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U.S. Department of Energy (DOE)

Finding of No Significant Impact (FONSI)

RADIOISOTOPE HEAT SOURCE FUEL PROCESSING AND FABRICATION

AGENCY: Department of Energy

ACTION: Finding of No Significant Impact

SUMMARY: DOE has prepared an Environmental Assessment (EA), DOE/EA-0534, for radioisotope heat source fuel processing and fabrication involving existing facilities at the Savannah River Site (SRS) near Aiken, South Carolina and the Los Alamos National Laboratory (LANL) near Los Alamos, New Mexico. The proposed action is needed to provide Radioisotope Thermoelectric Generators (RTG) to support the National Aeronautics and Space Administration's (NASA) CRAF and Cassini Missions. Based on the analysis in the EA, DOE has determined that the proposed action does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. 4321 et seq. Therefore, an Environmental Impact Statement is not required.

PUBLIC AVAILABILITY: Single copies of the EA (DOE/EA-0534) are available from:

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PROPOSED ACTION: The proposed action is for the U.S. Department of Energy (DOE) to operate existing plutonium-238 (Pu-238) processing facilities at the Savannah River Site (SRS), and fabricate a limited quantity of Pu-238 heat source units at an existing Pu-238 research and development facility at the Los Alamos National Laboratory (LANL). The proposed action includes facilities used in the Pu-238 fuel processing and fabrication from the point at which existing inventories of Pu-238 oxide can be dissolved and re-blended at SRS to the point at which the fabricated Pu-238 fuels forms are shipped from LANL for final integration into end-use system components. The purpose of the proposed action is to enable DOE to provide the required supplies of Pu-238 fuel in a fabricated form to support NASA's near-term CRAF/Cassini missions. The proposed action would be accomplished in two stages, involving specific facilities as follows:

- Stage I: Conducted within the existing SRS processing facilities in the 221-HB-Line located in the H-Area Canyon Building, including the Scrap Recovery Facility and the Plutonium Oxide Facility. The facilities would be used to re-blend existing inventories of Pu-238 into a uniform blend suitable for use.

- Stage II: Conducted within the existing LANL Plutonium Handling Facility Building 4 (PF-4) at Technical Area 55 (TA-55). This facility would be used to fabricate Pu-238 oxide into iridium-clad capsules used in the General Purpose Heat Source (GPHS) Radioisotope Thermoelectric Generator (RTG) and into Light-Weight Radioisotope Heater Units (LWRHUs). This work would be undertaken during the time period of approximately 1991 through 1994 in support of the next two NASA near-term missions. The required facility space, most of the equipment, and personnel are currently available for Pu-238 fabrication. Comparable work has been previously performed in this facility.

ALTERNATIVES: Three alternatives are identified in the EA as follows:

- Fabrication Alternatives: An alternative to using the PF-4 facility at LANL to satisfy Pu-238 fabrication needs is to use the Plutonium Fuel Form (PuFF) Facility located in F-Area Building 235 at SRS. However, the PuFF Facility needs refurbishment that would require at least several years to complete, and could not meet the near-term requirements to satisfy Pu-238 application needs.

- Construct New Building and Facility: An alternative that could potentially meet the need for Pu-238 fabrication and achieve the purpose of DOE's proposed action is the construction of a new building and facilities to replace, rather than refurbish, the existing Building

235-F and the PuFF facility that it houses. However, this could not be accomplished within the time frame needed to satisfy Pu-238 application requirements.

- No Action: In accordance with NEPA, the "no action" alternative is included to provide a baseline condition from which to evaluate the potential environmental impact of the proposed action. This alternative, by definition, would consist of DOE taking no action to operate the subject facilities to produce the Pu-238 fuel forms. It would result in a failure to meet both the purpose of and the need for the proposed action.

- Other Alternatives: None of the alternatives considered to the proposed action would provide Pu-238 in sufficient quantity and fabricated form on a schedule that would allow DOE to satisfy Pu-238 requirements for near-term NASA space missions. The action proposed in this EA will enable NASA to consider all alternatives for the CRAF/Cassini missions.

ENVIRONMENTAL IMPACTS: The EA analyzes for both RTG fuel processing (Stage I) at SRS, and fabrication (Stage II) at LANL, the environmental impacts on land use, on-site population, cultural and historical resources, transportation, air quality, water quality, radiation doses to the public and workers, vegetation, wildlife, and floodplains and wetlands. Both routine activities and potential accidents are considered. The impacts are compared to overall activities at SRS and LANL.

The proposed action is not expected to result in any land use impacts at SRS or LANL, as all required buildings and structures exist. Most of the personnel required for operations are currently employed at SRS and LANL. Thus, socioeconomic and traffic impacts are expected to be small. The proposed action is not expected to affect any sensitive areas such as floodplains, wetlands, habitats of State or Federally listed threatened or endangered species, sole-source aquifers, or cultural resources. Waste management and radiological impacts associated with the proposed actions at SRS and LANL are described below:

o Stage I

The projected annual volumes of transuranic (TRU) waste and low-level radioactive waste (LLW) to be generated at SRS resulting from facility operations as part of the proposed action represent less than 8 and 1.3 percent, respectively, of the TRU waste and LLW generated at SRS on an annual (1988) basis. Existing TRU and LLW waste management facilities at SRS were designed to handle wastes generated by all SRS facilities, including the operation of the HB-Line; therefore, there will be no additional burden on existing waste handling capacity by implementation of the proposed action at SRS. Any hazardous or radioactive-mixed wastes associated with operations will be handled in accordance with Resource Conservation and Recovery Act (RCRA) guidelines.

Radiological doses to the offsite population for all SRS 1988 atmospheric releases have been estimated to be 21 person-rem and 4.6E-04 rem to the offsite maximally-exposed individual. The proposed action will result in a conservatively estimated offsite dose increase of less than 1 percent. The overall radiological doses to the offsite population would be well within those specified by DOE Orders (less than 0.1 rem) and EPA Clean Air Act and Safe Drinking Water Act standards (less than 0.01 rem and 0.004 rem, respectively). For comparison, the doses from natural background radiation and all other non-SRS sources to the offsite population living within an 80 kilometer radius of SRS are 165,000 person-rem per year, and the doses to an individual living in the SRS regional area is 0.3 rem per year.

Exposure of operating personnel to radiation during normal operations will be monitored as part of the SRS health physics program. Normal operating procedures require that operating personnel wear dosimeters, which measure the radiation exposure received while on the SRS. Individual worker exposures would be limited to, and maintained below, 3 rem per year.

All nonreactor nuclear facilities associated with the processing of Pu-238 at SRS have been analyzed to identify potential accidents and abnormal events, and their consequences to SRS personnel and the public. Abnormal events include those events, such as certain maintenance and changeout operations, that do not occur on a continuous basis during normal operations. The potential for radioactivity releases due to abnormal

events at the Scrap Recovery Facility involve low-energy events. Process equipment leaks, transfer errors, overflows, and spills were found to be the major contributors to risk, with a combined expected frequency of 0.2.1 per year. These accidents could result in a dose to the maximally-exposed individual of 7.6E-03 rem. The doses to the onsite population would be 17 person-rem and to the offsite population, 62 person-rem. For the Plutonium Oxide Facility, a low-energy accident with a failure of both HEPA filters was determined to be the largest contributor to risk, with an expected frequency of 6.0E-02 per year. This scenario could result in a dose to the maximally-exposed individual of 2.7E-04 rem. The doses to the onsite population would be 0.6 person-rem and to the offsite population, 2.1 person-rem.

- Stage II:

  Radioactive liquid wastes produced from the proposed action at LANL would be treated at the Radioactive Liquid Waste Treatment Plant. The project would increase the liquid flow into the facility by less than 0.0001 percent and the plutonium by about 3 percent. The discharges remain on-site and would not contaminate offsite waters or the deep potable aquifer. The proposed action would increase the amount of TRU waste generated at LANL by approximately 4 percent. Any hazardous or radioactive-mixed waste associated with operations will be handled in accordance with RCRA guidelines.

Radiological dose to the offsite population living within 80-kilometers of LANL from all 1989 LANL releases has been estimated to be 3.1 person-rem and the dose to the offsite individual nearest the location of the proposed action is 0.0001 rem. The proposed action would result in an estimated offsite dose increase of less than 0.00002 percent. The overall radiological doses to this offsite population is maintained well within those specified by DOE Orders (less than 0.1 rem) and EPA Clean Air Act and Safe Drinking Water Act standards (less than 0.01 rem and 0.004 rem, respectively). For comparison, the doses from natural background radiation and all other non-LANL sources to the offsite population living within 80 kilometers of LANL is 68,200 person-rem per year and the doses to an individual living within the region is 0.34 rem per year. Personnel working with this project in PF-4 will be included in the health physics monitoring program maintained at TA-55. Although all work will be performed in extensively shielded glove boxes, some of the energetic decay products penetrate the shielding and cause some exposure to the workers. Individual worker exposures are limited to and maintained below 3 rem per year.

For the proposed action, accident scenarios that could cause radioactive material to be released into the work area in PF-4 and the environment are evaluated that describe a high-probability, low-consequence event (airborne release from contaminated equipment) and a low-probability, high-consequence event (fire that breaches the glove box line) to represent the range of credible accidents. During routine maintenance of contaminated equipment, glove box window change, or waste bag-out, a

handling error could occur and plutonium-238 could be released into the PF-4 laboratory. The maintenance-related accidental release could cause an individual who happened to be at the Pajarito Road site boundary, 200 meters away, to receive a dose of 2.3E-11. The dose to the population living within 80 kilometers of LANL would be 2.8E-07 person-rem. The fire breach scenario considers a fire in one of the glove boxes. The probability of this type of accident is estimated to be 1E-04 to 1E-06 per year; such an accident has never occurred in PF-4. When conservative assumptions are used, the fire-related release could cause an individual at the site boundary to receive a dose of 0.37 rem. The dose to the population living within 80 kilometers of LANL would be 4.7 person-rem.

The protection of the public and transport workers from hazards associated with the shipment of the Pu-238 is achieved by a combination of limitations on the contents, the package design, and the method of shipment. All of these aspects are regulated at the Federal level by the Department of Transportation (DOT). In addition, certain aspects, such as limitations on gross weight of trucks, are regulated by the States. The certified packages are designed to remain leak-tight under normal conditions of transport. The packages are also designed to provide sufficient radiation shielding under normal conditions. All shipments will be made according to DOT standards which limit the dose rate at the surface of the transportation container to 0.2 rem per hour.

However, the actual dose rates to personnel in any normally occupied position in the transport vehicle will not exceed 0.002 rem per hour. The certified packages are designed to minimize any leakage of material in accident situations. Prototypes of certified shipping packages must survive an extensive postulated accident test sequence consisting of impact, puncture, and fire testing, as well as an immersion test in water. Packages designed to carry Pu-238 must be shown to have a post-accident leak-rate not exceeding 0.003 Curies per week. In addition, the packages are designed to maintain adequate radiation shielding under accident conditions.

DETERMINATION: Based on the analysis in the EA, the proposed RTG processing at SRS and fabrication of fueled source units at LANL as RTG components and LWRHUs do not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969, U.S.C. 4321 et seq.

Therefore, an Environmental Impact Statement is not required.

Issued this 19th day of July, 1991.

Paul L. Ziemer, Ph.D.
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Environment, Safety and Health