

**U. S. Department of Energy  
Finding of No Significant Impact  
Proposed Decontamination and Decommissioning  
of the Juggernaut Reactor  
at Argonne National Laboratory – East  
Argonne, Illinois**

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

**ACTION:** Finding of No Significant Impact (FONSI)

**SUMMARY:** DOE has prepared an Environmental Assessment (EA), DOE/EA-1483, evaluating the decontamination and decommissioning of the Juggernaut Reactor at Argonne National Laboratory-East (ANL-E), in Argonne, Illinois. The decontamination and decommissioning of the reactor is needed to ensure the protection of the health and safety of the public, DOE and contractor employees, and the environment, consistent with DOE Order 5400.5, Radiation Protection of the Public and the Environment.

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 of 1969 (NEPA). Therefore, the preparation of an environmental impact statement is not required.

**DESCRIPTION OF THE PROPOSED ACTION:** DOE is proposing to decontaminate and decommission the Juggernaut Reactor, which is located in the high bay area of Building 335 at ANL-E. The reactor was a light-water moderated and cooled, graphite-reflected research reactor with a rated thermal power of 250 kilowatts. It operated from 1962 through 1970. Following reactor shutdown, the reactor room was used for numerous nonradiological experiments. The equipment used for these experiments has since been removed.

In 2001, DOE conducted a characterization of the Juggernaut Reactor facility to evaluate the presence of radiological contamination and the presence of any non-nuclear hazardous or toxic material. Beta-gamma contamination is the predominant radiological hazard identified throughout the facility. The primary contaminant was found to be Europium-152, although various other nuclides consistent with the research believed to have been performed were found in smaller quantities. The total isotopic inventory is conservatively estimated to be 22 curies. In addition, most of the reactor surfaces were painted with a lead-based paint. Asbestos-containing material has also been identified in the cooling tower pipe insulation, floor tile, and floor tile mastic.

The decontamination and decommissioning of the Juggernaut Reactor will include activities such as disassembly, size reduction, waste packaging, and transportation of waste to offsite disposal sites. In addition, DOE will perform supplemental sampling and facility characterization. The majority of the work will be performed inside Building 335. The only planned outdoor demolition work will be the removal of the cooling tower and concrete storage pads. However,

if contaminated soil is found under the reactor vessel, bio-shield, or cooling tower, this soil will be excavated and removed.

Approximately 140 cubic meters (5,000 cubic feet) of contact-handled low-level radioactive waste (LLW), 7 cubic meters (250 cubic feet) of remote-handled LLW, and 6 cubic meters (200 cubic feet) of mixed LLW would be generated, packaged, and shipped for disposal at either the Hanford Site in Richland, Washington; Nevada Test Site (NTS) in Mercury, Nevada; Envirocare, a permitted and regulated commercial site in Clive, Utah; Perma-Fix/Materials & Energy Corporation in Oak Ridge, Tennessee; or a combination of those sites. As a bounding assumption, DOE estimated that 550 cubic meters (19,500 cubic feet) would be the maximum volume of contaminated soil that may need to be removed and disposed of as low-level radioactive waste (LLW). If soil were to be excavated, DOE anticipates that groundwater would be encountered, resulting in the generation of up to 1,500 liters (400 gallons) of groundwater sludge that would be disposed of as LLW or mixed LLW. In addition, up to approximately 114 liters (30 gallons) of contaminated oil, 380 liters (100 gallons) of residual aqueous radioactive liquid waste, 6 cubic meters (220 cubic feet) of asbestos insulation, two 208 liter (55 gallon) drums of polychlorinated biphenyls (PCBs), and 46 cubic meters (1,620 cubic feet) of nonradioactive and nonhazardous debris waste would be generated and shipped to permitted disposal sites in accordance with DOE policies and procedures.

The proposed action is expected to take 8 months to complete and require 12,000 worker-hours (approximately 12 temporary workers). A final status release survey will be conducted to confirm that radiological release criteria for the building are met in accordance with DOE Order 5400.5. Completion of the proposed action will allow the Building 335 high bay area and associated facilities to be released for unrestricted use.

**ALTERNATIVES:** Under the no action alternative, the facility housing the Juggernaut Reactor would not be decontaminated and the existing equipment would not be removed. The facility would be maintained in its present safe shutdown condition. Surveillance and monitoring activities would continue to ensure adequate containment of radioactive contamination, provide physical safety and security controls, and allow for personnel access. The facility would remain unavailable for other beneficial uses. DOE would also continue to incur costs for surveillance and monitoring activities at the facility. For the 12-month period ending in September 2003, annual surveillance and maintenance costs for the facility were \$78,839.

**ENVIRONMENTAL IMPACTS:** Impacts of activities associated with the decontamination and decommissioning of the reactor were analyzed in the EA. The decontamination and decommissioning activities will occur within Building 335 or immediately outside of the building in previously disturbed areas. For this reason, no impacts are expected to current land use, biological resources (including sensitive, threatened, or endangered species or their critical habitats), visual resources, wetlands, or floodplains. The proposed action will not affect cultural or archeological resources because Building 335 is not eligible for listing on the National Register of Historic Places and all decontamination and decommissioning activities will be conducted within the area disturbed during the construction of Building 335.

The potential effects of decontamination and decommissioning activities include minor releases of dust and combustion gases from power equipment. In addition, minor amounts of dust containing asbestos and radionuclides will be released, but will be controlled through high-efficiency particulate air filters.

Decontamination and decommissioning activities will result in the exposure of workers to radiation and exposure of the public to very small quantities of radioactive materials. This exposure could result in an increased risk of a latent cancer fatality. Personnel exposures are expected to average 430 mrem per project worker. Workers engaged on this proposed project would incur a 0.003 risk of a latent cancer fatality, or 2 chances in 10,000 that any one of the 12 workers would die from cancer caused by exposure to radiation as a result of this decontamination and decommissioning effort. The calculated dose rate for members of the public will be  $1.36 \times 10^{-7}$  millirem per year. This is equivalent to a latent cancer fatality risk of  $8 \times 10^{-14}$ , or 1 chance in 12 trillion.

LLW, mixed LLW, hazardous waste, solid waste, and wastewater will be generated as a result of the proposed action. These wastes will be disposed of in existing disposal facilities with adequate capacity to receive this waste.

Risks associated with natural events such as earthquakes, tornados, lightning, and floods will be negligible. DOE will implement specific protections to avoid and minimize the consequences of accidents during decontamination and decommissioning.

All transportation of wastes for offsite disposal will be conducted by truck. Approximately 18 truckloads of waste will leave the ANL-E site for shipment to disposal sites throughout the 8-month duration of the project. This compares to the annual average of about 75 shipments of waste from ANL-E and represents a 24-percent increase in waste shipments.

Approximately 218,000 to 291,700 round-trip vehicle-kilometers will be traveled to dispose of all of the waste types that will be generated by the proposed action (including contaminated soil, if found), depending on the disposal site used. Based on national average rates, the proposed waste shipments will result in an estimated 0.10 risk of an accident (1 chance in 10) and 0.0043 risk of a fatality (1 chance in 230). The risk of fatality is due to crash impacts, not as a result of cargo hazard. This risk is likely to be substantially lower because DOE does not expect to generate contaminated soil that would require shipment and disposal as LLW.

**DETERMINATION:** Based on the analysis in the EA, DOE has determined that the proposed decontamination and decommissioning of the Juggernaut Reactor at ANL-E does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of NEPA, and DOE will not prepare an environmental impact statement. The proposed action alternative will have the least environment, health, and safety impact and is the most efficient and cost-effective alternative.

**PUBLIC AVAILABILITY:** Copies of the EA (DOE/EA-1483) are available from:

Kenneth Chiu  
NEPA Document Manager  
9800 South Cass Avenue  
Argonne, Illinois 60439  
(630) 252-2376

Copies of the EA are also available for review at the following locations:

Lemont Public Library  
50 East Wend Street  
Lemont, IL 60439

Indian Prairie Public Library  
Reference Section  
401 Plainfield Road  
Darien, IL 60561

For further information regarding the DOE NEPA process, contact:

Peter R. Siebach  
NEPA Compliance Officer  
Chicago Operations Office  
9800 South Cass Avenue  
Argonne, Illinois 60439  
(630) 252-2007

Issued in Argonne, Illinois, this \_\_\_\_ day of \_\_\_\_\_, 2004.

---

Marvin E. Gunn, Jr.  
Manager