# CHEMICAL WARFARE AGENTS AND ENVIRONMENTAL PROTECTION

*EAD supports the U.S. Department of the Army and several of its installations in a number of environmental projects that focus on chemical warfare agents (CWAs). EAD helps conduct and evaluate complex environmental assessments; develop sensitive analytical methods; evaluate options for disassembling and treating chemical weapons; and define standards for hazardous waste classification, treatment, and disposal.*

## PROBLEM/OPPORTUNITY

CWAs are dangerous chemicals because they have very toxic or incapacitating effects, and humans are their specific target. For example, some nerve agents are designed to kill in a very short time, while blister agents are not quite as lethal. However, a positive aspect of most CWAs is that they live for only a very short time in the environment. They rapidly degrade into relatively innocuous materials, especially in an aqueous environment.

Even though many chemicals used by private industry are comparable in their toxicity, CWAs receive more attention from regulators and the public. One reason is that the Army is required by Congressional directive and international treaty to destroy the nation's stockpile of assembled chemical weapons and bulk chemical agents. In addition, at a number of old test facilities and burial sites around the country, residues from past weapons production and disposal are a concern.

There is a need for safe, effective, environmentally protective, and cost-effective programs to manage and destroy stockpiled CWAs and associated weapons and to deal with old disposal sites. The challenge is to balance concerns about chemical agents' toxic and physical/chemical properties with the concerns of regulators and the public.

## APPROACH

EAD has worked with the Army and several installations to develop and manage programs that meet the above challenge head on. It has helped produce and evaluate environmental impact statements (EISs); develop analytical methods; assess health and environmental risks; compare alternative management and treatment strategies and technologies; and define treatment criteria, requirements, and standards.

## RESULTS

EAD supported Aberdeen Proving Ground (APG) in Maryland in developing its Multiple EIS Assessment Summary. APG is one of the Army's primary centers for research, development, and testing of CWAs and incendiary materials, munitions, and vehicles.

To help demonstrate that certain CWA-associated wastes were not hazardous, EAD developed ultra-sensitive methods for analyzing CWAs in waste/environmental matrices. This work has allowed the Army to analyze CWA wastes to below health-based hazard levels.

EAD has been involved in the Land Disposal Restrictions Program for CWAs and associated wastes. It is helping the Army work with regulators in Utah to develop regulations that

will establish specific categories for CWA and associated wastes, standards and requirements for treating wastes, and criteria for demonstrating that treated residues or wastes no longer pose a significant hazard to human health or the environment.

Under Congressional mandate, the U.S. Department of Defense created the Assembled Chemical Weapons Assessment (ACWA) Program to demonstrate possible alternatives to the current plan to incinerate weapons that contain CWA. EAD is helping to evaluate potential technologies and manage the program's environmental and human health protection aspects.

EAD is also involved in environmental investigation and remediation activities at Army sites where CWAs were treated or disposed of. Installation restoration work is being done at APG, Rocky Mountain Arsenal in Colorado, and Yuma Proving Ground in Arizona. Efforts focus on assessing risks to human health and the environment.

## Future

The Army faces a daunting challenge with respect to its CWA programs. It is charged with finding the means to destroy the nation's chemical stockpile in a limited period of time. The Army must also address managing areas where chemical munitions may have been disposed of. The programs must be conducted in a manner that protects human health and the environment and is acceptable to regulators and the public as well as being cost-effective.

EAD can continue providing multidisciplinary support to the Army in several CWA areas. EAD's experience with chemical agents in technical, programmatic, regulatory, and public policy arenas can be drawn on to provide the Army with a broad perspective on the special issues that pertain to CWAs. The work also has direct applications to the U.S. Department of Energy and the private sector, which also deal with some very toxic materials.

## Communication of Results

EAD has prepared many reports on these projects, as well as journal articles and conference presentations. It has developed five databases — on chemical agents; associated waste streams; facility management; off-site treatment, storage, and disposal facilities; and analytical methods — to support various aspects of the work. It maintains one secure Web site to coordinate work group activities for the Land Disposal Restrictions Program and another to provide access to a database on chemical agent analytical methods. EAD also periodically supports a Pentagon-level standards steering committee.

Edgewood Area at Aberdeen Proving Ground: Location of environmental cleanup efforts and research on chemical agent disposal methods

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