UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-134 AND LICENSE NO. R-61

LESLIE C. WILBUR NUCLEAR REACTOR FACILITY

AT THE

WORCESTER POLYTECHNIC INSTITUTE

ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) staff has performed an environmental review of the Leslie C. Wilbur Nuclear Reactor Facility's (LCWNRF) Decommissioning Plan (DP) for its light water cooled, and moderated heterogeneous reactor located on the campus of Worcester Polytechnic Institute (WPI). The LCWNRF reactor was constructed by the General Electric Company as a standard 1-kW (thermal) open training reactor, and first achieved criticality on December 18, 1959. The reactor license was upgraded to 10-kW (thermal) in 1967, and the LCWNRF reactor first achieved 10-kW operation on January 31, 1968. The LCWNRF reactor license was renewed in 1982, which extended the operating license for 20 years. No modifications were made to the reactor other than the fuel itself. Prior to implementing the decommissioning actions described in the DP, WPI will have cleared LCWNRF of extraneous furnishings and materials not directly associated with the reactor. In additional, the used nuclear fuel will have been transferred to another research and test reactor or returned to the U.S. Department of Energy.

WPI's Quality Assurance Program for Radioactive Packages No. 0946 (Agencywide Documents Access Management System [ADAMS] ML092160598) was reviewed and approved by letter dated August 19, 2009, (ADAMS ML092310471) by NRC staff in accordance with requirements of 10 CFR 71.17(b) and 71.101(f). On September 21, 2009, WPI submitted its

nuclear materials Transportation Plan (TP) in support of the removal of fuel. The TP, which specifically addresses compliance with the requirements of 10 CFR Part 73 ("Physical Protection of Plants and Material"), was reviewed and approved by NRC staff under letter dated February 18, 2010 (ADAMS ML100350070). The TP will govern the one-time shipment offsite of WPI's nuclear reactor fuel. WPI plans to ship the fuel to another research and test reactor licensed by the NRC or return the used fuel to the U.S. Department of Energy.

The majority of the remediation will focus on components within the reactor pool, the biological shield surrounding the reactor, and connected support systems (e.g., exhaust ventilation system, pool water treatment system and floor drains adjacent to the reactor pool). No structural contamination in other areas of the facility is known or suspected, such that only minor remediation efforts, if any, are anticipated for the building structures. Additionally, no contamination of soil or ground water is known or suspected; therefore, decommissioning of the LCWNRF can be accomplished without dismantlement or bleaching of the building. After termination of the NRC license (thus allowing unrestricted use), the affected portions of the building will be restored for reuse as an educational facility.

The NRC staff has evaluated WPI's request and has developed an environmental assessment (EA) to support the review of the WPI's proposed DP and license amendment request, in accordance with the requirements of 10 CFR Part 51. Based on the staff evaluation, the conclusion of the EA is a "Finding of No Significant Impact" (FONSI) on human health and the environment for the proposed licensing action.

The staff's safety review of the proposed action will be documented in a Safety Evaluation Report.

ENVIRONMENTAL ASSESSMENT

Identification of the Proposed Action

By letter dated March 31, 2009, (ADAMS ML090960651), as supplemented on September 30, 2009 (ADAMS ML092880231), the licensee submitted a DP in accordance with 10 CFR 50.82(b)(1), in order to dismantle the 10-kw (thermal) General Electric (GE) Reactor, to dispose of its component parts and radioactive material, and to decontaminate the facilities in accordance with the proposed DP to meet the NRC's unrestricted release criteria. After the NRC verifies that the release criteria have been met, Facility Operating License No. R-61 will be terminated. The licensee submitted an environmental report as part of the Final DP, dated September 2009, that addresses the estimated environmental impacts resulting from decommissioning the GE Reactor. The reactor is currently shutdown permanently with the fuel removed from the core and stored in racks in the reactor pool. The objective of the decommissioning is the regulatory release of the reactor facility located within the Washburn Shops and Stoddard Laboratories building, allowing for unrestricted use. On this basis, the safe storage (SAFSTOR) and entombment (ENTOMB) decommissioning options were considered inappropriate to WPI's future plans, and decontamination and dismantlement (DECON) is the decommissioning alternative selected by WPI.

A notice of license amendment request and opportunity to request a hearing was published in the *Federal Register* on March 8, 2010 (75 FR 10519-10524). No requests for hearing were received.

Need for the Proposed Action

The proposed action is necessary because of WPI's decision to cease operations permanently at the LCWNRF. As specified in 10 CFR 50.82, any licensee may permanently cease operation and apply to the NRC for license termination and authorization to decommission the affected facility. Further, 10 CFR 51.53(d) provides that each applicant for a license amendment to authorize decommissioning of a production or utilization facility shall submit with its application an environmental report that reflects any new information or significant environmental change associated with the proposed decommissioning activities. WPI is planning unrestricted use for the area that would be released.

Environmental Impact of the Proposed Action

Many of the potential environmental impacts that would normally be associated with a decommissioning project are not applicable to the WPI decommissioning program. The factors distinguishing the WPI decommissioning program include: the small size of the facility, the limited scope of the planned decontamination and decommissioning work, the short duration of the proposed work, and the small radiological inventory within this facility. Based upon the work scope and approach described in the WPI DP, the potential for negative impact to the environment during the decommissioning of the WPI research reactor is small or not applicable.

The DP states that all decontamination will be performed by trained personnel in accordance with the requirements of the radiation protection program, and will be overseen by a radiation safety officer with multiple years of experience in decommissioning health physics practices. All reactor and pool components will be removed from the facility as low level radioactive waste and managed in accordance with NRC requirements. The licensee estimates the total radiation exposure for the decommissioning process to be about 0.5 person-rem. In addition, by keeping the public at a safe distance, using access control, and by using the

approved DP and WPI's radiation protection program to control effluent releases, the licensee expects the radiation exposure to the general public to be negligible. The licensee's conclusion is consistent with the estimate given for the "reference research reactor" in NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of the Nuclear Facilities, August 1988." Only one truck shipment is anticipated: to transport the radioactive waste to the disposal site.

Occupational and public exposure may result from offsite disposal of the low-level residual radioactive material from the LCWNRF, which includes the GE reactor. In the DP the licensee stated that the handling, storage, and shipment of this radioactive material will meet the requirements of Subpart D, "Technical Requirements for Land Disposal Facilities," of 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," 10 CFR Part 71, "Packaging and Transportation of Radioactive Material" and 10 CFR 20.2006, "Transfer for Disposal and Manifests." The waste that needs to be processed prior to disposal will be shipped to an acceptable waste disposal site in accordance with applicable NRC and U.S. Department of Transportation regulations regarding waste packaging, labeling, and placarding. Only one truck shipment is anticipated: to transport the radioactive waste to the disposal site.

The processes of decontamination and dismantlement of the WPI LCWNRF will result in solid low-level radioactive waste, consisting principally of activated metals, and a small amount of contaminated metals and concrete debris. No mixed or hazardous waste is expected to be generated. Lead paint coatings and asbestos containing materials are likely to be present in the facility, but are not anticipated to be significantly present on materials likely to become radioactive waste. No soil remediation is anticipated which would result in solid radioactive waste. Solid, low-level radioactive waste will be handled (processed and packaged), stored and disposed of in accordance with applicable sections of the Code of Federal Regulations (CFR), disposal site Waste Acceptance Criteria, Massachusetts Department of Environmental Quality

requirements, WPI Licenses and Permits, and the applicable implementing plans and procedures. Radioactive waste processing includes waste minimization or volume reduction, radioactive and hazardous waste segregation, waste characterization, neutralization, stabilization, solidification and packaging.

Low-level radioactive waste will be processed and package for disposal at a licensed low-level waste site such as the Energy*Solutions*, LLC facility in Clive, Utah. The volume of low-level radioactive waste is estimated at 600 cubic feet (package volume). All wastes resulting from dismantling and decontamination are estimated to have concentrations of radioactive materials well below 10 CFR Part 61 Class A waste limits. The decommissioning will require disposal of approximately 7,000 gallons of pool water via the public sewer system. Historically the pool water has not contained any detectable radioactivity. However, as a precaution, pool water will be filtered, sampled and analyzed for radioactive content, and batch released to assure that 10 CFR Part 20 effluent limits are not exceeded. The most highly radioactive item of waste arising from the decontamination and dismantling of structures, systems and components will be the activated regulating control blade. The blade is estimated to contain a total of 56 mCi, representing the majority of the waste radioactivity to be generated during the decommissioning program.

The NRC regulations at 10 CFR 20.1402 provide radiological criteria for release of a site for unrestricted use. Release criteria for unrestricted use is a maximum Total Effective Dose Equivalent (TEDE) of 25 mrem per year from residual radioactivity above background. Application of the final status survey will be used to demonstrate that the predicted doses to a member of the public from any residual activity do not exceed the 25 mrem per year dose limit. The NRC will perform inspections and a confirmatory survey to verify the decommissioning activities and the final status survey.

With regard to potential non-radiological impacts, the proposed action does not involve any historic sites. Proper precautions will be taken to reduce the exposure to dust from lead paint and asbestos. WPI has committed to compliance with applicable occupational health and safety requirements, primarily the federal Occupational Safety and Health Acts (OSHA) of 1973.

Accordingly, the NRC concludes that there are no significant environmental impacts associated with the proposed action.

Alternatives to the Proposed Action

The three alternatives for disposition of the LCWNRF, which includes the GE Reactor, are: DECON, SAFSTOR, and no action. The ENTOMB decommissioning option was not considered because it would necessitate continued surveillance and maintenance of the LCWNRF over a substantial time period. During this period, the radiological risks would continue to exist. WPI has proposed the DECON option. DECON is the alternative in which the equipment, structures, and portions of the facilities containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use. SAFSTOR is the alternative in which the nuclear facilities are placed and maintained in a condition that allows the nuclear facilities to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use. The no-action alternative would leave the facilities in their present configuration, without any decommissioning activities required or implemented. The SAFSTOR and no-action alternatives would entail continued surveillance and physical security measures to be in place and continued monitoring by licensee personnel. The SAFSTOR and no-action alternatives would also require continued maintenance of the facilities. The radiological impacts of SAFSTOR and no-action would be less than the DECON option because of radioactive decay prior to the start of future decommissioning activities under the SAFSTOR and no action options. The SAFSTOR and no-

action alternatives also would have no significant environmental impact. However, these options involve the continued use of resources during the SAFSTOR or no-action period. WPI has determined that the proposed action (DECON) is the most efficient use of the LCWNRF, including the GE Reactor, since it proposes to use the space that will become available for unrestricted uses. In addition, the regulations in 10 CFR 50.82(b)(4)(i) allow an alternative which provides for delayed completion of decommissioning only when the delay is necessary to protect the public health and safety. The NRC staff finds that delay is not justified since the environmental impacts of the proposed action and the alternatives are similar and insignificant.

Alternative Use of Resources

This action does not involve the use of any resources not previously considered in the Environmental Report submitted as part of the DP on September 30, 2009, for the LCWNRF Reactor.

Agencies and Persons Contacted

On Tuesday, June 29, 2010, the staff sent a copy of the draft EA to the Chief for Solid Waste Program, Bureau of Waste Prevention, Central Regional Office, Massachusetts Department of Environmental Protection regarding the environmental impact of the proposed action. After review, the Chief had no comments.

FINDING OF NO SIGNIFICANT IMPACT

On the basis of the environmental assessment, the NRC staff concludes that the proposed action will not have a significant effect on the quality of human health or the environment. Accordingly, the NRC has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's letters dated September 30, 2009 (ADAMS ML092880231), which is available for public inspection, and can be copied for a fee, at the U.S. Nuclear Regulatory Commission's Public Document Room (PDR), located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland. The NRC maintains an Agency-wide Documents Access and Management System (ADAMS), which provides text and image files of NRC's public documents. This document may be accessed through the NRC's Public Electronic Reading Room on the internet at http://www.nrc.gov. Persons who do not have access to ADAMS or who have problems in accessing the documents located in ADAMS may contact the PDR reference staff at 1-800-397-4209, 301-415-4737 or by email at pdr@nrc.gov.

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