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# Report to **STAKEHOLDERS**

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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.

Contents of the *Report to Stakeholders* are not necessarily the official view of, or endorsed by, the U.S. government, the Department of Defense or the Department of the Air Force.

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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?

**LANDFILL** — The base landfill was quickly approaching capacity, so solid waste specialists obtained an expansion permit this year and are looking at alternative waste solutions. See article, p. 4.



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**PEPÉ LE PEW** — During a series of live trapping activities on base, this striped skunk made his way into one of the cages for a night's stay. This is the first time biologists have actually seen a striped skunk on base.

### TURKEY VULTURE MIGRATION

— Base biologists took these photographs (right and below) of a large group of turkey vultures resting near the Environmental Management building on Main Base. After hovering over the area, the birds settled on power poles and along the ridge just off of Rosamond Boulevard.

Monitoring bird migration patterns and reporting events like this one, are important aspects of keeping pilots, aircraft and wildlife safe in the air. Biologists report these events to the base Flight Safety office to help prevent potential bird and aircraft strike hazards.



# Volunteers give back to Edwards community, desert tortoise

If you were to drive toward the West Gate at Edwards Air Force Base you might catch a glimpse of orange out in the desert parallel to the road. It's not a patch of poppies, but rather desert tortoise fencing.

The desert tortoise is a federally protected species that makes its home at Edwards, so precautions are being taken to ensure its safety. In doing so, biologists from Environmental Management teamed up with volunteers to install temporary desert tortoise fencing near the West Gate while road construction is underway.

Matt South, a biologist at Environmental Management, led a group of six volunteers and spent eight hours in February installing the tortoise fencing around the perimeter of the construction zone. This particular type of fencing was placed to keep desert tortoises and other wildlife from entering into the construction zone, where they could be hurt or even killed.

"We installed a total of 1,800 feet of desert tortoise fencing," South said. "The volunteers did a great job and completed the process from start to finish. They worked in an assembly line to modify the fence to ensure it was more suitable for desert tortoise purposes."

According to South, the fence was not compatible with desert tortoise fencing standards because it had been prestructured before it was received. South also said the stakes were too far apart and because of that, the fence could sag. If the fence were to sag or hang too low to the ground, the tortoises could potentially climb over the fence into the construction area.

"It took one day to modify the fencing to use as desert tortoise fencing," South added. "The next day we had another assembly line going and we installed the 1,800 feet of fencing in three hours. We went down the line, hammering in the orange fencing 100 feet at a time. The volunteers were fast and their work ethic was spectacular."

For Senior Airman Cameron Neal, from the 412th Logistics Test Squadron, and Staff Sgt. Bobby Rodriguez, from the 31st Test and Evaluation Squadron, volunteering through the Environmental Management Volunteer Program means more than just installing a fence.

"At any given time we are given the choice to volunteer for something as simple as making a fence for the protection of the desert tortoises, to volunteering to help with disaster relief. To get ready to help out in any situation I believe starts right here at home — volunteering for the little projects around the base and community," Neal said. "It is also just a good way to give back to the base and local community, and in this case does a job that could help prevent the extinction of a species."

"I volunteer with Environmental Management because I am personally making a difference with something special, whether it's for a protected species or rescuing an injured animal," Rodriguez said. "The small acts of selflessness build a strong bond between fellow volunteers and the species at risk. You can make a difference between survival and extinction."

For more information about how to get involved with similar



**TORTOISE FENCING** — (From left) Senior Airman Cameron Neal and Staff Sgt. Bobby Rodriguez were part of a group of volunteers who helped install desert tortoise fencing near the West Gate this winter. The fencing will help prevent desert tortoises from entering construction zones.

projects or the Environmental Management Volunteer Program, you may contact the Environmental Management Customer Service Desk at (661) 277-1401.

RTS

## Volunteer 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."

# Landfill expansion saves Air Force dollars

**W**ith an estimated \$30 million price tag to close the base landfill, Edwards Air Force Base project managers are finding new ways to extend the life of the landfill and in the process, give the base a greener solid waste operation.

Between 2004 and 2006, employees from the Civil Engineer and Environmental Management offices came to the conclusion that the Edwards 62-acre landfill was getting close to capacity. “In 2006, we figured we had a year or two left at the most,” said Steve Madoski, integrated solid resource conservation manager at Environmental Management. Construction and demolition debris from projects replacing 50-year-old base housing units were rapidly filling up the remaining landfill space. Prior to that, with the normal amount of solid waste going in, the Air Force estimated the landfill could handle Edwards’ solid waste needs until 2028.

## Late Permit Makes for Greener Opportunities

In 2004, the base’s landfill permit was up for renewal. Environmental Management submitted paperwork to renew it, but delays at the county-level and new state rules and requirements would delay the process for years. One requirement for renewing the permit was updating the landfill’s closure plan. After analyzing the situation, solid waste employees came to the conclusion that landfill closure would cost the Air Force \$30 million in fees, labor and equipment. This included costs to cover potential future problems in case the landfill were to become a threat to human health or the environment.

Closing the landfill was not an option. “The Air Force is not in a position to spend that kind of money, and we would have been behind on closure planning and

design approval, which can take years,” Madoski said. So, Edwards pursued an expansion of the current landfill and turned in revised permit paperwork to allow another 10 feet of waste to be added on top of the current waste. In the meantime, they also had to find solutions for reducing the amount of waste going into the landfill.

To begin, Civil Engineer operations project manager Milt Riley redirected the construction and demolition debris to off-base landfills. The potential for tiny amounts of asbestos within the waste made recycling it impossible.

An advantage to this initiative was that local, off-base landfills benefited from the increased amount of fees they were collecting. “The Mojave landfill, in particular, loves to get our debris,” said Gary Schafer, a solid waste specialist at Environmental Management.

Landfill operations employees also found another creative solution. “The crew found a way to get extra waste into the space we already had,” Schafer said. In low lying areas of the landfill, they scraped off the 12-inch layer of dirt cover and began to fill the space with solid waste to the limit of the existing permit.

“The equipment operators at the landfill are very skilled,” Schafer said. “Without GPS or laser-guided machines, they accurately scraped the dirt off and filled in the low spots with waste.”

Diverting even more waste away from the landfill also helped, according to Madoski and Schafer. Paper, metal, glass and plastic recycling efforts were ramped up. The base started recycling concrete. “We recycled two airmen’s dormitories,” Schafer said. The ‘50s-era concrete buildings were crushed and the product will be used in new construction and landscaping efforts throughout the base.”

“The purchase of a polystyrene

densifier machine was of particular help in reducing the mass of solid waste going into the landfill,” Madoski said. Almost every new computer or piece of electronic equipment purchased today is packed with polystyrene foam. Most of that ends up in the nation’s landfills because it is reportedly uneconomical to recycle because it is so light. The densifier heats the polystyrene, removing air, and reduces its size by a factor of 90 to 1. Then the base can sell the product to recyclers off base.

## More New Requirements

While the permit application percolated through county and state offices for review, new state requirements were creating more hurdles. Initially, the base had to redo the landfill’s closure cost estimate. They also had to produce a study to include a slope stability analysis, showing that the landfill side slope would be stable and safe in the event of a major earthquake.

Then, a new requirement to install gas monitoring wells around the perimeter of the landfill was enacted. “We had to act very quickly in order to program for the requirement, get the plan approved and the wells installed before the compliance deadline,” Madoski said. “This could have resulted in an NOV [notice of violation] if we hadn’t pooled all of our resources into meeting the deadline, so that delayed the permitting activity further.

“For state financial assurance planning purposes, we had to find a new source of cover for the landfill,” Madoski said. Luckily enough, the borax mine in nearby Boron was able to supply a clay material. “The benefit there is reduced transportation costs, and this is a byproduct for them, so they’re happy to get rid of it at no cost,” he continued. “However, we’d like to identify a final



**ADD ANOTHER 10 FEET, PLEASE** — Solid waste specialists at Edwards worked to keep the base landfill open and save Air Force money by obtaining an expansion permit. This gives them a little more time to explore ways to reduce waste.

source of cover material on base so that we can have an assured source in the years to come.”

At the same time, a clock started ticking: the California Integrated Waste Management Board (CIWMB) was scheduled for decommissioning in early 2010. Further delays would occur if Edwards didn't have everything together.

One last-minute requirement was a planning document to cover California Environmental Quality Act requirements. “We had all the NEPA [National Environmental Policy Act] paperwork together,” Madoski said. “Our regulator at Kern County was able to get assistance from their planning department.” That document was completed and submitted through an abbreviated review process just before the CIWMB meeting in November 2009.

In December, the base finally received their new permit that allowed another 10 feet of waste on top of the current cells. Now, with current diversion efforts, the landfill should remain in business until at least 2023.

### Future Looks Even Greener

Despite the new permit, Madoski isn't taking it easy. “Having 10 feet gives us

“

We had to act very quickly in order to program for the requirement, get the plan approved and the wells installed before the compliance deadline.

**Steve Madoski**  
**Integrated Solid Waste**  
**Conservation Manager**  
**Environmental Management**

”

breathing room and some time,” he said. Madoski is using some of that time to find a permanent solution for dealing with solid waste. He sees greenhouse gases emitting from the landfill as a future issue.

The solid waste team is investigating waste-to-energy technologies that have very low air emissions. “Germany is diverting 90 percent of their waste with this technology,” Schafer said. With waste-to-energy, the base could dig up

waste from the landfill, remove what recyclable material they can find, and convert the rest to electricity. “We aren't looking at this as a way to make money on electricity,” he said. “It's all about reducing the amount of waste in the ground.”

In addition, Schafer said future demolition projects are being looked at more carefully. “Steel and concrete can be recycled,” he said. “And the base recycling program can make money selling scrap metal.” This will become more and more important as the base is planning to reduce the number of buildings on base by 20 percent in the next 10 years.

“Anything we can do to reduce the amount of solid waste in the landfill will save us money in the long term. If you go a step beyond the \$30 million closure price tag and view the landfill as a potential restoration site, and you know how much money is being spent on cleanup at those sites, it begins to bring things into perspective,” Madoski said. “Our landfill is unlined, and sits over fractured granite, which can be very tricky to pump contaminated water out of and treat. However, the real success story here is that a lot of people worked hard together to get the job done.”

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## Edwards seeks to turn waste into energy

For most landfills — including the active one at Edwards — shrinking available space is a growing issue, but solid waste specialists at Environmental Management and partners in the 95th Civil Engineer Directorate are looking to keep the landfill from closing and create energy to put on the electrical grid by using a process called waste-to-energy.

Steve Madoski, integrated solid resource conservation manager at Environmental Management said, “The current cost estimate to close and monitor our landfill here at Edwards is \$30 million and that doesn't even include most cleanup or restoration costs.

“Our goal here is to no longer simply ‘manage’ waste, but to view everything we use here as a valuable resource that is either reused or recycled,” Madoski said.

Waste-to-energy is the process of creating electricity through physical, chemical or biological conversion of a solid waste, according to Madoski. Most waste-to-energy processes produce electricity directly through burning, or produce a combustible fuel product, such as methane, methanol, ethanol or synthetic fuels.

The system that Edwards is considering as a tool for keeping the landfill open and from filling too quickly starts with ‘preprocessing.’ The system runs on real, municipal waste that is sorted



**WASTE PELLETS** — Solid waste specialists on base are looking at options for converting waste in the landfill into energy. This is the pellet stage of a process they are looking to test at Edwards this fall. Waste is shredded and then compressed into fuel pellets for gasification.

and sent to a shredder. The solid waste preprocessing system then compresses the shredded waste into fuel pellets. Then, the pellets are added to the gasification unit where they are partially oxidized until they produce gas suitable for electricity or heat generation. To this end, synthetic gas from the gasifier is

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# Site 285 plays host to “*hungry*” microbeads

A pilot study demonstrating a new cleanup technology to address perchlorate contamination generated promising test results at Edwards Air Force Base last winter. And, unlike other treatment systems, the Microvi Biotech, Inc. system cleaned the perchlorate-contaminated groundwater without producing any secondary waste.

“The results from the nine-month research project proved perchlorate was removed to nondetect [levels] with low retention times under optimum conditions,” said company founder, Dr. Fatemeh Shirazi. “Microvi Biotech examined many different operating conditions such as low carbon source, lack of nutrients and reduction of sulfate with results exceeding all expectations.”

The innovation behind Microvi’s system consists of tiny membrane carriers packed with natural microorganisms that degrade contaminants, such as perchlorate, into harmless byproducts.

“The natural microorganisms are encased in a permeable membrane allowing for the flow of contaminated water into and out of the membrane,” said Bruce Oshita, environmental program manager for Site 285. “As the water passes through the membrane, the contaminant is degraded by the encased microorganisms. The membrane functions like a tiny time-released pill you take for a cold, except the microbes are not released; they just eat what gets through the permeable membrane wall.”

Based on test results, base officials may consider using the technology at other contaminated sites at Edwards.

“Microvi’s technology has the potential to remove perchlorate and trichloroethene [a solvent],” Oshita said. “So it can be used at other restoration sites.”

During the treatability study, Microvi’s treatment system operated at Site 285, near the northern boundary of the base. Site 285 is one of the locations at Edwards with detected amounts of perchlorate in the groundwater. Historical records indicate perchlorate was used in this area for solid rocket motor activities.

Perchlorate cleanup at Site 285 is nothing new. In response to public concerns, base officials installed a treatment system in May 2003 as part of a treatability study. This ion-exchange system was the first in operation at an Air Force installation, and to date, the system has removed 151 pounds of perchlorate and cleaned 50 million gallons of groundwater.

For the ion-exchange system, contaminated groundwater flows through vessels containing resin beads. Perchlorate molecules transfer from the groundwater to the resin beads. Over time, the beads become saturated and must be changed out and replaced with new beads. The used or spent beads are then transported and disposed of in accordance with applicable environmental regulations as hazardous waste.

Unlike the ion-exchange system, the Microvi treatment system produces no waste byproduct.

“There’s no byproduct from this process and it costs 20 to 30 percent less than other perchlorate-removal systems,” said system project engineer Noci Farhadi. “There’s a need for water



**BEADS AND CHECKERBOARDS** — Noci Farhadi, Microvi Biotech, Inc. project engineer, demonstrates the microbead technology equipment, shown here, that was used during a pilot study at Environmental Restoration Program Site 285.

cleaning systems like this. We’re going to take the lessons learned here and expand the system for a large-scale installation.”

“Perchlorate is a community concern,” Oshita said. “The Air Force is interested in supporting new technologies which remove contaminants more efficiently, with reduced costs.”

The pilot study, funded by a government grant, began with field testing in February 2009. The Microvi treatment system took contaminated groundwater directly from extraction wells at Site 285. A filter trapped any sediment before pumping it through two inline Microvi reactors containing the permeable membrane carriers. During the study, Microvi employees tested different operating flow rates to achieve the most efficient settings for the system.

A flow meter monitored the system to ensure an adequate amount of water was pumped through the tanks. The meter sent data to a programmable logic control or PLC, which acts like the hard drive in a desktop computer.

The PLC also can make adjustments to the system according to the data received. One such adjustment controls the variable frequency drive motor and optimizes the operation and extends

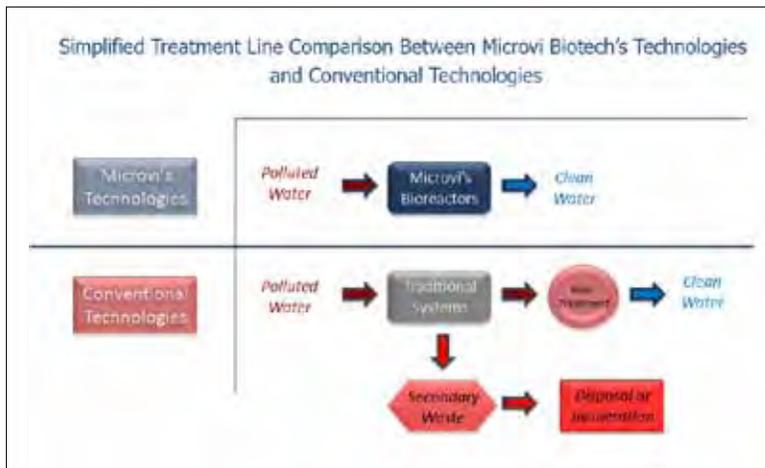
the useful life of the drive motor. The motor works based on demand, unlike a regular motor that runs constantly. This means the Microvi treatment system uses less energy than some other types of systems.

“We’ve built the system to be as simple and easy to contain as possible,” Farhadi said. “There are checks and balances built into the system. So, if there’s a failure, there will be no effect on the environment.

It’s a simple yet effective system.”

Safety features were built into the system to prevent any perchlorate-contaminated groundwater from leaking onto the surface. If electrical power had been lost during the pilot study, the system would have shut down automatically.

Another advantage to the Microvi treatment system is its rate of extraction. At normal operating speed, the Microvi treat-



**TECHNOLOGY COMPARISON —** According to Microvi Biotech, Inc., the microbead technology tested at Site 285 streamlines the remediation process compared to conventional technologies.

ment system runs at 1.5 to 5 gallons per minute. At this rate, the Microvi treatment system can fill a 21,000-gallon holding tank within

three weeks. Using such a system means more groundwater can be cleaned up in less time.

Whether the Air Force decides to use the existing ion-exchange or the Microvi treatment system, local residents can be assured Air Force officials are continuing their efforts to clean up perchlorate at Edwards Air Force Base.

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## WTE continued

From page 5

redirected to power the generators.

“The major benefit of waste-to-energy is there is less trash disposed of in the landfill,” said Gary Schafer, solid waste specialist at Environmental Management. “Recycling should increase due to sorting of the waste material, and electricity will be added to the power grid, reducing the cost of power for the base.”

“The system will power a 120-kilowatt generator,” Madoski said. “About 40 kilowatts will be used to keep the machine running, for example the preprocessor, and gasifier, and the remaining 80 kilowatts will be put back into the power grid. The system also generates a significant

amount of heat that could be used to power a boiler, chiller, or a topping cycle generating additional electricity.

“We can’t afford to keep burying our waste in the ground. We know very little about what combinations and concentrations of contaminants exist or may accumulate over time, not to mention the potential for future generations of greenhouse gases,” Madoski said. “These contaminants will sooner or later leach into our aquifers and pollute the soil as well as valuable fresh water resources, unless they’re removed and treated.

“The bottom line is it is always easy to make a mess and let someone else worry about cleaning it up later. That’s pretty much what a landfill is.” Madoski continued. “It may cost a bit more upfront and cause some anxiety, but in the long

run it is better to deal with the mess right now.”

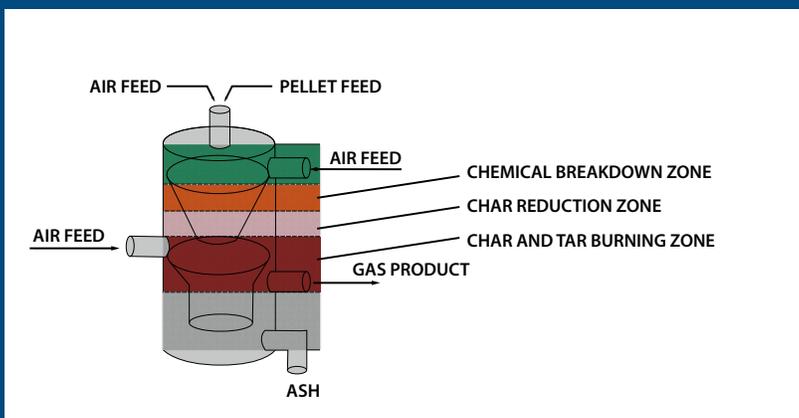
According to Madoski, currently there is much being done to advance the science of emissions control, coupled with emerging waste-to-energy conversion technology. These advancements provide better opportunities for capturing and treating the harmful substances that are being buried in landfills, or may be released into our atmosphere through burning.

According to Schafer, Infoscitex — a defense, aerospace, life sciences, energy and environmental contractor — received money from the Environmental Security Technology Certification Program office to develop a waste-to-energy system. The ESTCP is a program that has promoted innovative environmental technologies at Department of Defense sites.

Infoscitex chose Edwards as the testing location for their system and the project will be fully funded through ESTCP. Construction for the waste-to-energy project is scheduled for implementation in late September or early October 2010.

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**CREATING ENERGY —** Infoscitex will test this type of gasifier machine at Edwards in the fall. Waste is shredded, compressed into fuel pellets and fed into the machine. The end result is a gas product capable of producing energy.



# 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 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).

# 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: Aug. 19, 2010  
Time: 5:30 p.m.  
Location: Rosamond, Calif.  
Venue to be determined

## RAB Members

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Vacant

**Rosamond**  
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ALTERNATE: Leslie Uhazy (661) 256-8209 Home  
[luhazy@avc.edu](mailto:luhazy@avc.edu) (661) 722-6417 Work

### ON-BASE COMMUNITIES

**Housing**  
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**Main Base Air Base Wing**  
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**Main Base Test Wing**  
Richard Salazar (661) 275-3275 Work  
[richard.j.salazar@lmco.com](mailto:richard.j.salazar@lmco.com)

**NASA Dryden**  
Vacant

**North Base**  
Vacant

**South Base**  
Brenda Weems-Hunter (661) 275-0456 Work  
[brenda.weems-hunter.ctr@us.af.mil](mailto:brenda.weems-hunter.ctr@us.af.mil)

**AF Research Laboratory and Propulsion Directorate**  
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**Edwards AFB**  
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**Lahontan Regional Water Quality Control Board**  
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[tpost@waterboards.ca.gov](mailto:tpost@waterboards.ca.gov)

**U.S. Environmental Protection Agency**  
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Joseph Healy (415) 972-3269 Work  
[healy.joseph@epa.gov](mailto:healy.joseph@epa.gov)

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