



Guardian

America's First Choice for Environmental Restoration

A Publication of the Environmental Restoration Program

Travis Air Force Base, California

January 2017

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We often mention that Green and Sustainable Remediation (GSR) is key to our success, and now the Travis Restoration Program Manager describes a GSR achievement by our clean-up program that is a first in the Department of Defense.....**2**

Next RAB Meeting:

The next Restoration Advisory Board meeting will be held on April 20, 2017 at 7 p.m. at the Office of the Northern Solano County Assn. of Realtors.....**4**

Editor's Corner

What's on your mind?

Each edition of the Guardian presents articles that describe the key environmental activities that have taken place over the previous three months and the progress that we are making to clean up soil and groundwater contamination from past industrial practices. Usually, we have a lot to say, but there are times when there is not a lot of new activities to report on.

Are there any burning questions or topics of interest that you would like to read about? If so, you can send them to us via the environmental public affairs e-mail account:

EnviroPA@us.af.mil. Short responses will be sent directly to you, and longer responses will be the basis of a future article (we will even give you credit for the idea!).



(Photo by Jordan Ollanik [CH2M])

Work in Progress: Heavy equipment operators continue to fill the first Travis AFB subgrade sulfate reactor with a mixture of gravel and crushed drywall. The sulfate in the drywall particles creates the right conditions for naturally occurring microbes to use fuel contaminants as food. Powered by a solar panel array, this cleanup technology is both nonintrusive and environmentally friendly.

The Value of Being First

Travis Tests First Sulfate Reactor to Clean up Fuel Contaminants

By Glenn Anderson

Travis Environmental Project Manager

What do Roger Bannister, Neil Armstrong, Nadia Comaneci, and George Washington have in common? They all were the first to accomplish something that had never been done before. Often, people come along afterwards who equal or surpass these accomplishments, but there can only be one first (to run the first sub-four-minute mile, to walk on the moon, to achieve the perfect 10 in gymnastics, to lead the U.S. as our first president).

Why is it so important to be "The First"? Besides earning a place in the history books, the first shows the rest of the world that something that was once considered impossible is now challenging but possible. The first can create a paradigm shift that changes the way we think. The first can inspire others and make a difference in our lives.

At the same time, breakthroughs in science and technology are actually demonstrated firsts and are becoming commonplace. In fact, two Department of Defense (DOD)-funded research programs, the Strategic En-

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Visit our Environmental Program web site at <http://www.travis.af.mil/About-Us/Environment>



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A Self-Stamp of Approval

By the time you read this Viewpoint, we should know who will be playing in this year's Superbowl. The last game of the National Football League season showcases two teams that survived a 17-week regular schedule and three playoff games. These two teams represent the cream of the cream, the best of the best, the coaches and players with the highest standards and the most effective culture of success.

It is fun to watch a well-oiled machine in action, regardless of the sport or the business or the life goal in question. For example, a small business owner wants to see his employees increase company profits, and a surgeon wants to see his/her staff work hard to cure every patient. With few exceptions, the most successful groups seem to share similar characteristics: adherence to high standards and winning thinking by all group members.

As the program manager for the Travis AFB environmental restoration program (ERP), I strive to create this type of work setting to get the best effort from all team members. Long-time *Guardian* readers know that we focus on cleanup strategies that are green (environmentally friendly) and sustainable (limited energy usage and greenhouse gas generation). Our achievements with green and sustainable remediation (GSR) strategies could only take place as long as everyone was on the same page and had the same winning focus.

The winning mindset of a group is usually measured by the group's achievements, but what about high standards? How can I measure my team's standards when it comes to environmental cleanup?

Fortunately, there is a group of scientists and engineers that takes care of this. ASTM International is an organization that develops and publishes voluntary technical standards for many materials, products



VIEWPOINT

Lonnie A. Duke
 Travis AFB Restoration
 Program Manager

and services. Over 12,000 standards are used around the world today to improve product quality, enhance health and safety, and build consumer confidence.

One such standard is ASTM E2893-13, the Standard Guide for Greener Cleanups, which allows organizations to self-certify that their ERP implements greener cleanup practices. After reviewing the standard, we realized that our ERP met all greener cleanup criteria. So, we followed the guide and published a technical memorandum that documented the way that this standard was met.

Why is this achievement so significant? ASTM E2893-13 has been on the books for less than two years, and the Travis AFB ERP is the first Department of Defense (DOD) program (and the first private or federal program in Environmental Protection Agency Region IX) to self-certify conformance with this standard. This self-certification demonstrates that the Best Management Practices in the Travis AFB ERP reduce the environmental footprint associated with site restoration. The EPA Region IX out of San Francisco uses Travis AFB GSR successes in its training materials to explain how facilities within or outside of the DOD can use similar GSR approaches to effectively clean up contamination.

At the end of the Superbowl, the winning team hoists the Lombardi trophy in the air, thanks the fans for their support, and comes home as heroes. Although our achievements are not so public, our self-certification provides validation that our strategic approach toward environmental cleanup is one of the best in the country. Go Team Travis!

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Environmental Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP), were established to promote the development and demonstration of new, innovative, cost-effective solutions to DOD's environmental challenges. If you are in the business of environmental cleanup, it is good to be first.

One common environmental challenge is the cleanup of underground fuel releases. From breaks in fuel pipes and leaks from underground storage tank to gasoline spills at gas stations, there are plenty of soil and groundwater sites at military installations and private businesses with petroleum contamination.

There are several ways to clean up petroleum contamination. Contaminated

soil can be dug up and hauled away or treated at the site, and contaminated groundwater can be pumped out of the ground for treatment. Unfortunately, these treatment options tend to be disruptive and not practical in a busy industrial or urban area. The cleanup actions can interfere with the current business or manufacturing activities and usually lead to their shutdown, which is not always desirable.

One cleanup technology that has been successfully used at Travis AFB is the subgrade biogeochemical reactor (SBGR). This technology relies on biological and/or chemical processes to break down contaminants into harmless com-

pounds. It has no mechanical components other than gauges to evaluate system performance and pumps that run entirely on electricity from solar panel arrays. The October 2010 Guardian describes in detail how this technology works and its advantages over conventional treatment options.

The two SBGRs on Travis AFB were designed to treat chlorinated hydrocarbons, such as trichloroethene, an industrial solvent. These reactors perform very well and are

use different approaches to inject oxygen into the subsurface. These technologies are very effective and tend to break down petroleum fairly quickly. However, there are drawbacks. The technology has to continuously pump oxygen into the subsurface. If the flow of oxygen is interrupted, the microorganisms die or become dormant, and it takes time to turn the flow of oxygen back on and restart the cleanup process. Also, it is not easy to distribute oxygen throughout a tight

clay soil; some areas would be cleaned while other areas would remain contaminated.

What if subgrade reactor technology could clean up fuel contaminants without oxygen? To test this concept, Travis AFB built the first ever subgrade sulfate reactor at a former fuel pipeline rupture site. The reactor relies on



Attention Amateur Geologists!: Will a sulfate reactor work on Travis AFB? One clue lies at another fuel site where intact gypsum crystals (calcium sulfate) were found in deep soil borings, a site where fuel contaminants are breaking down naturally. Base officials hope that the sulfate in the reactor will produce similar results. (Photograph by Levi Pratt [CH2M])

expected to achieve established cleanup levels a lot quicker than previously used engineered technologies. However, they would not work on petroleum contaminants, because the two SBGRs create an oxygen-poor environment that allows a specific class of microorganisms to feed on the solvents. This environment is not suitable for the class of microorganisms that feeds on fuel.

A successful biological cleanup of petroleum creates a suitable environment for petroleum-eating microorganisms. One common class of microorganisms thrives in an oxygen-rich environment, so technologies based on this class

sulfate-reducing bacteria to achieve petroleum cleanup levels. Contaminated groundwater from two wells is extracted and carried to the top of the reactor by aboveground conveyance piping. As the groundwater flows through the reactor, it is cleaned by the bacteria that live on the gravel. It also picks up dissolved sulfate from the drywall and flows out of the reactor and into the plume. This creates a recirculation cell that redistributes sulfate throughout the subsurface. Similar to the solvent reactors, it runs on electricity from a solar panel array, so system operation does not generate any greenhouse gases.

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To reduce its construction cost and make it more environmentally friendly, the sulfate reactor was filled with gravel and crushed drywall. Drywall is a panel made of calcium sulfate dihydrate (gypsum), so it serves as an excellent source of sulfate. The drywall was in the form of broken sheets from home building projects that normally would have been sent to a local landfill as construction waste. Instead, the field team collected the unpainted drywall last year and saved them for this project.

“We plan on operating the sulfate reactor for about four years,” said Mr. Lonnie Duke, Travis AFB Restoration Program Manager. “If successful, the results could support the use of more cost-effective, green, and sustainable cleanup technologies at other fuel sites.”

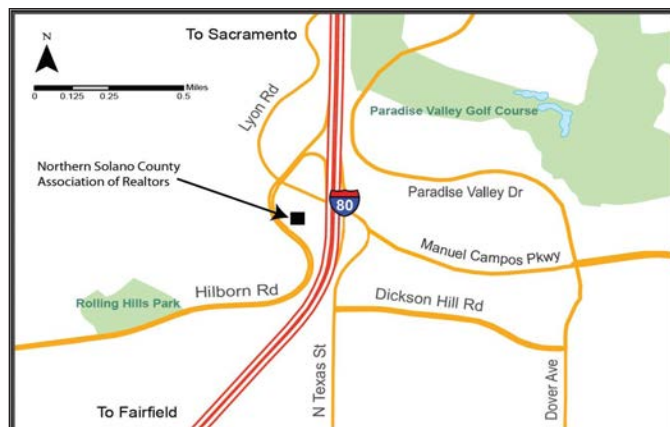
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Travis AFB Restoration Advisory Board Meeting

April 20, 2017
7 p.m.

Northern Solano County Association of Realtors
3690 Hilborn Road
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.

If you have any questions or would like more information about the RAB tour, please contact Lonnie Duke, (707) 424-7520.

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

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