

After a decade of work on its program to eliminate surplus weapons plutonium, not a single gram has been disposed by the Department of Energy (DOE). By any standard, the program is a failure. Left unchanged and without adequate oversight and budget scrutiny, it will continue to suffer from chronic bad management, escalating costs, and technical uncertainties. Congress and President Obama can put the disposition program onto the safer, less costly plutonium immobilization or “vitrification” track.

## Disposition of Surplus Plutonium

In 2000, after a lengthy Environmental Impact Statement (EIS) process, DOE’s Savannah River Site (SRS) in South Carolina was chosen for the surplus plutonium disposition mission. The Record of Decision included a “dual track” approach for disposition. Some of the 50 tons of surplus weapons plutonium would be turned into plutonium mixed oxide fuel (MOX) to be “burned” in commercial nuclear reactors. Some would be immobilized by vitrification, or mixing the plutonium with high-level waste and solidifying into large highly radioactive glass logs. That same year, the U.S. and Russia committed to disposing of 34 metric tons of surplus weapons-grade plutonium. However, the program has now devolved into a U.S.-only MOX track and a risky, unnecessarily elaborate proposal to process plutonium for immobilization in the old H-Canyon reprocessing plant at SRS. In the H-Canyon, the plutonium would be directly introduced into aging high-level waste tanks for vitrification in the problem-plagued nuclear waste management program.

## Plutonium Immobilization, or Vitrification, Is Least Costly Option

For FY 2008, Congress provided only \$1 million for plutonium vitrification. In its 2009 budget, DOE shelves the program. Termination of vitrification could result in large amounts of plutonium being stranded at SRS. Earlier DOE cost estimates that vitrification was the cheapest option should still apply, especially given that costs for the MOX factory are sure to skyrocket further. DOE has completed preliminary planning for a vitrification facility where surplus plutonium can be turned into “pucks” that would be placed within larger canisters filled with vitrified high-level radioactive tank waste in the Defense Waste Processing Facility (DWPF) at SRS. DWPF can be used to vitrify the surplus plutonium without the major complications or new waste streams that would be generated by MOX.

## Costs of MOX Are Unknown

In 2007, DOE estimated the MOX plant would cost \$4.8 billion. Since then the agency has refused to release an updated cost estimate. The MOX plant remains one of the largest single line-item projects in the entire DOE budget. Just as for proposed nuclear power plants, costs are likely to increase dramatically due to rising costs of materials. The Government Accountability Office (GAO) has been charged by the House and Senate Appropriations Committees “to monitor the construction and management of the MOX facility, and report on a quarterly basis on the progress of the fuel fabrication facility, regarding scope, cost and schedule changes and performance.” GAO may have been giving updates to the Congress, but a full, public report should be prepared on scheduling, cost and operational uncertainties.

In spite of the unknown final cost of the MOX plant and continuous design changes to the facility, DOE has requested a whopping \$487 million for construction of the facility in FY 2009. More than \$600 million has been requested for the overall MOX program. The budget reflects plans to ask for another \$1.4 billion in construction costs over the next four years. MOX plant construction began in August 2007. The MOX factory is undergoing Nuclear Regulatory Commission licensing even though its design is only 75% complete, and citizen interveners have exposed the absence of high-level MOX waste plans. The NRC has cited the construction contractor, Shaw Areva MOX Services, (SHAMS) with violations due to placements of shoddy reinforcement bars and concrete in the foundation of the building, raising concern about quality control

## Proliferation Threats

The FY 2009 budget request adds another mission to the MOX program: research on fast reactor fuels for the Global Nuclear Energy Partnership (GNEP). Such a full-scale program could lead to wide-scale plutonium processing and use. It also presents grave proliferation and environmental threats. The original mission of producing MOX from weapons-grade plutonium must not erode into making the MOX facility a cornerstone of a massively expensive and dangerous worldwide reprocessing program.

## Unresolved Technical Problems — MOX Test Failure, Reactor Issues, Red Oil

Beginning in 2005, four assemblies of experimental MOX fuel, fabricated by AREVA in France, were placed in Duke Energy's Catawba nuclear reactor for testing. (Four reactors at Duke Power's Catawba and McGuire nuclear power stations near Charlotte, NC, are involved in DOE's MOX plans. The plutonium disposition MOX program would require six reactors to meet the disposition goal.) In May 2008, after two 18-month irradiation cycles, the Catawba MOX test failed due to unanticipated, stretching of fuel rod cladding during irradiation. Three 18-month irradiation cycles of MOX fuel are necessary in order to coordinate the irradiation cycles of plutonium-based and conventional uranium-based fuel in the reactors. With only 65% of the required MOX test completed, Duke was forced to remove the four MOX fuel assemblies and ship several of the MOX rods to Oak Ridge for analysis. No MOX facility on earth is equipped to fabricate a new test batch of fuel, so a repeat of the required test is impossible. Without a valid test, the NRC will be unable to license MOX for large "batch" use. This should constitute the death-knell for MOX. It would be unconscionable to build a full-scale plutonium fuel factory or to expose the public to full-scale use of experimental plutonium fuel without a successful pilot project. In spite of this failed test, SHAMS is currently squandering the taxpayers' money to seek additional reactors to use MOX fuel.

Serious explosive risks involving "red oil," a dangerous chemical byproduct produced during plutonium processing, remain unresolved. One of the worst accidents in nuclear history was a red oil explosion in the Russian plutonium processing facility in Tomsk. The unresolved problems are likely to require further redesign of the Savannah River MOX plant.

## H-Canyon Plutonium Proposal Too Dangerous

Instead of straight-forward vitrification, DOE's consideration of the 50-year-old H-Canyon reprocessing facility at SRS for around 5000 kg (5 metric tons) of surplus plutonium is a risky proposition. Such processing, reviewed by DOE in a non-public "alternatives analysis," increases the probability of a criticality accident in the H-Canyon, in the high-level waste preparation tank into which the plutonium would be dumped, or in the existing waste vitrification facility. DOE gathered public comments about the scheme in a draft Supplemental EIS. DOE should either release the EIS for public comment or terminate it in order to refocus on developing cheaper, safer and more proliferation-resistant vitrification processes.

### **RECOMMENDATIONS**

- Eliminate funding for the MOX program.
- Halt construction of the MOX plant.
- Increase congressional oversight of the entire plutonium disposition program.
- Provide funding for plutonium vitrification and require DOE to vigorously pursue that option.

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