

Utility Energy Service Contract Boosts Chemical Weapons Destruction Mission at Army Pueblo Chemical Depot

For six decades, the U.S. Army has safely and securely stored chemical munitions at the Pueblo Chemical Depot in Colorado. To help fulfill international treaty obligations and to meet a congressional deadline of 2023 for the elimination of these aging weapons, initial destruction of the Pueblo chemical weapons stockpile began in 2015. A utility energy service contract (UESC) executed in 2016 between the U.S. Army Corps of Engineers and the Depot's serving utility, Black Hills Energy (BHE), directly supported this mission with the installation of a new electrical substation that was essential to the Depot's need for uninterrupted power.

Destroying Chemical Weapons at Pueblo

As part of the broader Chemical Demilitarization Program of the U.S. Army Corps of Engineers Engineering and Support Center, Huntsville, the Program Executive Office, Assembled Chemical Weapons Alternatives (PEO ACWA) is the organization responsible for destroying the final 10% of the U.S. chemical weapons stockpile. This is in accordance with the international Chemical Weapons Convention ratified



The Pueblo Chemical Agent Destruction Pilot Plant at the Army Pueblo Chemical Depot in Colorado. *Image credit: U.S. Army PEO ACWA*

by the United States in 1997. Along with the Blue Grass Army Depot in Kentucky, the Army's Pueblo Chemical Depot is one of two remaining U.S. sites where such chemical weapons still reside. The munitions stored at the Pueblo Depot are World War II-era projectiles and mortars containing mustard, a toxic blister agent.

In 2002, the Army awarded a systems contract to the Bechtel Pueblo team to design, build, and operate the Pueblo Chemical Agent Destruction Pilot Plant (PCAPP) to destroy the munitions and eventually close the plant once the mission is complete. At the PCAPP, robotic equipment and other machines remove explosive components, drain the mustard agent with high pressure water, and chemically neutralize the agent. The resulting solution enters large tanks where bacteria—the same microbes used to treat sewage in wastewater treatment plants—consume the remaining organics. Then the biosludge byproduct is transported to a permitted disposal facility and water is captured and recycled back into the process. Meanwhile, a furnace heats the munitions' metal parts to 1,000°F, eliminating any remaining agent or explosive materials so they can be recycled. Finally, a robust air filtration system removes the other chemicals produced in the agent neutralization process before exhaust air is released from the facility, handling some 80 to 100 times the air flow of a typical residential heating, ventilating, and air conditioning system.

Maintaining uninterrupted power to the PCAPP facility is of critical importance to the safe, secure destruction of these munitions.

Project Background

By 2013, PCAPP construction was complete but much work remained for the Bechtel Pueblo team to ready the 85-acre plant for full operation. That year, the Army Corps' Huntsville Engineering Directorate conducted a power reliability risk assessment for the Depot. The study uncovered a looming challenge: if PCAPP and the Depot campus were to operate simultaneously at peak power demand, the site's existing electricity substation, with two 20-megavolt-ampere (MVA) transformers, would be insufficient to satisfy both loads. The Depot would need at least 10 additional MVA of capacity to meet the projected need and leave some room for future demand growth. This additional capacity would require a new electrical substation and transformer.

The Huntsville PEO ACWA team considered various options for acquiring the new substation. Procurement through the Army Corps' Omaha District would involve a lengthy acquisition process, which the program wanted to avoid in order to keep PCAPP's mission on track. A much more efficient option, they realized, would be to award a UESC to the Depot's local electric utility, BHE, which owned the original substation and was already familiar with the site and its energy usage. The program turned to the Army Corps UESC team at Huntsville's Energy Division to execute the firm-fixed price order under BHE's General Services Administration (GSA) Areawide Contract.

BHE presented its feasibility study/ investment grade audit in late 2015. Huntsville awarded the \$9.2 million UESC order in March 2016, with a target completion date just six months away. Although this would be BHE's first UESC project, the utility brought in an experienced energy service company, Energy Systems Group (ESG), for technical analysis and project integration and management, as well as ESG's subcontractors Hooper Corp., Sebesta, Inc., and Electrical Power Systems for other crucial aspects of the project.

The existing BHE-owned substation, fed from the grid by 115-kilovolt (kV) transmission lines, in turn supplied power to multiple 13.8-kV feeder circuits. These feeder lines provided power to the PCAPP facility and the Depot campus, including a firehouse and pump station. The plan was to intercept and reroute those two feeder lines to the new substation, which would be equipped with a 20-MVA transformer—double the capacity identified in the power reliability study. The Army would own, operate, and maintain the new substation, complete with a new control house and independent switchgear, which would serve the Depot campus. BHE would continue to own and maintain the existing substation, which would now serve the PCAPP load via a different, pre-existing 13.8-kV feeder.



A new 20-MVA transformer installed on a foundation. As part of the new substation, it ensures power supply to the Depot campus. *Image credit: Billy Swinnea, ESG project manager for the Depot substation UESC.*

¹ Originally quoted in Debra Valine, "Huntsville programs team up to ensure power for chemical demilitarization operations in Pueblo," press release (Huntsville, AL: U.S. Army Engineering and Support Center, 6 September 2016).

Project Execution

On the first weekend in September 2016, the new substation was in place and ready for switch-over: first the Depot line, then the PCAPP line, using multiple backup generators in the process. The precise timing of each step was critical to ensure no loss of electricity to PCAPP, its data collection system, and other loads.

The project teams were able to perform both circuit switch-overs with no loss of power, meeting the ambitious six-month completion deadline, allowing PCAPP to begin the pilot testing phase for its agent-filled munition destruction activities. (The PCAPP Explosive Destruction System, separate from the main plant, had already destroyed mustard-filled containers unsuitable for the automated neutralization and biotreatment process, beginning in 2015.) As of September 2020, PCAPP has destroyed 65% of the 2,600 tons of mustard agent stored at Pueblo and is on pace to eliminate the entire stockpile by Congress' legislative deadline of December 31, 2023, with time to spare.

Executing this project in such a short timeframe took constant communication and coordination among the Army Corps, BHE, and Bechtel teams working to implement the solution, with a spirit of safety always at the forefront. "Installation required a lot of coordination," said Lisa Harris, then Army Corps Huntsville's UESC program manager. "We had to execute critically timed power outages and coordinate outages with the installation and the PCAPP contractor, Bechtel, to assure there were no mission impacts."¹

Benefits of Using a UESC

Using a UESC for the Army Pueblo Chemical Depot substation project was advantageous for both the Army and BHE. For the Army, the UESC enabled PEO ACWA to quickly make needed upgrades to its electrical infrastructure and more expeditiously carry out its chemical destruction mission. There is now a clear separation of Depot power and PCAPP power. With the new switchgear, in the event of a fault, the Depot can isolate and fix any problem loads

while restoring power to those remaining. Additionally, because a UESC allows the customer to pay for an entire project once completed, PEO ACWA funds paid all project costs at substation completion and the government avoided paying long-term interest on financing.

On the utility side, BHE further developed its relationship with a federal customer and gained valuable experience from performing its first UESC. Building on the success of this project, BHE began to pursue UESCs with other customers. In 2019, the utility refreshed its Areawide Contract with GSA.

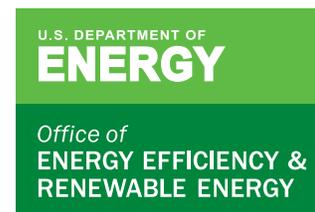
Conclusion

Established in 1942, the Pueblo Chemical Depot has stored mustard-filled munitions since the late 1950s. Thanks to the dedication to mission and safety shown by teams from the Army Corps, Bechtel, BHE, ESG, and their subcontractors, using state of the art technology and a modern contracting vehicle, the last of these chemical weapons are on track to be destroyed ahead of schedule.

Learn More

The U.S. Department of Energy's Federal Energy Management Program provides information about how federal agencies can work with their serving utilities to execute energy projects, including through UESCs, at energy.gov/eere/femp/utility-energy-service-contracts-federal-agencies.

For questions about UESC technical assistance, contact Tracy Niro at 202-431-7601 or Tracy.Niro@ee.doe.gov.



For more information, visit: energy.gov/eere/femp

DOE/EE-2326 • February 2021