



United States Air Force

Requests Your Comments on the Engineering Evaluation and Cost Analysis for the PFAS Removal Action at Site SS016P, Air Force Plant 44, Tucson, Arizona

Engineering Evaluation / Cost Analysis Additional Information

October 2026

Text in bold italics indicates that a word/phrase is included in the glossary at the end of this information sheet.

Introduction

The United States Air Force (USAF) has prepared an ***Engineering Evaluation and Cost Analysis*** (EE/CA) for a ***Non-Time Critical Removal Action*** to address ***per- and polyfluoroalkyl substances*** (PFAS) at Installation Restoration Program Site SS016P (the Fire Engine Wash Outfall, or FEWO) at Air Force Plant (AFP) 44 in Tucson, Arizona (see **Figure 1** on the following page). This EE/CA looks at ways to reduce the chance that people could be exposed to PFAS concentrations above the project screening levels (PSLs) in FEWO-area groundwater. The PSLs used in the EE/CA are the PFAS screening levels the Department of Defense set in 2025, based on the November 2024 U.S. Environmental Protection Agency screening levels. Other contaminants of concern at AFP 44 were also considered when the USAF developed the cleanup options in the EE/CA.

The EE/CA identifies a proposed removal action called the **Recommended Alternative**. This action was developed to meet the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as Superfund). The Recommended Alternative was selected to protect people and the environment by keeping PFAS in FEWO-area groundwater from moving toward drinking water supplies. The next steps in the removal action process include providing the Fact Sheet and this additional information, holding a public meeting presenting the EE/CA information and Recommended Alternative, supporting a public comment period, documenting selection of the Recommended Alternative after considering public comments in the Action Memorandum, and implementing the removal action. These steps are shown below.

The USAF used information from the *Bench-Scale PFAS Treatability Study Report* and other documents in the AFP 44 Administrative Record to prepare the EE/CA. The USAF welcomes your comments on the EE/CA and the supporting documents in the **Administrative Record File**. See the **Community Involvement and Participation** Section on **Pages 6 and 7** for ways to provide comments during the public comment period. The USAF will review and consider all comments received. When a removal action is selected, the USAF will prepare an **Action Memorandum**, which will describe the selected removal action and will summarize public comments and USAF responses in its Responsiveness Summary section.

What is the purpose of the Engineering Evaluation and Cost Analysis?

- Develop removal alternatives for treatment of PFAS in the Fire Engine Wash Outfall area at Air Force Plant 44
- Evaluate effectiveness, implementability, and cost for each removal alternative developed
- Recommend a removal alternative for the site based on this evaluation

Removal Action Next Steps

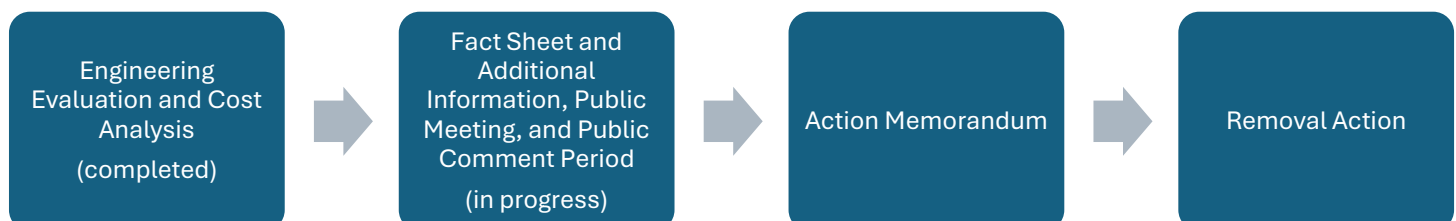
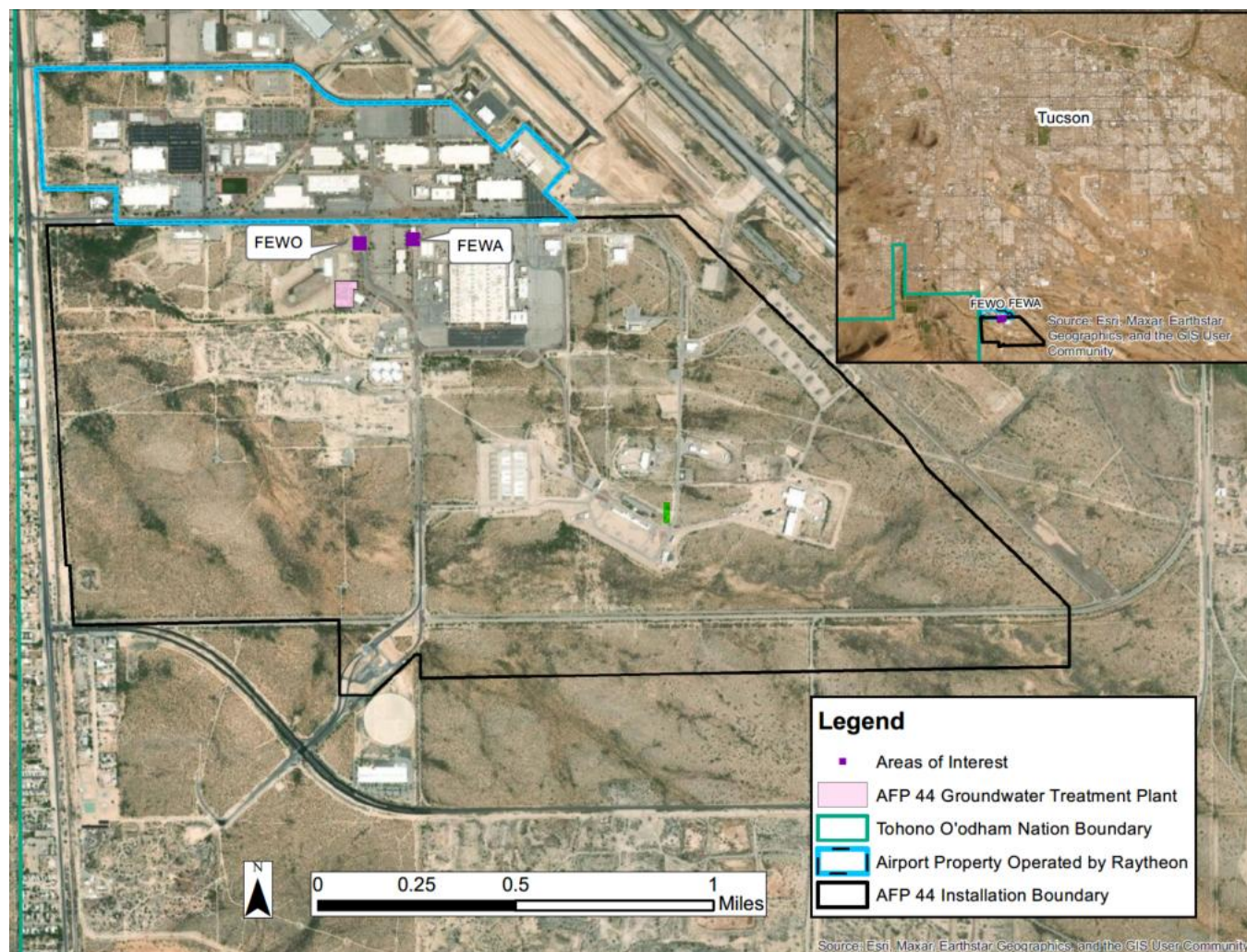


Figure 1 - Site Location



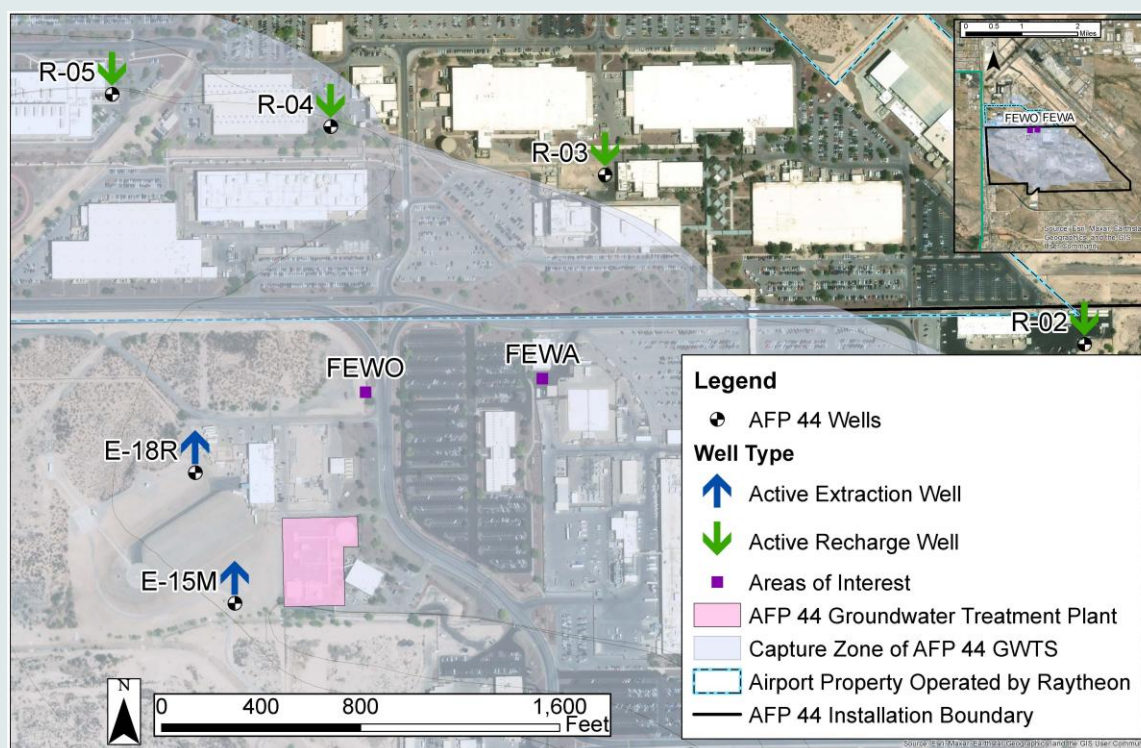
Site Background

Hughes Aircraft Company built AFP 44 in 1951 to make missiles. Hughes operated the facility until December 1997, when Hughes merged with Raytheon. Raytheon still operates the plant today for the USAF.

Building 828 has served as a fire station for the facility since 1951. The potential source of PFAS, aqueous film-forming foam (AFFF), was carried on the fire trucks from 2007 to 2015. Following fire training activities, fire engines were washed down on the asphalt paved surface immediately south and east of Building 828, referred to as the Fire Engine Wash Area (FEWA). A storm drain at the FEWA carries surface water west through an underground pipe to the FEWO (Figure 1). PFAS found in soil and groundwater near the FEWA and FEWO at AFP 44 is likely related to past use of AFFF in the fire trucks.

To begin to address PFAS at AFP 44, the USAF completed a Preliminary Assessment to identify possible ways people or the environment could be exposed to PFAS from AFFF. Based on the Preliminary Assessment, the USAF completed a Site Inspection in 2020 at the FEWA, FEWO, and Building 864 (the fuel storage area). Samples were collected from each area. Since 2020, testing requirements have changed to include more PFAS chemicals. The USAF is now conducting a Remedial Investigation to better understand how much PFAS is present and how far it extends in the FEWA, FEWO, and Building 864 areas. The Remedial Investigation is evaluating 40 PFAS compounds.

Figure 2 - Capture Zone of Existing AFP 44 GWTS in the FEWO Area



In April 2024, the USAF completed the bench-scale treatability study that is mentioned on **Page 1** to test PFAS treatment options for FEWO-area groundwater. A **bench-scale study** is a small-scale study done in a laboratory before doing it on a larger scale. Based on the bench-scale results, the USAF built a PFAS wellhead treatment system at extraction well E-18R in November 2024. E-18R was already pumping groundwater to the existing Groundwater Treatment System (GWTS) that treats volatile organic compounds (VOCs) and 1,4-dioxane at AFP 44. E-18R also captures groundwater from the FEWO area. **Figure 2** shows the capture zone for the GWTS in the FEWO area, including the location of E-18R.

The USAF is also completing a GWTS Upgrade Treatability Study. This study tested PFAS treatment for the water at the existing GWTS. The other AFP 44 contaminants of concern (VOCs, 1,4-dioxane, and chromium) also overlap with the FEWO area, and they were considered when evaluating PFAS treatment alternatives.

The Alternatives

In the EE/CA, an **alternative** is a cleanup option. The options below compare treating the groundwater found at the FEWO area. Treatment options vary how the water is extracted from beneath the FEWO area (using wells placed in the aquitard and/or the aquifer) and from the entire area where the existing GWTS extracts groundwater. An **aquitard** is an underground layer of rock, clay, or sediment that restricts or lowers the flow of groundwater. An **aquifer** is an underground layer of porous rock, sand, or gravel that allows water to flow through it. Cleanup options also include different treatment materials or methods.

- **Alternative 1:** No Action (required by CERCLA for comparison as a baseline; this means the USAF would not add PFAS treatment).
- **Alternative 2a:** Granular Activated Carbon (GAC) treatment of the aquitard in the FEWO area (treat groundwater from the lower flow layer above the main aquifer using GAC).
- **Alternative 2b:** GAC treatment of the aquifer in the FEWO area (treat groundwater from the main water-bearing layer under the site using GAC).

- **Alternative 2c (Recommended Alternative):** Add GAC to treat PFAS at the GWTS before the water is reinjected.
- **Alternative 3a:** Ion Exchange (IX) treatment of the aquitard in the FEWO area (uses IX media to treat groundwater from the lower flow layer above the main aquifer using IX media).
- **Alternative 3b:** IX treatment of the aquifer in the FEWO area (uses IX media to treat groundwater from the main water-bearing layer under the site).
- **Alternative 3c (Recommended Alternative):** Add IX media to treat PFAS at the GWTS before the water is reinjected.
- **Alternative 4a:** Foam fractionation treatment of the aquitard in the FEWO area (uses air bubbles/foam to separate PFAS from groundwater from the lower flow layer above the main aquifer).
- **Alternative 4b:** Foam fractionation treatment of the aquifer in the FEWO area (uses air bubbles/foam to separate PFAS from groundwater from the main water-bearing layer under the site).
- **Alternative 5a:** Submicron powdered activated carbon treatment of the aquitard in the FEWO area (uses very fine carbon particles to help remove PFAS from groundwater from the lower flow layer above the main aquifer).
- **Alternative 5b:** Submicron powdered activated carbon treatment of the aquifer in the FEWO area (uses very fine carbon particles to help remove PFAS from groundwater from the main water-bearing layer under the site).

Evaluation of Alternatives

The alternatives were compared using the evaluation criteria shown in **Figure 3**. Three primary categories were evaluated: effectiveness, implementability, and cost. Higher scores mean a better fit for that category. A score of 3 is high, 2 is medium, 1 is low, and 0 means it does not work well for that category. **Table 1** on the following page provides a comparison of the alternatives based on the evaluation criteria. The highlighted rows in Table 1 show the recommended options. The scores were added up for each alternative. The alternative with the highest total score was identified as the **Recommended Alternative**.

Recommended Alternative

The USAF recommends **Alternative 2c** or **Alternative 3c** as the **Recommended Alternative** in the EE/CA. Both options use the existing groundwater extraction well network (including extraction well E-18R) and add PFAS treatment at the existing GWTS.

For effectiveness and implementability, **Alternative 2c** (add GAC treatment) tied with **Alternative 3c** (add IX treatment) for the highest combined scores (see Table 1). All action alternatives could provide strong PFAS treatment, but the aquitard options (**2a, 3a, 4a, and 5a**) would capture less PFAS because there is limited groundwater that can be extracted from the aquitard. The FEWO-area aquifer extraction options (**2b, 3b, 4b, and 5b**) scored lower for implementability because they could change the treatment chemistry at the GWTS and lead to unacceptable levels of bromate (a regulated treatment byproduct) in the GWTS effluent. This is because groundwater in the FEWO area has higher bromide concentrations and bromide is converted to bromate as a result of the existing treatment process. **Alternative 2c** and **Alternative 3c** would reduce PFAS in GWTS effluent to below the PSLs, capture PFAS from the FEWO-area aquifer, and avoid increasing bromate in the GWTS effluent because groundwater would be extracted from a larger area resulting in lower overall bromide concentrations in the water to be treated.

Because **Alternative 2c** and **Alternative 3c** received the same effectiveness and implementability scores, either one is technically acceptable. Their estimated costs are similar, but how often the treatment media must be replaced can greatly affect long-term operating costs. The initial treatability study tested FEWO-area specific groundwater. The USAF is now completing a Groundwater Treatment System Upgrade Treatability Study using groundwater extracted throughout the GWTS extraction well network that captures groundwater across AFP 44. The study will help to refine cost estimates and determine whether GAC, IX, or a combination of both would work best at the existing GWTS. Both alternatives would protect human health and the environment.

Figure 3 - Evaluation Criteria

	Effectiveness Treatment: Ability of an alternative to reduce PFAS constituents to PSLs in treatment system effluent Capture: Ability of an alternative to capture and remove PFAS mass
	Implementability Technical, logistical, and administrative considerations for implementing the technology
	Cost Estimated capital, operation, and maintenance costs of an alternative

Table 1 – Comparison of Alternatives

Criteria	Effectiveness		Implementability	Total Score (Effectiveness + Implementability)	Cost		
	Does this option reduce PFAS in treated water to below the project screening levels (PSLs)?	Does this option capture and remove PFAS from groundwater?			Capital Cost	Annual Operating Cost	30-Year NPV Cost
Alternative 1	0	0	3	3	0	0	0
Alternative 2a	3	1	3	7	\$260,000	\$160,000	\$3,125,000
Alternative 2b	3	3	1	7	\$300,000	\$500,000	\$9,250,000
Alternative 2c	3	3	3	9	\$7,500,000	\$660,000	\$19,500,000
Alternative 3a	3	1	1	5	\$215,000	\$125,000	\$2,500,000
Alternative 3b	3	3	1	7	\$275,000	\$185,000	\$3,650,000
Alternative 3c	3	3	3	9	\$6,300,000	\$910,000	\$22,800,000
Alternative 4a	3	1	1	5	\$2,200,000	\$560,000	\$12,300,000
Alternative 4b	3	3	1	7	\$3,700,000	\$3,200,000	\$62,300,000
Alternative 5a	3	1	3	7	\$3,200,000	\$270,000	\$8,100,000
Alternative 5b	3	3	1	7	\$3,500,000	\$350,000	\$9,800,000

Notes:

NPV = net present value.

NPV is a standard way to show the estimated total cost over time in today's dollars. NPV calculations are provided in the EE/CA.

Highlighted rows identify the recommended **Alternatives 2c and 3c**, based on their total scores.The results of the ongoing treatability study will determine whether **Alternative 2c**, **Alternative 3c**, or a combination of **Alternatives 2c and 3c** will be selected as the best method for PFAS removal.

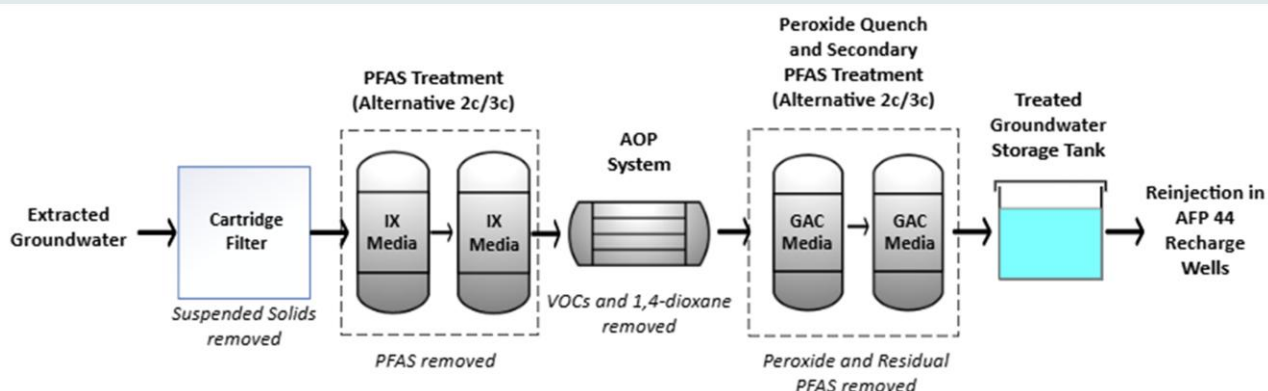
PFAS Treatment

The current GWTS does not remove PFAS. Under **Alternative 2c** and/or **Alternative 3c**, the USAF would add PFAS treatment to the current GWTS by adding GAC and/or IX treatment. This type of treatment works by pushing water through one or more tanks that hold the treatment material (GAC or IX; called media). The media attracts certain chemicals and holds them while the water flows through. Over time, the media fills up and does not work as well, so the system is monitored and the media is replaced when needed. Tanks are installed in a row so that the next tank can continue treating the water when the first tank starts to lose effectiveness.

At the AFP 44 GWTS, adding GAC, IX, or a combination of both is expected to reduce PFAS in the GWTS effluent to below the PSLs. Under **Alternative 2c** and/or **Alternative 3c**, extracted groundwater would be treated for PFAS using GAC or IX media and for VOCs and 1,4-dioxane by the GWTS advanced oxidation process system. The treated water would then be reinjected into the aquifer at AFP 44 once it is confirmed the treated water meets the reinjection criteria established for the GWTS. **Figure 4** shows a basic diagram of this process.

Both GAC and IX systems usually need a pre-filter to remove suspended solids. The USAF would routinely sample the system to check PFAS treatment performance and to decide when to replace the media so PFAS in the water flowing out of the system stays below the PSLs. GAC and IX are both widely available, effective at reducing PFAS, and similar in cost. The USAF will make the final choice of treatment media during the design process.

Figure 4 - PFAS Treatment Process Conceptual Diagram



Abbreviations:

AOP = Advanced Oxidation Process

AFP 44 = Air Force Plant 44

GAC = Granular Activated Carbon

IX = Ion Exchange

PFAS = Per- and Polyfluoroalkyl Substances

VOCs = Volatile Organic Compounds

Community Involvement and Participation

The USAF believes public input is an important part of choosing a cleanup approach. The USAF will review and consider all comments received during the public comment period and at the public meeting. The public is encouraged to take part in this process (see next page).

After the public comment period and public meeting, the selected removal action alternative will be documented in an Action Memorandum. The USAF will review public comments before making a final decision and will summarize comments and USAF responses in a Responsiveness Summary that will be included in the Action Memorandum. The Action Memorandum will be available in the Administrative Record Files (see **Page 8**) once finalized.

Mark Your Calendar

The USAF invites you to a Public Meeting

October 21, 2026

Poster Session: 5:00 - 5:45 PM

Meeting: 5:45 - 7:45 PM

**El Pueblo Senior Center
101 W Irvington Road, Tucson, Arizona**

A Public Meeting will be held in conjunction with the quarterly Unified Community Advisory Board Meeting during which the USAF will explain the EE/CA, the removal action alternatives considered, and the rationale for selection of the recommended alternative. The meeting will include multiple speakers and discussion of the EE/CA will be part of the USAF's presentation.

Oral and written comments will be accepted at the meeting.

Public Comment Period

October 21 – November 20, 2026

The USAF will accept written comments on the EE/CA during the above 30-day public comment period.

Written comments can be provided by letter or email to the USAF contact below.

Roger McCready, AFCEC/CZRC

2145 Monahan Way, Building 28

Wright-Patterson Air Force Base, Ohio 45433

Telephone: (385) 634-9490

Email: roger.mccready.1@us.af.mil

Letters must be post-marked by and emails received no later than November 20, 2026.

For More Information



The Engineering Evaluation/Cost Analysis and other documents that support the recommended alternative are in the USAF Administrative Record Files. View documents online: <https://ar.cce.af.mil>

This document, Engineering Evaluation / Cost Analysis Additional Information and a Fact Sheet in English and Spanish can be found on the Arizona Department of Environmental Quality (AZDEQ) website for AFP 44 <https://azdeq.gov/superfund/usaf-plant44>

View Documents in person:

Valencia Public Library
202 West Valencia Road
Tucson, AZ 85706
(520) 594 - 5390

Library Hours:

Monday/Wednesday	10:00 am – 6:00 pm
Tuesday/Thursday	10:20 am – 7:00 pm
Friday/Saturday	10:00 am – 5:00 pm
Sunday	Closed

Acronyms

AFFF	Aqueous Film-Forming Foam	GAC	Granular Activated Carbon
AFP	Air Force Plant	GWTS	Groundwater Treatment System
AOP	Advanced Oxidation Process	IX	Ion Exchange
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	NPV	Net Present Value
EE/CA	Engineering Evaluation and Cost Analysis	PFAS	Per- and Polyfluoroalkyl Substances
FEWA	Fire Engine Wash Area	PSL	Project Screening Level
FEWO	Fire Engine Wash Outfall	USAF	United States Air Force
		VOCs	Volatile Organic Compounds

Glossary

Action Memorandum – a brief document that describes the selected removal action and summarizes public comments and USAF responses in its Responsiveness Summary section

Alternative - a cleanup option presented in the Engineering Evaluation and Cost Analysis

Aquifer - an underground layer of porous rock, sand, or gravel that allows water to flow through it

Aquitard - an underground layer of rock, clay, or sediment that restricts or lowers the flow of groundwater

Bench-scale study - a small-scale study done in a laboratory before doing it on a larger scale in the real world

Engineering Evaluation and Cost Analysis - a detailed study used to figure out the best way to clean up an area

Non-time Critical Removal Action – a cleanup with time to plan, budget costs, and receive community feedback before work begins

Per- and polyfluoroalkyl substances - a group of man-made chemicals that resist heat, water, stains, and grease and do not break down easily in the environment