

Attachment F to Raines Declaration



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
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February 22, 2017

Dr. Grace Bochenek
Acting Secretary of Energy
U.S. Department of Energy
1000 Independence Ave
Washington, DC 20585

Dear Madam Secretary:

On behalf of the Chief of Engineers, LTG Todd T. Semonite, I am pleased to send you the enclosed report on the contract for the Mixed Oxide Fuel Fabrication (MOX) Facility at the Savannah River Site, South Carolina. The report was prepared by U.S. Army Corps of Engineers (USACE) as requested by the Department of Energy.

Section 3116 of the National Defense Authorization Act (NDAA) for Fiscal Year 2017, Public Law 114-328, directed the Chief of Engineers to conduct an assessment and prepare a report on the contract for the construction, management, and operations of the MOX Facility at the Savannah River Site near Aiken, South Carolina. The report is to include: an assessment of the contractual, technical, and managerial risks to the Department of Energy (DOE); and an assessment of what elements of the contract can be converted to fixed price and other contract mechanisms. This report provides the findings of the assessment as well as recommendations regarding contract changes.

The USACE review team greatly appreciates the cooperation and assistance of the National Nuclear Security Administration leadership and staff. They went to great lengths to ensure the team had full access to personnel and necessary documentation and other information for the assessment.

Please contact me if you have any questions or concerns with the report, or your staff may contact Mr. Ray Alexander at 202-761-8586
charles.r.alexander@usace.army.mil.

Sincerely,

A handwritten signature in black ink, appearing to read "Lloyd C. Caldwell", written over a horizontal line.

Lloyd C. Caldwell, P.E.
Director of Military Programs

Enclosure



**US Army Corps
of Engineers®**

U.S. Army Corps of Engineers Report Assessment of the MOX Facility Contract

February 2017

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U.S. Army Corps of Engineers Report Assessment of the MOX Facility Contract

EXECUTIVE SUMMARY

The National Defense Authorization Act (NDAA) of Fiscal Year (FY) 2017 directs the Chief of Engineers to conduct an assessment and prepare a report on the contract for the construction, management, and operations of the MOX Facility at the Savannah River Site near Aiken, South Carolina. Further, the NDAA requires the report to include: an assessment of the contractual, technical, and managerial risks to the Department of Energy (DOE); and an assessment of what elements of the contract can be converted to fixed price and other contract mechanisms. This report provides the findings of the assessment as well as recommendations regarding contract changes based on that assessment.

Chicago Bridge & Iron (CB&I)/AREVA MOX Services, LLC (MOX Services) is the contractor responsible for the design, construction, operations and maintenance, and decommissioning of the National Nuclear Security Administration's (NNSA) Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF). The facility will remove impurities from surplus weapons-grade plutonium and mix it with depleted uranium oxide to form fuel pellets which will be assembled into rods as fuel for commercial nuclear power reactors. Design of the facility began in March 1999, construction activities began in August 2007, and operations are planned to commence upon construction completion.

The general findings of this assessment indicate that the initial contract structure of the MOX contract, while appropriate for the type of work being performed at the time of award, poses a high risk to the Government today. Under the terms of the current contract, the project is currently behind schedule and over budget. Based on current funding profile, MOX Services' overhead far exceeds costs to the direct construction effort. Given the contractual (high), technical (low), and managerial (high) risks to DOE/NNSA associated with the current contract, changes to the contract arrangement are highly recommended. The contract was awarded as a construction management services contract (under FAR Part 37) and included fixed fees (FF), incentive/milestone fees (IF), and award fees (AF). There has been a great deal of cost and schedule growth over the life of the project. Based on the established fee schedules, fees were paid and/or are no longer available. The lack of availability of fee may be a disincentive to complete the work in a cost-effective or timely manner.

Several different contract types could be utilized to complete the remaining project requirements. The recommendations include a two phased approach based on a bilateral agreement. First, as an interim measure, modify the current Contract Line Item Number (CLIN) 0002 – Option 1 (Construct Mixed-Oxide Fuel Fabrication Facility) to define work to be completed and establish a specified date for submission of the final design. Second, once an agreement has been reached on the final design, change the contract to a Fixed-Price Incentive Firm Target (FPI(F)). The interim measure permits the government to define the work to be completed, gain confidence in target cost, and to develop an appropriate strategy to negotiate the follow-on FPI(F) contract. The FPI(F) arrangement places the risk to complete the project on both the Government and the contractor, and includes financial incentives to control costs and schedule. The contractor realizes profit by completing work below the ceiling price with the ability to earn higher profit by ensuring costs remain below the negotiated target cost. Implementation of this two-phased approach will allow the contractor to continue working during the process to mature the design, rework the schedule, retain key technical and construction craft, and complete the acquisition.

Provided that the DOE/NNSA project team is properly resourced and staffed appropriately for the recommended contract types, they can be successful in reducing the cost and schedule for the work remaining on the contract. In the event a bilateral agreement cannot be reached, it is recommended NNSA consider termination and re-procurement above continuation of the contract in its current form. Management and process recommendations are also included in this report for consideration regardless of the contract type selected (to include the status quo).

U.S. Army Corps of Engineers Report Assessment of the MOX Facility Contract

INTRODUCTION

This report provides an assessment of the contract for the construction, management, and operations of the MOX Facility at the Savannah River Site near Aiken, South Carolina. The Plutonium Management and Disposition Agreement (PMDA) signed in 2000 committed the United States and Russia to each dispose of no less than thirty-four metric tons of weapons-grade plutonium.¹ As part of the Nuclear Non-Proliferation Program, MOX technology was selected by the DOE to convert weapons-grade plutonium to mixed oxide fuel suitable for use in commercial nuclear power reactors.

The FY17 National Defense Authorization Act (NDAA) (Appendix 1), signed by the President on December 23, 2016, directs the Chief of Engineers to assess the contract for construction, management, and operations of the MOX Facility. USACE assembled a team of senior technical and management staff from across the nation to review and assess the MOX Facility contract. Specific disciplines included project managers, construction managers, design and engineering managers, cost estimators, risk engineers, contracting officers, and schedulers. The team interviewed personnel from NNSA and the MOX design and construction contractor. Both NNSA and MOX Services provided presentations and data to USACE. Site inspections were conducted and data was collected through a series of Requests for Information (RFI). This report is a synthesis of these interviews, data, and USACE personnel knowledge and experience with similar types of contracts.

DOE contract DE-AC02-99CH1088 was awarded on March 22, 1999, to Duke Cogema, Stone and Webster LLC. The company changed ownership multiple times since 1999 and is currently known as Chicago Bridge & Iron (CB&I)/AREVA MOX Services, LLC (MOX Services).² Design commenced upon award and the Nuclear Regulatory Commission (NRC) authorized construction to begin in March 2005. The contract was awarded as an incrementally funded, cost-plus (CP) type contract using FAR Part 37 with a variety of fees including: Fixed Fees (FF), Award Fees (AF) and Incentive Fees (IF). The contract includes seven contract line items (CLINS) as follows:

- 0001 Fuel Services and Project Design (CPFF) (CPIF)
- 0002 Option 1, Design & Construct Mixed-Oxide Fuel Fabrication Facility (CPFF) (CPIF) (CPAF)
- 0003 Option 2, MFFF Operations (TBD)
- 0004 Option 3, MFFF Deactivation (FFP, TBD)
- 0005 Other MOX Activities (CPFF)
- 0006 Technology Transfer Fee Agreement (FFP)
- 0007 Fees

The MOX project site is approximately 110 acres and is comprised of seventeen buildings, the largest of which is the MFFF. Some buildings are temporary and will be used only through

¹ 2000 Plutonium Management and Disposition Agreement, dated April 13, 2010

² NNSA presentation "USACE NDAA – MOX Overview" Page 11, dated January 18, 2017

completion of construction. Once complete, the MFFF will be approximately 500,000 square feet and five stories tall. The MFFF Building represents approximately 95% of the total project cost according to DOE/NNSA. Additional information on the current contract can be found in Appendix 3.

In April 2007, the Cost and Schedule Baseline was approved for approximately \$4.8B with an estimated completion date of September 2016.³ The project has been funded at levels identified in the approved baseline since 1999, with the exception of FY 2008 when less was appropriated than requested.⁴ The average annual funding has ranged between \$350M to \$500M per year.

In July 2016, at NNSA's request, MOX Services provided NNSA with a revised Estimate at Completion (EAC) indicating a total cost at completion (TCC) of \$9.9B and a completion date of 2029.⁵ According to MOX Services, this estimate was formulated to 85% confidence level and was based on an assumed consistent funding profile of \$350M per year. Comparison against MOX Services' July 2016 estimate of \$9.9B would indicate that the project is 48% complete.

In August 2016, USACE assisted the DOE Office Project Management Oversight and Assessments (DOE-PM) with the formulation of an independent cost estimate of the project. TCC was estimated at \$17.2B and a completion date of 2048. According to USACE, this estimate was formulated to 95% confidence level and was based on an assumed consistent funding profile of \$350M per year. The estimate was subsequently provided to the Government Accountability Office (GAO).

In order to assess the current contract and determine whether a change in contracting strategy is feasible one would first need to understand the current status of the project. MOX Services staff reports the design of the MOX Facility is 100% complete and the MFFF is about 72% complete. The MOX Services completion estimate is based on total dollars spent relative to their 2012 EAC of \$7.7B.⁶

In terms of actual construction placement, NNSA on-site staff estimates the MFFF Building at 30-40% complete.⁷ The USACE team toured the MFFF on January 19, 2017. To date, a substantial amount has been spent on the procurement of materials; some of which has not been placed. The USACE team estimates the construction placement of the MFFF to be less than 50%.

Based on the terms of the current contract, the project is currently behind schedule and over budget.

RISK ASSESSEMENT OF THE CURRENT CONTRACT

Contractual Risks Associated With the Current Contract (HIGH RISK)

³ NNSA presentation "USACE NDAA – MOX Overview" Page 5, dated January 18, 2017

⁴ According to DOE 413.3B, a baseline is a quantitative definition of cost, schedule and technical performance that serves as a base or standard for measurement and control during the performance of an effort; the established plan against which the status of resources and the effort of the overall program, field program(s), project(s), task(s), or subtask(s) are measured, assessed and controlled.

⁵ NNSA presentation "USACE NDAA – MOX Overview" Page 5, dated January 18, 2017

⁶ MOX Project Progress, AREVA presentation, 2016

⁷ NNSA presentation "USACE NDAA – MOX Overview" Page 18, dated January 18, 2017

A significant component of successful risk management is how well the project participants allocate risks at the contract formation stage. Ideally, the project documents will allocate responsibility for certain risks to the party best situated to bear them, thereby minimizing the likelihood and the cost of each risk. A well-defined requirement and a clearly defined scope and deliverables are key to reducing contractual risks.

CONTRACTUAL RISKS FOR DOE/NNSA There are contractual risks associated with the absence of clearly defined deliverables and schedules in the current contract. The CLIN structure in the contract does not delineate the deliverables and schedules for each element of work sufficiently to assign, manage and track costs and schedule completion for each. For example, within CLIN 0002 there are, at a minimum, three distinct elements of work: (1) construction of all seventeen facilities, (2) cold start commissioning, and (3) operation and maintenance of the other facilities already constructed within the MOX complex. However, these elements cannot be clearly delineated or financially tracked within the scope of CLIN 0002 of the current contract. Additionally, CLIN 0002 indicates multiple cost reimbursement contract types (CPFF, CPIF and CPAF) within a single CLIN 0002 that also includes reference to undated “milestones”. These contract types are associated with high cost risks and places most, if not, all of the risks on the Government. The absence of definitive milestones associated with deliverables permits the contractor to receive milestone fees without measurable progress towards completion of the overall project. Deliverables and milestones are essential to establish whether the terms of the contract have been achieved.

There is an indirect contract risk associated with delays or failure to complete the MFFF, which has the potential to result in additional costs to NNSA. An “economic and impact assistance” cost of \$1M per day, not to exceed \$100M per year, can be assessed by the State of South Carolina for storage of plutonium at the site.⁸

CONTRACTUAL RISKS FOR MOX SERVICES There are no contractual risks associated solely to MOX Services.

SHARED RISKS (DOE/NNSA & MOX SERVICES) The use of the cost reimbursement contract vehicle requires the contractor to maintain an approved cost accounting system (FAR 16.104), purchasing system (FAR Part 44), and property management system (FAR 45.105). An approved Earned Value Management System (EVMS) is required per FAR 34.201; however, MOX Services’ EVMS was decertified on October 19, 2016, by DOE-PM. Furthermore, NNSA consulted with the accounting firm Cohn Reznick to conduct an independent analysis of the accounting, purchasing, estimating systems and the company’s cost accounting standards disclosure statement. Several issues were identified within these systems and disclosure statement.⁹ The intent of these systems is to ensure internal controls on the part of the contractor to help prevent fraud, waste, and abuse of taxpayer dollars. Without these systems being in place and functional, both parties share the risk of uncertain controls of the project and funds.

In summary, the contractual risks for DOE/NNSA is high under the current contract. The cost reimbursement contract is considered high risk for the Government because of the potential for cost escalation and because the Government pays a contractor’s costs of performance regardless of whether the work is completed.

⁸ 50 U.S.C. 2566

⁹ CB&I AREVA MOX Services, LLC Risk Assessment and Audit Priority Analysis, November 2016 by Cohn Reznick, Contract Audit & Advisory Services (Note: This document is not available for general release.)

Technical Risks Associated with the Current Contract (LOW RISK)

TECHNICAL RISKS FOR DOE/NNSA: The Government owns all cost and schedule risk associated with MOX Services performance. NNSA has been cautious to let MOX Services establish design, construction, equipment procurement, installation and commissioning requirements that will lead to successful achievement of their contractual/functional requirements without directing or approving the contractor's approach, products, designs, or plans; thereby preventing transfer of the NRC licensure risk to the Government. While technical risk under the current contract to the DOE is low, this could change if there is an event that results in the loss of key and essential technical and construction personnel that understand the basis of design for both facility and process features. The most fundamental risk that DOE faces is the cost and schedule risk associated with the capability of MOX Services. This risk is increased given the fact that MOX services has divested most nuclear work of this scale and AREVA has never constructed or operated this process to United States standards with highly enriched (weapons grade) feed stock. The current NRC license is held by MOX services. Any change to the acquisition approach would have to maintain this license agreement or a new, lengthy license effort would become necessary. The same is true for the intellectual property transfer agreement with AREVA.

There are perceived technical risks associated with uncertainty with the design status of the MOX project. The design of the MFFF contractually consists of several stages. These stages, such as preliminary design, advanced preliminary design, preliminary final design and final design, are narratively described but not quantified. At the contract award stage there was no clear agreement between the Government and contractor on what constituted a completed stage. MOX Services stated they reached 100% design completion in March 2016. NNSA has reportedly not received, reviewed or accepted the final packages. However, NNSA does not concur that the base design (Title II) is complete as defined by Paragraph II.A.1.b(4)(d) of the scope of work, revised by modification A124 (May 2008).

Any contract for remaining construction will require the use of the MOX Services design and construction documents have not been accepted by the Government. The amount of time given to this assessment did not permit a review of the current construction packages to assess whether they are appropriately structured to reflect the remaining work to be completed and integrated so a logical, coordinated, and sequential construction package (drawings, specifications, schedule, etc.) can be developed and managed. A definitive "design" baseline is necessary to form a contractual basis for NNSA to effectively manage the construction effort. Until this definitive design is received and accepted, the Government will bear all of the cost and schedule risk associated with developing a design baseline.

Rework of materials and equipment MOX Services procured and fabricated out of sequence is a major technical and construction cost risk to the Government. There are uncertainties associated with whether or not stored equipment have been properly maintained, still fit the design configuration, and have valid warranties. Changes to include re-purchasing and modification of stockpiled materials and equipment are likely, presuming they are still needed and meet performance and functional requirements.

TECHNICAL RISKS FOR MOX SERVICES: Cost risk to MOX Services, due to engineering and construction performance under the current contract arrangement thru cold-commissioning, is nearly zero. MOX Services has reduced risk by transitioning most engineering staff into Title III work (construction-phase engineering). MOX Services will likely have technical performance risk if there is a work stoppage, since any work stoppage will disrupt the contractor's ability to retain both technical and construction craft on the project. This will increase risk related to successful completion of this first of a

kind (FOAK) project.

According to NNSA, MOX Services' parent company has reduced their portfolio of nuclear construction projects to just the MOX project.¹⁰ This assessment did not delve into the nuclear technical capabilities within the contractor's organization. However, if their portfolio of nuclear projects have decreased, there is uncertainty on the part of NNSA regarding the qualifications and experience levels remaining, which may pose a risk to completion of the MOX Facility.

MOX Services owns the technical risk for software development which is a major effort remaining on the project. Software risks are associated with obsolescence of the operating system or equipment, Programmable Logic Controller design, and commercial grade dedication (modification of Commercial Off The Shelf (COTS) software for Nuclear Quality Assurance (NQA)-1/DOE/NRC). From a construction perspective, MOX Services also owns the risks associated with the 247 process-related gloveboxes. Some of the NQA-1 gloveboxes have been installed in the facility out of sequence and are exposed to weather and construction conditions that will accelerate their need for rework once the facility is completely "in-the-dry". Furthermore, the gloveboxes require quite a bit of mechanical/electrical interface with other systems that have not even been started. There is significant risk in maintaining these gloveboxes in good condition over a long period of time when installed early in this uncontrolled environment. Also fit-up, testing and cold commissioning of these gloveboxes is a risk; although, many have been factory or field tested at the onsite preassembly facility prior to installation. Cold commissioning and system integration of the gloveboxes is also a very large risk of the remaining CLIN 0002 work.

The method of developing MOX fuel is a well-established process and is proprietary to AREVA. However, there are technical risks associated with designing and constructing the facilities and gloveboxes to NRC requirements. To date, the facilities operated by AREVA have reportedly been analog configured. The process and process control system has never been digitally configured to NNSA requirements. Many features in this plant are FOAK assemblies that have never been operated by AREVA.

SHARED TECHNICAL RISKS (DOE/NNSA & MOX SERVICES): Based on USACE's limited review and observation, it does not appear that MOX Services has an adequate or effective basis of estimate, or cost and schedule risk analysis (CSRA) that captures risks to the project, both qualitatively and quantitatively, as required by the current contract. An effective CSRA is necessary to determine an appropriate amount of contingency, schedule contingency, management reserve, and schedule reserve. Risk to the Government and MOX Services may exist if MOX Services does not have the requisite technical capability to perform or construct a facility that meets NRC requirements (staffing, obsolescence, FOAK sole-source process, etc.) MOX Services is contractually responsible for NRC licensure. Both NNSA and MOX Services share the risk of continued NRC licensure of the facility. The longer the project extends, the more likely NRC requirements will evolve to the point that features of the plant may have to be completely abandoned or replaced. As mentioned above, there is a substantial amount of rework that can be anticipated given current design constructability issues, the elongated schedule, out of sequence work, and rework of assemblies and materials procured out of sequence. The top project level construction risks from the 2016 Performance Baseline (PB) Update are shown below:¹¹

¹⁰ NNSA presentation "USACE NDAA – MOX Overview" Page 40, dated January 18, 2017

¹¹ According to DOE 413.3B, a Performance Baseline is the collective key performance, scope, cost, and schedule parameters for a project. The PB includes the entire project budget (Total Project Cost including fee and contingency) and represents DOE's commitment to Congress.

- Process Unit Gloveboxes, Glovebox fit-up, Testing, Cold-Start (instrumentation, power, piping and repair) and major technical problems experienced during acceptance testing/NRC inspection.
- Inability to recruit and retain technical and construction staff.
- Testing and balancing of the HVAC system.
- Physical and Electronic Security/Access control.
- Engineering rework due to procured/pre-fabricated configuration differing from the MOX design model.
- Obsolescence of computer-based process and security equipment, software, equipment, major features of construction (seismic or security features obsolete) and even construction.
- Software development, cyber security, and approval thereof.¹²

In summary, technical risks are low for the Government under the existing contract because those risks are borne by MOX Services.

Managerial Risks Associated with the Current Contract (HIGH RISK)

The staffing and management processes employed by both the prime contractor and the Government introduce potential risks to the timely and cost effective completion of the construction phase of the MOX program. Because Option 1 was awarded as a cost reimbursable line item, the majority of the risk resides with the Government. Issues related to how MOX Services is managing the current contract are identified below as Government risks, because MOX Services is reimbursed for all efforts performed, and is only responsible per the contract for providing their “best effort” toward completion of the requirement.

MANAGERIAL RISKS FOR DOE/NNSA: Current risks to the Government may be categorized as relating to project staffing or to management processes. Both categories represent cost, schedule, and quality risks.

MOX Services has a very large overhead staff supporting the current cost-plus contract that increases cost risk to the “direct” construction cost of the facility. MOX Services has an overhead (non-manual) cost of approximately \$15M-\$26M per month. Using the PB EAC, it is estimated that less than \$30M of the \$350M annual funding is going towards direct work. This imbalance represents a cost risk to the Government. This is also reflective of a very large focus on project design, project management, engineered equipment/Title III support, NRC cost/coordination, procurement engineering, software design, construction management, process unit assembly, quality control, cold start-up, operations preparation, environmental and safety, and NNSA support.¹³ The contract, in its current form, lacks incentive for effective performance of the construction in a cost effective or timely manner. Therefore, situations have arisen such as the advance purchase of a large quantity of stored materials and partial installation of system components. It is not clear that the MOX Services’ management efforts have been focused adequately on the design constructability and an integrated approach to scheduling and planning resources to ensure proper coordination of the complex trades work required for the MFFF. The NNSA cited improvements in contractor project management within the last year. It is essential this trend continues to minimize the quality and schedule risks of required rework and of conflicts as piping, conduit and duct installation continues, and intensifies. Unless mitigated, this risk has the potential to be

¹² DOE MOX Fuel Fabrication Facility (MFFF) Project Baseline (PB) Update, August 2016 by Paul Bosco.

¹³ DOE MOX Fuel Fabrication Facility (MFFF) Project Baseline (PB) Update, August 2016 by Paul Bosco

transferred to any recommended contract types for the remaining work.

The size of MOX Services' engineering staff, in relation to their stated stage of construction and design completion, represents a cost risk to the project. The state of completion of the final design remains a point of contention. However, accepting the contractor's assertion that the Title II design effort is 100% complete and is constructible, maintainable, and sustainable leads to the conclusion that the only remaining engineering effort is the resolution of RFIs, preparation of shop drawings, and design during construction (as required to support the specifics of selected equipment models and components for the MFFF), and the other four buildings still to be constructed.¹⁴ However, based on information provided by MOX Services, the current engineering staff during performance of these Title III design services equals approximately 74% of the Title II engineering staff which was responsible for the full design of the seventeen facilities under contract.¹⁵ Based on data provided by the NNSA project office, \$42M of the budgeted \$117M remaining in engineering costs was charged in FY2016, despite the fact that all parties agree that a significant portion of the actual construction placement remains.¹⁶

The NNSA project office's current staffing level is approximately twenty-nine. Based on a review of the NNSA staffing level and disciplines assigned to the project in comparison with the highly complex nature of the project, it is the team's finding that this level of staffing may not be sufficient to provide Government oversight; particularly in a cost reimbursement type environment. An analysis by USACE during previous cost estimating efforts for DOE-PM indicated that the NNSA project office was not adequately resourced to meet the DOE's project administration requirements as reflected in DOE Order 413.3B. With a cost reimbursable contracting methodology, there is an increased burden on the Government for oversight and validation of charges against the project. While the current staff is making every effort to be good stewards of Government resources, the size of the project and the accompanying review requirements exceed the current capacity, even with the current use of service contracts to supplement the Government workforce. In particular, additional assistance in the form of auditors and quality assurance personnel is critically needed to ensure the ongoing, real-time review of submitted invoices and to provide adequate quality assurance.

In terms of management processes, MOX Services and the NNSA project office differ in their estimation of both the quality and the degree of implementation of the contractor's operating procedures and scheduling tools. MOX Services provided a comprehensive list of standard operating procedures (SOPs), but the NNSA project staff's observations led them to question the contractor's routine and effective implementation of their SOPs.¹⁷ A lack of common understanding of the standards by which the project is being managed and a lack of validation of the implementation of those standards present a quality risk.

The USACE team conducted a short review of the MOX Services' schedule. The most recent schedule provided by MOX Services represented the remaining work as of February 25, 2016.¹⁸ The schedule projected a completion/start-up date of October 2031. However, the 2016 EAC document indicated that the project completion date was 2029. The construction schedule contained over 50,000 activities and the overall schedule over 165,000 activities. The conclusion of the USACE review is that the findings of previous schedule reviews are still valid concerns. A summary of the results of the previous schedule reviews are as follows.

¹⁴ MOX Services presentation "MOX Fuel Fabrication Facility (MFFF), USACE Assessment", January 19, 2017

¹⁵ MOX Services Response to RFI#17

¹⁶ NNSA Response to RFI #27

¹⁷ MOX Services Response to RFI #14

¹⁸ MOX Services Response to RFI #16

The schedule was analyzed using two sets of standards. First, the schedule data was compared to the best practices in the GAO Schedule Assessment Guide (GAO-16-89G, December 2015). Second, the schedule was analyzed with the Deltek® Acumen Fuse software program to evaluate compliance with the Defense Contract Management Agency (DCMA) 14 Point Assessment. The schedule scored poorly when evaluated against several criteria common to the GAO and DCMA guidelines. A primary concern is that MOX Services' schedule is not fully resource-loaded to industry standards with their cost estimate, nor correlated to the work breakdown structure or Management Accounts (MAs), which would facilitate a more accurate constrained funding impact to the schedule. A second major concern is the lack of complete schedule logic (13% of all activities without a valid predecessor or successor). The impact of missing logic is an inability to confidently forecast project completion.

The MOX Services schedule includes optimistic assumptions such as unit production rates for some commodities in the out years and minimal plans for rework during startup. Additionally, resource-loading and logic is insufficient (primarily in the construction schedule) to use the current schedule as a tool for making necessary management decisions and planning. The MOX Services team reported that they chose to manually create the critical path rather than relying on their Primavera schedule's critical path calculation.¹⁹

In summary, regarding the schedule risk, the configuration management and control inconsistencies impact the usability of the current schedule as a reliable tool for managing the project. It appears MOX Services constrained the schedule portraying optimistic results. When that constraint was released, it extended the completion date by approximately two years. Also, there is evidence that not all scope items are included. In addition, procurement related durations do not differ based on relevant factors such as estimated value, complexity, contract type, etc.

Another significant concern is that MOX Services' EVMS certification of compliance with Electronic Industry Alliance (EIA)-748 Guidelines was withdrawn in October 2016, based on the results of the EVMS Surveillance review conducted by the DOE-PM.²⁰ Without a valid system for measuring project performance and progress, there is a risk of improper, or at least inadequate, cost accounting under the current cost reimbursable structure, and no validated basis for determining the baseline for a potential restructuring of the contract.

The fact that the contract was modified to allow the prime contractor to self-perform the construction, rather than serving only as a construction manager, also creates a concern. As a result of this decision, the same contractor is responsible for designing, constructing, and potentially (upon exercise of Option 2) operating the facilities. This eliminates a layer of oversight, and leaves MOX Services with the ability/responsibility to both set and complete the requirements for construction completion (i.e., answer their own RFIs, ensure their own compliance with their design, and modify that design during construction). Considering the realities of the under-resourced NNSA project office as discussed above, this creates a cost and quality risk, with at least the potential for decisions to be made with the wrong motivation. While no evidence was presented to indicate that this has occurred, it must still be considered as a potential risk.

There are managerial risks associated with the absence of clear lines of communication between the

¹⁹ Assessment Report - Chicago Bridge & Iron (CB&I)/AREVA MOX Services, LLC (MOX Services, MOX-AR-17-0026, FY17 Integrated Project Schedule (IPS) Update; NNSA; January 2017.

²⁰ NNSA response to RFI #19

Government and the contractor particularly as it pertains to the MOX Service joint venture arrangement consisting of various entities each with its own corporate structure. The potential consequence is decision making by inappropriate personnel that affect cost, quality, and schedule. Unless properly mitigated, the potential exists for these risks to be transferred to any recommended contract type.

MANAGERIAL RISKS FOR MOX SERVICES: MOX Services personnel conveyed to the USACE team that the current state of project uncertainty has created a staffing risk for MOX Services, making it difficult for them to attract and retain experienced personnel. With other large construction projects underway in the area (at both Vogtle Electric Generating Plant and the Virgil C. Summer Nuclear Generating Station), skilled trade workers have multiple employment options, although the Salt Waste Processing Facility, which was also a competitor for skilled labor, has just been completed. While the NNSA project office and the contractor have differing opinions on the severity, impact, and cause of this potential trades' shortage, it is definitely viewed by MOX Services as a performance risk, and could introduce cost risk due to competition for skilled labor.

SHARED MANAGERIAL RISK (DOE/NNSA & MOX SERVICES): As stated above, the NNSA project office and MOX Services have differing opinions regarding the current project completion percentage. Any difference in understanding the amount of work still to be accomplished increases the risk that the parties would not be able to establish a reasonable baseline for restructuring the remaining contract terms.

Differing priorities for scheduling and resource commitment present another potential source of schedule risk. The NNSA project office has asked MOX Services to focus on execution of work that is on the critical path, and would therefore, have a direct impact on the final completion date for the project. In contrast to the NNSA project office's position, MOX Services acknowledges the need to work items on the critical path but it would also like to work on additional systems and components as conditions and resources permit.

Based on USACE observation during the site visit and interviews with both the Government and contractor personnel, the relationship between the two appears to be strained. The team was unable to ascertain whether or not this was a localized issue or whether it involved the corporate levels of the respective organizations, and the extent to which it may be impacting the schedule. With the significant and complex topics currently under discussion, effective partnering is required to mitigate risks in all aspects of the project, to include cost, schedule, and quality.

A final shared managerial risk to successful project completion is the fact that both the NNSA project office and the prime contractor have experienced an almost complete turnover in assigned personnel since the award of Option 1. The loss of historical knowledge presents cost and schedule risk, with the potential that current decisions and understandings might impact work previously completed.

In summary, the managerial risk is rated high for the current contract because of the lack of adequate managerial controls and accounting systems to reduce cost and schedule. Cost reimbursement contracts involve significantly more Government oversight than do fixed-price contracts.

ELEMENTS OF THE CONTRACT THAT CAN BE CHANGED

Factors that affect the overall consideration of a proposed contract type consist of the following:

- Inadequate system controls: Several high risk areas currently exist in the contractor's accounting, estimating, and purchasing systems. With the exception of FFP, any proposed contract type would require corrections by the contractor to the identified deficiencies.
- An EVMS (or equivalent type system) is required for all contracts over \$20M, regardless of contract type (DOE Order 413.3B). As previously noted, the contractor's EVMS system has been decertified.
- Quantification of the work to complete: A definition of the work to complete the MFFF must be identified. A clearer definition makes the contract type more suitable for a fixed-price contract type.
- Level of rework: The magnitude of likely rework that is yet to be defined and/or quantified will make a firm-fixed-price contract type less suitable.
- Time-and-material subcontracts: Cost-reimbursement contract types make the effort to firm up pricing on subcontracts less likely. Continuation of time-and-material subcontracts discourages subcontractors from committing quality personnel for the work or accomplishing the work in a timely manner.
- Identifying proper delineation of work under CLIN 0002: Within CLIN 0002 there are, at a minimum, three distinct elements of work as previously discussed. This current structure does not delineate the deliverables and schedules for each element of work sufficiently to assign, manage and track costs and schedule completion for each.

ANALYSIS OF CONTRACT TYPE POSSIBILITIES

A two-step process was completed to determine the recommended contract type.

STEP 1: ANALYSIS OF CONTRACT TYPE.

USACE conducted an analysis on the portfolio of contract types prescribed by FAR Part 16.2 thru 16.4 and the risks associated with each contract type. This analysis is documented in Appendix 4, with the summary as follows.

Based on the best information available to USACE, the recommended contract type to maximize the reduction of cost and risk to the Government while motivating the contractor to complete this project in the most expeditious manner is to change the construction portion of this contract to FPI(F). Getting to a FPI(F) contract would require a phased approach to reduce risks associated with potential work stoppage while the scope of the remaining work is being determined, the project re-baselined, and a new contract is negotiated. The first phase, a modification of CLIN 0002 of the current contract, is recommended to re-baseline the project, and to establish a specified date for submission of the final design. Once an agreement has been reached on the final design, the second phase involves changing the contract to a Fixed-Price Incentive Firm Target (FPI(F)). This interim phase permits the Government to define the work to be completed, gain confidence in target cost, and to develop an appropriate strategy to negotiate the follow on FPI(F) contract. During this period, the contractor may continue working in order to retain the necessary technical and construction craft. It is essential that DOE/NNSA implement the appropriate oversight and control measures on this project to control cost and schedule during the interim period.

Any other contract type alternative could potentially increase the total cost to the overall completion of the project; and/or increase the risk associated with schedule control. Although this analysis concludes FFP is not the most viable contract type for CLIN 0002, FFP is still addressed below per NDAA direction. FFP is a viable option for elements of CLIN 0003.

STEP 2: IDENTIFY COURSES OF ACTION (COA) FOR ELEMENTS OF CLIN 0002 AND CLIN 0003 THAT CAN BE CHANGED

What element(s) of CLIN 0001 can be changed?

According to NNSA, CLIN 0001 is 100% billed and paid at the project level; therefore, conversion of this CLIN is not possible.

What elements of CLIN 0002 can be changed?

Under the current contract, the primary objective of CLIN 0002 (Option 2) is to deliver a completed facility capable of processing weapons-grade plutonium. The preponderance of cost for CLIN 0002 (Option 1) is associated with the construction of the MFFF.

The level of success in each Course of Action (COA) is dependent upon the degree the assumptions are achievable as listed below.

COA 1: Firm Fixed Price (FFP)

It may be possible to change CLIN 0002 to a FFP Design-Build contract type under a bilateral agreement, if the following could be achieved:

- Development of a clear definition of the remaining work (which will allow for a more accurate Independent Government Estimate (IGE)).
- Completion of a thorough design review to determine a baseline schedule and delineate contract deliverables to assist in developing target completion, funding requirements, etc.
- Negotiation of a fair and reasonable price, acceptable to both the Government and the contractor.
- Validation that the contractor has the financial capability to obtain adequate surety (e.g., performance and payment bonds) for the construction work.
- Allowance for the amount of bonding to be established at either the incremental funding levels or at discrete elements of work.
- Determination of a defined funding profile (which will eliminate disruption of work and to permit the contractor to schedule completion of the project in an efficient and timely manner).
- Assurance that Congress will fund the project at the defined funding profile.
- Government validation that Title II Design is complete.*

*This additional assumption will be applicable if CLIN 0002 is converted to a FFP design-bid-build construct.

Although FFP is possible, the contractor is likely to be unwilling to assume all the risk with a FFP arrangement. DOE/NNSA requested a FFP proposal on August 19, 2016. MOX Services has not provided a proposal, although they have requested additional information from the Government in order to develop their proposal. During the USACE interview with MOX Services on January 19, 2017, a number of reasons were given as to why a FFP arrangement is not agreeable. MOX stated that it would take at a minimum of one year to develop a FFP proposal.

COA 2: Fixed-Price Incentive Firm Target (FPI(F))

It may be possible to change CLIN 0002 to a FPI(F) Design-Build contract type under a bilateral agreement, if the following could be achieved:

- Development of a clear definition of the remaining work (which will allow for a more accurate IGE).
- Completion of a thorough design review to determine a baseline schedule and delineate contract deliverables to assist in developing target completion, funding requirements, etc.
- Assurance the Government and the contractor understand the characteristics of an FPI(F) contract.
- Definition of a process to address how changes are made to the incentive arrangement.
- Negotiation of a fair and reasonable target price, ceiling price, and share ratios, acceptable to both the Government and the contractor.
- Determination of a defined funding profile (which will eliminate disruption of work and to permit the contractor to schedule completion of the project in an efficient and timely manner).
- Assurance that Congress will fund the project at the defined funding profile.
- Incorporation of Advanced Agreements for items such as contract management procedures, relocation, overtime, bonuses, etc.
- Validation that the Government has both in-house resources and ability to contract for audit support services.
- Validation that the contractor has the financial capability to obtain adequate surety (e.g., performance and payment bonds) for the construction work.
- Allowance for the amount of bonding to be established at either the incremental funding levels or at discrete elements of work.
- Validation that the contractor's accounting system is adequate for providing data to support negotiation of final cost and incentive price revision.²¹
- Government validation that Title II Design is complete.*

*This additional assumption will be applicable if CLIN 0002 is converted to a FPI(F) design-bid-build construct.

Conversion of the remaining work under CLIN 0002 of the current contract to FPI(F) is a viable course of action. In order to change the contract to this arrangement an interim cost type contract would have to be utilized. FPI(F) shares the risk between the Government and the contractor to complete the project, and provides financial incentives to control costs and schedule. The contractor realizes profit on costs by completing work below the ceiling price as the ability to earn higher profit by incurring cost below the negotiated target cost.

COA 3: Cost-Plus-Fixed-Fee (CPFF)

It may be possible to change CLIN 0002 to a cost-plus-fixed-fee (CPFF) contract type under a bilateral agreement, if the following could be achieved:

- Definition of a definite goal/target or end product.
- Structuring of the conditions for payment of the fixed fee to require the contractor to complete the specific goal/target or end product within the estimated cost.
- Completion of a thorough design review to determine a baseline schedule and delineate contract deliverables to assist in developing target completion, funding requirements, etc.
- Validation that the Government has both in-house resources to perform inherently governmental

²¹ FAR 16.403-1

- functions and ability to contract for audit support services.
- Validation that the contractor's accounting system that is adequate for determining cost applicable to the contract and incentive price revision.²²
- Incorporation of Advanced Agreements for items such as contract management procedures, relocation, overtime, bonuses, etc.
- Validation that the contractor has an approved purchasing system.²³
- Certification of the contractor's EVMS.²⁴
- Definition of a funding profile (which will eliminate disruption of work and to permit the contractor to schedule completion of the project in an efficient and timely manner).
- Assurance that Congress will fund the project at the defined funding profile.

Based on the status of the current contract and concerns with the ability to achieve risk reduction, a CPFF would not be the preferred contract type as a final solution for restructuring of the existing contract. On the continuum of contract types considered, the USACE team considered CPFF as the highest risk option to the Government.

COA 4: Cost-Plus Incentive Fee (CPIF)

It may be possible to change CLIN 0002 to a cost-plus incentive fee (CPIF) contract type under a bilateral agreement, if the following could be achieved:

- Creation of an incentive/milestone fee structure that is mutually beneficial to the Government and the contractor.
- Completion of a thorough design review to determine a baseline schedule and delineate contract deliverables to assist in developing target completion, funding requirements, etc.
- Assurance that the Government has both in-house resources to perform inherently governmental functions and ability to contract for audit support services.
- Definition of a process to address how changes are made to the incentive arrangement.
- Validation that the contractor's accounting system is adequate for providing data to support negotiation of final cost and incentive price revision (FAR 16.403-1).
- Incorporation of Advanced Agreements for items such as contract management procedures, relocation, overtime, bonuses, etc.
- Validation that the contractor has an approved purchasing system (FAR 44.301).
- Validation that the contractor has a certified EVMS (DOE 413.3B).
- Determine a defined funding profile (which will eliminate disruption of work and to permit the contractor to schedule completion of the project in an efficient and timely manner).
- Assurance that Congress will fund the project at the defined funding profile.

Changing the remaining work under CLIN 0002 to CPIF is a viable course of action. Under the CPIF structure the contractor could be incentivized to control costs and schedule. This would reduce the schedule risks from the level currently experienced, but only if the incentives were structured with milestones tied firmly to successful completion of definable features of work. The contractor realizes a higher rate of return as they are able to decrease project costs. Unlike FPI(F), however, if the contractor exceeds the ceiling cost they are reimbursed for all incurred costs.

The remaining contract types identified in Appendix 4 (FPAF, FPI(S), and CPAF) were not considered

²² FAR 16.403-1

²³ FAR 44.301

²⁴ [DOE 413.3B, Program and Project Management for the Acquisition of Capital Assets, DOE O 413.3B Chg2 \(11/29/10\)](#)

viable options for CLIN 0002 based on their associated risks. Restructuring the contract to any type of award fee methodology would require increased responsibility for evaluating and documenting the contractor's performance to justify payment of award fees. The evaluation is subjective, which could result in more issues than the arrangement would solve based on strained relationship between the parties. The FPI(S) construct would require another round of negotiations. The NNSA would be at a disadvantage during follow-on negotiations since it would need to complete the project without delay resulting in little bargaining power.

What elements of CLIN 0003 can be changed?

CLIN 0003, Operations (and Maintenance), has not been exercised or definitized. This CLIN consists of "Hot-Start-up", Certification and Approval by the NRC to start full operations, and operation and maintenance of the MFFF for an estimated thirty months during which the thirty-four metric tons of weapons-grade material will be oxidized, polished, and loaded into fuel rods. The DOE has extensive experience with large Government-owned, contractor-operated facilities nation-wide through large cost reimbursable contracts. Operations of the MFFF could be broken into several sub-CLINs, many of which could employ some form of FFP contract mechanisms. Actual operation of the "processing of nuclear material" however has many risks and uncertainties that will likely lend themselves towards being cost reimbursable sub-CLINs. For instance, this facility relies upon over 325 glove boxes, 247 of which are "process gloveboxes" for handling the nuclear material and processing it. The glove boxes, and process equipment contained within them are all FOAK equipment. These gloveboxes have never been manufactured to NRC NQA-1 standards, configured in this manner, processed weapons-grade plutonium, nor operated by United States personnel. The reliability, availability, maintainability, and predictability of "production-rates" is very uncertain and will require great flexibility in the operation of the MFFF.

Other components of the CLIN 0003 such as Surety, Security, Overhead and Management, storage and transportation could be FFP. However, given that completion of cold commissioning is not until the 2029-2048 timeframe, attempting to definitize a FFP cost for operations at this time would likely result in a meaningless CLIN value.

During previous discussions of the currently undefinitized CLIN 0003, NNSA and MOX Services initiated negotiations to break out the "Hot Start-up Testing" element, in an attempt to establish a realistic baseline of cost for operations and maintenance.²⁵ The intent was to gather data on a cost-reimbursable basis during this ramp-up period to document the actual level of expenditures which could then be used as a basis for projecting cost for the remaining performance period. A version of this strategy could be employed as part of a contract restructuring effort to reduce Government risk under CLIN 0003. The Government could exercise the original intent of awarding the "Hot Start-up Testing" as an initial cost reimbursable sub-CLIN, or could expand the concept to include a period of full site operations and maintenance, at the end of which the potential contract types could be re-assessed for all elements of CLIN 0003. It is possible that additional elements beyond those currently discussed as potential candidates for FFP could be identified, such as preventive maintenance.

Because operations and maintenance of the facility is not expected to begin until 2029-2048 (given a \$350M/year funding profile), it is difficult at this point in time to provide a reasonable recommendation as to contract type for CLIN 0003. Based on the assessment conducted, it is assumed there are elements that

²⁵DOE-DCS-001682 Memorandum, DE-AC56-99CH10888 MOX Fuel Fabrication Facility; Request for Proposal NO 0-006, Early Option 2, dated November 25, 2008

may be FFP and other elements that may be more appropriately suited to a cost-type construct.

SUMMARY OF CLINS THAT CAN BE CHANGED

To summarize, CLIN 0001 is considered complete and was not analyzed. CLIN 0002 was analyzed and can be changed. Although elements of CLIN 0003 could be changed, further analysis would be required once the scope is definitized. As noted previously, the remaining CLINs were not part of this analysis.

ASSESSMENT OF MILESTONES, COST, SCHEDULE, AND ANY DAMAGE FEES

The analysis described above included an assessment of all contract types available for consideration, completed as part of the effort to assess the elements of the existing contract which could potentially be changed to reduce both the risk and cost to the DOE. This analysis led to the conclusion that an interim Cost Reimbursable followed by a FPI(F) contract type presents the best potential for risk reduction for restructuring of the existing CLIN 0002.

The analysis also indicated that while the DOE would be best served to leave the majority of the tasks under CLIN 0003 as cost reimbursable items due to the inherent uncertainties associated with the operation and maintenance of a project site of this complexity, there would be specific tasks which could be successfully converted to a FFP basis under CLIN 0003. Conversion of this CLIN to other acquisition approaches should be revisited as the project approaches hot start.

The following discussion provides additional analysis of the four (4) contract types identified as potentially viable, specific to the efforts required to restructure the applicable CLINs or elements of CLINs to those contract types, rather than to the efforts required for the actual completion of the work to be performed under those CLINS. As discussed in other sections of this report, a significant effort would be required to provide any level of certainty in terms of cost or schedule for the actual construction action which would result from a potential restructuring of the current contract. That effort would require the clear definition of both the extent and quality of remaining design and construction work to serve as the basis for completion of a detailed schedule analysis and full IGE. This level of analysis, estimated in other sections of this report as requiring 12-18 months of concerted effort, is beyond the scope of the current report. Similarly, the cost and schedule for the potential FFP services during operation of the site under CLIN 0003 cannot be accurately assessed at this point because of the lack of information available regarding both the final operational requirements of the MFFF and other support facilities, and the NRC requirements which might apply at the time the site is eventually turned over for full operation.

As required by the NDAA language, the assessment below focuses primarily upon the milestones, cost, schedules, and potential damage fees associated with the CLIN-specific application of these contract types. For purposes of this discussion, damage fees are defined as those costs which the Government might be required to pay the current contractor resulting from pursuit of various contract actions. Damage fees in this context do not include any potential fees associated with the ongoing discussions of legal commitments to the State of South Carolina or any other entity.

Firm-Fixed Price (FFP):

The preceding analysis indicates that the only elements of the current contract which would be strong candidates for restructuring as FFP provisions (with no incentive structure) are those elements for which

the requirement can be clearly defined, and for which a price can be determined from the outset. While some elements of CLIN 0002 could be converted to FFP, such as completion of the construction of the four remaining non-MFFF facilities, and possibly individual management tasks such as performance of the safety program or scheduling, these elements represent an insignificant portion of the overall cost and effort of CLIN 0002. The effort required to break out these elements as FFP sub-CLINs would likely not prove to be cost or time effective.

However, it is likely that multiple elements of CLIN 0003 would prove to be good candidates for performance as FFP sub-CLINs. Those elements were noted to include surety, security, overhead and management, storage and transportation. The major milestones to change these elements to FFP are as follows:

- Develop FFP modification Request for Proposal (RFP) (scope, contract clauses, proposal requirements, etc.);
- Develop IGE;
- Receive and answer any pre-proposal requests for information (RFIs);
- Receive and evaluate contractor proposal;
- Establish basis for negotiations;
- Conduct negotiations; and
- Award modification.

The schedule start date would depend upon the point during the construction action at which NNSA has adequate information regarding the operational requirements of the project site. It is likely this conversion to an FFP effort would need to occur concurrent with the cold-start of the MFFF, near the completion of the work required by CLIN 0002, or following a ramp-up period as discussed above.

Because CLIN 0003 is not currently priced, there would be essentially no lost effort in terms of development of previous estimates, and no anticipation that any damage fees would apply. Contractor proposal preparation costs are highly dependent upon internal business processes, and would be difficult to predict.

Fixed-Price Incentive Firm Target (FPI(F)):

The analysis of contract types suggests that conversion of the remaining work under CLIN 0002 of the current contract to FPI(F) is a viable course of action. As mentioned in the discussions of the risks associated with this contract type, the primary obstacle to be overcome in converting CLIN 0002 to FPI(F) is the definition of the current completion status and acceptability of work performed to date. This would impact the time required for completion of the procurement milestones up to and including receipt of the contractor's proposal. The remaining milestones required for conversion of the remainder of CLIN 0002 to FPI(F) would parallel those required for negotiation of FFP elements under CLIN 0003 as discussed above.

- Define existing status (define elements of work to be completed, determine a realistic work breakdown schedule, place the facility in caretaker status and settle all existing subcontracts);
- Develop FFP modification RFP (scope, contract clauses, proposal requirements, etc.);
- Develop IGE;
- Receive and answer any pre-proposal requests for information (RFIs);
- Receive and evaluate contractor proposal;

- Establish basis for negotiations;
- Conduct negotiations; and
- Award modification.

These milestones represent a total schedule requirement of 31-43 months from the point of the decision to convert the remaining work under CLIN 0002 to FPI(F), to award of the bilateral modification required to complete that conversion. This estimated timeframe includes the 12-18 months to define existing status; 18-24 months for preparation of RFP and negotiations; and one month for award. At the current funding profile, this implies that a further \$1B may be incurred during the transition period. The cost of the effort would involve the cost for government labor hours for scoping, estimating, and negotiating the price of the services to be converted, and contractor costs for development of a FFP proposal and participation in negotiations (since the contractor is currently due payment for allocable costs).

Assuming this restructuring process could occur by modification rather than through a termination and re-procurement under a new contract vehicle, then no damage fees would be anticipated.

Cost-Plus Fixed Fee (CPFF):

The analysis above indicates that changing the remaining work under CLIN 0002 to CPFF would not be the preferred final solution for restructuring of the existing contract. A complicating factor for cost reimbursable contract types is that without a change in scope, it is inappropriate to increase fee. This would create a cost plus percentage of cost arrangement which is prohibited.²⁶ Any possible use of the CPFF would require further legal analysis.

Cost-Plus Incentive Fee (CPIF):

Another option for consideration in a potential restructuring of the current contract would be a re-baselining of the remaining work under CLIN 0002 as CPIF. This process would require less cost, effort and time to accomplish the restructuring, as compared to a fixed price option, but would not limit Government risk to the same extent as the FPI(F) contract type would, particularly given the fact that this methodology is very similar to the current contract structure which has not successfully ensured cost and schedule control. Because the existing contract is already cost reimbursable, the required effort would not include development of a modification RFP, but only formulation and acceptance of a new project baseline.

This contract type presents the same challenges discussed above in that without a change in scope, it is inappropriate to increase fee. With a limited amount remaining in potential fees on the current contract, either the available incentive fee would be limited to the point of having no appreciable motivating effect on the contractor's performance, or relief from the prohibition on increasing the fee without an accompanying scope change would be required. Assuming this issue could be resolved, the process of re-baselining the remaining work under CLIN 0002 would require the following milestones.

- Define existing overall project status as required to provide reasonable basis for re-baselining;
- Develop new Government and contractor baselines;
- Reconcile Government and contractor baselines;
- Develop new incentive fee plan;

²⁶ See 41 U.S.C. 3905(a). It is also prohibited by FAR 16.102(c)).

- Prepare contract modification to incorporate accepted baseline, establish new incentive fee plan, and remove award fee and fixed fee provisions pertaining to the remaining CLIN 0002 work; and
- Award modification.

It should be noted that the schedule for this restructuring option also includes some level of slow-down in the performance of ongoing construction work, as the new baseline is developed. There will be significant costs on both sides to convert this CLIN to CPI(F). Assuming this restructuring process could occur by modification rather than through termination and re-procurement under a new contract vehicle, then no damage fees would be anticipated.

RECOMMENDATIONS

As discussed above, a number of factors have contributed to the current over-budget and behind-schedule state of the MOX project. The recommendations discussed below have been formulated to address identified issues, minimize risk, and potentially reduce cost for the remaining contract requirements. In addition to the recommendations required by the NDAA regarding options for restructuring the contract, this report also presents management and process recommendations which should be considered regardless of the contract type selected (to include the status quo).

The primary recommendation of this report is a two phased approach based on a bilateral agreement. First, as an interim measure modify the current CLIN 0002 to a cost type contract in order to re-baseline, and reach an agreement on: the final design; existing as-fabricated or built condition of the structures, systems and components; as well as roles, responsibilities, authorities and accountabilities of the invested parties. Second, once an agreement has been reached on these issues, change the contract to a Fixed-Price Incentive Firm Target (FPI(F)). The interim arrangement will allow MOX Services to continue working and retain the necessary technical and construction craft.

As emphasized in the discussion above regarding the viability of conversion to FPI(F) for the remainder of CLIN 0002, it is essential that DOE/NNSA implement appropriate oversight and control measures to ensure successful contract administration, to include the measures described in the recommendations below. While changing the contract type for the remainder of CLIN 0002 to FPI(F) would reduce the level of Government risk from that currently experienced under the existing cost reimbursable contract, that risk reduction is highly dependent upon the ability of the Government to effectively manage the complexities of the FPI(F) contract type. The recommendation of this contract type is based on the expectation that DOE/NNSA will take the necessary steps to properly resource the NNSA project office and to implement the controls needed to manage this complex contracting tool.

In the event a bilateral agreement cannot be reached for conversion of the remainder of CLIN 0002 to either the interim cost reimbursement or the final FPI(F), it is recommended that DOE consider terminating the current contract, retain AREVA (via sole-source contract) for the required proprietary processes, and re-procure the construction and licensing requirement. Operations and Maintenance of the facility could then be procured separately from CLIN 0002. The more certain risks of re-procurement are likely preferable to the uncertain risks of the current contract. However, NNSA would need to further evaluate the costs and benefits of that course of action.

Because Operations and Maintenance of the facility is not expected to begin until 2029-2048 (given a \$350M per year funding profile), it is difficult at this point in time to provide a reasonable recommendation as to contract type for CLIN 0003. Based on the assessment conducted, it is assumed

there are elements that may be FFP and other elements that may be more appropriately suited to a cost-type construct.

The consensus opinion of the USACE multidisciplinary team tasked with the development of this report is that critical changes in Government oversight and management of the MOX project are essential, and should be implemented as a part of any attempted restructuring of the contract terms. Most would be equally (or possibly more) relevant even if the DOE were to decide to continue with the contract as currently structured. The recommended changes are as follows:

- Establish a funding profile for the remaining construction effort. Previous schedule and cost estimating efforts have established that the funding profile is the most significant variable in determination of the final cost and schedule for the MOX project. A firm funding profile must be established to provide the basis for any contract restructuring effort.
- Conduct a design review to determine both technical and schedule baselines to validate the current contract status. Developing an effective RFP for conversion of the remaining CLIN 0002 work to an interim cost reimbursable arrangement and subsequently to a FPI(F) will require a complete design package from which both the government and contractor may estimate the remaining level of effort. Depending on the level of risk the DOE is willing to accept, a Design-Bid-Build or Design-Build RFP may be developed. The benefits of the interim measure is to mature the design and schedule while allowing the contractor to continue working and retain the necessary technical and construction craft.
- Clearly define adequate government management controls in the contract. Effective government oversight must be based on clear and enforceable contractual terms. Regardless of the contract type employed, the DOE must ensure that the government's expectations in terms of deliverables, reviews, quality control/assurance, and documentation are clearly stated.
- Ensure the NNSA project office is properly staffed and resourced to effectively manage the contract. Any contract type selected requires a significant level of government administration and supervision to validate both quality and proper cost accounting.
- Upon award of the modification restructuring CLIN 0002, conduct the equivalent of a pre-construction meeting to re-establish roles, responsibilities, authorities and accountability in light of the new contract terms. This meeting should address DOE/NNSA, NRC, and contractor roles and responsibilities, and should be used to re-set relationships and expectations for all three parties critical to the successful completion of the MOX project.
- Conduct site level and executive partnering sessions throughout the remaining life of the contract. Successful completion of the MOX project is contingent upon the ability of the DOE and the contractor to operate effectively as partners at all management levels.

CONCLUSION

The general findings of this assessment indicate that the current structure of the MOX contract poses a high risk to the Government. For the Government to minimize future cost and schedule uncertainty, the project must be completed as expeditiously as possible. Given the contractual, technical, and managerial risks associated with the current contract and the fact that the contractor has no incentive to control either cost or schedule, a restructuring of the current contract would be in the Government's best interest.

Several different contract types could potentially be utilized to complete the remaining project requirements. The recommended contract type for completion of the remaining CLIN 0002 effort is a FPI(F) arrangement subject to successful negotiations between the DOE/NNSA and MOX Services, conducted during a cost reimbursable interim period. The USACE team believes NNSA has the knowledge and capability to manage this type of contract, subject to NNSA's willingness to provide adequate resourcing. There is also the potential for restructuring of discrete elements of CLIN 0003, but additional analysis would be required once the operational requirements are better definitized.

Through a combination of revisions to the contract structure and refinements in both the Government's and the contractor's staffing and management processes, it may be possible to complete the MOX project with reduced risk to the Government. However, the extent to which the risk may be reduced is highly dependent upon factors which may prove to be beyond the control of any of the concerned parties, such as annual appropriated funding and future advances in technology, which may render all or parts of the MOX processes and/or facilities obsolete.

APPENDIX 1 – NDAA

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for which the Administration is responsible, meets the criteria for accepting waste at WIPP.

SEC. 3116. DISPOSITION OF WEAPONS-USABLE PLUTONIUM.

(a) CONSTRUCTION AND PROJECT SUPPORT ACTIVITIES AT MOX FACILITY.—

(1) IN GENERAL.—Using funds described in paragraph (2), the Secretary of Energy shall carry out construction and project support activities relating to the MOX facility.

(2) FUNDS DESCRIBED.—The funds described in this paragraph are the following:

(A) Funds authorized to be appropriated by this Act or otherwise made available for fiscal year 2017 for the National Nuclear Security Administration for the MOX facility for construction and project support activities.

(B) Funds authorized to be appropriated for a fiscal year prior to fiscal year 2017 for the National Nuclear Security Administration for the MOX facility for construction and project support activities that are unobligated as of the date of the enactment of this Act.

(b) ASSESSMENT OF THE MOX FACILITY CONTRACT BY OWNER'S AGENT.—

(1) ARRANGEMENT WITH OWNER'S AGENT.—Not later than 30 days after the date of the enactment of this Act, the Secretary of Energy shall enter into an arrangement pursuant to sections 1535 and 1536 of title 31, United States Code, with the Chief of Engineers to act as an owner's agent with respect to preparing the report required by paragraph (2).

(2) REPORT OF OWNER'S AGENT.—

(A) IN GENERAL.—The Chief of Engineers shall prepare a report on the contract for the construction, management and operations of the MOX facility, as in effect on the date of the enactment of this Act, that includes the following:

(i) An assessment of the contractual, technical, and managerial risks for the Department of Energy and the contractor.

(ii) An assessment of what elements of the contract can be changed to—

(I) a fixed price provision;

(II) a fixed price incentive fee provision; or

(III) another contractual mechanism designed to minimize risk to the Department of Energy while reducing cost.

(iii) An assessment of the options under clause (ii), including milestones, cost, schedules, and any damage fees for those options.

(iv) Recommendations on changes to the contract, based on the assessments described in clauses (i), (ii), and (iii), to reduce risk and cost to the Department of Energy while preserving a fair and reasonable contract.

(v) For each element of the contract that the Chief of Engineers does not recommend be changed pursuant to clause (iv), an assessment of the risks and costs associated with that element and a description of why

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that element is not appropriate for the provision types described in clause (ii).

(B) CONSULTATIONS.—In preparing the report required by subparagraph (A), the Chief of Engineers shall consult with the Secretary, the contractor referred to in subparagraph (A)(i), and other knowledgeable parties, as the Chief of Engineers considers appropriate.

(C) SUBMISSION TO SECRETARY.—Not later than 30 days after entering into the arrangement under paragraph (1), the Chief of Engineers shall submit to the Secretary the report required by subparagraph (A).

(3) SUBMISSIONS BY DEPARTMENT OF ENERGY.—Not later than 60 days after receiving the report required by paragraph (2), the Secretary shall transmit to the congressional defense committees and the Comptroller General of the United States—

(A) the report;

(B) any comments of the Secretary with respect to the report;

(C) a determination of whether the contractor referred to in paragraph (2)(A)(i) will or will not agree to the revisions to the contract recommended by the Chief of Engineers and offered by the Secretary to the contractor;

(D) if the contractor will not agree to such revisions, a description of the reasons given for not agreeing to such revisions; and

(E) any other materials relating to the potential modification of the contract that the Secretary considers appropriate.

(4) BRIEFING BY GOVERNMENT ACCOUNTABILITY OFFICE.—Not later than 30 days after receiving the report and other matters under paragraph (3), the Comptroller General of the United States shall brief the congressional defense committees on the actions taken by the Secretary under this subsection, to be followed by a written report not later than 120 days after the briefing is provided to Congress.

(c) DEFINITIONS.—In this section:

(1) MOX FACILITY.—The term “MOX facility” means the mixed-oxide fuel fabrication facility at the Savannah River Site, Aiken, South Carolina.

(2) PROJECT SUPPORT ACTIVITIES.—The term “project support activities” means activities that support the design, long-lead equipment procurement, and site preparation of the MOX facility.

SEC. 3117. DESIGN BASIS THREAT.

(a) UPDATE TO ORDER.—Not later than 30 days after the date of the enactment of this Act, the Secretary of Energy shall update Department of Energy Order 470.3B relating to the design basis threat for protecting nuclear weapons, special nuclear material, and other critical assets in the custody of the Department of Energy.

(b) SENSE OF CONGRESS.—It is the sense of Congress that—

(1) the intelligence community (as defined in section 3(4) of the National Security Act of 1947 (50 U.S.C. 3003(4))) should promulgate regular, biannual updates to the Nuclear Security Threat Capabilities Assessment to better inform nuclear security postures within the Department of Defense and the Department of Energy;

APPENDIX 2 - PROJECT TIMELINE

Key Milestones

- March 1999 –DOE awarded a contract to MOX Facility Contract to Duke, Cogma, Stone & Wester, LLC which is now known as Chicago Bridge & Iron (CB&I)/AREVA MOX Services, LLC (MOX Services)
- 2000- NNSA was established by Congress as a separately organized agency within the DOE, responsible for the management and security of the nation’s nuclear weapons, nuclear nonproliferation, and naval reactor programs
- March 2005 – NRC authorized MOX construction
- April 2007-Cost and Schedule Baseline was approved; ~\$4.8B with a scheduled contract completion of Sept 2016
- August 2007 – Construction begins
- July 2011- Per NNSA, MOX Services verbally advised NNSA the project was ‘still on budget and on schedule’
- June 2012- NNSA requested baseline change from the contractor
- August 2012 –MOX Services provided NNSA a revised baseline
- March 2013-Main Process Building concrete placement
- April 2013- DOE/NNSA announced a construction slowdown
- 2014- POTUS orders DOE to look at other Nuclear Non-Proliferation Program alternatives; Funding level for MOX project was \$320M
- 2015- MOX Services sell out total interest in nuclear construction portfolio except for the Mixed Fuel Fabrication Facility (MFFF)
- March 2016-Per NNSA, Shaw AREVA MOX Services, LLC claims that design is complete
- July 2016 MOX Services provides NNSA a revised baseline indicating a total cost at completion (TCC) for the project of \$9.9B and a completion date in 2029. Note MOX Services estimate with 85% certainty and based on a continued funding profile of \$350M/year.
- August 2016 – DOE-PM (with assistance from USACE) provides an independent assessment of the project total cost of \$17.2B and a completion date of 2048. Note that the USACE estimate 95% certainty and based on a continued funding profile of \$350M/year. The estimate was provided to the Government Accounting Office (GAO) for review.
- August 2016 – NNSA requested a FFP proposal from MOX Services to complete all work through CLIN 2
- October 2016 – End of Period of Performance for CLIN 2 (IAW conformed contract)
- December 2016 – FY17 NDAA signed by POTUS
- January 2017 – USACE team, led by SAS, begins MOX project assessment

APPENDIX 3 -- BACKGROUND INFORMATION ON THE CURRENT MOX CONTRACT

The original MOX contract was awarded in March 1999 as a construction management services contract (under FAR Part 37). The contract included design as a base contract line item (CLIN), and three optional line items: 1) construction and cold-start; 2) Operations & Maintenance of the facility; and 3) Deactivation of the facility. The contract was awarded with an estimated base CLIN cost of \$116,613,863.00. The contract included fixed fees (FF), incentive/milestone fees (IF), and award fees (AF). Option 1 (CLIN 0002) to construct the facility was exercised on 31 July 2007, via modification A112, and initially definitized under modification A124 for an estimated cost of \$2,677,801,149.00. As previously stated, the contractor has evolved throughout the life of this contract from Duke Energy, Cogema, Stone and Webster LLC into Shaw AREVA, and now Chicago Bridge & Iron (CB&I)/AREVA MOX Services, LLC (MOX Services). As a construction management services contract, the contractor was prohibited from self-performing construction activities. However, in Modification A152, issued in March 2010, this changed. Based on initial FFP subcontractor structural construction packages that far exceeded estimated costs, the contractor suggested that self-performing some of the construction work would be more cost effective. The current conformed copy (through Modification 255 executed on 14 December 2016) includes the same fee structure, as well as two CLINs that are or will be firm fixed price (FFP). The table below represents the current contract type by CLIN and estimated cost IAW section B (Schedule) of the conformed contract. In response to RFI #28, NNSA provided the actual/revised estimate, expended to date, percent expended and percent project work complete.

CLIN	Description	CLIN Type	Estimated Cost/Fee per Contract	Actual/Revised Estimate	Expended to Date	%Project Work Complete
0001 BASE	Base – Design/Fuel Activities	FF, IF	\$384,743,860	\$384,743,860	\$232,571,778	100%*
0002 OPT 1	Design Construct Cold Start - Exercised	FF, IF, AF	\$5,070,855,913	\$17,000,000,000 **	\$4,741,385,724	< 50%*
0003 OPT 2	Hot Start/Operations	TBD	TBD	N/A	N/A	N/A
0004 OPT 3	Deactivation	FFP	TBD	N/A	N/A	N/A
0005	Other MOX activities	FF	\$10,447,767	\$10,447,767	\$9,874,786	95%
0006	Technology/Transfer Fee	FFP	\$28,200,000	\$28,200,000	\$10,018,691	36%
0007	Fees (Fixed, Incentive, Award)***	N/A	\$254,622,632	\$185,299,761	\$158,150,524	N/A
Total Estimated Price (as of Modification 255):			\$5,748,910,172	\$17,608,691,388	\$5,152,001,503	

* Percent Work Complete for CLIN 0001 is based on the contractor's assertion of 100%. Percent Work complete for CLIN 0002 is based on the USACE team's assessment after site visit.

**Revised estimate for CLIN 0002 is based on the August 2016 Updated PB.

The period of performance for construction has ended based on the current baseline.²⁷ The contractor is no longer eligible to receive incentives fees, so the contractor has no real motivation to control costs or schedule. Although MOX Services asserts the building is ~72% complete, this estimate is inflated based on the inordinate amount of accelerated material purchases made but not yet installed in the facility.

CLIN 0003 (Operations) has not yet been negotiated, though it appears the intent of the current contract is for Operations of the MOX Facility to be cost-reimbursement.

In addition, CLIN 0004 (Deactivation) has not yet been negotiated, though it appears the intent is for a firm-fixed fixed price approach. De-activation is not within the scope of this assessment and will not be discussed further. Similarly, the remaining CLINs are not within the scope of this assessment and will not be further discussed.

In 2012, NNSA identified the need for an updated project baseline. At that time, MOX estimated a TCC of \$7.7B and a completion date of 2019 based on annual project funding of \$630M. The NNSA instituted a construction slowdown to re-evaluate the project. Since 2013, several additional project estimates have been developed by MOX Services, the DOE-PM office (with assistance from USACE and others ranging from \$8.5B to \$21.5B to complete the project with completion dates ranging from 2023 to 2048.

Due to the increased uncertainty regarding project costs and schedule, NNSA requested a Firm Fixed Price (FFP) proposal from MOX Services on August 19, 2016.²⁸ Back-and-forth communication occurred between the parties through November 2016, though it has not resulted in an acceptable path forward. For example, MOX Services provided correspondence back to NNSA stating ‘the NNSA does not have the legal authority to enter into an incrementally funded firm fixed price contract for a single capital construction project.’ NNSA has provided materials evidencing its position that it has legal authority to enter into this type of contractual arrangement. This report takes no position on this dispute, other than to note that Congress may authorize an incrementally funded fix price contract by statute. Given MOX Services’ concerns regarding the legal authority for this type of arrangement, and the large scope and nature of this contract, it may be beneficial for Congress to specifically authorize incremental funding for this project, regardless of whether such authorization is actually necessary.

²⁷ NNSA presentation “USACE NDAA – MOX Overview” Page 17, dated January 18, 2017.

²⁸ NNSA presentation “USACE NDAA – MOX Overview” Page 16, dated January 18, 2017

APPENDIX 4 – ANALYSIS OF CONTRACT TYPE

Analysis of Firm-Fixed-Price (FFP) Contract Type: A firm-fixed-price contract is best suited when a requirement is defined; price can be determined from the outset; and financial risks are otherwise insignificant.²⁹ Under this contract type, the risk shifts from the Government to the contractor. The contractor is motivated to complete the project on time and more efficiently to improve their profit margins.

NNSA does not agree with MOX Services that a 100% design actually exists for the project. Assuming a 100% design is readily available, the contractor will likely submit a FFP proposal to the Government with built-in contingencies to offset the level of financial risks with the current state and nature of the project which would preclude the Government's ability to negotiate a fair and reasonable price. It is estimated that a FFP proposal may not be available to the Government to permit negotiations for 18 – 24 months. This time is in addition to the 12 – 18 months required to define elements of work to be completed, determine a realistic work breakdown schedule, place the facility in caretaker status, and settle all existing subcontracts. Converting the contract type for a partially completed facility from a cost contract to a fixed price contract will prove difficult until the elements of work are quantified. Furthermore, the risk to the contractor in obtaining adequate performance and payment bonds (or alternative payment protections) under the FFP arrangement is high.³⁰

Assuming that there is a work slow-down to prevent further costs to be incurred and to provide the necessary time for the development and negotiation of a FFP proposal, the contractor may have difficulty retaining existing technical and construction personnel, since this is one of the only remaining nuclear projects remaining in their portfolio. A pause of any significant time in this contract has the potential to affect the efficiency of the NQA-1 program that has been developed for this project in this region of the country. . A pause will potentially reset this program back such that the supply side material providers and the skilled labor installers will need retraining and retooling to come back up to speed with this requirement.

Additionally, funding necessary to complete the project on a firm-fixed-price basis would need to be allocated accordingly to provide a level of certainty to the contractor regarding the ability to properly fund the contract to project completion. Based on current project performance/status and historical funding of DOE Major System Acquisitions which have funded one-of-a-kind nuclear facilities NNSA believes that the optimal funding ranges from \$500M to \$650M.³¹ The ability to receive a funding profile to match the projected cost expenditures in the contractor's proposal is uncertain. If the Government cannot meet the funding profile, the contract will need to be renegotiated.

The Government's managerial risks would be reduced, primarily by transferring many of the current risks to the contractor. Risks related to staffing and to schedule quality and focus would become contractor risks in a FFP scenario. The Government's risk in the apparent under-resourcing of the NNSA project office would be reduced, since the Government's management and oversight role for a FFP construction contract is significantly less in comparison to the roles for a cost reimbursable contract. In addition, the contractor would only need an equivalent EVMS system but it would not have to be certified. Therefore, the current risk represented by the decertification of the contractor's EVMS would no longer be

²⁹ FAR 16.202-2

³⁰ FAR 28.102

³¹ NNSA Response to RFI #7

applicable under the FFP construct.³² Finally, the contractor's identified risk in recruitment and retention of skilled trades personnel would be reduced by the project certainty associated with a negotiated FFP contract.

Analysis of Fixed-Price with Award Fee (FPAF): The contract type is appropriate when the work to be performed is such that it is neither feasible nor effective to devise predetermined objective incentive targets applicable to cost, schedule, and technical performance. Award-fee provisions may be used in fixed-price contracts when the Government wishes to motivate a contractor and other incentives cannot be used because contractor performance cannot be measured objectively (FAR 16.404). The likelihood of meeting acquisition objectives will be enhanced by using a contract that effectively motivates the contractor toward exceptional performance and provides the Government with the flexibility to evaluate both actual performance and the conditions under which it was achieved. Any additional administrative effort and cost required to monitor and evaluate performance are justified by the expected benefits as documented by a risk and cost benefit analysis which would be included in the Determination and Findings referenced in FAR 16.401(e)(5)(iii).

Success in utilizing this format would depend on structuring the award fee evaluation factors appropriately. In addition, the FPAF construct will require more oversight than the FFP construct due to an increased responsibility for evaluating and documenting the contractor's performance to justify payment of award fees, which is subjective. Consequently, from a management risk perspective, the NNSA's project office resourcing risk would not be reduced as much as in the FFP scenario.

These risks are in addition to those identified under the FFP contract type.

Analysis of Fixed-Price Incentive (Firm Target) [FPI(F)]: This contract type is appropriate when the parties can negotiate (at the outset) a firm target cost, target profit, and profit adjustment formula that will provide a fair and reasonable incentive to control costs and to deliver the project. A ceiling can be established to cover the most probable risks inherent to the work. Per FAR 16.403-1, this contract type can only be used when there is adequate cost or pricing information available for both parties to establish reasonable firm targets at the time of contract award. In addition, this approach will allow both parties flexibility in the pricing to account for unknowns. Under this alternative the Government will motivate contractor to underrun costs and deliver early.

It may be unrealistic to expect the contractor to submit a FPI(F) proposal and firm schedule to the Government without building in substantial contingencies to offset the level of financial risks with the current state and nature of the project. If the Government permits the contractor the time necessary to reach a level of cost certainty (with reasonable contingencies), it is estimated that a FPI(F) proposal may not be available to the Government and subsequently permit negotiations for 18 – 24 months, or less (because of reduced level certainty required for this contract type). This time is in addition to the 12 – 18 months required to define elements of work to be completed, determine a realistic work breakdown schedule, place the facility in caretaker status and settle all existing subcontracts. Converting the contract type for a partially completed facility from a cost contract to a FPI(F) will prove difficult until the elements of work are quantified. Furthermore, the risk to the contractor in obtaining adequate performance and payment bonds (or alternative payment protections) (FAR 28.102) under the FPI(F) arrangement is high.

As with a FFP Contract type, it is assumed a work slow-down would be implemented to prevent further

³² [DOE 413.3B, Program and Project Management for the Acquisition of Capital Assets, DOE O 413.3B Chg2 \(11/29/10\)](#)

costs to be incurred and provide time for the development and negotiation of a FPI(F) proposal. This would present the same challenges for retention of staff and associated impacts outlined above under the analysis of FFP Contract Type.

Additionally, funding necessary to complete the project on a FPI(F) basis would need to be allocated accordingly to provide a level of certainty to the contractor regarding the ability to properly fund the contract to project completion. Based on current project performance/status and historical funding of DOE Major System Acquisitions which have funded one-of-a-kind nuclear facilities NNSA believes that the optimal funding ranges from \$500M to \$650M.³³ The ability to receive a funding profile to match the projected cost expenditures in the contractor's proposal is uncertain. If the Government cannot meet the funding profile, the contract will need to be renegotiated. Incremental funding of a fixed price contract limits the contractor's liability, which introduces risk to the Government. The contractor has no duty to perform beyond an amount obligated, and if additional funds are not authorized, the Government may pay the contractor appropriate termination costs under the terms of the contract.

The Government's managerial risks would be reduced, primarily by transferring many of the current risks to the contractor. Risks related to staffing and to schedule quality and focus would become a shared risk between the Government and contractor. The Government's risk in the apparent under-resourcing of the NNSA project office would be reduced, since the Government's management and oversight role for a FPI(F) construction contract is less in comparison to the roles for a cost reimbursable contract. In addition, the current risk represented by the decertification of the contractor's EVMS is still applicable to the FPI(F) contract type.³⁴ Finally, the contractor's identified risk in recruitment and retention of skilled trades personnel would be reduced by the project certainty associated with a negotiated FPI(F) contract.

Additionally, the contractor's cost accounting system must be adequate for determining costs applicable to the contract.³⁵ Currently, there are concerns whether the contractor's cost accounting system is adequate. An audit of the contractor's CAS Disclosure Statement and the accounting systems will need to be conducted and any deficiencies corrected before work could be conducted under this contract type.³⁶ This contract type does not require an approved purchasing system.³⁷

A FPI(F) structure offers the same level of managerial risk reduction and transfer as the FFP contract type. The nature of the firm target incentive is objective rather than subjective, and therefore does not impact the Government's staffing requirements the same way other incentives might.

Analysis of Fixed-Price Incentive (Successive Targets) [FPI(S)]: This contract type is appropriate when cost or pricing information is not sufficient at the initiation of the project.³⁸ In this scenario, both parties establish an initial target cost, initial target profit, and initial profit adjustment formula. Later, both parties negotiate either a FFP or negotiate firm targets and a formula for establishing final profit and price.

While there would be additional information later in the contract, the information may not make negotiation with the contractor more productive. First, the contractor may have little incentive to propose a FFP below the ceiling price which would exclude the Government from sharing in cost savings.

³³ NNSA response to RFI #7

³⁴ [DOE 413.3B, Program and Project Management for the Acquisition of Capital Assets, DOE O 413.3B Chg2 \(11/29/10\)](#)

³⁵ FAR 16.403-1(c)

³⁶ FAR Appendix 1

³⁷ FAR 44.301

³⁸ FAR 16.403-2

Second, if the Government rejected the FFP proposal, the contractor may want to renegotiate higher final targets and a higher final profit formula and the Government would be at a disadvantage during follow-on negotiations since it would need to complete the project without delay resulting in little bargaining power.

From a managerial risk perspective, the FPI(S) contract type presents almost the same level of risk to the Government as would a cost reimbursable contract. The re-establishment of targets throughout the life of the contract requires that the Government manage and oversee the progress of the project with a much higher level of scrutiny than other FFP contract types would require. While there are still advantages to the Government in the transfer of staffing and process risks to the contractor, the Government does retain some level of schedule and cost risk.

These risks are in addition to those identified under the FPI(F) contract type, with the exception of requiring a complete design.

Analysis of Cost-Plus-Incentive-Fee: This contract type is appropriate when a cost-reimbursement contract is necessary and a target cost and a fee adjustment formula can be negotiated that are likely to motivate the contractor to manage effectively.³⁹ A cost-reimbursable contract is appropriate when circumstances do not allow the agency to define its requirements sufficiently to allow for a fixed-price type contract; or uncertainties involved in contract performance do not permit costs to be estimated with sufficient accuracy to use any type of fixed-price contract. A properly structured incentive arrangement can motivate the contractor to control costs and schedule.

Funding necessary to complete the project at the negotiated estimated cost plus any potential contingent liabilities (cost overruns) would need to be allocated accordingly to provide a level of certainty to the contractor regarding the ability to properly fund the contract to project completion. The ability to receive a funding profile to match the projected cost expenditures in the contractor's proposal and for any potential contingent liability is uncertain. If the funding profile does not materialize in any given fiscal year, the contractor may be entitled to an adjustment to the incentive fee. In accordance with FAR 52.232-22(c)(1), the Contractor shall notify the Contracting Officer in writing whenever it has reason to believe that the costs it expects to incur under this contract in the next 60 days, when added to all costs previously incurred, will exceed 75 percent of the total amount so far allotted to the contract by the Government.⁴⁰

As with an FPI(F) and other cost type contracts, the contractor's cost accounting system must be adequate for determining costs applicable to the contract and there is uncertainty whether the contractor's current cost accounting system is compliant. According to NNSA there is no record for approval of the accounting system. Furthermore, the adequacy and compliance of their CAS Disclosure statement was highlighted as a risk in the Cohn Reznick report.⁴¹ An audit of the contractor's CAS Disclosure Statement and the accounting systems would need to be reviewed prior to the start of work and continuing on a regular basis (at a minimum every three years). This will help to ensure that any deficiencies are corrected before work could be conducted under this contract type.

³⁹ FAR 16.405-1

⁴⁰ FAR 52.232-22(c)(1)

⁴¹ CB&I AREVA MOX Services, LLC Risk Assessment and Audit Priority Analysis, November 2016 by Cohn Reznick, Contract Audit & Advisory Services (Note: This document is not available for general release.)

Furthermore, FAR 44.301 states, the objective of a contractor purchasing system review (CPSR) is to evaluate the efficiency and effectiveness with which the contractor spends Government funds and complies with Government policy when subcontracting.⁴² The review provides the contracting officer a basis for granting, withholding, or withdrawing approval of the contractor's purchasing system. If the contractor uses other than FFP subcontracts, the contractor is required to have an approved purchasing system. Otherwise, all subcontracts would need to be reviewed and approved by NNSA.

Finally, according to DOE 413.3B cost type contracts valued at \$20M or more requires an approved Earned Value Management System (EVMS) shall comply with EVMS guidelines in the American National Standards Institute/ Electronic Industries Alliance System (ANSI/EIA-748).⁴³

Under the CPIF structure the contractor would once again be incentivized to control costs and efficiently manage the work to a timely and successful completion. This would reduce the schedule risks from the level currently experienced, but only if the incentives were structured with milestones tied firmly to successful completion of definable features of work.

Analysis of Cost-Plus Award Fee: The contract type is appropriate when the work to be performed is such that it is neither feasible nor effective to devise predetermined objective incentive targets applicable to cost, schedule, and technical performance; the likelihood of meeting acquisition objectives will be enhanced by using a contract that effectively motivates the contractor towards excellence in cost, schedule and technical performance⁴⁴; provides the Government with the flexibility to evaluate both actual performance and the conditions under which it was achieved; and any additional administrative effort and cost required to monitor and evaluate performance are justified by the expected benefits as documented by a risk and cost benefit analysis to be included in the Determination and Findings referenced in FAR 16.401(e)(5)(iii).⁴⁵

Under this contract type, funding necessary to complete the project at the negotiated estimated cost plus any potential contingent liabilities (cost overruns) would need to be allocated accordingly to provide a level of certainty to the contractor as discussed in the analysis of CPIF.

As with an FPI(F) and other cost type contracts, the contractor's cost accounting system must be adequate for determining costs applicable to the contract and there is uncertainty whether the contractor's current cost accounting system is compliant.

Success in utilizing a CPAF contract would depend on structuring the award fee evaluation factors appropriately. In addition, the CPAF construct will require more oversight due to an increased responsibility for evaluating and documenting the contractor's performance to justify payment of award fees, which is subjective. Consequently, from a management risk perspective, the NNSA's project office resourcing risk would not be reduced as much as any of the preceding contract types.

Restructuring the contract to cost plus award fee would not offer any significant reduction in Government risk as compared to the current contractual arrangement, beyond those items stated as common to any contract restructuring.

⁴² FAR 44.301

⁴³ [DOE 413.3B, Program and Project Management for the Acquisition of Capital Assets, DOE O 413.3B Chg2 \(11/29/10\)](#)

⁴⁴ FAR 16.405-2

⁴⁵ FAR 16.401(e)(5)(iii)

Analysis of Cost-Plus-Fixed-Fee: A cost-reimbursable contract is appropriate when circumstances do not allow the agency to define its requirements sufficiently to allow for a fixed-price type contract; or uncertainties involved in contract performance do not permit costs to be estimated with sufficient accuracy to use any type of fixed-price contract.⁴⁶ In this case, the contractor claims that there are 100% design documents that can be utilized for the construction of the project; however there are unknowns with the regards to construction that is already completed plus the amount of potential rework that may be required. The assessment conducted by the USACE team revealed that the design is likely nowhere near being complete, since electrical conduit and cable tray installation, wiring, and termination of both power, low voltage, and instrumentation is non-existent. The unknowns are not so significant that they cannot be quantified at some future date during the project construction.

Funding necessary to complete the project at the negotiated estimated cost plus any potential contingent liabilities (cost overruns) would need to be allocated accordingly to provide a level of certainty to the contractor regarding the ability to properly fund the contract to project completion. The ability to receive a funding profile to match the projected cost expenditures in the contractor's proposal and for any potential contingent liability is uncertain. If the funding profile does not materialize in any given fiscal year, the contractor may be entitled to an adjustment to the incentive fee. In accordance with FAR 52.232-22(c)(1), the Contractor shall notify the Contracting Officer in writing whenever it has reason to believe that the costs it expects to incur under this contract in the next 60 days, when added to all costs previously incurred, will exceed 75 percent of the total amount so far allotted to the contract by the Government Under this contract type, funding necessary to complete the project at the negotiated estimated cost plus any potential contingent liabilities (cost overruns) would need to be allocated accordingly to provide a level of certainty to the contractor as discussed in the analysis of CPIF.⁴⁷

As with an FPI(F) and other cost type contracts the contractor's cost accounting system must be adequate for determining costs applicable to the contract and there is uncertainty whether the contractor's current cost accounting system is compliant.

⁴⁶ FAR 16.306

⁴⁷ FAR 52.232-22(c)(1)

APPENDIX 5 – ACRONYMNS

ACWP	Actual Cost of Work Performed
AE	Architect-Engineer
AF	Award Fee
ANSI	American National Standards Institute
B	Billion
CAS	Cost Accounting Standards
CB&I	Chicago Bridge & Iron
CLIN	Contract Line Item
CO	Contracting Officer
COA	Course of Action
COTS	Commercial Off the Shelf
CP	Cost Plus
CPAF	Cost-Plus Award Fee
CPIF	Cost-Plus Incentive Fee
CPFF	Cost-Plus Fixed Fee
CSRA	Cost and Schedule Risk Analysis
DB	Design Build
DBB	Design Bid Build
DCAA	Defense Contract Audit Agency
DCMA	Defense Contract Management Agency
DOD	Department of Defense
DOE	Department of Energy
DOE-PM	DOE Office of Project Management Oversight and Assessments
EAC	Estimate at Completion
EIA	Electronic Industry Alliance
EVMS	Earned Value Management System
FAR	Federal Acquisition Regulations
FF	Fixed Fee
FPAF	Fixed Price with Award Fee
FPI(F)	Fixed Price Incentive (Firm Target)
FPI(S)	Fixed Price Incentive (Successive Targets)
FFP	Firm Fixed Price
FT	Firm Target
FOAK	First of a Kind
GAO	Government Accountability Office
HVAC	Heating, Ventilation and Air Conditioning
IAW	In Accordance With
IF	Incentive Fee
IGE	Independent Government Estimate
J&A	Justification and Approval
LLC	Limited Liability Company
M	Million
MA	Management Accounts
MEP	Mechanical/Electrical/Plumbing

MFFF	MOX Fuel Fabrication Facility
MOX	Mixed Oxide
NAS	Network Analysis Schedule
NDAA	National Defense Authorization Act
NNSA	National Nuclear Security Agency
NQA-1	Nuclear Quality Assurance-1
NRC	Nuclear Regulatory Commission
NTE	Not to Exceed
OTB	Over Target Baseline
PB	Performance Baseline
PMDA	Plutonium Management and Disposition Agreement
POTUS	President of the United States
RFI	Request for Information
RFP	Request for Proposal
SAS	U.S. Army Corps of Engineers, Savannah District
SOP	Standard Operating Procedure
ST	Successive Target
TBD	To Be Determined
TPC	Total Project Cost
TCC	Total Cost at Completion
US	United States
USACE	U.S. Army Corps of Engineers

APPENDIX 6 – REFERENCES

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Attachment G to Raines Declaration



Mr. Lance Nyman
Lead Contracting Officer
US Department of Energy, NNSA
Savannah River Site Office
P.O. Box A
Aiken, SC 29802

13 June 2017

DCS-DOE-005687

Response Required: No
Response Required By: N/A

Subject: Contract No. DE-AC02-99CH10888, MOX Fuel Fabrication Facility Project, USACE Contract Recommendations

Reference: NNSA Letter NA-APM-17-0209, dated 6 June 2017

Dear Mr. Nyman:

In response to the referenced letter, below please find CBI AREVA MOX Services, LLC (MOX Services) responses to the five questions regarding the subject recommendations.

NNSA Question 1

Will MOX Services execute a bilateral agreement to fully and irrevocably convert the CLIN 0002 work scope to a FPI(F) contract type?

MOX Services Response

MOX Services accepts the recommendation of the U.S. Army Corp of Engineers (USACE) to proceed with a two-phased approach where phase one involves a rebaselining of the project and reaching agreement on the final design, existing as-fabricated or built condition of the structures, systems and components, as well as roles, responsibilities, authorities and accountabilities; and under phase two, once an agreement has been reached on these issues, changing the contract to a Fixed-Price Incentive Firm Target (FPIF). We agree with the USACE finding that this approach, with phase one as an interim measure, will allow MOX Services to continue working and retain necessary technical and construction craft. As such, MOX Services stands ready to execute a bi-lateral agreement consistent with the recommendation in the USACE study.

NNSA Question 2

If not, please identify which subset(s) of the CLIN 0002 scope of work MOX Services is not willing to convert to a FPI(F) contract type, and explain why.

MOX Services Response

As noted in the answer to Question 1, MOX Services accepts the recommendation of the USACE and stands ready to implement the two-phase process defined in that

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13 June 2017
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recommendation. MOX Services is willing to consider conversion of all subsets of the CLIN 0002 scope of work to a FPI(F) contract structure. Under the rebaseline process of phase one of this recommendation, it is possible that MOX Services and NNSA mutually agree that certain subsets of the scope are not appropriate for a FPI(F) structure. Additionally, the parent companies of MOX Services will need to follow their internal corporate governance processes for review and approval of any new contract. Having said this, MOX Services does not see any impediment to being able to successfully implement the USACE recommendation, consistent with the language in Section 3116(b)(2) of the National Defense Authorization Act to "reduce risks and costs to the Department of Energy while preserving a fair and reasonable contract."

NNSA Question 3

By what date can MOX Services provide a bounding (i.e., not –to-exceed) FPI(F) estimate to the Department?

MOX Services Response

It is MOX Services understanding that the USACE study estimated a timeline for implementing the two phase process of their recommendation that includes 12 to 18 months to define existing status; 18 to 24 months for preparation of RFP and negotiations; and one month for award. MOX Services is confident that, working cooperatively with NNSA, we can achieve a substantial improvement to this timeline and can provide a bounding FPI(F) estimate within 12 months of receipt of the RFP from NNSA. Through the rebaseline process described in the USACE recommendation, the RFP is the key element necessary to fully evaluate and price the risks associated with a FPI(F) approach to completing the CLIN 0002 scope.

NNSA Question 4

MOX Services' respective Estimates at Completion delivered in 2015 and 2016 indicate approximately \$10B as a bounded cost under the current contract type. In its presentation to the USACE, MOX Services indicated there was a risk premium associated with performing this work under a fixed price contract. What is the risk premium MOX Services would include in order to convert to a FPI(F) contract as recommended?

MOX Services Response

MOX Services will provide the risk premium as part of the bounding estimate described in our response to question 3 above.

NNSA Question 5

Will MOX Services agree to a more efficient approach to construction (compared to the status quo) to focus on reaching agreement on design status, validation of work in place,

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and development of a new project baseline? If yes, what staffing and spending profile would MOX Services implement over the next 6-12 months? If not, why not?

MOX Services Response

MOX Services is agreeable to working with NNSA on ensuring an efficient approach to construction while implementing the USACE recommendation. MOX Services will provide a staffing and spending profile within 30 days of receipt of formal direction consistent with applicable Congressional funding and authorization directives.

MOX Services is fully committed to completing this important non-proliferation project.

If you have any questions or need any additional information regarding this subject please don't hesitate to contact the undersigned at 803-819-8654.

Sincerely,


Rex Norton

VP, Contracts and Supply Chain Management
CBI AREVA MOX Services, LLC

cc: NNSA
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