



## Arizona's Military History

Arizona plays a major role in the nation's defense and has a long military history. For instance, Camp Huachuca was established in 1877 during the Indian wars in Southeast Arizona. They later renamed it Fort Huachuca. From 1913 to 1933 it was the home of the 10th Cavalry "Buffalo Soldiers."

Arizona was very important during World War II. Davis-Monthan Air Force Base served as an operational training base for B-18 "Bolos", B-24 "Liberators" and the B-29 "Superfortress." Luke was the largest fighter training base in the Air Corps, graduating more than 12,000 fighter pilots. Also, as odd as it seems, the Army used the Yuma Proving Ground--in the middle of the desert--to test river bridging equipment! The nearby Colorado River was the perfect spot.

During the Gulf War, the Yuma Army Proving Ground tested nearly all the ground equipment used there. More recently, Arizona's reserve units served in Iraq.

Arizona's climate is excellent for training military personnel, particularly pilots. Yuma Marine Corps Air Station is the corps premier aviation training facility, and Luke is the largest fighter aircrew-training base in the world. Our climate is also excellent for storing military equipment. Navajo Army Depot stores munitions and explosives, and Davis Monthan Air Force Base has the largest airplane graveyard in the world with more than 5,200 planes. Arizona will continue to play a major role in the military of the future.

**The importance of P2.** Today, worldwide competition pushes everyone toward greater efficiency, and doing more with less. The military faces downsizing and base closures. For instance, Congress has reduced force levels by one-third. Similarly, Arizona is growing at a

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rapid rate and state government is working to keep up. We are all trying to do things smarter, cheaper and better. Pollution prevention is a good way to do that for the environment.

Luke is a good place to find examples of pollution prevention. Luke won the General Thomas D. White Environmental Quality Award in 1996.

**Arizona's Pollution Prevention Success.** Statewide, hazardous waste shipped off site for treatment, storage or disposal was 21,015 tons in 1991. In 1996, the most recent year for which we have complete data, it was only 10,845 tons. This is a 48% reduction! This is good news and illustrates how Arizona facilities have worked hard to reduce waste at the source.

## **U.S. Air Force**

**Pollution Prevention (P2) Program at Air Force Plant 44.** Air Force Plant 44 is what's known as a GOCO, or a government-owned, contractor-operated facility. It is owned by the U.S. Air Force and is operated by Raytheon Missile Systems. At the plant, which is located in Tucson, Raytheon manufactures missiles for the Army and Navy, as well as the Air Force. The plant is adjacent to the Tucson International Airport. It consists of 123 buildings with a floor space of 1.4 million square feet. Raytheon leases an additional one million square feet of space from the airport.

An aggressive P2 program focuses on eliminating hazardous material; reducing hazardous waste, air emissions, and solid waste; and chemical, water, and solid waste recycling. Pollution prevention projects that are under way, or have been completed, will eliminate or reduce 5.5 tons per year of hazardous air pollutants; 33.4 tons per year volatile organic compounds; 3.4 million gallons per year of wastewater; 8.8 tons per year of solid waste; and 44.5 tons per year of hazardous waste.

Pollution prevention projects range in nature from substituting aqueous, or water-based, compounds for toxic chemicals in metal cleaning operations, to using "dry ice" blasting and a laser instead of hazardous chemical for paint removal. This same laser will be used to roughen the surface of composites, plastics, prior to painting. Formerly, sand blasting was used to prepare composites for painting. This process produced airborne particulates and required the operators to wear personal protective equipment that presents an occupational safety and health concern. A future P2 project will involve manufacturing composites with pigmented resins so that they are produced in the "as needed" color, thus eliminating the painting process altogether.

One benefit to waste reduction is that it lowers plant-operating cost, and in the long run, should result in lower-cost missiles. For example, P2 projects contributed significantly to the reduction of wastewater flow from 750 gal/min to zero, thus enabling Raytheon to close the Industrial Wastewater Treatment Plant. Also, air emission reduction projects have allowed Air Force Plant 44 to achieve a "synthetic minor" status for hazardous air pollutants. This reduces the required regulatory reporting. As a testimony to its aggressive P2 program, Raytheon garnered the Arizona Governor's Pride award for industrial pollution prevention in October 2001.

***Pollution Prevention (P2) Program at Air Force Plant 44—continued from Page 2***

**Mercury Lamp Recycling.** Air Force Plant 44 generates approximately 15,000 used fluorescent lamps each year. The lamps are in standard 8-ft and 4-ft lengths, as well as "mini" tubes. All of the waste lamps are recycled. The cost is approximately \$0.08 per foot for fluorescent lamp recycling, not including transportation costs. Transportation costs are reasonable because the lamps are classified as universal waste, not hazardous waste, so they can be transported by a common carrier. In addition, approximately 25 waste "U" tubes are generated each year which cost about \$0.60 each to recycle. Finally, the site generates about 150 high intensity discharge/mercury vapor lamps and about 400 high pressure sodium lamps per year.

The waste lamps are sent to *AERC*, formerly *Mercury Technologies Inc.*, in Hayward, California. *AERC* also has facilities in Allentown PA; Ashland, VA; and Melbourne, FL.

Most lamps are 100% recyclable; the glass, aluminum ends, phosphor powder, filaments (ferrous), and mercury are separated through a "closed loop" process. If you want additional information on this topic and process descriptions, go to <http://www.aerc recycling.com>.

A side note: Recently, electricians at the Tucson plant were instructed to start using "green lights" which is a euphemism for fluorescent tubes that contain a lower concentration of mercury. It was discovered that a "green light" lasts only about 1/3 as long as the standard lamp, and has a much higher electrical consumption. The EPA has acknowledged that this is a concern because now it may be creating more waste and pollution than by using standard lamps. Regardless, AFP 44 recycles all of its lamps, whether they are "green lights" or standard lamps. For more information, call (937) 255-3054 ext 424.

**Electrofloation and recycling aqueous cleaning solutions.** Two additional pollution prevention projects that were recently completed demonstrate the use of state of the art technology in achieving our P2 goals.



"E-floter" on a waterfall lacquer paint booth in the TOW missile line.

The first incorporates a technology known as *electrofloation*. This process, developed by two Russian professors and licensed to a company in Cleveland, OH, involves using gas bubbles generated by electrolysis to "float" contaminants out of wastewater.

Electrolysis is the process by which a slight electrical current is applied to water to separate it into hydrogen and oxygen that "bubble" to the surface. A flocculating or coagulating agent is added to the

***Pollution Prevention (P2) Program at Air Force Plant 44—continued from Page 3***

solution to enhance capturing the contaminants. The process can be used for organic and inorganic contaminants, although it works better on organic matter. Early in the project a unit was installed on a “waterfall” lacquer paint booth in the TOW missile line. This reduced wastewater flow by 36,000 gallons a year. The last stage involved installation of a unit in a laboratory to recycle 500,000 gal/yr of wastewater.



Aqueous Cleaner and Rinsewater Recycler

Another project involves the recycling of aqueous cleaning solutions and associated rinse water by the processes of ultrafiltration and reverse osmosis.

Five recyclers have been installed throughout the plant, resulting in an elimination of approximately 1.2 million gallons of wastewater per year.

This contributed to closing the Industrial Wastewater Treatment Plant and the associated cost of operating that large facility. For more information, call (937) 255-2918.

**U.S. Marine Corps Lead Battle Against Pollution**

Since November 10, 1775, the Marines have been on the forefront of the battleground against their enemies and have used cutting edge technology to wage those battles. One of the newest battles being fought, other than the one against terrorism, is the fight for clean air.

Since January, the station motor transportation office has been filling several of their vehicles with compressed natural gas.



This vehicle is one of 12 in the station motor pool that is capable of running on compressed natural gas and gasoline. These vehicles are one example of how the Marine Corps is doing its part to help the environment.



***Marines Lead Battle Against Pollution—continued from Page 4***

Compressed natural gas (CNG) is a cleaner burning and less costly fuel than gasoline, but one of the biggest advantages for the station is the convenience. CNG is exactly the same gas used to heat homes and cook food.

With the air station using CNG to power many of its vehicles, Joe Valenzuela, dispatcher, station motor transportation, views the station as leading the way in being environmentally safe. "I think we're the ones that have to set the example," said Valenzuela. "It's a good advantage for us to have the fuel system set up and running."

According to Valenzuela, there are 12 vehicles in the motor pool that can use gasoline and CNG. Valenzuela explained performance is roughly the same with natural gas as with gasoline. On a single fill up, a vehicle can get a range of up to 150 miles on a single tank of CNG.

A single tank for a 15-passenger van can hold six gallons of natural gas, whereas a sedan will hold about 3.5 gallons, said Valenzuela. The mileage would be greater if not for the small size of the tank, he said.

With vehicles being able to run on both fuel types, a vehicle can leave for a long road trip with two full tanks of fuel, saving the station money and essentially doubling the range. Vehicles that are checked out but not leaving the Yuma area are required to run off CNG, because it is readily available to government vehicles.

With gas prices rising, CNG makes a lot more sense, said a transportation assistant, station motor transportation. Fuel around town can be high--\$1.40 or more for a gallon of regular unleaded gasoline. CNG costs the station just less than a dollar a gallon.

He explained that the motor pool has been mandated by the government to have at least 75% of all their vehicles running on both fuels by 2006.

From an environmental point of view, F.D. , environmental compliance manager, explained that natural gas is a safe and clean alternative to gasoline. CNG has no additives, and does not produce carbon monoxide or carbon dioxide, said Daniel. Also, with CNG, no additional filters are needed on vehicles to clean the exhaust emitted from the engine.

Marine Corps Air Station Yuma is a model installation that sets an environmental example for other Marine Corps bases to follow, said Daniel. Though the Marine Corps is simply complying with an executive order to enforce the Clean Air Act, many of the projects the station undertakes are simply for the betterment of the community.

"I think MCAS is an excellent environmental steward," said Daniel. "We're constantly looking for ways to go further environmentally even though we don't have to."

MCAS Yuma is not the only base on the west coast to have alternative fuel capability. Marine Corps Recruit Depot San Diego and Marine Corps Air Ground Combat Center Twenty-nine Palms, California also have CNG.

***Marines Lead Battle Against Pollution—continued from Page 5***

If a station vehicle needs to be refueled here in CNG, however, don't expect to be able to jump out of the vehicle and pump a quick tank of gas. It can take anywhere from a few hours to all night to fuel up a vehicle, one of the few drawbacks to the CNG dispensing system, said Valenzuela.

**U.S. Army**

**Tire Recycling.** The Fort Huachuca Sportsman Center has found an interesting approach to recycling. Old tires, pallets, and cable spools have been used to construct the buildings, command posts, and obstacles for a paint ball field.



"I inherited these tires" a spokesman of the Sportsman Center quoted, "so I can't say where all of them came from. After I started working here more tires kept arriving from people just dropping them off and donating them. We had more than enough, so I stopped that practice.

"We also use empty cable spools to construct our paint ball fields. I get them from the electric companies downtown [off post] but I'll take them

from anywhere. I plan to paint them, and that will make the field look nicer. We can get the paint for free from the Hazardous Waste Minimization Point."



When a partially used can of paint is turned back to the HWMP, it is free issue to whomever wants to finish it off. When asked if he could use more pallets, he responded, "Not really. I prefer the cable spools. I think the spools look nicer than the tires or pallets."

## Arizona Department of Environmental Quality (ADEQ)

**Green Building.** What makes a building green? A green building is a structure that is designed, built, renovated, operated, or reused in an ecological and resource-efficient manner.

The newly occupied Arizona Department of Environmental Quality (ADEQ) office building has been registered as a project in the nationwide Leadership in Energy and Environmental Design (LEED) rating system developed by the U.S. Green Building Council.

The LEED green building rating system includes a menu of several categories from which a builder may choose to demonstrate environmentally sensitive design. Such categories include: site design, energy efficiency, water conservation, materials use, and indoor air quality.

The “green” features of our new building include:

### **Sustainable Sites:**

- Building is adjacent to several city bus lines.
- Shower facilities are provided for occupants who bike or walk to work.
- Alternative-fuel fueling stations are provided in parking garage.
- Stormwater retention ponds handle runoff.
- Energy Star-rated roof system.
- Light layout modified so there is no light beyond property line.

**Water Efficiency:** High efficiency irrigation and a gray water system.

### **Energy and Atmosphere:**

- DOE II energy study completed.
- Dimmable ballasts.
- Motion sensors control all lights.
- VFDs on all electric motors.
- Energy Star transformers.

### **Materials and Resources:**

- Recycling areas located on each floor and loading dock.
- Separate recycling receptacles for different waste streams.
- Recycled construction materials, including:
  - structural steel, > 20% recycled content.
  - carpet, > 65% recycled content.
  - ceiling tile, > 85% recycled content.
  - glass, 20% recycled content.
  - uses locally manufactured materials.

### **Indoor Environmental Quality:**

- Prevent exposure to tobacco smoke.
- Carbon dioxide monitoring system.
- Mechanical design adjusted to have more air exchanges per hour.

**Indoor Environmental Quality:**

Ductwork openings covered during construction and flushed out for a minimum of two weeks prior to occupancy.

Used low VOC paint, carpet adhesives, mechanical adhesives and wood with no formaldehyde resins.

Placed all open areas near windows, all enclosed offices and rooms near the center away from glass.

**Innovation in Design:**

Used Rockland Materials to supply redi-mix concrete because their truck fleet uses bio-diesel fuel (vegetable oil).

Installed a 55 KW solar system on parking canopies to create renewable energy from the sun and provide shade for 90 stalls.



The Facility Assistance Unit staff was instrumental in the plan to design and construct this new building to these high environmental standards.

For more information about LEED, call

(602) 771-4207 or  
(602) 771- 4203.

Arizona Department of Environmental Quality’s “Green Building”

**City of Mesa and Arizona National Guard**

**Complete Wind Turbine Project.** The City of Mesa Utilities Department Gas Division, in partnership with the Arizona National Guard, has completed a wind generation project. The 10kw Bergey wind turbine will be used to produce low-cost “green” electricity for the Navajo Army Depot located in Bellemont, Arizona. The Gas Division Director for the City of Mesa, and The Energy Manager for the Arizona National Guard, served as project managers. A ribbon-cutting ceremony at the Camp Navajo site was held on April 3, 2003.



“Energy efficiency and a clean, renewable energy source mean a stronger economy, cleaner environment and a more secure energy future for America,” said Seaton.

Wind energy is a form of solar energy produced by uneven heating of the earth’s surface. As a power source, wind energy is available for more hours each day than solar energy. Following seasonal patterns that provide the best performance in winter months and the lowest performance in summer months, wind turbines are environmentally safe.

“Joint projects such as this, via the use of grant monies from the National Guard Bureau, helped prepare Mesa’s employees to understand distributed generation better than anyone else,” said Paulus. “The future of distributed generation, whether in the form of fuel cells, solar or wind energy, will play a vital part in our nation’s energy policy.”

For more information about the joint wind turbine project, contact the Arizona National Guard, at (602) 267-2743, or the City of Mesa Gas Division, at (480) 861-9573.

### **Arizona Green Business Program**

#### *Vehicle maintenance facilities at military installations statewide to participate*

The Arizona Department of Environmental Quality (ADEQ), in partnership with military installations throughout the state, has initiated a pilot program targeting vehicle maintenance facilities for the initial phase of the Green Business Program.

Other participants include fleet maintenance shops for cities and counties sponsored by the Rocky Mountain Fleet Management Association and commercial automotive repair shops sponsored by the City of Mesa, Arizona. Similar programs are being developed in California and Hawaii.

The Arizona Green Business Program is a voluntary partnership between businesses, trade associations, the public, military installations, and local and state agencies. The program’s goal is to recognize Arizona facilities that use a proactive approach to comply with federal, state, and local environmental regulations and implement measures to prevent pollution and conserve resources.

The Arizona Green Business Program **objectives** are to:

- Comply with all applicable environmental regulations and strive to exceed compliance.
- Conserve energy, water and other natural resources.
- Develop and implement practices that reduce waste generation and prevent pollution.
- Demonstrate environmental responsibility.

**Arizona Green Business Program—continued from Page 9**

Participation in the Green Business Program provides:

- Streamlined environmental assistance.
- Improved operations through innovations.
- Money saving opportunities.
- Enhanced image in the community.

EPA Region IX and the State of Arizona Department of Environmental Quality will recognize military vehicle maintenance facilities that meet the Green Business criteria for compliance, pollution prevention, and resource conservation at a ceremony later this year.

For more information, please call the, ADEQ Facility Assistance Unit, at 602-771-4179, or by email at [cp1@ev.az.state.gov](mailto:cp1@ev.az.state.gov).

**Alodine**

Alodine, also known as Iridite, is a material used to protect aluminum from corrosion. It also provides an excellent electrically conductive surface after treatment. Alodine is a strong oxidizer that causes a chemical conversion to the surface of the part in preparation for painting or to ensure electrical bonding. For small applications felt-tipped Alodine pens are available for use. There are many advantages to using the pens such as no waste overspray, no rinsing and no risk of spilling the fluid. Secondary waste is virtually eliminated. Information on the pens is available under Alodine on the web.

Members of the Arizona Pollution Prevention Partnership contributed articles in this newsletter. This partnership includes representatives of the Department of Defense and the State of Arizona. The views and opinions expressed in this publication are not necessarily those of the Department of Defense or the Arizona Department of Health. All inquiries should be addressed to the Environmental Quality Division Director, Naval Facilities Engineering Service Center, 1100 23<sup>rd</sup> Avenue, Port Hueneme, CA 93043. Telephone DSN: 551-2638, 805-982-2638.