

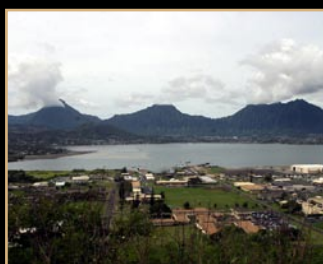


NDCEE

National Defense Center for Environmental Excellence



2007 ANNUAL REPORT



Technology Transfer—Supporting DoD Readiness, Sustainability, and Transformation

NATIONAL DEFENSE CENTER FOR ENVIRONMENTAL EXCELLENCE

The NDCEE was established in 1991 with the directive to serve as a national leadership organization to address high-priority environmental, safety, and occupational health problems for the DoD, other government organizations, and the industrial community.

The NDCEE's mission is to support DoD sustainability and readiness through:

- Applied research and development, where appropriate, to transition new technologies
- Transition of environmentally acceptable materials and processes to defense industrial activities and private industry
- Training that supports the use of new, environmentally acceptable technologies

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Energy Efficiency and Renewable Energy. Page 12 - Safety Officer, U.S. Air Force.



DoD Executive Agent
Office of the
Assistant Secretary
of the Army (Installations
and Environment)

A MESSAGE FROM THE EXECUTIVE AGENT



“The National Defense Center for Environmental Excellence (NDCEE) researches, demonstrates, and supports the fielding of viable, mission-driven solutions that reduce total ownership costs and fulfill environmental, safety, occupational health, and sustainability requirements. The NDCEE proactively identifies and focuses on current and emerging issues, providing the Department of Defense (DoD) with opportunities to develop Service-unique or joint initiatives to better focus research, development, testing and evaluation execution, and maximize the deployment of viable technologies to multiple users. Overall, the NDCEE supports DoD installations, ranges, weapon systems, and the warfighter in achieving performance advantages, enhanced efficiency and cost effectiveness, improved personnel well being, and compliance with regulations.”

– Tad Davis, Deputy Assistant Secretary of the Army
for Environment, Safety, and Occupational Health, and Department of Defense
Executive Agent for the National Defense Center for Environmental Excellence

A MESSAGE FROM THE PROGRAM DIRECTOR



“The NDCEE program stands ready to bring knowledge, experience, and expertise to demonstrate technology solutions for the DoD and other Federal agencies. The steady expansion in workload from reimbursable clients shows that the NDCEE is responsive to the needs of the DoD and the entire Federal community. As one of the avenues for performing environmental, safety, and occupational health (ESOH) technology demonstrations, the NDCEE should be considered as an information source and resource executor for the DoD and other Federal agencies that wish to resolve complex challenges relating to ESOH, Sustainability and energy consumption. Prospective client offices will find that the Army’s partial underwriting of the NDCEE program has helped to make the NDCEE an effective and cost-efficient source for such technology answers.”

– Hershell E. Wolfe (Hew), Principal Assistant to the Deputy Assistant Secretary of the Army
(Environment, Safety, and Occupational Health), and Department of Defense
Program Director for the National Defense Center for Environmental Excellence



THE YEAR IN REVIEW

The National Defense Center for Environmental Excellence (NDCEE) began Fiscal Year 2007 (FY07) by continuing the mission that it began in 1991: identifying, demonstrating, and transferring technologies in support of Department of Defense (DoD) readiness, sustainability, and transformation. Some of the projects addressed during the fiscal year included those conducted under major NDCEE programs—the Joint Group on Pollution Prevention (JG-PP), the Voluntary Protection Programs Center of Excellence (VPP CX), support to the Defense Safety Oversight Council (DSOC), Commercialization of Technologies to Lower Defense Costs, and Sustainable Painting Operations for the Total Army (SPOTA). Others addressed key environmental, safety, and occupational health (ESOH) issues for the DoD and other federal agencies, in keeping with the NDCEE mission.

Significant directives and regulatory changes, such as Executive Order 13423, occurred in FY07, and the NDCEE was fully prepared to assist our clients in addressing the new requirements. That support is expected to continue and even increase in FY08 and beyond as the DoD develops and implements strategies to achieve long-term milestones related to fuel, renewable energy, water conservation, greenhouse gas emissions, and the procurement of green goods and services.

To promote sustainable installations and the wise stewardship of environmental and energy resources, the NDCEE applied the Leadership in Energy and Environmental Design

– Neighborhood Design (LEED-ND) standards to military housing at Ft. Belvoir. In addition, the NDCEE evaluated designs for near-zero energy houses, tools for managing DoD forests, and vegetative roofs as a green building technology.

The NDCEE further minimized the DoD's environmental footprint by reducing emissions of volatile organic compounds (VOCs), hazardous air pollutants (HAPS) and the generation of hazardous waste. For example, we explored hand-held lasers as an alternative to chemical stripping. To extend the life of Air Force plating baths, we demonstrated and validated backwash filtration and additives. The NDCEE also continued initiatives to support the implementation of a water-dispersible chemical agent resistant coating (WD-CARC) and demonstrated a new drying technology that increases overall process efficiency, allowing military vehicles to be treated without exposing maintenance workers to VOCs.

In FY07, the NDCEE addressed solid waste generation and disposal issues affecting U.S. installations, overseas bases, and deployed locations. Projects included work at Ft. Hood in which scientists demonstrated and evaluated a composting technology and a compost-monitoring technology that allows remote collection of temperature, moisture, and oxygen data to optimize the composting process. At Anderson Air Force Base on the Island of Guam, where landfill space is limited and DoD presence on the island is expanding, the NDCEE conducted an Air Force Waste to Energy Feasibility Study. The NDCEE

also continued to optimize the CONsolidated and Deployable Omni-Recycling (CONDOR) System to enhance its ability to treat multiple waste streams at deployed airbases.

Other important NDCEE projects provided a safer working environment for those in uniform or those who support the warfighter. For example, our scientists evaluated corrosion-related safety issues affecting military vehicles. In another example, we provided data for risk assessments of new energetic components to reduce soldiers' exposure to harmful substances during training and deployment. The NDCEE also provided customized training for emergency responders who may be involved in incidents involving weapons of mass destruction and support to Air Force Explosive Ordnance Disposal flights. Other examples detailed elsewhere in this report include evaluating audio and visual alert devices to reduce HMMWV rollovers and the development of a Web portal to help reduce midair aircraft collisions.

Finally, the NDCEE looked into the future to assess the impact of emerging contaminants—chemicals that are not yet regulated or for which regulations are changing—that can have a major impact on DoD operations. The NDCEE developed the Impact Criteria Assessment Tool (ICAT), which generates a score for the likelihood and severity of an impact based on a series of pre-set queries, allowing the DoD to investigate and prioritize risks. This information is valuable when the DoD must assess the effect that new development in human health or environmental toxicological endpoints could have on mission and costs.

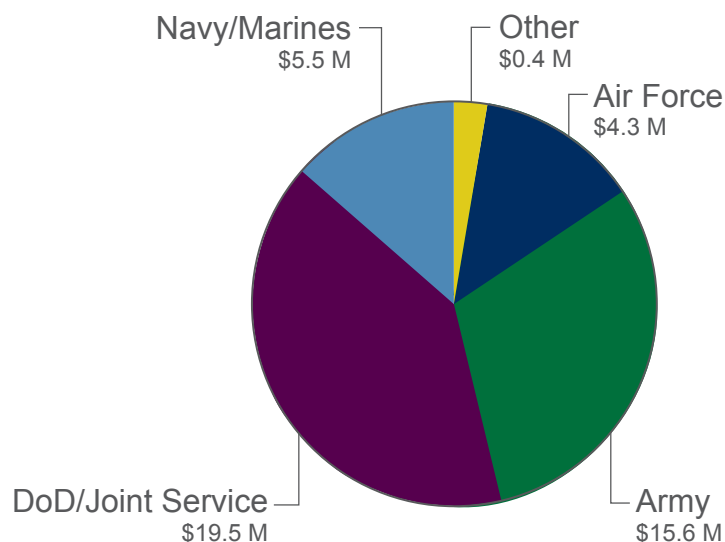
These projects are representative of the work undertaken by the NDCEE—mission driven, results-oriented work summarized in this annual report. The NDCEE began FY07 with 60 task orders and a funded contract backlog of \$84 million. Throughout the year, the NDCEE initiated 44 new

task orders, completed 18, and ended FY07 with 103 task orders and \$129 million in contracts, thanks in part to many returning reimbursable clients. As shown in the graph "FY07 Contract Awards by Service/Agency," the NDCEE performs work across the DoD and DoD agencies, all of the Services, and even supports other Federal agencies (for example, the Environmental Protection Agency and the National Institute of Standards and Technology). The NDCEE averaged 83 client deliverables per month in FY07, maintaining an average on-time delivery of 99 percent.

In addition to serving a diverse client base, we strive to achieve diversity with regard to subcontracting, especially in compliance with Public Law 95-507 that encourages the use of small and disadvantaged businesses in federal contracting. In support of these socioeconomic goals, to date, 65 percent of subcontracting dollars have been to small businesses, including small disadvantaged business and women-owned small businesses.

This annual report provides highlights of several NDCEE projects that encompass many of our capabilities and services. We invite and encourage you to become familiar with the highly successful NDCEE Program and take advantage of our offer—How Can We Support Your Mission?

FY07 Contract Awards by Service/Agency



The NDCEE is working across the U.S. Army, Navy, Air Force, Marines, Department of Defense, and other federal agencies. This chart shows the percentage of FY07 contract awards supporting each client.

The NDCEE performs work in each phase of the technology transfer lifecycle—assessment; demonstration and validation; and transfer. However, clients do not contract with the NDCEE to perform each phase for every assigned task. Thus, each task is not initiated with technology transfer as the intended outcome. The NDCEE provides a broad spectrum of capabilities supporting various aspects of technology transfer (such as analysis and decision support, technical and economic assessments, research and development, engineering and testing, education and training, outreach, and more) that are leveraged by our clients in support of their missions.

Collaborative relationships are an integral component of the NDCEE's success at identifying, demonstrating, validating, and implementing solutions for clients. From the onset of each task, the NDCEE works closely with the client to understand

their unique concerns, challenges, and needs. Wherever appropriate, the NDCEE also collaborates with other entities in the quest for a cost-effective, technically-viable solution that is most appropriate for each client. The NDCEE works with a wide variety of organizations and programs within the DoD, academia, and private industry. More than 85 of these stakeholder organizations (not including vendors) were involved with FY07 technology activities.

In addition to technology evaluation and demonstration, the NDCEE transferred eight technologies to DoD entities in FY07. These technologies address a variety of critical ESOH challenges including alternative energy sources, green building technologies, waste reduction, public and worker exposure to hazardous substances, and environmental management. FY07 technology transfers include:



Backwash Filter System – validated and included in the plans for Warner-Robins Air Logistics Center's new plating shop to extend the life of alkaline plating baths and reduce waste disposal costs.



Bullet Trap – transferred a STAPP Bullet Catcher (20 firing positions) to Fort A.P. Hill on a 25m-zero range to reduce contamination of the surrounding soils and groundwater from munitions constituents.



Corn-Hybrid Polymer (CHP) Blasting – transferred for use at Naval Submarine Base Kings Bay to improve coatings removal from delicate substrates and reduce worker exposure to hazardous materials.



Corrosion Control Center – enhanced Corrosion Control Center installed at the vehicle maintenance facility at Fort Bragg to improve application of corrosion protection and extend the useful life of vehicles.



Fuel Cell Standby Generator – installed at Tobyhanna Army Depot as proof-of-concept evaluation of meeting standby power requirements.



Landscape Management System – to be used for ongoing natural resources management at Naval Magazine Indian Island.



Ultraviolet-Cured Bullet Tip ID Coatings – validated HAP-free UV-cured coatings for bullet tip ID and case mouth waterproofing for multiple calibers at Lake City Army Ammunition Plant.



Vegetative Roofing – installed on the Headquarters Building at Tobyhanna Army Depot to demonstrate green building technologies.



SUPPORTING THE MISSION OF THE WARFIGHTER

The NDCEE Program encompasses multiple diverse projects—each with the common goal of helping the U.S. warfighter achieve performance advantages so that the world's most sophisticated defense program will continue to be the world's most capable.

In FY07, for example, the NDCEE and its military and industrial partners investigated several technologies that reduce risks to explosive ordnance disposal (EOD) technicians, enable troops to train as they fight, and reduce volatile organic compound (VOC) and hazardous air pollutant (HAP) emissions from identification coatings for ammunition while increasing production.

Excavating buried unexploded ordnance (UXO) manually is highly risky for EOD technicians, as well as slow and costly. Automation and/or remotely controlled devices could make the job safer and faster and support future improvised explosive device (IED) applications. In FY07, the NDCEE initiated a project, funded by the Environmental Security Technology Certification Program, to build and demonstrate a prototype of the Magnetic UXO Recovery System (MURS) based on a design that was conceived in a prior NDCEE effort. MURS uses a Caterpillar 324L hydraulic excavator with a remote operating system, an electromagnet, a 20kW power source, and a digging claw to enable remote-controlled excavation of UXO.

In this effort the NDCEE teamed with the Air Force Research Laboratory (AFRL) Robotic Research Group, whose mission is to “develop and advance robotic technologies that will protect, support, and augment the warfighter in the accomplishment of dirty, dull dangerous, and impossible missions.” In 2007, at Tyndall Air Force Base, Florida, the MURS retrieved a 2,000-pound bomb on the surface, 500-pound bombs six inches below ground, and 81 mm and 60 mm mortar rounds from one foot to 18 inches below ground at various orientations. The MURS was also successfully tested in shallow water. The technology awaits further testing at Massachusetts Military Reservation (MMR) in 2008.

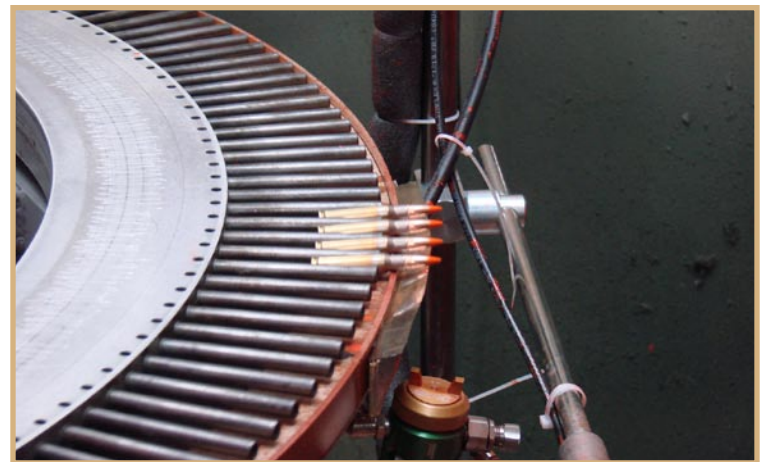


AFRL adapted the electromagnet to an Automated Ordnance Excavator (AOE) for this NDCEE demonstration.

Another NDCEE project at MMR is having a significant impact on the warfighter now. Because the MMR lies over the groundwater aquifer that supplies much of the water to Cape Cod communities, the Environmental Protection Agency (EPA) would not allow bullets to be fired into traditional soil-berm backstops at the installation due to the risk of groundwater contamination. In 2007, the EPA lifted the ban on the use of lead bullets at the MMR with the stipulation the installation use the STAPP Bullet Catcher, a technology demonstrated at the MMR by the NDCEE. Now, soldiers in the Massachusetts National Guard can once again train as they fight—with lead bullets.

Typical rubber traps reduce fragmentation and lead dust because they decelerate and encapsulate bullets. The Bullet Catcher does this and more. Using a unique, self-healing elastomeric top cover that keeps out moisture and minimizes oxygen content, the Bullet Catcher allows soldiers to train without threat of fire, which the NDCEE validated even in an extremely hot climate at Yuma Proving Grounds, Arizona. This makes the Bullet Catcher significant because, unlike when using traditional granular rubber traps, soldiers do not have to take the time to remove tracer rounds from ammo belts.

The NDCEE demonstrated that UV-cured coatings were a viable alternative to coatings currently used for bullet-tip identification. These coatings can reduce HAP emissions and increase production of small arms ammunition at Lake City Army Ammunition Plant, Jefferson City, Missouri.



The NDCEE demonstrated the STAPP Bullet Catcher at the Massachusetts Military Reservation (MMR), and the innovative rubber trap was shown to enable soldiers to train as they fight—with lead bullets—and without the threat of lead contamination or fire.



PROVIDING VALIDATED TECHNOLOGY SOLUTIONS FOR SUSTAINABLE INSTALLATIONS

As a result of work performed by the NDCEE . . .

- Military installations will be able to manage complex, DoD-required data using a customizable Environmental Management Information System (EMIS).
- Vegetative roofs (flat-top roofs planted with more than 60 types of vegetation) are being evaluated for potential long-term energy savings and sustainability value.
- The U.S. Navy is adopting an innovative Landscape Management System because, as a result of NDCEE validation, they know it will work—allowing them to steward their forests wisely and avoid future fire damage.
- Innovative energy strategies and technologies are being integrated into the DoD.

These and other advanced-technology solutions to critical sustainability challenges exemplify the NDCEE's service to DoD clients. For example, the NDCEE is demonstrating a Web-based EMIS that can be used at any military installation to facilitate management, compliance reporting, and tracking of complex environmental data.

The EMIS provides more timely access to reliable data (sometimes replacing pencil and paper methods, decreasing the possibility of human error), enhances monitoring by providing an electronic history, facilitates timely and efficient reporting, and reduces the likelihood of environmental compliance violations. While EMIS technology is widely used in industry, the NDCEE demonstration and validation is applying it at a variety of military facilities with differing missions and needs including Anniston Army Depot, Fort

Detrick, Fort Benning, Fort Carson, and the California, Hawaii, and West Virginia National Guards.

Officials at Fort Carson, Colorado, note that “accuracy and savings are significant” and that the system is saving “valuable time by streamlining our previous efforts to keep track of numerous moving parts.”

OPTIMIZING ENERGY SAVINGS IN MILITARY HOUSING

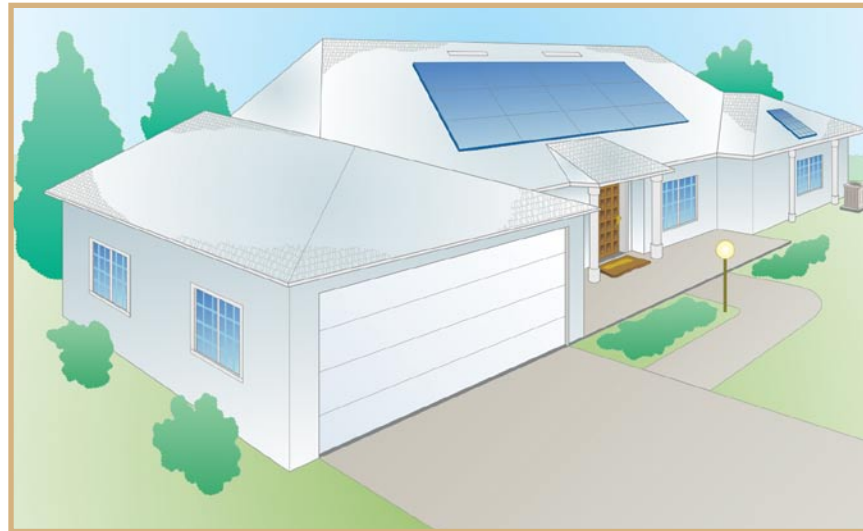
Environmentally responsible construction remains a challenge for both engineers and architects throughout the world. The NDCEE is committed to assisting the DoD, which has assumed a leadership role in the drive to identify leading-edge building solutions that optimize energy savings while ensuring environmental quality for generations to come.

One area of NDCEE study is the near-zero energy house (NZEH), which produces nearly as much energy as it consumes. These buildings, which require state-of-the-art, energy-efficient construction and renewable energy systems such as solar and wind, remain challenging to design and build, but can have long-term environmental benefits. The NDCEE is evaluating energy-efficient designs and renewable energy technologies that will best offset energy usage and costs in new and renovated housing at military installations.

From walls and insulation to windows and roofs, all opportunities for conservation are evaluated. Results will be disseminated throughout the DoD and may be applicable to the private sector as well.

The NDCEE has teamed with Actus Lend Lease and the Engineer Research and Development Center-Construction Engineering Research Laboratory to identify and evaluate NZEH concepts that can be incorporated into military housing. The team selected an energy modeling software package called eQuest to evaluate candidate energy-saving technologies. Potential technologies will be evaluated at Schofield Barracks, Hawaii, and at Fort Campbell, Kentucky.

Using the eQuest model, the NDCEE has determined that current and past construction practices and codes are effective in Hawaii; however, to reach NZEH targets, energy-generating technologies must be incorporated more broadly. Results should help the military achieve its goal of providing its personnel with affordable houses that maximize occupant well-being, have few energy and maintenance requirements, and have a minimum service life of 50 years.



The NDCEE is evaluating near-zero energy housing (NZEH) concepts to help identify energy-efficient designs and renewable energy technologies that can allow a building to produce nearly as much energy as it consumes—ultimately saving energy and money.

Because the technology performed well and is applicable to many flat-roofed buildings found on most military installations, the NDCEE will share information gained from the vegetative roof demonstration across the Services.

MITIGATING FOREST FIRE RISKS: SUSTAINABLE MANAGEMENT OF REAL ASSETS

The U.S. Navy and Fort Lewis, Washington, are adopting an NDCEE-validated Landscape Management System (LMS) shown to help manage forested lands for training, protection of sensitive habitats, and reduction of future fire risk. The NDCEE conducted a successful evaluation of the LMS decision-making tool at Washington's Naval Magazine (NAVMAG) Island.

Eighty percent of NAVMAG's 2,716 acres is forested, and the Naval facility there operates the deepest ordnance port in the Northwest. The forest provides a visual barrier and added security for the installation, but the presence of ordnance makes forest fires a serious risk. DoD forested land is managed with specific goals including biodiversity, fire safety, and sustainability. The NDCEE and its partners evaluated landscape management software to support these goals and ensure military readiness activities at sites such as NAVMAG.

The LMS can identify fire-prone areas, show how forests can be managed to meet mission objectives, and illustrate how the



TRULY GREEN BUILDINGS: EVALUATING VEGETATIVE ROOFS FOR ARMY SUSTAINABILITY

The DoD is interested in cost-effective, energy-saving alternatives for future military construction. To evaluate one such an alternative, the NDCEE installed a 14,000-square-foot vegetative roof at Tobyhanna Army Depot, Pennsylvania, next to a conventional flat roof that served as a control. The modular design, which included 64 plant types, was retrofitted with a thermocouple tree to collect temperature data, and the NDCEE designed and installed an innovative vertical flow meter to measure stormwater runoff.

The NDCEE validated an overall reduction in stormwater flow of 10 percent as compared to a conventional roof. Radiated heat from the vegetative roof was, on average, 10 degrees cooler, reducing the urban heat island effect. The vegetative roof reduces the tonnage of air conditioning required by four to six tons per 6,000 square feet, resulting in as much as 40 percent in energy savings. Visual aspects of a vegetative roof are nothing short of stunning; within hours of installation, butterflies and other pollinators were already present in small numbers.

The vegetative roof project, which was widely covered in the media, received a Green Power Award from PennFuture.

"The quality of the end product and service was outstanding. The project exceeded expectations as it provided additional capabilities beyond expectations that will benefit the Navy and natural resources over the long-term."

- U.S. Navy Client

impact of fire spread and intensity change over time. Because it helps DoD foresters minimize impacts from wildfires, the LMS offers cost avoidance ranging from \$1,500 per acre to more than \$8,000 per acre depending on fire risk and types of benefits quantified. The NDCEE cost-benefit analysis included firefighting costs; timber loss, erosion control, regeneration, and rehabilitation costs; fatality and facility loss; wildlife habitat loss; community and regional economic values; and LMS software and training costs.

Ensuring DoD sustainability into the 22nd Century is incumbent upon smart planning and development of the right technology solutions, such as the examples outlined here. The NDCEE is committed to meeting high-level national challenges with continued diligence and innovation.

The energy landscape for DoD facilities and operations changed significantly in 2007 with Executive Orders, a Supreme Court decision, and new regulations all impacting the types of fuels and other sources of energy as well as energy consuming devices and facilities that the DoD will be utilizing in the near and distant future. In FY07, the NDCEE addressed energy stewardship with projects that exemplify its systematic technical approach to ensure that client needs are carefully assessed, technologies are thoroughly evaluated, and attractive solutions are integrated into the DoD to meet current and anticipated future requirements

REDUCING EMISSIONS AND COSTS AT THE PUMP

Conserving fuel and reducing emissions is the focus of an NDCEE project involving military fueling stations. An NDCEE technology demonstration shows that dripless fuel nozzles reduce 60 percent of gasoline drips during fueling—as well as reducing VOC and HAP emissions. Taking into account the price of replacing existing nozzles with dripless nozzles, the study identified a cost savings after the first year.

The NDCEE teamed with Fort Benning, the Army and Air Force Exchange Service (AAFES), and the U.S. Environmental Protection Agency (EPA) to evaluate the effectiveness of dripless nozzles to reduce gasoline spills during vehicle fueling. Four different nozzles offered by different manufacturers were evaluated in August 2007 and compared to conventional nozzles during a field demonstration at the AAFES Mall Station, Fort Benning, Georgia. Testing and certification procedures used in the evaluation were developed by the California Air Resources Board.

Gasoline contains high levels of VOCs and HAPs, both of which are targeted for increasingly stringent regulations. Exposure to gasoline and gasoline vapors can put humans at risk, and most human exposure to those vapors occurs during fueling. Based on an EPA estimate that post-fueling spillage loss from drips from conventional nozzles is approximately 0.7 pounds per 1,000 gallons of dispensed gasoline, it is estimated that AAFES refueling operations lose approximately 49,000 gallons annually from post-fueling drips. The NDCEE found that implementing dripless nozzles at AAFES stations would reduce gasoline losses by approximately 29,000 gallons annually. Reducing drips will reduce the amount of gasoline discharged into the environment as well as human risk from emissions.



DoD forested land is managed with specific goals including biodiversity, fire safety, and sustainability.



The dripless nozzle can reduce gasoline spillage during vehicle refueling, creating both EHS and cost benefits.



ENHANCING READINESS BY IMPROVING SAFETY AND REDUCING MISHAPS

“We can no longer tolerate the injuries, costs, and capabilities losses from preventable accidents,” warned Secretary of Defense Robert M. Gates early in FY07, reiterating the DoD goal of a 75 percent reduction in preventable mishaps by the end of 2008.

Preventable mishaps impact force readiness and cost the DoD approximately \$3 billion annually. When the 75 percent reduction goal was set in 2005, the Defense Safety Oversight Council (DSOC) was established to govern DoD-wide efforts to reduce preventable workplace and workforce mishaps at military installations. The NDCEE is supporting this effort through the validation, development, demonstration, and implementation of a variety of technologies.

To achieve its goal, the DSOC supported the DoD-wide implementation of a proven worksite-based safety and health initiative—the Occupational Safety and Health Administration’s (OSHA’s) Voluntary Protection Programs (VPP)—and chose the NDCEE to establish and operate the DoD Voluntary Protection Programs Center of Excellence (VPP CX).

The VPP CX staff helps military installations and defense agencies attain VPP Star recognition. OSHA VPP Star sites experience better than a 60 percent reduction in injuries and achieve up to 150 percent return on investment. They prove that workplace health and safety programs are effective. The VPP CX is capably deploying the systems and programs necessary to assist DoD installations in their efforts to develop a culture focused on successfully reducing preventable mishaps. By the end of FY07, 79 installations were using

the VPP CX for VPP implementation. Commanders at Star sites are already realizing a decrease in non-availability of personnel, thus an increase in readiness and sustainability.

As part of its efforts to serve as the DoD’s in-house center of excellence for deploying VPP-compliant safety and health management systems, the NDCEE developed the Electronic VPP Application (eVPP) tool. This convenient, easy-to-use Web-based application streamlines VPP efforts on military installations, saving time and money. Using the eVPP tool, installations can create centralized data repositories for all VPP documentation; manage activities based on OSHA-defined categories (such as worksite analysis, safety and health training, and employee involvement); and prepare and submit their applications online.

In an NDCEE VPP CX client survey, the Safety Director at a U.S. Army Depot wrote: “Rarely do you find such a professionally experienced group of experts with such outstanding credentials in one place. The five VPP metrics can be subjective, hard to measure, and difficult to assess, but this team provided a great product, invaluable service, and would be welcomed back at any time.”



MINIMIZING RISKS: SAFER AIRSPACE, SAFER VEHICLES

Other DSOC projects are assisting the DoD in addressing a wide range of preventable accidents—from mid-air to roadway. A Web-based Mid-Air Collision Avoidance Web site, for example, may already be making a difference.

From 1978 to 2005 there were an average of 30 mid-air collisions in the U.S. each year; these accidents resulted in an average of 75 deaths annually according to the Federal Aviation Administration/National Transportation Safety Board (FAA/NTSB). Since FY05, no DoD aircraft have been lost due to civilian mid-air collision, and efforts such as the new Web site have supported the nation's efforts to reduce this figure.

The Mid-Air Collision Avoidance System is a first-of-its-kind Web site that links civilian and DoD information. SeeAndAvoid.org offers easy-to-use, credible information on airspace, visual identification, aircraft performance, and mutual hazards from more than 400 military and civilian aviation entities throughout the country. This at-a-glance data includes cutting-edge mapping tools and is helping to alleviate misinformation and misunderstanding between military and



The NDCEE evaluated visual and audio warning devices for HMMWVs.

civilian pilots. Military flight training had been affected when civilian pilots entered military air space. In addition, small civilian aircraft were not readily seen by military pilots, and civilian pilots did not understand the operating characteristics of military aircraft. Now, SeeAndAvoid.org is linked to related sites such as the FAA Special Use Airspace, Aircraft Owners and Pilots Association Air Safety Foundation, and the new FAA MADE (military airspace de-confliction) program and is being hosted on the Air Force Safety Center server. SeeAndAvoid.org anticipates an increase from 18,900 civilian pilot Web hits in FY07 to 500,000 in FY08.

Bird strikes or bird/aircraft collisions are another common flight safety problem. Bird strikes account for an estimated \$1.5 billion in damages per year. The costs are not only financial; lives have been lost as the result of collisions between airplanes and birds. In support of the DSOC, the NDCEE is demonstrating a new tool to identify flocks of birds near airfields and warn air traffic controllers—the small mobile radar (SMR) unit. The technology was demonstrated and validated at Whiteman and Dover Air Force Bases during FY07 and proved successful.

The SMR unit collects data on bird movement patterns and provides real-time bird detection. It scans vertically and horizontally for six nautical miles and is effective in poor weather and at night when visual scanning is difficult or impossible. Bird movement is displayed on radar screens, providing pilots and flight personnel with information that could make it possible to lift flight restrictions that are now in place—making flight safer and for longer periods of time.

The NDCEE also is reducing roadway risks for warfighters, addressing the high number of soldiers killed in High Mobility Multi-purpose Wheeled Vehicle (HMMWV) or truck rollovers. Protective armor added to the vehicles raised the center of gravity, making them more difficult to control, especially when

Aircraft Birdstrike Avoidance Radar in operation at Dover AFB.



driving at the high speeds required for evasive action on the front lines. Working with the DSOC and the U.S. Army Combat Readiness Center, the NDCEE evaluated a number of rollover alert devices before selecting one for proof-of-concept evaluation. Tests at the U.S. Army Aberdeen Proving Grounds, Maryland, showed that the majority of drivers surveyed thought the device was effective and useful. Approximately 76 percent of those drivers thought the U.S. Army should investigate further use of this or similar rollover alert devices in an operational setting. That testing, if pursued, would be conducted by the U.S. Government under the oversight of the HMMWV Program Management Office.



The rollover alert device was installed in the top left corner of the HMMWV cab where a driver could refer to it.

PUTTING INFORMATION AND EDUCATION TO WORK FOR HUMAN HEALTH AND SAFETY

Validating new technology. Collecting data. Finding answers. The NDCEE is engaged in a number of important DoD projects that are helping ensure our troops are ready at a moment's notice. Often, mission readiness centers do not have the right information at the right time. For instance, DoD installations need to quickly share safety data and track mishaps in real time—a task that can be met with an enterprise-wide Defense Safety Enterprise System (DSES) currently under spiral development by the Office of the Under Secretary of Defense. The DoD is moving to an enterprise-wide, single authoritative

decision-support tool for safety data because existing systems do not incorporate standardized data elements. In FY07, the NDCEE conducted a proof-of-concept demonstration of the proposed DSES and issued a final report to the DSOC.

It is anticipated that the DSES will save costs by quickly moving information worldwide, enabling Commanders to develop tactical mitigation strategies for problem areas and hopefully eliminate causal factors.

Information and education often go hand-in-hand in improving causal factors, and the NDCEE is responsible for two advanced, three-dimensional (3-D) safety training initiatives under development for the DSOC to help reduce injuries and fatalities. The first, 3-D Private Motor Vehicle (PMV) Safety Training, is being designed using an Advanced Distributed Learning Environment with sophisticated simulation technology. This online training geared toward alcohol-related risks will immerse trainees in real-world situations with life-like characters and a myriad of safety hazards. The trainees' decisions will lead to realistic and emotional consequences that develop, reinforce, and improve their own safety skills. As they move from scenario to scenario, trainees will encounter situations that would be difficult—if not impossible—to rehearse in the real world because of their inherent danger, and they will test their abilities and experience ways to avoid or mitigate these hazards.

Information and education often go hand-in-hand in improving causal factors, and the NDCEE is responsible for successfully updating and integrating Environment, Safety and Occupation Health (ESOH) Hazards considerations into curricula for the Defense Acquisition University (DAU). This accomplishment will help the acquisition workforce in numerous career fields to make better decisions affecting acquisitions. Improved, effective training will increase awareness and understanding of ESOH-related impacts and concerns, and this is expected to result in improved acquisition decision-making. The effect of strengthened ESOH hazard analyses and risk management will be realized over time. Expected long-term results could include a reduction in the following: loss of life and/or serious injury to personnel; serious damage to facilities and/or equipment; serious adverse impact on mission capabilities/and operations; lawsuits or injunctions from citizens and public interest groups; and harm to the environment and surrounding community.



THE YEAR AHEAD

When the National Defense Center for Environmental Excellence (NDCEE) was established in 1991 by public law, its mission was to research, demonstrate, and support the fielding of viable, mission-driven solutions that reduce total ownership costs and address priority environmental, safety, and occupational health (ESOH) challenges across the Department of Defense (DoD).

In keeping with the NDCEE's focus on current and emerging issues, and in direct support of the DoD's proactive implementation of Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management," the NDCEE will be re-designated as the National Defense Center for Energy and Environment in 2008. This will ensure that the NDCEE, consistent with its mission, recognizes and addresses the strategic interdependence of environmental and energy technology requirements within an overall sustainability framework balancing the triple bottom line plus: mission, environment, community, and economics.

Going forward, the NDCEE will continue to research, demonstrate, and transfer energy and environmental technologies. As the National Defense Center for Energy and Environment, the NDCEE will continue to play a vital role supporting DoD's integrated ESOH and energy objectives in support of our installations, weapons systems, and warfighters.



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