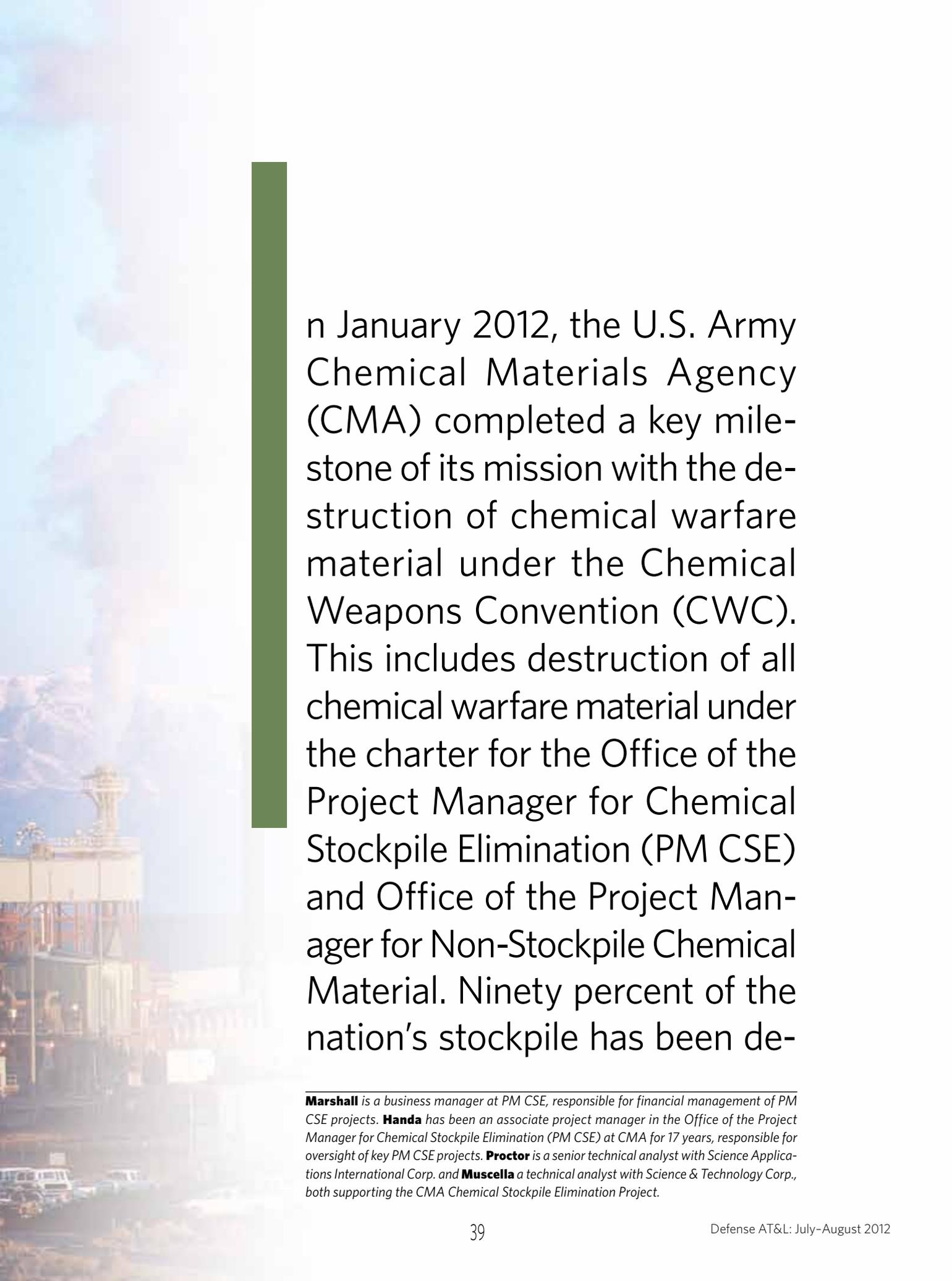


# Success in Chemical Weapons Stockpile Elimination: The Intersection of Risk and Vision

*Larry Marshall ■ Om Handa  
Lisa Proctor ■ Janice Muscella*





n January 2012, the U.S. Army Chemical Materials Agency (CMA) completed a key milestone of its mission with the destruction of chemical warfare material under the Chemical Weapons Convention (CWC). This includes destruction of all chemical warfare material under the charter for the Office of the Project Manager for Chemical Stockpile Elimination (PM CSE) and Office of the Project Manager for Non-Stockpile Chemical Material. Ninety percent of the nation's stockpile has been de-

---

**Marshall** is a business manager at PM CSE, responsible for financial management of PM CSE projects. **Handa** has been an associate project manager in the Office of the Project Manager for Chemical Stockpile Elimination (PM CSE) at CMA for 17 years, responsible for oversight of key PM CSE projects. **Proctor** is a senior technical analyst with Science Applications International Corp. and **Muscella** a technical analyst with Science & Technology Corp., both supporting the CMA Chemical Stockpile Elimination Project.

stroyed. The agency has a remaining mission to complete the environmental closure of the last four of seven chemical demilitarization facilities. This is a significant achievement and a great opportunity to reflect on the successes and lessons learned and to highlight those strategic changes in contracting at the last four facilities that helped reach this milestone 3 months prior to the treaty deadline and at a projected cost avoidance of \$5.7 billion to the taxpayer. These four facilities destroyed more than 75 percent of the total stockpile eliminated.

### **Scope: Rapidly Changing Requirements and Initial Costs**

Destruction of the U.S. chemical weapons stockpile of more than 30,000 tons of lethal liquid chemical agents stored in 3.3 million munitions and bulk containers was a formidable challenge for the Army. In 1986, when Congress authorized disposal of the nation's aging and deteriorating stockpile, there were many unknowns about the condition of the munitions and chemical agents they contained. This venture would be the first of its kind. The entire spectrum of federal, state, and local environmental requirements applicable to the site stockpiles was undefined, destruction technology at full scale was not proven, and little industrial experience existed for the task, beyond that gleaned from the Army's research and development facilities.

As is typical at the beginning of a program's acquisition life cycle, scope based on initial requirements, maturity of technologies or best available technologies, cost, funding, and schedule estimates were still being defined. At the outset, the government defined requirements in broad prescriptive terms and played a significant role in determining how contractors would operate to meet initial program and contract requirements. Initial cost estimates for the destruction of the chemical weapons stockpile in 1986 were \$2.1 billion. At the time, only the government held expertise and technology related to chemical agent munitions and demilitarization operations. This knowledge was based, in part, on pilot operations at the government-owned/government-operated Chemical Agent Munitions Disposal System (CAMDS) in Tooele, Utah, as well as operations previously conducted by the Army.

The contracting acquisition strategy for the first full-scale facility, Johnston Atoll Chemical Agent Disposal System (JACADS), deliberately administered and awarded separate contract vehicles for design; facility construction; equipment acquisition, installation, and systemization; and project operations. In the early 1990s, as construction and testing (systemization) was being completed, the Army estimated a life cycle cost increase of the program to \$6.5 billion. Design and testing of incineration-based chemical demilitarization facilities within the continental United States (CONUS) were ongoing, with ever-increasing changes in legal and environmental requirements, mission requirements, public concerns, and available acquisition strategies. Multiple, competing contract awards were intended to encourage competition. However, they diminished the

desire and efficiency of contractors to work together and contributed to cost and schedule growth.

### **Challenges and Lessons**

Based on lessons learned at JACADS, the Army determined that all aspects of each CONUS site's construction, systemization, operation, and closure would be awarded to a single systems contractor. Design of all of the incineration-based facilities would be awarded to a single contractor, to ensure design continuity and uniformity among the sites. This approach was followed for all future sites, starting with the systems contract award for the Tooele Chemical Agent Disposal Facility in September 1989.

In compliance with Public Law 102-484, the Army in 1994 established the Alternative Technologies and Approaches Project (ATAP), primarily aimed at the two sites that only stored bulk containers of chemical agents. The ATAP acquisition strategy also combined responsibility for all life cycle phases for these two demilitarization facilities—design, construction, systemization, operations, and closure—into a single system contract. This approach, as well as that for the four incineration-based facilities, would act as the precursor to the final life cycle contracting approach implemented at all CONUS sites.

In 1997, as the United States signed onto CWC, an international treaty requiring 100 percent destruction of chemical agent munitions by April 2007 (later extended to April 29, 2012), challenges to the program continued to emerge and escalate. With each of the four incineration-based facilities in a different phase of its life cycle (construction, design, installation, testing, or startup), the Army continued to face integration issues among the systems contractors; this led to further schedule slippages and continued program cost escalation. Increased environmental activism, litigation, and tightening of Environmental Protection Agency (EPA) standards and state regulations also contributed significantly to delays. The problem was exacerbated by overly aggressive program assumptions, first-of-a-kind processes, and worsening condition of the aging stockpile. Changing requirements and stakeholder expectations led to modifications to the design of the plants and equipment leading to frequent contract changes, and cost and schedule growth. At this point, the project cost had soared to approximately \$24 billion, and was under very high levels of scrutiny by both Congress and the General Accountability Office.

As late as 2006, there was minimal likelihood of meeting the extended CWC deadline of April 29, 2012. It was at this point that the Army identified the need to have a life cycle focus and to motivate multiple systems contractor(s) to work collaboratively and aggressively while maintaining highest levels of safety and environmental focus.

### **Change Requires Change: Contracts, Award Fees, Incentives**

Moving toward a life cycle approach allowed the project manager to motivate the systems contractor with additional profits

through increased efficiency. One of the first strategic changes the project manager implemented was to develop and use a risk-based schedule and cost model. Based on historical processing rates and identification of program risks, PM CSE was able to develop the best, most reliable, and most auditable schedules and costs.

In 2006, PM CSE decided to establish life cycle schedules and use them as the basis to negotiate required systems contractor resources, target cost, and fee pools. Life cycle contracting placed responsibility of the entire process from operations through closure on the systems contractors, in lieu of annual levels of effort negotiations, as had been done in the past. This redirected responsibility was the only way to achieve agent destruction by the CWC deadline.

Cost-reimbursable contracts continued to be the most appropriate vehicle for completing the remaining operations and closure of these projects, due to many remaining technical, regulatory, and political risks; the lethal nature of the chemical munitions; and the congressional mandate for maximum protection of the workforce, the public, and the environment. It was not possible to define the scope sufficiently to use fixed fee-type contracts.

With congressional support, CMA was able to put in place multiple performance incentives on contracts, to encourage timely and cost-effective completion of operations and closure of facilities, while maintaining the highest levels of safety and environmental compliance. Award fees are a critical part of the contracts and encompass safety, environmental compliance, cost, schedule, and management—with a significant emphasis on safety and environmental compliance. The project manager had two key incentives for schedule acceleration. The CWC requires all signatories to destroy all chemical weapons no later than April 29, 2012. In addition, Congress passed the CWC Implementation Act of 1998 to reinforce the U.S. commitment to destroying the stockpile. Moreover, each of the four incineration-based facilities has contract values of \$10 million–\$20 million per month; early completion of operations and closures would result in significant program cost avoidance.

Initially, from 2005 to 2007, a CMA director's programmatic performance-based incentive (DPPBI) was established to augment the award fee incentives. The DPPBI was a means to encourage the systems contractors operating the four incineration-based facilities to collaborate and use their combined expertise to mitigate programmatic risks, including actively sharing lessons learned. However, there was still concern that even with the DPPBI, the four incineration-based facilities might not meet the final CWC milestone.

Using the scheduling tools available to the project manager, it was determined that the confidence to meet the CWC deadline was 19 percent at best at one site and less than 10 percent for the remaining three incineration-based facilities.



**With each of the four incineration-based facilities in a different phase of its life cycle, the Army continued to face integration issues among the systems contractors.**

Significant action had to be taken to meet the revised CWC date of April 29, 2012. To increase the probability of meeting the treaty deadline, the project manager proposed a significant schedule incentive approach, with a focus on accelerating chemical agent munitions disposal operations and closure of the facilities. In 2007, with the passage of Public Law 109-364, the John Warner National Defense Authorization Act, Section 923, CMA incorporated additional incentives into the contracts without delay.

The schedule incentives placed strict performance milestones on the contracts with April 29, 2012, as the key end of operations milestone. The investment of the maximum payout would be offset by the resulting schedule savings and other program cost savings as a result of finishing early. At the time the incentives were put into place, the project had a program estimate of \$24.3 billion. As of January 2012, all four of the incineration-based facilities on which the incentives had been placed have completed operations and the current program office estimate is \$18.6 billion, resulting in a projected cost avoidance of \$5.7 billion.

### **Blueprint for Success: Expectations, Motivation, Integration of Commercial Solutions**

Congressional support in allowing the use of an incentivization approach had a measurable and highly positive impact on the schedules without sacrificing safety or environmental compliance, and consequently in achieving project success at significantly lower cost in meeting the CWC deadline. This is due, in no small part, to the four core operational evaluation expectations put in place—safety, compliance, reliability, and margin—as well as the use of compliance assessments, performance improvement, and integration methodologies. This new strategy set the stage for the synchronization of the government and systems contractors' goals.

Motivation for the systems contractors to meet or beat defined milestones became a paramount force that led to their adoption of safe, innovative, commercially available technologies in order to continue to reduce schedule risk and meet the CWC target date. Prime examples were the pursuit of explosive destruction technologies to process non-standard, problematic munitions; additional available technologies and alternatives to destroy the nerve agent tabun (also known as agent GA) and blister-agent L; and heel-transfer systems to facilitate the processing of heels in the ton containers that were otherwise proving very difficult to remove.

Alternative solutions were not only chosen to meet programmatic milestones, but also for the quickest reduction in overall risk and added safety to the workers, public, and the environment. Safety has always been the cornerstone of this project, something that would never be compromised. Despite highly hazardous operations being routinely conducted with lethal chemicals, the contractors were able to accomplish recordable injury rates at levels comparable to those of public libraries while finishing ahead of the contract schedule. In addition, each of the four demilitarization facilities achieved the Occupational Safety Health Administration's (OSHA) Voluntary Protection Program-Star Status. This is OSHA's highest recognition, given only to companies with comprehensive safety programs and injury and/or illness rates at or below the national average for their industry. Approximately 0.2 percent of companies in the United States receive this recognition.

The largest decrease in risk to the public occurred with the elimination of all sarin (agent GB) rockets on May 19, 2007. The destruction of the chemical weapons stockpile at the

last four incineration-based facilities resulted in the complete elimination of public risk to the communities surrounding the facilities.

### Success

In January 2012, the project manager for chemical stockpile elimination, along with the systems contractors and primary stakeholders, completed the safe elimination of the entire stockpile that the project manager was chartered to destroy approximately 3 months ahead of the CWC deadline and at a projected cost avoidance of \$5.7 billion to the program and to the taxpayer. Table 1 shows the number of months each site is projected to complete closure ahead of the 2005 program office estimate.

**Table 1.**

Site	Number of Months
Anniston Chemical Agent Disposal Facility	39
Pine Bluff Chemical Agent Disposal Facility	31
Tooele Chemical Agent Disposal Facility	36
Umatilla Chemical Agent Disposal Facility	45

In conclusion, the introduction of the new contracting strategy and use of the life cycle contracting approach, with congressional approval of the schedule incentive program, resulted in a significant and measurable success on this program. 🏆

*The authors can be reached at [lisa.proctor@saic.com](mailto:lisa.proctor@saic.com).*



## Where Can You Get the Latest on the Better Buying Power Initiatives?

- **BBP Gateway (<https://dap.dau.mil/bbp>)** is your source for the latest information, guidance, and directives on better buying power in defense acquisition
- **BBP Public Site (<https://acc.dau.mil/bbp>)** is your forum to share BBP knowledge and experience