

**FINDING OF NO SIGNIFICANT IMPACT
URANIUM-233 MATERIAL DOWNBLENDING AND DISPOSITION PROJECT
AT THE OAK RIDGE NATIONAL LABORATORY,
OAK RIDGE, TENNESSEE**

AGENCY: U.S. Department of Energy (DOE)

ACTION: Finding of No Significant Impact (FONSI)

SUMMARY: DOE has completed the *Final Environmental Assessment for U-233 Material Downblending and Disposition Project at the Oak Ridge National Laboratory* [DOE/EA-1651]. This environmental assessment (EA) evaluates the impacts of planned activities to modify selected Oak Ridge National Laboratory (ORNL) facilities; process the ORNL inventory of uranium-233 (U-233); and transport the processed material to a long-term disposal facility. Small quantities of similar material currently stored at other DOE sites may also be included in this initiative. The project objectives are: to modify the Building 3019 Complex facilities to accommodate the necessary process equipment and operations; to process, downblend, and package the U-233 inventory for final disposal; to transport the downblended material to a licensed disposal facility; and to place the Building 3019 Complex in safe and stable shutdown for eventual decontamination and decommissioning (D&D). DOE has determined that there is no programmatic use for the U-233 inventory stored at ORNL.

DOE action is needed to: (1) address safeguards and security requirements; (2) eliminate long-term worker safety and criticality concerns; and (3) provide for final disposal of the U-233 inventory. Once the planned DOE actions have been completed, substantial landlord costs would be eliminated, and the U-233 safe storage requirements identified by the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 97-1 would be satisfied. Recommendation 97-1 describes actions that the DNFSB considers necessary to ensure the safe storage of U-233 materials in the interim and the longer term.

The EA was issued for public comment in September 2009 and was revised as appropriate based on public comments. The EA was issued final in December 2009. Based on the results of the analyses reported in the Final EA, DOE has determined that the proposed action is not a major federal action that would significantly affect the quality of the human environment within the context of the National Environmental Policy Act (NEPA) of 1969. Therefore, the preparation of an Environmental Impact Statement (EIS) is not required, and DOE is issuing this FONSI.

PUBLIC AVAILABILITY OF EA AND FONSI: The EA and FONSI may be reviewed at and copies of the documents obtained from:

U.S. Department of Energy
Information Center
475 Oak Ridge Turnpike
Oak Ridge, Tennessee 37830
Phone: (865) 241-4780

INFORMATION ON THE NEPA PROCESS: For further information on the NEPA process, contact:

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BACKGROUND: Recommendation 97-1 describes actions that the DNFSB considers necessary to ensure the safe storage of U-233 bearing material in the interim and the longer term. In response to Recommendation 97-1, DOE first initiated an inspection program to evaluate the integrity of the U-233 storage canisters. DOE then prepared and issued an EA (DOE/EA-1488) in 2004 on its proposal to process the U-233 material. DOE issued a FONSI for that project in December 2004.

In November 2005, Congress directed the termination of the planned medical isotope production project, which had been included in the proposed action evaluated in DOE/EA-1488, and the transfer of the project from the Office of Nuclear Energy to the Office of Environmental Management for disposition of the U-233. In response, DOE modified the original scope and prepared a new EA to evaluate the impacts associated with (1) the installation of new process equipment in Building 3019; (2) processing, packaging, and on-site interim storage of the U-233 material; and (3) placement of the Building 3019 Complex in safe and stable shutdown for eventual D&D. The EA (DOE/EA-1574) was issued for public comment, revised as appropriate based on public comments and was issued as final in February 2007. DOE issued a FONSI for these activities in March 2007.

Since that time, DOE has researched historical documents and has determined that the majority of the U-233 inventory can be processed to a matrix which meets the waste acceptance criteria for disposal at the Nevada Test Site (NTS). This determination resulted in a process design change to render the U-233 material in the form of stable uranium salt monoliths (Annex Option). The NTS determination has also allowed for the consideration of an option to process and package downblended U-233 material at the Transuranic Waste Processing Center (TWPC) at ORNL (TWPC Option). The waste form produced by the TWPC Option would be cementitious grout monoliths. If the TWPC Option is selected, the annex facility as currently conceptualized will not be constructed. The impacts associated with both options are evaluated in the EA. Additionally, DOE plans to dismantle the current 3020 Stack and replace it with a new emissions stack to support the Building 3019 Complex operations.

NEED FOR THE PROPOSED ACTION: DOE action is needed to: (1) satisfy the requirements of DNFSB Recommendation 97-1; (2) address safeguards and security requirements, (3) eliminate long-term worker safety and criticality concerns; and (4) provide for final disposal of the U-233 inventory.

DESCRIPTION OF PROPOSED ACTION: DOE proposes to: (1) modify the existing facility to accommodate new process equipment and support operations; (2) process and package the

U-233 stored at ORNL and other small quantities of similar material currently stored at other DOE sites; (3) transport the processed material to a disposal facility; and (4) place the Building 3019 Complex in safe and stable shutdown for eventual D&D. Isotek Systems, LLC, located in Oak Ridge, Tennessee, was awarded the U-233 disposition contract by DOE on October 9, 2003.

Several activities would be required to disposition the U-233 and prepare the Building 3019 Complex for eventual D&D. These activities are as follows:

- Transport depleted uranium oxide (DUO) from the DOE Savannah River Site; convert this material into depleted uranyl nitrate (DUN) form at a facility located in Erwin, Tennessee; and receive DUN at Building 3019A;
- Demolish the 3020 Stack and construct a replacement stack;
- Remove equipment from hot cells and laboratories within Building 3019A;
- Modify Building 3019A to enable dissolution and downblend of the U-233 material;
- Annex Option: Construct an annex facility to dry and package the downblended material;
- TWPC Option: Modify piping systems and storage facilities necessary to process downblended material at the TWPC;
- Retrieve and inspect the U-233 containers within Building 3019A;
- Dissolve and downblend the U-233 inventory;
- Dry and package the downblended material and package the material in containers suitable for transportation and disposal;
- Transport the downblended inventory to a suitable disposal facility such as NTS;
- Dispose secondary waste; and
- Stabilize the Building 3019 Complex in preparation for shutdown and eventual D&D.

Isotek Systems, LLC would be responsible for design and construction of modifications to Building 3019A and its associated facilities in order to implement the proposed action for DOE. Building 3019A would be modified and shielded workstations installed to facilitate high-radiation work. Criticality safety controls would be in place to prevent an inadvertent nuclear criticality.

ALTERNATIVES: In addition to the proposed action, impacts were evaluated for the no action alternative. If no action were taken, DOE would continue to have responsibility for the operation of the Building 3019 Complex, and the ORNL inventory of U-233 would remain stored within Building 3019A. Continued storage in Building 3019A would require major capital upgrades and retrofits to critical facility systems that have nearly reached the end of their effective design life, have deteriorated beyond cost-effective repair, or may not satisfy current standards. Significant annual costs would be incurred to operate the 3019A facility to handle and repackage about 400 containers to satisfy current DOE storage standards, and to provide continued protection against potential nuclear criticality accidents or theft of the material.

DOE dismissed from further analysis alternatives based on continued storage of the U-233 inventory at another location; the use of the material as a tag for Russian highly enriched uranium; development and test of a thorium fuel cycle; and use of the material in analytical safeguard procedures. DOE also dismissed the option to co-process the U-233 inventory with TRU waste and chemical dilution at the Savannah River Site. These alternatives were considered

but determined not to be reasonable as they fail to fully address the DOE purpose and need. DOE is aware there may be a need for small quantities of U-233 and would continue to cooperate with potential users for the safe transfer of material.

ENVIRONMENTAL IMPACTS: The EA assesses direct and indirect impacts of the proposed action on the following: land use, infrastructure, air quality, noise quality, geology and soils, water resources, ecological resources, cultural resources, socioeconomics, visual resources, waste management, human health, transportation, and accidents. Cumulative impacts were also assessed.

Under the proposed action, there would be no impact on land use immediately around the Building 3019 Complex. This area is currently used for industrial purposes and is part of the industrialized portion of ORNL. There would be no impact to undisturbed land (in the vicinity of the TWPC) if the TWPC Option is implemented. Interim storage of the downblended inventory would be temporary and would occur within the Building 3019 Complex. Off-site disposal would only occur at suitably permitted/licensed facilities. Previously disturbed areas outside of ORNL may be temporarily used as construction laydown areas and are not expected to exceed two acres in size; there would be no significant impact on land use at these locations.

Construction requirements would include around 725 cubic yards of concrete and 28 tons of steel. These are small quantities for an industrial construction project and could easily be provided by local suppliers without prior notification. Construction would also require modest quantities of water, electrical power, diesel fuel, and propane; however, these modest demands on infrastructure would pose effectively no impact on ORNL infrastructure.

Under the proposed action there would be insignificant air quality impacts. Emission levels from construction activities and vehicle/equipment operation would be very small compared to other emissions sources at ORNL, and the impact of these emissions would be small and temporary. Process emissions generated by the proposed action would pass through a charcoal filtration system and HEPA filtration system before discharge. The downblended inventory would be placed in containers equipped with a vent and HEPA filter to eliminate any pressure build-up, and technology to address the formation of radon-220 such as decay tubes, activated carbon filtration, or other suitable technology.

These containers would be placed inside robust over-pack containers to reduce the exposures to workers and provide secondary containment in the case of an accident. The estimated annual radiological emissions from the proposed action represent less than 0.2 percent of the radiological stack emissions at ORNL for year 2008. The radiological exposure to workers in all occupied on-site buildings would be less than 1.0 mrem per year and the radiological exposure to the off-site maximally exposed individual (member of the public) would not exceed 0.3 mrem per year. Isotek Systems, LLC would be required to maintain compliance with the terms and conditions of permits issued by the Tennessee Department of Environment and Conservation. Safe shutdown of the Building 3019 Complex would also reduce air emissions and have a positive long-term effect on air quality in the vicinity of ORNL.

The highest daily noise levels generated by the project would be produced during construction of the annex and replacement stack. Because the Building 3019 Complex is located within an active

industrialized area of ORNL and since no sensitive noise receptors are located in the immediate vicinity, no adverse noise impacts would occur.

Under the proposed action, no effects to geological resources would occur and soil disturbances would be temporary and occur within previously disturbed areas used for industrial applications. Standard soil retention and erosion practices would be applied throughout the construction process to minimize or eliminate soil destruction caused by erosion and surface water run-off.

The Building 3019 Complex and TWPC areas consist of primarily impervious surfaces that would not be appreciably altered. The present stormwater collection systems in these areas would continue to collect runoff from the project areas, and no new stormwater facilities would be required. Stormwater discharges would be controlled, if necessary, to remove soil and any contaminants before discharge to storm drains or surface waters. Concentrations of toxic and conventional pollutants and radionuclides would be expected to remain within current permit limits. The proposed action would not draw from or discharge to groundwater sources and would therefore have no impact on groundwater resources. The safe and secure shutdown of the Building 3019 Complex at the completion of the proposed action would not substantially change the amount of stormwater runoff generated and discharged, but would reduce the potential for a spill or release of contaminants into the stormwater collection system, which would be a net positive benefit. The proposed action would not result in any adverse impacts to ecological resources. Habitat in the vicinity of the Building 3019 Complex and TWPC is highly disturbed and mostly maintained by lawn equipment. This type of habitat also precludes the presence of rare, threatened, and endangered plant and animal species.

Building 3019A contributes to the ORNL Historic District and is eligible for listing in the National Register of Historic Places. DOE completed a Project Summary and Archaeological and Historical Review for the proposed modifications to the facility and determined that the proposed action would not have an adverse effect on the exterior physical structure or visual appearance of the building. As a result, DOE determined that no exterior archeological resources would be adversely affected by the proposed action. The Tennessee State Historic Preservation Officer has concurred with the DOE determination. In addition, the proposed action would have no adverse impacts on the adjacent Graphite Reactor which is designated as a National Historic Landmark. Implementation of the TWPC Option would have no impact on cultural resources.

Socioeconomic impacts are expected to be positive but small. Based on the small number of jobs created and the availability of qualified local workers, no impact on population size is anticipated. Likewise, no adverse health and environmental impacts would occur that could have a disproportionate effect on low-income or minority populations. Net jobs lost upon the completion of the project would have a negligible employment and income impact in the region.

Visual impacts associated with construction activities at the Building 3019 Complex would include construction materials and equipment and additional traffic from construction workers and material deliveries. These impacts would be minor, temporary, and consistent with those of an industrial area. Other visual impacts would be posed by construction of the 3166 Stack and the 3019 Annex. The 3166 Stack would be shorter and less prominent to the skyline than the 3020 Stack and the 3019 Annex would occupy the area occupied by two other buildings recently

removed; therefore, these changes would pose no appreciable difference in appearance to the area. Implementation of the TWPC Option would have no impact on visual resources.

The proposed action would generate primary and secondary wastes. Primary waste generated would include low-level waste (LLW) in the form of a dry monolithic uranium salt and liquid LLW (LLLW). The total volume of primary LLW waste is estimated at 3,667 55-gallon drums to be disposed of at NTS. If the TWPC Option is selected, the primary waste form would differ and may potentially result in a slightly larger primary waste volume over the Annex Option. The environmental impacts of the increased primary waste volume are expected to be roughly equivalent to the Annex Option. An estimated 211 gallons of LLLW condensate per week would be discharged to the ORNL LLLW treatment facility. Secondary wastes would be generated by construction and facility modifications associated with the proposed action and would generate an estimated 30,000 cubic feet of LLW mainly in the form of scrap metal, debris, and concrete. This material would be packaged and sent to NTS or other approved facility for disposal.

Uncontaminated debris generated from project activities would be sent to a local construction and demolition waste landfill for disposal. Solid, secondary waste materials would also be generated by the downblending and drying processes. These materials would include items such as U-233 package waste, hot cell debris waste, empty cans, failed equipment and components, decontamination waste, gas filtration media, personal protective equipment, maintenance waste, and DUO not consumed by the project. Small volumes of RCRA hazardous waste could be generated by laboratory activities. Small volumes of PCB waste could be generated from old paint/coatings and light ballasts during dismantlement activities. Secondary waste materials would be packaged in Type A containers and transported off-site to a licensed disposal facility. The volume of waste materials generated by construction, facility modifications, and process operations would be minimized through Best Management Practices and project waste management procedures. Local and off-site treatment and disposal facilities anticipated to be used have adequate capacity to accommodate all forms of waste generated by the proposed action. Waste management impacts would be small.

The proposed action would result in potential radiological and chemical exposure to workers and the public. Radiological worker exposures would vary by activity and by location within the Building 3019 Complex or the TWPC. As specified in the Isotek Radiation Protection Program Plan, the dose to each worker would be expected to remain below 500 mrem per year. This goal would be achieved through a combination of facility design features (radiation shields) and administrative controls (limited worker exposure times). Radiological emissions from downblending and drying operations would be filtered and exhausted such that radiological exposure to any member of the public would be expected to be no greater than 0.3 mrem. If the TWPC Option is selected, emissions systems would be modified to address emissions specific to the downblended U-233 material; after modification, radiological emissions are expected to be similar to historical levels at the TWPC. Radiological emissions from the Building 3019 Complex are expected to cease after the downblend operations are completed and D&D activities have been completed. Bulk chemicals used would include DUN, nitric acid, sodium hydroxide, iron sulfate, and magnesium hydroxide. Under normal operations, these chemicals would be confined within closed tanks and pipelines, and any chemical exhaust fumes would be captured in the ventilation system, HEPA filtered, exhausted out the 3166 Stack, and dispersed in the atmosphere. Project health and safety procedures would govern the receipt, storage, and use of

these chemicals to ensure worker safety. Under normal operations, the quantities and concentrations of the chemicals involved for either option would not pose any chemical exposure hazard to members of the public.


Transportation impacts that would occur as a result of the proposed action would be minimal. Compared to the traffic associated with daily material delivery trucks and the more than 4,000 workers who commute to ORNL, the increase in traffic from construction workers and delivery trucks would be small and would pose only a modest additional delay along the main roads, and would have little impact on the risk for a traffic accident. Truck transport of DUO, DUN, and off-site waste shipments would be conducted by qualified carriers according to all applicable U.S. Department of Transportation and Nuclear Regulatory Commission packaging and transportation requirements. These shipments represent a small incremental increase in risk of fatality due to the nature of the material being shipped. The primary risk is related to non-radiological fatalities due to accidents and inhalation of exhaust fumes. The risk of a fatality due to a radiological incident is negligible.

Facility operations and the associated potential for accidents are identified and evaluated in the facility safety basis. The safety basis also identifies engineering and administrative controls to protect facility workers and to mitigate the potential for a release of radioactive or hazardous materials. Accidents do not pose an unacceptable risk of injury to the facility worker, ORNL workers, or the public.

Past, present, and reasonably foreseeable future actions, including the proposed action, are not expected to cumulatively degrade environmental conditions substantially. The areas with the most impacts would be waste generation and air pollution associated with demolition of legacy facilities and new construction activities. Most of the actions considered remediate the environment and remove or stabilize future sources of contamination and, therefore, have net positive benefits in the long-term.

DETERMINATION: Based on the conclusions of DOE/EA-1651, and after careful consideration of public and agency comments, DOE has determined that the U-233 Material Downblending and Disposition Project at ORNL does not constitute a major federal action that would significantly affect the quality of the human environment within the context of NEPA. Therefore, preparation of an EIS is not required.

Issued at Oak Ridge, Tennessee, this 13th day of January, 2010.



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