

UNIVERSITY OF ILLINOIS DECOMMISSIONING OF NUCLEAR REACTOR LAB URBANA, IL



Before D&D



After complete D&D



The reactor (blue structure at front) revealed during demo



During asbestos abatement

Photos by Ray Cunningham



Mark II TRIGA Nuclear Reactor



October 2011 – August 2012



\$3,625,000 (Original)
\$3,945,596 (Final)



University of Illinois



Nuclear Decontamination
& Decommissioning (D&D)



Structural Demolition



Hazardous Material Abatement



Zero OSHA Recordable Injuries

LVI was selected to decontaminate and decommission (D&D) the University of Illinois’ 1950’s era Mark II Training, Research, Isotopes, General Atomics (TRIGA) reactor and nuclear reactor laboratory. LVI dismantled, removed, and packaged the reactor, systems, and structures and decontaminated and removed radiologically contaminated surfaces, components, and debris with unrestricted site release in accordance with 10 CFR 20.

Built in 1959, the research reactor was placed in “safe storage” mode in 1998, when its 30-year operating license expired. The 1.5 megawatt reactor was used for research, student instruction, and service to the industry. It produced no electricity, but was used in a wide variety of research applications. The NRC terminated the University’s reactor license in January 2013.

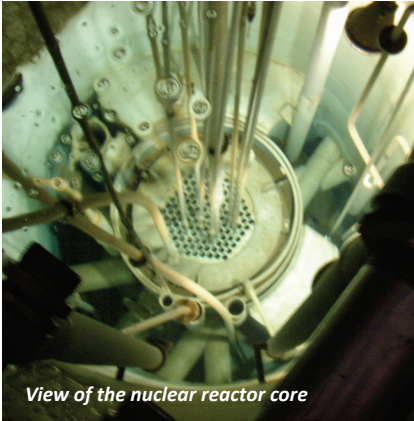
RADIOLOGICAL WASTE REMOVAL AND MANAGEMENT

Working within the regulatory framework of the Nuclear Regulatory Commission (NRC) and Environmental Protection Agency (EPA), contaminants were removed inside the facility and included neutron-activated aluminum, steel, concrete, and fission products and laboratory radiological nuclides used in various experiments.



LVI's attention to detail and safety created a smooth and efficient work environment that brought the project to completion on time and budget. The crew as a whole had a very harmonious working relationship that made working with them a genuine pleasure. I would not hesitate to recommend your company and crew to others seeking your services.

Rich Holm, Reactor Administrator, University of Illinois



View of the nuclear reactor core

LVI's experienced engineering and operations team completed facility and reactor removal preparation activities, including stripping the bioshield exterior surfaces of conduit, piping systems, and interferences. Electrical isolations allowed for removal of process components and electrical distribution

components. LVI removed the control rod drive mechanisms, irradiation facility drives, control rod guide tubes, irradiation tubing that entered the reactor assembly, fuel racks, reactor instrumentation, reactor tank ancillary items, such as lighting, water cooling piping, emergency spray header, and miscellaneous items that were stored in the tank.

Other facility preparation activities included the sizing and packaging of approximately 1,200 cubic feet of radioactive waste, consisting of glove boxes, debris, graphite stringers from the thermal columns, beam plugs, and miscellaneous laboratory items. The effort cleared a large portion of the floor area to allow more efficient D&D operations. The reactor tank water was pumped and removed to half height, which provided sufficient shielding for the 40 R/hr reactor assembly, and yet allowed the top half of the Bioshield to be removed.

CONCRETE CUTTING

The top Bioshield and shield tank were removed by wire saw cutting, and the concrete was radiologically released. Cutting Edge services performed approximately 1,200 square feet of wire saw cuts into 70 blocks. The cutting water was recycled to minimize waste volume.

REACTOR REMOVAL

The reactor components were removed in phases. The rotating rack had a dose rate of 40 R/hr, which measured the charge produced per hour, and was segregated from the reflector. The rotating rack was individually packaged, shielded, and loaded

in a cask for shipment to an off-site facility for proper disposal. The tank was completely pumped of all liquids, dependent upon dose rates, prior to reactor assembly removal. The reflector and core support plenum was then disconnected from the cooling loop, 7 beam ports, and bolted connections. The assembly and remaining components were specially-packaged for disposal.

ACTIVATED MATERIAL REMOVAL

A remotely-operated Brokk was equipped with an impact hammer to break and remove the activated concrete and metals in the vicinity of the active core region. A containment, portable HEPA ventilation, and a light water mist was used to control dust levels. As the embedded beam tubes were exposed, they were separated in sections using the Brokk. The shadow shields and activated Bioshield metals were removed with the concrete. Once it was determined that all concrete and steel had been removed that required packaging and disposal as low-level radioactive waste, the remainder of the Bioshield was released in place.

LVI removed the remaining potentially-contaminated systems from the building structure, including the primary coolant piping, heat exchanger, and pump, Nitrogen-16 delay tanks, wastewater system, and embedded fuel storage tubes. The reactor room floor, pipe tunnel, catch basin, sump and other concrete were decontaminated using scabblers, saw cuts, or impact hammers. Any contaminated soils were removed and packaged. LVI also performed asbestos abatement and hazardous material removal prior to facility demolition. Finally, LVI demolished and removed the 3,200 square foot structure, foundation, tunnels, and vaults. The released portion of the Bioshield was rubblized during building demolition.

CONTRACTOR COORDINATION

LVI hired Enercon to provide waste management, radiation protection, health physics personnel and equipment, and Final Status Surveys to verify that the endpoint criteria had been met to satisfy license termination with the NRC.

Project Managed By LVI Environmental Services Inc., a subsidiary of LVI Services Inc. | **Client Contact** Rich Holm, Reactor Administrator, Department of Nuclear, Plasma and Radiological Engineering, University of Illinois, (217) 333-7755, r-holm@illinois.edu