

Aberdeen: Making Chemical Weapons History

Did you know that Aberdeen Proving Ground, located in Edgewood, Md., is playing a vital role in global security? Workers at the Aberdeen Chemical Agent Disposal Facility are destroying chemical agent that has been stored in the area for decades.

What type of chemical agent is stored at Aberdeen Proving Ground?

The chemical stockpile consists of mustard agent that is stored in sturdy steel containers. Although it is frequently referred to as mustard "gas," in its original form it is actually a liquid with the consistency of molasses. Aberdeen Proving Ground's mustard agent stockpile has never been used and remains safely stored. Mustard agent was manufactured during World War I and World War II. The last large production of mustard agent occurred in 1950.

Where is the chemical agent located?

The stockpile is located at the Edgewood Area of Aberdeen Proving Ground, a military installation established in 1917. Shortly after the United States entered World War I, the Army purchased a portion of the rural, southern part of Harford County, Md., to establish a new site for testing munitions and equipment. Aberdeen Proving Ground was developed as the Army's center of ordnance activities in research, development and testing of arms, ammunition, tanks and combat vehicles. Edgewood Arsenal became the Army's center for production and research in chemical warfare. The arsenal became the Edgewood Area of Aberdeen Proving Ground in 1971, when the installations were merged.

What is the Aberdeen Chemical Agent Disposal Facility?

The Aberdeen Chemical Agent Disposal Facility is a state-of-the-art facility designed to neutralize the mustard agent stockpile safely and efficiently.



How will the agent be destroyed?

The facility will neutralize the mustard agent by mixing it vigorously with hot water, using standard industrial equipment. The byproduct, called "hydrolysate," is mostly water and will be tested to ensure that the agent has been destroyed. It then will be transported to DuPont's Secure Environmental Treatment at Chambers Works in Deepwater, N.J. for final treatment using a state-of-the-art biotreatment process that employs DuPont's innovative technology.

Who will destroy the stockpile?

The Army's Chemical Materials Agency (Provisional) is responsible for safe stockpile disposal. In 1999, the Army awarded Bechtel Aberdeen the contract to build, test, operate and close the Aberdeen Chemical Agent Disposal Facility. Following the Sept. 11, 2001,

For more information, contact the Public Outreach and Information Office of the Chemical Materials Agency (Provisional) 1(800) 488-0648 or www.cma.army.mil

or visit the Edgewood Chemical Stockpile Outreach Office Woodbridge Station

1011 B Woodbridge Center Way
Edgewood, Maryland 21040
Phone: (410) 676-6800
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Aberdeen: Making Chemical Weapons History (continued)

terrorist attacks, the Army announced plans to accelerate the disposal project at Aberdeen, and a new contract was awarded to Bechtel Aberdeen in February 2002. Many other organizations will work in partnership with the Army to complete this mission successfully. Among these are the Maryland Department of the Environment; U.S. Environmental Protection Agency; and local, state and federal emergency management agencies.

How long will it take to destroy the chemical agent?

Construction of the original Aberdeen Chemical Agent Disposal Facility began in April 1999. Since adopting processes to allow for accelerated neutralization, construction of the modified facility was completed in late 2002. This was followed by a period of testing called systemization. Destruction of the stockpile began in April 2003. Once full-scale operations are reached, destruction of the mustard agent will last about six months. After all operations are completed and the empty storage containers are cleaned and sent off-site for recycling, the facility will be closed.

What will happen to the facility and the proving ground once the agent is destroyed?

After the mustard agent has been destroyed safely, the disposal facility will go through a controlled and regulated closure process. The proving ground's other missions will continue.

How will the environment be protected?

The facility permits issued by the Maryland Department of the Environment and the U.S. Environmental Protection Agency were written based on studies conducted locally. This ensures that disposal facility operations will be protective of local citizens and the environment. The state of Maryland supports the Army's plans for accelerated neutralization and works with the Army to ensure that the

stringent requirements of the original permit are met under the expedited process. Additionally, the Army will conduct two health impact assessments that will analyze potential health effects resulting from Aberdeen Chemical Agent Disposal Facility operations.

What is the Citizens' Advisory Commission?

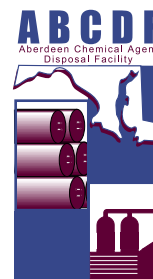
This commission, often called the CAC for short, is made up of eight members appointed by the governor of Maryland. Six are local citizens and two are representatives of state agencies that work closely with the chemical stockpile disposal program. The purpose of the CAC is to provide a link between citizens and the Army. The members do not make program decisions, but they are encouraged to provide guidance and recommendations. The commission offers a local perspective to the Army so that it may manage the chemical disposal program in the most positive way for the community. The Maryland CAC meets several times throughout the year.

How can I contact the CAC?

For information on the current issues the commission is considering, or to find out when the next CAC meeting will be held, please call the Edgewood Chemical Stockpile Outreach Office at (410) 676-6800.

Where can I learn more?

For more information, call the Edgewood Chemical Stockpile Outreach Office staff at (410) 676-6800. You may visit the office at 1011B Woodbridge Center Way in Edgewood. The office is open Monday through Friday from 8:30 a.m. to 5 p.m. Additional office hours are available upon request. Also, you may contact the Aberdeen Chemical Agent Disposal Facility Public Affairs Office at (410) 436-5253 or the Bechtel Aberdeen Public Affairs Office at (410) 436-9507 or visit our Web site at www.cma.army.mil.



Characteristics of Mustard Agent

Mustard agent, also known as HD, purified sulfur mustard or distilled mustard, has a five-percent sulfur impurity, less odor and greater blistering power than the original mustard agent that was used during World War I.

In its pure liquid state, mustard agent is colorless. However, when exposed to impurities, it becomes a pale yellow to brown oily substance. Mustard agent freezes at 58°F, is liquid at any temperature above 58°F, boils (becomes a vapor



with a garlic-like odor) at 419°F, and can remain active in the soil for at least three years.

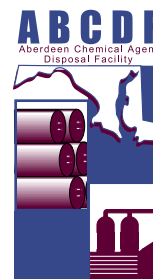
Exposure to mustard agent causes inflammation of the eyes, nose, throat, trachea, bronchi and lung tissue, and blisters the skin. In amounts approaching the lethal dose, injury to bone marrow, lymph nodes and spleen may occur. Mustard agent is toxic, and the International Agency for Research on Cancer has deemed it a carcinogen (cancer-causing agent).

If you would like more information on how the mustard agent stockpile will be destroyed at the Aberdeen Proving Ground, read the fact sheet *Aberdeen Chemical Agent Disposal Facility: Accelerated Disposal* or contact the staff at the Edgewood Chemical Stockpile Outreach Office at (410) 676-6800, the ABCDF Public Affairs Specialist at (410) 436-5253 or Bechtel Aberdeen's Public Outreach Manager at (410) 436-9507. Also, you may visit our Web site at www.cma.army.mil.

For more information on mustard agent, contact the Edgewood Chemical Activity (ECA) Public Affairs Office at (410) 436-5368 or visit ECA's Web site at <http://eca.sbcom.army.mil>.

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Aberdeen Chemical Agent Disposal Facility: Accelerated Disposal

After the Sept. 11, 2001, terrorist attacks, the U.S. Army began evaluating additional methods to reduce the public risk associated with chemical stockpile storage, including methods to accelerate stockpile destruction.

In January 2002, the Army announced plans to accelerate the destruction of the mustard agent stockpile located at Aberdeen Proving Ground in Maryland, recognizing that complete destruction of the stockpile offers the best security and permanent protection to the public. The Army worked closely with officials and regulators from the Maryland Department of the Environment and the U.S. Environmental Protection Agency (EPA) to determine the safest and most effective way to accelerate the destruction of the bulk mustard agent stockpile. The resulting plan was approved by environmental regulators and endorsed by the Maryland Citizens' Advisory Commission and federal, state and local officials. Community input on the resulting plan also was considered.

An Army acquisition decision memorandum signed by Under Secretary of Defense for Acquisition, Technology and Logistics E.C. "Pete" Aldridge on Feb. 1, 2002, officially signaled the start of the accelerated disposal project. A Phase I Consent Agreement governing construction of the accelerated facility was signed between the Maryland Department of the Environment and Aberdeen Proving Ground. In addition, a Class 1 Permit Modification from EPA Region III and the Record of Environmental Consideration for construction were signed.

General Process Comparison

Accelerating the destruction of the stockpile involves the same neutralization technology and much of the same equipment approved for use in the original Aberdeen Chemical Agent Disposal Facility. The accelerated plan simplifies the original process and reorders its sequence to destroy the mustard agent first, thereby reducing the risk to Maryland citizens more than two years earlier than previously

scheduled. It differs from the original process in four main steps: container draining; agent destruction and confirmation; disposal of the neutralization by-product or "hydrolysate;" and container decontamination and disposal.

Step 1: Container Draining

Workers drain the mustard agent from the steel containers by manually removing the containers' plugs through a glove box system that has been used safely by the Army for agent handling for more than 10 years. A tube is inserted and the agent is pumped to an agent holding tank.

Step 2: Agent Destruction and Confirmation

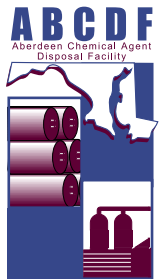
The mustard agent is fed into a tank containing hot water where it is vigorously mixed, causing the mustard agent to react with the water to form a biodegradable liquid byproduct called hydrolysate. The hydrolysate is a relatively benign liquid that is approximately 90 percent water with a mixture of salts, a chemical called thiodiglycol and possible minute traces of impurities such as copper and iron. Thiodiglycol, an organic chemical used in the paint and ink industry, is readily biodegradable. A large batch made up of four well-mixed, small batches is tested to confirm complete agent destruction.

Step 3: Hydrolysate Disposal

Although free of mustard agent, the hydrolysate still is considered an industrial hazardous waste and requires further treatment. This post-treatment step—where the hydrolysate is added to a mixture of ordinary sewage treatment bacteria that "digests" the thiodiglycol to form carbon dioxide and wet solids—will be accomplished at DuPont's Secure Environmental Treatment at Chambers Works in Deepwater, N.J.

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Aberdeen Chemical Agent Disposal Facility: Accelerated Disposal (continued)

By transporting the hydrolysate to a permitted off-site commercial facility that is well equipped to handle these kinds of wastes, the buildings and equipment designed for on-site hydrolysate biotreatment did not have to be built, nor will there be any discharge to the Bush River from this facility.

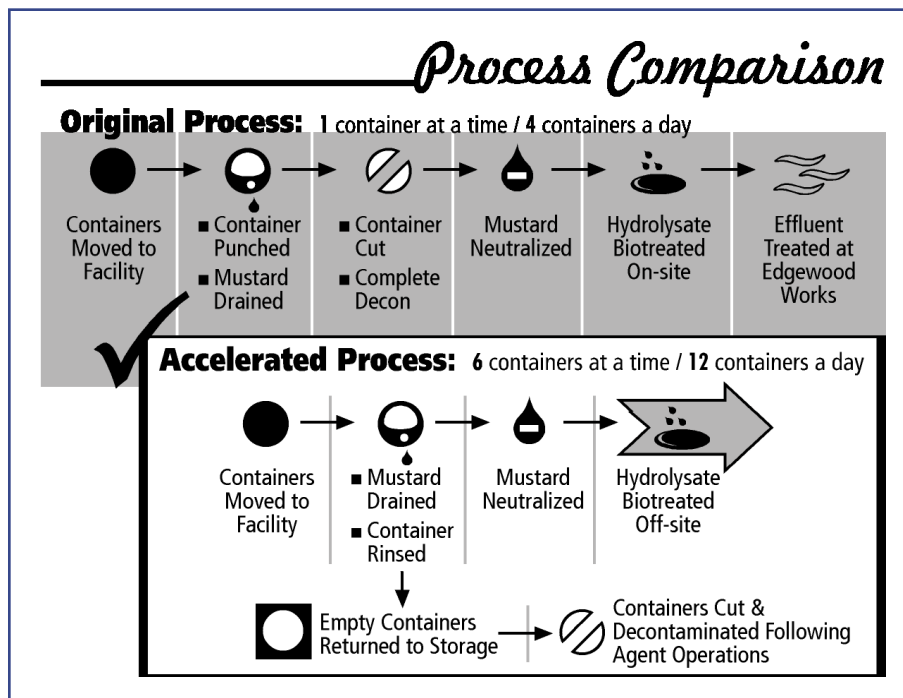
Step 4: Container Decontamination and Disposal

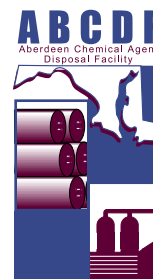
Under the original disposal plan, the steel containers would have been cut, rinsed and decontaminated right after draining the agent. The accelerated process calls for draining and neutralizing the agent first, then decontaminating and recycling the empty containers later. This approach provides the most immediate protection to the public by destroying the mustard agent contents of the container first, and then decontaminating all of the containers after the mustard agent

is neutralized. The container parts will be monitored to ensure that no agent remains and will be shipped off-site for recycling.

Many authorities with extensive knowledge of the chemical demilitarization program, hazardous waste disposal, worker safety regulations and environmental protection continue to work closely with the Army to ensure that worker and public safety and environmental protection are the most important elements of this project.

If you would like more information on the accelerated mustard agent disposal project at Aberdeen Proving Ground, contact the staff at the Edgewood Chemical Stockpile Outreach Office at (410) 676-6800, the ABCDF Public Affairs Specialist at (410) 436-5253 or Bechtel Aberdeen's Public Outreach Manager at (410) 436-9507. Also, you may visit our Web site at www.cma.army.mil.





Hydrolysate shipment from APG

Aberdeen Proving Ground, located in Harford County, Maryland, has stored a portion of the Army's mustard agent stockpile safely for more than 60 years. Destruction of the stockpile was scheduled for completion by 2006, but was accelerated after the terrorist attacks of Sept. 11, 2001.

APG began the process of destroying the stockpile in April 2003 using a neutralization process at the Aberdeen Chemical Agent Disposal Facility (ABCDF). Once full-scale operations are reached, the process will take approximately six months.

During neutralization, the liquid mustard agent is drained from its steel containers and fed into tanks containing hot water. The mustard agent and hot water are mixed vigorously, causing an irreversible chemical reaction in which the mustard agent is destroyed and a byproduct called hydrolysate is produced. The hydrolysate is then transported to DuPont's Secure Environmental Treatment at Chambers Works, located in Deepwater, N.J., where it is biotreated.

What is hydrolysate?

The hydrolysate [pronounced high-DRAWL-ih-sate] is a muddy-looking liquid that is approximately 90% water with a mixture of salts, an organic chemical called thiodiglycol [pronounced THIGH-oh-die-GLY-kol] and possible minute traces of impurities — organic

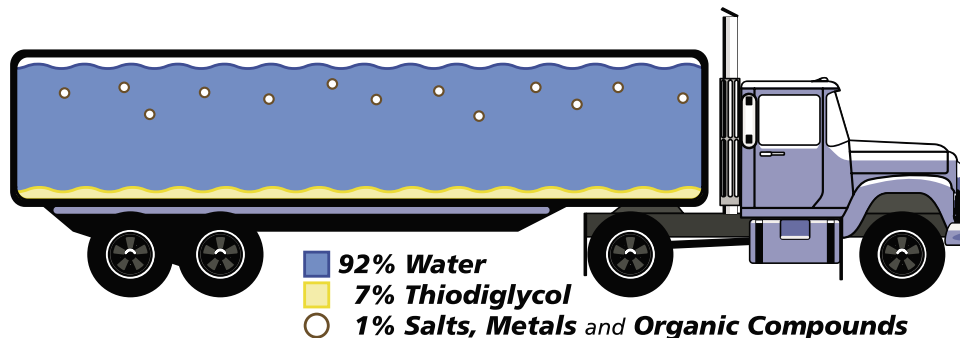
compounds and metals, such as copper and iron — which were present in the mustard agent, but not destroyed in the neutralization process. The hydrolysate does not contain mustard agent. Thiodiglycol, known chemically as dihydroxyethyl sulfide, is a commercial compound used extensively in the ink and paint industry. As part of the extensive testing that went into the design of the disposal facility, the hydrolysate was tested for toxicity. The testing concluded that the hydrolysate does not demonstrate any acute inhalation, oral or dermal toxicity.

What will happen to the hydrolysate?

The hydrolysate will be treated by DuPont Secure Environmental Treatment at Chambers Works using a state-of-the-art, two-stage enhanced biodegradation process employing innovative technology created by DuPont. DuPont Secure Environmental Treatment processes more than 18 million gallons of wastewater daily. It is the largest commercial and industrial wastewater treatment facility in the United States. DuPont signed a contract May 15, 2002, with the Army's systems contractor, Bechtel National, to treat the mostly water byproduct of the mustard agent neutralization process. (Bechtel National, Inc. (BNI) is the prime contractor. Bechtel Aberdeen is the five-company team, headed by BNI, involved in designing, building, testing, operating and closing the Aberdeen facility.)

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Hydrolysate shipment from APG (continued)

Is hydrolysate hazardous?

The hydrolysate is neither explosive nor flammable. It will be tested before it leaves the facility to ensure that no mustard agent can be detected. By regulation, it will be considered a hazardous waste and it will be handled accordingly, but in comparison to other chemicals and hazardous material transported commercially every day by truck or rail, it is relatively benign.

Harford County Emergency Manager Doug Richmond told citizens at a recent public meeting, "I would rather deal with the hydrolysate than most of the chemicals we have going up and down the I-95 and railroad corridors every day." Nonetheless, the Army and Harford County will continue to exercise emergency response plans in coordination with other teams at the local, state and federal levels and will work closely with their partners to ensure that human health and the environment are not jeopardized in any way during the transport of the hydrolysate.

How will the hydrolysate be transported?

Trained hazardous materials drivers under contract to DuPont will transport the hydrolysate to Chambers Works from APG using a dedicated fleet of 5,000-gallon tanker trucks. The neutralization of the entire Aberdeen stockpile and the decontamination of the containers will produce roughly 7 million gallons of hydrolysate. DuPont eventually will receive approximately 12 trucks a day, five days a week, during full-scale operations.

Hydrolysate will be classified as a Resource Conservation and Recovery Act (RCRA) hazardous waste, even though some analyses to date show it to be non-hazardous. The potential hazardous classification is driven by the

possible presence of the trace organic and metal impurities in the hydrolysate. Our assessment is that it would be shipped in accordance with Department of Transportation rules as a Class 9 hazardous waste. The recommended emergency response measures for the hydrolysate are the same as for consumer commodities (e.g., household cleaners, etc.) shipped as Class ORM-D, (the DOT classification commonly used by industry to ship household chemicals to retail stores for sale to the public).

Like wastes of similar (and greater) hazard, hydrolysate can be safely transported in tanker trucks specifically configured to carry hazardous waste. These trucks meet the stringent requirements of the Department of Transportation and will be operated by experienced and specially licensed hazardous waste transport operators. No special police or security escorts will be required. It is possible that the tanker trucks will require security seals to comply with international treaty requirements. Each truckload will be carefully inspected, recorded and tracked. Chemical Weapons Convention inspectors may be present also at the Chambers Works facility to ensure that all aspects of the hydrolysate biotreatment meet treaty requirements.

For more information about neutralization of the mustard agent stockpile at Aberdeen Proving Ground, call the Public Outreach and Information Office, (410) 436-4555 or (410) 436-6137; the Edgewood Chemical Stockpile Outreach Office, (410) 676-6800; the Aberdeen Chemical Agent Disposal Facility Public Affairs Office, (410) 436-5253; or the Bechtel Aberdeen Public Outreach Office, (410) 436-9507. Also, you may visit our Web site at www.cma.army.mil.

For more information about the DuPont Secure Environmental Treatment program, call the External Affairs Office, (302) 992-4273.



PROGRESS UPDATE

Aberdeen Chemical Agent Disposal Facility

(as of June 30, 2003)

Where We Are

- **TOTAL DRAINED** – Work continues on the accelerated destruction of the mustard agent stockpile at the Aberdeen Chemical Agent Disposal Facility at Aberdeen Proving Ground, Md. As of June 30, the U.S. Army Technical Escort Unit has transported 72 bulk containers of mustard agent to the facility. Of those, ABCDF workers have drained 57 containers, a total of more than 38 tons of mustard agent.
- **HYDROLYSATE** – Of the drained mustard agent, more than 32 tons have been neutralized as of June 30. Shipment of the byproduct of neutralization, known as hydrolysate, began June 17. The hydrolysate is shipped to DuPont Secure Environmental Treatment at Chambers Works, in Deepwater, N.J., where it is biotreated.
- **PUBLIC MEETINGS SCHEDULED** – Public meetings will be held on July 16, 2003, 7 p.m. at the Edgewood Senior Center in Edgewood, Md., and July 17, 2003, 7 p.m. at Chestertown Middle School in Kent County, Md. The purpose of these meetings is to provide citizens with an update on progress at the ABCDF, answer questions and discuss findings of a higher pH in some batches of the neutralization byproduct, called hydrolysate.
- **STOP WORK ORDER** – On June 6, the ABCDF stopped draining and neutralizing mustard agent following an inspection at the facility. This inspection discovered administrative issues with paperwork that had to be resolved. Maintenance and hydrolysate actions continued during the stop work order. The stop work order was lifted on June 16, and draining and neutralization of mustard agent resumed.
- **INCIDENTS** – Press releases were issued about several incidents at the ABCDF. None of the incidents resulted in injury to workers, the community or the environment, or release outside the facility.
 - On May 12, a low level of mustard agent vapor was detected near a drained ton container due to an error in reading the level of agent inside a drain station. Additional training was implemented and procedures were adjusted to prevent this from happening again. (*Press release #03-02, dated May 13, 2003*)
 - On May 28, a power outage resulted in a brief rise in agent levels, which were contained within the neutralization building. Back-up generators restored the facility's cascade ventilation system within moments, and the levels subsided. Workers evacuated temporarily and there was no threat to the workforce or outside community. The facility's electrical engineers have corrected the cause of the power failure. (*Press release #03-03, dated May 30, 2003*)
 - On June 22, an alarm went off when mustard agent vapor was detected in an airlock, where workers were processing a hazardous waste drum. Workers masked and evacuated the facility. Additional training was implemented and procedures were adjusted to prevent this from happening again. (*Press release #03-04, dated June 25, 2003*)
 - On June 25, workers masked and evacuated the facility after an alarm alerted to the possible presence of mustard agent vapor. Three employees who were working at a drain station returned to work after they were medically cleared. (*Press release #03-05, dated June 26, 2003*)
 - On June 28, an alarm sounded at a drain station room, where a container had been removed after draining and decontamination. No one was in the room at the time of the alarm, and evacuation was not required. (*Press release #03-06, dated June 28, 2003*)
- The ramp-up of the ABCDF remains slow and methodical. To date, the target date for completion of the project remains at November 2003. This date will be reevaluated, as needed, and adjusted if necessary. We remain committed to ensuring the safety of all our workers, the community and the environment during all phases of the accelerated neutralization process.

Where We'll Be

- Visit our information booth at the Harford County Farm Fair, July 24-27, at the Harford County Equestrian Center in Bel Air, Md., and at the Party on the Bay, Aug. 16, in Rock Hall (Kent County), Md.

For more information, contact the Edgewood Chemical Stockpile Outreach Office, (410) 676-6800; the Aberdeen Chemical Agent Disposal Facility Public Affairs Office, (410) 436-5253; or the Bechtel Aberdeen Public Outreach Office, (410) 436-9507.