Recommendation #243

Plutonium Vitrification Update

Background

In order to assure that excess plutonium will not be used to make nuclear weapons, it is necessary to put the excess plutonium into a non-weapons-usable form. One way of accomplishing this is to encapsulate small containers of the vitrified excess plutonium with a large quantity of molten glass in larger containers to form glass logs. Plutonium concentration in the glass logs could range from a fraction of one percent to several percent. At these concentrations DOE must be aware of and control radioactive criticality issues with the containers. Re-extraction of plutonium from the glass logs would require very complex processing, making it harder to steal or re-extract the plutonium.

DOE, following an analysis of the potential disposition alternatives for non-MOXable plutonium (plutonium not suitable for fabrication into MOX fuel due to isotopic or other impurities), has approved vitrification as the preferred technology to immobilize this material. The K-Area Complex at SRS is the proposed location of the planned facility that would provide the capability to vitrify up to 13 MT of plutonium materials, enough capacity to dispose of all of the non-Moxable plutonium across the DOE complex. DOE has not made a final decision to consolidate the non-MOXable plutonium at SRS, and is evaluating the optimal plant size based on material characterization, potential for alternate disposition paths for portions of the Plutonium inventory, and life cycle costs.

The impure plutonium would be melted with glass frit and poured into small cans. The small cans of vitrified plutonium would then be placed inside larger high-level waste canisters and subsequently shipped to the Defense Waste Processing Facility (DWPF) at SRS where they would be filled with glass containing high-level waste. The filled canisters would be stored at SRS for an interim period of time while awaiting shipment to the geological repository for final disposal upon qualification for waste acceptance.

A Critical Decision-1A (CD-1A) approved by Deputy Secretary Sell was approved on August 17, 2006. This decision approved vitrification as the preferred technology alternative for the plutonium Disposition Project at SRS. Additional analyses under NEPA would be required before the Department could finalize a decision on this disposition strategy. A Critical Decision-1 (CD-1) to approve the selection and establish a cost range is scheduled to be approved on September 30, 2007. Preliminary design will begin after the approval of CD-1.

The plutonium vitrification facility is currently planned to have a design life of 20 years and will be operational for 7-9 years depending upon the inventory of plutonium to be vitrified. DOE believes this plutonium vitrification process is very promising, and it is estimated that if conceptual design is completed in fiscal year (FY) 2007, the facility can be operational in FY2013 (assuming full finding is received in FY2008 through FY2013). DOE believes this will be enough time to complete vitrification of up to 13 MT plutonium and placement of the vitrified plutonium into DWPF canisters consistent with the current DWPF schedule (Ref. 1).

Comments

It has been a little over 18 months since the Savannah River Site (SRS) Citizens Advisory Board (CAB) stated its support for the rapid disposition of stored plutonium across the DOE complex (Ref. 2). The SRS CAB still believes that the assets at SRS offer unique advantages relative to plutonium handling and vitrification experience. While considerable progress has been made to identify and approve vitrification as the preferred technology alternative for the plutonium disposition, many of the SRS CAB's original questions remain unanswered. We understand that DOE's original response was limited due to the early stages of the project planning (Ref. 3). However, given that the current plan is to have the facility constructed and operational in 6-7 years, the SRS CAB is concerned about the facility schedule based upon the funding needs. With an initial taxpayer investment of $13 million (just for the conceptual design) being required in this fiscal year and the schedule hinging on full funding (amount unknown) a year from now, the SRS CAB questions if enough time is available to complete vitrification of all excess non-MOXable plutonium without impacting the DWPF schedule.

In addition, much of the schedule could unravel if the anticipated NEPA documentation encounters difficulties. The SRS CAB does not understand why some, if not most, of the NEPA document preparation could not begin along side Critical Decision-1 (CD-1). The SRS CAB is concerned that the cost of such a crucial facility is still unknown, given the very short timeline to acquire funding and to have the facility operational. The SRS CAB would like to be kept informed regarding developing funding estimates. The SRS CAB also wants to know more about the impact the current schedule and any potential delays may have on the DWPF operational schedule.

Recommendation

In an effort to expedite the plutonium vitrification facility at SRS, the SRS CAB recommends that DOE:

1. Provide and justify the anticipated NEPA documentation schedule and defend why it could not start earlier to the SRS CAB by March 26, 2007.

2. Provide an overlay of the plutonium vitrification facility schedule versus the current DWPF operational schedule to demonstrate the anticipated impacts by March 26, 2007.

3. Provide final funding estimates for the plutonium vitrification facility to the SRS CAB as soon as available, but no later than July 23, 2007.

References

1. Plutonium Disposition Project, presentation to the Nuclear Materials Committee by H. A. Gunter, DOE-SR, on October 30, 2006.
2. Citizens Advisory Board Recommendation No. 213 (adopted May 24, 2005), "Proposed Plutonium Vitrification Facility at SRS".
3. Citizens Advisory Board Recommendation No. 213 response letter from Jeffrey Allison, Manager DOE-SR to Ms. Jean Sulc, SRS CAB Chair, dated June 16, 2005.

Agency Responses

Department of Energy-SR