U.S. Department of Energy
Finding of No Significant Impact
Proposed Demolition of Building 330
at Argonne National Laboratory,
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-1659, to evaluate impacts from the demolition of Building 330 at Argonne National Laboratory (Argonne) in Argonne, Illinois. Under this proposed action, DOE would demolish the building and cover the project site with an impermeable barrier cap. DOE intends to demolish this building as part of its mission to protect human health and the environment from risks associated with unneeded and deteriorating structures that contain radioactively contaminated areas and material.

Based on the analysis in the EA, DOE has determined that the proposed action would not significantly affect 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: The proposed action is the demolition of Building 330, the Chicago Pile-5 (CP-5) reactor facility, without additional radiological decontamination.[1] The scope of the proposed action involves the removal of all interior mechanical, electrical, and architectural systems and components; the open-air demolition and removal of physical structures, including the concrete foundations, sidewalk and asphalt surfaces adjacent to the facility; the transportation of waste materials to approved disposal facilities, and capping of the project site. All activities would be performed in accordance with an approved work plan that meets the requirements of 10 CFR Part 835, Occupational Radiation Protection.

The areas of elevated contamination that would be encountered during demolition include systems embedded in structural components, such as the containment ventilation system located in the containment shell wall and test piping located in the reactor pedestal. Predominant radionuclides include cesium-137, cobalt-60, and strontium-90. In addition, significant quantities of tritium (hydrogen-3) are present in the building foundations and soils beneath the concrete slabs, due primarily to the porous nature of concrete coupled with the presence of tritium that was pervasive during facility operation.

[1] Decontamination and demolition of the interior of Building 330 has been largely completed. The environmental impacts of this action were described in *Environmental Assessment Related to the Decontamination and Decommissioning of the Argonne National Laboratory CP-5 Research Reactor* (DOE/EA-0173) and the project is summarized in *Decontamination and Decommissioning of the Chicago Pile-Five Reactor at Argonne National Laboratory-East Project Final Report* (ANL/D&D/00-1).

Background

Building 330 was constructed from 1951 to 1954 and is located in the south-central area of the Argonne site. The CP-5 reactor was the principal nuclear reactor used to produce neutrons for scientific research from 1954 until shutdown in 1979. The reactor employed a heavy-water moderator and was surrounded on the bottom and sides with a graphite reflector, lead gamma shield, and a biological shield of high-density concrete. In 1980, all nuclear fuel and heavy water that could be drained from the process system were shipped to the DOE Savannah River Plant. Following an assessment of potential environmental impacts and the issuance of a Finding of No Significant Impact (FONSI) in 1991, decontamination and decommissioning of the CP-5 reactor began in 1992 and was completed in 2000. The reactor, biological shield, and associated components were completely dismantled, and portions of the concrete pedestal were removed to comply with DOE and Argonne objectives for the release of structures (i.e., release from radiological control after confirming that residual contamination did not exceed established limits). Areas with residual contamination exceeding release levels were rendered inaccessible through the use of bolted metal covers.

Demolition

Interior demolition tasks would include activities such as equipment and systems disassembly, size reduction, disconnection of utilities, removal of salvageable equipment or materials, and removal of building components, tanks, piping, ventilation, fixtures, equipment, and debris. Polychlorinated biphenyl (PCB)-containing light fixtures would be removed and disposed of by trained workers. Asbestos-containing material (ACM), present primarily as fire-retardant insulation and floor tile, would be removed and disposed of by certified asbestos abatement workers prior to any demolition activities. DOE intends to conduct ACM abatement under Categorical Exclusion B1.16 of 10 CFR 1021, Appendix A to Subpart D, and may initiate this activity prior to the completion of the EA process. However, the transportation impacts of ACM waste removal were considered in the EA.

Any water encountered during demolition activities would be collected and tested for contamination. In addition, water would be misted over all surfaces to control dust emissions during demolition of the exterior structure and subsequent rubble reduction, generating a secondary waste stream of potentially contaminated water. Up to an estimated 13,600 liters (3,600 gallons) of water per day would be used to suppress dust, requiring collection and pumping to the Laboratory Wastewater Treatment Plant (LWTP). Standard industry practices would be used to minimize the potential for generating waste and spreading contamination, and the wastewater would be tested and disposed of in accordance with Argonne Waste Management Procedures. If the wastewater requires treatment, Argonne would use a commercial waste disposal contractor to store, treat, and transport the contaminated water for disposal.

Soil beneath Building 330 is expected to be contaminated with tritium, based on soil and groundwater monitoring. However, there are no plans to remove or remediate tritium-

contaminated soil as a part of the proposed action due to the low risk presented by the contaminant and its lack of migration away from the building. Approximately 57 cubic meters (2,000 cubic feet) of soil are expected to be removed incidental to excavation of the building foundation.

Waste generated by the proposed action would be transported by truck for off-site disposition. Although some wastes may not be radiologically contaminated, DOE assumed for purposes of analysis that all waste would have some level of radioactive contamination and would need to be disposed accordingly. There are no plans to recycle any waste from Building 330.

DOE estimated that the proposed action would generate approximately 8,480 cubic meters (299,400 cubic feet) of solid debris waste and low-level radioactive waste (LLW), consisting mainly of concrete, metal, wood, plastic, soils, paper, and cloth. Based on building characterization results, DOE assumed that all debris waste would be slightly radioactive and disposed of as LLW. DOE also estimated that the proposed action would generate less than 2.5 cubic meters (90 cubic feet) of mixed LLW. LLW or mixed LLW would likely be disposed of at Nevada Test Site (NTS) in Mercury, Nevada, or Energy Solutions in Clive, Utah.

The proposed action would also generate approximately 170 cubic meters (6,000 cubic feet) of ACM and less than 2.5 cubic meters (90 cubic feet) of hazardous, chemical, or Toxic Substances Control Act (TSCA) waste in forms such as lead-based paint or PCBs. ACM sampling has suggested that ACM is not radiologically contaminated and can be disposed of at a licensed commercial landfill within 160 kilometers (100 miles) of Argonne. However, to conservatively bound transportation impacts, DOE assumed that all ACM is radiologically contaminated and would be disposed of in the same manner as LLW. Hazardous, chemical, and TSCA wastes would be disposed of at a licensed facility.

After demolition, a final status survey would be performed to identify any non-tritium soil contamination and determine if additional actions or remediation are necessary. Once it has been determined that no further remediation is necessary, the site would be backfilled, graded, and covered with an impermeable barrier cap (such as asphalt or other waterproof membrane) to help prevent surface water infiltration.

The proposed action is expected to take 15 months to complete (excluding ACM abatement) and require a workforce of approximately 18 full-time equivalent employees or contractors.

ALTERNATIVES: Under the no action alternative, Building 330 would not be demolished. Surveillance and monitoring activities would continue to (1) ensure adequate containment of radioactive contamination, (2) provide physical safety and security controls, and (3) preserve the facilities to allow for personnel access. Continued maintenance, surveillance, and monitoring would cost approximately $141,000 annually ($1.6 million over the next 10 years).

DOE considered alternatives to demolition, but these alternatives did not meet DOE's purpose and need for agency action and were not analyzed in the EA. Partial demolition would not protect individuals and the environment from risks associated with unneeded and deteriorating structures that contain radioactively contaminated areas and material, as demolition to a few feet below grade would not eliminate all building contamination. No future use has been identified for this excess facility, so no alternatives to demolition were considered reasonable.

ENVIRONMENTAL IMPACTS: Impacts of activities associated with the proposed demolition of Building 330 were analyzed in the EA. This FONSI for the proposed action is based on the following factors, which are supported by information and analysis in the EA.

Sensitive Resource Impacts: Demolition activities would be conducted outdoors, and all of the nearby wildlife habitats are potentially susceptible to air (dust and radiological), noise, and human disturbance. However, no state or federally listed threatened or endangered species are known to reside in these habitats. All proposed demolition activities would be conducted in a manner that controls the airborne spread of dust and residual radioactive contamination. There would be no environmental impact on woods, wetlands, and floodplain as a result of the proposed action.

Cultural Resource Impacts: Building 330 has been evaluated and was determined to be historically significant for its association with CP-5. The facility design and history were documented to Illinois Historic American Engineering Record standards in 1998.

In anticipation of the demolition of Building 330, an additional historical review was conducted in 2009, focusing on activities that occurred in the building after 1989. No activities occurred in the building between 1989 and 2009 that were of historical significance. In April 2009, the Illinois Historic Preservation Agency concurred with DOE's finding of no adverse effect.

Solid Waste Impacts: Waste generated as a result of the proposed action would be transported off-site for disposal at the DOE disposal facility at NTS or at commercial disposal sites (e.g., Energy*Solutions*) in accordance with their waste acceptance criteria. Neither NTS nor Energy*Solutions* are nearing their capacities for LLW disposal.

Wastewater Impacts: Approximately 18 current Argonne personnel and/or outside contractors would conduct the proposed demolition activities for a period of about 15 months. The increase in sanitary wastewater handling requirements would be negligible and within the excess handling capacity of the existing Laboratory system.

The LWTP is expected to have adequate wastewater treatment capacity to accommodate liquid wastes generated as a result of the proposed action. All wastewater would be collected within the project site and sampled to determine if it meets LWTP release requirements. If radiologically contaminated wastewater meets Argonne release criteria,

it would be released to the LWTP in accordance with Argonne Waste Management Procedures. If the wastewater requires additional treatment beyond LWTP capability, DOE would use a commercial waste treatment contractor to store, treat, and transport the contaminated wastewater for disposal.

Argonne would develop a stormwater pollution prevention plan to contain runoff from the demolition site, as required by the National Pollutant Discharge Elimination System (NPDES) Permit. Implementation of this plan would prevent runoff from the leaving the demolition site, thereby mitigating any potential impacts.

Air Quality Impacts: Fugitive dust particulate emissions from the proposed action (which could include lead and small amounts of radioactive material) would be subject to the terms of the Argonne Title V air permit. However, by employing dust suppression techniques, dust emissions from the proposed action are unlikely to violate permit conditions. Work areas would be monitored for airborne dust, and respiratory protection may be used, if necessary. Protective clothing and personnel monitoring devices may also be used. Portable high efficiency particulate air (HEPA) filters would be used during internal demolition activities. If necessary, a small, temporary shelter or tent with portable HEPA filtration would be used to contain potential emissions from size reduction of certain materials.

A construction permit would be required under the terms of the Argonne Title V air permit due to the potential release of radionuclides. Air modeling was used to prepare the permit application for open-air demolition (see ***Human Health Impacts*** for air modeling results). Air monitoring may be performed during the project to verify emissions levels and demonstrate compliance with permitted limits (10 mrem/year to any member of the public).

Demolition activities would also generate criteria and toxic air pollutants from heavy equipment engine exhaust, soil disturbances, and unpaved road traffic. Considering the small numbers of heavy equipment and crew, and the fact that emissions would take place over a 15-month period, the potential impacts of engine exhaust emissions from heavy equipment on ambient air quality are anticipated to be minimal. Preliminary screening calculations indicate that, even under the most unfavorable meteorological conditions, the particulate matter concentration at the nearest site boundaries would be low. Currently, the highest background particulate concentrations observed at nearby monitoring stations are well below the ambient air quality standard. Accordingly, fugitive dust emissions from the proposed action would not likely result in exceedance of the ambient air quality standard at site boundaries.

Levels of diesel particulate matter (DPM) from engine exhaust, which is toxic and accounts for most of the inhalation risk in urban air, are expected to be low at site boundaries. DPM is a known occupational hazard, so effects would be generally limited to heavy equipment operators and nearby workers.

Regulators generally rely on work practice standards rather than emission standards to control emissions. Dust suppression techniques, which reflect the current state of knowledge and may be specified by permit, would be employed during demolition. In addition, most emissions from demolition activities would be temporary and intermittent in nature, and unlikely to result in the exceedance of the ambient air quality standard at site boundaries.

Noise Impacts: Noise receptors are limited to persons who work in or near Building 330, and noise levels would be monitored weekly. Workers in areas where noise levels exceed permissible noise exposures would be required to wear hearing protection. Persons beyond the Argonne site boundary and buffer zone (Waterfall Glen Forest Preserve) would not notice noise impacts due to the distances from the source.

The heavy equipment used during demolition activities (e.g., jackhammers and bulldozers) could generate maximum combined noise level of around 95 dBA at a distance of 15 m (50 ft) from noise sources. The noise levels at 1,600 meters (1 mile) west-southwest of Building 330 (the nearest residence) would be approximately 50 dBA. In addition, the Advance Photon Source (APS) structures and densely wooded forest in the direction of the nearest residence would significantly attenuate noise levels. Due to the proximity to Lemont Road and Interstates 55 and 355, the background noise level at the nearest residence is relatively high and noise levels from the proposed activity would be barely discernable or completely inaudible.

Demolition activities result in various degrees of ground vibration, depending on the equipment, methods employed, and soil compactness. However, vibrations diminish in strength with distance. Major demolition equipment could cause vibrations that are capable of affecting ongoing experimental activities at nearby facilities, requiring that activities be coordinated or that vibrations be dampened to acceptable levels. The vibration velocity level at a receptor beyond 70 meters (230 feet) from any demolition activities (except high-explosive detonation or impact pile driving) would diminish below the threshold of human perception and interference with vibration-sensitive activities. No high-explosive detonation or major heavy equipment capable of causing great ground vibration would be used and APS structures are located beyond about 140 meters (450 feet) from Building 330. Therefore, there would be no adverse vibration impacts from the proposed activity on the main APS structure. However, necessary precautions should be taken to reduce the potential for vibration impacts on the nearby APS utility building.

Socioeconomic and Environmental Justice Impacts: The total cost of the proposed action would be approximately $34.35 million. The expenditure would take place over approximately 24 months and represents a small fraction of Argonne's annual operational budget. Thus, the economic impact of the proposed action would be minor in the context of Argonne and extremely small in the context of the regional economy. There would be no social impacts such as those related to relocation of residents or impacts on lifestyle and living conditions.

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, requires federal agencies to analyze disproportionately high and adverse environmental effects of proposed actions on minority and low-income populations. Since off-site impacts of the proposed action would be minimal and the "adverse" condition is not met, there is no reason to determine and quantify the "disproportionately high" condition. Therefore, there would not be any environmental justice concerns associated with the proposed action.

Human Health Impacts: The proposed action would result in the exposure of workers to ionizing radiation and exposure of the public to very small quantities of radioactive materials, which could result in an increased risk of a latent cancer fatality. The discussion below describes the potential for these human health impacts.

Radiological Impacts to Workers. Workers demolishing Building 330 would be exposed to beta/gamma radiation from residual contamination and activated building components, as well as airborne tritium. Occupational exposures from direct radiation are expected to average less than 200 mrem per full-time equivalent laborer or equipment operator, and the upper bound collective worker dose would be approximately 3 person-rem. Based on an occupational risk factor of 6.0×10^{-4} fatal cancers per person-rem, workers engaged in the proposed action would incur a 1.8×10^{-3} collective risk for a fatal cancer, or about 1 chance in 550. Worker exposure to radiation would be controlled under established Argonne procedures that require doses to be kept As Low As Reasonably Achievable (ALARA) and administratively limit any individual's dose to less than 1 rem per year.

Radiological Impacts to Noninvolved Workers and the Public. The only potential radiological impact on non-project-related workers at the Argonne site or to members of the public would be from radiological air emissions. Assuming no dust suppression (for bounding purposes), the estimated radiation dose from the proposed action for a nearby, maximally exposed resident is 4.37×10^{-4} mrem per year, which is much less than the 10 mrem/year regulatory limit contained in the National Emission Standard for Hazardous Air Pollutants, Subpart H to 40 CFR 61. This radiation dose is equivalent to a latent cancer fatality risk of less than 2.6×10^{-10}, or about 1 chance in 3.8 billion. Although doses to nearby non-project-related workers would likely be higher due to their closer proximity to Building 330, the anticipated doses are significantly less than 1 mrem. As with worker exposures, public and non-project-related worker exposure to radiation would be controlled under established Argonne procedures that require doses to be kept ALARA.

Transportation Impacts: All waste transportation for the proposed action would be conducted by truck. Approximately 1,037 truckloads of potentially radioactive debris waste and LLW and 20 truckloads of potentially contaminated ACM would leave Argonne for transport to either NTS or Energy*Solutions*. This is a bounding estimate, based on the conservative assumption that all waste would be radiologically contaminated. It is likely that some of the debris waste or ACM, if found to be uncontaminated, could be disposed of as nonradioactive at a licensed landfill. In addition, one shipment each of MLLW and hazardous/chemical/TSCA waste are anticipated.

Because preferred disposal locations for these shipments are subject to change, NTS was assumed to bound the transportation impacts.

The 1,037 projected LLW/debris shipments for the proposed action represent an 1,100-percent increase in LLW-type shipments from Argonne over the span of one year. The total of 1,059 waste shipments for the proposed action compares to the FY2009 projection of approximately 154 shipments of similar waste from Argonne, representing a 450-percent increase in the number of annual shipments. On-site roads and gates would be adequate to accommodate this volume, as would the nearby interstate highways. The additional truck traffic associated with the off-site transportation of waste for disposal would be temporary and would contribute to a very small increase in the volume of truck traffic on the interstate highways in the vicinity of the site and nationwide.

A total of 6,110,638 vehicle-kilometers (3,797,786 vehicle-miles) would be traveled by the 1,059 round-trip shipments to NTS in Nevada (the farthest of the anticipated disposal site options). The round-trip shipments to NTS were assumed to bound the transportation risk; actual distance traveled is expected to be less. Based on state-specific accident and fatality rates for all proposed waste shipments, the estimated probability of a traffic accident is 1.78 (approximately two occurrences) and the estimated probability of a crash-related fatality is 0.067 (1 chance in 15).

Using conservative assumptions, the estimated collective latent cancer risk to the general public from incident-free radiological exposure to cargo in transit is 0.012 (19.6 person-rem), or about 1 chance in 85. The estimated collective latent cancer risk to occupational workers (truck drivers only) is 0.017 (28.1 person-rem), or about 1 chance in 60. The estimated collective latent cancer risk from the accidental release of radioactive materials following accidents severe enough to damage a shipping container is 4.6×10^{-6} (7.7×10^{-3} person-rem), or about 1 chance in 216,000. The estimated collective risk of pollution health effects from vehicle emissions is 0.005, or about 1 chance in 200.

Physical Hazards and Accidents: Auditable Safety Analyses (ASAs) were prepared for the decontamination and decommissioning of the CP-5 reactor and the decontamination and demolition of Building 301. Both projects were similar in scope to the proposed action, and both ASAs indicated the potential for only localized consequences.

Occupational accidents could occur during all operations of the proposed action, including demolition, maintenance, characterization, disassembly, and packaging, and transportation. Potential causes of accidents could include vehicular crashes, forceful contact with objects and equipment, and falls. Based on a projected 30,000 person-hours of effort and a national average occurrence rate of 1.04×10^{-7} fatalities per hour for construction laborers, no fatal accidents are expected to occur during the proposed action (risk of 0.003, or about 1 chance in 300). Based on a national average nonfatal occupational injury and illness incidence rate of 2.6×10^{-5} cases per hour for the construction industry, approximately one nonfatal occupational injury/illness is anticipated (risk of 0.78). Accident rates for the proposed action would be expected to be

lower because of the safety programs that would be implemented for decommissioning workers at Argonne.

Accidents could also occur due to natural phenomena (e.g., earthquakes, tornadoes, floods, etc.), equipment failure, or human error. These types of accidents are generally categorized according to expected frequency of occurrence and severity, from high probability/low consequence to low probability/high consequence. The maximum, reasonably foreseeable accident is the dispersal of contaminated dust and debris initiated by a tornado, although other events capable of causing similar dispersion are possible. The likelihood of a tornado hitting anywhere in DuPage County is 35 percent in a given year, and the odds of a tornado hitting any particular square mile in the County in a given year are 1 in 960.

Analyses performed for previous Argonne decommissioning projects of similar size and scope have indicated that the consequences of accidents would be localized and within the limits established by DOE for emergency actions, regardless of the frequency. Consequently, the risks were determined to be negligible. These conclusions continue to hold for the proposed action because the limited amount of residual radioactive material in the building is volumetrically fixed not readily dispersible. If an accident occurs involving a container of rubblized debris, some of that debris could aerosolize and disperse into the environment. However, the impacts from exposure to dispersed radioactive or hazardous material in an accident scenario would be comparable to the impacts from normal demolition activities. The potential impacts from a hypothetical ten-fold increase in exposure from a time-intensive cleanup effort would still be very low, with the collective risk of latent cancer fatality increasing from 1.8×10^{-3} to 1.8×10^{-2}. The more significant potential impacts would be largely physical, such as the risk of injury from wind-blown debris. The potential for dispersal of contaminated dust would be mitigated by minimizing the duration that demolition rubble is present at the project site.

Because of their nature, a probability of occurrence for intentional destructive or terrorist acts cannot be estimated. Although Argonne is a secure, access-controlled site with security gates and 24-hour security, DOE considered the potential for a terrorist attack or sabotage during the decontamination and demolition of Building 301 and the subsequent transportation of waste. The impacts of such an unlikely event would be similar to those associated with natural hazards such as tornadoes or the impacts of an accident involving a truck carrying waste from the site. The Building 330 project would also be conducted in such a manner that would not create a "highly visible" target for malicious acts or acts of terrorism.

Other Potential Direct, Indirect, Cumulative, or Long-Term Impacts: Based on the impact analysis of past decontamination and decommissioning projects, the incremental impact of the proposed action would be minimal and not significant when added to the impacts from other projects at Argonne (including ongoing operations). The decontamination and demolition of Building 310 is currently in the planning phase and the commencement of Building 310 activities may overlap with the proposed action.

Compliance with Regulations: The proposed action would comply with applicable federal, state, and local laws and regulations, as well as current permits.

Pollution Prevention: The proposed action would be performed in accordance with Argonne's waste minimization and pollution prevention (P2) practices.

DETERMINATION: Based on the analysis in the EA, DOE has determined that the proposed demolition of Building 330 at Argonne does not constitute a major federal action that would significantly affect the quality of the human environment within the meaning of NEPA, and DOE will not prepare an environmental impact statement. The proposed action alternative would result in only minor environmental, health, and safety impacts and is the most efficient and cost-effective alternative.

PUBLIC AVAILABILITY: Copies of the EA (DOE/EA-1659) are available from:

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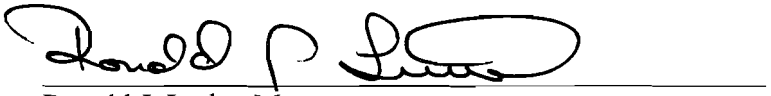

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