The Secretary of Energy
Washington, DC 20585

May 10, 2018

[redacted]

Section 3121 of the *National Defense Authorization Act for Fiscal Year 2018 (FY 2018 NDAA)* and section 309 of the *Consolidated Appropriations Act, 2018*, permits the Secretary of Energy to waive the requirement to use funds for construction and project support activities relating to the Mixed Oxide (MOX) facility. This letter constitutes my execution of that waiver authority, consistent with section 3121 of the FY 2018 NDAA and section 309 of the *Consolidated Appropriations Act, 2018*.

I confirm that the Department is committed to removing plutonium from South Carolina intended to be disposed of in the MOX facility. We are currently processing plutonium in South Carolina for shipment to the Waste Isolation Pilot Plant (WIPP) and intend to continue to do so. At the same time, we are planning to install additional equipment for processing plutonium for removal from South Carolina and to increase the rate at which this removal can be carried out. We are also exploring whether any of the plutonium currently in South Carolina can be moved elsewhere for programmatic uses. I am also committed to ensuring a sustainable future for the Savannah River Site supporting the Department's many enduring national security missions, such as tritium production or other nuclear security efforts.

I certify that an alternative option for carrying out the plutonium disposition program for the same amount of plutonium intended to be disposed of in the MOX facility exists. The Department's alternative method for carrying out the 34 metric ton plutonium disposition program, the Dilute and Dispose approach, was evaluated using the National Nuclear Security Administration's Business Operating Procedure entitled "Analysis of Alternatives" and dated March 14, 2016 (BOP-03.07) and met its requirements. Furthermore, I certify that the remaining lifecycle cost for the Dilute and Dispose approach will be less than approximately half of the estimated remaining lifecycle cost of the MOX fuel program. The Department's independent cost estimate concluded that the remaining Dilute and Dispose lifecycle cost is $19.9 billion. The Department estimated the remaining lifecycle cost of the MOX fuel program to be $49.4 billion. The independent cost estimate for the Dilute and Dispose lifecycle cost was determined in a manner comparable to the cost estimating and assessment best practices of the

Government Accountability Office, as found in the document entitled "GAO Estimating and Assessment Guide" (GAO-09-3SP), and the estimates used were of comparable accuracy.

Finally, I certify that the Department will work with the State of New Mexico to address the capacity issues related to the receipt of the full 34 metric tons at WIPP. This can be accomplished by more accurately calculating the volumes disposed of at WIPP. A proposed permit modification to implement this new approach was discussed with stakeholders prior to being submitted to the New Mexico Environment Department on January 31, 2018.

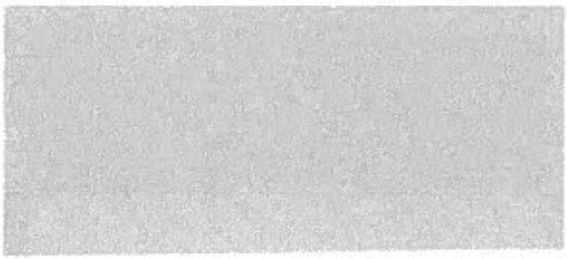
I appreciate the waiver authority Congress has provided me in the FY 2018 NDAA to cease MOX construction. Consistent with that authority and the certification provided in this letter, the Department will begin pursuing the Dilute and Dispose approach to plutonium disposition.

If you have any questions, please contact Jennifer Loraine, Deputy Assistant Secretary for Senate Affairs, at (202) 586-5450.

Sincerely,

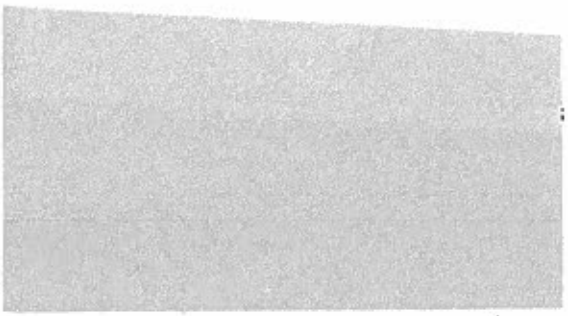
Rick Perry

Rick Perry



Department of Energy
Under Secretary for Nuclear Security
Administrator, National Nuclear Security Administration
Washington, DC 20585

May 10, 2018



Pursuant to Section 3141 of the *National Defense Authorization Act for Fiscal Year 2018* (Public Law 115-91), the Department of Energy's National Nuclear Security Administration (DOE/NNSA) is providing Congress with the Analysis of Alternatives (AoA) that was conducted in accordance with DOE's project management requirements, the Engineering Assessment, and the Workforce Analysis reports produced to inform the necessary recapitalization of NNSA's plutonium pit production capabilities.

The recommended alternative outlined below is consistent with the direction in the 2018 *Nuclear Posture Review* to ensure an "effective, responsive, and resilient nuclear weapons infrastructure" capable of adjusting to meet requirements and has been certified by the Chairman of the Nuclear Weapons Council. NNSA's recommended alternative is to repurpose the Savannah River Site's Mixed Oxide Fuel Fabrication Facility to produce 50 war reserve plutonium pits per year (PPY) in 2030. Concurrently, NNSA will continue to invest in Los Alamos National Laboratory (LANL) to produce an enduring 30 war reserve PPY in 2026. As practicable, NNSA will assess opportunities for LANL to produce above that quantity.

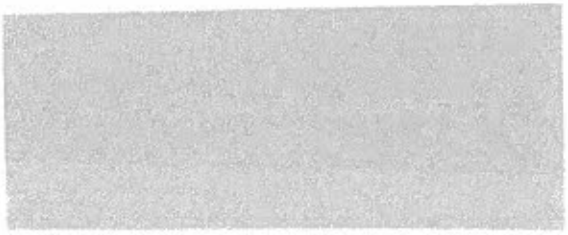
NNSA's recommended alternative is the optimal path forward for meeting requirements to produce 80 war reserve PPY in 2030 and managing the risks associated with increasing pit production while maintaining existing plutonium operations. LANL will remain the Nation's plutonium center of excellence as we work to ensure a resilient and responsive infrastructure for pit production for decades to come.

With the continued support of Congress, I am confident in the ability of the nuclear security enterprise to meet our pit production requirements. I look forward to continuing to work with you on this important national security matter. If you have any questions, please contact Ms. Nora Khalil, Associate Administrator for External Affairs, at 202-586-7332.

Sincerely,

Lisa E. Gordon-Hagerty

Lisa E. Gordon-Hagerty



Plutonium Pit Production Mission

"An effective, responsive, and resilient nuclear weapons infrastructure [that can] adapt flexibly to shifting requirements" - *2018 Nuclear Posture Review*

Future

Recapitalized infrastructure to produce 80 pits per year in 2030 across two NNSA sites

To meet stockpile requirements, NNSA's recommended alternative is to repurpose the Mixed Oxide Fuel Fabrication Facility (MOX) at the Savannah River Site (SRS) to produce 50 pits per year with an enduring mission of at least 30 pits per year at Los Alamos National Laboratory (LANL)

- Maintains LANL as the Nation's *Plutonium Center of Excellence for R&D*
- Is the lowest risk approach
- Improves resiliency, flexibility, and redundancy by not relying on a single site
- Meets requirements of Nuclear Weapons Council and direction of 2018 Nuclear Posture Review
- Informed by analysis of alternatives, engineering assessment, and workforce analysis conducted by internal and external experts

Mixed Oxide Fuel Fabrication Facility at Savannah River Site

More Responsive and Flexible Infrastructure

Savannah River Site

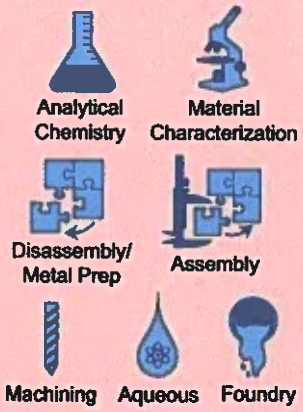
Mixed Oxide Fuel Fabrication Facility

Los Alamos National Laboratory

Radiological Laboratory Utility Office Building

Plutonium Facility 4

Activities



Present

Aging infrastructure that poses significant risk to pit production mission and our national security

LANL's Cold War-era Plutonium Facility 4 is the only site presently capable of plutonium pit production

Plutonium Facility 4 at Los Alamos National Laboratory

Past

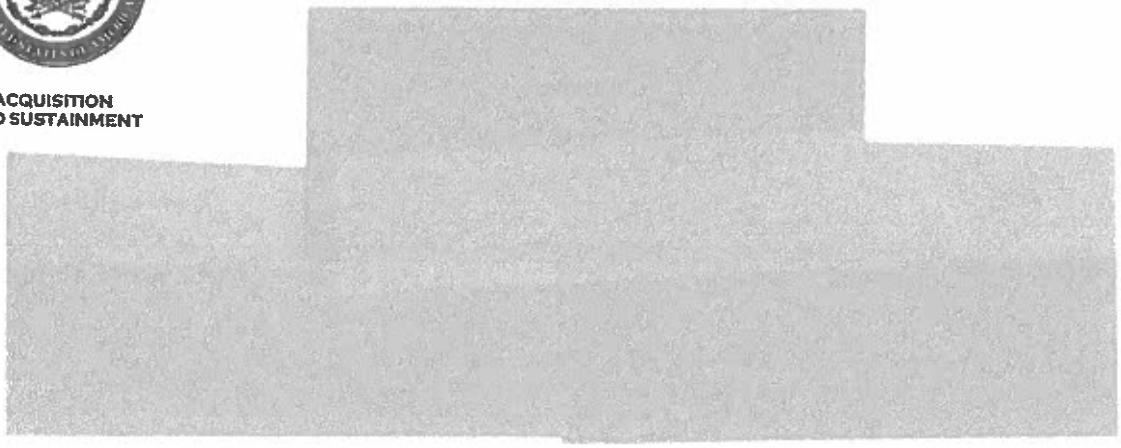
A vast, costly infrastructure to support a large nuclear stockpile during the Cold War

1,000 pits per year were produced at Rocky Flats, which closed in 1992 and was supported by the Pinellas Plant, the Hanford Site, SRS, LANL, and Lawrence Livermore National Laboratory

Rocky Flats Plant in Colorado

THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

ACQUISITION
AND SUSTAINMENT



This letter provides the written certification from the Nuclear Weapons Council (NWC) Chairwoman required by section 3141 of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2018 (Public Law 115-91) regarding the Administrator for Nuclear Security recommended alternative for the Department of Energy's National Nuclear Security Administration (DOE/NNSA) plutonium capabilities. The recommended alternative is acceptable to the Secretary of Defense and NWC, and represents a resilient and responsive option to meet the Department of Defense (DoD) requirements for plutonium pit production capacity and capability.

The proposed strategy repurposes the Mixed-Oxide Fuel Fabrication Facility (MFFF), currently under construction at the Savannah River Site (SRS), and utilizes capabilities at the Plutonium Facility (PF)-4 at the Los Alamos National Laboratory (LANL). However, as reported in the DOE/NNSA Plutonium Production Engineering Assessment (EA), there are major construction and certification schedule risks inherent in the plan. DOE must address these risks to preclude failure to meet military requirements by 2030.

To reduce risk under any proposed strategy, it is essential that NNSA resource near-term surge pit production capacity at PF-4 to the fullest extent practicable. This surge capacity increase will hedge against potential schedule risks in repurposing MFFF, and ensure the two sites achieve additive production capacity of 80 war reserve pits per year, the minimum necessary to meet military requirements by 2030.

DoD examination of the proposed alternatives included a review of cost estimates in the EA. Recognizing that non-recurring costs of reutilizing the MFFF are lower, and the recurring costs of the two-site option are higher, the hybrid two-site solution provides significant strategic resilience, hedging against the risk of an interruption in production at one site due to technical, environmental, or other unanticipated issues. The recommended alternative has been reconciled with the 2013 Cost Assessment and Program Evaluation Business Case Analysis. The acquisition cost estimates appear consistent with history for high hazard material processing facilities. To reduce risk, the recurring and non-recurring cost estimates for the recommended alternative must be refined prior to the next construction major milestone decision point, estimated to be in year 2021.

This approach will require leadership and intense focus by DoD and NNSA to meet the 2030 timeline. I commit to working collaboratively with your Committee and NNSA to continue to examine areas where we can further reduce risks and take advantage of opportunities to improve both production and fiscal performance. The NWC will exercise regular coordination and monitoring of progress implementing the recommended alternative. Reestablishing a robust plutonium pit capability is a top priority for Secretary Mattis and Secretary Perry. I look forward to addressing any questions you might have.

Sincerely,

Ellen M. Lord
Chairwoman

Weapons Complex Morning Briefing

Leaked NNSA Report Sheds Light on Cost Estimate for MFFF Alternative

By ExchangeMonitor

A leaked report from a nominally independent office within the National Nuclear Security Administration offers a trove of new details about the cost estimate for a plan the agency must sell to Congress in order to start producing nuclear-warhead cores in South Carolina.

On Thursday, Energy Secretary Rick Perry said he would officially cancel the Mixed Oxide Fuel Fabrication Facility (MFFF) — intended to deweaponize 34 metric tons of surplus weapon-usable plutonium — and convert the unfinished building into a factory capable of annually making 50 fissile warhead cores called plutonium pits by 2030.

Perry cited authority given to him by Congress to cancel the facility if he could prove an alternative, called dilute and dispose, could deweaponize the plutonium for half the cost of finishing the MFFF. Perry said dilute and dispose would cost about $20 billion while MFFF would cost about $50 billion.

Now, a 37-page report from the NNSA's Cost Estimation and Program Evaluation office, obtained by the Union of Concerned Scientists and posted online Monday, fills in some of the details.

In inflation-adjusted terms, dilute and dispose would cost about $20 billion from 2019 through 2050, the CEPE office estimated in the study. That averages about $645 million per year.

Nearly $8 billion would be spent at the Los Alamos National Laboratory in New Mexico, which would process plutonium pits into plutonium oxide ahead of further downblending at the Savannah River Site's K-Area. Savannah River would take the next biggest share of dilute and dispose costs at around $6 billion, according to the internal NNSA report. The Waste Isolation Pilot Plant (WIPP), which would receive the processed plutonium, bears the third-largest share of the costs at about $1.2 billion inflation-adjusted dollars, the report says.

Transportation costs to WIPP from the Savannah River Site — an expense Rep. Mike Simpson (R-Idaho) has demanded the NNSA tally before it even thought of canceling the MFFF — would ring in at about $650 million over the life of the project. That includes both transportation and the criticality control overpack containers "and other containers" that would hold the material during the ride, according to the report.

Simpson and his colleagues on the House Appropriations Committee have their first opportunity to reject or accept the NNSA's estimates today during a markup of the agency's 2019 budget bill. The legislation, approved for a vote last week days before the agency announced its pit decision, funds MFFF and zeroes out the NNSA's request for dilute and dispose.

House NNSA Budget Would Fund Low-Yield Warhead, But Not Pit Production in S.C.

The National Nuclear Security Administration (NNSA) would get the $65 million it seeks in fiscal 2019 for a low-yield nuclear warhead, but nothing for a new warhead-core factory in South Carolina, under a budget bill approved Wednesday by the House Appropriations Committee.

Overall, the NNSA would receive more than $15 billion for 2019: 4.5 percent more than in 2018 and 1.5 percent more than the White House sought for the fiscal year that begins Oct. 1.

The bill passed the committee 29-20 along party lines and was not scheduled for a vote on the House floor at deadline Wednesday for *Weapons Complex Morning Briefing*.

The bill would provide $65 million for the NNSA to modify some existing W76 submarine-launched ballistic missile warheads beginning in 2019. Rep Barbara Lee (D-Calif.) offered and withdrew an amendment that would have defunded the low-yield warhead and spent the $65 million on NNSA nonproliferation programs in 2019.

The NNSA requested funding for the low-yield warhead last month as part of a series of modifications to the federal budget request it delivered to Capitol Hill in March. As a result, the House Appropriations energy and water development subcommittee, which writes the the agency's budget bill every year, never held a hearing about the weapon.

Meanwhile, the House NNSA budget as written would not fund the two-pronged pit-production strategy the agency announced last week, under which operations would be split between the Los Alamos National Laboratory in New Mexico and the Savannah River Site in South Carolina.

The strategy involves converting the unfinished Mixed Oxide Fuel Fabrication Facility (MFFF) at Savannah River into a factory capable of producing 50 of these fissile nuclear-warhead cores a year by 2030. Los Alamos would supply another 30 pits annually.

The NNSA budget approved Wednesday provides no funding for dilute-and-dispose, DOE's proposed replacement to the MFFF for elimination of 34 metric tons of nuclear weapon-usable plutonium, and includes $335 million for continued construction of the plant. Dilute-and-dispose involves chemically weakening the 34 metric tons of plutonium at proposed Savannah River Site facilities, mixing the material with concrete-like grout, then burying the resulting mixture at the Department of Energy's Waste Isolation Pilot Plant near Carlsbad, N.M.

On Wednesday, after House appropriators approved funding MFFF for another year, the local *Aiken Standard* newspaper reported the NNSA had frozen hiring and procurement at MFFF prime contractor CB&I AREVA MOX Services. The freeze went into effect Monday and could last up to 90 days, the newspaper reported.

The Senate Appropriations energy and water development subcommittee is set to mark up its version of the NNSA's 2019 budget next week.

ENR
Engineering News-Record

Digital Wire

This story was not reported, edited or fact-checked by ENR editors.

Energy Sec. Perry Formally Ends MOX Project at Savannah River Site

2018-05-12

Associated Press

AIKEN, S.C. (AP) — Energy Secretary Rick Perry has formally ended construction of a facility meant to reprocess weapons-grade plutonium and uranium into fuel for reactors, a key element of the nation's commitment to containing the global nuclear threat.

Perry executed a waiver on Thursday to terminate construction of the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site in South Carolina .

A day earlier, Perry called it a "historically questionable" expenditure in testimony before Congress about the Trump administration's 2019 budget proposal, which includes $220 million toward closing the project, and $59 million toward replacing it with a so-called "dilute and dispose" approach to surplus nuclear material.

The MOX was initially slated to open in 2016, blending weapons-grade plutonium and uranium into commercial reactor fuel. But its estimated construction cost soared from $1.4 billion in 2004 to more than $17 billion . About $5 billion had already been spent by last year, with completion not expected until 2048.

The MOX was proposed as part of the US-Russia nuclear non-proliferation agreement in 2000. Since then, the idea of converting potential weapons into safe energy has helped persuade leaders in multiple countries to surrender their nuclear material before it could fall into dangerous hands.

With MOX being discontinued, the National Nuclear Security Administration has proposed installing pits to store plutonium waste — 50 per year at the Savannah River Site, and 30 per year at the Los Alamos National Laboratory in New Mexico .

A news release from NNSA said the two-pronged approach involving the pits "is the best way to manage the cost, schedule, and risk of such a vital undertaking."

Rep. Rick Allen , a Republican from Georgia , criticized the move on Friday, saying he still believes "MOX is the most viable way forward to dispose of our weapons grade plutonium," but he also supports installing pits at the Savannah River Site, which will continue to provide jobs in the local economy.

South Carolina Gov. Henry McMaster called dilute-and-dispose "not logical" during a March question-and-answer session in North Augusta .

" The Department of Energy has been trying to shut down the MOX project for years, breaking a promise to the people of South Carolina and breaking federal law along the way," McMaster said. "We will not accept it, and we will fight every step of the way to make sure South Carolina's interests are protected."

Several studies are needed and environmental concerns are to be addressed before dilute-and-dispose can fully proceed, according to a U.S. Environmental Protection Agency letter sent on April 2 . The EPA said agency involvement in the matter at this point would be "premature."

Information from: Aiken Standard, http://www.aikenstandard.com

View all news wire headlines

Major MOX Project Issues

This presentation addresses the following MOX topics presented by Bob Raines:

- MOX Project Cost and Schedule
- NNSA Mandated 4% Inflation Rate Impact on Cost and Schedule
- MOX Fuel Facilities Operating Costs After Construction is Complete
- MOX Program vs Dilute and Dispose Program
- NNSA Manage to Termination Policy for the MOX Project

MOX Project Cost and Schedule

Estimate to complete the MOX Project

Category	DOE Estimate ($B)	Contractor Estimate ($B)	Delta ($B)	Comments
Total	$17.2	$9.9	$7.3	**This delta demonstrates the need for a real and unbiased rebaselining. Follow the GNAC recommendation for a rebaselining.**
Escalation from 4% Inflation	$5.1	$0.4	$4.7	**NNSA states, "This (4%) is a consistent escalation estimate used for all of NNSA's new nuclear capital asset acquisitions" Page 9 of the 2016 DOE Updated Performance Baseline**
Obsolescence	$0.5	$0.05	$0.5	No GAO guidelines for this add to the cost. The 15 year MOX operational budget includes $300M for capital improvements and obsolescence in addition to $372M for parts and maintenance
Risk	$1.4	$0.6	$0.8	NNSA went from 85% to 95% - exceeds GAO standards
Level of Effort	$4.7	$3.9	$0.8	Additional effort and cost caused by the 4% escalation rate schedule changes
Other	$0.5	$0.4	$0.1	Will be added to the contract – new work not originally in estimate
Completion Date	2048	2029	19 years	The NNSA position is a project that is 70% complete will require 31 years to finish

Normalizing brings both estimates very close. The delta is the combination of under reporting of construction progress by NNSA, cost escalation through a 4% inflation rate which increases the level of effort, cost and schedule, additional scope and artificial obsolescence value

2012 Corps of Engineer Estimate vs Contractor

Estimator	Estimate Contents	Value
MOX Services	Excluded the DMO (Direct Metal Oxidation contract add), includes contractor fee and uses 85% confidence	$7.9B
USACE – independent estimate	Includes the DMO costs, excludes contractor award fee, 95% confidence, boundary escalation	$9.4B
Adjustment of both Bids for to compare the contents. The results demonstrate that both bids are very close	Used 2.0% inflation, includes the DMO costs, uses the original 85% confidence	Contractor value: $8.2B USACE value: $8.5B

In 2012 the Corps of Engineers prepared an estimate to complete the MOX project. They included items which were variations in the estimate baseline from the Contractor's estimate. When the two estimates were normalized with each estimate containing the same items, the Corps of Engineers estimate was within $300M of the contractor. The NNSA prevented the formal completion of the comparison of the two estimates by suspending the contractor's work on the estimate.

History of Estimating the EAC

NNSA Estimates	Date	Estimate	
CD-2 (Baseline at start of project)	2008	$4.8B	Original estimate
US ACE (ICE for rebaseline)	2013	$9.4B	This estimate was nearly the same as the contractor
NNSA Pu Working Group	2014	$10B	Estimate compares to current contractor $9.9B estimate
Aerospace Report	2015	$21B	This DOE estimate was discredited because of NNSA interference and instructing the contractor which values to use. See Congressional letters confirming this fact.
FPD Estimate	2016	$14-16B	

MOX Services Estimates	Date	Estimate
CD-2	2008	$4.8B
Rebaseline @ 2% inflation rate	2012	$7.9B
EAC	2013-2014	Not Performed
EAC (includes discrete work only per FPD)	2015	$10B (mid-range estimate of several scenarios)
EAC (2 funding scenarios)	2016	$8.4B - $10B

The following organizations want a bottoms up rebaselining of the cost to complete MOX

- The United States Senate
  - Senate Armed Service Committee – signed into law by the President
- The United States House of Representatives
  - House Armed Services committee
- The Governor of South Carolina
- The South Carolina delegation
- CBI-Areva (Contractor)
- Special interest Groups

The NNSA says they have completed a cost rebaselining and do not need to do another. At this point the only organization opposed to doing a pipe by pipe analysis to find out what the real costs will be to complete MOX before abandoning the $5B taxpayer investment is the NNSA

NNSA Mandated 4% Inflation Rate Impact on Cost and Schedule

NNSA States on Page 9 of the 2016 Updated MOX Performance Baseline, "This (4%) is a consistent escalation estimate used for all of NNSA's new nuclear capital asset acquisitions"

Comparison: UPF Project at Oak Ridge
Projected Contract Inflation Rate

UPF Escalation used for Project Baseline.										
Cost Category	2017	2018	2019	2020	2021	2022	2023	2024	2025	Average
Craft Labor	0.0285	0.0310	0.0312	0.0317	0.0320	0.0312	0.0310	0.0310	0.0310	**0.0310**
ODCs & Const Equip	0.0112	0.0120	0.0112	0.0117	0.0112	0.0102	0.0100	0.0100	0.0100	**0.0108**
Travel, Relo & Temp	-0.0003	0.0025	0.0214	0.0310	0.0312	0.0302	0.0300	0.0300	0.0300	**0.0229**
Bulk Material	0.0213	0.0119	0.0095	0.0132	0.0125	0.0120	0.0120	0.0120	0.0120	**0.0129**
Subcontract Costs	0.0232	0.0180	0.0170	0.0202	0.0195	0.0190	0.0190	0.0190	0.0190	**0.0193**
Engrd Equip	0.0186	0.0457	0.0437	0.0255	0.0185	0.0202	0.0210	0.0210	0.0210	**0.0261**
Non-Manual Labor	0.0000	0.0194	0.0275	0.0317	0.0315	0.0310	0.0310	0.0310	0.0310	**0.0260**
Average Annual Inflation	0.0146	0.0201	0.0231	0.0236	0.0223	0.0220	0.0220	0.0220	0.0220	**0.0213**

The NNSA is presently trying to estimate what UPF will cost to complete. They are using 2.13% as the composite inflation rate. UPF is an NNSA project with a funding profile similar to MOX. Total budget is $6.5B. Completion scheduled in 2025. The project appears to be already running over budget according to the Government Accountability Office with identified likely increases of $1B. The Government Accountability Office stated, "The Administration has either rough or no estimate of total costs". (KNOX News 9-22-17)

If 2.1% is appropriate for UPF, why is the NNSA using 4% as the inflation rate for MOX?

Costs and Time Added by DOE Accounting Practices (2016 DOE Updated Performance Baseline)

Item	Cost	Time added	Notes
4.0% inflation rate	$4.7B	13.5 Years	DOE had previously mandated 2.3% from Global Insight until Secretary Moniz joined the DOE and changed DOE policy. Albuquerque recommended 2.3%
95% Confidence Rate (Contingency)	$800M	2 Years	This confidence rate is outside of DOE guidelines and is not used on other DOE projects. Changing with a project 70% complete is outside of normal accounting practices Management reserve (MR) and contingency are calculated using a Monte Carlo analysis which provides a probability distribution. DOE G 413.3-7A, Risk Management Guide attachment 12, recommends a range of 70-90 percent confidence. The DOE used a 95% confidence to determine the dollar value of MR/contingency, which is not within the recommended range. (2016 DOE Updated Performance Baseline)
Obsolescence	$500M	1.5 Years	Not an issue with long term reactor projects, an arbitrary assignment of costs without justification. NNSA added this number even though there is no 'Best Practice' guidance from GAO, NDIA or DOE to add a plug number for obsolescence. The NNSA ignores the 38M/ yr in the annual operations budget for equipment replacement.
LOE extension	$800M	2.0 Years	Additional level of effort because of the increased inflation rate and extension of the contract life. This is due to the longer schedule duration to 2048 in the DOE 2016 updated PB. Level of effort costs are incurred until a project is complete. These costs include portions or all of Project Management, Construction Management, QA/QC, Environmental Safety & Health (ES&H), Project Controls, Human Resources, Finance & Accounting, Training, Information Technology, Document Control, NNSA Subcontractors, NRC, etc.
Direct Metal Oxide scope change	$200M	1 year	New work not included in the original schedule or scope of work. Direct Metal Oxide is a plant modification not currently on contract. The Contractor does not include it in the FY17 EAC. The modification requires specialized furnaces to be installed in the MFFF to convert plutonium metal to plutonium oxide. When this scope is added to the contract, it will require additional budget and EAC.
Total Cost and time Added by DOE	$7B	20 Years	

10/20 Year Labor Inflation Rate at MOX by Category

10 Year Analysis

Asbetos Workers Journeyman			Boilermakers Journeyman			Cement Masons Journeyman			Carpenters Journeyman			Electricians Journeyman			Iron Workers Journeyman			Laborers Journeyman			Millrights Journeyman		
2007	$23.58	1.275%	2007	$25.13	1.433%	2007	$20.35	1.879%	2007	$21.05	2.520%	2007	$24.02	1.415%	2007	$24.41	1.645%	2007	$15.00	2.480%	2007	$22.20	2.125%
2008	$23.88		2008	$25.49		2008	$20.73		2008	$21.58		2008	$24.36		2008	$24.81		2008	$15.37		2008	$22.67	
2009	$24.19		2009	$25.86		2009	$21.12		2009	$22.12		2009	$24.70		2009	$25.22		2009	$15.75		2009	$23.15	
2010	$24.49		2010	$26.23		2010	$21.52		2010	$22.68		2010	$25.05		2010	$25.63		2010	$16.14		2010	$23.65	
2011	$24.81		2011	$26.60		2011	$21.92		2011	$23.25		2011	$25.41		2011	$26.06		2011	$16.54		2011	$24.15	
2012	$25.12		2012	$26.98		2012	$22.34		2012	$23.84		2012	$25.77		2012	$26.48		2012	$16.95		2012	$24.66	
2013	$25.44		2013	$27.37		2013	$22.75		2013	$24.44		2013	$26.13		2013	$26.92		2013	$17.38		2013	$25.19	
2014	$25.77		2014	$27.76		2014	$23.18		2014	$25.06		2014	$26.50		2014	$27.36		2014	$17.81		2014	$25.72	
2015	$26.10		2015	$28.16		2015	$23.62		2015	$25.69		2015	$26.88		2015	$27.81		2015	$18.25		2015	$26.27	
2016	$26.43		2016	$28.56		2016	$24.06		2016	$26.33		2016	$27.26		2016	$28.27		2016	$18.70		2016	$26.83	
2017	$26.76		2017	$28.97		2017	$24.51		2017	$27.00		2017	$27.64		2017	$28.74		2017	$19.16		2017	$27.40	

Pipefitters Journeyman			Sheetmetal Workers Journeyman			Teamsters Journeyman			Operation Engineers Journeyman		
2007	$22.92	2.665%	2007	$24.03	1.564%	2007	$20.99	2.824%	2007	$22.13	3.300%
2008	$23.53		2008	$24.41		2008	$21.58		2008	$22.86	
2009	$24.16		2009	$24.79		2009	$22.19		2009	$23.61	
2010	$24.80		2010	$25.18		2010	$22.82		2010	$24.39	
2011	$25.46		2011	$25.57		2011	$23.46		2011	$25.20	
2012	$26.14		2012	$25.97		2012	$24.13		2012	$26.03	
2013	$26.84		2013	$26.38		2013	$24.81		2013	$26.89	
2014	$27.55		2014	$26.79		2014	$25.51		2014	$27.78	
2015	$28.29		2015	$27.21		2015	$26.23		2015	$28.69	
2016	$29.04		2016	$27.63		2016	$26.97		2016	$29.64	
2017	$29.82		2017	$28.06		2017	$27.73		2017	$30.62	

20 Year Analysis

Pipefitter Journeyman		
1997	$19.03	2.271%
1998	$19.46	
1999	$19.46	
2000	$19.46	
2001	$19.46	
2002	$19.46	
2003	$19.46	
2004	$19.46	
2009	$19.46	
2010	$19.46	
2011	$19.46	
2012	$19.46	
2013	$19.46	
2014	$19.46	
2015	$19.46	
2016	$19.46	
2017	$19.46	

Actual rates for craft personnel staffing the MOX project and the average annual increase since project inception by craft category based on the union labor agreements

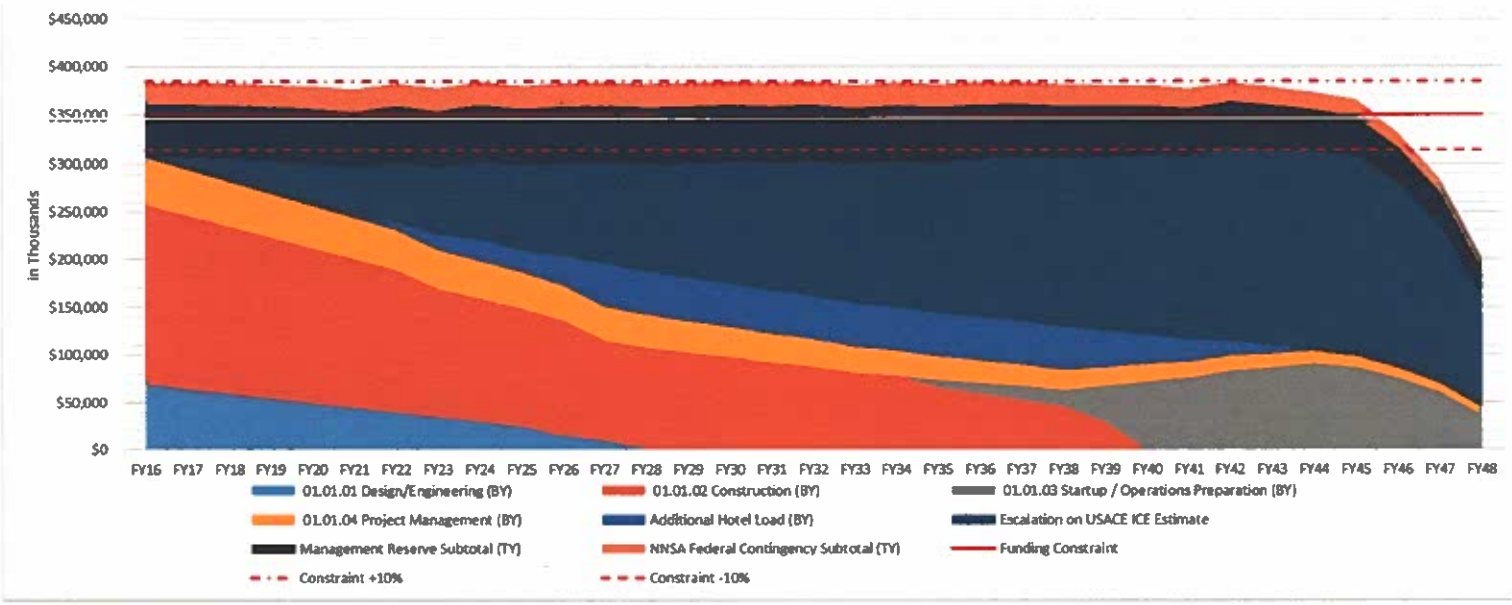
Composite MOX 10/20 Year Craft Labor Inflation Rate Summary

Craft Type	Current MOX FTEs by craft (07 JAN 18)	Average Annual Rate Increase/yr	Weighted Value
Asbestos Workers Journeyman	5	1.3%	0.06
Electricians Journeyman	72	1.4%	1.02
Pipefitters Journeyman	105	2.7%	2.80
Boilermakers Journeyman	13	1.4%	0.19
Iron Workers Journeyman	81	1.6%	1.33
Sheetmetal Workers Journeyman	138	1.6%	2.16
Cement Masons Journeyman	13	1.9%	0.24
Laborers Journeyman	45	2.5%	1.12
Teamsters Journeyman	9	2.8%	0.25
Carpenters Journeyman	44	2.5%	1.11
Millrights Journeyman	26	2.1%	0.55
Operation Engineers Journeyman	26	3.3%	0.86
Painters**	30	2.5%	0.75
TOTAL	607	2.0%	12.44

Average CPI Inflation for Previous 28 Years = 2.47%

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual Rate
1990	5.2	5.3	5.2	4.7	4.4	4.7	4.8	5.6	6.2	6.3	6.3	6.1	5.4
1991	5.7	5.3	4.9	4.9	5	4.7	4.4	3.8	3.4	2.9	3	3.1	4.2
1992	2.6	2.8	3.2	3.2	3	3.1	3.2	3.1	3	3.2	3	2.9	3
1993	3.3	3.2	3.1	3.2	3.2	3	2.8	2.8	2.7	2.8	2.7	2.7	3
1994	2.5	2.5	2.5	2.4	2.3	2.5	2.8	2.9	3	2.6	2.7	2.7	2.6
1995	2.8	2.9	2.9	3.1	3.2	3	2.8	2.6	2.5	2.8	2.6	2.5	2.8
1996	2.7	2.7	2.8	2.9	2.9	2.8	3	2.9	3	3	3.3	3.3	3
1997	3	3	2.8	2.5	2.2	2.3	2.2	2.2	2.2	2.1	1.8	1.7	2.3
1998	1.6	1.4	1.4	1.4	1.7	1.7	1.7	1.6	1.5	1.5	1.5	1.6	1.6
1999	1.7	1.6	1.7	2.3	2.1	2	2.1	2.3	2.6	2.6	2.6	2.7	2.2
2000	2.7	3.2	3.8	3.1	3.2	3.7	3.7	3.4	3.5	3.4	3.4	3.4	3.4
2001	3.7	3.5	2.9	3.3	3.6	3.2	2.7	2.7	2.6	2.1	1.9	1.6	2.8
2002	1.1	1.1	1.5	1.6	1.2	1.1	1.5	1.8	1.5	2	2.2	2.4	1.6
2003	2.6	3	3	2.2	2.1	2.1	2.1	2.2	2.3	2	1.8	1.9	2.3
2004	1.9	1.7	1.7	2.3	3.1	3.3	3	2.7	2.5	3.2	3.5	3.3	2.7
2005	3	3	3.1	3.5	2.8	2.5	3.2	3.6	4.7	4.3	3.5	3.4	3.4
2006	4	3.6	3.4	3.5	4.2	4.3	4.1	3.8	2.1	1.3	2	2.5	3.2
2007	2.1	2.4	2.8	2.6	2.7	2.7	2.4	2	2.8	3.5	4.3	4.1	2.8
2008	4.3	4	4	3.9	4.2	5	5.6	5.4	4.9	3.7	1.1	0.1	3.8
2009	0	0.2	-0.4	-0.7	-1.3	-1.4	-2.1	-1.5	-1.3	-0.2	1.8	2.7	-0.4
2010	2.6	2.1	2.3	2.2	2	1.1	1.2	1.1	1.1	1.2	1.1	1.5	1.6
2011	1.6	2.1	2.7	3.2	3.6	3.6	3.6	3.8	3.9	3.5	3.4	3	3.2
2012	2.9	2.9	2.7	2.3	1.7	1.7	1.4	1.7	2	2.2	1.8	1.7	2.1
2013	1.6	2	1.5	1.1	1.4	1.8	2	1.5	1.2	1	1.2	1.5	1.5
2014	1.6	1.1	1.5	2	2.1	2.1	2	1.7	1.7	1.7	1.3	0.8	1.6
2015	-0.1	0	-0.1	-0.2	0	0.1	0.2	0.2	0	0.2	0.5	0.7	0.1
2016	1.4	1	0.9	1.1	1	1	0.8	1.1	1.5	1.6	1.7	2.1	1.3
2017	2.5	2.7	2.4	2.2	1.9	1.6	1.7	1.9	2.2	2	2.2	2.1	2.1

Impact of NNSA Decision to use 4% Inflation Rate



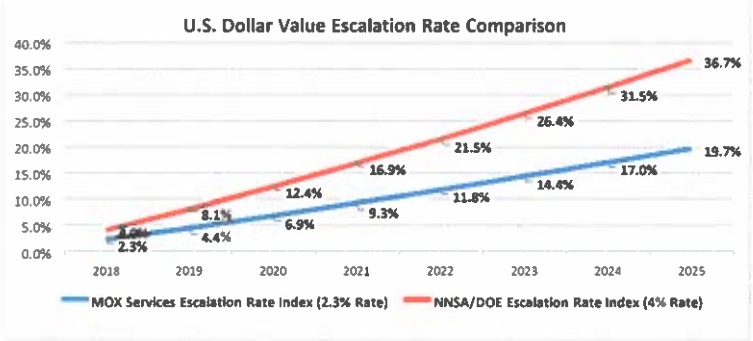
This figure shows how the fixing the annual appropriation and using a 4% inflation rate influences the availability of funds as the project moves forward. The % of appropriated funds available for construction declines every year and as a result increases the time to complete the project as well as the cost for the level of effort and hotel costs. Artificially fixing the annual appropriation for 31 years at $350M guarantees that less and less money is available to perform construction. The best way to avoid the impact of inflation is to fund the project at its optimum productivity level ($500+M/Yr) and to choose the proper inflation rate for projections vs choosing an inflation rate that drives up the cost and extends the schedule and thus supports the Manage to Termination policy of the NNSA.

2.3% vs 4.0% Impact on Available Project Funding

This graphic demonstrates the effect on an annual basis of the delta between the new NNSA mandated 4% inflation rate and the 2.3% rate the contractor was instructed to use in long term estimates. The NNSA

NNSA asserts that only about $30M was spent on direct cost of construction in FY17. This claim position adds $233M in costs to the final cost to complete estimate. The contractor states they are spent $263M in FY17 on discrete construction and discrete support work to continue construction of the MOX facility.

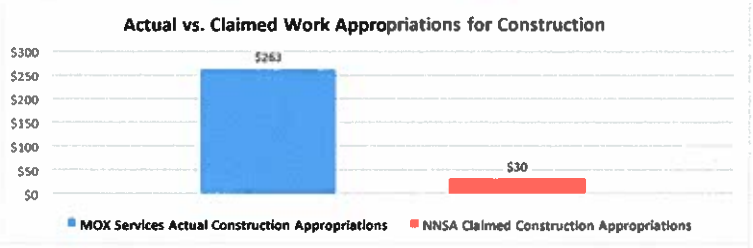
ESCALATION RATES: Dramatic Difference in Impact of the Two Different Rates Being Used



- According to government support services company Global Insight, the typical base escalation rate best applied to nuclear construction projects is 2.3% – the same rate being used by MOX Services.
- NNSA/DOE are using an unrealistic escalation rate of about 4%, leading to inaccurate overall costs and completion dates of the MOX Facility.

Construction Spending Dispute:

$300 million (MOX Services) vs. $30 million (NNSA)



Global Insight, a Government support services company, states the typical base escalation rate best applied to nuclear construction is 2.3% - which is the same rate that the contractor is using in their estimates.

MOX Fuel Facilities Operating Costs After Construction is Complete

MFFF Operating Cost Information – Actual vs NNSA Estimate

	NNSA 2013 $M	PWG 2014 $M	MOX Services To-Go 2015 $M	MOX Services Annual Operation budget $M
MFFF Capital	7,424	10,000	5,300	
WSB Capital	398	450	0	
PDCF Capital	730	730	0	
MFFF Operations- 17 years	7,161	8,145	5,100	300.0
WSB Operations	1,910	2,115	500	25.0
Security Operations	1,098	1,300	1,300	66.0
Fuel Qualification/Shipping/Reactor support[2] (MFT)	1,117	800	200	
LANL, H-Canyon, Pantex[1] (23 years)	4,515	7,100	6,000	280.9
Fuel qualification with GE/W		1,000	0	
TOTAL	24,353	31,640	18,400	
MFFF Startup	2019	2028	2028	
Program complete	2035	2045	2045	

[1]These costs are necessary for either MOX or disposal in WIPP
[2]If another Lead Test Assembly program is required this cost will increase

MFFF Operations cost Annual breakdown 17 years	MOX Services 2008 $M	NNSA estimate 2008
Labor (~1000 employees)	127.0	123.0
Capital Improvements	19.9	19.7
Maintenance	16.2	16.2
Spare Parts	8.6	8.6
Consumables	2.8	8.1
Other	23.3	34.5
Fee	20.0	26.6
NRC cost	5.0	5.0
Gov Furnished	21.5	21.5
Waste Disposal	0.0	18.1
Reactor Customer	0.0	1.7
Security Force	50.1	50.1
Contingency	0.0	32.6
TOTAL	294.4	365.6

WSB = Waste Solidification Bldg
PDCF = Pit Disassembly
PWG = Plutonium Working Group

France – of 1000 employees, 527 run the plant
Security Force charge of 50M is excessive
Total SR Safety and Security Budget 136M

Obsolescence, maint, cap. Improvements, parts $670M is in operations budget

Contents and costs of labs in fuel qualification is unknown and significant

No visibility into LANL, H-Canyon, Pantex charges

- 2008 Contractor and NNSA cost to operate nearly the same
- NNSA estimate to complete MOX was 7.2B in 2013.
- NNSA Began adding costs in 2013 to operations with "life-cycle cost concept"
- Actual annual costs in France $237M/yr – 1000 people. NNSA estimate for MOX operations is $1B/yr for 1000 people
- NNSA added costs which already exist in other budgets and failed to capture EM costs among others. It appears they added Pantex, LANL, security and other life cycle costs not related to MOX.

Data from AREVA 2013

Annual Operation costs	La Hague T4 =R4	La Hague URP	Melox within integrated platform	Totals
Total Nbr Staff (inc. Lab + Support + security) 24/7 operation	115	55	750	920
Total Staff (kEuros)	10,925	5,225	71,250	87,400
Consumables (kEuros)	1,900	500	14,500	16,900
Utilities (kEuros)	3,000	300		3,300
Liquid Waste (kEuros)	1,200			1,200
Solide Waste (kEuros)	600	400	18,500	19,500
Laboratory Analysis (kEuros)	2,500	1,200		3,700
Maintenance (kEuros)	3,200	1,300	37,000	41,500
Taxes, impots, service ES&H (kEuros)	9,800	1,000	6,715	17,515
				0
Totals (kEuros)	33,125	9,925	147,965	191,015

MOX Program vs Dilute and Dispose Program

WIPP Obstacles

- EM has fully subscribed WIPP
- Regulatory issues remain undefined
- Expanding WIPP is extremely problematic and has not been approached either legally or scientifically.
- Reopening the licensing of WIPP to evaluate this new, unanalyzed Pu concentration could lead to unacceptable consequences for the nation
- The amount of fissile plutonium being added to the repository is nearly three times the amount in the permit.
- According to Industry Experts, the DOE has not performed a Criticality Safety Evaluation (CSE) for the WIPP repository.
- There is no precedent for DOE terminating Safeguards for this quantity of surplus weapons grade plutonium.
- Shipping and transportation issues.
- The obstacle at MOX is getting it finished – proven technology

New Mexico Pu^{239} Stockpile Ranking vs World Nuclear Powers after D&D Program Completed

Country	Tons of Stockpiled Weapons Grade Pu^{239} on Hand
Russia	128
United States	87.6
New Mexico	40
France	6.0
India	5.7
United Kingdom	3.2
China	1.8
Israel	.86
Pakistan	.2
North Korea	.03

Information from the International Panel on Fissile Materials as of 2016

Former Secretary of US Dept of Energy and Governor of New Mexico – Bill Richardson Statement on D&D

New Mexicans and anyone else who cares about the safe reopening of the Waste Isolation Pilot Plant (WIPP) near Carlsbad should be concerned about recent reports of plans to move tons of dangerous nuclear weapons-grade plutonium to WIPP, and overwhelm WIPP's capability to clean up Cold War waste from sites in Washington, Idaho and elsewhere.

This is not a good idea for a variety of reasons, but mainly that WIPP is not suitable to be a high-level waste dump. WIPP opened 16 years ago with my approval as Secretary of Energy, but only to accept low-level defense "transuranic waste," or TRU, which is mainly contaminated gloves, tools, rags, assorted machinery and sludge.

New Mexico could change WIPP's accounting so only the volume of the waste, and not its containers, counts against the cap. But **WIPP's Environmental Impact Statement is based on its radioactive inventory. Even after 1,000 years, the added MOX plutonium would still cause WIPP to exceed its EIS curie basis by 430 percent.**

Former Governor and Secretary of the DOE, Bill Richardson, January 2016

http://www.lcsun-news.com/story/opinion/columnists/2016/01/10/richardson-weapons-grade-plutonium-wipp-bad-policy/78526398/

NNSA "Manage to Termination" Policy for the MOX Project

DOE Changes in Scoring Patterns of the MOX Project

AWARD FEE	09	10	11	12	13	14	15	16
MOX Rating	SES	SES	SES	E	E	N/A*	Very Good	E
NNSA Rating	ES	ES	ES	S	S	N/A*	S	S
% Pool Earned	81%	82%	81%	50.2%	57%	N/A*	49%	8.9%

SES = Substantially Exceeds Standards
ES = Exceeds Standards
E = Excellent (2012 Changed Ratings)
S = Satisfactory

VG = Very Good
SAT = Satisfactory
M = Marginal
UNSAT = Unsatisfactory

CPARS	09	10	11	12	13	14	15	16
NNSA Initial Rating	4	4	3	3	2	2	1	1
CO Recommend for new award	YES	YES	YES	50/50	50/50	YES	NO	NO
MOX Response	VG	VG	VG	SAT	SAT	SAT	SAT	SAT
Reviewing Official	N/A	N/A	No Change	No Change	No Change	No Change	No Change	None**

*No Award Fee Plan approved/implemented by NNSA
**No comments from NNSA Reviewing Official (due end of FEB 17)

Note: No Award Fee on contract for FY17 and Beyond

The contractor received excellent scores prior to the implementation of the NNSA policy of "Manage to Termination". As the contractor has resisted the project moving to termination and demanded that NNSA follow the law, there is a correlation with their falling fee and rating scores.