

**FINDING OF NO SIGNIFICANT IMPACT
FOR THE ENVIRONMENTAL ASSESSMENT FOR THE
U.S. RECEIPT AND STORAGE OF GAP MATERIAL - PLUTONIUM**

ISSUED BY: United States Department of Energy
National Nuclear Security Administration

ACTION: Finding of No Significant Impact

SUMMARY: The Department of Energy (DOE), National Nuclear Security Administration (NNSA) has completed the *Environmental Assessment for the Receipt and Storage of Gap Material – Plutonium* (DOE/EA-1771) in support of the Global Threat Reduction Initiative (GTRI). The environmental assessment (EA) evaluates the potential environmental impacts of transporting up to 100 kilograms (220 pounds) of plutonium from foreign countries to the Savannah River Site (SRS) for storage pending final disposition.

NNSA's Proposed Action is to transport packaged plutonium by ship from foreign countries to a United States marine port of entry, transfer the packages to a DOE Safeguards Transporter (SGT), transport the material to SRS, and place the plutonium into an approved storage facility. NNSA also considered an alternative of transporting the packaged plutonium by U.S. military aircraft. Analysis in the EA of transport is based on nominal shipments of up to 25 kilograms (55 pounds) and a maximum shipment of 50 kilograms (110 pounds) of plutonium. Final decision on the acceptance of any particular shipment of plutonium from a foreign country will be contingent on confirmation that the material: 1) poses a threat to national security, 2) is susceptible for use in an improvised nuclear device, 3) presents a high risk of terrorist threat, 4) has no other reasonable pathway to assure security from theft or diversion; 5) meets the acceptance criteria of the storage facility at SRS and that there is adequate storage capacity to accommodate the material at SRS.

NNSA sent a draft of the EA to the States of South Carolina, Georgia, Delaware, and Tennessee for a 15-day review. The State of South Carolina submitted a response in which they agreed that it is acceptable for the United States to consolidate up to 100 kilograms (220 pounds) of plutonium now residing in foreign countries at SRS. The state also expressed reservations about the federal government's ability to ensure timely disposition of the material in light of the delayed licensing of a geologic repository. No comments were received from Georgia, Delaware or Tennessee.

NNSA has elected to implement the Proposed Action, using ship transport for the plutonium from foreign countries to the United States. Based on the analysis in the EA, NNSA has determined that the impacts of implementing the proposed action are not significant. Further, DOE has determined that this is not a major action significantly affecting the quality of the environment, and thus, does not require the preparation of an environmental impact statement.

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SUPPLEMENTAL INFORMATION:

Background

GTRI is a vital part of the U.S. national security strategy of preventing the proliferation of nuclear and radiological materials that could be used in weapons of mass destruction (WMDs) or other acts of terrorism. The GTRI mission is to reduce and protect vulnerable nuclear and radiological materials located at civilian sites worldwide. GTRI's goals include: (1) converting reactors from using WMD-usable highly enriched uranium to low-enriched uranium, (2) removing or disposing of WMD-usable excess nuclear and radiological materials, and (3) protecting at-risk WMD-usable nuclear and radiological materials from theft and sabotage.

Since it was established in 2004, GTRI had analyzed and implemented several activities to reduce nuclear and radiological threats worldwide by removing or disposing of excess weapons-usable nuclear and radiological materials. These activities did not, however, include the removal and disposal of certain types of material (Gap Material) including separated plutonium.

GTRI's first priority for gap material plutonium is to seek a foreign commercial solution that does not require bringing the material to the United States. Efforts will continue to be made to return the plutonium to secure locations in the countries where the material is located or to transfer it to a foreign commercial facility for processing to a form that is not susceptible to use in a WMD. If no other reasonable pathways are identified to address U.S. national security interests, NNSA proposes to transport the plutonium to SRS, a DOE site in the United States, for storage pending disposition. Gap material plutonium would be dispositioned along with U.S. plutonium identified as surplus to U.S. national security needs.

Proposed Action

The purpose and need for the Proposed Action is to bring gap material plutonium to the United States for management and disposition because the material is susceptible to use in an improvised nuclear device, presents a high risk of theft, lacks another reasonable pathway to assure security from theft or diversion, and thus poses a threat to national security. The Proposed Action is to transport by ship up to 100 kilograms (220 pounds) of gap material plutonium (either metal or oxide) from foreign countries to the United States for storage at SRS, pending its final disposition.

Prior to the start of actions evaluated in this EA, the gap material plutonium would be prepared for shipment and transported to a port of departure. The plutonium would be stabilized in

accordance with DOE-STD-3013 and containerized to meet the applicable SRS storage acceptance criteria.¹ Containers of plutonium would be placed in Type B packages for transportation and the packages securely fastened in International Organization for Standardization (ISO) shipping containers to facilitate their loading onto and off the ship.

Chartered commercial ships would transport the packaged plutonium across the global commons (those parts of the Earth not under the jurisdiction of any nation) to a U.S. port of entry. Because more than one type of Type B package could be used for the shipment of the plutonium, the EA analyzed the potential environmental impacts associated with the use of two Type B packages for transportation. The two packages are of different sizes and plutonium-carrying capacity and were selected for purposes of analysis to reasonably and conservatively bound the potential impacts that could result from actual plutonium shipments. The EA evaluates anticipated transportation from Europe (22 days transit time) as well as transportation from anywhere in the world (up to 60 days transit time). At the port, the ISO containers would be lifted off the ship and placed on the ground. Workers would remove the packages of plutonium from the ISO containers and immediately transfer them to waiting SGTs for the trip to SRS. Since, however, the outer Type B packages used for transportation may be different from those acceptable for storage, the closed containers of plutonium may have to be removed from the transportation packages and placed within Type B packages that comply with the storage criteria prior to being placed into storage.

NNSA also evaluated the potential impacts of an aircraft transport alternative and a No Action Alternative. Under the aircraft transport alternative, U.S. military aircraft would transport the gap material plutonium from the foreign nations to a U.S. military port of entry. In this case, the Type B transportation packages would not be placed inside ISO containers, but would be loaded directly into the aircraft and securely fastened. Other aspects of the handling, transportation, and storage of the plutonium would be the same as those for the Proposed Action. U.S. regulations for the air transport of plutonium in the quantities evaluated in the EA require the use of packages that meet more stringent requirements than those of a typical Type B package. At this time, a package that meets both the more stringent regulatory requirements and the storage requirements at SRS is not available. Therefore, if NNSA were to decide that air transport of plutonium using the Type B packages as evaluated in the EA was necessary, a national security exemption would be required.

Environmental Impacts

The analysis in the EA shows that the proposed receipt of gap material plutonium from foreign nations and storage in the United States entails little or no risk to human health or to the quality of the environment. The specific countries from which plutonium might be shipped and the specific quantities in each shipment are uncertain. To provide a reasonable analysis that bounds the potential impacts of the actual shipments, the EA analyzes the potential environmental impacts for 10 shipments. The maximum size of any one shipment is assumed to be 50 kilograms (110 pounds) and the remaining shipments are assumed to be up to 25 kilograms (55 pounds) each (because the total quantity of plutonium is limited to 100 kilograms [220 pounds).

For the Proposed Action, the EA evaluates the potential impacts of ship transport across the global commons, transfer from the ship to SGTs, ground transport to SRS, and receipt and storage at SRS. The increased risk of a latent cancer fatality (LCF) among ship crews and

¹ DOE standard DOE-STD-3013 provides criteria for stabilization, packaging, and long-term storage of plutonium-bearing materials. DOE issued the most recent version of this standard in 2004.

workers handling the packages at the port of entry are conservatively estimated to be 8×10^{-4} (1 chance in 1,250) and 4×10^{-4} (1 chance in 2,500), respectively. Potential increased risk of an LCF to the SGT crew and members of the public from ground transport to SRS are conservatively estimated to be 4×10^{-5} (1 chance in 25,000) and 3×10^{-5} (1 chance in 33,000), respectively. The analytical approach to estimating public and worker risks for incident-free transport of gap material plutonium overestimates the potential impacts because radiation levels for actual transport are expected to be smaller than the radiation levels assumed in the analysis (10 millirem per hour at 2 meters [6.6 feet] from the package surface).² To ensure that doses to workers and crew involved with the transportation of the plutonium are maintained within applicable limits, NNSA would extend the mitigation plan in place for the Foreign Research Reactor Spent Nuclear Fuel Acceptance Program to also cover gap material plutonium. Under this plan, NNSA would require radiation surveys of packages before shipment and use of these data to ensure that estimated doses to any persons involved in ship transport of gap material plutonium would comply with applicable radiation safety requirements.

The EA also evaluated the potential impacts associated with accidents. In the unlikely event of a severe port accident involving 50 kilograms (110 pounds) of plutonium under average (50th percentile³) meteorological conditions, the maximum dose to the population within 80 kilometers (50 miles) would be 38,000 person-rem. Taking into account the probability of such a severe accident occurring (5×10^{-9} per shipment), the risk of an LCF would be 1×10^{-7} (1 chance in 10 million). Assuming less favorable meteorological conditions (95th percentile⁴), the highest risk would be 9×10^{-7} LCFs (approximately 1 chance in 1 million). For ground transport in an SGT, the risk of an LCF in the population along the transport route is 2×10^{-8} , taking into account the probability of an accident occurring. The probabilities for both the port and ground transportation accident are much smaller than the level DOE typically considers as a reasonably foreseeable accident (1×10^{-7}).

For the alternative of aircraft transport, the risks of an LCF to flight crews and workers at airfields would be 4×10^{-4} (1 chance in 2,500) and 3×10^{-4} (1 chance in 3,300), respectively. The highest risk of an LCF to the SGT crew and population along a transportation route would each be 2×10^{-4} (1 chance in 5,000). As indicated for the Proposed Action, the actual risks would be less than those estimated because the package dose rates are expected to be well below the regulatory limit assumed for the analysis.

Two accidents were evaluated for aircraft transport of 50 kilograms (110 pounds) of plutonium. One is an in-flight accident over the continental United States. The risk of an LCF in the population for this accident is proportional to the mileage flown over land; the highest risk would be 6×10^{-8} (1 chance in 17 million). The other accident is a landing-stall-fire accident at the airfield. The highest risk of an LCF in the population within 80 kilometers (50 miles) of the airfield would be 2×10^{-6} (1 chance in 500,000).

The incremental radiological impacts of managing the 100 kilograms (220 pounds) of gap material plutonium at SRS would be a small fraction of the impacts previously analyzed for managing 50,000 kilograms (110,000 pounds) of U.S. surplus plutonium. The likelihood of an intentional destructive act associated with transport of gap material plutonium to SRS would be

² The radiation level was assumed to equal the regulatory limit for the publicly-accessible surface of a transport vehicle. See U.S. Department of Transportation regulations at 49 CFR 173.441. Experience with actual shipments of foreign research reactor spent nuclear fuel has shown that average radiation levels at the surfaces of casks received under the Foreign Research Reactor Spent Nuclear Fuel Acceptance Program have been more than a factor of 10 smaller than this limit.

³ The 50th percentile meteorology condition represents the median condition and is that for which the radiological exposures would be exceeded 50 percent of the time.

⁴ The 95th percentile meteorology represents relatively low probability meteorological conditions for which the radiological exposure would not be exceeded more than 5 percent of the time.

minimized by the security measures that would be taken to reduce knowledge of and access to the shipments. An analysis was performed to consider the potential impacts in the unlikely event of an intentional destructive act; this analysis is contained in a classified appendix to the EA.

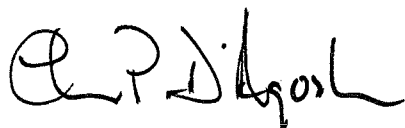
External Review Comments

NNSA sent the draft EA to the States of South Carolina, Georgia, Delaware, and Tennessee and solicited their comments during a 15-day review time. The State of South Carolina submitted a response indicating that it is acceptable for the United States to consolidate up to 100 kilograms (220 pounds) of plutonium now residing in a foreign country at SRS. The state also expressed reservations about the Federal Government's ability to ensure timely disposal of the gap material plutonium in light of the delayed licensing of a geologic repository. No comments were received from Georgia, Delaware or Tennessee.

DETERMINATION:

The Proposed Action is to transport up to 100 kilograms (220 pounds) of gap material plutonium by ship to the U.S., transport the material in SGTs to the Savannah River Site, and store the material in compliance with storage facility acceptance criteria pending its final disposition. NNSA will extend the existing mitigation plan in place for the Foreign Research Reactor Spent Nuclear Fuel Acceptance Program to the receipt of gap material plutonium to ensure that potential doses to workers and crew involved with the transportation of the plutonium are maintained within acceptable limits. A final decision on the acceptance of any particular shipment of plutonium is contingent on confirmation that the material: 1) poses a threat to national security, 2) is susceptible for use in an improvised nuclear device, 3) presents a high risk of terrorist threat, 4) has no other reasonable pathway to assure security from theft or diversion; 5) meets the acceptance criteria of the storage facility at SRS and that there is adequate storage capacity to accommodate the material at SRS. The potential environmental impact associated with the transport and storage of the gap material plutonium entail minor impacts and low risks, and do not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act. Therefore, based upon the analysis in the EA, an environmental impact statement is not required.

Issued this 26 day of May 2010, in Washington, D.C.



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