Defying the Odds

Given a less than 1 percent chance of meeting its treaty deadline, a project team safely destroys more than 220,000 munitions.

By Keith Jackson II

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HOLDING MORE THAN 220,000 AGING AND DECAYING WEAPONS CONTAINING 7.4 MILLION POUNDS (3.4 MILLION KILOGRAMS) OF VX, SARIN AND MUSTARD GASES, THE UMATILLA CHEMICAL DEPOT FACILITY COULD BE A DANGEROUS PLACE.

The Hermiston, Oregon, USA site held 12 percent of the U.S. chemical weapons inventory, one of the largest stashes in the country, created for use in previous wars. Under a disarmament treaty signed by 188 countries, the project team at the Umatilla facility was tasked with safely destroying the stockpile by 29 April 2012.

Recognizing the great risk and complexity of the project, the U.S. Army brought in the engineering firm URS. Even with the company’s extensive chemical demilitarization experience, it was still a “massive undertaking,” says Steven Warren, PhD, project general manager at URS.

And the team would be completing the project with the world watching. Along with international treaty inspectors on site, Oregon’s Department of Environmental Quality set up an office near the facility to monitor compliance.

SAFETY CHECK

Given the dangers inherent to dealing with such volatile weapons and chemicals, URS knew it had to make safety a priority. Any slip-up could have serious—even deadly—consequences, from sarin gas and VX nerve agent polluting the surrounding environment to a munitions fire scorching the landscape.

To reduce these significant risks, the team packaged each nerve agent into different “campaigns,” during which only the designated chemical could be incinerated. For instance, from September 2004 to July 2007, only sarin agent munitions were destroyed.

“Creating campaigns helped us in terms of safety, because it allowed us to always know what was being incinerated,” says Laura Jendro, PMP, life cycle manager at URS. “When dealing with such volatile chemicals, it is extremely important to have that transparency.”

Safety aspects were featured prominently at meetings to reinforce this critical focus, and the team added prominent signage around the facility. One sign contained a “safety message of the day” and safety statistics, such as the number of hours since the last work injury.

Project leaders also established an Operational Readiness Review board comprised of staff from the Centers for Disease Control, the U.S. Army Chemical Materials Agency (CMA) and other URS chemical demilitarization sites across the country, as well as other technical experts. The group helped ensure the site had the systems and processes to safely process the weapons in compliance with regulations.

“It let us know where we were succeeding and where we needed to get better,” says Dr. Warren. For example, the board confirmed that plant equipment, personnel and procedures were tested and fully capable prior to initiating munitions destruction operations.

Despite the extensive safety precautions, in March 2010 a worker ignored protocols and was exposed to mustard agent. It could have been a fatal mistake, and even though the worker suffered only...
minor injuries, URS and the U.S. Army shut down the site for a month as they investigated. At the same time, the URS team conducted a thorough root-cause analysis, convened a meeting of the review board and implemented corrective actions. “The shutdown ended up helping us,” says Peggy Zipperer, PMP, project controls manager, URS. “It made the possibility of something happening real, instead of just a ‘what-if.’”

In response, a new department was created to identify potential risk behaviors. The specialists assigned to the new department observed toxic entry performance to ensure employee safety and provide feedback to improve performance. These specialists were also empowered to escalate problems to management. The move was so successful that Umatilla’s sister site in Pueblo, Colorado, USA created the same department.

IN A CRUNCH

The weapons disposal process started on 8 September 2004. One year later, projected budget increases at the facility and its sister sites forced the CMA to restructure the timelines for all remaining campaigns. Based on demonstrated processing rates at three other chemical demilitarization sites, Umatilla’s project completion date was estimated to be 17 May 2014. The CMA risk models showed the site had less than a 1 percent chance of meeting the treaty deadline two years earlier.

The URS project team faced the challenge head-on, looking at every possibility that allowed for a safe shortening of the schedule. “The team really pulled together,” Ms. Zipperer says. “We looked at each campaign individually—what opportunities were there, what needed to be done, what could be shortened, what could be done early—and put together a plan to shorten each campaign.”

In one case, for example, the team figured out a new—and more effective—way of dealing with the caked mustard agent that gathered at the bottom of storage containers. Normally, the team would break up the hardened mass with high-pressure water, forming a waste called rinsate mixture, which was then put back into the containers for incineration.

But regulations limit the amount of rinsate incinerated to approximately 40 gallons (151 liters), and the volume of mustard agent on site would require twice the number of containers the facility had. Instead, the team created a system that pumped the leftover rinsate into a liquid incinera- tor, eliminating the need for extra containers.

The process improvements didn’t end there. The team conducted daily, weekly and monthly scheduling meetings that covered everything from critical path analysis to scope changes—all in an effort to keep the project on track and avoid violating the treaty.

NO GUTS, NO GLORY

Completed nearly six months ahead of the treaty deadline and millions of dollars under budget, the initiative was honored as the 2012 PMI Project of the Year. In the end, URS destroyed 155,543 sarin or GB nerve agent munitions, 2,635 ton containers of mustard blister agent and 62,426 VX nerve agent containers. And even with the mustard gas incident, the team closed with a remarkably low injury rate, all the more impressive given the risk-laden sector the site was working in.

“Destroying the munitions is a fantastic accomplishment and something we are all extremely happy about, but to do it safely with all the pressure we had is simply phenomenal,” says Steven Warren, PhD, URS, Hermiston, Oregon, USA.

To mitigate the risk of using staff with little background in the sector, project leaders hired most of the workforce a year earlier, and immediately started training. “We had mockups of most of the things they’d be doing, and allowed them to actually do their job in a dry run,” says Steven Warren, PhD, URS, Hermiston, Oregon, USA.

For example, team members responsible for weapons incineration simulated the proper way to start up, operate and turn off the machines. That early learning enabled a smooth transition for the team at the outset of the project, helping workers become comfortable with their positions and safety measures.

“[That year of training allowed the team to realize] what needed to be done, how to do it and, most important, how to do it safely,” says Laura Jendro, PMP, URS.