Guardian

America's First Choice for Environmental Restoration

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Inside

Photo by Dale Malsberger

One Big Mixing Bowl: A team of heavy equipment vehicles mix bentonite, a dense clay, with clean soil to produce the processed soil needed to build a cap for the Corrective Action Management Unit (CAMU). The spreader on the left places bentonite onto the clean soil, while the tiller on the right follows a water truck and mixes the soil, water and bentonite until it is suitable to be placed on top of contaminated soil.

CAMU Phase 2 is Complete

On-base Soil Strategy was Key to 2003 Soil Cleanup Actions

By Dale Malsberger
Travis Remedial Project Manager

After a long summer of soil cleanup actions, the 2003 environmental construction season for Travis AFB officially ended with a walk around a closed landfill. On top of the landfill sits the centerpiece of the soil cleanup strategy, the Corrective Action Management Unit (CAMU).

A CAMU is a designated area that is designed to carry out an aspect of a cleanup action, such as the accumulation and permanent control of contaminated soil. At Travis AFB, the CAMU is set up to receive contaminated soil from other cleanup sites.

Why a CAMU?

There are many benefits to the CAMU:

1. It protects human health and the environment. The contaminated soil from other cleanup sites is covered by a cap. The cap is a layer of clean soil that minimizes the amount of rainwater that flows through the contaminated soil. The base will routinely collect and analyze groundwater samples to verify that the cap is working properly. The cap also does not allow anyone to come in contact with the contaminated soil.

2. A large quantity of contaminated soil stays on Travis AFB, avoiding the transport of this soil by truck on major roads and highways. This reduces air emissions, noise, and the risk of vehicle accidents.

3. The CAMU keeps a large amount of soil out of commercial off-base landfills. This helps to extend the functional life of these landfills. It also saves a substantial amount of $$ in off-base disposal fees.

4. The CAMU cuts down on the paperwork and cost of managing

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To learn more about the Environmental Restoration Program, visit ***public.travis.amc.af.mil/pages/enviro***

Guardian
Travis Air Force Base, California

Staff

Chief, Environmental Flight
Troy Martinson, P.E.
Chief, Environmental Restoration
Mark Smith
60th AMW Public Affairs
Linda Weese

RAB Members

Col. Michael Sevier, *Air Force Co-Chair*
Jim Whalen, *Community Co-Chair*
Dick Curtis, *N.Solano County Realtors*
John Foster, *City of Fairfield representative*
David Kanouff, *NARFE*
John Lucey, *U.S. EPA*
David Marianno, *Suisun City resident*
Cyrus Morad, *Fairfield resident*
Eamon Moriarty, *B.F. Goodrich Aerospace*
Sarah Raker, *SFBRWQCB*
Michael Reagan, *TRAFC*
Jose Salcedo, *Cal EPA/DTSC*
William Taylor, *Travis Unified School District*
Ron Tolentino, *Solano Garbage Company*
Philip Velez, *Vacaville Ch. of Commerce*

The *Guardian* is a publication of the 60th Civil Engineer Squadron's Environmental Restoration Program (ERP). The newsletter is designed to inform and educate the public about the base's ongoing environmental cleanup program. Contents expressed herein are not necessarily the official views of, or endorsed by, the U.S. government, the Department of Defense, or the Department of the Air Force. Additional information about the program can be obtained from the public website at *https://public.travis.amc.af.mil/pages/enviro*. Questions and comments about the environmental cleanup program should be addressed to:

Linda Weese
60th AMW Public Affairs
400 Brennan Circle
Travis AFB, CA 94535
(707) 424-0132
linda.weese@travis.af.mil

When Servers Don't Serve

VIEWPOINT

Glenn Anderson
Project Manager

In the October 2003 edition of the Guardian, we proposed a lofty idea: the creation of an electronic newsletter that community members could receive via their in-box rather than their mailbox. It seemed like a great idea at the time for a number of reasons. Photographs would be in color, e-mail is a lot quicker than snail mail, it would save the government scarce funds for other projects, and a PDF file is a lot easier to recycle than a piece of paper.

The concept seemed like a slam dunk, and we could not wait to receive the avalanche of requests to save some trees and sign up for this new and improved newsletter. However, to our surprise, we received only one request for the E-Guardian in the months of October and November.

What happened? Did we misjudge the needs and desires of the local community? Are people no longer interested in the Internet or environmental protection? Well, we think the answer to the last two questions is 'no'. As it turned out, we were stung by improvements in our own technology.

In our E-Guardian article, we had asked interested readers to contact us via our Travis Environmental web site. A web site is a group of web pages that is stored on a server which is a powerful computer that is connected to the Internet. When you type a web address into a browser (a computer program that accesses the Internet) and click the Enter button, your computer sends out a request for the first page of the web site at that address. It sounds simple, but this procedure does not work when the web address changes.

Yes, our Environmental web site has a new address, because it was moved from our local server to one at Air Mobility Command (AMC). In fact, this happened to the web sites at all eleven bases in AMC. As we learned later on, it was part of a directive by the Secretary of the Air Force to consolidate all networks, servers, and desktop services on each base. This makes a lot of sense, since the Air Force (like most other large organizations) is relying more and more on computer networks for information management.

Sometimes it seems that you cannot read a newspaper without seeing an article about the latest virus or worm that is wreaking havoc on the World Wide Web. By consolidating its network systems at the major command level, the Air Force seeks to improve system reliability, performance, and information assurance with the few Information Technology professionals that it has on staff. Plus, with fewer servers and software packages to maintain, information management costs should drop in the long run.

So, the Environmental web site along with all of the other web sites on Travis AFB migrated to the server network at Scott AFB (home of AMC), and our local servers were shut down a short time later. Afterwards, when you tried to access our web site using the old address, all that you would get is the dreaded "Page Cannot Be Found" warning. How embarrassing!

First, we want to thank our one reader who either found our new web address or knew our old e-mail address. Second, we want to try this again. Would you like to try out the E-Guardian? If so, please log onto the Travis Environmental web site at its new address, click on "Feedback", and follow the instructions to send us your name, mailing address (to ensure that it is taken off of the mailing list), and e-mail address.

The new address for the Travis Environmental web site is *https://public.travis.amc.af.mil/pages/enviro/*.

CAMU

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contaminated soil.

Thanks to the reduced costs, more cleanup actions can take place each year. But, does the CAMU have a downside?

Planning the CAMU

The simple idea of consolidating contaminated soil on the base has been around for the last decade. Making the CAMU happen, however, was no simple matter. Basically, it took a lot of planning, designing, and detailed fieldwork. The first step was to develop a consolidation plan that met federal and state legal requirements. U.S. and California CAMU regulations allow soil consolidation on base to speed up cleanup if it is safe, cost-effective, and permanent.

Also, the base and regulatory agencies had to establish acceptable levels of soil contamination that would go to the CAMU. Once these "CAMU Acceptance Levels" were developed and approved, and with positive input from the Travis AFB Restoration Advisory Board (RAB), the CAMU concept was on its way.

Designing the CAMU

The CAMU design accommodates an estimated maximum volume of 111,000 cubic yards of contaminated soil. The cap selected for the CAMU is a 4-foot thick evapotranspiration (ET) cover that relies on deep-rooted plants to use and expel most of the rainwater that is absorbed into the cap. This design feature limits the amount of water that passes through to the contaminated soil below.

The CAMU design includes a number of special features:

1. An interceptor trench along the east side of the CAMU is buried 6 feet below the surface of the CAMU pad. It diverts the natural flow of groundwater from the east to a low area to the south of the CAMU. Ms. Sarah Raker of the RWQCB explained, "The trench assures that the contaminated soil in the CAMU will always be at least 5 feet above the groundwater as required by California Waste Management and Water Board requirements."

Photo by Dale Malsberger

The Finished Product: Contaminated soil from other restoration sites lie beneath a 4-foot layer of clean soil. Installed sensors and local monitoring wells verify that contaminants are not moving into the local groundwater.

2. A lysimeter is buried under the western slope of the CAMU. It consists of a plastic liner that catches and measures the amount of water that passes through the ET cap to monitor cap performance.

3. Five gypsum blocks are also buried in the cap to measure soil moisture.

Building the CAMU

Shaw Environmental & Infastructure, Inc. (Shaw) is the contractor that was selected to build the CAMU, using a phased approach to complete the fieldwork. In Phase 1, Shaw filled in the depressions in the closed landfill and built the foundation for the CAMU. This phase was finished in the summer of 2002.

Phase 2 was done by November 2003. After preparing a large work area at the landfill by scraping off vegetation, Shaw placed contaminated soil from 3 soil sites (the base entomology shop, a solvent spill area, & a drainage ditch) in the work area next to where the CAMU would be built. Contaminated soil from a fourth site (a group of pesticide disposal trenches, known as LF008) was delivered directly into the CAMU.

"LF008 provided about 2700 cubic yards of soil and made up the base layer of the CAMU," stated Brian Garber, Shaw project manager. The soil from the three other sites was individually placed as distinct cells across the top of the LF008 soil. "Our RAB members suggested the soil segregation strategy during the review of the CAMU design," Mark Smith, base Remedial Program Manager explained. "It is a remote possibility, but you never know if we may need to find and dig up soil with specific contaminants in the future."

A total of 3200 cubic yards of contaminated soil was placed into the CAMU during Phase 2. "We added clean soil to the CAMU to form a flat-topped four-sided pyramid with a base of about 160 foot square and 10 foot high," stated Mike Wray, project manager for the design and field oversight team. "We needed the extra soil to build a lysimeter that is large enough to give accurate results."

Once the contaminated soil was in place, it was covered with the cap. "Fortunately, Travis had stockpiled almost 100,000 cubic yards of excess clean soil from various construction projects over the last 8 years," said Steve Stopher, Travis Environmental Field Manager. "We did not have to buy clean soil and truck it on base to support the CAMU project." Shaw added bentonite, a processed clay, to the clean soil to ensure that water flow through the cap would be restricted. This processed soil was used to add a 4-foot thick cap to the contaminated soil pyramid.

To install the lysimeter, Shaw excavated a temporary 35 foot by 41 foot pit in the western face of the CAMU pyramid. Thick plastic material was placed in the pit and formed into the shape of a bathtub. The 'bathtub' was connected with piping to tanks to collect and measure the surface runoff from the surface above the lysimeter and the amount of water that passes through the cap. Later, Shaw refilled the pit with the same processed soil

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Photo by Brian Garber (Shaw E&I)

Scraping Away: A backhoe removes contaminated soil from a drainage ditch, one scrape at a time. All of the contaminated soil was placed in the Corrective Action Management Unit (CAMU).

Cleaning the Big Ditch

By Glenn Anderson
Travis Remedial Project Manager

Another restoration site made significant strides toward closure when Shaw Environmental and Infrastructure, Inc. (Shaw) completed the cleanup of a drainage ditch on the western portion of Travis AFB last summer.

Site SD042 consists of a drainage ditch on a hill, north of W Street, that collects water from nearby paved areas and drains in east and west directions. The ditch received metals and semi-volatile organic compounds from three nearby buildings. Building 929 is a storage shed near a Hazardous Waste Accumulation Area, building 931 is a maintenance facility for electric generators, and building 940 is a former paint drying facility.

The cleanup of site SD042 consisted of the excavation of contaminated sediment at the bottom of the ditch and the cleaning of a sump connected to building 940. The Soil Record of Decision for the West/Annexes/Basewide Operable Unit presents the cleanup levels for this project.

Shaw needed only a week in early July to complete the cleanup action. By using a backhoe to scrape the bottom of the ditch, the contaminated sediment was excavated and moved by truck to the Corrective Action Management Unit (CAMU). The CAMU is a designated area on the base that is designed to receive and consolidate contaminated soil. The chemical concentrations in the soil have to meet regulator-approved acceptance criteria to be placed in the CAMU.

"This was a fairly simple cleanup from a technical standpoint,' stated Brian Garber, project manager for Shaw. "All of the contaminated soil met the standards for CAMU placement, and the only materials that had to be sent to an off-base landfill were the paint chips and metal particles from the Building 940 sump."

The most challenging aspect of the project turned out to be the work around the shrubs that personnel in Building 931 had planted and nurtured over the years. "There were a dozen or so bushes in the middle of the excavation area that we protected with cheese cloth and hand digging to prevent them from being damaged. It's all part of helping the environment," remarked Mr. Garber.

Confirmation samples collected from the bottom of the ditch after the completion of the excavation demonstrated that residential cleanup levels had been reached for all but a small portion of the ditch. A second excavation effort removed the remaining contaminants, allowing the site to be available for unrestricted use.

Once excavation was complete, the site was restored by backfilling the

CAMU

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that was used to make the cap.

Gypsum blocks were added to the cap to monitor soil moisture conditions, and a rain gauge was installed nearby. This monitoring equipment will allow a thorough evaluation of cap performance. In the final step, Shaw added fertilizer to the top 6 inches of the cap, a special seed mix to grow deep-rooted plants in the topsoil, and erosion control matting around the lower edges of the pyramid.

The best part of CAMU Phase 2 was that it was completed on schedule and under budget. Mark Smith stated "The success of this project was due to the hard work and coordinated efforts of contractors, project managers, regulators, and the contracting folks from the Air Force Center for Environmental Excellence." Brian Garber added "The fact that the rains held off until we finished the field work was also a big help."

What Next?

CAMU Phase 3 is scheduled to begin during the 2006 construction season. Once open, the CAMU will accept contaminated soil from cleanup actions in the North, East, and West Industrial Operable Unit (NEWIOU). Travis AFB will be authorized to start these actions once the NEWIOU Soil, Sediment and Surface Water Record of Decision (ROD) is signed. Similar to the ROD for the West/Annexes/Basewide Operable Unit, it will select cleanup strategies and establish cleanup levels for 18 soil sites. In the meantime, periodic upkeep and monitoring of the CAMU will verify that the performance of the cap meets the design requirements.

"Looking back at this year's environmental work, it is clear that the CAMU required a lot of work that spanned over six years," Mark Smith stated. "However, the considerable benefits made it all worthwhile."

landscape areas with clean soil. The loose soil was covered by a hydroseed mixture of native seed and fertilizer that will promote the growth of vegetation during the wet winter months.

Full Plume Capture

Base Begins Cleanup of Largest Off-Base Body of Contaminated Groundwater

By Tom Sreenivasan
Travis Remedial Project Manager

After five years of real estate negotiations and design changes, Travis AFB connected an off-base groundwater extraction system to an on-base groundwater treatment system and started to clean up solvent-contaminated groundwater that had moved beyond the base boundary.

A former fire training area that had been active in the 1960's, designated as FT005, is the source of the solvent-contaminated groundwater. Waste fuels, oils and solvents had been burned at the site during training exercises. FT005 was closed in the early 1970's.

Groundwater contaminants at FT005 consist of industrial solvents such as Trichloroethene (TCE) and 1,2-Dichloroethane (DCA). "FT005 has been very difficult to manage, because most of the plume contains DCA," stated Tom Sreenivasan, treatment plant project manager. A plume is a body of contaminated groundwater.

1,2-DCA is a lighter molecule compared to TCE, and it travels faster in groundwater. This is one reason why the FT005 plume has grown so large compared to other base plumes. The smaller molecular size also makes it more difficult to remove 1,2-DCA from water using standard treatment methods, such as granular activated carbon. Finally, the cleanup goal for 1,2-DCA is ten times lower than the TCE cleanup goal, which increases the cleanup time.

> *"We estimate that our pump-and-treat system will take up to 15 years to do the job at FT005, but the future may provide us with a more effective treatment alternative to reduce the cleanup time substantially."*
> Mark Smith

Groundwater extraction takes place at FT005 through a network of 15 vertical extraction wells that starts at the base boundary and extends over 1800 feet in a southern direction. The extracted water is conveyed in a series of connecting underground pipes to the South Base Boundary Groundwater Treatment Plant where it is run through an air stripper. The air stripper uses agitated air movement to tear the solvents away from the water molecules. The solvents are expelled in very low concentrations into the atmosphere, and the treated water is discharged into Union Creek or used to irrigate base property. Occasionally, when the air stripper requires maintenance, the groundwater is treated in 6,000-pound vessels containing granular activated carbon. The sides of an activated carbon granule act as sticky surfaces, grabbing onto the solvent molecules while letting the cleaned water flow through the system.

Construction of the FT005 extraction system took place in three phases. Phase 1 was complete in 1998 and consisted of a row of extraction wells along the southern base property line to stop the flow of contaminated groundwater off-base. Phase 2 ended in 2000 and consisted of three additional on-base extraction wells to prevent off-base groundwater flow. Phase 3 was finished last autumn and added nine new extraction wells and conveyance pipelines onto off-base property to capture the portion of the FT005 plume that has already migrated off-base.

In addition to extraction wells, a network of monitoring wells has been installed around the FT005 plume to verify that the extraction wells have stopped the advance of the FT005 plume.

Final cleanup of this 20-acre plume will take many years, but it is possible that innovative technologies may one day speed up the cleanup process. "Advances in cleanup technology are exciting and show some promise," noted Mark Smith, remedial program manager. "We estimate that our pump-and-treat system will take up to 15 years to do the job at FT005, but the future may provide us with a more effective treatment alternative to reduce the cleanup time substantially ."

Photo by Tom Sreenivasan

Installation in Progress: A backhoe digs a trench on off-base property to bury approximately 3,600 feet of conveyance piping. The piping connects a series of extraction wells to a groundwater treatment plant on the south side of the base. The wells surround a body of contaminated groundwater that has moved beyond the base boundary.

Cleaning Up the Neighborhood

Base Completes Last of Three Off-Base Groundwater Cleanup Projects

By Dale Malsberger
Travis Remedial Project Manager

Sometimes the easiest jobs become very difficult when they are done in someone else's yard.

In cooperation with base neighbors, Travis AFB has wrapped up the third and final off-base groundwater project. Even though it only involved the installation of a couple of monitoring wells, this field effort marks the last restoration project that involves off-base property.

"Contaminated groundwater becomes a more complex issue when it flows beyond the base boundary," explained Mark Smith, restoration project manager. "When this happens, we work with the neighboring property owner and negotiate an appropriate real estate agreement to gain access to the property before a cleanup project can start."

Often a federal agency will use an easement to arrange for property access. An easement is a right to make limited use of another person's real property. Normally, the property owner can still use the property unless the easement specifically restricts land use. Easements for cleanup actions support the installation of needed cleanup equipment that will be removed from the property once the cleanup is complete.

In this case, the focus of the cleanup is a small body of contaminated groundwater, or plume, from a closed municipal landfill at the northeastern boundary of the base. The plume contains Trichloroethene (TCE), an industrial solvent that was once a popular degreaser until the U.S. EPA banned it in 1980. A 1996 environmental investigation determined that a portion of the plume had migrated up to 200 feet north of the base boundary.

Most of the on-base construction for this cleanup action took place in 2002, installing three new monitoring wells and two extraction wells adjacent to the north fence. The easement was not in place until mid-2003, and the last two monitoring wells were placed about 75 feet north of the base.

Photo by Dale Malsberger

A Road Less Travelled: Field team members use planks of plywood to bring heavy equipment onto off-base property for the installation of several monitoring wells. The plywood helps to protect a large dried-up vernal pool that lies north of the base fenceline from damage.

To complicate the project even further, special precautions had to be taken to protect a large vernal pool in the area where the wells were going to be placed. A vernal pool is a sensitive wetlands habitat where protected plants and animals often make their home. Fieldwork did not start until the pool was completely dry, and wooden planks were placed over the pool area to prevent damage from vehicles.

Next spring, solar powered pumps will be placed into the two on-base extraction wells and connected with underground pipes to a groundwater treatment plant to extract and treat contaminated groundwater. "We will use the two off-base wells to verify the effectiveness of the extraction wells in capturing the off-base part of the plume," stated Mark Smith. "Monitoring well data will tell us when the off-base groundwater is clean."

Against the Grain

Of the three contaminated bodies of groundwater that managed to escape beyond the base boundaries, the plume at LF007 is unique. Unlike the two plumes that have moved beyond the south base boundary, the LF007 plume crosses the north base boundary and stretches about 200 feet to the north.

"In a sense, the plume should not even be there," stated Dale Malsberger, project manager for the North/East/West Industrial Operable Unit. "Since the regional groundwater generally flows from the north to the south, the LF007 plume appears to be flowing uphill."

Dale uses groundwater information to explain this occurrence. A review of water

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Travis AFB
Restoration Advisory Board
Meeting Agenda
January 22, 2004

Northern Solano County
Association of Realtors
3690 Hilborn Road
Fairfield, California

6:30 - 7:00 p.m. Open Forum:
The open forum allows RAB and community members to discuss ongoing Travis AFB restoration program activities with the Travis AFB environmental restoration staff on a one-to-one basis.

7:00 - 9:00 p.m. RAB General Meeting

I. Welcome and Introductions

II. Approval of Minutes

III. Additional Agenda Items and Questions

IV. Discussion Topics
- North/East/West Industrial Operable Unit Soil Record of Decision Status
- RAB Bylaws

Break

V. Cleanup Program Status
- Corrective Action Management Unit Phase 2
- LF007 Off-Base Groundwater Remedial Action
- FT005 Off-Base Groundwater Remedial Action

VI. Regulatory Agency Reports

VII. Focus Group Reports

VIII. RAB/Public Questions

IX. Set Time and Place for Next RAB Meeting

X. Set Focus Group Meeting Times

Adjourn

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level measurements and chemical data shows that the water picked up primarily solvents from the closed LF007 landfill and was forced northward by a nearby mound of groundwater.

It is likely that former subsidence trenches on top of the landfill caused the mound effect. The trenches acted as catch basins, collecting water and piling it up in the subsurface. The flow off of the local mound countered the regional flow, causing the contaminated groundwater to move beyond the north base boundary.

"We filled in the trenches with tons of clean soil last year," mentioned Mr. Malsberger. The improved drainage and the addition of an interceptor trench in the landfill are designed to reduce the mound. "Recent water measurements show that the landfill maintenance has already reduced the height of the mound by about 2 feet."

Travis AFB Restoration Advisory Board Meeting

January 22, 2004
7 p.m.

Northern Solano County
Association of Realtors
3690 Hilborn Rd
Fairfield, CA

Location of Information Repositories

Vacaville Public Library
1020 Ulatis Drive
Vacaville, CA 95688

(707) 449-6290

Monday-Thursday: 10 a.m. - 9 p.m.
Friday-Saturday: 10 a.m. - 5 p.m.
Sunday: 1 p.m. - 5 p.m.

Fairfield-Suisun Com. Library
1150 Kentucky Street
Fairfield, CA 94533

(707) 421-6500

Monday-Thursday: 10 a.m. - 9 p.m.
Friday-Saturday: 10 a.m. - 5 p.m.
Sunday: 1 p.m. - 5 p.m.

Mitchell Memorial Library
510 Travis Boulevard
Travis AFB, CA 94535

(707) 424-3279

Monday-Thursday: 10 a.m. - 9 p.m.
Friday: 10 a.m. - 6 p.m.
Saturday: Closed
Sunday: 12 p.m. - 6 p.m.

or view our web site at https://public.travis.amc.af.mil/pages/enviro

For more information about Travis AFB's restoration program, please contact:

Mark Smith
Chief, Environmental Restoration
Travis AFB
(707) 424-3062

Kristine Escarda
Public Participation Specialist
Cal EPA/DTSC
(916) 255-6683

Viola Cooper
Community Involvement,
Program Coordinator, U.S. EPA
(415) 972-3243
(800) 231-3075

Community Relations
60 CES/CEVR (Environmental Restoration)
411 Airmen Drive, Building 570
Travis AFB, CA 94535-2001
(707) 424-4359