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Lessons Learned on Uranium Processing Facility Infrastructure Completion

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The Y-12 National Security Complex has a long history in the research, development and production of uranium enrichment and processing. The majority of the existing facilities in the complex are over 70 years old. A new Uranium Processing Facility (UPF) project was authorized to be constructed by the Department of Energy's National Nuclear Security Administration (NNSA). The overall project has been divided into seven sub-projects with the first two being site infrastructure upgrades.

NNSA decided to partner with the US Army Corps of Engineers (USACE) to contract and manage the first two sub-projects. Through a cooperative process, the two agencies developed an Interagency Agreement along with detailed interface procedures to manage the site upgrade projects. The result of this partnership was the successful completion of these projects ahead of schedule and millions of dollars under budget. Numerous lessons learned were generated from this NNSA/USACE partnership, and are provided in this bulletin.

Discussion:

Background

The Y-12 National Security Complex, as a part of the Manhattan Project, was one of the first locations selected during World War II for research and production of materials for an atomic bomb. Ground was broken in February 1943 to construct the first production facility, and within 13 months, operations began to enrich uranium for the weapons that eventually ended the war. At its peak in 1945, more than 22,000 workers were employed at the site. Since that time, the role of Y-12 has changed from uranium enrichment to the processing of uranium. Currently Y-12 plays a key role in (1) the manufacture, processing and storage of special materials; (2) providing uranium for naval nuclear reactors and medical research; and (3) contributes to the prevention of the spread of weapons of mass destruction through its role in weapons surveillance and nuclear non-proliferation.

Despite playing a continued role in the nuclear weapon and medical search arenas, most of the Y-12 facilities are over 70 years old. In order to modernize these facilities, the Department of Energy, through the National Nuclear Security Administration (NNSA) has authorized $6.5 billion for construction of the Uranium Processing Facility (UPF). This project will provide new facilities that are safe and code-compliant to continue long term operations at Y-12. In preparation for construction of UPF, NNSA and the Army Corps of Engineers (USACE) partnered to upgrade the infrastructure that will support the new facility.

Discussion

The UPF project is being managed in seven sub-projects: Site Readiness; Site Infrastructure & Services; Substation, Mechanical/Electrical building; Salvage & Accountability Building; Main Process building; and Process Support Facilities. The first two sub-projects were successfully completed by the NNSA/USACE partnership to upgrade the infrastructure for the main UPF campus.

The first sub-project for Site Readiness was authorized by NNSA in early 2013 for $65 million. The scope included relocating the main Y-12 roadway, waterlines and electrical services; building a construction haul road and corresponding bridge overpass; and preparing spoil areas to receive excess soils from the main complex construction activities. The second sub-project for Site Infrastructure & Services was authorized in March 2015 for $78 million. The scope of work included construction of a Concrete Batch Plant and a Construction Support Building, installation of haul road security features, plus additional site grading and building/utilities demolition.

To perform the first sub-project, NNSA developed an alternative acquisition strategy, which used a comprehensive NNSA/USACE Interagency Agreement. Partnering meetings were held between the two agencies to define interfaces, clarify expectations and understand each other's governing procedures. An agreement, specifically for the UPF project acquisition and construction, was prepared focusing on a long-term relationship. One aspect of the agreement was for NNSA to participate in the USACE source selection board for the Site Readiness solicitation. NNSA was able to provide valuable insight on Y-12 political, ecological and operating conditions that would assist in selection of the best subcontractor. In April 2013, USACE awarded a fixed-unit rate contract for half of the scope to AVISCO Inc., a woman-owned small business.

Challenges were quickly discovered including how to efficiently integrate USACE and the Management & Operations (M&O) contractor efforts. Both parties were used to performing in accordance with their own internal practices and procedures. Eventually, NNSA hired two employees (including a sub-project director) to work directly on this project, to develop detailed interface procedures and to ensure that USACE and the M&O complied with the procedures. The second challenge was the alignment of expectations between NNSA and USACE. NNSA expected USACE to have a full time project manager and a quality assurance representative on site, as well to provide weekly status reports, schedule updates and daily quality assurance reports. The Interagency Agreement was modified several times to reflect these expectations. USACE increased the supervisory and administrative charges from typical 6% to 20% of the subcontract award value.

After working through the above challenges, the team completed the Site Readiness sub-project in February 2015, on schedule and more than $20 million under the total authorized cost earning the project numerous awards including Secretary of Energy Achievement Award, NNSA Environmental Stewardship Award and the Tennessee Chamber of Commerce & Industry Award.

This success led to approval of the second sub-project. NNSA again used USACE through the Interagency Agreement to contract and manage the construction activities. USACE awarded two fixed unit rate contracts for most of the scope including a design-build contract for the Construction Support Building. Again, there were challenges on this sub-project, but the team completed the scope in February 2018, ahead of schedule and more than $18 million under budget.

Conclusion

The DOE's NNSA and the US Army Corps of Engineers partnered over the past five years to upgrade the Y-12 National Security Complex infrastructure. Two sub-projects were successfully delivered using a project specific Interagency Agreement with clearly defined interface procedures. The partnership delivered safe, quality construction deliverables ahead of schedule and millions of dollars under budget. These activities positioned NNSA for starting the successful execution of the remaining five sub-projects at the Uranium Processing Facility. The lessons learned during the project can provide valuable insight for future effective interagency partnerships.

Recommended Actions:

Lessons Learned:

The following lessons learned actions were identified as a result of completing the Site Readiness and Site Infrastructure & Services projects at the Y-12 National Security Complex:

- **Leadership Continuity** – the continuity in leadership of an interagency partnership is extremely important. Both NNSA and USACE leadership remained fairly consistent during the UPF Site Readiness and Site Infrastructure & Services sub-projects, including the NNSA construction manager and the USACE resident engineer. Key members of both sub-project teams were also consistent, including the NNSA construction integrator and the USCE project manager. Although contracting officers transitioned several times during the five years, their focus remained on supporting the main effort with minimal administrative delays.
- **The Prime project manager must coordinate planning and construction activities** – the NNSA Federal Sub-Project Director (FPD) led and coordinated all efforts during the planning and construction, especially when

the Integrated Project Team included multiple partners and stakeholders. Clearly defined roles, responsibilities and authorities empowered team members, while the encouragement of leadership facilitated optimum performance.

- **Build flexibility into project schedules** – Construction schedules demanded flexibility and agility to make timely, informed decisions. The FPD must have the contractual authority to enforce requirements and expectations, and must communicate expectations in a manner that they cannot be misunderstood. The individual also should encourage regular, honest feedback to facilitate open communication and understanding.[1]
- **Visit similar projects for lessons learned** – NNSA facilitated a USACE visit to the Pantex site in Texas, where the same partners were engaged in similar activities. The team returned to Y-12 with eighteen actions based on lessons learned from the Pantex site.

Additional lessons were learned from the first sub-project, Site Readiness, and were applied during the second sub-project, Site Infrastructure & Services, including:

- Require NNSA and design authority participation in the USACE-led Construction Support Building design meetings with detailed minutes, action items and target completion dates.
- Require formal design authority concurrence with USACE design deliverables at key milestones (30%, 60%, 90% and final design).
- Formalize the USACE contract submittal process, including reviewing and concurring on the Submittal Register, defining specific submittals requiring design authority concurrence, and incorporating approved submittals into the project record.
- Execute weekly status, schedule and interface meetings led by NNSA FPD
- Require "by Name" reporting of labor charges to the USACE Interagency Agreement
- Execute a comprehensive Transition & Turnover Plan for the 14 distinct infrastructure systems that interface with Y-12.

Critical Decision(s):	CD-1, CD-2, CD-3
Facility Type(s):	Non nuclear construction facilities
Work Function(s):	Project Management, Engineering, Construction/Operations
Technical Discipline(s):	All

References:

1. Peters, Richard Jr, Branton, Courtney, Cravens, Jeff, "The Tennessee Manhattan Makeover: An Interagency Infrastructure Initiative", The Military Engineer, Society of American Military Engineers, Volume 111, January-February 2019.
2. "USA's uranium processing facility achieves site readiness", World Nuclear News, March 17, 2015.
3. "Y-12 History", https://www.y12.doe.gov/about/history, 2019 Y-12 National Security Complex.