

## MOX Misses the Mark

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The United States and Russia entered into a Plutonium Management and Disposition Agreement in 2000, a plan to mutually dispose of at least 34 metric tons of surplus of weapons-grade plutonium left over after the end of the Cold War by converting it into Mixed Oxide (MOX) fuel for use in nuclear reactors. On the surface, it seems like a win-win: we can dispose of plutonium while simultaneously supporting domestic energy production.



The National Nuclear Security Administration (NNSA), within the Department of Energy (DOE), manages the Plutonium Disposition Program and is responsible for the design and construction of two facilities for the conversion of the plutonium into reactor fuel:

1. **Mixed Oxide (MOX) Fuel Fabrication Facility:** to remove impurities from plutonium feedstock obtained from nuclear weapon pits, form the plutonium into MOX fuel pellets, and fabricate pellets into fuel assemblies for use in a reactor.
2. **Waste Solidification Building (WSB):** to process radioactive liquid waste streams from the MOX facility into solid waste forms suitable for disposal at DOE sites in New Mexico and Nevada.



MOX Fuel Fabrication Facility.



Waste Solidification Building.

Source: National Nuclear Security Administration.

In 2007, NNSA estimated construction of the MOX facility would cost \$4.8 billion and start operations in September 2016. In 2008, NNSA estimated the WSB would cost \$344.5 million and start operations in September 2013.

Unfortunately, the MOX program has been riddled with chronic economic and logistical problems. For example:

- The cost of the MOX program is not worth the energy derived. Converting weapons-grade plutonium to usable nuclear fuel requires the construction of a special facility, and once the

MOX fuel is produced, existing nuclear facilities will need to be updated in order to handle MOX fuel because the actual processing breaks down reactors much more quickly than conventional nuclear fuel.

- The MOX program requires heightened safety and security to prevent nuclear proliferation because of the inherent danger in transporting and processing weapons-grade plutonium – further adding to the overall cost.
- MOX technology has not been properly tested. The design of the program is based on similar technology already in place in Europe and Japan, but the MOX fuel they process uses a plutonium byproduct of conventional reactors, as opposed to the weapons-grade plutonium that DOE plans to use. Accordingly, if and when the facility is completed, its first few operational years will be spent merely running tests.

In late 2008, the contract between Duke Energy and MOX Services committing Duke to buying the MOX fuel produced at the Savannah River Site was terminated, leaving the DOE without a buyer for the fuel. Since MOX will carry a much higher price tag than conventional fuel, the DOE will have to pay companies to take the fuel off their hands—if they can find any companies interested in processing the volatile substance.

In 2012, NNSA revised the estimates for both facilities upward. The MOX facility price tag increased to \$7.7 billion – a 60 percent increase – and the operational date was pushed back more than three years to November 2019. It increased the cost estimate of the WSB to \$414.1 million – a 17 percent increase – and pushed the operational date back two years to August 2015.

In April 2013, NNSA released a draft estimate of \$24.2 billion for all costs to complete the mission to dispose of surplus weapons-grade plutonium. NNSA still has not finalized its full life-cycle estimate.

In February, The Government Accountability Office (GAO) released the findings of its investigation into the \$3 billion increase in the program's estimated costs and delays. They include schedule delays in construction of the WSB and DOE's approval of the MOX facility's estimated cost and schedule before design was complete. Critical system components for the MOX facility have averaged 60 percent higher than originally estimated.

According to the GAO report, even the revised estimates are unreliable for a variety of reasons, including the following:

1. *NNSA's draft April 2013 life-cycle cost estimate of \$24.2 billion for the overall program was not credible because NNSA did not conduct an independent cost estimate to provide an unbiased test of whether the estimate was reasonable.*
2. *Because the MOX contractor's September 2012 proposal for increasing the cost of the MOX facility did not include a formal analysis to examine the effects of changing assumptions, it was*

*minimally credible.*

3. *The WSB contractor's February 2013 monthly update to its schedule estimate was minimally well-constructed in that it contained activities that were not properly tied with the start or end date of other activities, which could potentially obscure the critical path determining the project's completion date.*

The fiscal year 2014 budget request for NNSA stated that, due to rising cost estimates, converting plutonium to MOX fuel may be unaffordable. The NNSA is currently conducting an assessment of alternative plutonium disposition strategies.

### **Conclusion**

Despite the ever-increasing price tag, incessant delays in progress, and known safety risks, the Department of Energy continues to pour federal subsidies into the Mixed Oxide Fuel (MOX) program year after year. We could reach the same ends in terms of both disposal and energy production in easier and less risky ways. The costs are already high and only getting higher, so the threshold at which this program became fiscally irresponsible was crossed long ago. It's time to end the MOX handouts.