



# Guardian

America's First Choice for Environmental Restoration

A Publication of the Environmental Restoration Program

Travis Air Force Base, California

April 2012

## INSIDE

### Viewpoint:

*The saying goes "Prior Planning Prevents Pathetically Poor Performance," or something like that. The Air Force Center for Engineering and the Environment is putting together a huge ten-year plan to complete the cleanup of almost all Air Force contaminated sites. Mark Smith, the Travis Restoration Program Manager, discusses this planning effort and his involvement in it.....2*

### Next RAB Meeting:

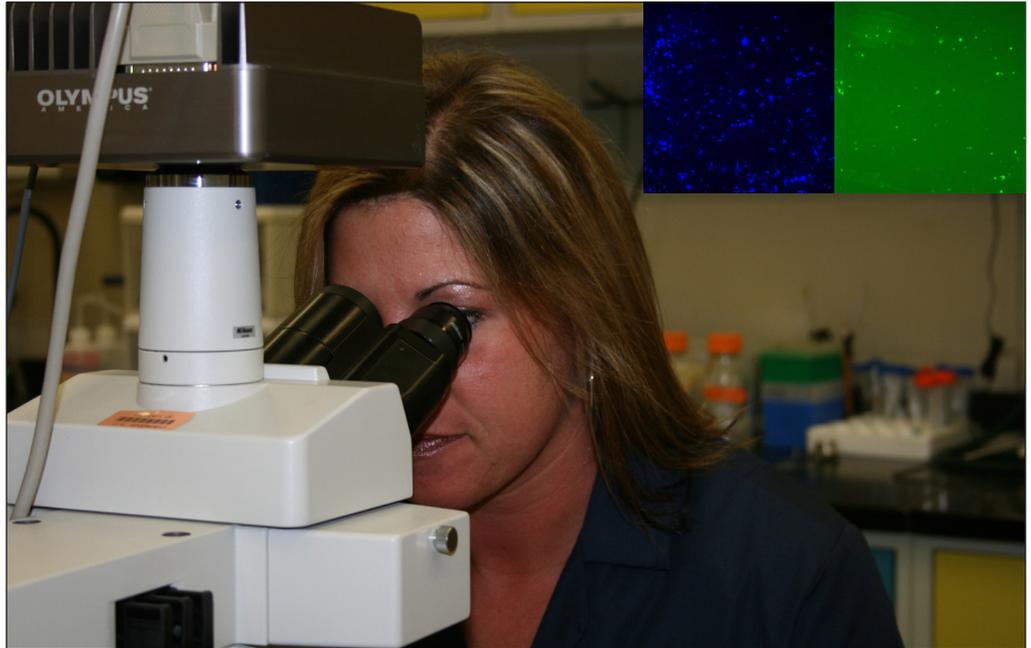
*The next Restoration Advisory Board meeting will be held on April 19, 2012 at 7 p.m. at the Office of the Northern Solano County Assn. of Realtors.....4*

## NOTICE

*Due to the large amount of work involved with the remedy selection process, Travis AFB has rescheduled the issuance of a **Proposed Plan** and the public meeting for this summer. The Plan will describe each proposed remedy and offer several ways to get your comments to the base.*

## Acronyms

**AFCEE:** *The Air Force Center for Engineering and the Environment provides Air Force leaders with the expertise and professional services needed to protect, preserve, restore, develop and sustain the nation's environmental and installation resources.*



(Photo by Idaho National Laboratory)

**Bug Inspection:** Dr. Hope Lee, an environmental microbiologist from the Idaho National Laboratory, uses a high-powered microscope to search for DNA strains (left inset) and associated enzymes (right inset) that could provide evidence of the natural breakdown of chlorinated solvents in groundwater.

# Are Enzymes the Answer?

## Base Studies Potential Mechanism to Clean Groundwater

**By Glenn Anderson**

Travis Environmental Project Manager

A science topic that is usually studied starting in middle school and definitely in high school is the importance of enzymes to all living creatures. We learned that enzymes are special protein molecules that break down nutrients, allowing them to be absorbed and used by our bodies. Because they are involved with the removal of waste materials and the building of muscle tissue, many chemical processes in the body would not function without them.

Virtually all life forms use enzymes, even microscopic organisms such as bacteria and protozoa that live in the soil and groundwater. Because of their size, these microbes release their enzymes into the environment around them and absorb food materials after the enzymes have had a chance to work on them.

Ironically, this use of enzymes by microbes to meet their food and energy needs may offer Travis AFB the added benefit of cleaning up the environment. Each enzyme is designed to work on specific chemical types, and some groundwater contaminants fit

See **ENZYME** page 3

Visit our Environmental Restoration Program web site at <http://www.travis.af.mil/enviro>



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<http://www.travis.af.mil/enviro>. Questions and comments about the program may be sent to this address:

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# The Ten Year Plan

Program management may not be the most exciting discussion topic at a social event, but planning ahead is my favorite subject and the essential foundation of any successful environmental cleanup program. As the Travis AFB Restoration Program Manager, it is my responsibility to identify our cleanup requirements, develop plans of action and timelines to meet those requirements, and estimate as accurately as possible the capital costs for selected remedies, including system installation, and long-term operation and maintenance costs to see the remedy through to completion. Before any of this becomes a reality though, I have to present the program and cost estimates to high level Air Force officials for validation, approval and funding. Once funding is received, the fun really starts, because that is when we can go into the field and accomplish real environmental cleanup, and I can talk about that anytime.

The Travis program is currently in the midst of conducting groundwater cleanup at sites that were contaminated almost 50 years ago, and these activities are based on agreements reached with the regulatory agencies over 10 years ago. Although it sounds like the wheels of progress turn slowly (and often they do in the federal government) you can track the restoration progress that we have made in past newsletters.

We have also mentioned in past newsletters the benefits (getting the most work for each dollar spent and accelerating cleanup) of awarding contracts based upon performance and achieving goals rather than contracts that provide prescriptive details and little flexibility for process or performance



## VIEWPOINT

Mark H. Smith  
Travis AFB Remedial  
Program Manager

improvements. Performance-based contracts (PBC) are best suited for accomplishing environmental restoration work, especially as cleanup technologies improve.

As you can imagine, the management of environmental cleanup programs at numerous Air Force properties is a huge task. The Air Force Center for Engineering and Environment (AFCEE) in San Antonio, Texas has been assigned this task and is heavily focused on building a ten-year program to accelerate as many cleanup actions to completion as possible. The idea is to clearly identify all Air Force environmental liabilities and the efforts and funding required to resolve them. Then, all future PBCs will be awarded based on the best ideas from private industry to complete most of the site cleanups within a ten-year timeframe.

To support this undertaking, I participated in two weeks of face-to-face meetings with AFCEE program managers and subject matter experts twice in the last two years as well as in a number of teleconferences with AFCEE leadership. There is a sense of urgency to complete the preparations for the next set of contracts; at the same time, everyone wants to make sure that all aspects of selecting the best contractor proposals have been completely evaluated before proceeding any further. They really want to get it right the first time!

Not an easy task when AFCEE has responsibility for the Environ-

See **VIEWPOINT** page 3

## Enzyme

■ From page 1

within those types. So, if the right enzyme runs into a contaminant molecule, there is one less contaminant molecule to clean up.

This mechanism for breaking down contaminants is known as cometabolism. The microbes that produce the enzymes cannot use either the contaminants or their breakdown products, so they get no benefit from the process. The contaminants break down naturally without any human intervention, and the breakdown products are harmless.

Cometabolism can be an effective process to clean up the environment under the right conditions. First, the population of microbes has to be large enough to produce enough active enzymes to reduce the contaminant concentrations to established cleanup levels. To be effective, the contaminant concentrations should be low to begin with; otherwise, there will be too much contaminant for the microbes to handle. Finally, the naturally-occurring chemicals in the groundwater (e.g., carbonates, sulfates, dissolved metals, etc.) should be suitable for growing microbes; also, the water should

contain enough oxygen to keep the microbes alive.

Cometabolism is a very slow process and not suitable for the cleanup of a large, highly contaminated body of groundwater. But, it could be an effective tool toward the end of an active cleanup program when the residual amounts of contamination are low but spread over a large area. So, it is important for decision-makers to know if cometabolism is taking place in the groundwater beneath Travis AFB.

“It is not easy to answer this question, because microbes are tiny creatures, and their enzymes are the size of molecules,” said Mr. Mark Smith, Travis AFB Restoration Program Manager. “Special tools are needed to “see” the molecules and their cleanup potential.”

Only a few laboratories in the United States have the expertise to use these tools, and each analysis is not cheap. But, the information generated by these tools could support the final step to wrap up a groundwater cleanup action.

Two tools were selected to evaluate the potential for cometabolism in the water beneath Travis AFB. A quantitative Polymerase Chain Reaction tool can identify microbial DNA that is needed by bacteria to

build cometabolic enzymes. If the DNA is present, then an Enzyme Activity Probe can provide direct evidence that the cometabolic process is present and active. The probe produces a fluorescent glow when the enzyme of interest is present and active in a groundwater sample.

These tools represent a new category of laboratory science, and it is important to realize that they do not “prove” that cometabolism is the right process to clean up residual contamination. However, they offer supporting data, usually referred to as a line of evidence that, along with other field observations can demonstrate whether natural processes are capable to reducing contaminant concentrations to cleanup levels.

“This type of lab work takes time, and we will not learn of the results of the enzyme study until the middle of spring,” said Mr. Smith. “We already have some evidence that physical processes contribute to contaminant reduction in our groundwater, and this study will help to improve our understanding of the biological component of natural attenuation processes.”



## Viewpoint

■ From page 2

mental Restoration Programs at all Air Force bases! If the cost to complete cleanup at each base is off by a little, collectively it adds up to a lot. If one base is not ready to award a contract in the year budgeted, their funding requirements are pushed into the next year and the effect ripples through and negatively impacts AFCEE’s carefully planned program. We have no intention of becoming that base.

Of course, I still have the day-

to-day management of our current PBCs and the work to pick the best technologies for our groundwater sites to keep me busy. The Travis AFB Environmental Restoration Branch has been on the forefront of technological innovation and savvy resource stewardship for many years, and it takes a lot of work from my staff to maintain our reputation for high standards. We are proud of our reputation and can now make a difference on a national level.

As always, I will continue to

use this newsletter to keep you informed of the latest advances in cleanup technologies and developments in Air Force restoration policy. By keeping our readers in the loop, they will be better prepared to help us out when the time comes for interested community members to discuss and comment on our proposed solutions to environmental challenges. Our public meeting will not be a cocktail party, but the conversation will definitely be stimulating!



## Meeting Agenda

6:30 - 7:00 p.m. Open Forum:

The open forum allows Restoration Advisory Board (RAB) and community members to discuss ongoing Travis AFB restoration program activities with the Travis AFB environmental staff on a one-to-one basis.

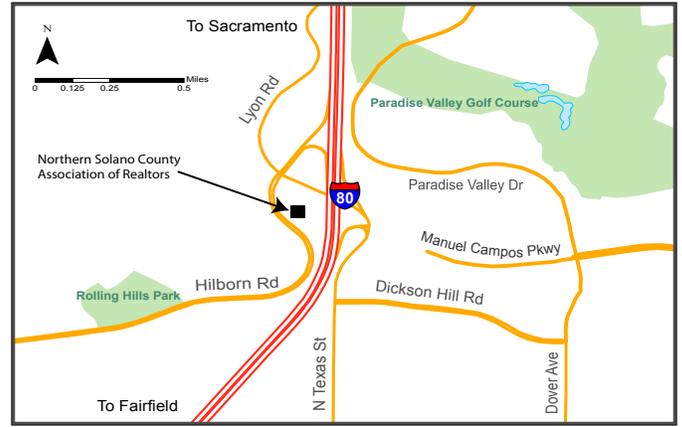
7:00 - 9:00 p.m. RAB/Public Poster Session

Normally, the Travis AFB RAB meetings are formally structured to allow base environmental staff members to present discussion topics, provide a status of the overall cleanup program, and receive reports from regulatory agencies and RAB focus groups. The April 2012 RAB meeting will feature an informal poster board session that will highlight the latest restoration activities and discuss the direction that the restoration program is headed.

## Travis AFB Restoration Advisory Board Meeting

April 19, 2012  
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.

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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://www.travis.af.mil/enviro>*

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