Highlighting the U.S. Army's Chemical Demilitarization Program

Reach

Edgewood
Winter 2004

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ABCDF ton container cleanout operations scheduled to go on line

Eleven-step process leads to decontaminated containers

For decades, the mustard agent stockpile stored at the Edgewood Area of Aberdeen Proving Ground, Md., has been kept in steel ton containers, commonly called "TCs." These ton containers, much like the mustard agent, soon will be destroyed in accordance with the requirements of the Chemical Weapons Convention, an international treaty prohibiting the development, production, stockpile and use of chemical weapons.

Since disposal operations began April 23, 2003, at the Aberdeen Chemical Agent Disposal Facility, or ABCDF, more than 80 tons of mustard agent have been drained from these TCs and destroyed using a technology known as neutralization, followed by off-site biotreatment. During the disposal process, workers drain the mustard agent from the ton containers by manually removing the containers' plugs through a glove box system like those used safely by the Army for agent handling for more than 10 years. Workers connect a drain tube and the agent is pumped to an agent holding tank. The container is then triple rinsed using hot water and a caustic solution and this water is pumped to a rinse water holding tank. The mustard agent and rinse water is then blended into a reactor containing hot water and vigorously mixed, causing the mustard agent to form a biodegradable liquid byproduct called hydrolysate. The mostly-water hydrolysate is tested to confirm complete agent destruction before it is transported to DuPont's Secure Environmental Treatment facility at Chambers Works in Deepwater, N.J., for disposal using a biotreatment process.

Originally, the empty ton containers would have been cut, rinsed and decontaminated immediately after draining the agent. However, after the Sept. 11, 2001, terrorist attacks, the Army announced plans to accelerate the destruction of the mustard agent stockpile, recognizing that complete destruction of the stockpile offers the best security and permanent protection for the public. Part of that plan to accelerate disposal simplified and re-sequenced the process of cutting, rinsing and decontaminating the containers after draining the agent.

At the ABCDF, the re-sequenced process begins when each container is weighed, prior to agent draining, at the Process Neutralization Building. Once the mustard agent has been drained, each container is triple rinsed with hot water and a caustic solution in order to remove the residual

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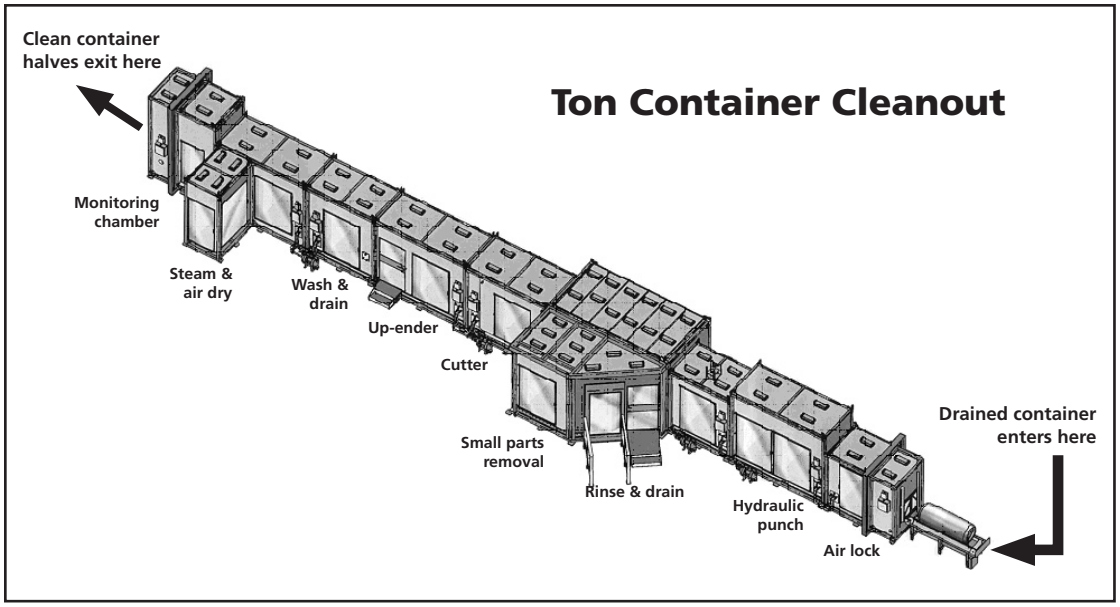

Graphic courtesy of Bechtel Aberdeen

The drained containers are processed through the Ton Container Cleanout facility where they are cut in half, cleaned and shipped to an Army facility for recycling.

TCC operations scheduled to begin at ABCDF

Continued from cover

material that remains in the ton container. "After each container has been drained, it's re-sealed, and monitored to ensure no agent contamination is detected," said ABCDF Process and Facilities Design Lead Bob Hessian. "We weigh the container again after the agent is drained so that we can determine the exact amount of agent drained from each container before we transfer the TC to the Drained Ton Container Storage Area. The containers are securely stored in that area until they are removed for processing at the Ton Container Cleanout, or TCC facility."

"After each container has been drained, it's re-sealed, and monitored to ensure no agent contamination is detected."

—Bob Hessian, ABCDF Process and Facilities Design Lead

Once inside the TCC facility, the ton container is prepared to begin its journey through an 11-step decontamination process. The process begins when a ton container is taken from a staging area next to the TCC facility and is loaded onto the In-Feed Conveyor. The container is inspected to verify that the shipping cap has been removed and the container has been properly loaded and does not contain any surface irregularities that could disrupt or prevent successful processing.

Once inspected, the container is transferred into the In-Feed Air Lock. The inlet door opens and a cascade ventilation system ensures that sufficient air is drawn in through the door to preserve the containment boundary in the Air Lock as the container is introduced. After verifying the system has properly closed the inlet door, the remote and automated control system transfers the container to the Bulk Drain Station.

"Originally, the Bulk Drain Station was designed to use a metal punch to open each container and drain the liquid agent," explained Hessian. "Under the accelerated plan, the containers will have been drained manually in the Process Neutralization Building drain station previously, so only the punch system will be used here."

Once the access holes are punched into the container, it is transferred to the Rinse and Drain Station. The container is rinsed thoroughly inside three times, using high-pressure hot water. The rinse is performed in a manner to ensure all interior surfaces of the container are cleaned thoroughly to remove any residual material.

All of the ton container's small parts, valves and plugs are robotically removed in the Small Parts Removal Station, and segregated for additional disassembly in the Maintenance Glove Box. Vent and drain tubes are steamed out to ensure that residual material within the tubes is dislodged. A final rinse, similar to that described previously, is performed to completely remove the dislodged residual. "In the event we are unable to robotically remove a small part, workers can use a glove box system to manually extract the part," said Hessian. A second feature incorporated into the design of the Small Parts Removal station is a "Kick Out Station," which allows for temporary "parking" of a container if maintenance or other operational issues arise.

With its small parts removed, the container is transferred into the TC Cutter Station. Here, the containers are cut in half using a pinch wheel technology (similar to a plumber's copper tube cutter). This method was chosen since it does not generate metal cutting waste. Each container half

Frequently Asked Q
Ton Container Clea

Photo by Bruce C. Wright, U.S. Army

Some bollards, like those pictured above, have been made from recycled ton container metal.

Questions about the anout facility (TCC)

How much water is used to process the containers through the TCC?

Approximately 1,100 gallons of water are used for each ton container processed during steady-state operations. Actual water volumes will depend on the decontamination results achieved once operations begin.

What happens to the water used in the TCC?

Rinse water from the stations in the TCC facility is collected and transferred to the Process Neutralization Building Rinse Water Holding Tank. Once there, the effluent is treated in the Process Neutralization reactors and tested to verify it is agent free.

Will any vapors be generated at the TCC facility? What happens to them?

Vapors generated at the TCC are collected in a dedicated carbon filtration system. The system includes a caustic scrubber, multi-stage filtration, and continuous air monitoring equipment. The facility will operate under an air permit issued by the Maryland Department of the Environment.

What happens to the ton containers once they have been decontaminated and cleared?

Ton container halves removed from the process line will be loaded onto a trailer outside the Process Neutralization Building. The trailer load will be secured and transported by the Army Test Center to Rock Island Arsenal in Illinois. There, the container halves will receive additional thermal treatment and the steel will be recycled.

is then up-ended and then transferred to the Wash and Drain Station, where the container is positioned open-side down and sprayed with high-pressure hot water to thoroughly clean it inside and out.

The washed container halves are transferred to the Steam and Air Dry Station where saturated steam is used to blow any remaining water from the tubes, as well as heat and dry all surfaces of the container. This step is performed in anticipation of monitoring the container for cleanliness, which requires all surfaces to be free of standing liquid and above 70 degrees Fahrenheit, during the monitoring period. "The goal of monitoring is to verify that the surface has been decontaminated and can be handled safely without protective equipment," Hessian explained.

In the Monitoring Air Lock, ton container halves are received in their upright positions and isolated from the cascade ventilation system following transfer. The container is held temporarily before a near real-time monitor is used to assess cleanliness. If the container halves are shown to be clean, they can be discharged from the air lock to the Down-Ender, where each half is laid on its side to be transferred by forklift for off-site shipping. If monitoring determines that the container halves have not been adequately cleaned, they can be passed back to the Steam and Air Dry Station Kick Out Conveyor where they await reprocessing in the Wash and Drain Station. "Safety is always the priority here at the ABCDF and we'll take the time to make sure the job is done the right way," said Hessian.

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At a glance – ABCDF stats

as of Jan. 31, 2004

Total Drained

A total of 98 tons of mustard agent have been drained.

Total Neutralized

Of the drained mustard agent, more than 80 tons have been neutralized.

Hydrolysate Transport

Approximately **586,745 gallons** of the neutralization byproduct, called hydrolysate, have been shipped for biotreatment to DuPont Secure Environmental Treatment at Chambers Works in Deepwater, N.J.

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—Bob Hessian, ABCDF Process and Facilities Design Lead

Flamm inducted into Senior Executive Service

Photo by Conrad Johnson, RDECOM

The Honorable Claude M. Bolton, Jr., Assistant Secretary of the Army (Acquisition, Logistics and Technology), left, presents a certificate to Kevin Flamm, following Flamm's induction into the Senior Executive Service, Dec. 9, 2003, at the Chemical Demilitarization Training Facility located at Aberdeen Proving Ground, Md. Flamm, formerly the Project Manager for Alternative Technologies and Approaches, is now the U.S. Army Chemical Materials Agency Program Manager for Elimination of Chemical Weapons. He is responsible for overseeing the Chemical Stockpile Disposal Project, the Alternative Technologies and Approaches Project and the Non-Stockpile Chemical Materiel Program, as well as the Army's support to the Cooperative Threat Reduction Program, which is the Department of Defense's provision of technical assistance to Russia's chemical weapons destruction program.

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