

## Air Force to Update the Groundwater Remedy at Site SS014 Subsite 1

The U.S. Air Force (Air Force) recently conducted a technology demonstration (TD) at Petroleum-Only Contaminated (POCO) Site SS014 Subsite 1 to determine if a subgrade biogeochemical reactor (bioreactor), which had been used successfully to enhance biodegradation of chlorinated volatile organic compounds in groundwater at other Travis Air Force Base (AFB) sites, could be adapted to enhance biodegradation of petroleum-related contaminants in groundwater at Site SS014 Subsite 1, specifically, the relatively high concentrations of benzene and total petroleum hydrocarbons as gasoline (TPH-G).

The TD started in 2016 when the bioreactor was installed. The bioreactor area was first excavated and then backfilled with gypsum in the form of crushed recycled drywall to aid in degradation of the contaminants, small amounts of wheat straw and iron pyrite gravel to optimize the remedial conditions, as well as pea gravel for volume. When the TD concluded in 2020, benzene, TPH-G, and total petroleum hydrocarbons as diesel (TPH-D) concentrations had decreased by more than 99 percent at the source area wells. Additionally, the TPH-G and TPH-D concentrations at the downgradient extraction wells decreased by more than 93 percent.

Because of its effectiveness, the Air Force opted to continue operating the bioreactor after the conclusion of the TD. Based on the 2022 groundwater monitoring results, TPH-G, TPH-D, benzene, toluene, ethylbenzene, and xylene concentrations are decreasing throughout the plume, and the plume is not migrating. Continued operation of the bioreactor has resulted in significant contaminant concentration reduction, even in the source area upgradient of the bioreactor. As shown on Figure 1, the extent of the TPH-G plume has decreased by approximately 93 percent, average TPH-G concentrations have decreased by approximately 98 percent, and benzene concentrations have decreased to below laboratory detection limits.

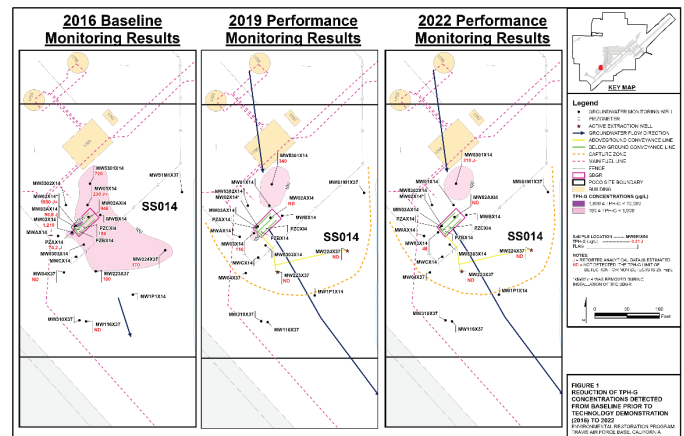


Figure 1: Graphic showing decrease in TPH-G plume size since initiation of the bioreactor technology demonstration (click on image to enlarge).

The current groundwater remedy at Site SS014 Subsite 1, established in 2011, is monitored natural attenuation (MNA); however, continued operation of the bioreactor since 2016 has enhanced the existing remedy, and fewer wells need to be sampled as part of the Groundwater Remedy Implementation Program. Additionally, based on current trends, key groundwater contaminant concentrations should reach their respective cleanup goals within 3 to 10 years with continued use of the bioreactor, rather than 10 to 35 years or more if relying on MNA.

The bioreactor and all associated infrastructure are already in place and have been operating successfully since 2016. Continued operation of the bioreactor will not require additional Air Force funding, and will have additional cost-saving implications on monitoring requirements because of the shortened remedial timeframe. Because of the proven effectiveness of the bioreactor for site cleanup at Site SS014 Subsite 1, the Air Force plans to update the final groundwater remedy for the site from MNA to the bioreactor. This change will be documented in the forthcoming POCO Site SS014 Subsite 1 Remedial Action Report Addendum, which will be available in the Administrative Record once finalized.

## Phase I RI for AFFF Areas – Field Event #3 Update

Field activities continue for the Phase I Remedial Investigation (RI) for aqueous film-forming foam (AFFF) areas at Travis AFB. The third field event began in June 2023, which consists of installing 55 new monitoring wells, collecting soil samples from 32 soil borings, and sampling groundwater at approximately 280 monitoring wells.

Experienced project geologists are working alongside drilling operators to advance and classify soil from borings using hollow-stem auger and direct-push technologies (Figure 2). Coordination efforts continue for equipment and project support services for drilling rigs, sampling equipment and services, waste management, biological monitoring, and other project activities. Each work area is reviewed in a collaborative effort with project biologists to coordinate conservation measures for working in sensitive areas near habitats for California tiger salamanders and other endangered species.

In June and July 2023, 25 new monitoring wells were installed and sampled. Soil samples were collected, as were groundwater samples from existing wells. Soil and groundwater samples are submitted to an analytical laboratory for chemical analysis to determine if per- and polyfluoroalkyl substances (PFAS) are present associated with the AFFF areas. The field event is scheduled to continue through September 2023.



Figure 2: Field team reviewing soil cores as drillers begin constructing a monitoring well using hollow-stem augers. Photo Credit: Oneida.

Lysimeters will also be installed as part of this field event. A lysimeter is a device installed above the groundwater to collect moisture from within the soil for laboratory analysis. The results help the project team determine if there are PFAS constituents present in the soil column and if they may influence concentrations in groundwater.

The Restoration Program Team continues to work, discuss project results, and gain consensus on recommendations from our regulatory stakeholders: the U.S. Environmental Protection Agency, California Department of Toxic Substances Control, and San Francisco Bay Regional Water Quality Control Board. The project requires a lot of coordination and has made great progress.

## Fifth Five-Year Review Nearing Completion

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires reviews of all remedial actions every 5 years until a site is cleared for unlimited use and unrestricted exposure. As such, Five-Year Reviews (FYRs) of the remedies at Travis AFB are conducted to ensure they remain protective of human health and the environment. FYRs typically include interviews of base personnel, community members, and regulatory agencies; review of relevant documents and data; and site inspections. In addition, recommendations are made to address any issues found. The information is gathered, analyzed, and compiled into an FYR report.

The FYR report serves as a snapshot in time and addresses three major questions:

- Is the remedy functioning as intended?
- Are the assumptions, data, cleanup levels, and cleanup objectives used at the time of remedy selection still valid?
- Has any other information surfaced that could affect the protectiveness of the remedy?

The last FYR for Travis AFB, its fourth, included a review of the remedial actions for various sites from 2013 to 2018. The Fourth FYR and other relevant public documents are available on the Travis AFB Administrative Record website at <https://ar.afcec-cloud.af.mil/>.

A contract for the preparation of the Fifth FYR was awarded in September 2022 to Bayside Engineering Construction, Inc. in partnership with Engineering Remediation Resources Group, Inc. This contract is administered and managed by the U.S. Army Corps of Engineers, Sacramento District, together with the



Air Force Civil Engineer Center. A work plan was prepared that describes the technical and on-site procedures of the Fifth FYR. A public notification was issued at the start of the FYR process in the *Tailwind*, the *Vacaville Reporter*, and the *Fairfield Daily Republic*. Relevant site inspections and interviews were conducted during March and April 2023. A draft version of the document was submitted to the regulatory agencies for review in June 2023. Comments were received in July. The Fifth FYR will conclude by September 27, 2023, and will address the sites shown on Figure 3. The final activity in the FYR process involves posting of a final public notice that details how the public can view the Fifth FYR Report.

For more information on the environmental cleanup at Travis AFB and the upcoming FYR, please send an email to [enviropa@us.af.mil](mailto:enviropa@us.af.mil).

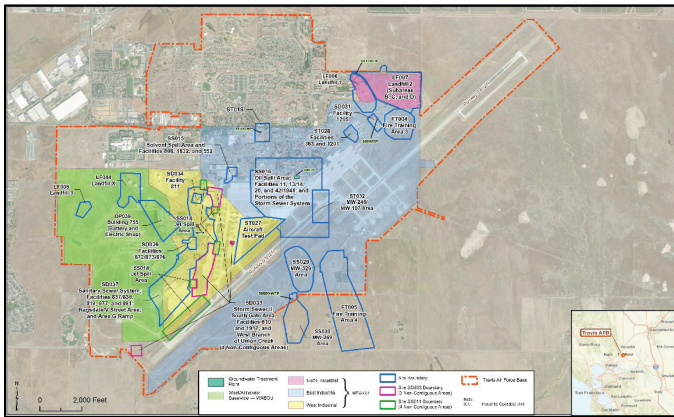


Figure 3: Graphic showing the Travis AFB sites for the Fifth Five-Year Review (click on image to enlarge).

## Other PFAS Source Areas

The Air Force is committed to ensuring that areas with potential PFAS impacts (beyond the AFFF areas discussed above) are identified, investigated, and addressed. Currently, a due diligence survey is under way for potential supplemental PFAS sources under a centralized managed contract across 128 Air Force installations, including Travis AFB. The due diligence survey includes a records search and interviews of personnel from base supply, maintenance, infrastructure support, medical clinics, fire department, environmental, and other departments for information on potential PFAS sources. Sources may include carwashes, warehouses, radar domes, fogger trucks, marinas/docks, metal finishing, painting stations, landscaping sheds, underground wiring, oil/water separators, landfills and snowpack, cleaning supply storage, medical clinics/facilities, sanitary/storm water runoff, non-AFFF fire suppression, automotive/hobby shops/motor pool, wastewater treatment plants, photolithography, and

herbicides/pesticides/insecticide use/storage areas. A draft summary document is expected soon.



## Restoration Advisory Board Tours and Meetings

Community members are cordially invited to attend the public Restoration Advisory Board (RAB) meetings and tours. The next RAB meeting is planned to be held in-person at 3690 Hilborn Road, Fairfield, CA. The meeting is scheduled for April 18, 2024, at 7:00 p.m. You are welcome to arrive early to socialize with fellow RAB members, community members, and the project team. Light refreshments will also be provided. We look forward to seeing you there!

***If you are interested in finding out more about the Travis AFB RAB, wish to be included on the email mailing list, or want to inquire about becoming a RAB member, let us know:***

[enviropa@us.af.mil](mailto:enviropa@us.af.mil)

(707) 424-2812

***For more information about Travis AFB's Environmental Restoration Program, contact us:***

**Remedial Program Manager**

(707) 424-2812

**Public Affairs Officer**

(707) 424-2011

**Or visit:**

<https://www.travis.af.mil/Information/Environment/>