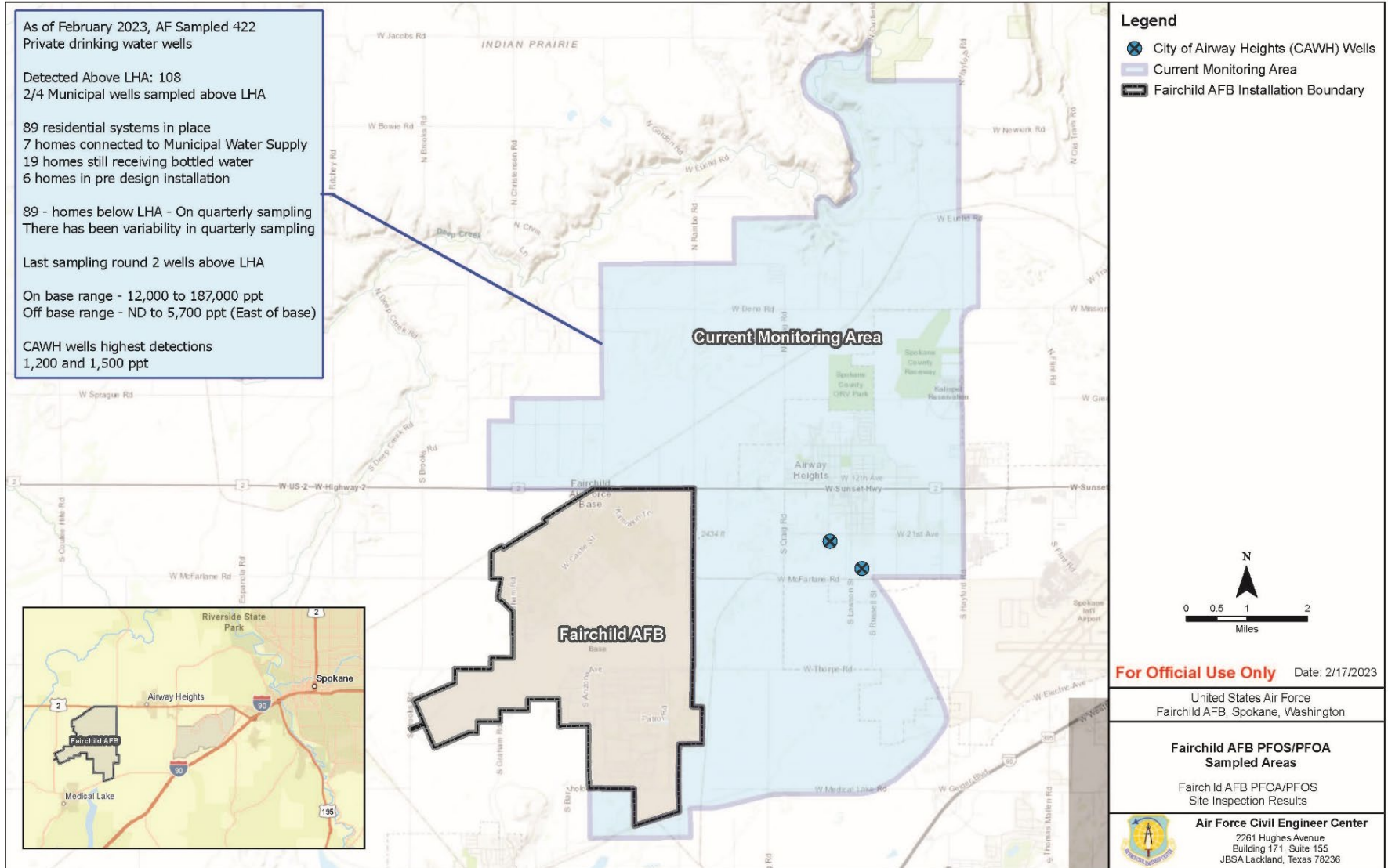
# Groundwater Flow







# Sampling Area





# Response Actions



- **Actions for residential drinking water wells**
  - Time Critical Removal Action (TCRA) approved March 2018; installation ongoing
  - Individual whole house Granular Activated Carbon (GAC) filtration systems:
  - **89 filtration systems installed**
    - 4 wells with systems pending
    - 4 wells (7 homes) connected to CAWH water system
    - 5 wells on hold
      - 2 homeowners refused system
      - 1 homeowner refuses to sign access agreement
      - 1 homeowner prohibiting AF entry
      - 1 homeowner no longer in communication with AF
    - 7 wells not currently in use (properties with more than one well)
      - Wells are not used as drinking water supply
      - Currently not needed to meet homeowner requirements



# City of Airway Heights



## CAWH

- Approximately 6,000 users

## Main CAWH Well #9 GAC system installed (Temporary solution)

- Commissioned on 24 September 2018
- Cost \$1.5M to install, \$180K per year to operate (5-month duration)
- Back-up municipal well remains shut down

## Acquired drinking water from City of Spokane

- Environmental Services Agreement (ESA) is about \$816k each year based on water usage

## TCRA amendment signed in October 2019

- 7 homes connected to CAWH drinking water system

## Municipal Treatment System

Granular Activated Carbon (GAC) filtration system selected as treatment technology

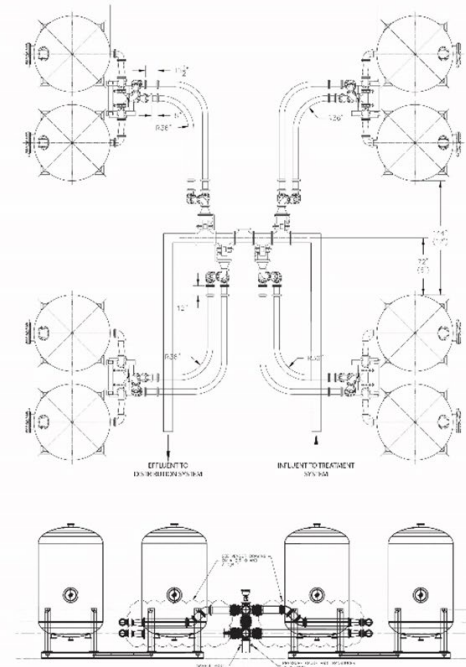
System segregated into four subsystems to allow for partial operation and redundancy

System designed for 2,100 gallons per minute with pressure telemetry added to City's control system



System commissioned in accordance with WDOH requirements in early September 2018

System Operational by mid-September 2018 - PFOS/PFOA removal to non-detect levels





# ***Residential Treatment Systems***



- 89 treatment systems have been installed at private residences from 2017 to present
- Typical capacity for these systems is 10 GPM, though there are some higher flow systems
- System designed with 3 tanks for redundancy and increased safety
- Sampling and routine maintenance is conducted quarterly
- A 24-hr hotline is available for emergency repairs and response
- System also includes:
  - Particulate filters to remove any sediment/sands from the well
  - Ultraviolet (UV) disinfection system for additional removal of bacteria and microorganisms



# Challenges with O&M of Residential Treatment Systems



- **Odor issues**

- Identified at 9 homes
- 7 homes have been mitigated
  - Performed chlorine disinfection of water distribution pipes
  - Replaced all 3 GAC canisters for each location
  - Performed a 24-hour flush
- 2 homes still trouble-shooting
  - Odor sampling to be completed for one new home
    - High concentrations of Manganese
    - Performing PH and Hardness tests to see if a water softener would be viable solution
  - Remove each GAC canister to isolate the odor

- **Low-pressure issues**

- Identified at 7 homes
- 3 homes mitigated
  - piping, frost-free hydrant, water heater, faucet, and water softener replacements
- 4 homes - Efforts being taken to address





# ***Remedial Investigation (RI)***



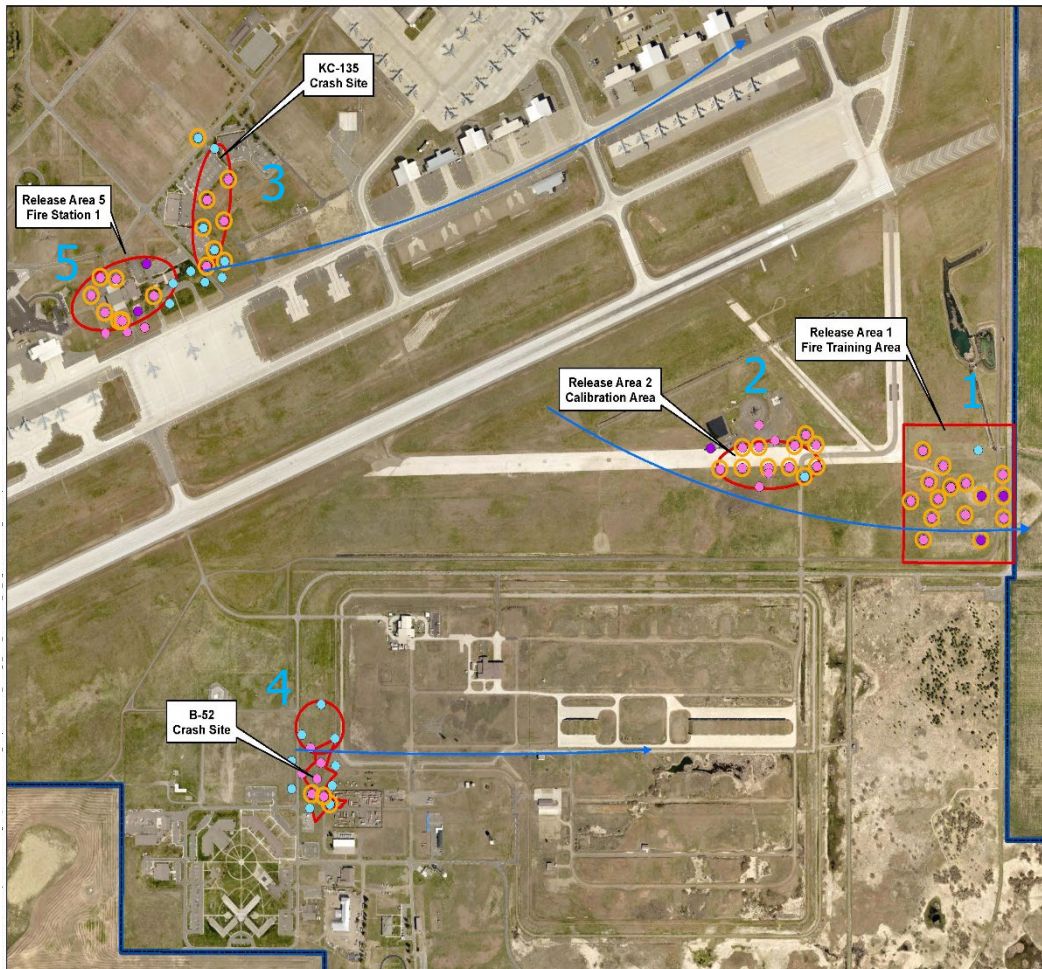
- **Goal: To determine the nature and extent of soil and groundwater contamination**
  - Starts with Work Plan/QAPP (completed)
  - Typically takes multiple phases to complete delineation
- **Phase I - delineation**
  - Soil sampling at the 5 source areas and at stormwater pond/no name ditch
  - Sample existing wells and install/sample up to 100 new monitoring wells
    - Sampled existing on base Monitoring wells (completed)
    - Install and sample 23 new monitoring wells on base (completed)
    - Install 16 off-base monitoring wells on Spokane County property starts 13 March 2023
    - Working on obtaining permission and rights to install 10 off-base wells within the City of Airway Heights
- **Phase II - Baseline Risk Assessment (BRA)**
  - Determine if there is an unacceptable risk to human health or the environment



# Phase I RI: AFFF Investigation Areas

## Aqueous Film - Forming Foam (AFFF) Release Areas:

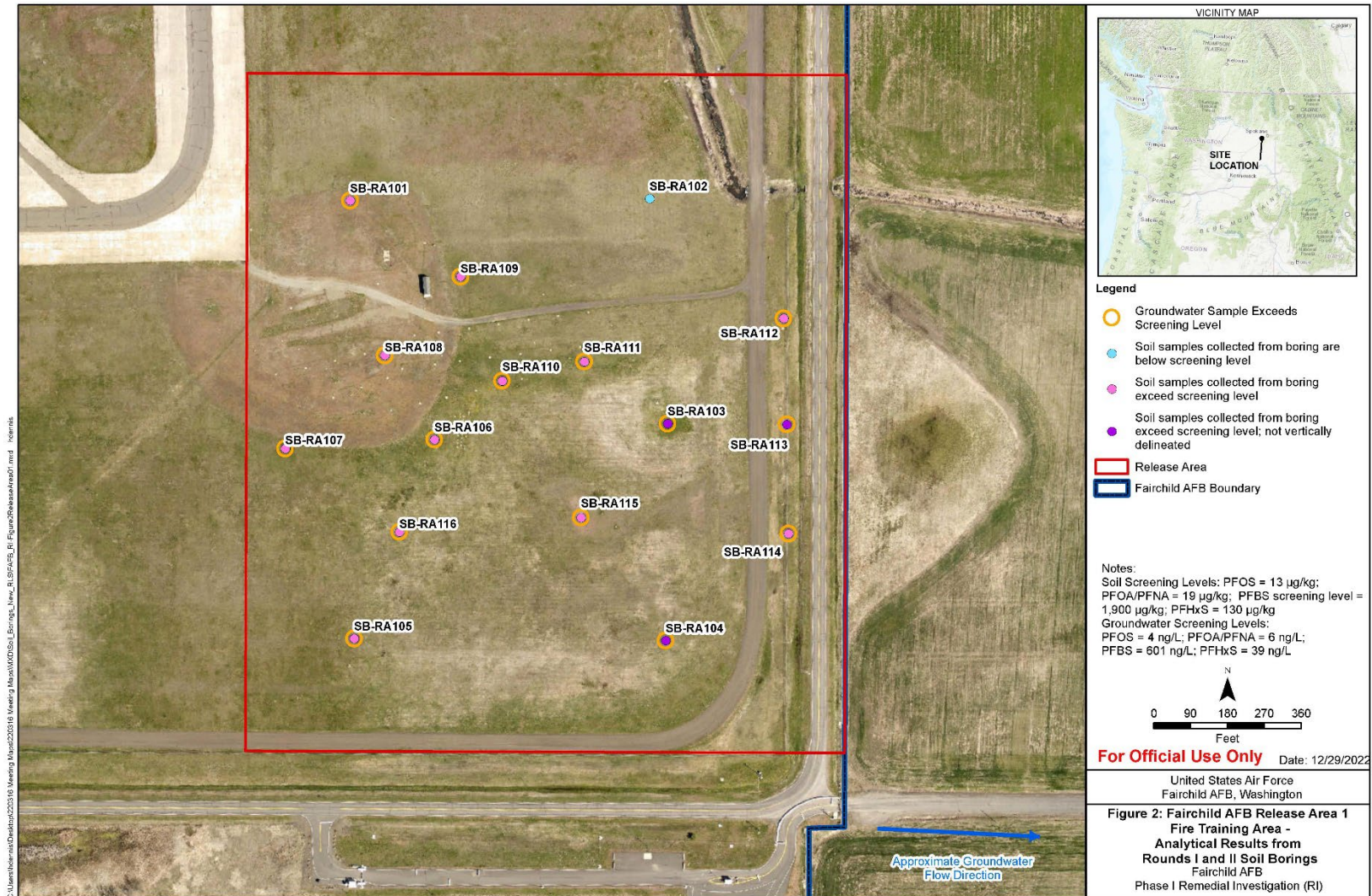
- **AFFF Release Area 1:**
  - Fire Training 1 / FT01 / FT004P-sub
- **AFFF Release Area 2:**
  - Calibration Area / RS003P
- **AFFF Release Area 3:**
  - Aircraft Crash Location (PS-4/PS-9) / SS008P-sub
- **AFFF Release Area 4:**
  - B-52 Crash (1994) / RS002P
- **AFFF Release Area 5:**
  - Fire Station 1 (Building 1) / RS001P







# Phase I RI: AFFF Release Area 1 Soil Borings

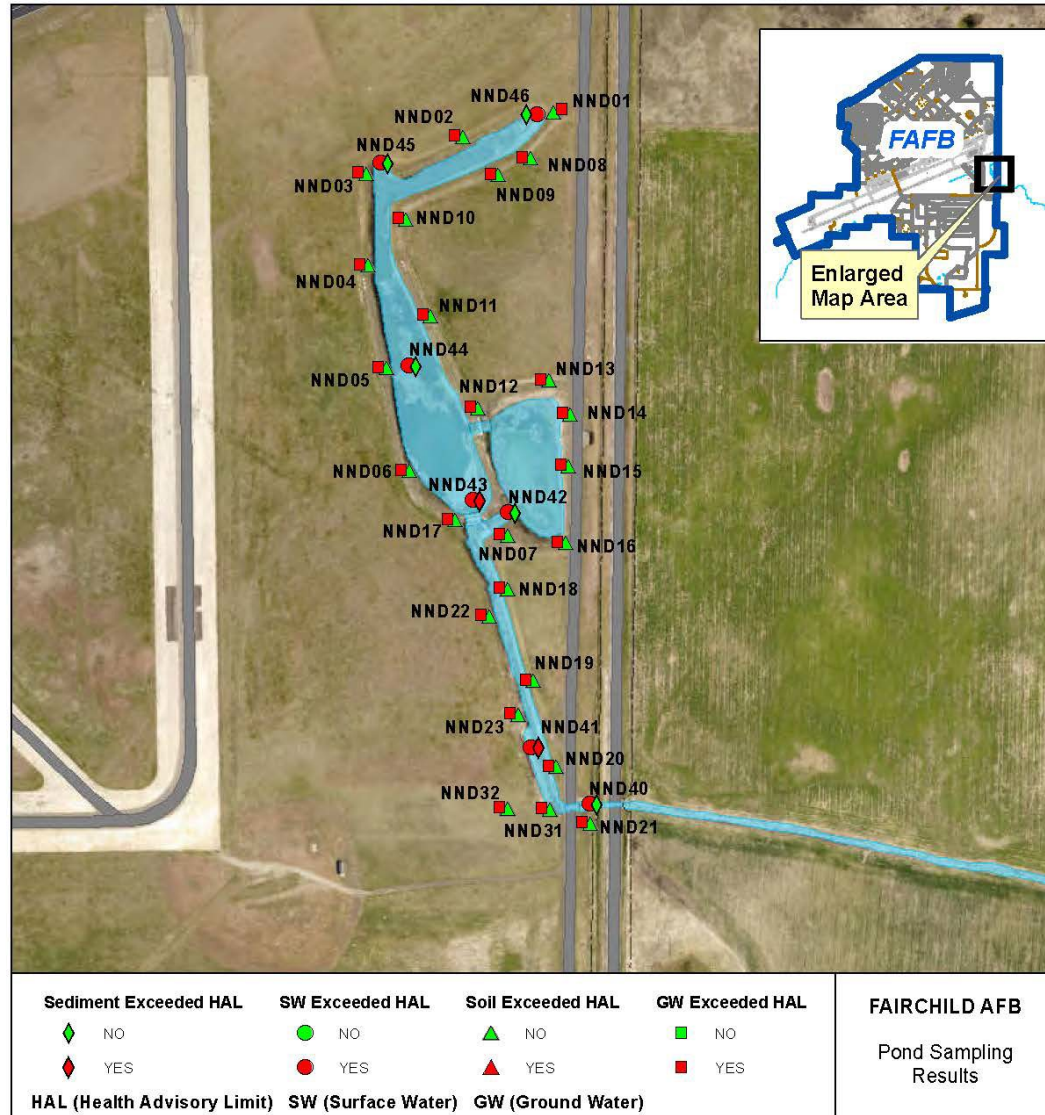


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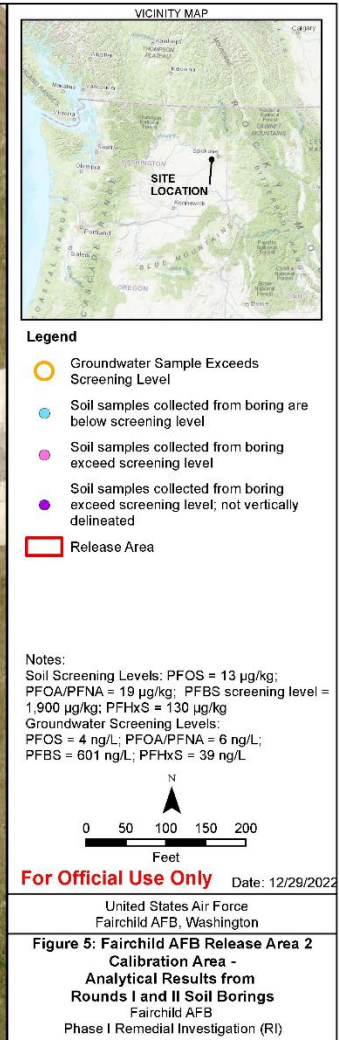




# Phase I RI: No-Name Ditch Sampling



# Phase I RI: AFFF Release Area 2 Soil Borings

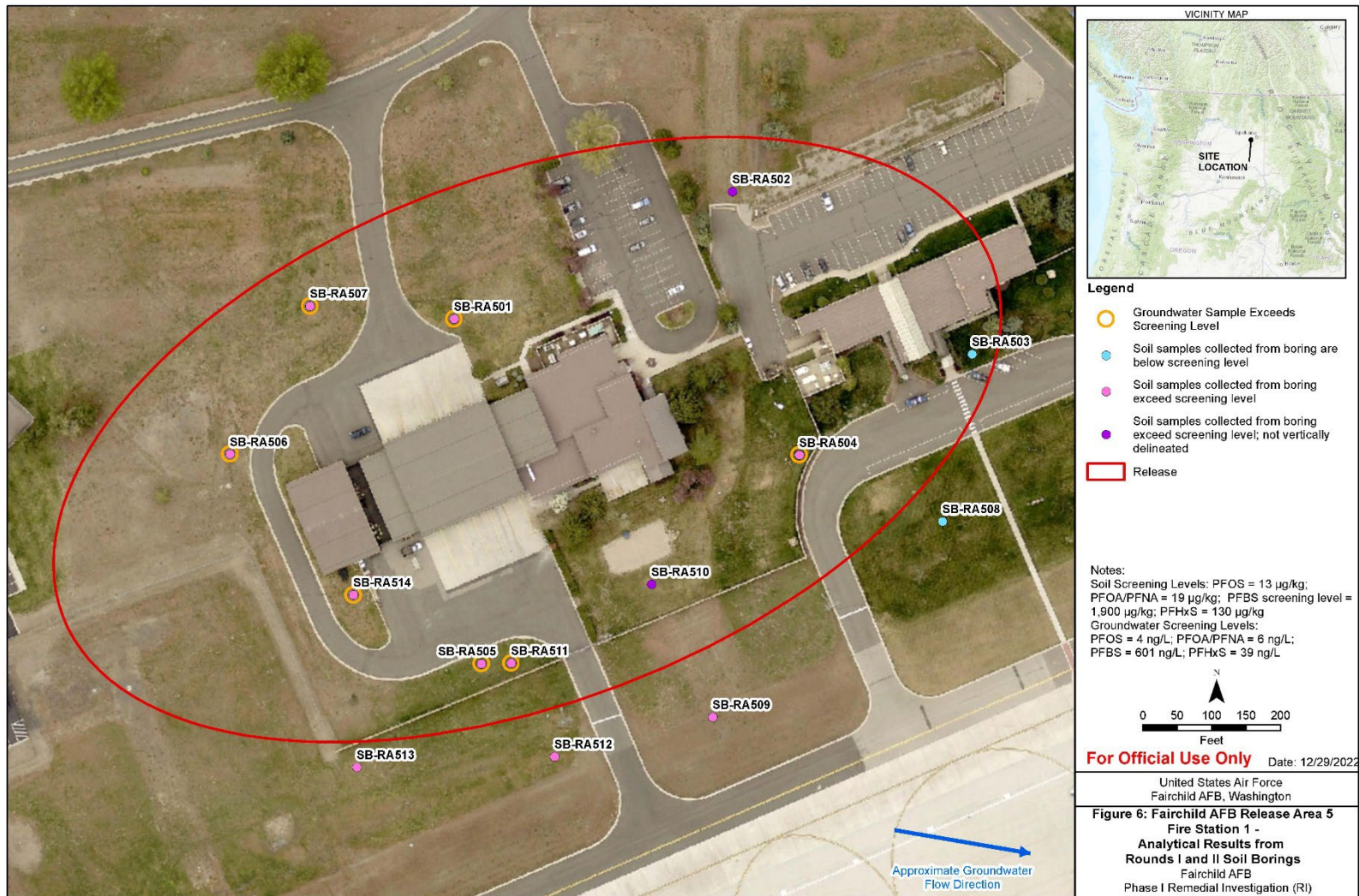






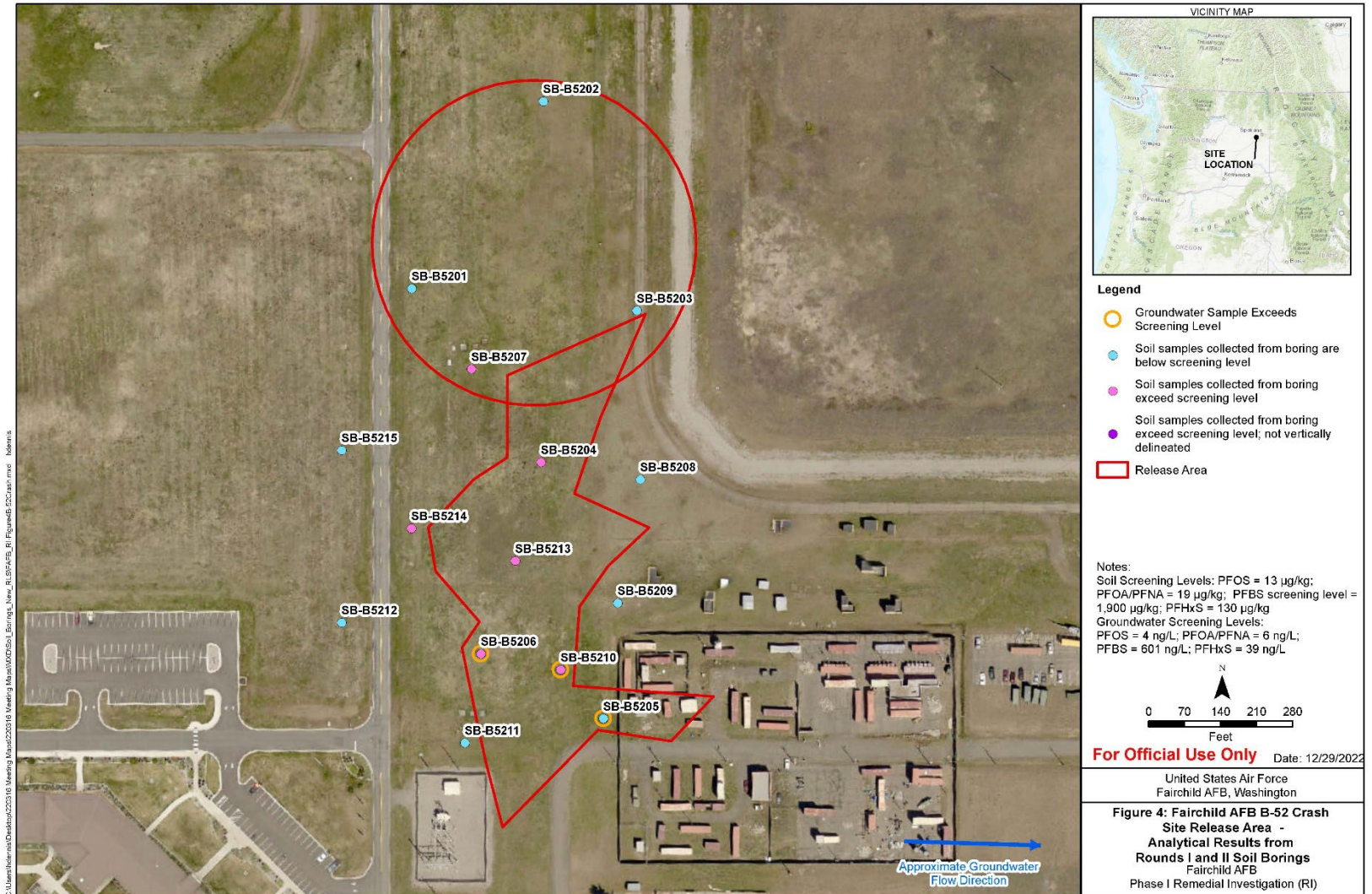


# Phase I RI: AFFF Release Area 5 Soil Borings





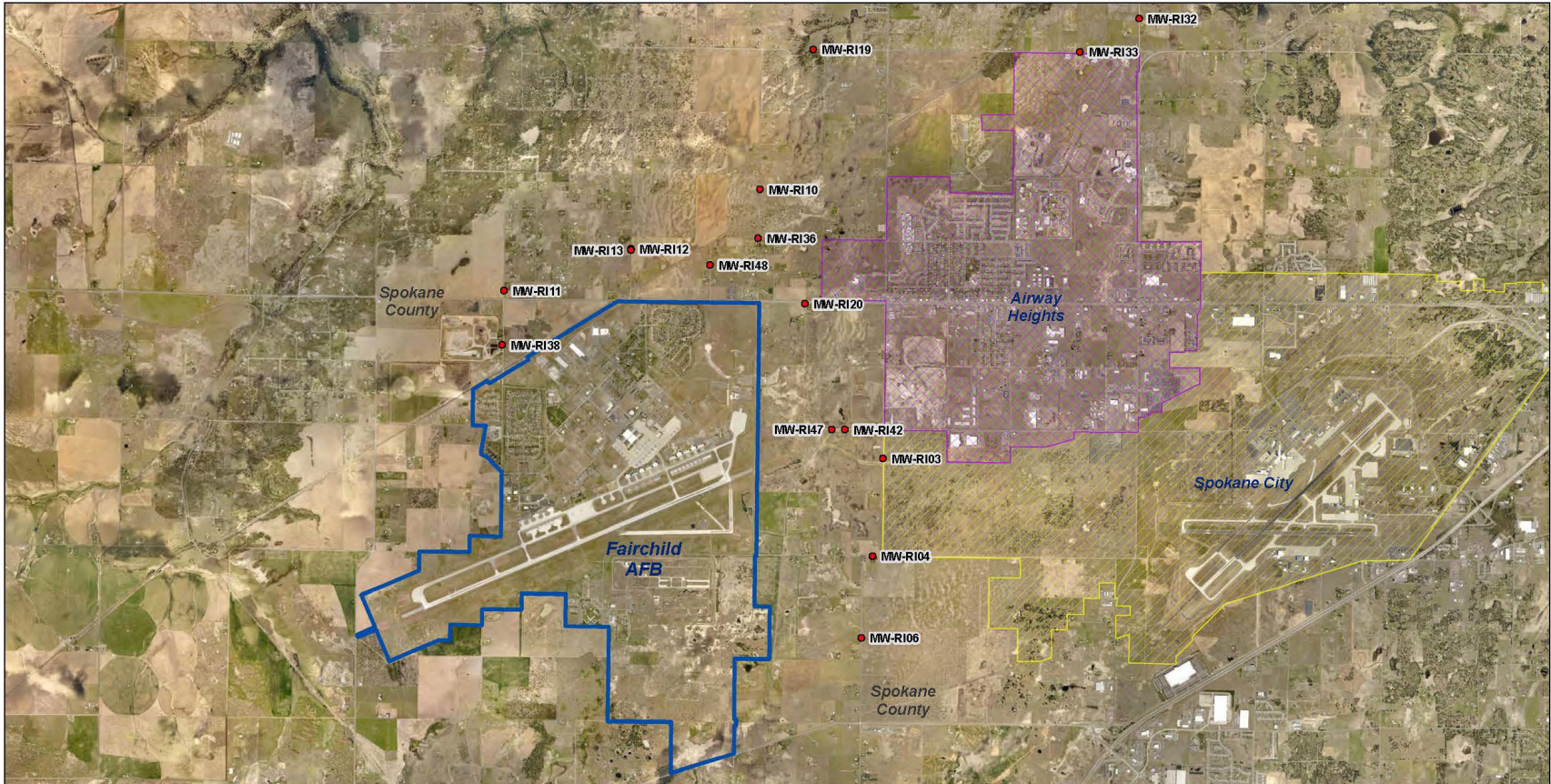
# Phase I RI: AFFF Release Area 4 Soil Borings







# Phase I RI: Monitoring Wells Spokane County

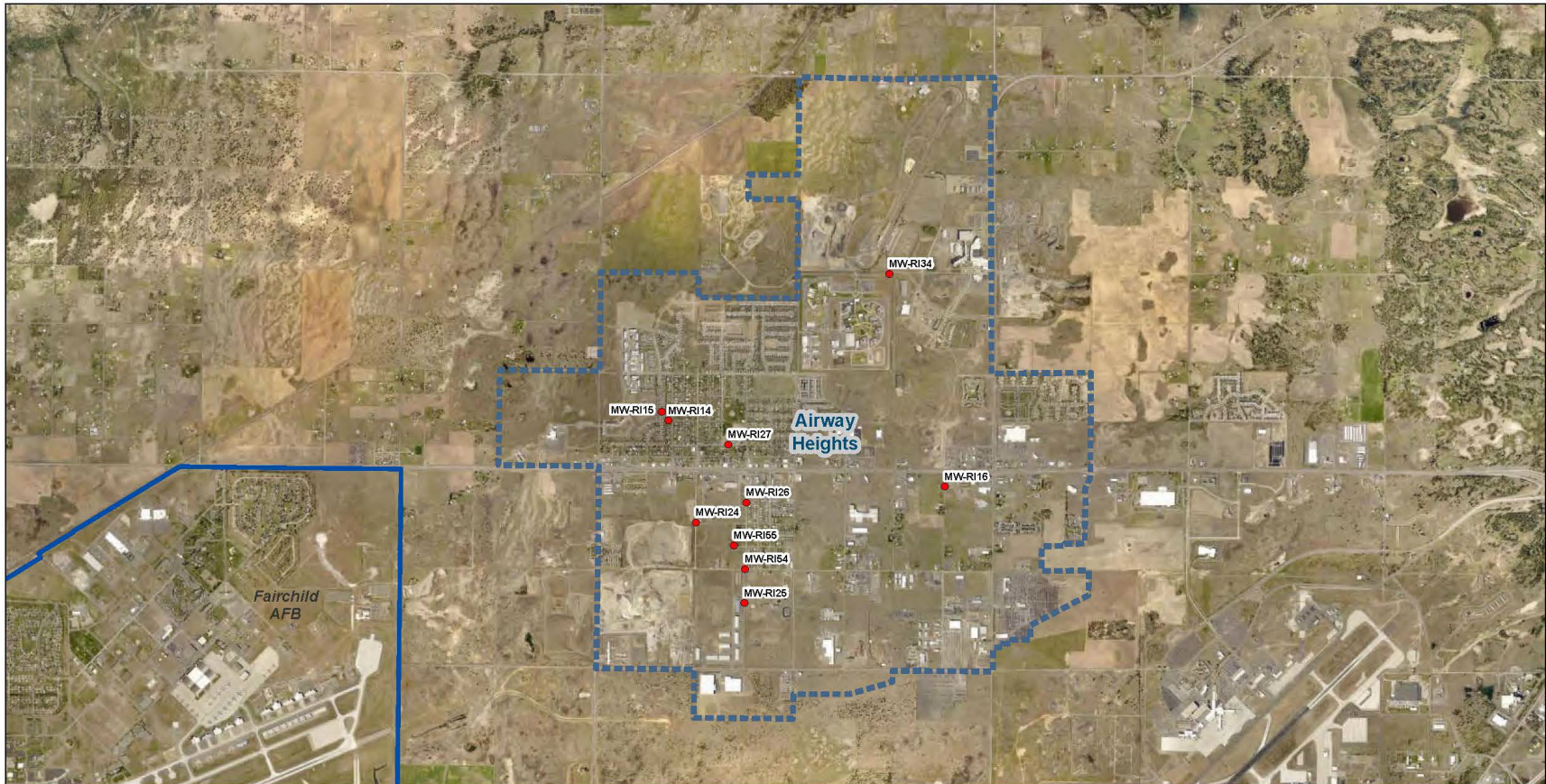



	<p><b>Prepared by:</b> Center for Environmental Management of Military Lands (CEMMLY) Colorado State University Date: 8/25/2022 Contact: Kate Stratford kate.stratford@colostate.edu 801-775-6838 Cooperative Agreement; Number W9126G-20-2-0004</p>	<p>Coordinate System: WGS 1984 UTM Zone 11N Projection: Transverse Mercator Datum: WGS 1984 Scale: 1:47,000</p> <p>N</p> <p>0 1 2 3 Miles</p> <p>0 1 2 3 Kilometers</p> <p>Map created for presentation purposes only. Although efforts have been made to verify data, accuracy cannot be guaranteed</p>		<p><b>Fairchild AFB</b> Monitoring Wells Spokane County</p>
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# Phase I RI: Monitoring Wells City of Airway Heights



	<p><b>Prepared by:</b> Center for Environmental Management of Military Lands (CEMML) Colorado State University Date: 3/1/2023 Contact: Kate Stratford kate.stratford@colostate.edu 801-775-6838 Cooperative Agreement: Number W6126G-20-2-0004</p>	<p><b>Coordinate System:</b> WGS 1984 UTM Zone 11N <b>Projection:</b> Transverse Mercator <b>Datum:</b> WGS 1984 <b>Scale:</b> 1:30,000</p> <p><b>Scale:</b> 0 0.5 1 1.5 2 Miles 0 0.5 1 1.5 2 Kilometers</p> <p>Map created for presentation purposes only. Although efforts have been made to verify data, accuracy cannot be guaranteed</p>	<p><b>Key</b></p> <ul style="list-style-type: none"><li>Monitoring Well</li><li>CAWH Boundary</li><li>FAFB Boundary</li></ul>		<p><b>Fairchild AFB</b> Monitoring Wells Airway Heights</p>
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# ***RI Schedules***

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- **RI field work began on 7 June 2021**
  - 108 soil borings completed in the 5 AFFF areas, including No-Name Ditch and the Airfield ponds as of February 2023.
  - Additionally, 10 surface water samples were also collected from No-Name Ditch and the Airfield ponds.
- **Monitoring wells installation:**
  - 23 installed on base, 16 installed off-base on Spokane County property and 10 to be installed on the City of Airway Heights property (upcoming)
  - Begun discussions with six (6) small business owners to install one (1) monitoring well on their property
  - Slug testing of each new monitoring well once installed
- **Phase I RI Report**
  - Regulatory review and comments due by 9 May 2024
  - Final Phase I RI Report due by 14 June 2024
- **Plan for additional RI Phases: October 2023 – April 2024**



# ***Early Action Projects***



- **Engineering Evaluation/Cost Analysis (EE/CA) for Fairchild AFB Impacts to City of Airway Heights Water Supply**
  - Evaluated interim cleanup alternatives for mitigating impacts from PFOS/PFOA on the City of Airway Heights
    - Alternative 1 (status quo)
    - Alternative 2 (Activated Carbon Wellhead Treatment at Wells 1/4 and 9)
    - Alternative 3 (Ion Exchange Wellhead Treatment)
    - Alternative 4 (Reverse Osmosis Wellhead Treatment)
    - Alternative 5 (New Water Supply Well)
    - Alternative 6 (Continued Use of Spokane Water Supply)
  - Final report provided to regulators 24 June 2021
  - Open House held on 23 September 2021
  - Action Memo (stating the preferred alternative) drafted – selecting Alternative 2
- Final Action Memo on hold – City of Airway Heights would like to implement Alternative 5; however, resolution on ability to obtain water rights, rights-of-way, etc. still being resolved



# ***Early Action Projects (Cont.)***



- **EE/CA for PFAS at FT004**

- The Air Force (AF) believes that it is wise to take an early action to stop PFAS from put a removal system(s) at Base boundary ASAP as well as “No Name Ditch”
- A Data Gap Study and Treatability Study are needed to support selection of a removal action
  - Data collection will include: Hydrogeologic data or Bench-scale treatability studies
  - EE/CA actions include a Public Comment Period and Public Meeting
- After the removal action selection, the NTCRA process includes:
  - Design, construction, operation and maintenance (O&M), and monitoring
- Schedule
  - Final Quality Assurance Project Plan (QAPP) due by 19 May 2023
  - Final Waste Management Plan due by 29 May 2023
  - Final Data Gap Study and Treatability Study (TS) due by 17 February 2024





# ***Acronyms and Abbreviations***

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AFB	Air Force Base
AF	Air Force
AFFF	Aqueous Film-Forming Foam
BRA	Baseline Risk Assessment
CAWH	City of Airway Heights
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CPA	Critical Process Analysis
EE/CA	Engineering Evaluation/Cost Analysis
ESA	Environmental Services Agreement
GAC	Granular Activated Carbon
GPM	gallons per minute
LHA	Lifetime Health Advisory
ND	non-detect
NTCRA	Non-Time Critical Removal Action
O&M	operation and maintenance
PBR	Performance-Based Remediation
PDI	Pre-Design Investigation
PFAS	per- and polyfluoroalkyl substances
PFOS/PFOA	perfluorooctane sulfonate/perfluorooctanoic acid
POP	Period of Performance
QAPP	Quality Assurance Project Plan
RAB	Restoration Advisory Board
RI	Remedial Investigation
SVE	soil vapor extraction
TCRA	Time Critical Removal Action
TS	treatability study
UV	ultraviolet
VCP	Voluntary Cleanup Program





# Questions?

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## ***2022/2023 Performance- Based Remediation Overview***

**Bay West and AECOM**

**30 March 2023**

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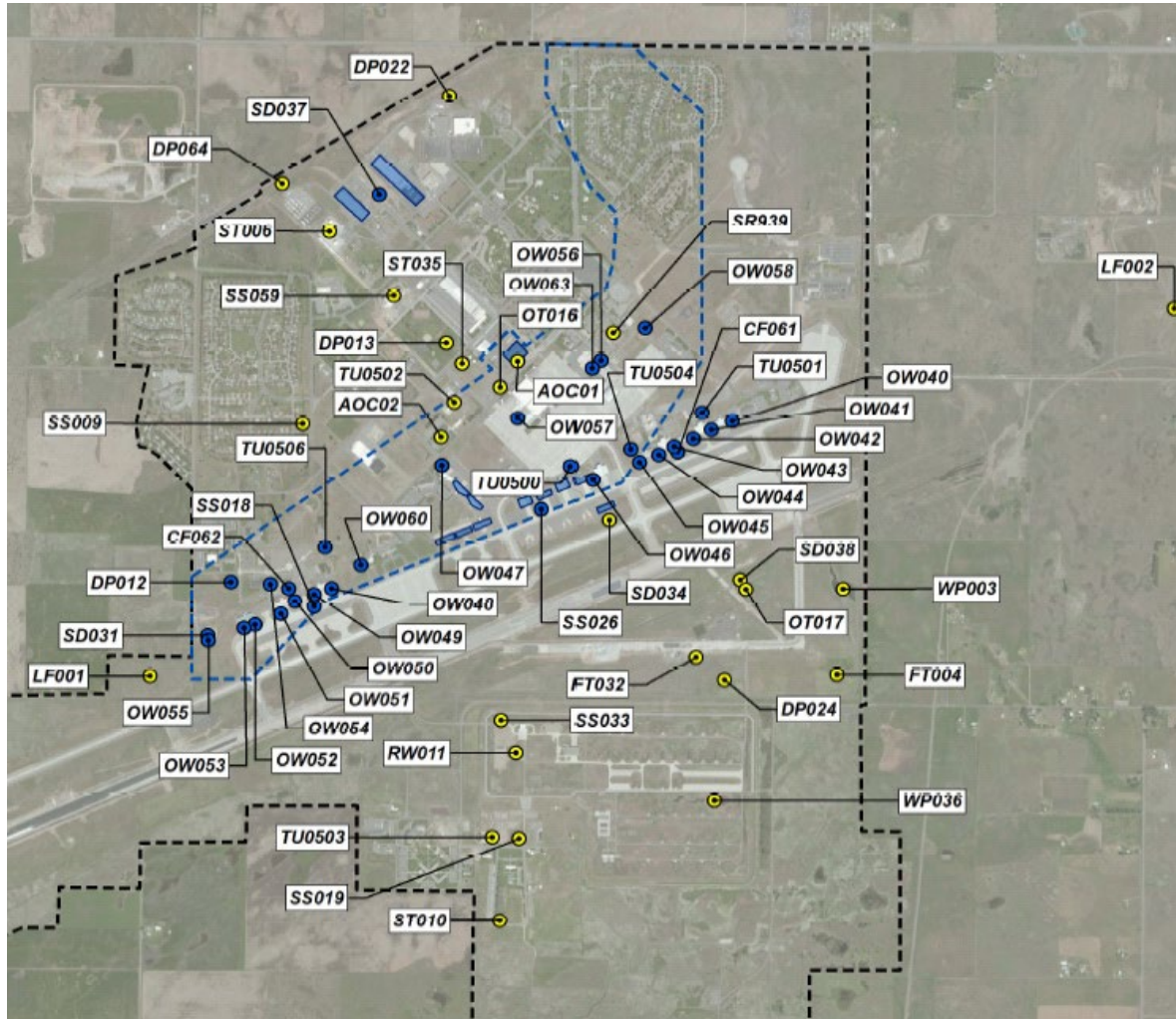


# Overview

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- **Site Overview**
- **2022/2023 Major Sites**
  - SS039, SD037, LF002, WP003, Voluntary Cleanup Program (VCP) Sites
- **Public Comment Opportunities in 2023**

# Contract Sites Overview



59 historical environmental sites. One historical Military Munitions Response Site at Fairchild Air Force Base. Environmental actions include:

- Work Plans
- Remedial Action-Operations (RA-O)
- Treatment Operations
- Remedial Design
- Investigation Reports
- Monitoring/Remedial Performance Reports
- Treatment Reports



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## ***Orphan TCE Plumes (SS039) 2022 Overview and Planned 2023 Actions***

**Ms. Kristine Weber  
AECOM Site Lead  
30 March 2023**

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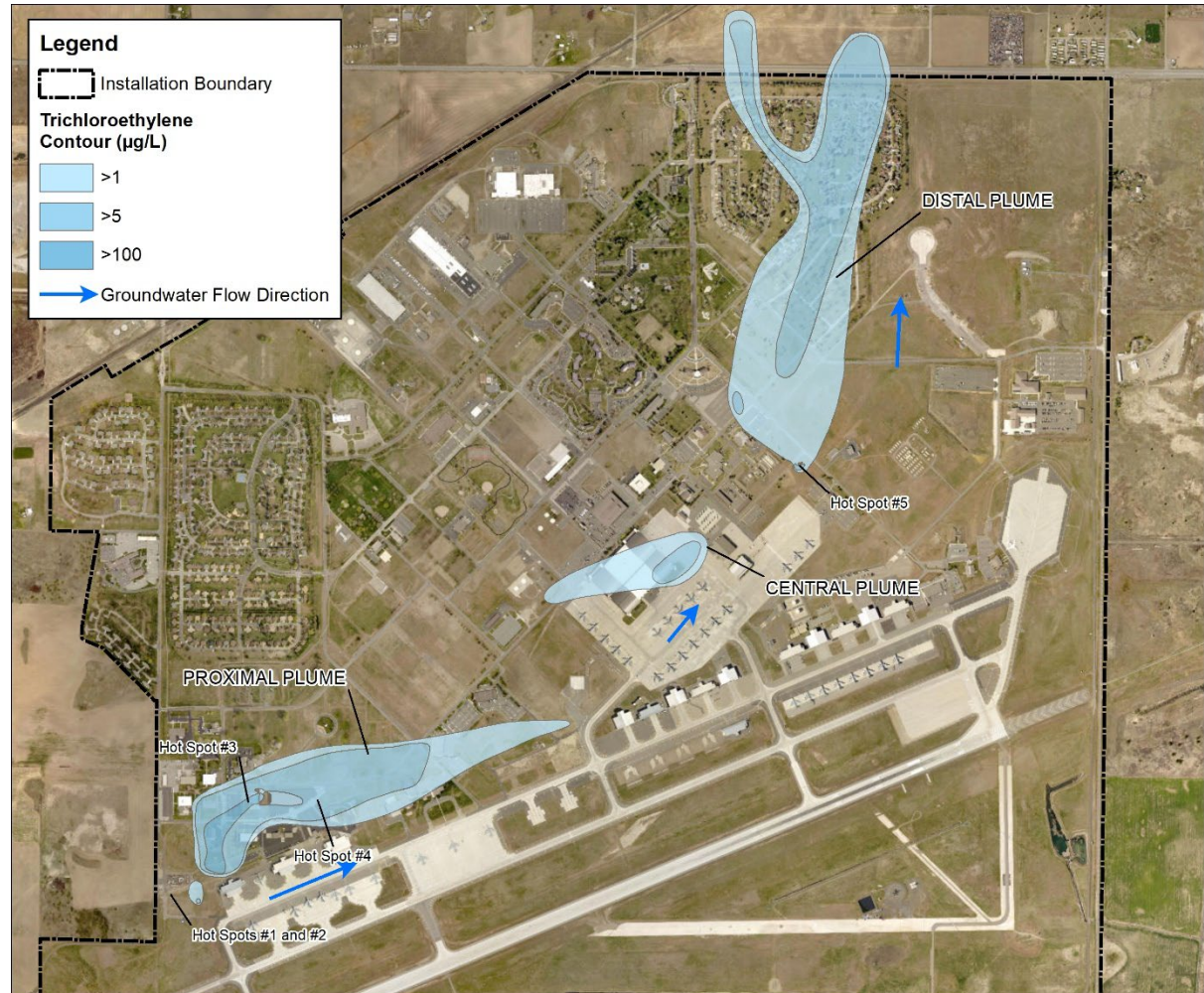
# SS039 Overview

## 2022 Summary

- Semi-annual Performance Monitoring
- Annual GW Monitoring and Reporting

## 2023 Planned

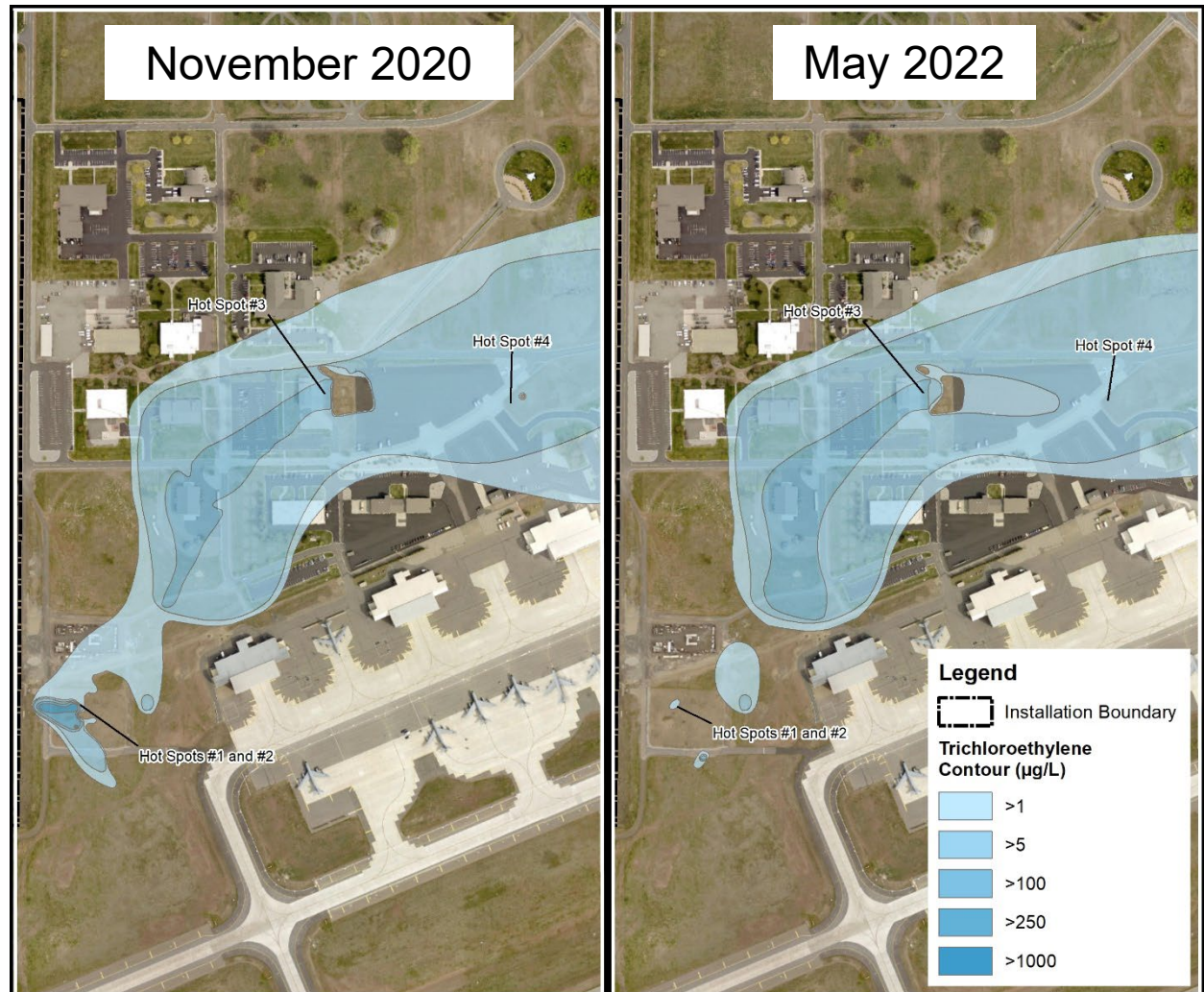
- Semi-annual Performance Monitoring
- Annual GW Monitoring and Reporting
- Polishing Injection Activities



# SS039 Overview

## ■ Before and After 2021 Sodium Permanganate Injection Event

- Injected approx. 85,215 gallons (1% solution) into five IWs at Hotspot #1 and #2
- Injected approx. 17,006 gallons (1% solution) into two IWs at Hotspot #4





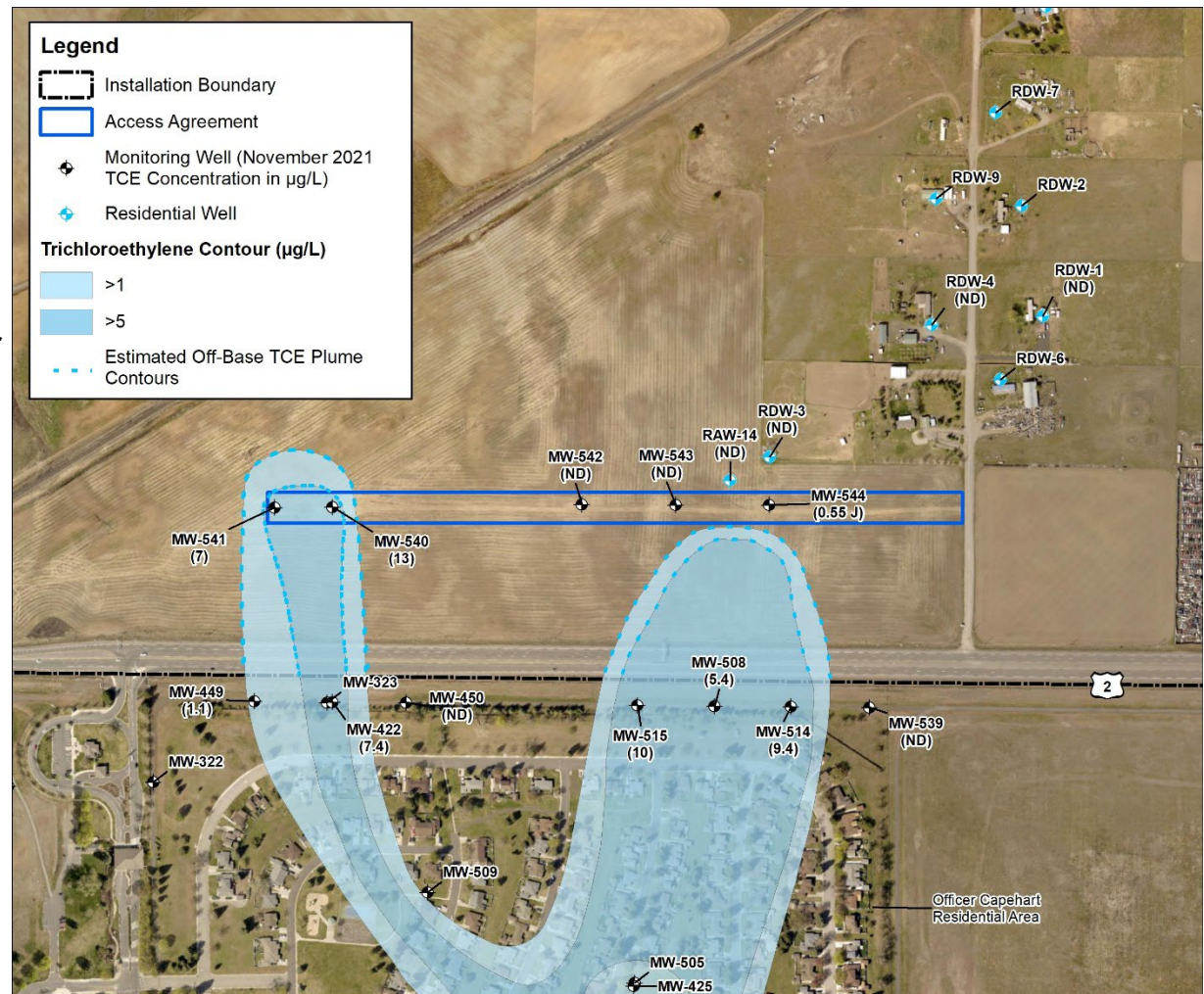
# SS039 Off-Base Overview

## 2022 Summary

- Completed Residential Well Sampling in May 2022
- Completed Annual GW Monitoring in November 2022

## 2023 Planned

- Complete Residential Well Sampling in May 2023
- Complete Annual GW Monitoring







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## ***SD037 Buildings 2447/2451 2021/2022 Summary and Planned 2023 Actions***

**Ms. Kristine Weber  
AECOM Site Lead  
30 March 2023**

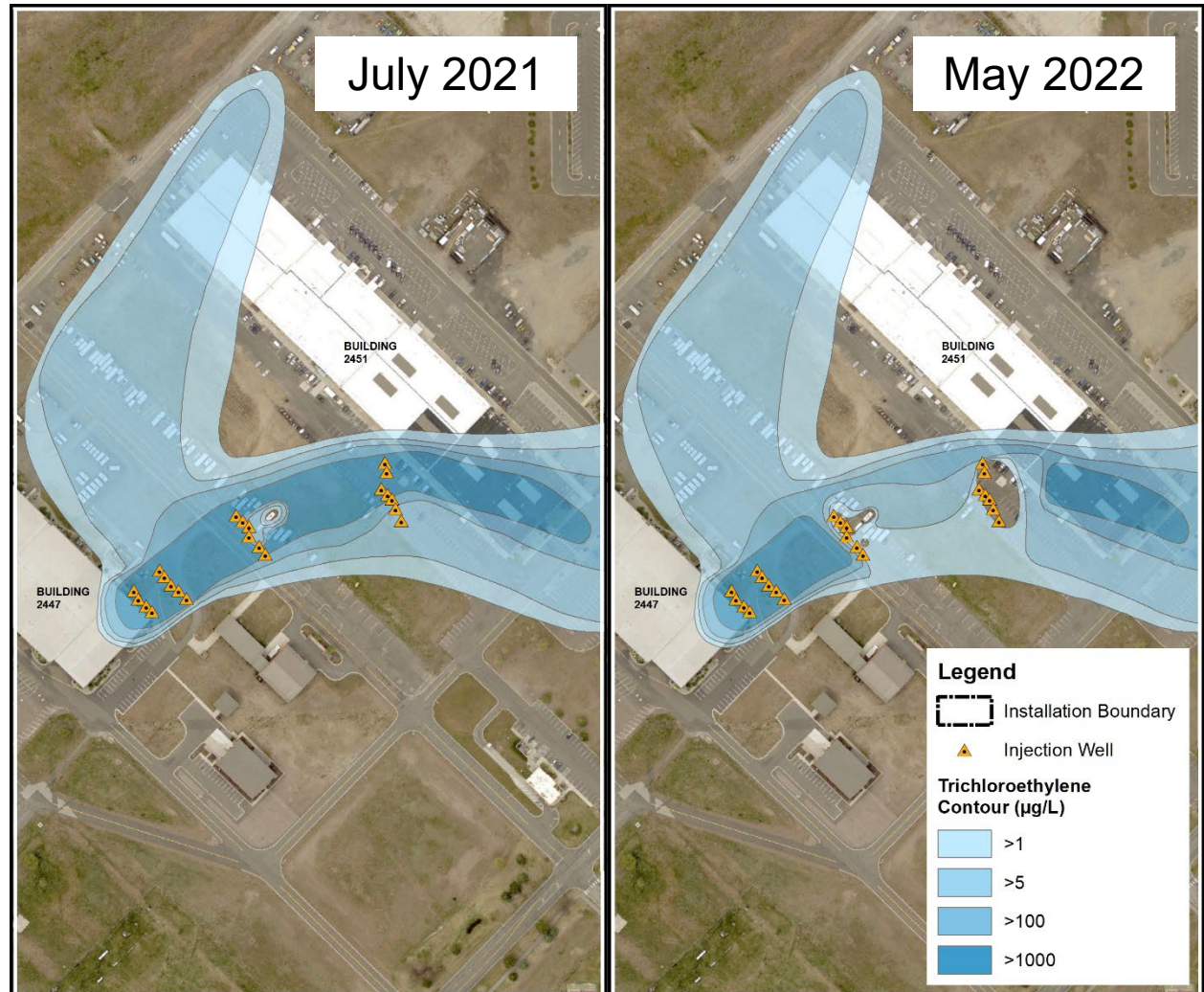
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# SS039 Overview

## ■ Before and After September 2021 Sodium Permanganate Injection Event

- Installed 22 injection wells
- Installed 6 additional monitoring wells
- Completed injection of 96,289 gallons of sodium permanganate (1% solution)





# SD037 Overview

## In Situ Chemical Oxidation Pilot Study and Vapor Intrusion Evaluation

### 2021 Summary

- Completed injection of 96,289 gallons of sodium permanganate (1% solution)

### 2022 Summary

- Quarterly Performance Monitoring
- Feasibility Study

### 2023 Planned

- Semi-annual Performance Monitoring
- Proposed Plan





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## ***Craig Road Landfill (LF002) 2022/2023 Remedial Action- Operations Overview***

**Mr. John Peper  
Bay West Project Manager  
30 March 2023**

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# ***LF002 Background***

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- LF002 is a former landfill on Air Force property located about one mile east of the Base.
- Trichloroethylene (TCE) was discovered in groundwater in the late 1980s and 1990s.
- Remedial action was implemented in 1995 and has consisted of:
  - Groundwater containment with extraction wells and stripper tower treatment
  - Construction of an engineered cap
  - Land use controls
  - Soil Vapor Extraction systems were added to the remedy in 2017.
- Remedial Action Operations (RA-O) consisting of systems operation and groundwater monitoring have been performed since 1995.



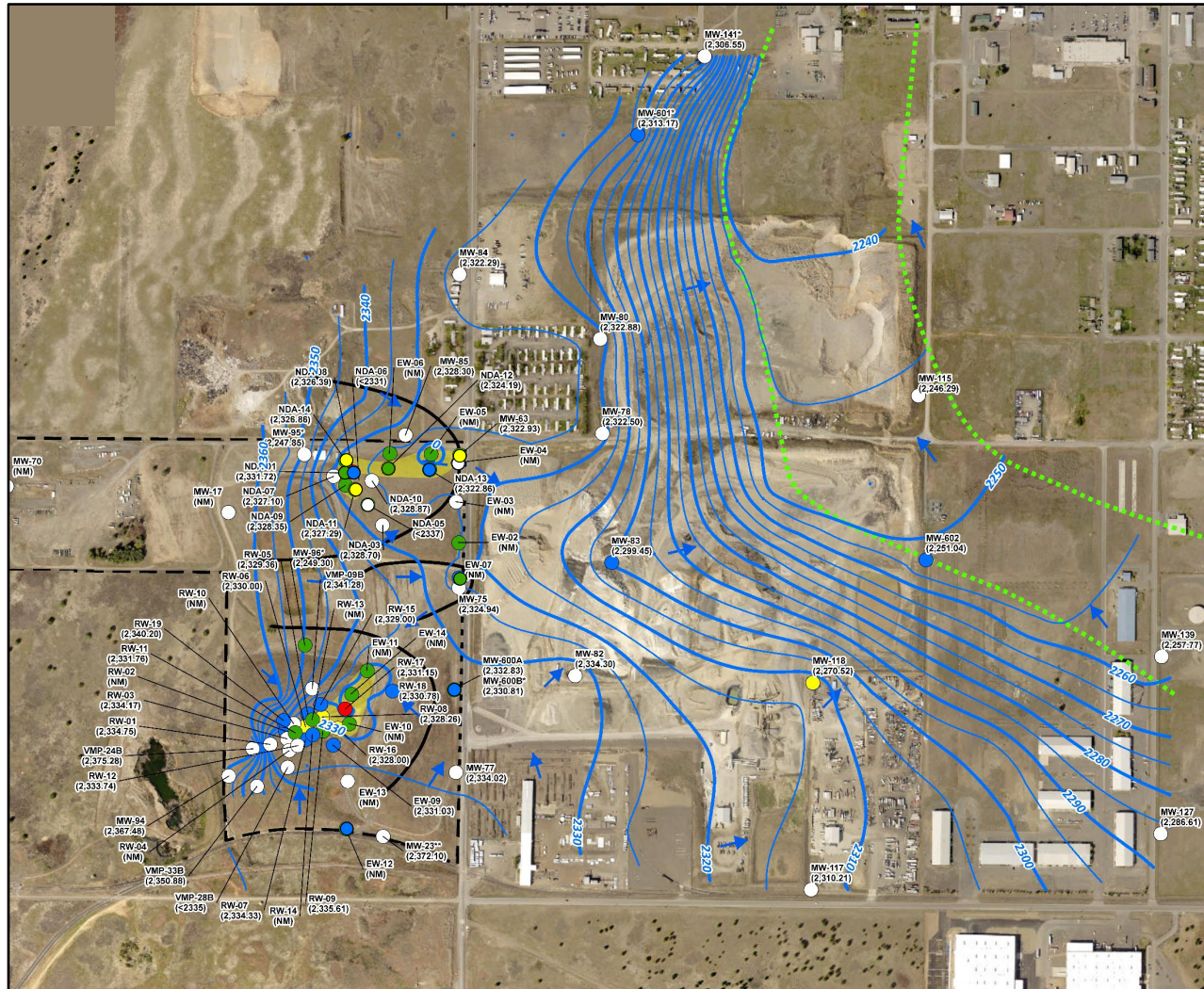
# LF002 2022/2023 Overview

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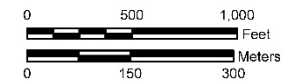
## 2022/2023 Actions

- **GETS Trial Shutdown: Proposed in 2021 RA-O Report. Formal request to EPA 16 December 2022. EPA concurred 22 December 2022.**
  - Justifications:
    - Over 28 yrs. of operation, the GETS has depleted the source mass by 99.7%. Influent concentrations are now near or below the MCLs; therefore, the GETS has become inefficient at treating the remaining mass.
    - The TCE concentrations are low enough that natural attenuation can contain and treat the remaining contamination. There is no longer a benefit to operating the GETS.
    - Land use controls and monitoring programs are in place to protect receptors.
    - Groundwater monitoring has been increased during the trial shutdown and re-activation triggers are in place should plume off-property migration be detected.
- **RA-O Reporting: The 2021 Annual RA-O Report was finalized in August 2022. The 2022 Annual RA-O Report is in preparation and will be submitted to the USAF in March 2023.**
- **RA-O Monitoring: Quarterly RA-O monitoring will be performed in 2023.**





## LF002 September 2022 Monitoring Results



- Monitoring Wells and Extraction Wells (Elevation values are in FT AMSL)
- Approximate Paleochannel Extent (Basalt A Not Present)
- 10-ft Groundwater Elevation Contour (FT AMSL)
- Groundwater Capture Zone
- ▬ Craig Road Landfill (LF002) Site Boundary
- TCE Groundwater Plume above 5 ug/L

FT AMSL = feet above mean sea level

TCE Results	
Sept	2022
○	Not Sampled
●	<5 µg/L
●	5-20 µg/L
●	20-100 µg/L
●	>100 µg/L



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## ***Industrial Wastewater Lagoon System (WP003) 2022/2023 RA-O Overview***

**Mr. John Peper**  
**Bay West Project Manager**  
**30 March 2023**

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# ***WP003 Background***

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- WP003 includes former wastewater treatment lagoons located on the east margin of the base.
- TCE was discovered in groundwater in the late 1980s and 1990s at concentrations above regulatory limits. Subsequent monitoring also identified concentrations of vinyl chloride (VC) above the regulatory limit and arsenic above background.
- Remedial action was implemented in 1996 and has consisted of:
  - Land use controls
  - 1996-2004 Groundwater containment with extraction wells and stripper tower treatment
  - 2000-2001 Source area excavation and organic substrate supplements
- RA-O currently consists of quarterly groundwater monitoring.



# WP003 2022/2023 Overview

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## 2022/2023 Actions

- **Pilot Test:** A pilot test was implemented in June 2020 to augment existing bioremediation of TCE and VC at WP003. Quarterly performance monitoring for the pilot test continued in 2022.
- **Pilot Test Results:** The performance data have indicated the following:
  - Preliminary results demonstrated the injections supported biodegradation of chlorinated ethenes for approximately one year.
  - There was a 50% reduction of chlorinated ethenes and a 61% to 71% reduction of VC concentrations.
  - In 2023 the VC plume shrunk to only one on-base well for quarters 1, 2, and 4 and only had a slight off-base detection in the 3<sup>rd</sup> quarter.
  - Bio-augmentation is effective at accelerating VC remediation.
- **RA-O Monitoring Results:**
  - The VC, TCE, and arsenic plume extents have remained stable or decreasing and the concentrations have stable or decreasing trends. The plumes are naturally attenuated. Land use controls and monitoring programs are in place to be protective of receptors.



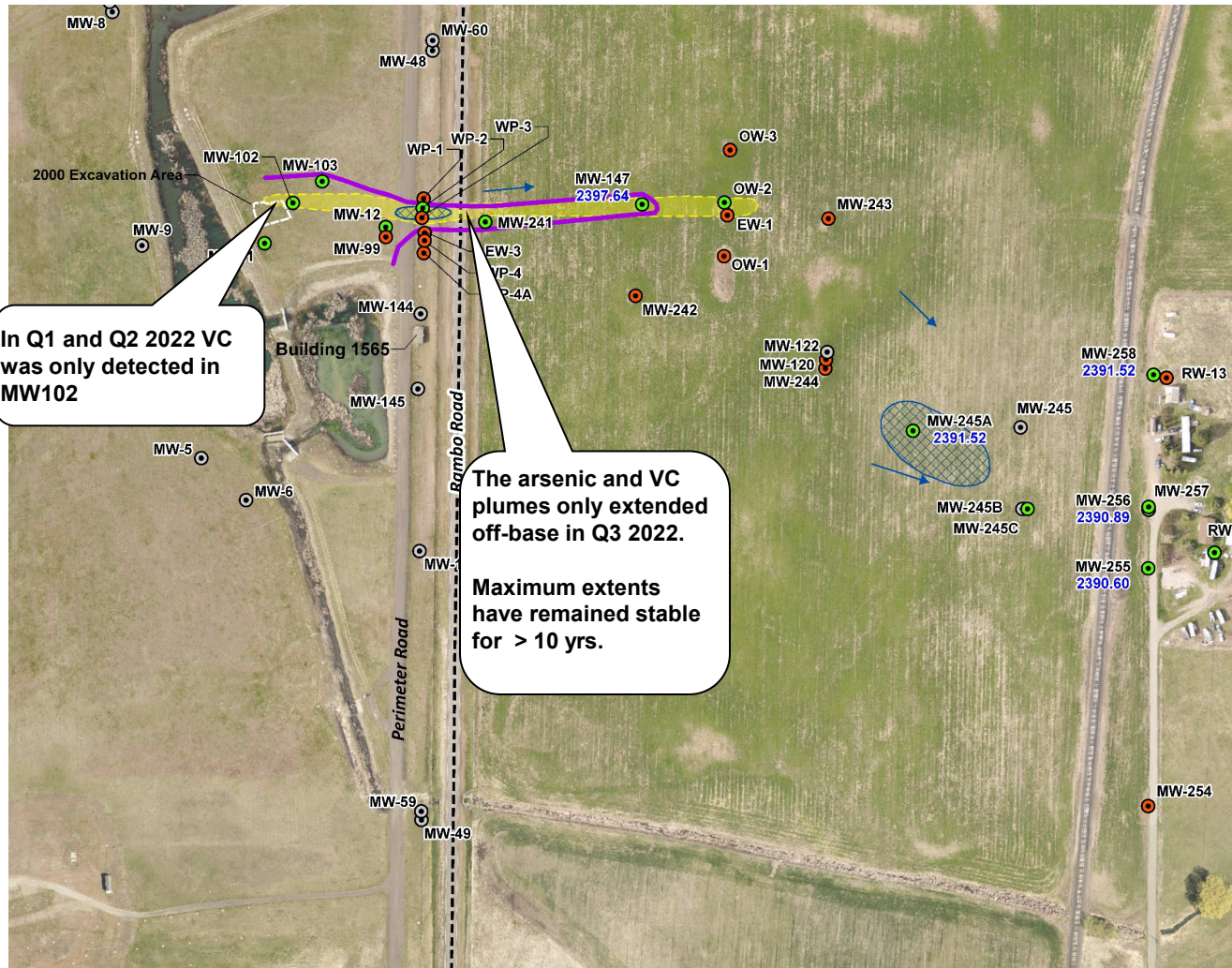
# WP003 2022/2023 Overview

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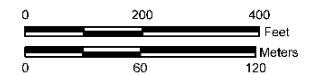


## 2022/2023 Actions (Continued)

- **RA-O Reporting:** The 2021 Annual RA-O Report was finalized in August 2022. The 2022 Annual RA-O Report is in preparation and will be finalized later in 2023.
- **RA-O Monitoring:** Semiannual and annual monitoring will be performed at WP003 to continue to document concentration trends and plume attenuation.
- **Proposed Plan for ROD Amendment:** A Proposed Plan for ROD Amendment is currently in review and is anticipated to be finalized later in 2023. The document will be available for public review and comment. The purpose of the Proposed Plan and ROD Amendment is as follows:
  - Add VC and arsenic as chemicals of concern (they not in the original ROD).
  - Add bioaugmentation as a remedy component.
  - Update land used controls.
  - Update the remedial action objectives.
- **ROD Amendment:** The ROD Amendment is anticipated to be finalized in late 2023 or early 2024.



## WP003 2022 Monitoring Results



- Wells sampled
- Wells not sampled
- Decommissioned Wells
- Groundwater Flow Direction
- Installation Boundary
- 2022 Maximum Arsenic Extent above a background of 10 µg/L
- 2022 Maximum TCE plume above the PAL of 5 µg/L
- 2022 Maximum VC plume above the PAL of 0.2 µg/L

### NOTE:

ug/L – micrograms per liter  
 PAL – project action level  
 TCE – trichloroethylene  
 VC – Vinyl Chloride  
 Arsenic concentrations are in dissolved forms





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## ***Voluntary Cleanup Program (VCP) Sites***

**Mr. John Peper**  
**Bay West Project Manager**  
**30 March 2023**

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# VCP Sites

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**Eight former oil/water separator sites along the flight line have achieved USAF and Washington Department of Ecology (WDOE) approval of Site Closure/No Further Action (NFA) through the WDOE VCP**

- OW044, OW047, OW053, OW054, OW055, OW056, OW057, and OW063

## **Other Petroleum Sites in the NFA Approval Process**

- NFA Tech Memo Approved: ST010, SS033
- NFA Approved: ST006 (groundwater), OT017, FT032, ST035, AOC02, and SS059
- Remedial Investigation/NFA Report Approved: SS059, TU503

## **Petroleum Sites in the Remedial Investigation Stage**

- SS009

## **Petroleum Sites in the Interim Measures/Remediation Planning Stage**

- TU500, TU502, TU506



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***West Flightline Plume  
(TU506)  
2022 Summary and 2023 Planned  
Actions***

**Ms. Kristine Weber  
AECOM Site Lead  
30 March 2023**

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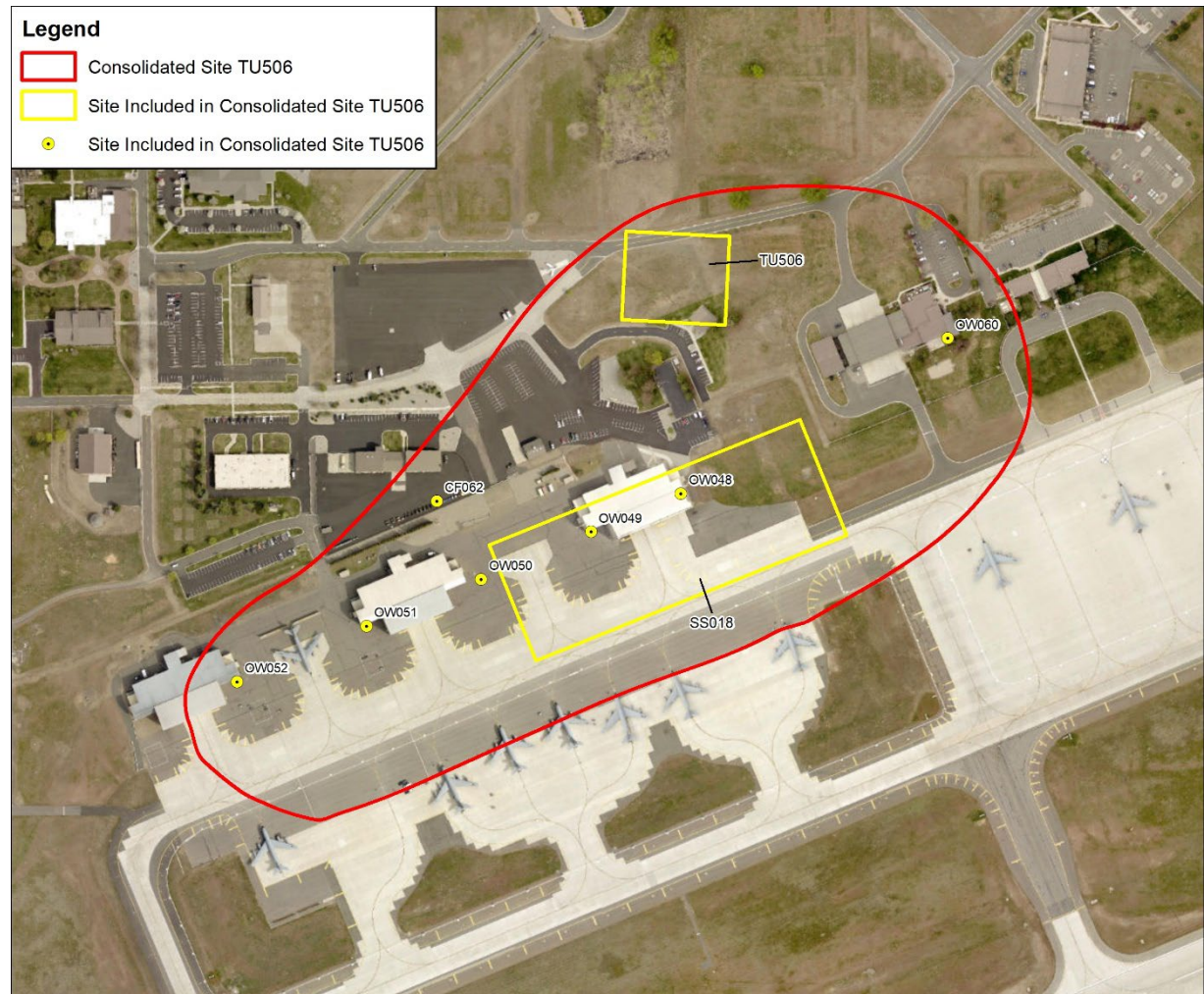
# TU506 Overview

## 2022 Summary

- Hot Spot Excavation at OW050
- Excavation Completion Report
- Quarterly Monitoring

## 2023 Planned

- Risk Assessment Addendum
- Feasibility Study





# TU506 Overview

- The excavation at TU506 included the removal of 69.5 tons of Total Petroleum Hydrocarbon – Gasoline Range Organics-contaminated soil.





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## ***East Flightline Plume (TU500) 2022 Summary and 2023 Planned Actions***

**Ms. Kristine Weber  
AECOM Site Lead  
30 March 2023**

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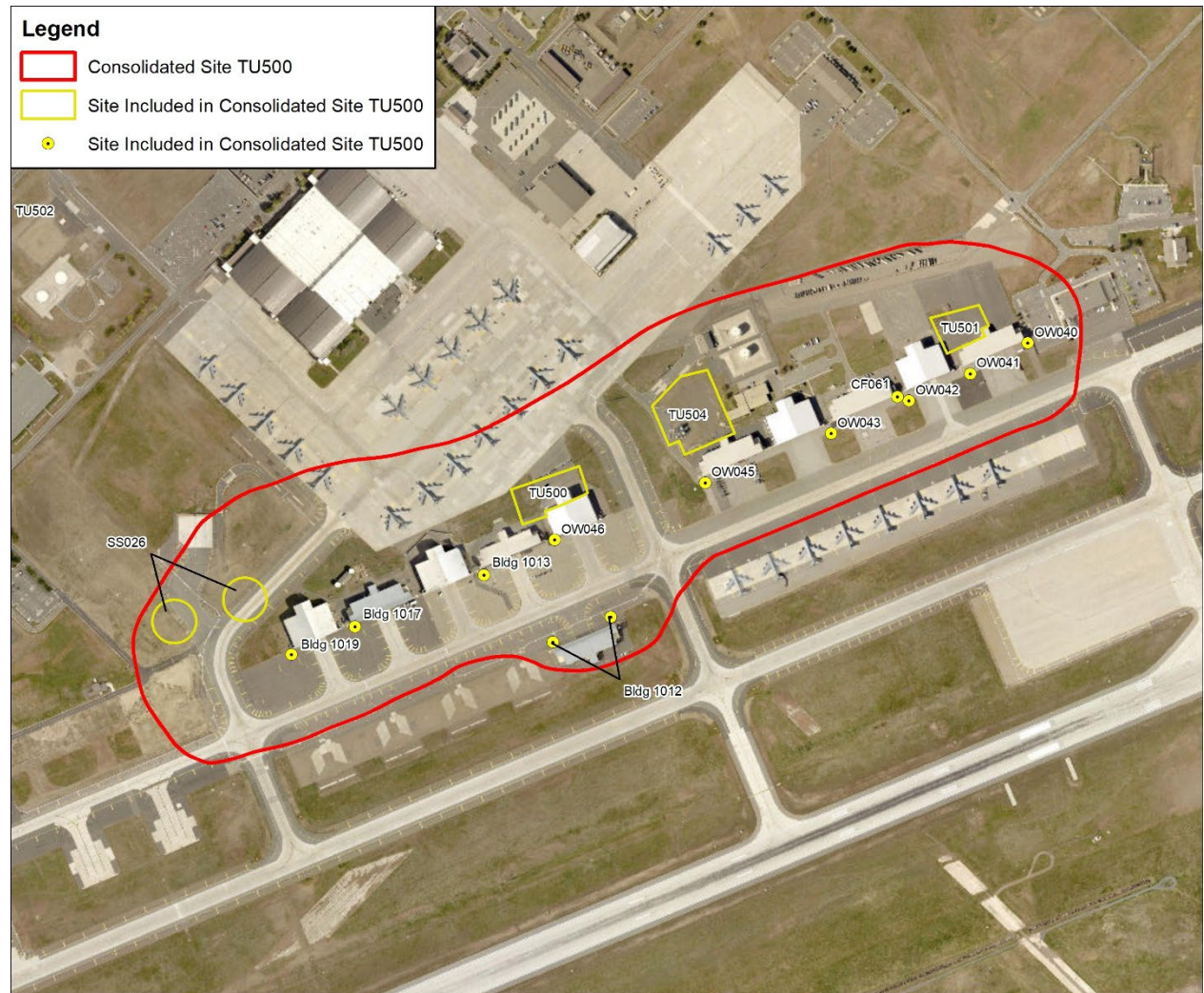
# TU500 Overview

## 2022 Summary

- Hot Spot Excavation at OW040, OW041, and OW043
- Excavation Completion Report
- Quarterly Monitoring

## 2023 Planned

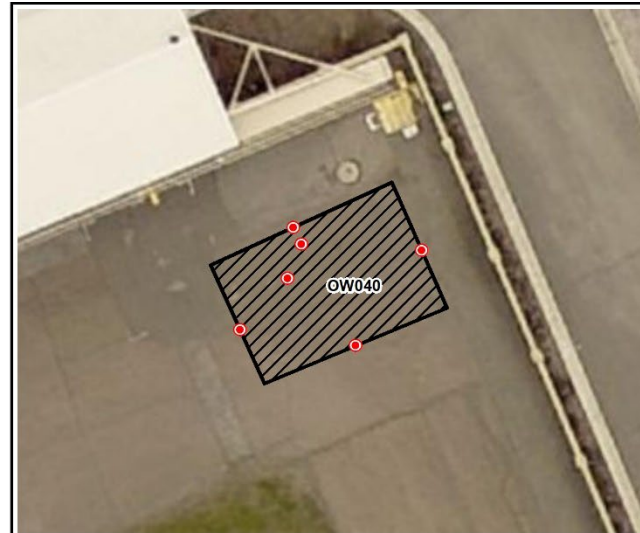
- Risk Assessment Addendum
- Feasibility Study







# TU506 Overview

- The excavation at TU500 included the removal of 250 tons of Total Petroleum Hydrocarbon – Gasoline Range Organics-contaminated soil.



**Legend**

-  Excavation Area
-  Confirmation Sample





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## ***Public Comment Opportunities in 2023***



**Mr. John Peper  
Bay West Project Manager  
30 March 2023**

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# Public Comment Opportunities 2023

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**OU2 (DP064, Construction Debris Landfill/Formal Coal Storage Area) Proposed Plan (PP):** *In Review Stage - Public Comment Period April 15 – May 15, 2023, following regulatory review*

- Remedial alternatives for DP064

**OU2 (WP003, Industrial Wastewater Lagoon System) PP:** *In Review Stage - Public Comment Period May 15 – June 15, 2023, following regulatory review*

- Will include selected remedy for the site based on the Feasibility Study Addendum (FSA)
- Anticipated public comment period summer 2023



# Public Comment Opportunities 2022

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**OU2 (OW058, Hotspot #5 TPH Contamination) PP:** In production stage - Public Comment Period summer, 2023

- Remedial alternatives for OW058
- Anticipated public comment period summer 2023

**SD037 (Building 2447 and 2451 TCE Contamination) PP:** In production stage - Public Comment Period summer, 2023

- Remedial alternatives for SD037
- Anticipated public comment period summer 2023



# *Acronyms and Abbreviations*

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µg/L	micrograms per liter
AFB	Air Force Base
AMSL	Above Mean Sea Level
EPA	United States Environmental Protection Agency
GW	groundwater
IW	injection well
NFA	no further action
OU	operable unit
RA-O	remedial action-operations
TCE	trichloroethylene
TPH	Total Petroleum Hydrocarbon
USAF	United States Air Force
VCP	Voluntary Cleanup Program
WDOE	Washington Department of Ecology





# Questions?

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# **BREAK**

**Meeting will resume in 5 minutes.**

# **PUBLIC COMMENT**

## **(10 Minutes)**

**MEETING  
ADJOURNED**

**THANK YOU!**

**Fairchild Air Force Base  
Open House  
5:30 to 8:00 p.m.**