



# ERP Fact Sheet

August 2009

**AFRL Arroyos  
Proposed Plan  
Public Comment  
Period**

*Aug. 28 — Oct. 13,  
2009*

**AFRL Availability  
Session:**

*Sept. 15, 2009  
11 a.m. – 1 p.m.  
Rocket Room*

**Public Meeting  
(tentative):**

*Sept. 29, 2009  
5:30 p.m.  
Boron High School  
26831 Prospect St.  
Boron, Calif.*

## Base opens public comment period on cleanup plan for northwest laboratory area



*Several rocket test stands are located on Leuhman Ridge within the AFRL Arroyos. These structures allow scientists to field test rocket engines and motors.*

**A**ir Force officials are seeking public input on proposed cleanup approaches to address groundwater contamination at the Air Force Research Laboratory (AFRL) Arroyos, Edwards Air Force Base.

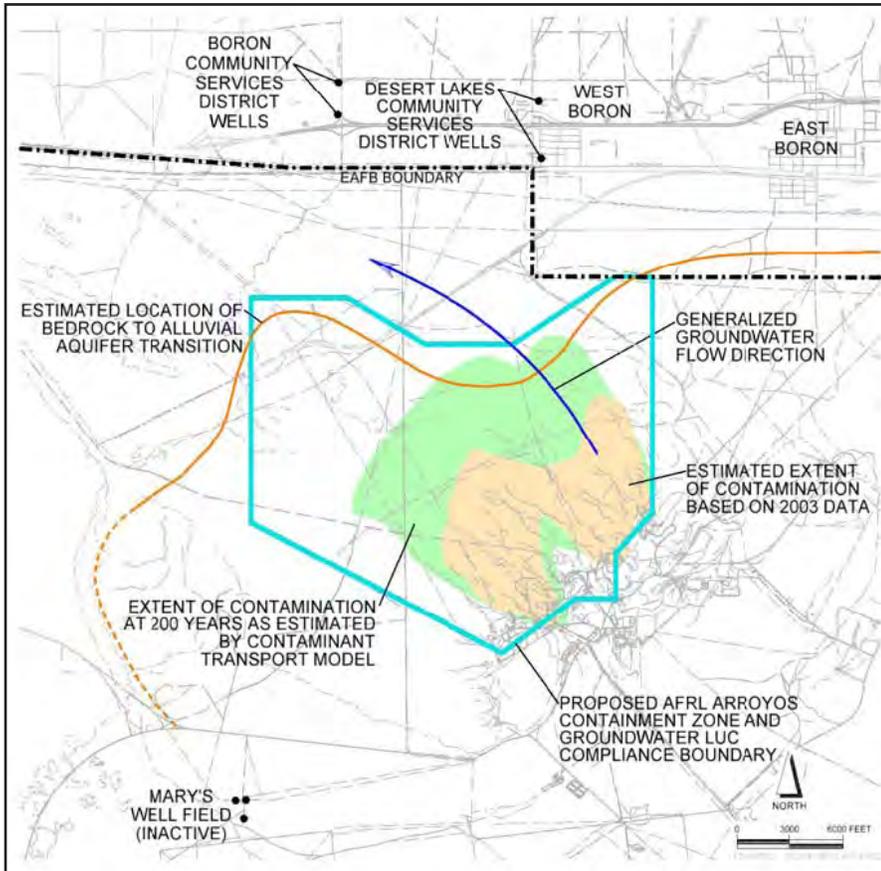
The six cleanup approaches can be viewed in detail in the AFRL Arroyos Proposed Plan. One of these approaches will be chosen as the final remedy.

The AFRL Arroyos makes up the northwest quadrant of AFRL and includes rocket test stands located on Leuhman Ridge. The test stands began operating in the 1950s and are still active today.

The primary groundwater contaminants are tetrachloroethene (PCE) and trichloroethene (TCE). These chlorinated solvents were used to clean rocket engine parts and pipelines at the test stands before their use was discontinued in the early 1980s.

Another contaminant in the groundwater is ammonium perchlorate, a component of solid rocket fuels.

The Air Force recommends a cleanup approach that includes a Technical Impracticability (TI) waiver and Containment Zone (with reliance on a slow rate of contaminant migration rather than active containment),



Above: The colored shapes show the present extent (yellow) and 200-year projected extent (light green) of the contaminant plume. The Containment Zone (turquoise line) and groundwater flow direction (dark blue arrow) are also shown.

long-term monitoring and land use controls. This approach is referred to as Alternative 1B in the AFRL Arroyos Proposed Plan.

A TI waiver is an agreement between the Air Force and federal and state regulators to allow groundwater contaminants within a specific area to exceed drinking water regulatory levels. The designated area is known as a Containment Zone.

None of the groundwater at AFRL is used for drinking water. Groundwater within the Arroyos area can only be found at a depth of 49 feet or greater. Therefore, plants, animals and humans cannot access the contaminated groundwater.

At AFRL, the scarce amount

of groundwater in granitic bedrock fractures contributes to an overall low flow that prevents any type of cleanup using current technologies. The low flow rate also means the contaminated groundwater does not migrate very quickly.

In fact, the contaminant plume is not expected to move outside of the AFRL Arroyos Containment Zone in 200 years of unchecked movement.

The No Action Alternative, or Alternative 1A, is a standard baseline proposal that allows the contaminated groundwater to migrate without controls or monitoring. The cost of this alternative is \$0.

Alternative 1B relies on natural

processes and low groundwater flow to contain groundwater contaminants tracked by monitoring. Alternative 1B will not involve any active containment until and unless the contaminant plume is projected to reach the boundary of the alluvial aquifer within 10 to 30 years. This remedy is estimated to cost approximately \$22.5 million for the first 200 years of treatment, not including any future containment costs.

The rest of the cleanup proposals involve a TI waiver, long-term monitoring and land use controls like Alternative 1B. The difference among these alternatives is in the type of action that would be used to contain the contaminant plume. The estimated costs for each alternative are expected to cover the first 200 years of treatment.



Above: Outcrop of fractured granitic bedrock at AFRL.



Left: A core sample of granitic bedrock shows the fractures present within.

Alternative 2B calls for plume containment when the plume reaches the alluvial aquifer, estimated to occur in 124 years. Until then, Alternative 2B would be identical to Alternative 1B in terms of long-term monitoring and land use controls. Groundwater is expected to move easily through the alluvial aquifer, making it feasible to pump the groundwater out through a network of water wells using a groundwater extraction and treatment system. The projected cost for Alternative 2B is about \$24 million.

Alternative 3B would contain higher concentrations within the plume by injecting natural bacteria. The bacteria feed off an organic food source (also added) and break down the groundwater contaminants into harmless byproducts. Due to the large number of injection and monitoring wells needed, the cost for this proce-

cedure would run nearly \$939.5 million.

Alternative 4 was eliminated during an early screening of the alternatives.

Alternative 5 combines the active containment measures from Alternatives 2B and 3B. The cost is expected to be slightly more than \$941 million.

Alternative 6 combines the active plume containment from Alternative 2B with aggressive treatment at contaminant source areas using chemical oxidants to break down the contaminants into harmless byproducts. The cost for Alternative 6 is estimated to be \$174 million.

The Air Force prefers Alternative 1B for several reasons:

- Contaminant movement is sluggish and not expected to affect active water supply wells during the next 1,000 years, even in the

absence of any active containment measures.

- Current cleanup technologies are very costly and only partially effective. This has been demonstrated by past bacteria treatability studies conducted at AFRL.
- The contaminants remain on site, which requires a review of Alternative 1B every five years, as required by law.
- Further action will be taken if long-term monitoring data indicate the plume will move faster than anticipated.

The AFRL Arroyos cleanup focuses on two areas known as Sites 162 and 461.

Site 162 includes Test Areas 1-14, 1-21 and 1-40 on the southern end of Leuhman Ridge. These areas were

*A rocket engine sits in front of Test Stand 1A. The test stands are designed to run rocket engines and motors for data collection.*





*Left: The Test Stand 1A deflector is shown here. The deflector redirects the hot exhaust slightly away from the base of the test stand.*

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You may also view a copy at one of the local libraries listed in the Information Repository box below.

Please submit your comments to Gary Hatch before the public comment period ends. You may make your comments in person at one of the public availability sessions.

### More Information Available

The Air Force encourages the public to gain a more complete understanding of the AFRL Arroyos and the cleanup activities that were conducted there. Documents used by the base to make decisions about cleanup options at the AFRL Arroyos are in the base's administrative record. To view the full administrative record, you must contact Gary Hatch.

To view a subset of decision documents, you may visit one of the Information Repository locations.



once used for the maintenance, repair, cleaning and testing of rocket engines and propellants.

Restoration analysts believe past leaks or spills released PCE at Site 162. The PCE has since migrated into the groundwater.

Wastewater containing perchlorate leaked from an aboveground storage tank once used at Test Area 1-21. As a result, perchlorate can be found in the groundwater and soil at Site 162. Additional excavation of subsurface soil in this area will be addressed as part of the final cleanup remedy for AFRL Soil and Debris Sites.

Site 461 includes Test Areas 1-115, 1-120 and 1-125. All are located on the northern portion of Leuhman Ridge. The Air Force still tests large rocket engines and motors

in these areas.

Until the early 1970s, past activities at Site 461 included the use of solvents such as TCE to ensure clean and nonreactive propellant systems. Past leakage or spills are believed to be responsible for current TCE contamination at the site.

### Proposed Plan and Public Comment Period

You may obtain a copy of the AFRL Arroyos Proposed Plan online at <https://bsx.edwards.af.mil/environmental>. Click on the folder labeled *Documents for Public Review* and click on the *AFRL Arroyos Proposed Plan*. Environmental Public Affairs can send you a copy if you contact Gary Hatch at:

### Information Repositories

Edwards AFB Library  
5 W. Yeager Blvd.  
Edwards AFB, Calif.  
(661) 275-2665

Kern County Public Library  
Wanda Kirk Branch  
3611 Rosamond Blvd.  
Rosamond, Calif.  
(661) 256-3236

Los Angeles County Public Library  
601 W. Lancaster Blvd.  
Lancaster, Calif.  
(661) 948-5029