Stakeholder SENTINEL

Aeronautical Systems Center,
Acquisition Environmental, Safety
and Health Division

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ASC completes environmental investigation at Plant 42

Engineers have a better understanding about the nature and extent of contamination at Air Force Plant 42 in Palmdale, Calif., after recently completing a comprehensive investigation at 27 sites.

The Remedial Investigation, conducted as part of the Air Force Installation Restoration Program, studied sites where plant operators disposed of materials such as jet fuel, cleaning solvents, paint thinner and metals in the years before such practices were understood to potentially contaminate the environment. The plant has operated for more than 50 years, supporting the production, flight test and modification of aerospace systems, and is managed by the Aeronautical Systems Center (ASC), Engineering Directorate, Acquisition Environmental, Safety and Health Division at Wright-Patterson Air Force Base, Ohio.

During the investigation, engineers collected soil, soil vapor and groundwater samples at different depths to get a clearer picture of concentration levels and where contamination exists. According to George Warner, ASC's remedial project manager for Plant 42, more than 500 samples were taken and analyzed during the complex probe. "We used several types of screening tools to learn more about the contamination," explained Warner. "For example, we took shallow and deep soil samples to determine if contamination in soil could be a threat to groundwater. We took soil gas samples to confirm whether there are elevated levels of volatile organic compounds, like the solvent trichloroethylene, in the soil."

A field technician uses a direct push drill rig to collect samples at a cleanup site during the Remedial Investigation at Air Force Plant 42, Palmdale, Calif.

The findings from the investigation are presented in a draft report, now under review by the California Environmental Protection Agency (Cal-EPA). The report explains in detail what was detected at each of the sites and the potential risks posed by the contaminants.

To assess potential risk, scientists used data from the investigation to perform risk assessments for each of the sites. "Cal-EPA requires cleanup actions at sites with potential excess lifetime cancer risks above one in one million," said Warner. "This means one more person out of a million may get cancer if exposed to a site for a certain duration. No sites had risks above this level."

Overall, engineers learned that of the 27 sites, about half, or 13, were found to contain contamination in the range requiring further risk management evaluation and possible action.

"Thirteen of the sites have levels of contamination that could warrant a cleanup action," said Warner. "And, pending Cal-EPA approval, the Air Force has determined that the remaining 14 sites have acceptable risks – less than one in one million excess lifetime cancer risk. Therefore, we are recommending that these 14 sites be considered for 'no further investigation' because they pose no unacceptable risks to human health or the environment."

*(See **Plant 42**, page 5)*

Inside:

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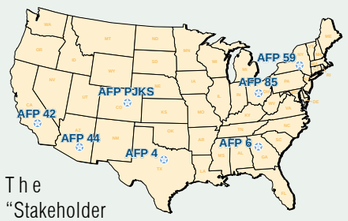

The "Stakeholder Sentinel" is published to provide community members with up-to-date information on environmental activities at Air Force industrial plants. The Aeronautical Systems Center (ASC), Acquisition Environmental, Safety and Health Division at Wright-Patterson AFB, Ohio, manages the cleanup at seven plants, called Government-Owned, Contractor-Operated facilities, located across the United States. This Air Force newsletter is an authorized publication of the Aeronautical Systems Center. The intent of this publication is to report on environmental activities and programs taking place at the seven industrial plants. Contents of the "Stakeholder Sentinel" are not necessarily the official views of, or endorsed by, the U.S. Government, the Department of Defense, or the Air Force. "Stakeholder Sentinel" is published under contract with Shaw Environmental and Infrastructure, Inc., a private firm in no way connected with the U. S. Air Force. Editorial content is edited, prepared and provided by the environmental staff of ASC Office of Public Affairs. For more information, call 1-800 982-7248, ext. 301, 322, or 346. Or, visit our home page at:

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Community Activities CALENDAR

Air Force Plant 4, Fort Worth, Texas
- Restoration Advisory Board Meeting, Aug. 8, 2002

Air Force Plant 42, Palmdale, California
- Environmental Restoration Advisory Board Meeting, July 30 and 31, 2002

Air Force Plant 6, Marietta, Georgia
- Partnering Meeting, August 13, 2002

Air Force Plant 44, Tucson, Arizona
- Unified Community Advisory Board Meeting, July 17, 2002

Air Force Plant PJKS, Waterton, Colorado
- Restoration Advisory Board Meeting, June 27, 2002

Editors Note: The above dates are subject to change. For the latest updates, look for notices on meetings and other events in your local newspaper or through direct mailings to your home. For more information, call 1 (800) 982-7248, ext. 301.

Spotlight On: Restoration Advisory Boards

California board works on cleanup

Antelope Valley resident, Juan Blanco is one of 14 community members who devote their time to overseeing environmental activities at Air Force Plant 42 in Palmdale, Calif.

Blanco is co-chair of the plant's Environmental Restoration Advisory Board, or ERAB, a volunteer community group formed in 1997 to represent the interests and concerns of residents living near the 50-year old facility. The board is providing valuable community input into the Plant 42 Installation Restoration Program, which is investigating and addressing 28 cleanup sites at the plant. Blanco, who became co-chair in June 2001, views the ERAB as a critical part of the cleanup process.


Juan Blanco

"We, as a committee, have very talented and resourceful people who are truly concerned and dedicated to our environment. I want to ensure that the community and board members have an opportunity for real input into restoration efforts at the plant," said Blanco.

To date, board members have been involved in such cleanup activities as reviewing and providing comments on technical documents, taking part in public comment periods for environmental projects, touring Plant 42 cleanup sites, and attending Air Force workshops on hydrogeology, soil sampling techniques, risk assessment, and environmental regulation.

Of special interest to Blanco and other ERAB members is protecting the groundwater in and around Plant 42. During the plant-wide Remedial Investigation of the sites, completed in December 2001, the Air Force confirmed that the cleaning solvent TCE (trichloroethylene) was released in a confined area at Bldg. 150, an aircraft hangar. Engineers now are evaluating cleanup methods to remove the contamination. In his role as co-chair, Blanco has asked the Air Force to acquire more funding to continue groundwater monitoring of wells at the plant to ensure the TCE does not move and impact groundwater in the future.

George Warner, Plant 42's remedial project manager, has worked with the ERAB since 1997 and understands their concerns for the environment. "We need to know these issues because it helps us make decisions about future cleanup activities at the plant," Warner stressed. "We are indebted to ERAB members for their time and the valuable role they play in the restoration process."

Combination of technologies ZAP contamination at Plant 44 sites

Environmental engineers recently witnessed a drop in contamination levels at two sites at Air Force Plant 44 in Tucson, Ariz., thanks to use of a compound called potassium permanganate.

A pilot test involved injecting 4500 lbs. of the purple-colored compound into monitoring wells to determine if the compound would degrade trichloroethylene (TCE) trapped in soil and groundwater.

"Sampling showed that TCE concentrations declined in all the wells the permanganate solution reached," said environmental engineer Dennis Scott, Aeronautical Systems Center team leader for the plant's cleanup program.

Scott said engineers consider the compound to be an alternative to traditional cleanup methods because it is effective in quickly reducing TCE concentrations. "The trick is getting the permanganate into the compact clay layers where TCE resides and leaches into groundwater," he said. "This is a problem facing our cleanup and others in the United States. The clay subsurface is inaccessible and imposes special challenges."

Used by industry to treat drinking water systems, potassium permanganate works by setting up a process that breaks down TCE into harmless chloride salts and carbon dioxide. Because the pilot test was successful, the ASC team is now developing a study to assess methods best suited to injecting and distributing the permanganate solution on a wider scale at the plant.


Workers use a drill rig to install a soil vapor extraction well at a cleanup site where contaminants are being removed from the soils.

Situated in the Sonoran Desert, Plant 44 is a Superfund cleanup site managed by the Aeronautical Systems Center at Wright-Patterson AFB, Ohio. It was built in the early 1950s to manufacture missiles for the Department of Defense.

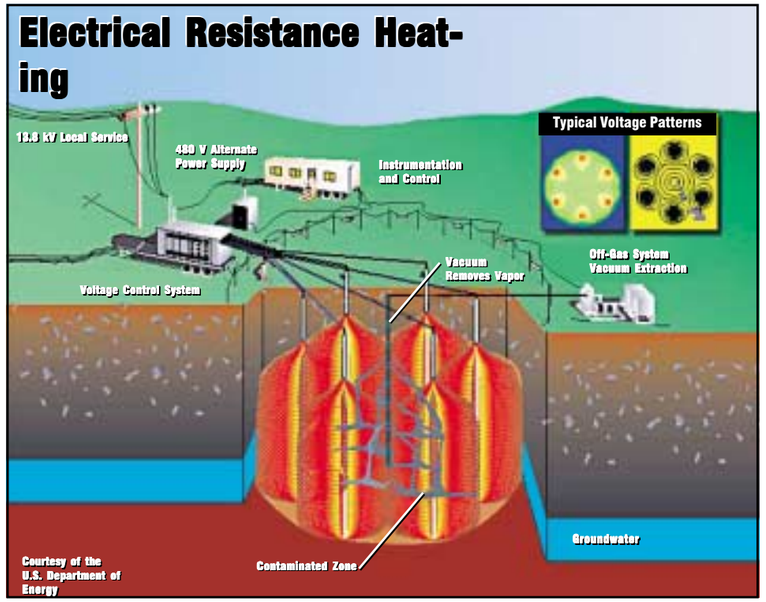
Since 1996 engineers have removed more than 43,000 tons of soils tainted with metals at three cleanup sites — and about 100,000 pounds of volatile organic compounds, or VOCs, from subsurface soils. The plant's pump and treat facility — one of the largest ever constructed on Air Force property — has restored 20 billion gallons of TCE-contaminated groundwater since it began operation in 1986. The facility has more than 30 groundwater extraction wells that withdraw some 2,000 gallons per minute. Another 20 injection wells return the treated, clean water to the aquifer.

In addition to cleaning the groundwater, seven of 12 sites have been cleaned and closed out, with concurrence of the Environmental Protection Agency.

A lion's share of the soil cleanup work has been accomplished through the team's use of hard-hitting technologies. Engineers are operating one of these technologies, called soil vapor extraction, which has removed roughly 100,000 pounds of VOCs from the ground. Another technology, known as DPE (dual phase extraction) has pulled 10,000 pounds of TCE from two sites. "DPE has been extremely effective at both sites because it can pump contaminated vapors from groundwater and soil simultaneously from the same well – allowing a higher volume of TCE to be reached and removed," said Scott.

With the reduction in TCE at most remaining sites, Scott said Plant 44 could complete the soil cleanup by 2005. Removing the TCE from groundwater, however, will take longer because of the nearly impenetrable geological structure. "Even so, we'll continue to look for and test new methods that will help speed restoration at Plant 44," he said.

By Larine Barr
ASC Public Affairs



This graphic displays how an electrical resistance heating system works to cleanup soil and groundwater contamination.

New technology heats up soil at Plant 4

A new environmental cleanup technology called ElectricalResistance Heating, or ERH, has passed its pilot test at Air Force Plant 4 and will now be put to wider use.

"Three-Phase Heating" and "Six-Phase Heating" are varieties of Electrical Resistance Heating – there really isn't much difference between them. Six-Phase Heating is optimized for the application of ERH to a single circular area approximately 65 feet in diameter. Three-Phase Heating is the preferred electrical phasing method for large and non-circular remediation areas due to its uniform heating pattern.

Both will be used to clean up soil and groundwater contamination under Building 181 at the plant, an active military manufacturing facility located on government-owned land in Fort Worth, Texas.

The contamination to be cleaned up is contained within Plant 4 boundaries and did not affect any water supply used for drinking purposes. Aeronautical Systems Center's Engineering Directorate, Acquisition Environmental, Safety and Health Division controls the property.

The primary source of contamination, trichloroethylene, or TCE, came from degreaser tanks removed from service after leaks were discovered in 1991. More than 20,000 gallons of TCE are thought to have leaked into the soil from tanks used by the chemical process facility at Building 181. These leaks were found to have occurred over several years during the 1980s. During that time TCE was used to clean aircraft parts. The contractor operating the plant ceased using TCE in 1992. A soap-and-water solution has since replaced it for all aircraft cleaning operations.

A small amount of a more condensed form of TCE, called "pure product," or dense non-aqueous phase liquid, was also found in the soil and groundwater.

George Walters, ASC's Remedial Program Manager for Plant 4, said government engineers called for an aggressive and thorough approach to the cleanup. "The Six-Phase Heating seemed to be the best choice for the test site," he said.

Engineering feasibility studies concluded that enhanced technology would be required to facilitate cleanup of the area that also included dense non-aqueous phase liquid, or DNAPL. Complexities presented by the highly varied soils, the presence of DNAPL, and occupational health concerns of an active facility, led engineers to choose a closely controlled remedial, or restoration, technology.

Although many studies have been conducted regarding effective technologies for DNAPL removal, the Interagency DNAPL Consortium provided the broadest range of candidate techniques. The consortium identified electrical resistive heating, steam injection and radio frequency heating as the best

(Continued on next page)

technologies for remediating this type of contamination.

> *"The Six-Phase Heating seemed to be the best choice for the test site."*
>
> *- George Walters, ASC's Remedial Program Manager, Plant 4*

Since a soil vapor extraction system was already in place at Plant 4 – one that matched up favorably with Six-Phase Soil Heating and Three-Phase Soil Heating — that technology was chosen to fix the problem area.

Engineers use this technology to remove contaminants from the soil and groundwater by passing an electrical current through the soil matrix. Passage of the current through the soil generates heat due to the soil's electrical resistance. This is the same process used in any electrically heated device (e.g., clothes iron, heater, stove). Heat is generated throughout the soil in the remediation area and the temperature of the soil is increased to the boiling point of water. Soil moisture then becomes steam that is captured by vapor recovery wells for removal. Soil contaminants are vaporized at the same time and are captured for extraction and treated in a catalytic oxidation system.

The pilot test for the enhanced technology was conducted in a circular area approximately 63 feet in diameter directly under Building 181.

Results exceeded treatment objectives, and the technology was found to be extremely cost effective when compared to existing soil vapor extraction and pumping treatment systems. Average TCE concentrations in groundwater and soil fell 95%. The enhanced technology now will be used to remediate a one-half acre area under the manufacturing facility.

The entire project followed ASC's objectives for better, cheaper and faster support of Air Force goals.

By Don Yates
ASC Public Affairs

Cables to electrodes are visible along with vapor extraction piping on the floor of Building 181 test site.

Plant 42

(Continued from page 1)

Warner indicated that the future action at these 14 lower risk sites might include establishing land use controls that would stipulate these areas must remain industrial and not become residential. The sites where no further investigation is recommended include former disposal areas, wash racks and locations where fuel run-up and fire training operations occurred.

The 13 sites with higher risk levels are former paint waste disposal areas, evaporation ponds, a wash rack, and engine run-up areas. Also among this group is a groundwater zone in the northwest portion of Bldg. 150, where the cleaning solvent trichloroethylene, or TCE, was detected in a production well used for industrial and drinking water purposes. As a safety precaution, field crews took the well off-line and it is no longer used for drinking water.

"We conducted an extensive investigation to locate the source of TCE in groundwater and have narrowed it to Bldg. 150. The good news is that groundwater samples indicate that the TCE is confined to the shallow part of the aquifer and has not moved off the plant property," said Warner.

According to Warner, the cleanup method under consideration for several of the 13 sites will probably be excavating the areas and transporting the soils to a permitted landfill where hazardous waste is safely disposed. Five of these sites may call for long-term monitoring to ensure that contamination in soil has not reached groundwater. To remove the TCE from beneath Bldg. 150, Warner said it is likely that the Air Force will install a pump and treat system.

Once Cal-EPA regulators approve the draft Remedial Investigation report, the Plant 42 team will conduct a feasibility study to assess the best methods for addressing contamination at the sites.

By Larine Barr
ASC Public Affairs

Wall of iron and sand treats groundwater

Air Force engineers have begun testing of a new technology to help clean up a contaminated groundwater plume shared by Air Force Plant 4 and the old Carswell AFB.

Called a Permeable Reactive Barrier, the new technology is designed to eliminate contaminants from groundwater starting approximately 20 feet deep below the surface. The Air Force will track results of this project for future use at other applicable sites.

The operator of the backhoe drops its 40-foot arm as he excavates a trench almost one thousand feet in length.

Teamwork is the key

Several Air Force agencies are cooperating in this effort. The Air Force Center for Environmental Excellence (AFCEE), Aeronautical Systems Center (ASC) and Base Realignment and Closure (BRAC) were all involved in bringing this innovative technology to the Plant 4/Carswell site just west of Fort Worth, Texas.

A Permeable Reactive Barrier consists of reactive media installed in a deep trench excavated below the groundwater surface. The reactive media in this case is iron filings. They will react with the contaminated groundwater, decreasing or eliminating contaminant concentrations. A work plan detailing construction of the barrier was received by regulatory agencies involved.

Low tech = High results

This relatively new technology, while not high tech in nature, has proven highly effective in locations with terrain similar to that at the Carswell site.

Although not a regulatory requirement, the barrier is being installed by the Air Force as a demonstration project designed to assess its capability to clean up groundwater contaminated with chlorinated hydrocarbons. The chlorinated hydrocarbons, primarily trichlorethyene, are common contaminants in underground water sources around the world. This barrier technology has produced cleanup rates of greater than 99% in previous smaller tests. Because it is expected to be just as effective at the Plant 4/Carswell site, the Air Force was able to mothball an expensive groundwater pump and treat system in place since 1991, resulting in substantial savings to the taxpayer.

How it works

The barrier being installed at the old Carswell site, now known as NAS Fort Worth JRB, is the biggest operation to date using this technology. It requires digging a trench two feet wide and forty feet deep which reaches bedrock native to that depth in this area.

Bedrock acts as a barrier to water flow. Approximately 20 feet of water sits on top of the bedrock.

When completed, the trench will be approximately one thousand feet long. The reactive media consist of iron filings mixed with sand. Iron filings attract the chlorine portion away from the hydrocarbons as the

Workers install a permeable reactive barrier at the former Carswell AFB, adjacent to Air Force Plant 4, in Fort Worth, Texas.

water moves through the barrier. Water exits the barrier as clean water and a few non-toxic, naturally occurring chemical compounds.

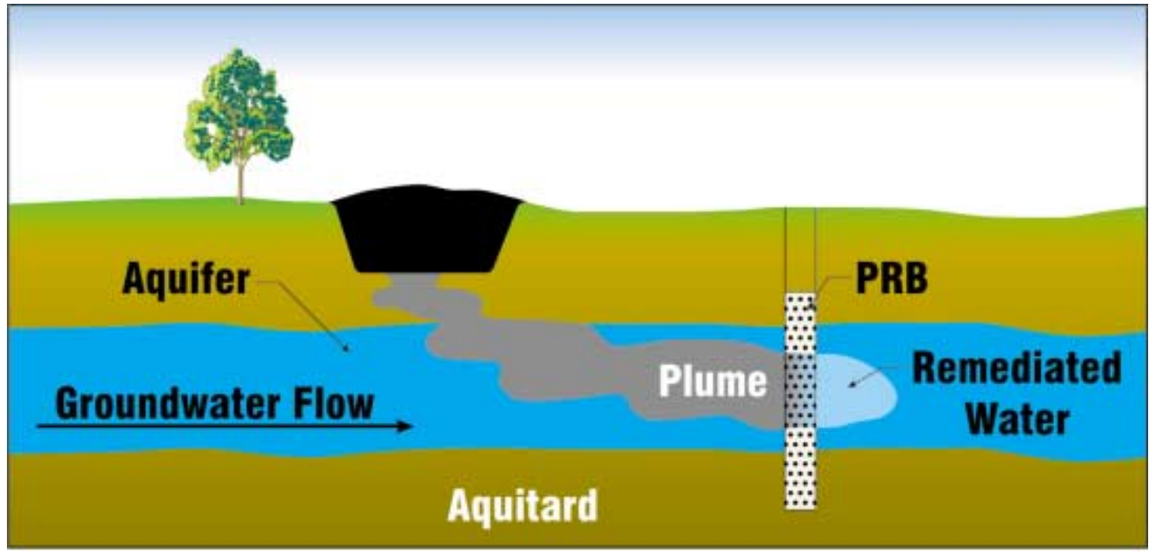
Installation involves excavating the trench by backhoe, filling it with a biopolymer slurry which acts as a coating to keep the walls from collapsing, and then adding the iron filings mixed with sand. An enzyme agent is then added to degrade the biopolymer slurry. The reactive media is installed from the top of the water table to the top of the bedrock to ensure it fully intercepts contaminated groundwater. Sand is then used to fill the remaining trench area to the top and any soil contaminated by the installation process is sampled and disposed of in accordance with all regulations.

No maintenance required

The barrier is located along the eastern edge of NAS Fort Worth JRB and crosses the base boundary and continues onto the Carswell Golf Course. Advantages of the technology include little or no maintenance after installation, no energy source requirement to operate, and once installed, the land above the barrier may be used for any purpose. In this case, the land will stay a golf course. Engineers expect to complete the project in mid-May.

Groundwater in the vicinity of the barrier, on both sides, will be sampled on a regular basis to determine the progress of the remediation. Upon completion of scheduled sampling tests, a report will be issued documenting effectiveness of the technology. The Air Force will use information gained from this study to determine if such barriers might be useful at other sites with similar groundwater contamination.

By Don Yates
ASC Public Affairs



This representaion of an installed permeable reactive barrier (PRB) depicts how the filtration process produces clean water.

Engineers locate source of groundwater contamination at Plant 42

After an extensive investigation of the entire property, environmental engineers have pinpointed the source of groundwater contamination at Air Force Plant 42 in Palmdale, Calif.

The investigation began in July 2000 after engineers detected the cleaning solvent trichloroethylene, or TCE, in a well used for industrial and drinking water purposes. The contamination was found near Bldg. 150, an aircraft hangar, located in the northwest section of Plant 42.

"Tests showed TCE at a maximum concentration of 3.7 parts per billion in a production well, which is lower than the Environmental Protection Agency's drinking water standard of 5 parts per billion. As a safety precaution, however, we took that well off-line," explained George Warner, Plant 42 project manager, Aeronautical Systems Center (ASC), Engineering Directorate, Acquisition Environmental, Safety and Health Division.

Owned by ASC, Plant 42 is a government-owned, contractor-operated facility which supports production engineering, final assembly, modification and flight testing of such aircraft as the B-2, Joint Strike Fighter and F-117. As caretaker, ASC is responsible for investigating and cleaning up contamination at Plant 42, along with six other industrial facilities.

Once TCE was detected in groundwater at Plant 42, engineers developed a sampling plan to isolate where the chemical originated so that further tests and cleanup could be done. Field crews began the search by taking soil gas samples across the northwest section of Plant 42. The soil gas samples were used as a test to learn if volatile organic compounds, like TCE, were present in gas form in the vadose zone (above the groundwater level).

"Based on the first soil gas samples, we identified Bldg. 150 as the location of the TCE release," said Warner. A second, more detailed soil gas survey indicated that the TCE release occurred in the northwest portion of Bldg. 150.

During the next step of the investigation, field crews collected shallow and deep soil samples to further characterize TCE at the site. "Shallow soil samples, taken down to 10 feet below the ground surface, are used to evaluated any threat to workers who might come in contact with the soil," said Warner. "Deep soil samples help us get a clear picture of the TCE concentrations at different depths, including whether it has reached groundwater. The deep soil samples were collected down to the water table at 360 feet."

In December 2000, the Air Force installed three groundwater monitoring wells around Bldg. 150 to assess the extent of TCE in the groundwater and evaluate the direction in which TCE is moving. In July 2001, a fourth well was installed at the north side of the building to evaluate the TCE concentration in groundwater near the location of the past TCE release.

Workers drill a monitoring well at Plant 42 in Palmdale, Calif., to study the extent of groundwater contamination.

Based on current results from the monitoring well samples, hydrogeologist John Lovenburg, with CH2M Hill, concluded that the TCE has filtered down to the groundwater beneath Bldg. 150, but has not moved off the plant property.

"The plume of TCE appears to be limited to the area around and southeast of the building," said Lovenburg. He added that, "Depth-specific groundwater samples collected from the production well impacted by TCE show that the bulk of TCE is in the shallowest portion of the aquifer just beneath the water table."

According to Warner, the TCE in groundwater is not a current hazard to workers or residents because the impacted groundwater is not currently used as a source of drinking water. The Air Force now will evaluate cleanup technologies to keep the TCE from migrating off site. "We will probably install a pump and treat system to contain and remove the TCE," Warner said.

Results of the groundwater investigation are included in a draft Remedial Investigation report, which was released for public review in December 2001. After the environmental regulators approve the report, the Air Force will prepare a feasibility study, which outlines the selected cleanup technologies for the site. That study is scheduled to be completed by early 2003.

Since its construction in 1958, Bldg. 150 has housed several contract operations, to include North American Aviation, Lockheed-Martin, Rockwell, and Boeing. In 1973, Lockheed transferred occupancy to NASA for work on the Space Shuttle Program. Various hazardous materials were reported to have been used and stored in the area such as paints, lubricants, chlorinated solvents and acids. During the 1950s through 1970s, TCE was used by industry as a common degreaser.

"It is possible that TCE or spent TCE was released to the ground during this period. Over time, the TCE may have moved downward through the soil to the water table," explained Warner.

Warner said TCE in the groundwater could be treated to meet the Environmental Protection Agency's drinking water standard of 5 parts per billion – or to a lower level that cannot be detected.

By Larine Barr
ASC Public Affairs

Left, workers prepare equipment before starting the project. Above, excavation crew removes soil at the volcano site during the soil cleanup project.

ASC completes soil cleanup project at Plant PJKS

Engineers unearthed and removed 3,000 tons of contaminated soil and debris in August from an environmental cleanup site at former Air Force Plant PJKS, near Littleton, Colo.

The excavation project is managed by Aeronautical Systems Center, an organization at Wright-Patterson AFB, Ohio, which develops, acquires and modernizes aeronautical weapon systems for the United States Air Force. The excavation removed polychlorinated biphenyls (PCBs), the cleaning solvent trichloroethylene (TCE), and petroleum products from a former disposal area called – because of its appearance — the Upper and Lower Volcanoes. These two areas are being restored by the Air Force and are among 56 other sites identified for possible cleanup at the former Air Force industrial plant.

According to Karl Kunas, ASC Acquisition Environmental, Safety and Health Division remedial project engineer for the plant, waste fuels and liquid oxygen that resulted from Titan testing were disposed of in the volcanoes in the 1960s.

During phase 1 of the project, scientists collected samples to determine the extent of contamination at the site. According to Kunas, PCBs were the only known contaminant of concern identified there at that time. While workers were excavating a portion of the area during phase II, Kunas said they detected a strong hydrocarbon and solvent odor and subsequently halted the project until more sampling could be done. "The additional testing found TCE and total petroleum hydrocarbons in the soil, in addition to the already known PCBs," said Kunas.

Engineers took more samples to determine the vertical and horizontal extent of the area's contamination. Once that was completed, state and federal environmental regulators reviewed a Construction Completion Report on the project and approved the Air Force's request to remove more soil during phase III of the project.

The roughly 3,000 tons of excavated earth were shipped to permitted landfills in Denver, where contaminated soils and debris are disposed of in accordance with state and federal environmental regulations.

Kunas said the Construction Completion Report – a document explaining the soil removal and testing process — received approval Oct. 9 by the Colorado Department of Public Health and Environment. Charles Johnson, from the state's Hazardous Waste Corrective Action Unit, stated in the approval letter that the report was concise and cleanup goals during the interim measure had been achieved. Kunas added, "We believe this interim action completes all necessary cleanup at the site. However, additional administrative actions, including further coordination with the regulators and the general public will have to be accomplished in order to make that final determination."

In August, workers regraded and seeded the former volcanoes site with native grasses to allow it to return to its natural state.

Plant PJKS, formerly involved in development and testing of the Titan missile and space exploration technology, was one of seven government-owned, contractor-operated facilities owned by the Air Force. The Air Force sold the 460-acre property in February 2001 to the on-site contractor, Lockheed Martin Space Systems Company.

Plant PJKS is on the National Priorities List of Superfund sites, which designates special funds for environmental cleanup, as a result of a 1989 decision by the EPA. According to Kunas, even though Lockheed Martin now owns the property, the Air Force continues to maintain a direct role in the environmental cleanup at the site.

The Air Force is working together with Lockheed Martin, the Colorado Health Department and the Environmental Protection Agency to ensure that all environmental contamination at PJKS is properly investigated and cleaned up. "Beyond the two volcanoes sites, we have 54 other suspect sites on PJKS. Four of these have already been cleaned up. The remaining 50 have been investigated, and our results submitted to the regulators," explained Kunas. "At two of these, we've agreed with the regulators to perform some additional investigation. That work is ongoing while the regulators continue to review the results of the remaining 48 site investigations."

-By Judy Charles
ASC/ENVR

Unique equipment provides underground answers for Air Force Plant 6

Adrian Addison, a geologist with US Geological Survey, shows a visitor data compiled by the multifunctional borehole tool.

A unique device called a multifunctional borehole tool is solving a challenging environmental problem at Air Force Plant 6 in Marietta, Ga.

The tool — designed and patented by Dr. Allen Shapiro of the U.S. Geological Survey – is being used to help engineers see below the surface to aid in the cleanup program, while coping with the complex geology under the plant. The USGS is supporting Air Force environmental restoration activities there, with emphasis on cleanup of contaminated groundwater.

The multifunctional borehole tool helps to characterize contamination in the complex crystalline bedrock by using two subsurface investigation techniques: borehole geophysics and hydraulic testing/sampling. The tool can dig deep into the earth's surface to capture needed information and relays it topside to engineers for processing. Data collected from the tool is then compiled and analyzed. Hydraulic testing and water sampling of specific fractures are conducted following analysis of all borehole data.

Bill Brown, from Aeronautical Systems Center, Engineering Directorate, Acquisition Environmental, Safety and Health Division, is the Air Force remedial project manager for Plant 6. "The USGS device is supplying us with an accurate roadmap of a very complicated underground area. This allows us to locate and attack the specific areas that need to be cleaned up."

Greg Mayer, a hydrologist/geologist, who heads up the Plant 6 USGS team said the area presents a challenge. "The area we are dealing with is where the glaciers from the Ice Age ended," Mayer said. "That created a subsurface seldom seen in other parts of the world. This part of Georgia consists of a fractured underground structure and an extremely complicated groundwater flow system."

The tool supplies virtually everything needed for figuring out what, why and which way contaminated water is flowing, and provides information needed to initiate a solution to the problem.

It measures the fracture, identifies materials found, pitch of the fractures, various angles of flow, provides a 360 degree view of area via televised lens, contents of the water and a host of other data.

Ultimately, based on current results obtained from using this equipment, the Plant 6 Installation Restoration Program will reap benefits in shorter time-cycles at any future sites requiring cleanup.

Mayer added, that the tool was originally designed to work at depths to 350 feet. However, Mayer and his crew have now enhanced the tool, for use in 6-inch diameter boreholes to depths of 600 feet. "Plant 6 is the only location where the multifunctional borehole tool has achieved that depth. We're gleaning valuable information from this operation that we may be able to use at other Air Force locations," said Mayer.

Plant 6 is one of seven government-owned, contractor-operated (GOCO) facilities managed by ASC. Historically an aircraft manufacturing facility, Plant 6 processes have included the use of cleaning solvents, acid and alkaline plating solutions, chromium salt bath solutions, jet fuel, lubricants, protective coatings and paints. Between 1943 and the early 1990s, some of these substances were released into the environment as a result of accidental spills or leaks, and former waste disposal practices. Today, Plant 6 is working with a multi-agency partnering team, to investigate remedial contamination sites and clean them up under the Air Force Installation Restoration Program.

Current use, storage and disposal of products in the manufacturing process, however, are strictly controlled by contractor and Air Force processes designed to prevent environmental contamination.

Numerous other government and contractor organizations are also involved in the Installation Restoration Program — or clean-up activities — at the plant. To ensure that clean-up efforts are effectively coordinated, and that necessary information is shared, a Partnering Program was developed.

"This truly is a unique tool producing valuable results for the Air Force. It pinpoints specific locations and shows the areas we need to address. That will ultimately help us do the job faster, better and cheaper," said Brown.

By Don Yates
ASC Public Affairs

Study finds cleanup systems operating efficiently

After conducting a scientific study, engineers have determined that cleanup technologies in place at Air Force Plant 44 in Tucson, Ariz., continue to operate at top efficiency.

The Air Force Center for Environmental Excellence at Brooks Air Force Base, Texas, conducted the Remedial Process Optimization study, which began in September 2000, to find ways to cut costs and optimize cleanup systems.

"Because these systems will run for many years, we want to ensure we are making the most of our operating funds," said Dennis Scott, Plant 44 team leader.

The primary technologies evaluated by the team included Plant 44's groundwater treatment facility, constructed in 1986 to remove trichloroethylene (TCE), and soil vapor extraction (SVE) systems, which have been removing chemical solvents at four sites.

Technicians collect vapor samples at a soil vapor extraction (SVE) monitoring well. The SVE systems were evaluated during the study.

During the study, the team focused on three main functions at the groundwater treatment facility, which endured intensive scrutiny, explained Scott. "They narrowed the study to concentrate on the groundwater treatment facility — since it has operated for many years and will continue well into the future," he added.

The three areas surveyed at the facility were the activated carbon filters installed at the treatment plant, groundwater pumping rates and general functional activities.

After completing the study, the team prepared a report, which summarized all the collected data and included recommendations on how to improve long-term operation of the systems. Overall, the groundwater treatment facility was credited as a "well run plant," according to the report. "Remedial Process Optimization recommendations have been minimal because most of the immediately attainable optimizations have already been implemented by Raytheon (Plant 44) personnel," the report concluded.

The team did make a few recommendations, however, that are under review by Plant 44 and regulators from the Environmental Protection Agency (EPA) and Arizona Department of Environmental Quality.

"One of the modifications recommended was to reduce the pumping rate of water that flows through the treatment system," said Scott. "This would allow us to operate only one of the three treatment units while continuing to remove contaminants at the same rate. The adjusted flow rate would be evaluated during a one-year period to see if we reduced energy consumption and costs."

Another modification recommended by the team was to remove the granular activated carbon filters that collect contaminants from the air stream. This recommendation will not be implemented, according to Scott, "because we already have significantly reduced contaminant levels and we would see very minimal cost savings."

The team also made a few recommendations concerning the SVE systems and site management. One idea was to reduce the number of sampling points at SVE sites where cleanup has been completed and only monitoring is taking place. "We recently implemented this recommendation at monitoring locations at the final assembly and checkout landfill, resulting in approximately $20,000 in cost savings," Scott said.

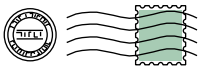
Although most cleanup systems will continue to operate without modification, the study has provided valuable insight into what might be done in the future to enhance efficiency of the cleanup. "We are very impressed with the report and will use this data to streamline and improve specific systems. It will become a guide for future decisions," Scott said.

The EPA and Arizona Department of Environmental Quality have reviewed the report and will be kept apprised of any future changes to Plant 44's cleanup systems.

By Larine Barr
ASC Public Affairs

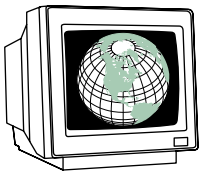
How you can get more information

If you are interested in environmental activities at our Air Force industrial plants, there are several ways to get more information.



Mailing Lists

We maintain community mailing lists for each of our seven Air Force industrial plants. If you, or someone you know, would like to be added to our mailing list, please call our toll-free number listed at the right.



Internet

Our web site at **http://www.ascenv.wpafb.af.mil** includes information about our organization. Find out more about our pollution prevention, compliance, restoration, and safety and health programs. The site also details ongoing restoration activities at each plant. Or, e-mail our staff at:

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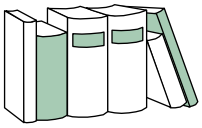
Contact Numbers.

To contact one of our public affairs specialists, call our toll-free number at (800) 982-7248. Extensions include: Don Yates, ext. 301; Daniel Johnson, ext. 346 and Gerald Wellner, ext. 322.



Administrative Record/ Information Repository

The Air Force maintains an Administrative Record for each Air Force plant at Wright-Patterson Air Force Base in Dayton, Ohio. The record contains documents on cleanup efforts and is available to the public for review. The Air Force also maintains an information repository, located at public libraries near each plant, which contains information pertinent to the cleanup effort, as well as related material.

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