Pueblo Chemical Agent-Destruction Pilot Plant

FOR MORE INFORMATION CONTACT:

Pueblo Chemical Stockpile
Outreach Office
104 West B Street
Pueblo, CO 81003
(719) 546-0400
PuebloOutreach@iem.com

Pueblo Chemical Agent-Destruction Pilot Plant Public Affairs
(719) 549-4959

U.S. Army
Pueblo Chemical Depot
Public Affairs Office
(719) 549-4135
usarmy.pueblo.usamc.mbx.pcd-pao@mail.mil

A Partnership for Safe Chemical Weapons Destruction

www.peoacwa.army.mil

Biotreatment Process

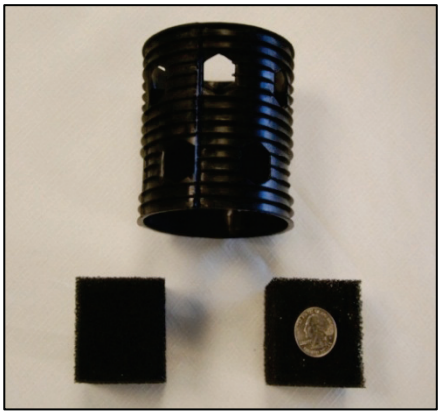
The Pueblo Chemical Agent-Destruction Pilot Plant, or PCAPP, has been built and is now being readied to safely and efficiently destroy a stockpile of chemical weapons currently in storage at the U.S. Army Pueblo Chemical Depot (PCD). A two-step technology - neutralization followed by biotreatment - is the process being employed to destroy the chemical agent stored at PCD.

Neutralization

During the neutralization process, munitions are taken apart, and the chemical agent drained and separated from the energetics, which includes explosives and propellants. The agent is then mixed vigorously with hot water and sodium hydroxide, which destroys or neutralizes it. The resulting byproducts, known as hydrolysates, are held and tested to ensure agent destruction before proceeding to secondary treatment.

Biotreatment

Following confirmation of agent destruction, the hydrolysate will be treated in the Immobilized Cell Bioreactor (ICB) system -- a system composed of 16 rectangular reaction tanks. Each tank is an aerobic fixed-film bioreactor packed with two-inch polyurethane foam cubes, or "media" and plastic spacers called "bio-rings." Because the hydrolysate is too concentrated for the ICB microorganism to break down, it is diluted prior to biotreatment in the ICB reactors.



Sandwiched between the various immobilized cells in the PCAPP bioreactors, is an assortment of media, in which the wastewater eating microbes will reside.

Four reactors are grouped together to form an ICB module. Each module is equipped with a feed tank, aeration system, nutrient-addition system, pH control system, effluent tank and an off-gas treatment system. A mix-culture of bacterial microorganisms attached to the ICB media will break down thiodiglycol, also called TDG, and other organics in the hydrolysate, converting them to carbon dioxide, water and minerals (chlorides and sulfides). Pilot testing at other sites has shown that this process will remove more than 98 percent of the TDG. The resulting effluent (biotreated water) will then go to three Brine Concentrator Feed Tanks.

The bioreactors located on the PCAPP site will use common microbes to treat hydrolysate, the wastewater byproduct resulting from the chemical agent neutralization process.

Brine Reduction System

The Brine Reduction System, or BRS, plays an important role in PCAPP's conservation efforts. It is a process that incorporates three technologies: evaporation, crystallization and solids dewatering. Biotreated effluent is held in the Brine Concentrator Feed Tanks prior to pumping it to the BRS for further processing. An 86-foot evaporator is used to boil water from the biotreated effluent and recover the water through condensation. The water is recycled back into the plant.

The Brine Reduction System is the final processing stage of the PCAPP Biotreatment Area. A secondary waste of dried salt cakes will be shipped off-site to a permitted facility.

After evaporation, the concentrated brine is pumped to a crystallizer to further reduce the brine volume and to prepare this salt slurry for filtration. With additional evaporation in the crystallizer, the dissolved salt concentrations increase to a critical point where salt crystals form.

As in the evaporator, the water vapor is condensed and recovered water is filtered and sent to the Process Water Tank. The salt crystals and other solids in the concentrated slurry are filtered out and compressed. The resulting filtered "salt cake" will be shipped to an off-site permitted hazardous waste disposal facility. Approximately 5,000 tons of salt cakes are expected to be produced during the life of the project.

Environmentally-Friendly Approach

PCAPP is employing an innovative and environmentally-friendly approach to chemical agent destruction, including the conservation of water, a precious commodity in Colorado's arid terrain. Over the life cycle of the Pueblo plant, more than 50 million gallons -- the equivalent of 85 percent of the plant's water usage -- will be recovered, recycled and reused.