

**SECRETARY OF DEFENSE
ENVIRONMENTAL AWARD
ENVIRONMENTAL QUALITY – INDUSTRIAL INSTALLATION
TINKER AIR FORCE BASE, OKLAHOMA**

INTRODUCTION

Tinker Air Force Base (TAFB), home of the Oklahoma City Air Logistics Center, provides worldwide technical logistics support to Air Force aerospace weapon systems while serving as a premier interservicing facility supporting the Air Combat Command, Air Force Reserve Command, and the U.S. Navy. TAFB manages 2,261 aircraft, including the B-1, B-2, B-52, C/KC-135, and E-3, and an inventory of approximately 23,000 jet engines.

TAFB comprises 5,000 acres and is located five miles east of downtown Oklahoma City. TAFB is the largest single employer in the state, with nearly 25,000 civilian and military employees and an economic impact of \$2.27 billion on the six counties surrounding the base.

Moreover, complementing TAFB's dynamic defense mission is its mission of environmental restoration and protection. The TAFB Environmental Management (EM) Directorate is the active steward of the base's water, soil, plant, and animal resources, including three creek systems, 15 base ponds, over 280 species of plants, and 220 different species of fish and wildlife.

BACKGROUND

TAFB's complex industrial manufacturing processes, aging infrastructure, and ever changing environmental regulations all pose significant environmental challenges to its dual mission of military readiness and environmental stewardship. As TAFB's support of Homeland Defense and Operation Enduring Freedom increases, striking a balance between national security and environmental stewardship will become progressively more difficult. In addition,

educating the base tenants and the surrounding community about TAFB's environmental mission and encouraging them to be aware of actions that could impact the environment is an ongoing challenge.

EM is well organized and well equipped to overcome these challenges. From November 1998 to March 2000, the EM Directorate went through the A-76 cost comparison study process and as a result, reorganized into two divisions in March 2001—the Most Efficient Organization (MEO) and the Functional Area Staff (FAS)—each containing a compliance branch and an engineering branch. There are over 70 employees within the EM Directorate with a strategic mix of specialized skills, including 10 scientists in the physical, biological, geological, and environmental fields; seven chemists; 19 environmental protection specialists; and 20 environmental engineers.

In July 2001, a new director, Ms. Vicki Preacher, took over the leadership of EM and introduced a holistic approach, integrating

TAFB is committed to protecting human health and the environment. The EM Directorate, provides employees, residents, and the surrounding communities with a safe and healthy environment. EM Directorate is committed to ensuring compliance, pollution prevention, and continuous improvement of its processes and facilities.



EM's staff is comprised of a unique blend of scientists, environmental protection specialists, and engineers.

communication and employee recognition with the department’s technical mission. Founded on the philosophy that if EM employees are treated well, they in turn treat their customers well, Ms. Preacher reinstated an awards program, staff-wide meetings, an open-door policy, and effective communication and team-building training. She puts a priority on input from her customers, both internal (the base populace) and external (the community). Ms. Preacher has conducted various stakeholder surveys and held forums to gather input from employees and customers in order to refocus office revitalization efforts.

TAFB’s partnerships with local and national organizations also influence its environmental management program. TAFB is a charter member of the Central Oklahoma Clean Cities Coalition and the Oklahoma Military Environmental Group (OMEG). OMEG plays an integral role in shaping communications between the base, other military organizations, and regulators. Fellow participants include the Department of Defense (DoD), the U.S. Environmental Protection Agency, and the Oklahoma Department of Environmental Quality (ODEQ).

Part of TAFB’s environmental management approach includes partnering with academic and research institutions to develop practices that can be implemented across the Air Force and DoD. During the past two years, TAFB’s partnerships with Oklahoma universities have developed innovative technologies whose implementation has resulted in a savings of \$5 million. At the University of Oklahoma, TAFB participated in two cutting-edge projects:

- 3-D real-time visualization of air quality modeling data, used to analyze and interpret air quality data and confirm compliance with environmental regulatory constraints.
- Operation of the open-path Fourier transform infrared spectrometer, which identifies and quantifies real-time hazardous air pollutants and determines regulatory compliance.

TAFB is also partnering with the Environmental Development Planning function at Brooks City-Base, Texas, to investigate innovative industrial wastewater treatment technologies.

EM has developed or updated a number of environmental plans during the past two years:

Environmental Plans and Agreements	Completion/ Update
Facility Response Plan	Under Revision
Affirmative Procurement Plan	Under Development
Management Action Plan	Sept. 2002
Compliance through Pollution Prevention Plan	Sept. 2002
Disposal Plan	Sept. 2002
Storm Water Pollution Prevention Plan	Aug. 2002
Spill Prevention Control and Countermeasures Plan	Jul. 2002
Extremely Hazardous Substance Plan	Jul. 2002
Integrated Solid Waste Management Plan	Draft, Jul. 2002
Best Management Practices Plan	Apr. 2002
Environmental Management Financial Plan	Feb. 2002
Integrated Natural Resources Management Plan	Jan. 2002
Community Relations Plan	Oct. 2001
Installation Historical Preservation Plan	Sept. 2001
Hazardous Waste Management Plan	Aug. 2001
Waste Analysis Plan	Aug. 2001
Chemical Hygiene Plan	Jan. 2001
Wastewater Contingency Plan	Dec. 2000
Secondary Containment Requirements Plan	Nov. 2000

PROGRAM SUMMARY

Over the past two years, the EM Directorate has remained focused on its mission—to serve as the Oklahoma City Air Logistics Center’s focal point for all environmental issues by developing and implementing policies, programs, and

procedures that ensure basewide compliance with environmental requirements for the health of our city, our country, and the world. EM's strategic goals articulate this mission:

- *To create a work environment that encourages the entire base population to be dedicated environmental stewards. To implement a cultural change wherein all base employees take ownership for their environmental actions.*

EM completes over 50 outreach activities per year emphasizing environmental awareness. EM designated April "Earth Month" and sponsored an activity each week that highlighted TAFB's environmental program and extolled environmental responsibility. EM initiated "Base Environmental Awareness Day" to allow employees to pose questions and concerns to environmental engineers, biologists, and program managers, as well as collect informational material on each of the base's environmental programs at displays set up in the workplace.

- *To preserve and restore our resources by reducing and controlling risks posed by releases of harmful substances; reducing waste production, promoting recycling, and practicing innovative waste management practices; and cleaning up contaminated sites.* EM has conducted over 50 compliance inspections within the past two years and has begun addressing areas needing attention. For example, EM has strengthened its solid waste program through mandatory recycling of certain items. To make recycling more convenient for workers and residents, EM also bought and distributed new recycling containers. In three months, TAFB's recycling revenue increased by over \$3,000 monthly, and the amount of recycled white paper doubled.

- *To develop innovative training methods that are effective and accessible based upon the target audience.* Tailoring the programs to fit employees' needs, EM brings the training into the workplace to ensure minimal impact on productivity and cost. EM set up four Internet training locations in industrial shops and

transported a mobile training station into the workplace for short training sessions. To date, EM has developed Web-based training for pollution prevention, air quality, and solid waste management and is in the process of developing additional training programs. Interactive training platforms enliven the sessions and maintain shop workers' interest.

- *To effect a cultural change wherein customers view EM as a partner in meeting mission requirements.* To encourage participation in the environmental programs, EM has placed environmental engineers in most major work areas to act as liaisons for all environmental issues. Since EM is now involved much earlier in production processes, the Directorate is able to avoid work stoppages and incurring additional costs. EM has a multitude of working groups that bring production, management, planners, and facilities staff together to concur on a solution that balances both mission and environmental requirements. The addition of an "Ask EM" section to the Directorate's website allows base employees to receive answers to their questions via e-mail.

- Program-wide initiatives shaped by EM's mission and strategic goals have produced a cost savings of nearly \$10 million during Fiscal Years (FYs) 2001–2002.

ACCOMPLISHMENTS

During FYs 2001–2002, EM distinguished itself as an exemplary environmental steward. The Air Force's General Thomas D. White Environmental Quality Award, Industrial Category, was awarded to EM in recognition of its efforts during this time period.

Of the many noteworthy accomplishments, five are detailed below—Environmental Management System (EMS), pollution control (air and water), toxic and hazardous waste management, and community relations.

Environmental Management System

The EM Directorate began implementation of an EMS in October 2000. TAFB's EMS goal is simple, direct, and fundamental—emphasize pollution prevention, sustainable development, and state-of-the-art environmental management programs.

TAFB's first step was to ensure top-level management commitment to the program and to communicate its environmental mission to all internal and external stakeholders.

Second, a Gap Analysis of the TAFB environmental program identified several recommended improvement areas. TAFB has successfully completed 75 percent of the recommendations, including the following:

- Designed a Web-based EMS to allow all base employees and contractors access to up-to-date environmental documents.
- Completed a root cause analysis of trends identified by previous Environmental Compliance Assessment and Management Program (ECAMP) findings, and proposed and implemented a training program for the high-impact areas.
- Wrote risk management regulations to address environmental compliance issues, with subsequent Environmental Deficiency Records given to shops. This resulted in a 90 percent decrease in air compliance issues.

Third, an EMS implementation plan was developed in conjunction with stakeholders. The plan encompasses four phases—planning, implementation, corrective action, and review.

Planning – EM identified “aspects and impacts;” determined objectives, targets, and goals consistent with policy; and maintained budget and management of the program.

Implementation – A strong environmental management program depends heavily on a

continuing awareness of the current status of, and trends in, environmental management and technology as developed by regulatory agencies and policy makers. TAFB achieves this through a continuing program of education and training that addresses the specific needs of blue-collar workers, supervisors, environmental specialists, and upper-level management. For example, TAFB has developed Web-based training programs for pollution prevention, air compliance, and solid waste management. Additionally, the EM Directorate conducted EMS awareness training for its environmental partners on base, as well as more inclusive training for its EMS team.

Corrective Action – The EM Directorate conducts audits and compliance inspections on at least 20 percent of compliance sites per year to assess and monitor progress and recommends areas of improvement.

Review – The EM Directorate continually evaluates its programs and improves its processes; maintains regular communication with bioenvironmental engineering, safety, and civil engineering divisions, as well as the Judge Advocate, regarding the need, inception, implementation plan, and direction for EMS.

Air Pollution Control

Historically, TAFB has maintained an excellent rapport with air pollution regulatory authorities. TAFB's EM Directorate submitted a draft Title V permit for the base to the ODEQ on December 13, 2001. Due to the base's long standing relationship with regulators and the community, ODEQ allowed EM, rather than the state, to draft the permit and submit it for review. This expedited processing time and provided TAFB the opportunity to tailor specific conditions of the permit to TAFB's operations, while also meeting both state and federal regulatory requirements.

TAFB has reduced toxic release inventory emissions by 1.3 million pounds as of 2002, which is an 81 percent reduction. It exceeded the Executive Order goal by over 30 percent and was commended by the DoD.

EM has developed innovative tools and methodologies over the past two years that have proven to be critical in ensuring overall compliance with ODEQ regulations:

- In December 2001, EM developed a database to track calibration fluid emissions. The database minimizes data handling, is interactive and user-friendly, and automatically generates required monthly and annual reports. Based on mass balance methodology, data accuracy and record keeping have improved, saving an estimated \$40,000.
- EM has developed a shop-specific compliance manual covering 34 different emission types, outlining the air quality compliance requirements for approximately 400 shops on base. This tool is in the final review phase and will be disseminated in early 2003.
- EM oversaw the installation of several magnehelic gauges with remote transmitting units in 11 different paint booths on base in 2002. The gauges are used daily to verify compliance with pressure drop requirements across these filters. This initiative has eliminated human error and saved an estimated \$10,000 per year in labor costs.



TAFB's 3-D visualization software allows base employees to view fence-line concentrations of hazardous air pollutants.

- TAFB was the first installation in the DoD to employ a 3-D visualization tool for viewing air modeling data. This software allows the user to don 3-D glasses to view fence-line concentrations of hazardous air pollutants. In-house modeling runs can now instantaneously predict the impact of mission changes and communicate real-time compliance data to the regulators, saving an estimated \$100,000 per year.
- EM reduced NO_x emissions on two major air emission sources by replacing boilers in Buildings 4007 and 3001 with high-efficiency burners. This innovation resulted in over \$50,000 in total cost savings due to lower labor, maintenance and testing, and calibration gas costs.
- TAFB was the first installation within the DoD to utilize an open-path air monitoring system for volatile organic compounds (VOCs). Testing data were used to demonstrate real-time compliance with emissions from the Industrial Wastewater Treatment Plant (IWTP) versus using traditional laboratory sampling methods, saving over \$100,000 and 1,100 man-hours per year.
- EM designed and developed data management tools such as Tier I and Tier II reporting software, which extracts data from the base hazardous material management database and automates reporting to regulators. This system saves over 1,200 man-hours each year in report preparation time.
- EM began substituting Hurrisafe for PD-680 solvent, which has reduced VOCs by 10 tons per year.
- Radome stripping operations now use SKY KLEEN™ in lieu of methyl ethyl ketone (MEK), reducing MEK usage by 50 tons per year.
- EM introduced B20 diesel fuel into over 700 vehicles, which annually used over 180,000 gallons, reducing hydrocarbon emissions by over 20 percent.
- TAFB has the largest Air Force alternative-fuel vehicles program; 75 percent of the base



TAFB's alternative-fuel vehicle program is a leader in the Air Force.

fleet is comprised of dual-fueled vehicles. Of its 1,300 vehicles, 1,018 can use alternative fuel. The Air Force Inspection Agency's "Eagle Look" review recognized TAFB as the DoD leader for compressed natural gas usage.

- TAFB was the first in Air Force Materiel Command to evaluate and use the battery-operated Segway™—a human transport electric vehicle to which trailers can be hooked for transporting various loads. Key benefits of the Segway™ include reducing fossil fuel emissions, improving the work environment, and enhance productivity and maneuverability within manufacturing plants.



The Segway™ provides base employees with a simple and pollution-free method of transporting materials within warehouses.



EM optimized plant operations at the IWTP in 2001, resulting in an annual cost savings of \$250,000 - \$350,000.

Water Pollution Control

TAFB's IWTP discharges treated effluent into the Oklahoma City sanitary sewer system. Seeking to improve treatment performance, EM performed an optimization study of all plant operations in 2001. The results determined the biological treatment process at IWTP was unnecessary and could be shut down to save money. Eliminating this process saves the base \$250,000–\$350,000 annually. In addition, the metals treatment process optimization recommended a change to electrolytic polymers, resulting in a savings of \$150,000 annually in reduced chemical and disposal costs.

Shutting down the biological treatment process produced another benefit—reduced odors generated at the IWTP. For further odor control, EM installed permanent covers on seven process units at the plant, covering 70 percent of the exposed surface areas. This significant reduction of offensive odors allowed the elimination of odor masking chemicals at the IWTP, saving approximately \$180,000 annually while improving the aesthetics for the nearby community.

EM works proactively through specialized working groups to eliminate non-permitted discharges into the TAFB creek system:

- *Aircraft Deicing Runoff on Base Surface Waters* – EM formed a deicing working group,



Deicing recovery vehicles remove deicing fluid from runways to prevent it from contaminating the base's creeks.

increased monitoring during deicing events, and encouraged deicing units to switch to a less-toxic deicing chemical. In addition, deicing recovery vehicles were purchased for all base aviation organizations to remove the spent deicing fluid from the ramp areas and prevent its discharge into the creek system.

- *Spill Response* – EM spill response personnel ensure that every effort is made to capture spilled material, to minimize any impact on fish and other aquatic life, and to track the source of the spill. By tracing spills back to their origin and eliminating the spill source, impact on the creek system is lessened and future spills of the same type are prevented. Since January 2000, the number of spills into the creek systems has decreased by approximately 15 percent each year.

- *Construction Requirements and Contractor Compliance* – Because runoff from construction sites is a major contributor to storm water pollution, EM revised the base boilerplate specification for construction contracts, requiring that contractors submit and implement an EM-approved Storm Water Pollution Prevention Plan (SWPPP) before obtaining a digging permit. EM provides training and developed a sample SWPPP and checklist to aid contractors in the development and implementation of their site-specific plans.

Toxic and Hazardous Waste Management

TAFB implemented a hazardous waste management program that emphasizes responsibility at all levels in the program and seeks to minimize the use of hazardous materials.

- Two source-reduction programs, Top Ten and AFMC 24, track the worst chemical offenders to their source. Usage of Top Ten chemicals has been reduced by over 80 percent.
- By initiating a state-of-the-art antifreeze recycling system, 10,000 gallons of antifreeze are diverted from disposal yearly at a cost savings of \$110,000.
- EM expanded the capability of the existing automated high-pressure water system to strip aircraft components, significantly reducing the use of chemical strippers and labor hours and saving \$300,000 yearly.
- Through the robotic manifold cleaning system, EM eliminated 100,000 pounds of solvent wastes and saved over \$200,000 yearly.
- The asbestos and lead database and management system contains sample information from over 500 base buildings and housing units. The point-and-click system, which is also available within a geographic information system format, allows the user to easily select a site and obtain data collected over the past 10 years.

Over the past seven years, hazardous waste sludge disposal costs have been reduced by \$750,000 annually. In addition, the changes prompted by EM's voluntary plant operations optimization study resulted in additional significant reductions in generation and disposal costs. EM significantly reduced the largest hazardous waste stream, IWTP sludge, by over 30 percent (600 tons) through improved sludge management techniques. These techniques save \$100,000 annually.

TAFB's hazardous waste tracking system provides cradle-to-grave monitoring of over 4,000 tons of hazardous waste generated

annually at TAFB. EM utilizes the system to track a waste stream from the issuance of an empty drum to its final destination at a disposal facility. As a direct result of this close monitoring of hazardous materials, no hazardous waste notices of violation have been issued at TAFB for 11 consecutive years.

TAFB uses underground storage tanks (USTs) and aboveground storage tanks (ASTs) to store hazardous materials. The newer USTs are designed to provide corrosion protection, release detection, spill and overflow prevention, and secondary containment. EM conducts random tests of tanks several times a month to ensure compliance with state regulations. EM is currently developing a computer network to monitor USTs and is gradually eliminating older USTs and moving their contents into ASTs. Although state and federal regulations do not require pressure testing, TAFB conducts tests on ASTs that are 20 years or older to ensure that the tanks are still intact.

EM has worked aggressively with base hazardous materials users to ensure local storage levels were established and are maintained below the regulatory trigger levels that require a Clean Air Act Risk Management Plan. This approach saves the base over \$200,000 annually in plan development and implementation costs.

Community Relations

TAFB's environmental education and outreach efforts start at home, striving to implement a cultural change involving all base employees and ownership for environmental actions.

EM provides environmental awareness and education training to different groups on base—new supervisors, base newcomers, unit environmental coordinators (UECs), contractors, and shop personnel, among others. Each group receives specific environmental training that enhances and complements their industry expertise; for example, UECs

participate in training on solid waste management, hazardous waste management, and air and water quality programs. Since an estimated 50 percent of TAFB's workforce will retire over the next five years, EM has instituted Web-based self-paced training modules that cater to a technologically "savvy" generation of workers.

EM receives a great deal of support for its community relations initiatives from the base leadership. The Officers' Career Broadener program allows them to rotate through EM for four to six weeks in order to learn about the importance of EM to a commander. To increase the involvement of base residents, EM orchestrated a basewide household hazardous waste collection and exchange day, which diverted disposal of over two tons of hazardous materials.

TAFB's Community Advisory Board (CAB) plays an important role in the base's community relations efforts. Since 1995, EM has established, coordinated, and participated on the CAB, which promotes community awareness of the activities that take place at TAFB and creates a forum for constructive community review and comment on environmental actions associated with TAFB. The CAB holds quarterly meetings, publishes *The Environmental Link* newsletter, and gives presentations to various organizations.

EM reaches out to the surrounding community through an extensive outreach program. While EM organizes activities throughout the year, two annual events, "America Recycles Day" and "Earth Month," are pinnacles of EM's community relations program.

America Recycles Day activities include:

- Providing recycling information to base employees and community members.
- Handing out environmentally friendly giveaways.



“Recycloman” visits local school children during America Recycles Day to encourage them to recycle.

- Bringing “Recycloman,” the base recycling mascot, to visit schools and workplaces.
- Holding a Haiku Poetry Contest, in which local students write poems about recycling.
- Hosting a Can Crush Contest, in which elementary students competed to collect the most aluminum cans and crush them in 30 seconds.



Students compete against each other to crush aluminum cans on America Recycles Day.

EM has expanded the traditional Earth Day into “Earth Month,” thus, offering a range of environmental awareness activities throughout the month of April. Past activities have included:

- Holding a youth fishing clinic for special-needs children at TAFB’s ponds, featuring demonstrations on angling, fish identification, and the use of fishing equipment.
- Hosting the Eco-Motion bus, a mobile environmental classroom, to give children from disadvantaged schools an opportunity to gain an appreciation of the environment.
- Sponsoring the Great American Trash-Off, where classes compete to generate the least amount of lunch waste.
- Setting up educational stations to teach elementary children how to read tree rings and identify animal tracks, among other activities.
- Launching a campaign to label approximately 600 storm drains on base to prevent improper dumping.

These recurring events provide EM with a venue to constantly update public awareness of environmental preservation.



Base employees label storm drains with “no dumping” signs during EM’s “Earth Month” environmental awareness campaign.

Other Program Accomplishments

Environmental Program	Recent Accomplishments	Outcome
Drinking Water	Completed an extensive survey of the 1940s drinking water system and have begun an aggressive backflow prevention program. Complied with primary and secondary drinking water standards for the past three years.	The 2002 consumer confidence report found that water was safe and met state and federal requirements.
Noise Pollution Control	Worked closely with the CAB to address and mitigate noise-related concerns.	No formal complaints were received.
Radiation Pollution Control	Installed radiation detection equipment at the Defense Reutilization Marketing Office to prevent improper disposal.	Increased employee awareness of proper radiation disposal techniques.
Waste Management and Resource Recovery	Proved feasibility of eliminating waste stream by recycling over 90,000 shop rags.	Saved \$100,000 annually.
	Base grass clippings are reused as compost to remediate soil contaminated with low-level fuels.	Saved over \$5,000 per year and provided 10 tons of compost for base uses annually.
Pest Management	Integrated pest management program elements and management methods; used native plants and grasses on base.	Use of native species will gradually eliminate use of pesticides altogether.
National Environmental Policy Act (NEPA) Planning, Analysis, and Implementation	Spearheaded effort to digitally obtain 3-D high-resolution map of TAFB and surrounding area versus gathering data manually.	Saved \$200,000 and helped locate air emission stacks for evaluation of new actions.
	Accomplished 4,500 Environmental Impact Analysis Process requests; completed 20 Environmental Assessments/ Environmental Baseline Surveys; developed paperless process and database for Air Force Form 813 (Request for Environmental Analysis) submissions.	Expedited the NEPA process for the customer, cutting processing time by up to half.
ECAMP	Held annual self-compliance assessments, evaluating 13 protocols; provided open ECAMP training for all base personnel on site to reduce downtime and have minimal impact on overall productivity.	Increased base employees' knowledge and expertise for verifying basewide compliance, both on the job and during ECAMP assessments.

SUMMARY

Always striving to improve, EM will continue to apply its environmental vision:

Reach out to neighbors – Partner with the community, strive to be honest and fair, learn from mistakes, and provide clear and open communication.

Seek new ways to fulfill TAFB's environmental mission – Explore industrial processes that are cheaper and faster, reduce flow time, reduce the use of chemicals, and meet or exceed all environmental compliance requirements.

Apply cutting-edge technologies to processes – Locate, develop, and implement innovative technologies and methods to accomplish the base's environmental mission.

Provide state-of-the-art training – Prepare training programs geared toward a new generation of workers, the base's greatest asset.

TAFB's EM Directorate will continue to provide the Oklahoma City Air Logistics Center with an unparalleled level of excellence as it fulfills its mission.