

**Department of Energy**

Washington, DC 20585

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DNF SAFETY BOARD

The Honorable John T. Conway  
Chairman  
Defense Nuclear Facilities Safety Board  
625 Indiana Avenue, NW  
Suite 700  
Washington, D.C. 20004-2901

Dear Mr. <sup>John</sup> Chairman:

As the Responsible Manager for the Department's 94-1 Program, I have been asked by the Secretary to respond to your January 28, 1999, letter regarding Revision 1 of the Department's Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 94-1, *Remediation of Nuclear Materials in the Defense Nuclear Facilities Complex*. Your letter states that the Board finds the revised Implementation Plan to be acceptable with three conditions. Those conditions concern: potential impacts on material stabilization activities from delaying construction of the Actinide Packaging and Storage Facility (APSF) at the Savannah River Site (SRS); a contingency plan for stabilization of SRS highly enriched uranium solutions in the event an agreement is not reached to blend down the material and transfer it to the Tennessee Valley Authority (TVA); and detailed plans and schedules for declassification at SRS of Rocky Flats classified metal parts. Enclosed is information to address the last two of those conditions.

As indicated in the enclosures, the Department has not yet finalized its plans for declassification of all Rocky Flats material, nor has an interagency agreement with TVA been completed. Development of the preferred method(s) for declassifying and managing Rocky Flats material will be completed this summer. A proposed agreement with TVA has been drafted, and both parties are working toward approval this spring. The enclosures provide you information on the scope of ongoing evaluations and planning. We will keep your staff informed of our progress on these activities and provide them with associated information as it becomes available.

The remaining condition identified in your letter states:

- That pursuant to 42 U.S.C. Section 2286b(d), DOE provide a report within 60 days of receipt of this letter detailing the effect on material stabilization activities of delays in construction of the Actinide Packaging and Storage Facility at the Savannah River Site (SRS). The report should include proposed resolutions for technical and funding issues as necessary to achieve the material end-states committed to in the Implementation Plan.

We understand the magnitude of potential impacts from delaying construction of the Actinide Packaging and Storage Facility (APSF). The potential impacts on our stabilization activities involve the capability at SRS to package plutonium in accordance with DOE-STD-3013, and the availability of suitable storage for Np-237 oxide.



We have concluded that it is prudent to halt further progress on the APSF to allow time to conduct a systems engineering evaluation of plutonium material management functions and planned new storage facilities at SRS. This study will consider the benefits and efficiencies available through designing and constructing storage facilities with an eye toward shared storage, economies of scale, and improved safety margins. This evaluation has become prudent given the significant estimated construction cost increases of the APSF subproject, coupled with recent Departmental decisions to name the SRS as the preferred location for the plutonium Pit Disassembly and Conversion Facility.

Due to the scope of this effort, we will not have all the information necessary to respond to the remaining condition in your letter until the end of June 1999. At that time we will provide to you a report describing the evaluations performed, the Department's decisions on a path forward with respect to both construction of the APSF (or another storage facility) and a 3013 packaging capability, and schedules for implementation of those decisions.

We will keep you and your staff apprised of our progress on this effort. If you have any questions, please contact me or have your staff contact Mr. Barry Smith at (301) 903-4948.

Sincerely,



David G. Huizenga  
Acting Deputy Assistant Secretary for  
Nuclear Material and Facility Stabilization  
Office of Environmental Management

Enclosures

SEPARATION

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Enclosure 1

The following information is provided in response to a January 28, 1999, letter from the Defense Nuclear Facilities Safety Board, which requested:

- That DOE develop a contingency plan for stabilization of the highly-enriched uranium solutions at SRS, to be implemented in the event that an agreement with the Tennessee Valley Authority is not reached within the timeframes established by DOE in the Implementation Plan.

### **Contingency Plan for Stabilization of Savannah River Site Highly-Enriched Uranium Solutions**

#### **BACKGROUND**

For the existing Savannah River Site (SRS) highly-enriched uranium (HEU) solution, the Department's February 28, 1995, 94-1 Implementation Plan (IP) cited the preferred alternative from the then Draft "Interim Management of Nuclear Materials" (IMNM) Environment Impact Statement (EIS), which was blending the solution down to less than one percent U-235 and converting the solution to oxide in FA-Line. However, the original IP also said the Department was evaluating a stabilization method in which the solution would be diluted to less than 20% U-235 and shipped off-site to commercial fuel fabricators. For HEU solution resulting from dissolution of the Mark-16/22 spent nuclear fuel (SNF), the original IP indicated it would be blended down and converted to an oxide, assuming the preferred alternative from the Draft IMNM EIS was selected for implementation.

The Department has continued pursuing disposition of both the existing SRS HEU solution and Mark-16/22 SNF HEU through transfer of the uranium off-site for ultimate use as fuel in commercial nuclear power plants. Additionally, subsequent to the development of the original 94-1 IP and following completion of an EIS, the Department issued in July 1996 a Record of Decision regarding disposition of surplus HEU. The Department decided to blend down and sell the material for use in commercial reactors. The SRS HEU solution and HEU from SNF that is to be stabilized are a subset of the HEU included in this ROD.

Based on the above, our approach for stabilizing the SRS HEU solution and Mark-16/22 SNF has been to pursue the path of making the material available for use in commercial reactors. Due to the "off-spec" nature of the reactor fuel that would be produced from SRS HEU, and to uranium marketing considerations, DOE is pursuing an agreement with the Tennessee Valley Authority (TVA) for transfer of this material to TVA for use in its reactors. In addition to accomplishing our goal of stabilizing (or dispositioning) SRS HEU, this would allow DOE to share in the savings that TVA might realize as compared to purchasing new fuel.

DOE has entered into a Memorandum of Understanding with TVA for the conversion of at least 30 metric tons of off-specification HEU to low-enriched uranium (LEU). The existing SRS HEU

solution and the solutions that will result from dissolution of the Mk-16/22 SNF are part of that project. TVA issued a Request for Proposal for commercial support of this project. Significant progress is being made toward evaluation and selection of a commercial vendor, and a decision leading to an interagency agreement between DOE and TVA for transfer of the uranium solutions should be made by Spring 1999. Subsequent to that agreement, a firm schedule for shipping the LEU solution to a commercial facility will be finalized. Under the schedule in its current form, and as stated in Revision 1 of the 94-1 IP, shipments from SRS to a commercial facility of LEU solution derived from HEU within the scope of the 94-1 program would begin in Spring 2001 and end in December 2003. The Department has begun work on the preliminary design for the loading station that will be required for shipping the LEU solution to the TVA vendor.

We believe the path forward described above is preferable to any other approach for several reasons, including not generating any additional depleted uranium oxide that would require disposition, minimizing required operations at SRS (FA-Line would not have to be restarted, and less dissolution and down-blending would be required), and recovering the substantial economic value of the material through its use in commercial nuclear plants.

### CONTINGENCY PLAN

If an interagency agreement to transfer uranium solutions from DOE to TVA is not achieved, the Department would stabilize the SRS existing HEU solution and the solutions resulting from the ongoing dissolution of Mk-16/22 SNF using the approach described in the original 94-1 IP. The uranium solutions would be diluted to 0.9% U-235 using SRS depleted uranium (DU), then converted to a stable, storable solid. The 0.9% U-235 uranium solution could be converted to a solid either on-site utilizing FA-Line, as originally planned, or off-site by a commercial vendor.

Current estimates indicated that approximately 760 metric tons of DU would be required to dilute the total HEU solution inventory that would exist at SRS following dissolution of the 94-1 SNF. The site currently has approximately 220 metric tons of DU solution that could be readily used for dilution and approximately 20 metric tons of DU solution are expected to be generated during F-Canyon operations. The remaining diluent solution will be prepared by activating a dissolver in FA-Line and dissolving 520 metric tons of the DU oxide currently stored at SRS.

### Stabilization Using FA-Line

The Westinghouse Savannah River Company (WSRC) has conducted preliminary walk downs of the FA-Line and estimated that restart would take approximately 18 months. During these walk downs, WSRC identified the following items that will require significant improvement to support restart:

- 1) Facility ventilation
- 2) Oxide powder handling system
- 3) Facility control systems
- 4) Facility safety documentation
- 5) Refurbishment and restart of the dissolver

It is estimated that approximately two and a half years would be required to dilute and convert all the solution to a solid form (0.9% U-235 uranium oxide) using FA-Line.

#### Stabilization by a Commercial Vendor

The 0.9% U-235 uranium solution would be shipped off-site to a commercial vendor for conversion to a safely storable solid. The converted material would be shipped back to SRS for storage and ultimate disposition. WSRC recently issued an expression of interest to determine if any vendors are interested in converting the existing DU solution into an oxide. The results of this expression of interest will provide a basis for SRS to investigate contracting with an off-site vendor to solidify the 0.9% U-235 solution. WSRC would use estimated vendor costs (derived from vendor input) for this service to evaluate off-site conversion compared to restarting and operating FA-Line.

**SEPARATION**

**PAGE**

Enclosure 2

The following information is provided in response to a January 28, 1999, letter from the Defense Nuclear Facilities Safety Board, which requested:

- That DOE provide the Board with detailed plans and schedules for the processing of classified metal parts from Rocky Flats Environmental Technology Site at SRS, including packaging of the stabilized material to DOE-STD-3013, *Criteria for Preparing and Packaging Plutonium Metals and Oxides for Long-Term Storage*.

### **Management of Rocky Flats Environmental Technology Site Classified Metal Parts at the Savannah River Site**

#### **BACKGROUND**

The Department of Energy prepared the *Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Environmental Impact Statement* (DOE/EIS-0229, December 1996), and issued the Storage and Disposition Record of Decision (ROD) in January 1997. The ROD indicated the Department would pursue a dual strategy for the disposition of surplus weapons-usable plutonium involving immobilization in a glass or ceramic form for disposition in a geologic repository and burning as mixed oxide fuel in commercial power reactors. Prior to disposition actions being implemented, DOE will be storing surplus weapons-usable plutonium. The ROD selected upgrading and expanding existing and planned storage facilities at the Pantex and Savannah River Site (SRS) to store on-site plutonium as well as to consolidate Rocky Flats Environmental Technology Site (RFETS) surplus plutonium; other DOE sites with surplus plutonium would continue to store their plutonium on-site until disposition (or movement to lag storage at the disposition facilities). At the SRS, the on-site and RFETS plutonium was to be stored in the to-be-built Actinide Packaging and Storage Facility (APSF) pending disposition.

Subsequently, in August 1998, DOE modified the ROD to accelerate the shipment of RFETS surplus plutonium to the SRS in advance of completing the APSF by storing the plutonium in shipping containers in modified space in K-Area. With the storage of the RFETS plutonium in K-Area, DOE also decided that surplus plutonium at Hanford could be consolidated to the SRS in the APSF space previously intended for the RFETS material. The relocation of RFETS and Hanford surplus plutonium inventories to the SRS remains contingent upon the SRS selection as the immobilization disposition site. The *Surplus Plutonium Disposition Environmental Impact Statement* (DOE/EIS-0283) is being prepared to evaluate disposition and site location alternatives, and is expected to be issued by August 1999.

Some of the RFETS surplus plutonium metal is classified due to dimensional characteristics (geometry) involving nuclear weapon design or production information. The classified plutonium metal will not be declassified prior to shipment to the SRS. RFETS does not have the capability to declassify some of these items and has no plans to restart plutonium processing capabilities that could declassify the remaining items. Such declassification activities would be



inconsistent and incompatible with the RFETS scope and closure schedule. Therefore, DOE planned to declassify this inventory of RFETS plutonium items through casting and oxidation operations using the FB-Line facility when shipped to the SRS. After further review, DOE has determined that using the FB-Line capabilities may be inappropriate for declassifying some of these classified items.

DESCRIPTION OF CLASSIFIED PLUTONIUM METAL ITEMS

Table 3-1 identifies the RFETS classified plutonium (Pu) metal items. These items consist of plutonium only parts as well as plutonium bonded to a non-plutonium substrate. The majority of the RFETS Pu metal items can be processed in FB-Line at the SRS as originally planned.

**TABLE 3-1: Classified RFETS Plutonium**

RFETS Classified Pu Identification	Number of Items	Declassification Action	Issues
Pu Hemishells	200	Recast in FB-Line	
Pu Metals	6	Recast in FB-Line	
Pu/Tantalum Targets	56	1. Recast in FB-Line 2. LLNL processing	Classified TRU Ta disposal
Pu/Vanadium Hemishells	6	1. Recast in FB-Line 2. LLNL processing	Classified TRU Va disposal
Pu/Beryllium Hemishells	25	1. LLNL processing 2. LANL processing	Classified TRU Be disposal
Pu/Enriched Uranium (EU) Hemishells and Parts	85	1. Disposition @ PDCF 2. Canyon processing	1. SRS storage with delayed APSF 2. Extended canyon operations; size reduction/security
Pu/Depleted Uranium (DU) Hemishells	2	1. LLNL processing 2. Disposition @ PDCF 3. Canyon processing	1. Classified contaminated DU disposal 2. SRS storage with delayed APSF 3. Canyon operations

LLNL = Lawrence Livermore National Laboratory  
 LANL = Los Alamos National Laboratory  
 PDCF = Pit Disassembly and Conversion Facility

Some items, e.g., the Pu/Beryllium (Pu/Be), Pu/Vanadium (Pu/Va) and Pu/Tantalum (Pu/Ta) composites, will result in classified transuranic (TRU) waste after removal of the bulk plutonium from the substrate material. Options for the disposal of the classified TRU waste items are being evaluated with the Los Alamos (LANL) and Lawrence Livermore National Laboratories (LLNL) in coordination with the Office of Fissile Materials Disposition (MD) program.

For the remaining items, i.e., the plutonium/enriched uranium (Pu/EU) and plutonium/depleted uranium (Pu/DU) composites, separating the bulk plutonium from the substrate using the FB-Line capabilities would be of little value. Additional processing would be required to allow disposal or disposition of the remaining uranium substrate.

## DECLASSIFICATION ALTERNATIVES

The plutonium-only components are the sole items which DOE has decided on a definitive declassification path. Two or more declassification actions are being considered for the other material items. For these, the first alternative identified under "Declassification Action" of Table 3-1 is the "preferred" alternative. DOE will ensure appropriate National Environmental Policy Act review(s) exist for all declassification actions undertaken.

Recast in FB-Line – The plutonium metal items would be cast to an unclassified metal button using existing FB-Line furnace capabilities. Where the plutonium is bonded to a substrate the plutonium composite items would be arranged, as with a basket within the furnace, to allow the plutonium to melt off and separate from the substrate. The remaining substrate (unmelted) would then require disposal as TRU waste.

LLNL & LANL Processing – The plutonium metal items would be processed through the HYDOX (hydride-oxidation or hydride/dehydride) process, separating the plutonium from the substrate through hydriding. The plutonium would subsequently be converted to an oxide. LLNL and LANL have research, development, and demonstration missions to declassify/disposition classified TRU waste. Classified substrate materials (e.g., Be, Va, DU) are candidate materials for this program.

Disposition at PDCF – The Department, through the surplus plutonium disposition program, expects to process Pu/highly-enriched uranium material streams. A development program at LANL and LLNL is underway to demonstrate the technologies to be applied at the Pit Disassembly and Conversion Facility (PDCF). These items could potentially be used as part of the PDCF development program, could potentially be used as an extension of the PDCF development program, and/or could be stored pending processing through the fully implemented PDCF facility. Based on the current plan for the PDCF development program, limited capacity exists for the classified RFETS plutonium composite items to augment the PDCF development/demonstration capability. Thus, for the majority of the RFETS plutonium composite materials considered for PDCF processing, DOE would store these items at the SRS [in Building 235-F vaults] pending the availability of the PDCF. Size-reduction of the classified items would not be required for the PDCF processing option.

Canyon Processing – Classified RFETS plutonium composite items (i.e., Pu/EU, Pu/DU) could be charged to a canyon dissolver, after size reduction, and subsequently processed through the separations cycles separating the plutonium from the uranium. Since the overwhelming majority of the items considered for this alternative involve enriched uranium, the preferred location would be H-Canyon. The separated plutonium would then be stabilized using the HB-Line,

resulting in plutonium oxide. (Alternatively, plutonium metal would be produced if H-Canyon plutonium solution were to be transferred to F-Canyon/FB-Line for final stabilization.) The plutonium metal or oxide would be stored pending disposition. The uranium would be stored with the existing H-Canyon enriched uranium pending disposition (down-blending to low enriched uranium).

## DECLASSIFICATION ISSUES

### Classified Transuranic (TRU) Waste Disposal

Declassifying plutonium composite items (Pu/Va, Pu/Ta, Pu/Be, Pu/DU) using FB-Line and the LLNL/LANL processes would result in plutonium-contaminated substrate material. The substrate material would remain classified since its physical characteristics (shape/curvature) will not be destroyed during processing. Classified (weapons information) TRU waste is not currently planned to be disposed at WIPP, DOE's defense TRU waste disposal facility. The proposed PDCF, for the disposition of surplus plutonium, is expected to have the capability to declassify some weapon parts for Waste Isolation Pilot Plant (WIPP) disposal. Some parts, however, may have to be processed at LANL or LLNL for disposal. As part of the PDCF laboratory development program, LANL and LLNL are investigating declassification options for non-nuclear weapon components. The current preferred alternative is to use these PDCF development and other national laboratory capabilities, which may augment the disposition development program, to declassify the resulting classified non-nuclear substrate materials.

### SRS Canyon Facility Processing

Approximately six months would be required to declassify the RFETS Pu/EU (and Pu/DU) metal items by canyon dissolution and processing. Based on existing and projected mission assignments, canyon processing would start about 2002. Storage pending canyon processing could be as full units or size-reduced metal pieces.

### Size Reduction

Two major issues exist with size reduction: (1) the capability currently does not exist at the SRS to size reduce classified metal items, and (2) security issues exist concerning size reduction actions for the Pu/EU items. The RFETS is installing size reduction equipment for all the RFETS classified plutonium items with the exception of the Pu/EU. Special security requirements and arrangements, currently not planned at the RFETS, are required to size reduce Pu/EU items. Similar security provisions would be necessary at the SRS.

### Plutonium Storage

Storing RFETS classified plutonium items pending processing through the SRS canyon facilities, PDCF developmental/demonstration, or PDCF disposition facilities would defer (or eliminate if transferred to the Immobilization and/or MOX Fuel Fabrication disposition facilities) packaging

the associated plutonium to DOE's *Criteria for Preparing and Packaging Plutonium Metals and Oxides for Long-Term Storage* (DOE-STD-3013-96). These items have been in storage at the RFETS since at least the shutdown of weapon component manufacturing activities in 1989. No adverse conditions have been identified from the extended storage of these items at RFETS. Storage at the SRS would be as received from RFETS with the items remaining in shipping containers, with the preferred storage location being Building 235-F.

Upon declassification processing (at SRS, LANL, or LLNL), the plutonium would be packaged for storage at the SRS. At SRS, separated plutonium metal would be packaged through the Bagless Transfer system in FB-Line. DOE is evaluating integration opportunities between SRS long-term plutonium storage and surplus plutonium disposition facilities. Therefore, it is unknown at this time when the SRS will have the capability to complete long-term plutonium storage packaging ("3013"). Nonetheless, DOE believes Bagless Transfer packaged stabilized plutonium metal can be stored safely, with appropriate facility controls, for an interim period pending full implementation of DOE's long-term storage criteria.

Due to limited plutonium storage capabilities, plutonium separated/declassified at LANL or LLNL must be shipped to the SRS as soon as possible, pending the satisfaction of the following criteria: the plutonium must be stabilized; packaged in accordance with DOE's long-term plutonium storage criteria (DOE-STD-3013-96); and DOE must select the SRS as the plutonium immobilization site. Separated and declassified plutonium from LANL and LLNL (and RFETS) would be stored in K-Area pending disposition. DOE-STD-3013-96 criteria is a component of the K-Area plutonium storage safety authorization basis.

## SCHEDULES

### Declassification

**TABLE 3-2: Schedule for RFETS Plutonium Declassification**

RFETS Classified Pu Identification	Number of Items	Process with Preferred Alternative (Month/Year)
Pu Hemishells	200	11/99 to 5/02
Pu Metals	6	9/99 to 1/00
Pu/Tantalum Targets	56	7/02 to 2/03
Pu/Vanadium Hemishells	6	3/03
Pu/Beryllium Hemishells	25	10/99 to 10/01
Pu/Enriched Uranium (EU) Hemishells and Parts	85	TBD
Pu/Depleted Uranium (DU) Hemishells	2	10/99 to 10/01

## Packaging to DOE-STD-3013

The equipment that was planned to be used at SRS to package plutonium to meet the requirements of this standard was to be included in the APSF. Since progress on the APSF has been halted while integration of the future SRS plutonium management mission is evaluated, the Department is also evaluating options with respect to compliance with DOE-STD-3013 as potential alternatives to the APSF. The outcome of this evaluation and resultant decisions for packaging of plutonium at SRS will equally apply to the declassified RFETS plutonium.

## OPTIONS REVIEW

As indicated, DOE is considering alternatives involving sites other than the SRS, e.g., the weapons national laboratories, to manage some of the RFETS classified plutonium metals. DOE expects to complete the development of the preferred method(s) for declassifying and managing the RFETS classified plutonium metal items in the Summer of 1999.