



# Report to **STAKEHOLDERS**

April 2010

Volume 15 No. 4

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imaging technology to  
manage habitat**

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*Report to Stakeholders* is a publication of Edwards Air Force Base, 95th Air Base Wing, Civil Engineer Directorate, Environmental Management. Its purpose is to inform and educate the public, base workers and residents about continuing environmental and safety efforts on base. It currently has a circulation of 6,000, including about 2,000 subscribers.

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Any comments or questions about the contents of the *Report to Stakeholders* may be directed to: Gary Hatch, 95 ABW/PAE, 305 E. Popson Ave., Edwards AFB, CA 93524-8060, (661) 277-1454.

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## WHAT'S ON THE COVER?

### DATA COLLECTION

— This image features the flight lines of hyperspectral imagery and ground spectra acquired between March 28 and April 4, 2009.



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## Volunteering Opportunities at Environmental Management

Interested in learning new skills? Do you need community service hours? Are you environmentally conscious? The Environmental Management Volunteer Program is looking for volunteers with base access. If you are interested, you may contact the Environmental Management Customer Service Desk at:

[95abw.cev.customer.service.helpdesk@edwards.af.mil](mailto:95abw.cev.customer.service.helpdesk@edwards.af.mil) for more information. Or you may obtain an application at <https://bsx.edwards.af.mil>, after clicking on "Edwards Air Force Base - Environmental Management," and then "Volunteering Opportunities at EM."

## Restoration Advisory Board (RAB) Meeting HIGHLIGHTS

The following report highlights the Feb. 18 Restoration Advisory Board (RAB) meeting in California City, Calif.

**Remedial Process Optimization** — Environmental restoration program manager Bruce Oshita led a mini-training session explaining remedial process optimization (RPO) at Edwards Air Force Base. The purpose of RPO is to enhance system performance, accelerate site closure and eliminate unnecessary costs associated with environmental cleanup. There are four phases: Phase I is where the remediation team reviews the scope of the inventory and program; Phase II is a detailed assessment of a specific process or system; Phase III is the implementation of accepted recommendations; and during Phase IV, the remediation team tracks the performance made on the program.

Mr. Oshita focused on RPO recommendations for the area he manages, North Base Operable Unit (OU) 5/10. The most common recommendations concern site operations and exit strategies designed to achieve the 2012 remedy-in-place goal for all base cleanup systems to be up and running.

**Perchlorate at Edwards Air Force Base** — Mr. Oshita announced that the Site 285 Groundwater Extraction Treatment Systems (GETS) have successfully removed 151 pounds of perchlorate between March 2003 and December 2009. The feasibility study for the GETS model indicates that the perchlorate concentrations will be reduced below the state requirement of six parts per billion within 7 to 10 years.

Patrice Hallman, environmental program manager for the Air Force Research Laboratory, noted that an evaporation tank was removed at Site 36. Approximately 40 cubic yards of perchlorate-contaminated soil is scheduled to be removed in 2010 based on a 2008 Record of Decision.

# Team Edwards with safety on the mind

**A**nother household name soon to be on the minds of the Edwards Air Force Base community is VPP, or the Voluntary Protection Program. From fueling aircraft to tossing a needle, the way the Edwards community practices safety is going to come down to the individual level. As the 95th Air Base Wing Voluntary Protection Program lead Sandra Stapleton said, “VPP equals you; every person at Edwards.”

When asked how the program works and how it was different from other safety programs, Stapleton smiled and gently pushed a manila folder filled with documents across the table. “You see, this is the complicated part of things,” she said. “When we are asked this very basic question, our tendency has been to go into each of the four elements of the program and that’s all of these pages in small print.”

“But it’s basically speaking up and doing what you’re supposed to do,” said 2nd Lt. Cherriza Plott, the secondary point of contact for the 95th Air Base Wing VPP. “If you identify something that can be a potential hazard, you can report it and not just pass by, thinking ‘someone can fix it later.’ Everyone’s involvement is important.”

The program objective is to empower each person to make his or her workplace safer without fear of retaliation from supervisors or peers. Oftentimes, day-to-day practices in workplaces have been carried out the same way for many years. In addition, some of the employees have been working in their same profession for decades.

While it is not always the case, familiarity and confidence in certain tasks can create a false sense of safety. “A big part of safety is wearing the right kind of protective equipment and a lot of people, because it’s hot in the summertime, don’t want to wear all of their gear,” Stapleton said. “They want to wear shorts and short sleeves. They don’t want to wear the gloves, long pants, safety toe boots or clothing that is going to protect them from a multitude of potential workplace hazards.

“They’ve just worn shorts for the past 10 years on the job,” she continued, “and because they’ve done that, they think they are invincible. But, if they don’t wear the proper equipment, it could cost them their life.”

Edwards’ leaders — from the military to labor unions — are committed to improving the safety and health of the base community using the Occupational Safety and Health Administration’s (OSHA) VPP. In 2007, a team of OSHA professionals visited the base to conduct a ‘gap analysis’ that assessed the Edwards safety culture in the four elements of VPP: management commitment and employee involvement, worksite analysis, hazard prevention and control, and safety and health training. The analysis demonstrated that while the community is safe, there’s room for improvement.

“Really what VPP is, is improved safety for everyone ... it’s not just the basics of safety, it’s safety excellence,” Stapleton said. “One of the messages I really want to get across is: don’t be afraid of retaliation, because the rewards are much better than any kind of threat.”

Stapleton and Plott plan to visit organizations on base to increase awareness of the program and give employees a list of



**WINNER** — Last year, there was a contest for designing a custom Voluntary Protection Program logo for Team Edwards. The Air Force Flight Test Center, Ground Safety Office won with this star.

points of contact for the 95th Air Base Wing within the next few months. For more information about VPP or the Department of Defense’s involvement with the program, you may go to [www.vppcx.org](http://www.vppcx.org).

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## 95 Air Base Wing (ABW) VPP Points of Contact (POC)

- Sandra Stapleton, 95ABW VPP lead and Civil Engineer Directorate
- Randy Harrison, Fire Protection Division
- Braden Styles, Fire Protection Division
- James Vilaseca, Fire Protection Division
- Montrey Gray, Communications Group
- 2nd Lt. Cherriza Plott, Alternate 95ABW VPP lead and Medical Group
- SSgt. Travis Beyea, Mission Support Group
- Mary Richardson, Mission Support Group
- Rebecca Hobbs, Environmental Management
- Peter Robles, JT3
- George Amaya, American Federation of Government Employee Unions
- Kenneth Vaughan, American Federation of Government Employee Unions
- Jimmy Brown, American Federation of Government Employee Unions

# HYPERSPECTRAL IMAGING

**B**eam me up, Scotty! Hyperspectral imaging. It sounds like something Spock would use to find Captain Kirk on a planet's surface. But hyperspectral imaging is a reality today at Edwards Air Force Base. Scientists with Environmental Management are using this tool to learn all they can about the spread of plant life on the base, the health of the ecosystem, how it changes over time and to identify potential locations for rare species in remote parts of the base.

The technology at work here isn't beamed down from the Starship Enterprise in orbit. It comes from an airplane flying about 1,500 feet above the ground. Inside the aircraft is a special sensor that takes images in hundreds of narrow spectral bands ranging from blue through infrared (wavelengths ranging from 400 to 1,000 nanometers). In contrast, normal color pictures consist only of three wide spectral bands; blue, green, and red.

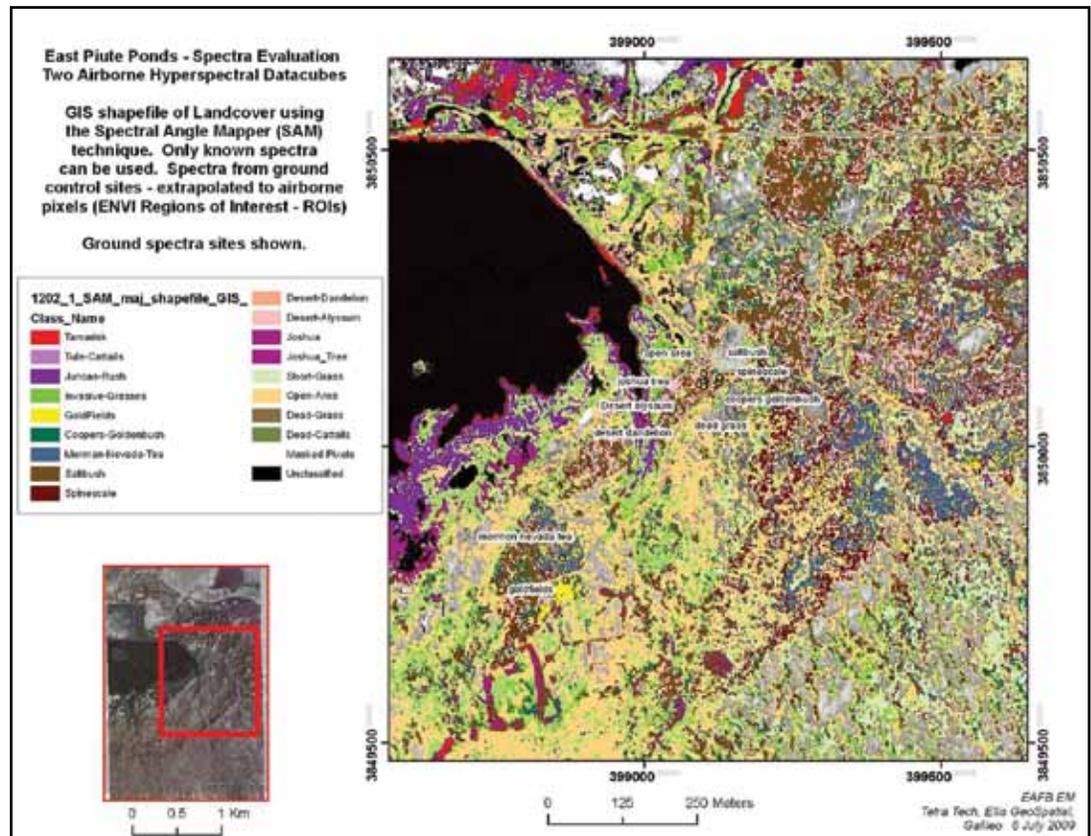
The sensor does not emit any light; it literally scans the terrain below the plane. It cannot see inside buildings or underneath roofs — it sees the same things that aerial photographs and satellite images show.

The sensor used at Edwards collects information in 128 spectral bands. Plants absorb some wavelengths of light from the sun, but other wavelengths reflect back to the sensor on the plane. Recording the intensity of reflected light in each spectral band creates a unique spectral signature for each species.

For example, the signature of a tamarisk tree is slightly different from a creosote bush because they are composed of different percentages of water, protein, chlorophyll (what makes a plant green), and everything else that makes up a plant. They have distinctive spectral signatures because the compounds that make up different plant species absorb and reflect light differently.

"The end result is that hyperspectral imagery is much more useful than aerial photography or typical satellite imagery," said Dr. Stephen Watts, program manager for hyperspectral imaging at Environmental Management. "The data set can provide much more information."

For example, a two-meter wide blob of green on an aerial photo could be a creosote bush, a Joshua tree or a small tamarisk. The hyperspectral imagery will allow the computer to determine that it is a creosote bush.



**COMBINE THE DATA** — This image includes hyperspectral imagery, ground spectra data and a landcover shapefile featuring color-coded information about the plant species in this area of Piute Ponds. Base scientists can use this information to guide modeling and habitat management efforts.

The first aerial hyperspectral project at Edwards was completed in March 2009. The aircraft flew over Edwards for about 50 hours. When each flight was complete, data storage devices were removed from the plane. They were returned to a contractor's office where high-powered computers married the data with GPS information collected at the same time, so that each image was precisely located.

Once all the computer processing was completed, the result was a hyperspectral data cube containing information from each spectral band. This cube provides information for the computer to build maps showing plant communities.

Watts received delivery of the first flyover data in September 2009. "The initial analysis shows we should be able to get good results," he said. "Preliminary tests show that the system has very good capabilities in distinguishing species."

Another important step was building a spectral library of the signatures for common plant species at Edwards. Technicians used handheld sensors, called hyperspectral spectroradiometers, for this task. Watts said technicians imaged approximately 80 common species like saltbush, creosote bush and tamarisk to get their signatures for the library.

Any plants of interest from the flyovers that the computer cannot identify are marked and biologists can be sent out to investigate.

"This system allows us to look for sensitive or endangered

# TECHNOLOGY AT EDWARDS

species more effectively,” Watts said. “We’ll use this info to help target the work of biologists.”

Although the 2009 flyover cost a little more than \$400,000, that is much less expensive than paying biologists to map the base plant life on foot, according to Watts.

“Another important feature is the system’s ability to distinguish soil types,” he said. “We’ll be able to see differences in soil characteristics. That will help us identify locations where the conditions are the same and the same plants should grow.”

“My priorities are to refine our desert cymopterus model and identify Mohave ground squirrel habitat,” he said.

The desert cymopterus is a flowering plant in the carrot family that at one time scientists believed was more plentiful on Edwards than anywhere else. “We didn’t know if we had most of them, or if it was just because no one was looking in the right places to find them off base,” Watts said.

He and his team were able to show with older, less precise imaging studies from a satellite that the right soil conditions for cymopterus existed elsewhere in the Mojave Desert. Subsequently, additional populations were found in Fort Irwin, Calif., and near Cuddeback Dry Lake, Calif. This effort assisted the U.S. Fish and Wildlife Service in making their decision not to list the cymopterus as a federally

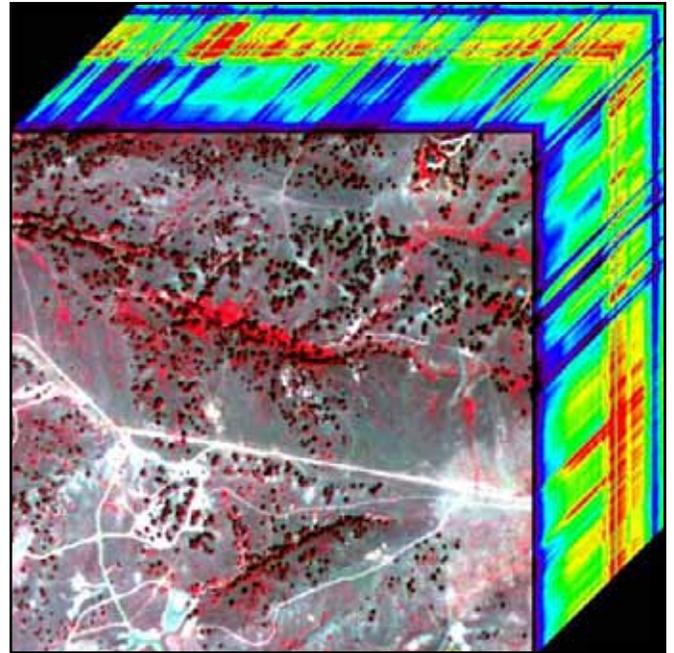
threatened or endangered species. Watts expects hyperspectral imaging data will enhance the model — or computer program — used to identify potential sites for this species.

Watts’ other target species is the Mohave ground squirrel, a California threatened species. Due to its habits, it is difficult for biologists to determine if it or other species of ground squirrel live in a particular area. Watts hopes that hyperspectral imaging can be used to locate the squirrel’s favorite foods and other variables, thus providing enough information to develop a model to better map the areas where this elusive species lives.

Every five years the base will send up another airplane to conduct another hyperspectral scan of the base. Over time, the data will tell the Air Force

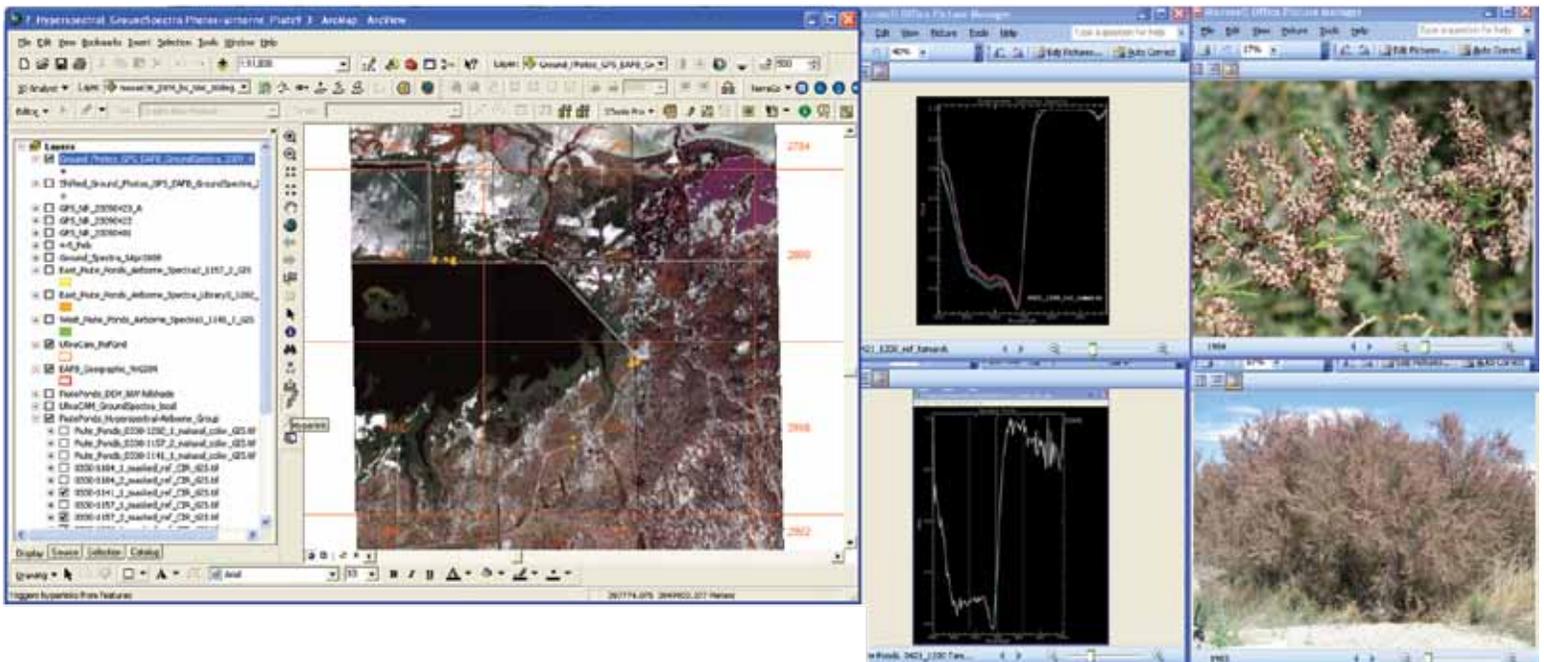
how the ecosystem is faring.

“This is a long-term process,” Watts said. “It will take us years to analyze all the data.”



**DATAcube** — This image shows the hyperspectral imagery datacube representing the 128 spectral bands collected, ranging from visible through near infrared.

**SPECTRA DIFFERENCES** — In this image (below), information from the ground spectra, aerial spectra and photographs of tamarisk are compared. The spectral differences between species of plants help distinguish which plant or plants are depicted.



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# Good things don't always come in smaller packages

**F**aced with more than a 50-percent reduction in hazardous waste recycling and disposal funding, Edwards Air Force Base hazardous waste employees had to come up with ways to save money to keep the base compliant with federal and state hazardous waste rules. One of their solutions is the Bulk Waste Segregation Program. This initiative reduces disposal costs, paperwork, supply costs and labor by combining waste into bigger packages.

These bigger packages include 20-, 30- or 40-cubic yard roll-off bins, big enclosed metal shipping containers that are 22 feet long, 8 feet wide and 4 ½ to 8 feet tall. A 40-cubic yard bin can hold about the same volume of waste as approximately 45 55-gallon drums and because of that, the Air Force can save a lot of money.

For example, under the old program, used absorbent materials were collected at a maintenance site. The absorbent material had been used to catch oil drippings from beneath an engine during maintenance. At the maintenance site, workers used wringers to squeeze out as much oil as possible before reusing the absorbent pad a few times. But eventually, the pad was no longer useful and was placed into a hazardous waste drum. Once it was in the drum, that drum could only stay in the maintenance area for 90 days, whether it was full or not.

“Under the old program, the hazardous waste staff would pick up 6 ½ barrels of absorbents from a customer,” said Cat McDonald, hazardous substance lead. “At the Hazardous Waste Support Facility (HWSF), we’d have to fill out and manage paperwork, and check each barrel every day until it was sent off base for recycling or disposal.”

Even the weight of a steel barrel came into play. “The container is considered hazardous, so the Air Force would have to pay for an extra 50 pounds of waste for every single barrel when it was sent offsite for disposal,” McDonald explained. “Even if it was only half full.”

The solution was consolidating waste into bigger containers. But to use them, Edwards had to get permission from the California Department of Toxic Substances Control. “Our permit from the state said we had to use drums,” said hazardous waste program manager Kathryn Curtis. “We went to the Department

of Toxic Substances Control to request a change to the permit to handle these items in bulk.”

Base employees submitted a request to the department to modify the permit in December 2007. The permit change was approved in September 2008, and Edwards got the final word in January 2009.

Now, hazardous waste employees pick up barrels from customers, bring them back to the Hazardous Waste Support Facility and dump them into a bin. The barrels are then returned to the customers. The drum return program alone saves customers \$70 to \$80 every time a barrel is returned and doesn't have to be replaced. Another bonus is that when the waste is picked up and sent for recycling or disposal, only the contents of the bins are considered.

“We saved \$8,000 in disposal costs on our first shipment of absorbents just from not having to count the weight of the barrels,” said Sharon Soliz, hazardous waste operations lead. “And the Air Force saved \$6,000 reusing the drums.”

Hazardous waste employees only have to inspect, track and prepare one rolloff container for shipment for each type of waste. Edwards is using the program to better manage absorbents, filters, paint debris, treated wood, wastewater and soil contaminated from spills or Environmental Restoration Program investigation efforts. “The goal is to ship everything out in bulk, if possible,” McDonald said.

Under the permit, the Bulk Waste Segregation Facility — located on base — can hold some items for up to a year. However, Soliz said with the roll-off bins, they try to fill them up and ship them off as soon as possible to save on roll-off rental costs. “If we're close to full, I'll even call customers to find out if they have materials we can pick up just to fill up the load.”

Curtis estimates one Bulk Waste Segregation Program shipment in February 2009 saved the Air Force \$18,000. She estimates it will save the Air Force \$200,000 in hazardous waste costs every year.

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**BULK** — Hazardous waste specialists started a new program last fall, in which they can store large amounts of certain hazardous wastes in rented roll-off bins rather than ship smaller loads of hazardous waste. The program is estimated to save the Air Force thousands of dollars each year.



## Continued work with the RAB gives Milt McKay an insider's perspective at the Air Force Research Laboratory

**E**nvironmental stewardship is an important part of his life, says Milton "Milt" McKay, a Restoration Advisory Board (RAB) member for the Air Force Research Laboratory. Perhaps that is why his everyday job and longtime volunteer work on the board are closely intertwined.

As a research chemist at the Air Force Research Laboratory (AFRL) at Edwards Air Force Base, McKay has been part of a small team working to develop environmentally acceptable monopropellant fuels, with the goal of replacing the fuels used today. Monopropellants are propellants composed of chemicals, or mixtures of chemicals that can be stored in a single container with some degree of safety.

"My team is working on a propellant that we have been working on since 1995. It is a monopropellant that will replace hydrogen," McKay said. "Whether it pertains to fighter-jet or satellite propulsion, we are moving forward with that and are pretty close to putting it out in the industry." The monopropellant is less toxic than peroxide and has gone through a full toxic panel.

In conjunction with the new propellant, and his experience gained from serving on the RAB, McKay plans to conduct a study at the AFRL about how a new environmentally friendly propellant affects the naturally occurring microbes and bacteria in the ground. He wants to survey and study the natural bioremediation process of the native bacteria and periodically take samples of the ground to see if it neutralizes the propellant.

"The study would be a neat project to work on, and it would directly relate to the RAB," McKay said. "It goes towards the mission of what they are trying to do by eliminating contaminants in the ground.

"I started with the RAB in August 2000 and wanted to make a difference in my community," McKay said. "I am still working on the same projects at the AFRL, but since I became the primary AFRL member for the RAB, I have been involved in developing new energetic ingredients and propellants that are more environmentally friendly."

As a board member, McKay said he wants to keep information flowing between the base and the community that he represents. "I think it's great that there are no concerns [about restoration efforts] from my community," he added, "but I wish there was more interaction from the public, and I want to find a way to get more participation.

"The RAB is here to inform the public," McKay added. "I would love to see the RAB do more public involvement to get the information outside of the base and to the public.

"Right now, I distribute the *Report to Stakeholders* magazine to the AFRL community," McKay said, "and they seem to take the copies rather quickly."

The *Report to Stakeholders* is an Environmental Management publication that features articles about current environmental projects on base, including cleanup efforts.

In his spare time, McKay is working toward obtaining a master's degree in biology from the University of Nebraska.



**SCIENCE AT WORK** — Milt McKay, Restoration Advisory Board member for the Air Force Research Laboratory, works to develop an environmentally friendly fuel on the job. As a board member, he keeps his community aware of cleanup efforts at Edwards.

"My interest right now is to finish my master's degree so I can teach biology to college students," McKay added. "Once I get my master's, I will continue to work at the AFRL until I retire and teach in the evenings and on weekends."

Aside from obtaining his master's degree, McKay's plans include traveling more after he retires. "I just got back from Costa Rica and I plan on doing a lot more traveling after I retire," McKay said. "But, I want to do it before I start teaching. I want to travel to Australia mainly."

McKay plans to retire within the next five years. Of course, according to him, it all depends on whether the projects he has been working on are completed.

The RAB is a forum for two-way communication between the public and those responsible for environmental cleanup activities at Edwards. The board meets quarterly to exchange information about the Environmental Restoration Branch's progress toward cleaning up past contamination sites around the base. The board members are made up of volunteers from communities in and around Edwards, federal and state regulators and base officials.

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# Where to find more INFORMATION

Published data and documents relating to Environmental Management are available for public review in information repositories at three locations. The current information repositories are located in the cities of Lancaster and Rosamond, as well as Edwards Air Force Base. They are updated when new documents are released.

For questions about information in the repositories, you may contact Gary Hatch, Environmental Public Affairs at (661) 277-1454 or by e-mail at [95abw.pae@edwards.af.mil](mailto:95abw.pae@edwards.af.mil). Here is a list of our current information repositories:

## Edwards Air Force Base Library

5 W. Yeager Blvd.  
Edwards AFB, Calif.  
(661) 275-2665  
Hours of operation: Mon-Thu 9:30 a.m. – 7 p.m.  
Fri 9:30 a.m. – 6 p.m.  
Sat-Sun 10:30 a.m. – 6 p.m.

## Kern County Public Library

**Wanda Kirk Branch**  
3611 Rosamond Blvd.  
Rosamond, Calif.  
(661) 256-3236  
Hours of operation: Tue-Thu 11 a.m. – 7 p.m.  
Sat 9 a.m. – 5 p.m.

## Los Angeles County Public Library

601 W. Lancaster Blvd.  
Lancaster, Calif.  
(661) 948-5029  
Hours of operation: Mon-Wed 10 a.m. – 8 p.m.  
Thu-Fri 10 a.m. – 5 p.m.  
Sat 11 a.m. – 5 p.m.

For general information about Edwards and an electronic version of the latest issue of *Report to Stakeholders* or other documents of public interest, you may visit the following link: [www.edwards.af.mil/library/environment](http://www.edwards.af.mil/library/environment).

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# Restoration Advisory Board (RAB) Information

The RAB is made up of elected representatives from communities in and around Edwards Air Force Base, regulators from federal and state agencies and base officials. The board's purpose is to provide a forum for two-way communication among base restoration officials, regulators and the community representatives regarding the cleanup of contamination from past military activities.

The board meets quarterly, rotating meeting locations in communities surrounding the base. The public is welcome to attend. If you have any questions or concerns about the cleanup activities

going on at Edwards, you may contact your community's RAB member or Gary Hatch, Environmental Public Affairs, at (661) 277-1454.

## NEXT QUARTERLY MEETING

Date: May 20, 2010

Time: 5:30 p.m.

Location: Boron, Calif.

Venue to be determined

## RAB Members

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### ON-BASE COMMUNITIES

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**Main Base Air Base Wing**  
Vacant

**Main Base Test Wing**  
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**NASA Dryden**  
Vacant

**North Base**  
Vacant

**South Base**  
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**AF Research Laboratory and Propulsion Directorate**  
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