

FY 2011 Secretary of Defense ENVIRONMENTAL AWARDS

Hill Air Force Base – 75 CEG/CEV, Environmental Management Division / Sustainability – Industrial Installation

INTRODUCTION

Located 30 miles north of Salt Lake City, Utah, Hill AFB is a major Air Force (AF) aircraft and missile maintenance depot and weapons systems program office with over 28,000 employees focused on the three AF core values: integrity first, service before self, and excellence in everything we do. Hill provides worldwide engineering and logistics management for the F-16 Fighting Falcon and A-10 Thunderbolt aircraft, and the Minuteman III and Peacekeeper intercontinental ballistic missiles. Hill also provides depot maintenance, repair, and overhaul (MRO) of the F-16, A-10, F-22, and C-130 Hercules aircraft. The installation is the Air Force Center of Industrial and Technical Excellence for low observable, “stealth,” aircraft structural composite materials and provides support for the B-2 Spirit multi-role bomber. Hill AFB is home to five wings, approximately 40 tenant units, and has responsibility for nearly a million acres of the Utah Test and Training Range (UTTR).



Aerial illustration of Hill AFB and primary aircraft maintained. Located nearly 30 miles north of Salt Lake City, Utah, Hill AFB is a major Air Force depot and weapons systems program office with over 28,000 employees. The base supports five wings, approximately 40 tenant units and the Utah Test and Training Range.

BACKGROUND

The Pollution Prevention (P2)/Green Sustainment Installation Program is a joint effort among multiple organizations including the 75 Air Base Wing, 309th Maintenance Wing, Engineering Directorate, multiple tenants, and Systems Programs Offices. The Civil Engineering Group, Environmental Division (75 CEG/CEV) serves as the program manager for all environmental issues and concerns; developing and implementing policies and procedures that ensure base-wide environmental compliance and implementation of pollution prevention investments.

Hill AFB's environmental aspects include 2,077 air emission processes; 71 hazardous material distribution centers (Hazmarts); 337 hazardous waste collection sites; 314 regulated storage tanks; 15 miles of industrial wastewater lines and associated treatment plant; and 24 remedial treatment systems. CEV conducts integrated working groups for air, hazardous waste, hazardous materials, and waste water. The success of these working groups hinges on the significant participation by the wings and tenants at Hill. 75 CEG's Energy Management Steering Group (EMSG) ensures energy conservation efforts are key issues at the installation.

Hill's unique management process lies in using our Quality Control Plan (QCP) and a Quality Assurance Surveillance Plan (QASP); web-based tools implemented in 2003. In 2006, the AF Manpower Agency declared our QCP and QASP tools to be Air Force “best practice benchmarks” that should be shared Air Force-wide. A new and integral tool for CEV is the Interactive Customer Evaluation (ICE) web-based system, which facilitates customer feedback on services provided at military installations and related facilities.

PROGRAM SUMMARY

Hill AFB is recognized within the Air Force and across DoD for its proactive approach to sustainability, and many of the ideas conceived and implemented at Hill have been adopted throughout the DoD. Hill's Sustainability Program has an effective and proven strategy for prioritizing, implementing, and sustaining our future. The goals and objectives of the Hill AFB P2/Green Sustainment Installation Program are to:

- Ensure worker safety through the removal of toxic chemicals from the workplace,
- Maintain readiness by ensuring resources are available to operate and maintain AF/DoD assets in the “greenest” ways possible, ensuring minimization of waste and pollution,
- Keep current with Emerging Contaminants/Registration, Evaluation, Authorization and Restriction of Chemical substances (REACH) initiatives; ensuring availability of required materials since many hazardous chemicals are being banned worldwide, making it difficult to operate and maintain our very unique National Defense Assets,
- Evaluate and prioritize projects to make green changes that cost less, yet do more, for our mission.

ACCOMPLISHMENTS

POLLUTION PREVENTION PROGRAM

During the award period, the 75 CEG revitalized its P2 Program by developing 13 new projects. Of key importance was the teaming of the P2 office with the 309th Commodities Maintenance Group (CMXG), the Small Innovative Business (SBIR) Office, and the Landing Gear System Programs Office, to design, install, and test a prototype Zinc-Nickel (Zn-Ni) plating line to replace the current toxic Cadmium plating process. The project was competitive-selected for funding by the DoD's Environmental Security Technology Certification Program (ESTCP), DoD's environmental technology demonstration and validation program established to promote the transfer of innovative technologies. By eliminating worker exposure to harmful cadmium and cyanide when plating high-strength steel, the system will have broad application throughout DoD and private industry. The synergy and teamwork exemplified by this project are clear indicators of the P2 program's impressive resurgence. The P2 office continued to look for new opportunities for improvement by conducting process assessments in its wheel and landing gear operations. Input from maintenance wing Unit Environmental Coordinators (UEC) initiated a multi-year study to quantify potential savings from the purchase and disposal of hazardous materials with expired shelf lives.

GREEN PROCUREMENT PROGRAM

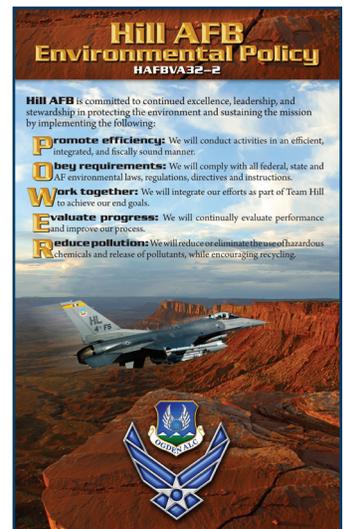
Through implementation of basewide efforts, Green Procurement at Hill AFB has soared. CEV spearheaded a policy to set office printers to default duplex printing with a net savings of \$400 per year in CEV alone. Hill AFB amended all contracts to require the reuse/recycling of construction/demolition material. In the industrial arena, many hazardous solvents and hydraulic fluids were changed to "green" alternatives; reducing new material expense and establishing zero disposal costs. Green procurement efforts basewide resulted in numerous projects initiated by the industrial organizations—it isn't simply an Environmental Management effort anymore. Many base organizations are witnessing first-hand the benefits of incorporating green procurement into their daily business practices.

ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

The Hill AFB EMS process joins the P2 and Green Procurement programs in demonstrating substantial improvement. Hill AFB's EMS process is one of the best in the AF and is the principle environmental management tool for the base. The installation's advancements in the EMS area are primarily centered on improving basewide awareness of the program's purpose and efforts.

Hill AFB provided environmental training for over 3,000 employees; establishing a web-based system for easy access. Additionally, 6700 employees were trained on shop-level EMS awareness to incorporate EMS principles into daily decisions. We also distributed 35 base environmental policy posters to educate and focus the workforce on awareness and excellence. Environmental, Safety, and Occupational Health Council (ESOHC) support energized the new Cross-Functional Team (CFT) which:

- Garnered membership base-wide
- Collaborated with leadership to conduct an EMS management review
- Advocated for the development of three significant aspect action plans
- Ensured visibility of the regulatory status of high risk items and
- Distributed more than 2500 business cards promoting EMS awareness across the base.



This poster was developed as part of the EMS building process. It communicates the key elements of the Base Environmental Policy. It is displayed in numerous areas across the installation to reinforce Hill AFB's commitment to environmental accountability and excellence.

RECYCLING

Hill's Qualified Recycling Program (QRP) has successfully consolidated all recycling activities under one program, raised awareness of recycling opportunities, identified numerous new streams of recyclable material, diverted millions of pounds of recyclable waste, generated revenue for the base, and produced significant savings for the Air Force. Hill AFB's QRP was recognized by the State when its program manager won the 2011 Utah Recycler of the Year Award from the Recycling Coalition of Utah. Along with metals recycled during the award period, Hill's QRP generated over \$134K of revenue by collecting and recycling 615K gallons of used oil, 426K lbs of batteries, and over 1.5M lbs of plastic blast media. In addition, over 3.7M lbs of mixed recyclable waste (plastic containers, mixed paper, cardboard, aluminum cans, and glass) were sent to the local recycling facility, and over 115K lbs of wood and yard waste were composted or mulched and used for base landscaping to reduce irrigation water usage. By diverting these materials from the landfill, Hill AFB avoided over \$1M in disposal costs and provided a total cost benefit of nearly \$1.2M to the AF. Some of the QRP proceeds are routed back into P2 projects base-wide.

Other recycling efforts have focused specifically on industrial operations. One significant project is the implementation of solvent filtration systems to allow multiple re-use of expensive aircraft parts cleaning solvent. With five units in place to date, Hill saved \$100K per year on new material purchase and disposal costs. Designed a new recycling facility to expand and improve program capability – construction will begin in the spring of 2012. Other initiatives include: carbon filter cleaning and refurbishing of F-16 air conditioning equipment saving \$12K per year; recycling 11K lbs of aerosol paint cans resulting in a disposal cost reduction of \$32K; and laundering and reusing 41K lbs of dirty rags eliminating \$90K in purchase costs and \$13K in disposal costs annually.

Hill AFB also published and distributed six newsletters on recycling opportunities to employees and local residents. We visited elementary schools and educated students on environmental matters including how to keep storm water clean. For Earth Day 2011, we initiated a new "Lunch and Learn" series to educate the workforce and local schools. Topics included tips on home energy savings and household recycling. Hill published and/or presented 23 scientific papers in professional science community journals and conferences. We also created four SharePoint sites for information exchange as a method to promote and increase environmental awareness.

MASTER PLANNING

The Hill AFB West Side Development project is at the heart of our master planning/green building projects with more than 500 acres of installation property under re-development using the Enhanced Use Lease concept. This large-scale effort will replace 1.6M sq ft of energy wasting buildings with 1.2M sq ft of LEED Silver Certified Structure.

GREEN BUILDING

The new east side fire station is currently being certified as a LEED Gold structure, making it the first LEED Gold building on Hill AFB. The station utilizes several green components for maximizing energy and resource efficiency, including ground source heat pumps, solar panels, xeriscaping, water recycling, and maximized natural lighting. The Child Development Center, constructed during the award period, is LEED Silver and our new F-22 aircraft facility also meets LEED standards.



The Qualified Recycling Program (QRP) at Hill AFB has begun to grow as a large variety of scrap materials are being collected and resold. We project that within 3 years the QRP will produce over \$3 million in revenue and cost savings annually. This money will be returned to the base to expand their environmental efforts and support morale, welfare and recreation.



Earth Day event at Hill AFB where children from a local elementary school learned about ecosystem design. Each child was given a component of the ecosystem and explored their interactions by building an eco-web. This allowed the students to visibly observe the impact of positive and negative effects on the environment.

IMPLEMENTING GREENER ALTERNATIVES TO HAZARDOUS MATERIALS

One of our most noteworthy and impactful projects is our Zn-Ni plating process which will replace toxic cadmium plating on landing gear. Funded by ESTCP, SBIR, and Hill AFB P2, a significant benefit of this project is the reduced risk from an occupational health standpoint as the process improvement eliminates other toxins in addition to cadmium; decreasing worker exposure to zero from the related chemicals. From a technical perspective, Zn-Ni plating saves \$344K per year over the high maintenance and unreliable Ion Vapor Deposition aluminum chamber. Hill anticipates a total savings of \$500K annually in process and environmental costs with a payback period of less than five years.



This C5 Galaxy nose landing gear illustrates the critical structures that must withstand corrosive environments. Center shows the ZnNi electroplating bath in which the parts are plated. Team Hill's SPO and chemical Engineer with newly ZnNi plated landing gear component.

IMPROVING MATERIALS/WASTE MANAGEMENT PRACTICES

Hill is saving more than \$60,000 annually by replacing manual paint mixers with an automated system. Another impressive project unique to Hill AFB is the chemical pour-down facility. This process decreases the use and waste of hazardous liquids by decanting materials from larger containers into smaller ones that are more practical on the shop floor and generates savings of \$1.7M per year. On the air quality front, our paint booth monitoring alarm system removes operator error and reduces the risk of non-compliance. Green procurement products/processes which save money on disposal costs, improve efficiency, and reduce human exposure are strongly advocated within the industrial organizations. A prime P2 project initiated by a Hill AFB industrial organization is the use of drum trash compactors for hazardous masking waste; cutting handling and disposal costs by \$6K per unit per year.

Other examples include the development and testing system for qualification standards to replace chemical and media blast systems for paint removal. Hill is also a leader for development in paint removal systems using robotic lasers. A cutting edge full plane laser paint removal system for F-16 and C-130 aircraft, implemented at Hill, will dramatically reduce the waste generated from the stripping process and help keep workplace air free of cadmium- and chrome-contaminated dust. Hill AFB is anticipating a net savings of \$6M annually from reductions to process times and waste disposal costs. The installation of sulfur hexafluoride recovery systems designed to capture greenhouse gases was initiated by an industrial organization. A significant improvement, it resulted in more than 26K tons of carbon dioxide emission reductions annually by utilizing a system to containerize, rather than emit, sulfur hexafluoride after its initial use on critical aircraft parts. The reclaimed greenhouse gas can be re-used on non-critical equipment.

Hill AFB's Hazardous Waste Program uses cost-effective and innovative methods of managing waste. Our knowledge-based system of waste characterization was updated with chemical data for 260 sites. This saved \$50K per year over original methods of waste management, also cut disposal costs by 10%, handling costs by 9%, container amounts by 12%, and management costs by \$.05 per lb. Other improvements include the use of large bin compactors for non-hazardous waste in our industrial areas resulting in a huge savings of \$100K per year. Hill AFB also triple rinses and reuses drums at a savings of \$40 per drum for a total savings of \$40K annually. 60K aerosol cans are punctured, drained, and/or crushed to save 18K lbs of landfill waste each year.

ENERGY

Hill AFB spearheaded its energy independence push by tapping national experts for guidance - in one instance, an energy audit revealed opportunity for improvement in 12 remedial systems; initiating 38 energy savings actions with a projected payback of less than 5 years. This audit resulted in annual reductions of 395 megawatt hours, 358,000 lbs of carbon dioxide emissions, and an outstanding cost savings of \$268K. During this extraordinary campaign, Hill worked closely with tenant organizations to identify low- and no-cost opportunities for energy savings of up to \$5-10K per year.

Two sources of sustainable energy making a huge difference at Hill AFB are our Landfill Gas-to-Energy and Solar Array Systems which produce on-site, renewable electricity to produce 15,854 megawatt hours and a remarkable cost savings of \$790K per year. The solar panel array saves 309 megawatt hours per year and more acreage has been set aside for potential expansion. Hill AFB has also recently renewed its steam contract with a nearby off-base municipal solid waste-to-energy facility. Negotiating a reduced price structure enabled Hill to save \$186,000 annually and reduces its on-base steam production air emissions by 20%.

Furthermore, Hill has the first Air Force process energy performance contract focusing on depot maintenance industrial energy; \$2.3M in savings is projected to start accruing in fiscal year 2014 or 10% of the energy expenditures for the entire installation. Today, 60% of the power required for the hazardous waste storage facility is solar supplied. Additionally, the “How Low Can We Go?” program increased employee awareness to turn off equipment during all holiday weekends to save \$3K per holiday.

COMPLIANCE WITH EO 13514

Hill AFB applied innovative methods and cutting-edge technologies to remediation sites resulting in significant greenhouse gas reductions and energy savings to meet the objectives of Executive Order 13514. Hill’s innovative, no-purge method for groundwater sampling reduced carbon dioxide emissions by 43K lbs annually, and the use of flexible “wellmaster” tubing on remediation systems reduced annual costs by \$45K per year and eliminated 70K lbs of carbon dioxide emissions. Through simple changes in remediation management technologies, other sites could experience similar reductions and savings. By reducing our greenhouse gas emissions, we have more opportunities to support production and ultimately the mission. Our greenhouse gas and mobile source inventories enabled us to establish a baseline for ultimate mission growth. Hill AFB collected commuter data on approximately 54K personally-owned vehicles for greenhouse emission analysis, and replaced 35 gasoline fueled Government-Owned Vehicles (GOV) with Hybrid vehicles to achieve reductions in both fuel consumption and air emissions. Hill serves as the test site of the teleworking alternative for employees to reduce vehicle use and air emissions.

As a depot maintenance facility, Hill is able to focus on precision plating of landing gear parts while reducing hazardous pollutants. Hill experienced an impressive 95% reduction in hazardous waste generation from re-work and a 33% reduction in both plating and baking cycles through the use of conforming anodes. This also contributed to a 61% reduction in average plating time, 62% reduction in flow through time, and a 63% reduction in operating cost, all of which directly support the mission through increased efficiency and production.



Hill AFB’s Energy Manager shows students from the Davis Applied Technology College the base’s fixed solar panel array. The array was constructed to produce renewable green energy to assist in meeting our energy security mission of independence from the commercial grid. The sighting for the array contains 1,275 panels with a large area in which to expand when funding becomes available.