



U.S. ARMY CHEMICAL MATERIALS AGENCY

Closure: *When the weapons are finally gone*



Demolition of the Johnston Atoll Chemical Agent Disposal System – the first facility to complete its agent destruction mission and be dismantled.

Chemical weapons disposal is a lengthy and complex process with a planned ending known as “closure.” When each plant completes its vital operations mission of safely destroying chemical agent and munitions, it begins the process of plant closure in which the physical plant and equipment are decontaminated and dismantled. The property is restored to environmental standards that were set in the facility’s original environmental permit. Depending on the needs of the U.S. Army, when some or all of the land meets regulatory standards for decontamination and cleanup, the disposal site may be retained and restored to its natural condition, transferred to another federal government agency or transferred to local government or the private sector for reuse through the Base Realignment and Closure (BRAC) process.

The entire life cycle of an Army chemical weapons disposal facility is comprised of environmental permitting, construction, systemization (setup and testing), disposal operations and closure. The closure phase involves many challenges: regulatory, engineering, applied science, personnel, technical, property and administrative. Millions of pounds of physical plant must be dismantled. Tens of thousands of procedural steps must be identified and implemented. Hundreds of workers must be reassigned or relocated to other disposal sites. Safety of the workers, the community and the environment must be maintained during facility closure, just as it is during munitions disposal operations. At sites where the entire depot is to be closed, structures not involved with agent handling and disposal may also be dismantled.

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Closure is part of the overall plan

Each plant is closed in a deliberate manner according to a detailed plan to ensure continued safety for the environment and surrounding communities. Planning begins well in advance of closure when the Army applies for appropriate permits to build and test each weapons disposal facility. Disposal sites are governed by the federal Resource Conservation and Recovery Act (RCRA) and are known as “permitted” treatment, storage and disposal facilities (TSDFs).

Individual states issue permits to TSDFs under the provisions of RCRA. The act requires that each treatment, storage and disposal facility must prepare a closure plan as part of the initial application for the operating permit. The plan must specify how and when closure will take place.

While closure plans submitted at the time of permit application provide an estimated timetable, they do not define every detail in the complex closure process. As closure nears, disposal sites expand and add detail to closure plans and submit them for approval to state RCRA regulators in the form of permit modification

requests. An overall closure plan includes two principle documents:

- The Decommissioning Plan describes the strategy for physical dismantlement of the disposal plant; and
- The Facility RCRA Closure Plan describes the policy for environmental compliance for closure set forth by the RCRA Permit.

Past experience guides the future

As a world leader in chemical weapons disposal, the U.S. Army Chemical Materials Agency (CMA) has amassed a great deal of knowledge about facility closures. This is due in part to valuable experience gained during closure operations at its Johnston Atoll Chemical Agent Disposal System (JACADS) in the equatorial Pacific Ocean. This facility was the first full-scale chemical weapons disposal facility in the world. It serves as a textbook example for CMA’s remaining disposal facilities to follow when it is time for closure. Cleanup, dismantling and demolition of the JACADS physical plant



Protecting the environment is a key value of CMA. Environmental concerns are always a top priority throughout the entire mission, especially during facility closure when the site is restored.

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and surrounding buildings lasted about three years, from early 2001 to November 2003.

Johnston Atoll has been returned to its natural state as a wildlife refuge, teeming with shorebirds, fish and other native wildlife. As an example of the Army's dedication to environmental protection, scientists monitored the atoll's bird and marine populations beginning six years before the project started and running throughout the life of the project — 20 years of extensive, continuous research and monitoring. During two decades of research, scientists did not find any adverse effects on the wildlife or marine life on the atoll due to the JACADS project.

In addition to JACADS, the Aberdeen Chemical Agent Disposal Facility (ABCDF) in Edgewood, Md., the Newport Chemical Agent Disposal Facility (NECDF) in Newport, Ind., the Pine Bluff Chemical Agent Disposal Facility (PBCDF) in Pine Bluff, Ark., Anniston Chemical Agent Disposal Facility (ANCDF) in Anniston, Ala., and the Umatilla Chemical Agent Disposal Facility (UMCDF) in Umatilla, Ore., have all completed stockpile destruction.

ABCDF completed RCRA closure in 2007, becoming the first U.S. chemical demilitarization site to achieve permitted closure. This was followed by JACADS in August 2009 when the Environmental Protection Agency (EPA) Region IX officials wrote the "EPA finds that the Army has fulfilled the requirement of its JACADS permit," and that the EPA "accepts the Army's closure of the facility as a clean closure."

In 2008, NECDF completed its bulk agent VX disposal mission, and shipment of the resulting caustic wastewater for final treatment and disposal. In January 2010, Newport officials received a letter from the Indiana Department of Environmental Management (IDEM) stating that the total closure as required by RCRA had been completed. IDEM's approval of Newport Chemical Depot's closure certification reports for hazardous waste storage areas used in support of the neutralization of the VX nerve agent stockpile closes the active portion of the RCRA permit which had been in place since December 1999.

In November 2010, PBCDF completed its stockpile destruction and in September 2011, ANCDF completed its stockpile destruction. UMCDF soon followed, destroying its entire stockpile in October 2011. These sites are currently in closure operations.

The closure technical process

Physical closure of a plant begins with the dismantling, decontamination and disposal of the equipment and structures used during chemical agent destruction once they are not needed for agent disposal campaigns. At incineration facilities, agent-contaminated closure wastes will typically be incinerated on site using many of the same processes that were used to dispose of chemical munitions. Neutralization and thermal treatment will be used at neutralization facilities.

The closure process, like the agent campaigns, generates secondary waste such as spent decontamination solution, personal protective equipment and cleaning tools and supplies. These are typically treated and disposed of in the same manner as they were during agent campaigns using existing equipment and processing techniques.

After decontamination, final disposal options for closure wastes are similar to those for munitions wastes and secondary wastes — some are sent to commercial landfills, some metals are commercially recycled. There may also be some non-agent hazardous wastes that are sent to commercial RCRA-permitted treatment, storage and disposal facilities for final processing.

While closure is often thought of as occurring after the completion of agent destruction, the two processes may overlap. At JACADS, for example, the deactivation furnace continued to process land mines while other furnace systems and areas were simultaneously undergoing closure.

Closure also includes sampling of soils and remaining structures on the property to verify that they meet regulatory standards. These "clean closure" standards vary based on each state's regulations and on the proposed future use for the property. Properties scheduled to



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be turned over to state or local governments or the private sector, for example, may be required to meet different standards than properties that remain under Army control.

Final closure tasks include making a health risk assessment and an ecological risk assessment based on the data from samples of the soil and remaining structures and, ultimately, terminating the RCRA facility permit. In addition, international treaty requires that disposal equipment be certified by treaty inspectors as having been dismantled.

It's about people, too

Dismantling and safe disposal of the physical plant is not the only significant activity during closure. Closure of a facility requires a sizeable workforce, though smaller than that for agent destruction, and workforce numbers decline as closure moves forward. The impact of job loss on local economies is a major community concern — the economic impact of site closure and the departure of hundreds of workers can be considerable depending upon the relative size of the disposal plant as an employer.

As they depart, many of these dedicated workers — technicians, operators, scientists, engineers, mechanics, clerks, team leads, supervisors, managers, soldiers and other government and contractor personnel — share their valuable experience by working at other chemical weapons disposal sites. Others return to related professions

such as the nuclear industry where they worked prior to their involvement in the chemical weapons disposal program.

As always, the health and safety of workers and community members is a priority during closure. Some delays may be expected as the Army and its contractors work to comply with stringent regulatory standards, perform industrial systems maintenance and decontaminate many structures and equipment. As always, safety remains a top priority in completing the mission.

What to expect during closure

It takes time to complete the job of closure and possible delays can be expected. At JACADS, it took 27 months to decommission the munitions disposal building (MDB) and 21 months to process 250,000 pounds of halogenated plastics and three million pounds of decommissioning waste. Decontamination and closing of outside areas at JACADS took six months.

Another aspect that can be anticipated is public involvement. Public meetings are part of the closure process, and input from these meetings is used to improve the closure process for other chemical agent disposal sites. Lessons learned from public participation have been invaluable to other CMA disposal facilities. CMA is committed to open communication with the public as it applies its expertise to finish the disposal mission.

Look for announcements and updates on public meetings, environmental forums and agency meetings with local government officials regarding the progress of closure activities.

Information repositories are maintained at CMA outreach offices located in each disposal site community and in some libraries. The CMA website www.cma.army.mil is an excellent source of additional information.



Thousands of highly dedicated and skilled workers are vital to bringing the chemical weapons disposal project to successful mission completion.