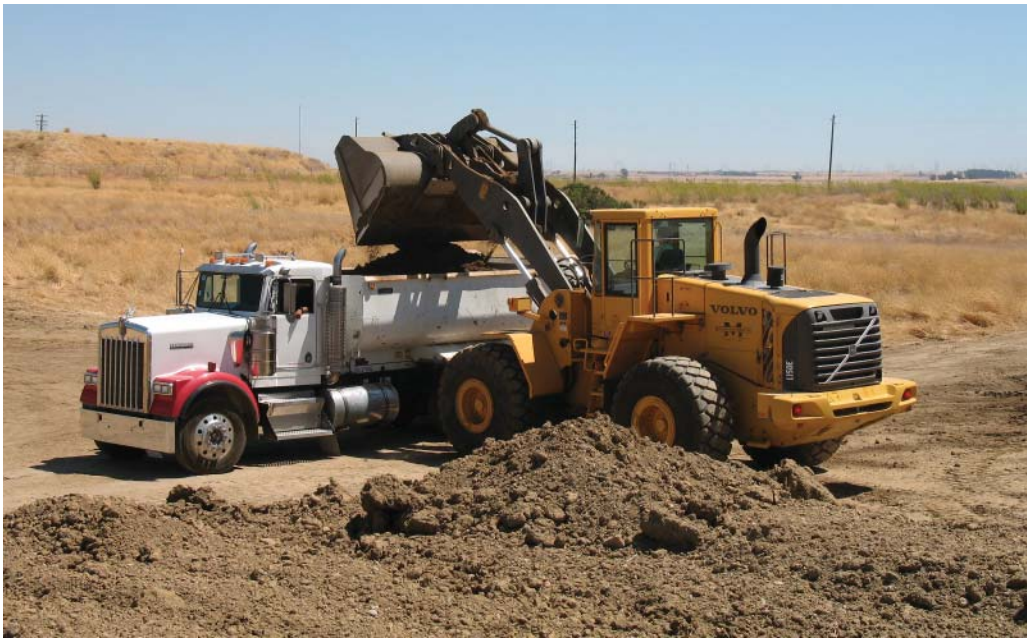
Guardian

America's First Choice for Environmental Restoration

A Publication of the Environmental Restoration Program | Travis Air Force Base, California | October 2007

Inside



(Photo by Lonnie Duke)

Load and Go: A front end loader places a scoop of clean soil into a dump truck. A large volume of soil was needed to fill in the excavation void from the cleanup of a former small arms range. Soil samples were analyzed by an off-base laboratory to confirm that the soil was suitable for this use.

Excavation Continuation

Soil Cleanup Proceeds into Critical Autumn Months

By Glenn Anderson
Travis Environmental Project Manager

It has been a busy summer for the field crews responsible for the cleanup of seven soil and sediment sites on Travis AFB. Thousands of cubic yards of contaminated soil have been excavated and transported to a soil repository in the northeast corner of the base, and thousands of cubic yards of clean soil have been used to fill in the excavation areas and restore the topography to pre-existing conditions.

As of the end of September 2007, one cleanup action at a former small arms range (designated as SD045) near the South Gate is complete, and two cleanup actions at two former fire training areas (FT003 and FT004) are nearing completion. Work at a third former fire training area (FT005) is in full swing, and preparations are being made to start work on two sediment sites (SD001 and SD033) in Union Creek. The final soil cleanup near a closed municipal landfill (LF007) will begin in late October.

"A lot of work has been done, but there is so much more work to be accomplished" stated Mark Smith,

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Guardian
Travis Air Force Base, California

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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 *http://public.travis.amc.af.mil/enviro*. Questions and comments about the program may be sent to this address:

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It is Definitely Worth It

VIEWPOINT

Mark H. Smith
Travis Remedial
Program Manager

I'm probably not going too far out on a limb to say that everyone who gets up and goes to work each day wants to make progress, wants to feel a sense of accomplishment, and wants to see the results of their hard work. We can feel lost in all the "behind the scenes" effort that doesn't seem to produce anything measurable and verifiable. We notice progress with implementation of an environmental project, whether it results in the building of a groundwater treatment plant or cleanup of contaminated soil. Implementation is where the rubber meets the road; we can see it and touch it.

In this newsletter you'll read about a milestone in groundwater treatment as well as the continuation of soil cleanup milestones that were first implemented in 2003. Billions of gallons of water treated; thousands of cubic yards of soil removed from contaminated sites on base; land that can now be used without environmental restrictions by the Air Force for training, readiness operations, facility construction or any future missions the Air Force may tackle. Now that's progress!

But progress is often hard to see at first. Early in the cleanup process, a remedial investigation finds where the contamination is and where the highest concentrations are. After all of the planning, negotiating, decision-making and signed agreements are finished, we can begin to see progress. In a few short weeks, instead of a contaminated field of limited value, we can see a piece of property that is restored to where it is safe enough to live on.

Also, progress sometimes comes at a price. In the case of one of our groundwater sites (a former battery acid neutralization sump that is contaminated with chlorinated solvents), we knew exactly where the contaminant was dumped, and we installed an extraction well in that very location to remove and treat both vapors and contaminated groundwater. We removed hundreds of pounds of contaminant mass within the first day of operation. The cost of operation per pound of mass removed of that system was very reasonable!

Today, our groundwater contains less contaminant mass than when we started, and we have to treat more water than before to remove one pound of contaminant mass. In fact, at some sites, we pump and treat to not only remove contaminant mass but also to stabilize the contaminant plume and keep it from moving further along with the groundwater flow. Therefore, the cost per pound of mass removed has become much more expensive, but the continuation of this work is still important.

To significantly reduce the cost of contaminant cleanup without increasing the potential risk to critters or humans, we look for exit strategies and opportunities to improve or optimize the current cleanup systems for our groundwater sites, but their implementation takes time. We are confident that the cost of progress will eventually go down. For now, however, it may be expensive but it's definitely worth it.

Continuation

From page 1

Travis Remedial Program Manager. "We just hope that the weather continues to cooperate with us and allows our field crews to work on dry land."

Heavy rains pose the biggest threat to the progress made in the field. Once the surface soil becomes saturated with rainwater, it becomes more difficult to handle. Heavy equipment can get bogged down in the mud, and field workers are more prone to accidents (slips, trips and falls). Coincidentally, light rains actually promote field work by making it easier to suppress dust generation and to compact soil.

Even without rain, there were enough surprises along the way to make it more difficult to stick to the original cleanup schedule. First, the actual volume of excavated soil at each site was much greater than the estimated volume, sometimes more than doubling the original estimate. This does not reflect badly on the environmental investigative work that was done in the past; rather, it demonstrates the difficulty of calculating accurate volume estimates with a limited amount of field data. Subsurface soil sampling and lab analysis tend to be expensive, so project managers must weigh the cost of investigating a site with the amount of field data generated and decide when there is 'enough' data to accurately estimate the amount of excavation needed to clean up a site.

Second, the presence of several families of burrowing owls near a former fire training area delayed a portion of the field excavation. Wildlife biologists determined that the young owls in at least one nest were not ready to leave the nest and make it on their own. Once the birds had left their nest, then the excavation near the nest could proceed. The article below covers this topic in more detail.

"Overall, it has been a very productive summer, and the field crews made up some time in the schedule to compensate for the delays," said Mr. Smith. "Northern California really needs the rain this year, but we just hope that it holds off until the soil cleanup is behind us. We look forward to letting everyone know how it all turns out in the next edition of the Guardian."

How to Evict a Burrowing Owl

By Glenn Anderson
Travis Environmental Project Manager

Most people would agree that the cleanup of a contaminated site to protect the environment is an appropriate course of action. Several of the soil cleanup actions that took place last summer were designed to ensure that plants and animals are not exposed to potential risks from contaminants. However, what do you do when animals are living in an area that is scheduled for excavation, particularly animals that receive protection from either federal or State of California laws?

Travis AFB faced this scenario at a former fire training area that was contaminated with lead and dioxins. The Air Force had agreed to excavate the contaminated soil and place it in a soil repository where it could not pose a risk to anyone. A soil cleanup contractor had mobilized heavy equipment and supplies at the site and was getting the site ready for excavation. Everything was ready to go until a biological survey discovered a nest of burrowing owls near the excavation area.

Burrowing owls are listed as special status species by the State of California, which means that they are federally listed as threatened or endangered or there is sufficient information to support listing. They are one of the smallest owls in North America and live underground in burrows that have been dug out by small mammals like ground squirrels and rodents.

One of the greatest threats to burrowing owls is habitat destruction and degradation from land development. Even with state protection, burrowing owls and their burrows can be harmed during construction activities.

It is not a surprise that so many burrowing owls call Travis AFB their home. Because of the space requirements for managing aircraft operations, there is a lot of relatively undisturbed land available for the owls to nest and feed.

Once the nest was discovered, Travis AFB and the cleanup contractor took immediate steps to prevent the nest from being disturbed. They put a 250-foot buffer zone around the nest and only allowed work outside the zone to take place. Also, they stationed a wildlife biologist within view of the nest to ensure that field activities did not have an adverse impact on the young owls. Finally, they came up with a plan to evict the owls once the younger ones were old enough to leave the nest.

Young burrowing owls often appear at the burrow's entrance two weeks after hatching and leave the nest to look for food after about 45 days and can fly after 6 weeks. So, we placed 'evictors' into the openings of all burrows in the vicinity of the nest after the young owls were old enough to take care of

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XRF Helps to Get the Lead Out

Handy Tool Supports Soil Cleanup Actions

By Glenn Anderson
Travis Environmental Project Manager

One of the most expensive aspects of a soil cleanup action is sampling and analysis. There is a cost associated with every sample analysis that is performed by a state-certified analytical laboratory, and we need a lot of soil samples to determine if a soil cleanup action achieved its chemical cleanup levels. Costs are also associated with the quality control samples that verify the precision and accuracy of the laboratory results. It is also possible for the laboratory to speed up the analysis of soil samples but only if the field team is willing to pay a premium for the service.

If the cleanup levels are not achieved, the field team has to continue the cleanup action in the contaminated areas until there is a reasonable expectation that the cleanup levels are now achieved. Of course, to verify this, the following is required:

More soil sampling. More laboratory analysis. More cost.

Another challenge involves the amount of time required for the laboratory to complete the analyses and quality control tests. During this time, there is nothing for the field team to do at the site, so the team and its equipment is usually transferred to another site until the analytical results and quality control tests are complete. Even if the amount of personnel downtime is minimal, there are still costs associated with the transport of heavy equipment from one site to another.

Fortunately, there are tools available for some contaminants that allow the field team to obtain real-time, high quality analytical data that can speed up cleanup decisions and save time and cleanup funds. One such tool is the portable X-ray Fluorescence (XRF) device.

An XRF device emits an energy beam of a specific wavelength and intensity into a soil sample. The energy is absorbed by atoms of a specific element (such as lead), which release the energy at a different wavelength. The device picks up the incoming energy, analyzes it, and determines the type and amount of element that is present in the soil. So, it can identify and measure materials that cannot be seen by the unaided eye.

There have been several changes to XRF technology that make these devices easier and cheaper to operate. Older XRF devices used radioactive isotopes to generate their energy beams, which created a number of problems. The radioactive sources used in the devices were expensive to manufacture and highly regulated. Strict control over the sources was time-consuming, and disposal requirements and costs were considerable.

Modern XRF devices that are used in the field tend to be lightweight, rugged in design, and fast in operation. They rely on X-ray tubes to be the excitation sources for X-ray analysis, so they avoid most of the problems associated with radioactive source devices. According to EPA Method 6200, x-ray tubes "*have higher radiation output, no intrinsic lifetime limit, produce constant output over their lifetime, and do not have the disposal problems of radioactive sources.*" Another advantage of these devices is that they rely on easy-to-use, highly accurate, on-board software to carry out the XRF analysis. So, since these devices often look like a toy ray gun, the operator points, shoots, and reads the data.

We tested a portable XRF device at the former small arms range in the southwest portion of the base, both to establish the boundaries of the soil cleanup and to verify that the cleanup levels had been reached after the excavation. Lead was the primary chemical of concern at this site, and XRF can identify a number of metals such as lead.

The advantages of XRF over laboratory analysis became obvious very quickly. The time to obtain the results of sample analysis dropped from up to three days

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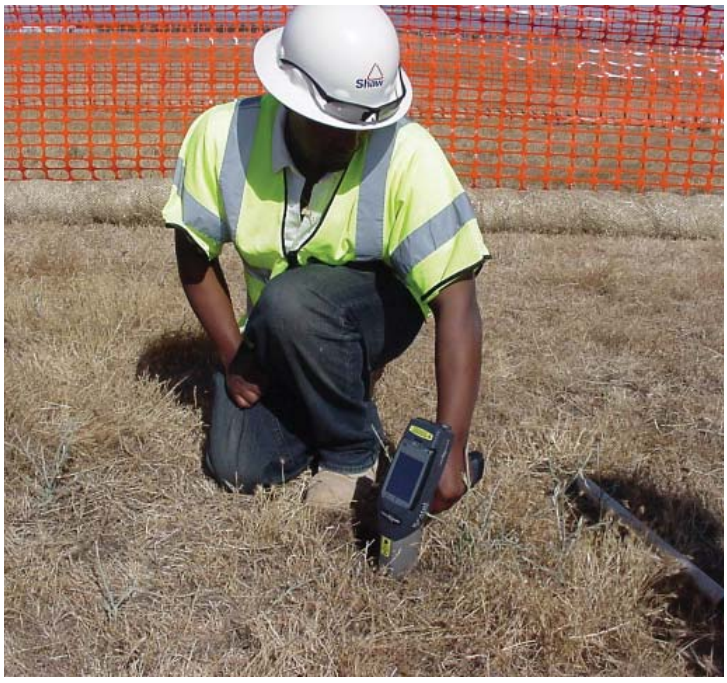


A field technician uses a portable XRF device to measure lead concentration in the surface soil at a former small arms range. Large numbers of detections in a short time period can guide decision-making in the field.

Over One Billion Treated

By Lonnie Duke
Travis Environmental Project Manager

While this may sound like a line from a fast-food advertisement, it is actually a milestone in groundwater cleanup here at Travis Air Force Base. We have treated over a billion gallons of groundwater.

During the first week of August 2007, three groundwater treatment plants at Travis AFB treated their one billionth gallon of groundwater since the start of the first treatment plant in January 1996. As a result of over ten years of groundwater extraction and treatment, over 16,000 lbs or 8 tons of Volatile Organic Compounds (VOCs) have been removed from the subsurface.

These performance numbers sound impressive, but how much does this cleanup work cost? Well, there is much to consider when looking at costs. We could focus on the cost of operating each individual treatment plant, or the cost per gallon of groundwater treated, or the cost per pound of contaminant removed.

Also, each groundwater treatment system receives contaminated water from separate groups of extraction wells and removes the contaminants with different technologies. As a result, costs will vary with each plant. Because the purpose of these plants is to clean up groundwater, we measure the cost for each pound of contaminant removed by each plant.

Toward the northeast part of the base, the North Groundwater Treatment Plant can treat both water and vapor, but the vapor concentrations that enter the plant have dropped significantly over time, so vapor is no longer treated there. When vapor concentrations were higher, vapor treatment at the North Plant resulted in the removal of 5,240 lb's of VOCs. In contrast, groundwater treatment at the North Plant removed only 173 lb's of VOCs. Its current rolling 12-month cost, which is the sum of the monthly costs over the last 12 months divided by the number of pounds removed during the same 12 months, is currently $34,210 per pound!

Near the flight line, the Central Groundwater Treatment Plant takes care of all contaminated groundwater and vapor beneath the industrial part of the base. It uses a Thermal Oxidation unit (ThOx) to treat the vapor and an Ultraviolet Oxidation system to treat the groundwater. It also receives groundwater from the Western Transfer and Treatment Plant (WTTP), which collects water and treats vapor from extraction well networks in the western part of the base. Groundwater treatment at the Central plant has resulted in the removal of 2,212 lbs of VOC, while vapor treatment at the WTTP and the ThOx has resulted in the removal of 8,322 lbs of VOCs. The rolling 12-month cost for the Central Plant/WTTP is $1,782 per pound.

To deal with contaminated groundwater that moved beyond the southern base boundary, the South Base Boundary Groundwater Treatment Plant uses an air stripper to physically take volatile contaminants out of the groundwater. So far, it has removed 315 lbs of VOCs but had to treat 574,000,000 gallons of groundwater to do so. Its rolling 12-month cost is $4,207 per pound of VOC removed.

Looking at this issue from a different perspective, the annual operating cost for the three treatment plants is nearly $500,000.

As the contaminant concentrations in groundwater and vapor drop, the cost to remove contaminants rises. While we have made some great progress over the years, the "Low-Hanging Fruit" has all been picked and getting the rest of the contamination with traditional pump-and-treat methods will be even more costly. So, Travis AFB is currently looking at alternative technologies to optimize the contaminant removal rates and will soon discuss several promising ideas with the regulatory agencies. These suggestions take into account all analytical data and contaminant recovery rates at each active groundwater site. We are reviewing these ideas and look forward to implementing the most promising ideas in the near future.

Bottom line: we have made great strides in our groundwater cleanup efforts and need to work more efficiently now to tackle the rest of the job in a cost effective manner.

XRF

From page 4

to less than a minute, so we could make decisions about the soil excavation as the heavy equipment operator was taking the previous scoop of soil to a dump truck.

Because we could get the results so quickly, we were able to collect a large number of samples over a small area without a large cost increase. This gave us a high level of confidence that an excavated area was clean before we collected our final confirmation soil samples and sent them to the laboratory.

We also used XRF at a former fire training area which had lower lead concentrations in the soil. The performance was the same; it worked great! So, if we have to investigate or clean up a small arms or skeet range in the future, we know what tool to use.

From the Field

By Glenn Anderson
Travis Environmental Project Manager

Throughout the summer and into autumn, heavy earthmoving equipment spent each day in dry fields, excavating contaminated soil and placing it in piles. Laborers covered the soil piles with plastic sheeting to prevent dust generation from the strong delta breezes. Field technicians collected soil samples to be sent to the laboratory for analysis. A steady stream of trucks moved contaminated soil to a soil repository or clean soil to sites to fill in the excavation voids.

In a nutshell, this describes the summer that was the Travis AFB soil cleanup program. The following photographs illustrate the kind of effort that it took to carry out the largest cleanup action in base history.

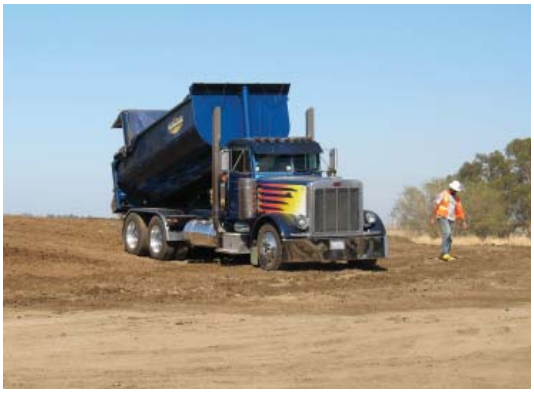
(Photos by Glenn Anderson)

A large excavation void remains after the cleanup of a former small arms range is complete. Note the covered stockpiles of contaminated soil that will be sent to a designated soil repository.

(Photo by Lonnie Duke)

(Photo by Glenn Anderson)

[Upper Left] A front-end loader places contaminated soil into a truck. Note the plastic tarp that is used to collect contaminated soil that inadvertently falls out of the truck during loading. [Upper Right] The truck moves the soil to a designated soil repository. [Lower left] A bull dozer shapes the contaminated soil into a pile which will be surveyed and covered with clean soil. [Lower right] Afterwards, rows of trucks bring clean backfill soil to a recently cleaned lead-contaminated site. The clean soil is used to fill in the excavated areas and restore the site to its original condition.



(Photo by Glenn Anderson)

(Photo by Lonnie Duke)

Owl

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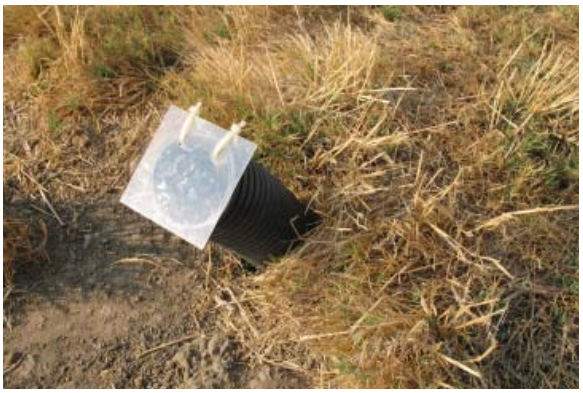
themselves.

An evictor is a piece of corrugated pipe with a flapper valve attached to its front. It is designed to allow an owl to easily leave the nest but prevent the owl from returning to it. Evictors are placed in all holes near the nest to ensure that the owls did not just move from one hole to another. After a period of observation to ensure that they are gone, the evictors are removed, and all holes near the nest are destroyed so that the owls are not encouraged to return to the work area.

"Although the presence of burrowing owls resulted in a slight delay in the soil cleanup schedule, we still conducted our field work in an environmentally friendly manner," said Mark Smith, Remedial Program Manager. "As environmental stewards, we strive to restore contaminated sites and protect our natural resources at the same time."

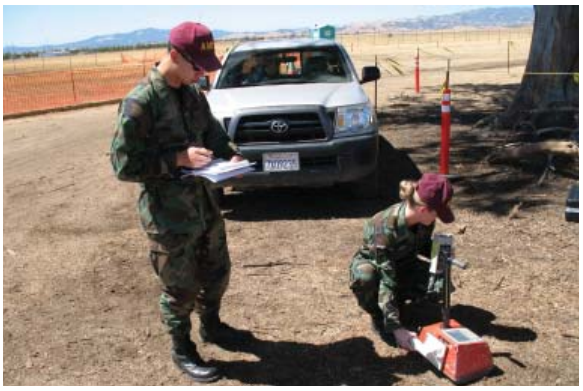
(Photo by Lonnie Duke)

A field technician with an XRF tool directs two heavy equipment operators to excavate soil in discrete locations. XRF lets the field team accurately identify the extent of contaminated soil.



(Photo by Lonnie Duke)

An evictor is placed over a potential home of a burrowing owl. The trap door allows owls to escape the nest and prevents reentry.



(Photo by Lonnie Duke)

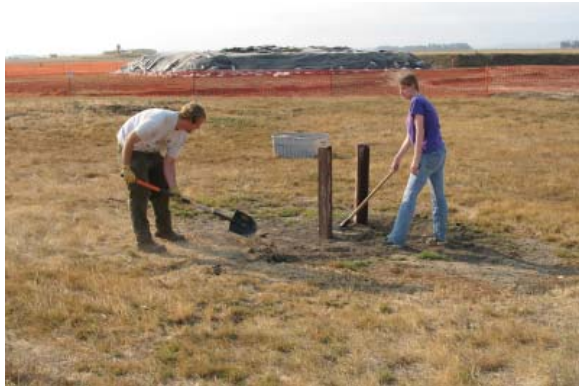
Members of the Travis AFB Radiation Safety Office conduct radiation checks on the outer casing of a nuclear density gauge.

(Photo by Glenn Anderson)

A backhoe and compactor move backfilled soil across an excavation void, restoring the site to its original topography.

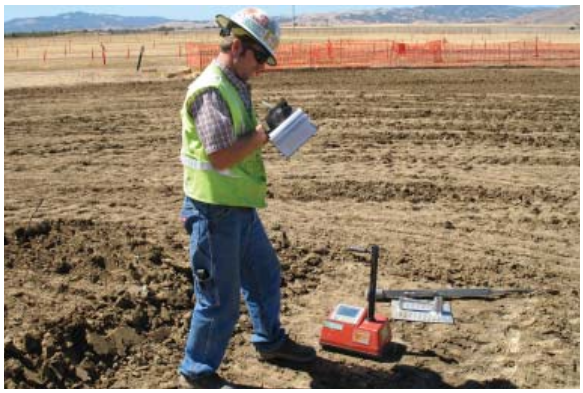
(Photo by Glenn Anderson)

A water truck sends a stream of water across contaminated soil at an on-base soil repository to assist with its compaction.



(Photo by Glenn Anderson)

Two wildlife biologist use a pick and shovel to break up ground holes that may serve as burrowing owl nests. By removing attractive site features, owls will not be present during earthwork.



(Photo by Lonnie Duke)

A field technician uses a nuclear density gauge to verify that the density of backfilled soil meets compaction requirements.

(Photo by Lonnie Duke)

A sheeps-foot compactor moves backfilled soil across a cleaned site and compacts it to prevent future subsidence of the new soil.

Meeting Agenda

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 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
- Status of Soil Cleanup Actions
- One Billion Gallons Later

Break

V. Cleanup Program Status

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

Travis AFB Restoration Advisory Board Meeting

October 25, 2007
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: Closed
Saturday: 12 p.m. - 6 p.m.
Sunday: 12 p.m. - 6 p.m.

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If you would like more information or need special accommodations for the RAB meeting, please contact Mark Smith, (707) 424-3062. You can also view our web site at http://public.travis.amc.af.mil/enviro

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