



6450-01-P

## DEPARTMENT OF ENERGY

### **Plutonium-238 Production for Radioisotope Power Systems for National Aeronautics and Space Administration and National Security Missions**

**AGENCY:** Department of Energy.

**ACTION:** Notice of Intent to Prepare a Supplement Analysis; Notice of Cancellation of an Environmental Impact Statement

**SUMMARY:** The Department of Energy (DOE) issued the *Programmatic Environmental Impact Statement for Accomplishing Expanded Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, Including the Role of the Fast Flux Test Facility* (Nuclear Infrastructure or NI PEIS) in December 2000 to evaluate alternatives for enhancement of DOE's nuclear infrastructure. After considering the analysis in the NI PEIS and other relevant factors, DOE decided to reestablish domestic production of plutonium-238 (Pu-238) for radioisotope power systems (RPSs) to support the National Aeronautics and Space Administration (NASA) and national security missions. Although a Record of Decision (ROD) for the NI PEIS was published in January 2001, DOE has not implemented the decision to date. That decision included using the Advanced Test Reactor at the Idaho National Laboratory (INL) and the High Flux Isotope Reactor at the Oak Ridge National Laboratory (ORNL) in Tennessee to irradiate neptunium-237 (Np-237) targets; using the Radiochemical Engineering Development Center at ORNL to fabricate Np-237 targets and isolate Pu-238; utilizing TA-55 at Los Alamos National Laboratory in New Mexico to purify and encapsulate Pu-238; and, using existing facilities at INL to assemble and test the RPSs. Subsequent to the decision, DOE issued the draft *Environmental Impact Statement for the Proposed Consolidation of Nuclear Operations Related to Production of Radioisotope Power*

*Systems* (Draft Consolidation EIS) in 2005 to consolidate the nuclear operations related to RPSs at a single site. DOE is now proposing to implement that earlier decision based on the NI PEIS and cancel the Consolidation EIS. Prior to proceeding with implementation of that earlier decision, DOE will prepare a Supplement Analysis (SA) in accordance with DOE's National Environmental Policy Act (NEPA) Implementing Procedures to determine whether a supplement to the NI PEIS or a new EIS should be prepared, or that no additional NEPA review is warranted.

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## **SUPPLEMENTARY INFORMATION**

### **Background**

Under the authority of the Atomic Energy Act of 1954, DOE's missions include: (1) producing isotopes for research and applications in medicine and industry; (2) meeting nuclear material needs of other Federal agencies; and (3) conducting research and development activities for civilian use of nuclear power. As part of these responsibilities, DOE and its predecessor

agencies have supplied Pu-238 for U.S. space programs and national security missions for more than five decades. NASA uses RPSs, which are fueled by Pu-238, as the source of electric power and heat for deep space missions. Nuclear reactors and chemical processing facilities at DOE's Savannah River Site (SRS) historically produced Pu-238. However, the relevant nuclear reactors and the chemical processing facilities and capabilities in F-Canyon and H-Canyon at SRS have been shut down or are no longer available. Lacking any source of domestic production of Pu-238, DOE signed a 5-year contract in 1992 to purchase up to 10 kilograms (22 pounds) of Pu-238 per year from Russia, not to exceed 40 kilograms (88 pounds) total. This purchase agreement was executed through a series of contracts and extensions. Purchases were suspended in 2009 due to a restructuring of the Russian nuclear industry and a need to establish a new contracting arrangement. Although DOE plans to pursue a new agreement under new terms with Russia, this process could delay any delivery of Pu-238 by three or more years, and such an arrangement will always be a risk to NASA missions. As discussed in detail in Section 1.2.2 of the NI PEIS, updated mission guidance from NASA at the time the NI PEIS was prepared indicated that the U.S. inventory of Pu-238 reserved for U.S. space missions was likely to be depleted by 2005. Therefore, DOE needed to review the adequacy of its nuclear infrastructure to meet NASA's demands for Pu-238-fueled RPSs.

Partially in response to this on-going need for Pu-238, DOE evaluated potential enhancements to its nuclear infrastructure that would allow it to meet its responsibilities under the Atomic Energy Act of 1954 for the foreseeable future in the NI PEIS (DOE/EIS-0310), which was issued on December 15, 2000 (65 FR 78484). The NI PEIS evaluated the potential environmental impacts that could result from implementation of reasonable alternatives and options that were

considered for enhancement of DOE's nuclear infrastructure. After considering the potential environmental impacts, costs, public comments, nonproliferation issues, and programmatic factors, DOE selected the Preferred Alternative identified in the Final NI PEIS (Alternative 2, Option 7) to reestablish domestic production of Pu-238 to support U.S. space exploration and national security missions. For this purpose, the Advanced Test Reactor (ATR) in Idaho and the High Flux Isotope Reactor (HFIR) at ORNL in Tennessee were to be used to irradiate neptunium-237 (Np-237) targets; this use would not interfere with the primary missions of ATR and HFIR. The Radiochemical Engineering Development Center (REDC) at ORNL was selected for fabricating targets and isolating Pu-238 from the irradiated targets to produce up to five kilograms of Pu-238 per year. The decision also allowed for continued purchase of Pu-238 from Russia to meet near-term space mission requirements while reestablishing domestic production capabilities. The NI PEIS ROD was published on January 26, 2001 (66 FR 7877).

In the ROD, DOE had decided to transport Np-237, after conversion to neptunium oxide (NpO<sub>2</sub>), from SRS to REDC at ORNL for target fabrication. After the September 11, 2001, terrorist attack, DOE required additional security and safeguards for special nuclear materials (SNMs). Np-237 is considered an SNM. REDC did not meet requirements for storage of SNMs and it would have required costly upgrades to qualify for safe, secure storage of NpO<sub>2</sub>. Two alternative locations which met the requirements for safe storage of NpO<sub>2</sub> were identified, one at each of the DOE's Oak Ridge and Idaho sites. DOE prepared an SA (DOE/EIS-0310-SA-01) for the proposed change of storage location of NpO<sub>2</sub> from REDC to the Y-12 National Security Complex at the Oak Ridge site and/or Argonne National Laboratory-West (renamed Materials and Fuels Complex [MFC]) at the INL site in Idaho to determine whether a supplement to the NI

PEIS would be necessary. DOE determined that no additional NEPA documentation was necessary and amended its ROD (69 FR 50180, August 13, 2004) to change the NpO<sub>2</sub> storage location from REDC to the MFC at INL. Consistent with this decision, NpO<sub>2</sub> for use as target material for production of Pu-238 has been transported from SRS to INL and is now stored at MFC.

### **Proposed Consolidation**

By the end of fiscal year 2004, DOE had taken no other action or incurred any expenses to implement the NI PEIS ROD related to production of Pu-238. On November 16, 2004, DOE published a *Notice of Intent to Prepare Environmental Impact Statement for the Proposed Consolidation of Nuclear Operations Related to Production of Radioisotope Power Systems* (69 FR 67139). At the time, DOE's ongoing and planned-to-be-established RPS-related production operations were located at three DOE sites in Idaho, New Mexico, and Tennessee, requiring the transport of radioactive material that could be avoided by consolidation of these activities at a single, highly secure DOE site. The proposed consolidation of these operations, which included production, purification, and encapsulation of Pu-238, would be consistent with DOE's approach on consolidating nuclear materials to enhance security of nuclear materials and reduce risks associated with their transport. The existing and planned operations related to RPS production in November 2004 were as follows: Np-237, used in preparation of targets as the feed material for Pu-238 production, was to be transported from SRS to INL for storage per amendment to the NI PEIS ROD (the shipment is now complete and Np-237 is currently stored at INL); the production capability was planned to be established at ORNL according to the NI PEIS ROD where the targets would be fabricated in REDC, irradiated at ATR in Idaho (supplemented by HFIR in Oak

Ridge) and then processed in REDC to recover Pu-238; Pu-238 was then to have been transported to LANL; Pu-238 was to be purified and encapsulated at LANL and transported to INL; and RPS assembly and test operations were to be conducted as ongoing operations at INL in existing facilities.

Under the preferred alternative identified in the Draft Consolidation EIS (DOE/EIS-0373), DOE proposed to consolidate all activities related to RPS production within the secure area at INL. New construction for the Pu-238 production, purification, and encapsulation part of the infrastructure was proposed due to the very limited capability of existing facilities in the secure area. No new construction was required for the assembly and test operations that were already being located in the secure area at INL. The consolidation of the RPS production infrastructure would have included the following activities: (1) Np-237 would be stored at the INL as already decided; (2) Pu-238 production capability (including Np-237 target fabrication and processing) would be established at INL with ATR serving as the primary irradiation facility, and HFIR would be used only as a back-up facility if necessary; (3) Pu-238 operations carried out at LANL would be transferred to INL and (4) the existing facility, the Space and Security Power Systems Facility, at INL would continue to be established and maintained for RPS assembly and test operations as already planned. DOE proposed to use existing facilities for the production of Pu-238 during the time period required for the new facilities at INL to become operational. This period between 2007 and 2011 was referred to in the Consolidation EIS as the “bridge” period. The Notice of Availability for the Draft Consolidation EIS was published on July 1, 2005 (70 FR 38132).

In response to public comments, DOE explored other locations and facilities for the “bridge” alternative, in addition to those analyzed in the Draft Consolidation EIS. While review of other reasonable alternatives at DOE sites was in progress, it became evident that refurbishment of existing facilities to make them suitable for the bridge period would not be cost effective. In addition, the escalating cost estimate of proposed new construction at INL did not favor the proposed consolidation. Therefore, DOE postponed issuance of the Final Consolidation EIS while the program reanalyzed its approach to Pu-238 production, with or without consolidation. On the basis of this reanalysis, DOE now believes that consolidation is no longer a reasonable alternative due to very high cost of refurbishment of facilities for the bridge period and for proposed new construction at the consolidation site. Therefore, the Consolidation EIS is hereby cancelled.

### **Next Steps**

In order to restart Pu-238 production, implementation of the decision made in the NI PEIS ROD offers the optimum approach. Since the NI PEIS ROD was issued nearly 12 years ago, DOE will prepare an SA in accordance with DOE’s NEPA Implementing Procedures at 10 CFR 1021.314 prior to implementing that decision. There are no changes to the proposed action as analyzed in the NI PEIS. If there are significant new circumstances or information relevant to environmental concerns, DOE will prepare a supplemental EIS in accordance with 10 CFR 1021.314 and the Council on Environmental Quality Regulations at 40 CFR 1502.9. Otherwise, DOE may determine that the 2001 decision can be implemented without further NEPA documentation. DOE’s determination will be announced in the *Federal Register* and the SA and the determination will be available to the public and posted on the DOE NEPA web site. Copies of



the determination and SA will be provided upon written request and will be available for inspection in the appropriate DOE public reading room(s) or other appropriate location(s) for a reasonable period of time.

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