# 3.0 Description of the Proposed Action and No Action Alternative

This section describes the elements of the proposed action, including anticipated air emissions and waste volumes. It also describes the no action alternative as required by NEPA-implementing regulations (10 CFR § 1021.321(c)).

## *3.1 Proposed Action*

The proposed action is the decontamination and decommissioning of the Juggernaut Reactor, which includes activities such as disassembly, size reduction, waste packaging, and transportation of waste to offsite disposal sites. In addition, DOE would perform supplemental sampling and facility characterization, including (1) taking radiological readings in Building 335 and the immediate reactor vicinity; (2) sampling for lead-based paint on reactor and support components; (3) sampling for asbestos in tiles and pipe insulation; (4) wiping samples from interior walls and piping around the reactor, high bay area, and control/pump room; and (5) surveying the stainless steel tubes. Table 3-1 lists the elements of the proposed action by area.

The majority of the work would be performed inside Building 335. The only planned outdoor demolition work would be the removal of the cooling tower and concrete storage pads. However, if soil contamination were found under the reactor vessel, bio-shield, or cooling tower, this soil would be excavated and removed.[2] The proposed action would be expected to take 8 months to complete and would require about 12,000 worker-hours (approximately 12 temporary workers).

A final status release survey would be conducted to confirm that radiological release criteria for the building were met in accordance with DOE Order 5400.5. Completion of the proposed action would allow the Building 335 high bay area and associated facilities to be released for unrestricted use.

[2] Based on DOE's experience with decontamination and decommissioning of other small research reactors at ANL-E, soil contamination is not anticipated. DOE would sample for soil contamination if radiological contamination below the bio-shield were found to extend completely through the concrete. For purposes of analysis, DOE has estimated 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 additional waste volumes.

## Table 3-1. Elements of the Proposed Action

| Juggernaut Reactor Facility Area | Proposed Action Activity |
|---|---|
| All Project Areas | • Remove and package for disposal all asbestos-containing materials. |
| | • Remove the associated electrical supply panel and all electrical components associated with the reactor and auxiliary systems. |
| | • Remove all unneeded, nonelectrical utilities, including high- and low-pressure air supplies, gas piping, and laboratory water supply piping associated with the reactor and associated systems. |
| | • Survey and package lead for disposal as mixed waste. |
| | • Package all miscellaneous materials and equipment as low-level radioactive waste (LLW) or mixed LLW. |
| | • Remove and dispose of peeling paint and paint coverings, contaminated or suspect contaminated areas of the floor, walls, and ceiling. |
| | • Remove contaminated concrete flooring not to exceed structural integrity of the facility. |
| | • Decontaminate all surfaces to below release criteria. |
| | • Perform 100% wipe-down and final status release survey. |
| Reactor and High Bay | • Remove bio-shield and package as LLW. |
| | • Remove reactor and core assembly; package as LLW (some parts expected to require management as remote-handled waste). |
| | • Remove lead shielding and pieces; package as mixed LLW. |
| | • Remove contaminated concrete flooring under reactor and package as LLW. |
| | • Remove concrete pad around storage holes and package as LLW. |
| | • Fill in storage holes and stainless steel tubes with concrete. |
| | • Remove asbestos tile and mastic on second level of high bay control room and dispose of as asbestos waste. |
| | • Remove wood planking and railing around reactor and dispose of as LLW. |
| | • Decontaminate and wipe down 100% of high bay floors, walls, and ceiling. |
| | • Perform final status release survey of high bay. |
| Pump Room | • Remove storage tanks, piping, valves, motors, and associated systems. |
| | • Decontaminate area as needed after removal. |
| | • Wipe down 100% of floors, walls, and ceilings. |
| | • Perform final status release survey of pump room. |
| Ventilation Duct | • Wipe down 100% of high bay ventilation duct exterior. |
| | • Perform final status release survey of ventilation duct. |
| Outside Facilities | • Remove asbestos insulation from cooling tower piping. |
| | • Locate and remove cooling tower energy sources at supply point origin. |
| | • Remove and package cooling tower, systems, and components; package as LLW. |
| | • Remove and dispose of cooling tower concrete pad. |
| | • Remove and dispose of south-side concrete pad as LLW. |
| Final Facility Condition Post Final Status Survey | • Replace high-efficiency particulate air (HEPA) filters for pump room and high bay. |
| | • Replace all diamond plating high bay cable trough covers with same gauge material. |
| | • Replace removed concrete flooring and resurface flooring to original as-built specification. |
| | • Fill in high bay storage holes with concrete, smooth surfaces, and meet original floor loading capacity. |
| | • Install floor tile in high bay second-floor control room. |
| | • Replace sump pump and piping with pumps with backup and fix groundwater leak from ventilation system. |
| | • Replace high bay second-floor railing with Occupational Safety and Health Act (OSHA)-compliant railings. |
| | • Replace high bay ladders associated with high bay pit and overhead HEPA bank with OSHA-compliant ladders. |
| | • Grade and reseed area where south-side and cooling tower pads would be removed. |

Source: (ANL 2003b).

Cleaning supplies, paint, decontamination solutions, and hydraulic fluid would be stored in cabinets designed for that purpose at the work site. Inventories would be kept to the minimum amount expected to be used and would be inventoried periodically.

A characterization of the Juggernaut Reactor Facility was completed in 2001. Based on the sample analyses conducted at that time, the following waste volume estimates are provided.

*Contact-Handled (CH) LLW.* Approximately 140 cubic meters (5,000 cubic feet) of CH-LLW would be generated, packaged, and shipped to a LLW disposal site in accordance with DOE policies and procedures. Though not likely, up to 550 cubic meters (19,500 cubic feet) of contaminated soil may also be excavated, packaged, and disposed of as CH-LLW. This waste would be shipped to either the Hanford Site in Richland, Washington; Nevada Test Site (NTS) in Mercury, Nevada; Envirocare, a permitted and regulated commercial site in Clive, Utah; or a combination of those sites.[3]

**Definitions**

**CH-LLW** has an outer surface dose rate no more than 200 mrem per hour and requires no additional shielding or special handling. Contact-handled waste primarily emits alpha particles that are easily shielded by a sheet of paper or the outer layer of a person's skin.

**RH-LLW** has an outer surface dose rate of greater than 200 mrem per hour and must be handled and transported in shielded casks. Remote-handled waste primarily emits gamma radiation, which is very penetrating and requires concrete, lead, or steel to block it.

**MLLW** contains hazardous components regulated under the Resource Conservation and Recovery Act and radioactive components regulated under the Atomic Energy Act. Some LLW is mixed.

*Remote-Handled (RH) LLW.* Approximately 7 cubic meters (250 cubic feet) of RH-LLW, consisting of parts of the reactor and the core assembly, would be generated, packaged, and shipped in accordance with DOE policies and procedures to either Hanford or NTS.

*Mixed LLW.* Mixed LLW in the form of lead shielding and pieces and lead-based paint would be accumulated during this project. Approximately 6 cubic meters (200 cubic feet) would be expected to require packaging and shipment, which would be conducted in accordance with applicable regulations and DOE policies and procedures. These wastes would be shipped to

[3] For purposes of analysis, DOE assumed all the LLW would be shipped to Hanford, NTS, or Envirocare.

Envirocare or the Perma-Fix/Materials & Energy Corporation in Oak Ridge, Tennessee, for treatment and disposal.

*Contaminated Oil*. Up to 114 liters (30 gallons) of contaminated oil could also require treatment and disposal. These mixed wastes would be shipped to Envirocare or the Perma-Fix/Materials & Energy Corporation in Oak Ridge, Tennessee, for treatment and disposal.

*Aqueous Radioactive Liquid Waste.* Up to 380 liters (100 gallons) of residual aqueous radioactive liquid waste may be found in facility piping. In addition, if contaminated soil were found, DOE expects that excavation would encounter groundwater, resulting in the extraction of up to 76,000 liters (20,000 gallons) of radioactively contaminated groundwater. Radioactive liquid wastes, potentially including groundwater, would be treated onsite by evaporation and stabilization. Approximately 1,500 liters (400 gallons) of sludge would be generated. The sludge would be disposed of as either CH-LLW or mixed LLW, depending on its composition, and in accordance with applicable regulations and DOE policies and procedures.

*Asbestos.* Approximately 6 cubic meters (220 cubic feet) of asbestos insulation would be removed from piping and ventilation ductwork and the floors. Testing for asbestos would be performed before beginning decommissioning procedures. Asbestos found would be labeled and removed prior to starting any decommissioning work in those areas. Asbestos abatement would be conducted in accordance with applicable site procedures. This waste would be disposed of at an industrial landfill located within 160 kilometers (100 miles) of ANL-E.

*Polychlorinated Biphenyls (PCBs).* Approximately two 208-liter (55-gallon) drums of PCBs from light ballasts and capacitors would also be generated. Depending on the presence of radioactive constituents, this waste would be packaged and transported in accordance with applicable regulations and DOE policies and procedures. It would be treated and disposed of either at Envirocare or at Perma-Fix/Materials & Energy Corporation.

*Solid Wastes*. Approximately 46 cubic meters (60 cubic yards) of nonradioactive and nonhazardous debris waste would be generated. This would be disposed of at a local landfill within 100 miles of ANL-E.

Table 3-2 lists the waste volumes estimated and the sites to which the waste would be shipped for disposal.

**Table 3-2. Estimated Waste Volumes**

| Waste Type | Volume | Planned Destination | Notes |
|---|---|---|---|
| LLW – debris (CH) | 140 $m^3$(5,000 $ft^3$) | Hanford, NTS, or Envirocare | Includes concrete, miscellaneous materials, and equipment |
| LLW – debris (RH) | 7 $m^3$ (250 $ft^3$) | Hanford or NTS | Parts of reactor and core assembly |
| LLW – soil (CH) | 550 $m^3$ (19,500 $ft^3$) | Hanford, NTS, or Envirocare | Based on past experience, contaminated soil is not likely to be found |
| Aqueous radioactive liquid waste | 380 L (100 gal) – residual in facility piping | Hanford or NTS (if LLW) or Envirocare (if mixed LLW) | N/A |
| | 1,500 L (400 gal) – sludge from groundwater contaminated during soil excavation (if needed) | Hanford or NTS (if LLW) or Envirocare (if mixed LLW) | Estimate of 20,000 gallons of groundwater, treated by onsite evaporation and stabilization, resulting in 400 gallons of sludge |
| Mixed LLW | 6 $m^3$ (200 $ft^3$) | Envirocare | Includes lead shielding and pieces, lead-based paint |
| Contaminated oil | 114 L (30 gal) | Envirocare or Perma-Fix/Materials & Energy Corporation | N/A |
| Asbestos | 6 $m^3$ (220 $ft^3$) | Special waste landfill within 100 miles of ANL-E | Floor tiles from control room, cooling tower piping; hazardous waste |
| PCBs | Two 208-L (55-gal) drums | Envirocare or Perma-Fix/Materials & Energy Corporation | Light ballasts, capacitors; could be hazardous or mixed waste |
| Solid waste | 46 $m^3$ (60 $yd^3$) | Local landfill within 100 miles of ANL-E | Nonradioactive and nonhazardous debris |

N/A: not applicable

## *3.2 No Action Alternative*

Under the no action alternative, the Juggernaut Reactor Facility 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.