

August 22, 2012

Mr. Richard L. Holm
Reactor Administrator
216 Talbot Laboratory
104 South Wright St.
Urbana, IL 61801

SUBJECT: NRC INSPECTION REPORT 05000151/12004(DNMS) – UNIVERSITY OF ILLINOIS NUCLEAR REACTOR

Dear Mr. Holm:

On August 13, 2012, the U.S. Nuclear Regulatory Commission (NRC) completed inspection activities at the permanently shut down University of Illinois Nuclear Reactor, Urbana, Illinois. The purpose of this inspection was to determine whether decommissioning activities were conducted safely and in accordance with NRC requirements. Specifically, during onsite inspections on May 8 – 11 and July 12 – 13, 2012, and in-office review between May 11 and August 13, 2012, the inspectors evaluated decommissioning performance and radiation survey activities. In addition, the inspectors performed independent confirmatory radiation surveys and sampling activities assisted by personnel from the Oak Ridge Institute for Science and Education (ORISE).

At the conclusion of the onsite inspections, on May 11 and July 13, 2012 respectively, the inspectors discussed the preliminary inspection findings with you and members of your staff. A final report from the ORISE documenting the results of the confirmatory surveys and sample analyses was provided to the NRC on June 28, 2012. The enclosed report presents the results of this inspection, which were discussed with you by telephone on August 13, 2012.

This inspection consisted of an examination of decommissioning activities at the site as they relate to safety and compliance with the Commission's rules and regulations. Areas examined during the inspection are identified in the enclosed inspection report. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations of activities in progress, and interviews with personnel. No violations of NRC requirements were identified during this inspection.

In accordance with Title 10 of the Code of Federal Regulations 2.390 of the NRC's "Rules of Practice," a copy of this letter and the enclosed report will be available electronically for public inspection in the NRC's Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC's website at <http://www.nrc.gov/reading-rm/adams.html>.

R. Holm

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We will gladly discuss any questions you may have regarding this inspection.

Sincerely,

/RA Wayne J. Slawinski Acting for/

Christine A. Lipa, Chief
Materials Control, ISFSI, and
Decommissioning Branch
Division of Nuclear Materials Safety

Docket No. 050-00151
License No. R-115

Enclosure:
NRC Inspection Report
No. 05000151/12004(DNMS)

cc w/encl: James Stubbins, University
of Illinois
Joseph G. Klinger, Illinois Emergency
Management Agency

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No. 050-00151

License No. R-115

Report No. 05000151/12004(DNMS)

Licensee: University of Illinois

Facility: Nuclear Research Laboratory

Location: Urbana, Illinois

Dates: May 8 – 11, 2012 (on-site)
July 12 – 13, 2012 (on-site)
May 11 – August 13, 2012 (in-office review)

NRC Inspectors: Jeremy E. Tapp, Health Physicist
Wayne J. Slawinski, Senior Health Physicist

Approved by: Christine A. Lipa, Chief
Materials Control, ISFSI, and
Decommissioning Branch
Division of Nuclear Materials Safety

Enclosure

EXECUTIVE SUMMARY
University of Illinois – Nuclear Reactor
Inspection Report 05000151/12004(DNMS)

The University of Illinois Nuclear Reactor was shut down in 1998 and has been maintained in a safe storage condition (SAFSTOR) since shutdown. In 2004, all spent fuel was shipped off site for permanent storage. In October 2011, the site transitioned to active decommissioning, as the qualified contractor arrived on site; project policies, programs, and procedures were developed and approved; and dismantlement work commenced. The licensee has completed wire saw cutting of the clean bioshield areas and removal of the reactor internal components. All components with radiologically significant dose rates have been transported and disposed of as radioactive waste. The licensee completed removing activated concrete in the bioshield surrounding the reactor core and tank. All ancillary systems were then removed and the material segregated into the appropriate waste streams for offsite disposal. The licensee performed surveys on the remaining Nuclear Research Laboratory (NRL) material to ensure it was suitable for release. Demolition and disposal of the NRL followed the completion of surveys. Any waste determined to be radioactive was segregated and disposed of at a licensed facility. This routine decommissioning inspection included a review of the licensee's activities related to radiation surveys of the building and demolition and disposal of the remaining material. In addition, confirmatory surveys and sampling were performed with the assistance of personnel from the Oak Ridge Institute for Science and Education (ORISE). Areas reviewed included radiation survey practices, radiation survey results, work controls during building demolition, and transportation of radioactive waste.

Research and Test Reactor Decommissioning

Health Physics

The licensee performed adequate surveys to free release the remaining NRL structure for disposal. Nevertheless, a number of locations were identified by ORISE to be above the free release criteria, which were then remediated, surveyed, and sampled to ensure the material was disposed of in accordance with the approved Decommissioning Plan (DP) and applicable NRC requirements. ORISE analysis of volumetric concrete split samples that the licensee collected from the NRL showed consistent results and verified the adequacy and accuracy of the licensee's contract laboratory.

Bioshield and building foundation excavation activities were conducted as provided in the licensee's work plan, consistent with industry radiological and industrial safety protocols. (Section 1.1)

Solid Radioactive Waste Management and Transportation

Methods used by the licensee to characterize miscellaneous concrete waste rubble and metal debris were adequate to demonstrate compliance with regulatory requirements. (Section 1.2)

Report Details

1.0 Research and Test Reactor Decommissioning (Inspection Procedure (IP) 69013)

1.1 Health Physics

a. Inspection Scope

With the assistance of personnel from the ORISE, the inspectors toured and performed confirmatory surveys and sampling of the facility, and reviewed radiological surveys and records for the site. Areas surveyed within the Nuclear Research Laboratory (NRL) included the remaining bioshield material, the floors of all three levels, walls up to two meters above the reactor level, the primary cooling pipe tunnel, two tank vaults, and storage ports. In addition, the ORISE personnel performed concrete sampling of selected areas of the bioshield and primary coolant pipe tunnel for laboratory analysis. The ORISE personnel also performed a laboratory analysis of randomly selected split samples of the licensee's NRL volumetric concrete samples to verify consistent results. Radiological surveys and records reviewed included survey guidance and survey release documents. These documents included NRL volumetric concrete sampling results. In addition, the inspectors interviewed licensee personnel and observed the performance of remediation activities and post-remediation surveys.

The inspectors reviewed the licensee's practices for volumetric sampling and characterization of the bioshield to determine if those methods provided representative samples and were adequate to assess concrete activation and contamination.

The inspectors observed bioshield and building footprint excavation activities to determine whether the licensee's radiological and industrial safety practices were adequate and aligned with the site work plan.

b. Observations and Findings

Building release surveys had been completed by the licensee before the beginning of the inspection. Interviews of licensee personnel cognizant of the surveys performed discussed the methods used to perform surveys. The inspectors found these methods to be adequate to demonstrate the requirements for free release of the building were met, which were in accordance with the approved DP.

During ORISE's performance of confirmatory surveys, the surveyors identified seven locations that were above the licensee's release criteria. In addition, the concrete samples collected and analyzed by ORISE from the bioshield and primary coolant pipe tunnel had results for Cobalt-60 and/or Europium-152 in excess of the respective volumetric release limits specified in the DP. These issues are documented in the ORISE final report, "Final Report – Independent Confirmatory Survey of the Nuclear Research Laboratory at the University of Illinois, Urbana-Champaign, Illinois," dated June 28, 2012 (ML12226A070). The licensee promptly remediated the locations identified and performed post-remediation surveys and sampling to ensure the locations were below the applicable release criteria. The licensee documented the results of these surveys and sample results in a letter to the NRC titled, "University of Illinois Response and Clarification to ORISE Report: DCN 5173-SR-01-0," dated July 13, 2012.

During the ORISE review of the licensee's survey guidance and release documents, a number of issues were identified: (1) the survey unit classifications were not designated according to Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidance; (2) survey instrument calibrations were not representative of the Radionuclides of Concern (ROCs); and (3) calculations for instrumentation detection capabilities did not align with the release criteria discussed in the licensee's survey guidance documents. These issues were also documented in the ORISE final report and in the licensee's response letter to the NRC described previously. The inspectors reviewed the licensee's response to the issues described in the ORISE report and determined the licensee adequately evaluated the issues. The licensee demonstrated there was proper release survey area coverage, adequate survey instrument calibration was performed, and required survey instrument detection capability was maintained throughout the release surveys performed.

The inspectors determined that the methods used by the licensee for volumetric sampling of the bioshield yielded representative samples so as to accurately characterize the radiological constituents of the concrete. Industrial and radiological safety practices observed by the inspectors during excavation work aligned with industry protocols and included radiation surveys sufficient to identify potentially contaminated materials unearthed during the excavation. Contaminated materials imbedded in the concrete such as floor drains, conduit and vent lines were identified by the licensee and segregated for disposal as radioactive waste.

No findings of significance were identified.

c. Conclusions

The licensee performed adequate surveys to free release the remaining NRL structure for disposal. Nevertheless, a number of locations were identified by ORISE to be above the free release criteria, which were then remediated, surveyed, and sampled to ensure the material was disposed of in accordance with the approved DP and applicable NRC requirements. ORISE analysis of volumetric concrete split samples that the licensee collected from the NRL showed consistent results and verified the adequacy and accuracy of the licensee's contract laboratory.

Bioshield and building foundation excavation activities were conducted as provided in the licensee's work plan, consistent with industry radiological and industrial safety protocols.

1.2 Solid Radioactive Waste Management and Transportation

a. Inspection Scope

The inspectors reviewed the Bill of Lading and associated waste characterization and manifest information for a shipment of Department of Transportation (DOT) exempt radioactive waste sent to a processor. The review was performed to determine whether the licensee characterized the waste to achieve compliance with 10 CFR 61.55 and 49 CFR 173.436.

b. Observations and Findings

The inspectors determined that the licensee's methods for characterization of concrete, metal and miscellaneous excavation debris were adequate as it consisted of volumetric sample analysis and a dose to curie measurement scaled to Cobalt-60. Characterization assumptions and modeling parameters were reviewed by the inspectors to verify the licensee's characterization methods were adequate. The waste manifest NRC Form 540 was completed as required.

No findings of significance were identified.

c. Conclusions

The methodology used by the licensee to characterize miscellaneous concrete waste rubble and metal debris was adequate to demonstrate compliance with regulatory requirements.

2.0 Exit Meeting Summary

The inspectors presented the inspection results to licensee management at the conclusion of the onsite inspections on May 11, and July 13, 2012. After an in-office review of the ORISE confirmatory survey final results and licensee response was completed, a final exit teleconference was held on August 13, 2012. The licensee acknowledged the results presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION
PARTIAL LIST OF PERSONS CONTACTED

Licensee

¹R. Holm, Reactor Administrator
C. Higgins, Project Radiation Safety Officer

¹Indicates presence at the exit meeting held on August 13, 2012.

LIST OF PROCEDURES USED

IP 69013 Research and Test Reactor Decommissioning

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened None

Closed None

Discussed None

LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
DNMS	Division of Nuclear Materials Safety
DOT	Department of Transportation
DP	Decommissioning Plan
IP	Inspection Procedure
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
NRC	U.S. Nuclear Regulatory Commission
NRL	Nuclear Research Laboratory
ORISE	Oak Ridge Institute for Science and Education
ROCs	Radionuclides of Concern
SAFSTOR	Safe Storage

DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety, but rather, that selected sections of portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

NRC Form 540, Uniform Low-level Radioactive Waste Manifest, Shipment of Solid Deposited Metal Oxides to Oak Ridge, TN, dated May 16, 2012

Nuclear Reactor Lab D&D, "Guidance for Sampling Concrete Floor Surfaces," Revision 1

Nuclear Reactor Lab D&D, "Guidance for release of Bioshield," dated April 9, 2012

Survey No. UI-205; "Asphalt Area;" dated May 7, 2012

Survey No. UI-204; "Exterior Walls (class 3);" dated May 7, 2012

Survey No. UI-203; "Ceiling;" dated May 4, 2012

Survey No. UI-200; "Main Level (class 3);" dated May 4, 2012

Survey No. UI-199; "Lower Level Floor (class 2);" dated May 3, 2012

Survey No. UI-195; "Mezzanine (class 3);" dated April 27, 2012

Survey No. UI-194; "Reactor Room Walls (class 3);" dated May 2, 2012

Survey No. UI-191; "Bioshield (class2);" dated May 1, 2012

Survey No. UI-192; "Roof;" dated April 25, 2012

Survey No. UI-206; "ORISE Locations;" dated May 10, 2012

Teledyne Brown Engineering, Inc., Report of Analysis/Certificate of Conformance, Concrete Sample Results; LIMS #: L49994; dated April 12, 2012

Teledyne Brown Engineering, Inc., Report of Analysis/Certificate of Conformance, Concrete Sample Results; LIMS #: L49994; dated May 1, 2012

Teledyne Brown Engineering, Inc., Report of Analysis/Certificate of Conformance, Concrete Sample Results; LIMS #: L50082; dated May 1, 2012

Teledyne Brown Engineering, Inc., Report of Analysis/Certificate of Conformance, Concrete Sample Results; LIMS #: L50878; dated June 28, 2012