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Lessons Learned from Applying Caps to Contracts

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In recent years, the Department of Energy has applied financial limits or "cost caps" to contracts that exhibit significant contractor cost growth and/or schedule delays with the intent of limiting the financial liability of the government as the project, or phase of a project, is completed. Two projects that both had a cap applied to their contract will be explored in this lessons learned bulletin. The two projects are: the Separations Process Research Unit (SPRU) project in Niskayuna, New York and the Integrated Waste Treatment Unit (IWTU) project, formerly known as the Sodium-Bearing Waste Treatment Facility (SBWTF), in Idaho Falls, Idaho.

Following the application of a cost cap to their contracts, each project had project execution issues which caused significant cost growth and schedule delays as the work was executed. This led to the DOE Office of the Inspector General (IG) to perform audits of the projects and then generate audit reports describing the events which caused the cost overruns. This bulletin provides lessons learned on the practice of applying cost caps to contracts and the unintended consequences that can result.

Discussion:

Background

SPRU PROJECT - The Separations Process Research Unit (SPRU) was a set of inactive radiological facilities located at the Knolls Atomic Power Laboratory in Niskayuna, New York. Constructed in the late 1940s, the SPRU facilities included a process research building, a waste processing building with associated underground waste storage tanks, and several interconnecting tunnels. The mission of SPRU was to perform research on the chemical process involved in extracting plutonium from irradiated material. Although the process equipment was drained and flushed when the facility was shut down in 1953, residual radioactive material was left in the buildings, tunnels and tanks. In September 2007, the DOE Office of Environmental Management (EM) set forth its plan to decontaminate and remove SPRU's buildings, tanks and equipment, dispose of the resulting waste and contaminated soil, and return the area to the Office of Naval Reactors for continuing mission use. In December 2007, EM awarded a $67 million cost-plus-incentive-fee task order to a contractor, URS Energy & Construction, Inc. (now AECOM) to complete the decontamination and decommissioning (D&D) activities by November 4, 2011.

IWTU PROJECT - The Integrated Waste Treatment Unit (IWTU), formerly known as the Sodium Bearing Waste Treatment Facility, is a first-of-a-kind facility designed and built to treat 900,000 gallons of liquid waste currently stored in underground waste tanks at the Idaho National Laboratory. IWTU uses a steam reforming technology to convert the sodium bearing liquid waste into a solid, granular material that can then be loaded into stainless steel containers and stored in concrete vaults at the site. Regulatory milestones for completion of the processing of this waste were implemented in the October 1995 Settlement Agreement between the state of Idaho, the U.S. Navy, and the DOE that required completion of treatment by December 31, 2012. Following treatment, as required by the Resource Conservation and Recovery Act (RCRA), the waste tanks were to be removed from service by December 2014.

Discussion

SPRU PROJECT – In 2010, two radiological events occurred at the SPRU site including the airborne release of radioactive particulates from open air demolition in September, and the release of approximately 600 gallons of radioactive water into the Mohawk River due to a failed sump pump in October. The Environmental Protection Agency determined that the National Emissions Standards for Hazardous Air Pollutants (NESHAPS) were violated for failure to operate the demolition consistent with good air pollution control practices. The U.S. Environmental Protection Agency issued a Notice of Violation (NOV). As a result of the NOV, a temporary halt to D&D activities was ordered, and a change in D&D

strategy was instituted. Instead of completing the demolition of H2 buildings in open air, the NOV required the contractor to construct large temporary enclosures with HEPA air filtration over Buildings H2 and G2 demolition activities to prevent further airborne release. DOE negotiated a task order change with the contractor, estimating that the contractor could construct the enclosures and complete the task order's scope of work at a total cost of $145 million. The terms of the February 2011 task order modification required that the DOE and the contractor share project costs between $105 million and $145 million equally, with the contractor paying all of costs above $145 million. This cost-sharing arrangement effectively placed a $125 million cap on the Department's financial responsibility for the contract work scope. Even with the radiological release and new D&D strategy, both parties agreed to a schedule completion date of December 31, 2011, only 2 months later than the original date agreed to in 2007.

Additional factors affected the cost and schedule of the SPRU project. In 2011, a hurricane and a tropical storm dropped significant amounts of rain which caused destabilization of the hillside on which the SPRU facilities were built. The project again had to stop D&D activities to stabilize the hillside, increase the drainage system capacity, and other hillside repairs. As of June 2018, the demolition portion of the project has been completed. Waste disposition and final site grading will be completed by September-October 2018. To date, the contractor has invoiced DOE more than $427M, estimating that its total project cost will be approximately $460M. DOE has authorized payment of approximately $180M, accounting for additional out of scope work above the $145M cap. AECOM has submitted claims for an additional $100M, but no agreement has been reached as the parties continue in alternative dispute resolution.

Once the contractor exceeded the cost cap, oversight of the project became problematic. Despite being required by the contract, the project has not had a baseline since 2011. Numerous requests for additional funds submitted by AECOM were denied by DOE citing the cost cap. Since the parties could not agree on who was responsible for the cost increases, they were also unable to agree on a baseline. Without a baseline to track, oversight of the project's costs has been severely limited. The project schedule was impacted after the cost cap was reached. At that point, the contractor looking to limit its monthly cash flow worked at its own pace. There was no urgency to proceed, and in multiple correspondence with DOE cited lack of funding as an issue to applying resources to complete work scope. In fact, at one point the contractor ceased activities on critical path D&D scope to allow for cost increases to be resolved. There was no remedy such as a penalty or other enforceable action that DOE had to force schedule acceleration. Costs then, from a DOE oversight perspective, increased significantly due to the project schedule being delayed. Oversight costs are anticipated to exceed the original baseline amount by $18M due to the increased schedule. Another factor that contributed to cost increase was that contaminated water could not be treated onsite for a period due to the contractor's treatment facility not being operational, and had to be shipped offsite. Finally, in the last two years, waste uncovered in 2015 was designated as transuranic (TRU) waste and deemed to be managed as contact-handled and remote-handled TRU. This waste has a disposition path to the Waste Isolation Pilot Plant in Carlsbad, New Mexico, however, due to the WIPP shutdown and a backlog of TRU waste across the complex, the project completion will be further delayed.

IWTU PROJECT – The initial baseline cost for the design and construction of IWTU was $461M approved in December 2006. Due to significant cost increases resulting from the design and construction phase, DOE approved a revised baseline in January 2009, at a cost of $571M with a completion date of August 2011. From April – November 2010, the contractor made several funding determinations, transferring $13.1M to other non-project operations accounts from the $571M baseline cost. Finally in December 2010, to address cost overruns due to performance issues, the DOE negotiated a contract modification where it placed a cost cap of $571 million for the construction of the facility. The contractor was financially incentivized to complete the facility under the cost cap, however, the contractor was responsible for all project costs exceeding the cap. All operating costs were fully reimbursable and not subject to the cost cap, and began after construction was declared complete.

In August 2010, the project made a decision to substitute a lower temperature test using heated nitrogen gas rather than performing the originally planned liquid waste simulant high temperature comprehensive test prior to declaring that construction and testing was complete. The comprehensive test was originally part of the project's key performance parameters to be done prior to the approval of Critical Decision (CD)-4, meaning the system was ready to

proceed into the operations phase. The facility operated well enough during the heated nitrogen gas test to declare that it was ready for operations. Therefore, in April 2012, DOE EM declared construction complete. In June 2012, the contractor initiated the high temperature comprehensive performance testing using a nonradioactive simulant to demonstrate full performance of the facility. Soon after starting this test, the facility experienced a serious "system pressure event" which led to the shutdown of the facility. In performing an investigation, it was determined that both operational and design deficiencies existed in the facility, and the system has been shut down since the event for modifications and repairs to the process.

Significant redesign and rework of numerous systems in the facility have occurred since the failed test. A Technical Review Group was established consisting of subject matter experts from National Labs, academia and industry to assist in providing review and advice. Additional engineering evaluations, bench scale testing, and modeling were undertaken to identify corrective actions. A pilot plant was designed and constructed to test and demonstrate the design changes. Much of the main process equipment was redesigned, fabricated, and replaced in the facility. Redesign and replacement of equipment continues into early 2018. The actual construction costs have been understated by several hundred million dollars due to all the redesign and rework that resulted from testing failures. If the full comprehensive testing had been performed prior to the DOE's approval of construction complete, the process would have failed, and the cost cap would have been exceeded. The contractor would have then been responsible for the costs that exceeded $571M and the cost cap would have worked as planned. In this case, however, the cost cap was not an effective tool.

Conclusion

In theory, cost caps applied to troubled contracts can be effective in limiting the financial exposure of the government, if properly applied. However, in the two cases discussed in this bulletin, the SPRU and IWTU projects, the cost caps were in fact, not effective and perhaps caused unintended negative effects.

On the SPRU contract, a cost cap (effectively agreed at $125M) was negotiated after a series of environmental issues occurred on the project. A new schedule completion date of December 2011 was approved that was only several months beyond the original baseline completion date of October 2011. The contract has not yet been completed as of early 2018, and the billed costs to the DOE are more than $427M with an estimate at completion of $460M. Several issues affected the work schedule which were beyond the contractor and the DOE control, including uncovering additional waste, as well as serious weather issues that physically affected the site. However, after the cost cap and new schedule were exceeded, the contractor worked at its own pace (stopping work for some periods) and could not come to agreement with the DOE on a new baseline cost or schedule limiting the ability of the department to track project status. No enforceable actions or incentives were included with the contract modification for the cost cap, and therefore, the DOE had no recourse to force faster action.

On the IWTU contract, a cost cap was implemented in December 2010 (agreed to $571M) during the design and construction phase to limit cost overruns that were occurring. During the end of plant construction, the parties agreed to shift the comprehensive test that was a key performance parameter for declaring the system was functional to the operations phase. As a replacement, a lesser test which did not take the system to full pressure or temperature was performed. This test was successful and allowed DOE to approve construction complete which ended the cost cap. When the full comprehensive test was performed in the operations phase, serious process issues arose showing the design would not work as specified. Significant costs for redesign, replacement of equipment, new testing including engineering scale and a pilot plant were developed that has driven the cost well beyond forecasts. This effort continues into 2018, as planned tests are still being done to validate system performance prior to the start of operations. In this case, the cap did not limit cost liability to the DOE and in fact, actual design and construction costs associated with rework have exceeded the cap by several hundred million dollars.

Recommended Actions:

Lessons Learned:

1. Maintain a baseline: DOE orders require the establishment of a baseline. When considering

a contract modification to implement a cost cap, ensure that a new baseline is established shortly thereafter, and include terms in the contract to enforce being able to get updated baseline schedules and cost to allow for oversight and monitoring. Utilize penalties or some enforceable action to ensure the Performance Baseline is established after the change and is maintained as the contract progresses.

2. Incentivize schedule adherence or acceleration: Even after a cost cap has been implemented, the contractor should be incentivized to maintain or accelerate schedule completion. This will limit or reduce the cost of oversight and ensure project has some sense of urgency to get to completion. It can also mitigate the effects of risk by uncovering unknown issues (e.g., additional waste, higher doses than anticipated, etc...) faster and then being able to develop a plan for correction without lingering effects.
3. Ensure the scope baseline is maintained as part of the overall PB: During negotiation of cost cap, ensure that clear and concise scope of work for completion of the contract exists and that both parties concur with the scope for finishing the task.
4. Address scope changes in a timely fashion: After a cost cap is implemented, if out of scope activities, or activities beyond the control of the contractor occur which impact the cost cap, then both parties should work quickly to negotiate a change to the cap, and implement a new baseline for cost and schedule. Work should not proceed beyond a reasonable time to do this.
5. Explore different type of cost caps: Examples of types of cost caps include annual cap on costs, caps based on percentage of auditable costs, caps on different phases of a project. A cap essentially turns a cost reimbursable contract into a fixed price contract which in some situations can be good (scope well understood, technology employed is simple, etc..) however, it other situations it can be very difficult and complex to manage.
6. Establish clear and concise key performance parameters and do not change them during the scope of the cost cap without considerable review and discussion of potential risks.
7. Add terms to the contract modification for the cost cap to address potential risks that could occur after the scope cap work is completed, e.g., redesign/rework for issue that arise once construction is complete that should be applied to a construction cost cap.

Critical Decision(s):	CD-2 to CD-4
Facility Type(s):	All
Work Functions(s):	Project/Program Management, Contract Management
Technical Discipline(s):	All

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