# Chemical Demilitarization Program – Assembled Chemical Weapons Alternatives (CHEM DEMIL-ACWA)

**Executive Summary**
- Army testing of demilitarization systems in the Chemical Demilitarization Program has been adequate to ensure the safe and secure disposal of chemical warfare material.
- The Army conducted operational testing in accordance with DOT&E-approved test plans.
- The Army began operational testing at the Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) located in Colorado in FY16.
- Disposal operations of the U.S. chemical stockpile did not meet the original Chemical Weapons Treaty deadline of April 2007. Congress, through Public Law 114-38, has established a new stockpile elimination deadline of December 31, 2023.

**System**
- The Chemical Demilitarization Program involves the destruction of lethal chemical agents, chemical munitions, and non-stockpile chemical warfare material.
- The PCAPP stockpile disposal facility in Pueblo, Colorado, has started operations while the Blue Grass Chemical Agent-Destruction Pilot Plant (BGCAPP) facility in Richmond, Kentucky, is preparing for operations. These facilities employ chemical neutralization of agents followed by post-treatment of the neutralized products.
  - The PCAPP is a first-of-a-kind facility designed to destroy the chemical blister agent mustard (HD and HT) stored in 155 mm projectiles, 105 mm projectiles, and 4.2-inch mortar rounds through the use of a low-temperature, low-pressure neutralization process. PCAPP will process the neutralized agent (hydrolysate) using biotreatment.
  - The BGCAPP is a first-of-a-kind facility designed to destroy chemical nerve agents Sarin (GB) and VX stored in 155 mm projectiles, 8-inch projectiles, M55 rockets, and M56 rocket warheads through the use of a chemical (caustic) neutralization process. BGCAPP will process hydrolysate using supercritical water oxidation (SCWO) technology.
- Explosive destruction technology is used in the Assembled Chemical Weapons Alternatives (ACWA) program:
  - PCAPP uses the Explosive Destruction System (EDS) for destruction of problematic munitions not easily processed in the main plant. The EDS uses shaped explosive charges to access chemical munitions and destroy the munitions' explosive components. After detonation, EDS chemically treats the munitions' contents within the containment vessel and collects vapor and liquid samples as required. The products of this neutralization process (neutralents) are transferred to drums and will be packaged for shipment to an approved treatment, storage, and disposal facility (TSDF).
  - BGCAPP will use the Static Detonation Chamber (SDC) to destroy mustard munitions. The SDC uses explosive destruction technology designed to destroy conventional munitions, munition components, and chemical-filled munitions by indirect heating in a detonation chamber. The heat produced in the chamber allows for detonation and/or deflagration of the agent-filled munition and its energetic components, and subsequently treats the chemical fill. The air pollution abatement system captures and treats any resulting harmful vapor products.

**Mission**
The United States is using the Chemical Demilitarization Program to comply with the Chemical Weapons Convention. This is an arms control and nonproliferation treaty that requires the destruction of the U.S. stockpile of lethal chemical agents, chemical munitions, and chemical warfare material.

**Major Contractors**
- Chemical Materials Activity – Aberdeen, Maryland
- Assembled Chemical Weapons Alternatives (ACWA) sites:
  - Bechtel National, Inc. – San Francisco, California
  - Parsons Infrastructure and Technology Group, Inc. – Pasadena, California

**Activity**
- The Chemical Demilitarization Program is not a traditional acquisition program. DOT&E oversight began in 1999 when Congress directed that the DOD oversee this program as a major defense acquisition program due to cost and schedule overruns.

- The test and evaluation program for chemical demilitarization consists of two phases:
  - The developmental testing phase consists of system and subsystem component testing without an agent culminating in end-to-end operations of the facility.
  - The operational testing phase consists of pilot testing and campaign changeover testing involving operations with an agent. Operational testing supports a decision to proceed to full operational status for a specific agent/munitions campaign. For example, one campaign would destroy 155 mm projectiles containing mustard blister agent, another would destroy 8-inch projectiles equipped with Sarin nerve agent, and the third would destroy M55 rockets equipped with Sarin. After the completion of each campaign, the facility reverts to operational test status for changeover to the next planned campaign. This process is repeated until the destruction of all agent/munitions configurations in the site's stockpile is complete. DOT&E monitors the test activity and independently analyzes test data at PCAPP and BGCAPP.
- As of August 2016, the Chemical Demilitarization Program has destroyed over 90 percent of the total U.S. chemical weapons stockpile (originally 31,498 agent tons).
- On February 11, 2016, the PCAPP EDS completed the destruction of 560 overpacked munitions and agent containers that could not be processed by the main plant. The PCAPP EDS campaign began in March 2015 after successfully completing multiple pre-operational reviews.
- The systems contractor led by Bechtel successfully conducted an Integrated Operations Demonstration (IOD) in August 2016, demonstrating main plant facility readiness for operations.
- The Army conducted a Cooperative Vulnerability and Penetration Assessment (CVPA) and an Adversarial Assessment (AA) on the industrial control system (ICS) and laboratory information system (LIS) at PCAPP. DOT&E observed all cybersecurity assessment activities. The Program Executive Office and the systems contractor committed to correcting defects prior to the start of operations, and the Army conducted two follow-on events to verify the correction of noted vulnerabilities.

**Assessment**

- Army testing of demilitarization systems in the Chemical Demilitarization Program has been adequate to ensure the safe and secure disposal of chemical warfare material. The U.S. Army Material Systems Analysis Activity (AMSAA) is providing effective independent oversight of the testing of both stockpile and non-stockpile programs. Fully integrated operational demonstrations that confirm all phases of operations (including preparation, destruction/neutralization, and disposal) remain critical prerequisites for transitioning to operations with live agents.
- Disposal operations of the U.S. chemical stockpile did not meet the original Chemical Weapons Treaty deadline of April 2007. Congress, through Public Law 114-38, has established a new stockpile elimination deadline of December 31, 2023.
- Cybersecurity testing at PCAPP identified technical and physical security vulnerabilities, which were corrected by the systems contractor and verified by both AMSAA and DOT&E.
  - Cybersecurity testing of the PCAPP LIS showed that the risk was low and acceptable based upon the assessment of the protect, detect, respond, and restore capabilities.
  - Cybersecurity testing of the PCAPP ICS resulted in a number of system improvements, including enhanced policies and procedures, installation of a Security Information and Event Management (SIEM) system for threat monitoring, and configuration of the SIEM to alert operators to suspicious activities. DOT&E and AMSAA have verified these improvements. The system contractor also made improvements to physical security following the AA.
  - The PCAPP IOD identified areas for procedural improvement, which were corrected and verified by the test community. The IOD demonstrated that the plant was ready to begin processing agent rounds as part of a controlled ramp-up (pilot testing). Following the correction of deficiencies noted during cybersecurity assessments and the IOD, PCAPP's main plant began processing chemical munitions as part of pilot (operational) testing on September 7, 2016. DOT&E is monitoring the pilot testing and operations.
- The BGCAPP test program started planning for FY17 activities by:
  - Developing IOD and pilot test plans for the SDC, to include a cybersecurity CVPA and AA. The SDC, based on current credible estimates, could begin processing mustard rounds in 4QFY17.
  - Planning cybersecurity test activities for the LIS, BGCAPP Main Plant, and SDC systems.
- AMSAA is monitoring BGCAPP systemization activities to support the readiness assessment to proceed into IOD.

**Recommendations**

- Status of Previous Recommendations. There are no outstanding previous recommendations.
- FY16 Recommendation.
  1. The Program Executive Officer ACWA should incorporate lessons learned from PCAPP test planning and cybersecurity testing at BGCAPP.