August 9, 2012

Mr. R. J. Agasie, Reactor Director
Nuclear Reactor Laboratory
University of Wisconsin - Madison
1513 University Avenue, Room 1215
Madison, WI 53706-1687

SUBJECT: UNIVERSITY OF WISCONSIN – NRC ROUTINE INSPECTION REPORT NO. 50-156/2012-201

Dear Mr. Agasie:

From July 9 to 12, 2012, the U.S. Nuclear Regulatory Commission (NRC or the Commission) completed an inspection at your University of Wisconsin Nuclear Reactor Laboratory. The enclosed report documents the inspection results, which were discussed on July 12, 2012, with you and members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspector reviewed selected procedures and records, observed activities, and interviewed personnel. Based on the results of this inspection, no findings of significance were identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations,* Section 2.390, "Public inspections, exemptions, and requests for withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Mike Morlang at (301) 415-4092 or by electronic mail at Gary Morlang@nrc.gov.

Sincerely,

/RA/
Gregory T. Bowman, Chief
Research and Test Reactors Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-156
License No. R-74

Enclosure: NRC Inspection Report No. 50-156/2012-201
cc w/encls: See next page

cc:

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Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

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Should you have any questions concerning this inspection, please contact Mike Morlang at (301) 415-40924495 or by electronic mail at Gary.Morlang@nrc.gov.

Sincerely,
/RA/
Gregory T. Bowman, Chief
Research and Test Reactors Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

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DATE	8/9/2012	8/9/2012	8/9/12

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U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Docket No:	50-156
License No:	R-74
Report No:	50-156/2012-201
Licensee:	University of Wisconsin
Facility:	Nuclear Reactor Laboratory
Location:	Madison, WI
Dates:	July 9 – 12, 2012
Inspector:	Mike Morlang Patrick Isaac
Approved by:	Gregory T. Bowman, Chief Research and Test Reactors Oversight Branch Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

University of Wisconsin - Madison
Nuclear Reactor Laboratory
Report No: 50-156/2012-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the University of Wisconsin (the licensee's) one megawatt Class II research reactor safety program including: 1) organizational structure and staffing; 2) operations logs and records; 3) radiation protection, 4) environmental monitoring; 5) design changes; 6) committees, audits, and reviews; and 7) transportation of radioactive material since the last U.S. Nuclear Regulatory Commission (NRC) inspection of these areas. The licensee's program was acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements. No violations or deviations were identified.

Organizational Structure and Staffing

- The facility organization and staffing were in compliance with the requirements specified in the Technical Specifications.

Operations Logs and Records

- Facility operating logs and records were being maintained as required by Technical Specifications.

Radiation Protection

- Surveys were being completed and documented acceptably.
- Postings met the regulatory requirements.
- Personnel dosimetry was being worn as required and doses were well within NRC regulatory limits.
- Radiation monitoring equipment was being maintained and calibrated as required.
- Acceptable radiation protection training was being provided to staff members.
- The Radiation Protection Program and the As Low As Reasonably Achievable Program were being acceptably implemented.

Effluent and Environmental Monitoring

- Effluent monitoring satisfied license and regulatory requirements.
- Releases were within the specified regulatory and Technical Specifications limits.

Design Changes

- The latest changes completed at the facility were reviewed by licensee personnel using the criteria specified in Title 10 of the *Code of Federal Regulations* Section 50.59 “Changes, test, and experiments,” then reviewed by the Reactor Safety Committee and implemented when determined to be acceptable.

Committees, Audits and Review

- The review and audit program was being conducted acceptably by the Reactor Safety Committee.

Transportation of Radioactive Materials

- Radioactive material produced in the reactor was transferred to the campus’s broad scope license and shipped under the auspices of that license, transferred to other authorized users on campus, or maintained at the reactor facility for use in labs in accordance with procedure.

REPORT DETAILS

Summary of Plant Status

The University of Wisconsin (UW or the licensee) continued to operate the one megawatt TRIGA conversion reactor as needed in support of laboratory and lecture courses, research in the area of neutron irradiation, and the Reactor Sharing Program. During this inspection the facility was in the process of reloading the reactor core following the annual maintenance shutdown and the reactor was not operated.

1. Organizational Structure and Staffing

a. Inspection Scope (Inspection Procedure (IP) 69001)

To verify that the organization and staffing requirements specified in Section 6.1 of the facility Technical Specifications (TS) and associated procedures were being met, the inspector reviewed:

- Organizational structure for the Nuclear Reactor Laboratory
- Selected Operations Log Sheets, checklists, and associated forms and records for 2010 and to date in 2012
- University of Wisconsin Nuclear Reactor (UWNR) Procedure number (No.) 001, "Standing Operating Instructions," Revision (Rev.) 14, Reactor Safety Committee approval dated May 14, 2009
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2009 – 2010 Annual Operating Report," for the period from July 2009 through June 2010
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2010 – 2011 Annual Operating Report," for the period from July 2010 through June 2011
- Startup checklists for 2010 to date in 2012

b. Observations and Findings

Through discussions with licensee representatives, the inspectors determined that management responsibilities and the organization at the UWNR laboratory had not changed since the previous NRC inspection in this area.

Through review of records and logs and through discussions with licensee personnel, the inspectors determined that the staffing at the facility was acceptable to support the current workload and ongoing activities. The staffing met the requirements of the TS.

c. Conclusion

The licensee's organization and staffing remain in compliance with the requirements specified in the TS.

2. Operations Logs and Records

a. Inspection Scope (IP 69001)

The inspectors reviewed selected parts of the following reactor operations records to verify that the requirements of TS were being met:

- Reactor Pre-startup Checklist UWNR – 110, Rev. 51, dated June 16, 2010
- Reactor Startup Checklist UWNR – 111, Rev. 43, dated June 16, 2010
- Surveillance Activities UWNR – 100, Rev. 49, dated December 13, 2010
- Reactor Safety Committee (RSC) minutes for 2011 and 2012

b. Observations and Findings

The procedures specified a records system that was commensurate with TS requirements. Procedures called for operational data to be recorded in the reactor logbooks, startup checklists, and shutdown checklists. Data recorded indicated that the reactor was operated within the envelope of safety parameters established in the reactor license and TS.

The inspectors reviewed weekly reactor water sample results and other annual maintenance requirements that were documented in accordance with TS requirements, noting that proper procedures were followed and detailed logbook entries were made.

c. Conclusion

Within the scope of this review, the licensee's operations recordkeeping program conformed to TS requirements.

3. Radiation Protection

a. Inspection Scope (IP 69001)

The inspectors reviewed the following to verify compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) Parts 19 and 20, and TS Sections 3.4, 4.2.3, 5.4, 6.6, and 6.7.2:

- Annual Radiation Safety Review dated February 7, 2012
- Annual Reactor Safety Committee TS Audit dated March 5, 2012
- UWNR dosimetry records for 2010 through the present
- Radiological signs and posting in various areas of the facility
- Annual Radiation Safety Audit - UW Reactor for 2010 and 2011
- Monthly Operation Summary Reports for 2010 through the present
- Calibration and periodic check records for radiation monitoring instruments
- Health Physics Monthly Nuclear Reactor Audits and Reports for 2010 through the present

- Radiation Protection and As Low As Reasonable Achievable (ALARA) Program documents dated March 6, 2012
- UWNR Laboratory Form No. 031, "Procedure for Facility Familiarization," Rev. 3, RSC approval dated May 21, 2008
- UWNR Laboratory Form No. 100, "Surveillance Activities," Rev. 53, RSC approval dated May 30, 2012
- UWNR Laboratory Procedure No. 117, "Air Monitor Operating Procedure," Rev. 21, RSC approval dated November 21, 2007
- UWNR Laboratory Procedure No. 118, "Area Radiation Monitor Operating Checks," Rev. 1, RSC approval dated May 14, 2004
- UWNR Laboratory Procedure No. 171, "Air Monitor Calibration and Records," Rev. 29, RSC approval dated December 16, 2010
- UWNR Laboratory Procedure No. 172, "Sampling and Calculation Procedure - Air Particulate Activity Samples," Rev. 15, RSC approval dated May 21, 2008
- UWNR Laboratory Procedure No. 177, "Procedure for Use and Calibration of Health Physics Instruments," Rev. 25, RSC approval dated December 8, 2011
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2009 – 2010 Annual Operating Report," for the period from July 2009 through June 2010
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2010 – 2011 Annual Operating Report," for the period from July 2010 through June 2011

The inspectors also toured the licensee's facility and observed the use of dosimetry and radiation monitoring equipment. Licensee personnel were interviewed as well.

b. Observations and Findings

(1) Surveys

The inspector reviewed monthly radiation and contamination surveys of licensee-controlled areas completed by UW Environmental Health and Safety (EH&S) Department personnel. The inspector also reviewed various weekly monitor checks and monthly general area radiation and contamination surveys conducted by reactor staff personnel. The various periodic contamination and radiation surveys had been completed within the prescribed time frame required by procedure. Survey results were evaluated to ensure that established action levels had not been exceeded.

(2) Postings and Notices

During tours of the facility, the inspector observed that caution signs and postings in place and controls established for the controlled areas were acceptable for the hazards involving radiation, high radiation, and contamination and were posted as required by 10 CFR 20, Subpart J, "Precautionary Procedures."

Copies of current notices to workers were posted in various areas in the facility. The copies of NRC Form 3, "Notice to Employees," noted at the facility were the latest issue and were posted in various areas throughout the facility as required by 10 CFR 19.11.

(3) Dosimetry

The inspector determined that the licensee used thermoluminescent dosimeters (TLDs) for whole body monitoring of beta and gamma radiation exposure with an additional component to measure neutron radiation. The dosimetry was supplied and processed by a vendor accredited through the National Voluntary Laboratory Accreditation Program. An examination of the TLD results, indicating exposure to radiation at the facility for the past 2 years, showed that the highest occupational doses, as well as doses to the public, were within 10 CFR Part 20 limits. The records showed that the highest annual whole body exposure received by a single individual for 2010 was 71 millirem (mr) deep dose equivalent (DDE) and 93 mr shallow dose equivalent (SDE). The highest annual whole body exposure received by a single person for 2011 was 65 mr DDE and 65 mr SDE.

(4) Radiation Monitoring Equipment

Calibration frequency met procedural and/or TS requirements and records were maintained as required. The inspectors verified that the instruments that were stationed for use in the Reactor Bay and in adjacent labs had been calibrated and were within the allowed calibration interval.

(5) Radiation Protection Program

The licensee's Radiation Protection Program was set forth in the UW EH&S Department manual entitled "Radiation Safety for Radiation Workers," dated August 2005, which was available in hard copy form and also maintained and available on-line. The program included requirements that all personnel who performed work in association with radioactive material were to receive training in radiation protection, policies, procedures, requirements, and facilities.

(6) ALARA Program

The ALARA Program was also outlined and established in the UW EH&S Department manual, "Radiation Safety for Radiation Workers," and in various UWNR laboratory guidance documents and procedures. The ALARA program provided guidance for keeping doses ALARA and was consistent with the guidance in 10 CFR Part 20.

(7) Radiation Protection Training

As noted above, people who handled radioactive material, including licensee personnel, were required to receive training in radiation protection. This was accomplished by staff members attending a class, reading the manual, and successfully passing a written examination. Completion of this training by reactor staff personnel was verified by EH&S Department personnel as well as by the Reactor Director and/or the Reactor Supervisor.

c. Conclusion

The inspector determined that the Radiation Protection and ALARA Programs satisfied regulatory requirements because: 1) surveys were being completed and documented acceptably, 2) postings met regulatory requirements, 3) personnel dosimetry was being worn as required and doses were well within the NRC's regulatory limits, 4) radiation monitoring equipment was being maintained and calibrated as required, and 5) acceptable radiation protection training was being provided.

4. Effluent and Environmental Monitoring

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with the requirements of 10 CFR Part 20 and TS Sections 3.4, 4.2.3, 5.4, 6.6, and 6.7.2:

- Liquid release records for the period from 2010 through the present
- Airborne release records documented in the UWNR Laboratory Monthly Operations Summary Reports provided to the RSC for the period from November 2010 to the present
- UWNR Laboratory Form No. 100, "Surveillance Activities," Rev. 53, RSC approval dated May 30, 2012
- UWNR Laboratory Procedure No. 100C, "Procedure for Gross Gamma Counting of Water Samples," Rev. 20, RSC approval dated June 3, 2011
- UWNR Laboratory Procedure No. 109, "Procedure for Liquid Waste Disposal," Rev. 25, RSC approval dated June 3, 2011
- UWNR Laboratory Procedure No. 117, "Air Monitor Operating Procedure," Rev. 25, RSC approval dated November 21, 2007
- UWNR Laboratory Procedure No. 118, "Area Radiation Monitor Operating Checks," Rev. 1, RSC approval dated May 14, 2004

- UWNR Laboratory Procedure No. 171, "Air Monitor Calibration and Records," Rev. 29, RSC approval dated December 16, 2010
- UWNR Laboratory Procedure No. 172, "Sampling and Calculation Procedure - Air Particulate Activity Samples," Rev. 15, RSC approval dated May 21, 2008
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2009 – 2010 Annual Operating Report," for the period from July 2009 through June 2010
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2010 – 2011 Annual Operating Report," for the period from July 2010 through June 2011

b. Observation and Findings

The inspectors reviewed the calibration records of the area radiation monitors and the stack monitoring system. These systems had been calibrated annually according to procedure. The weekly start-up check records for the monitoring equipment were also reviewed.

The inspectors also reviewed the records documenting liquid releases to the sanitary sewer for the past 2 years. The inspector determined that liquid releases were approved by a senior reactor operator after analyses indicated that the releases would meet regulatory requirements for discharge into the sanitary sewer. This was in accordance with procedure and the results of the releases were acceptably documented in the operating log records as well as in the Annual Operating Reports.

On-site and off-site gamma radiation monitoring was accomplished using various environmental optically-stimulated luminescent (OSL) dosimeters in accordance with the applicable procedures. The OSL dosimetry data indicated that there were no doses in excess of any regulatory limits. These results were also acceptably reported in the Annual Operating Reports for fiscal years 2009-2010 and 2010-2011.

b. Conclusion

Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and TS limits.

5. Design Changes

a. Inspection Scope (IP 69001)

To verify compliance with the licensee's procedures, TS Section 6.2.3, "Review Function," and 10 CFR 50.59, the inspector reviewed selected aspects of:

- UWNR Annual Report for Fiscal Year 2010 – 2011
- UWNR Annual Report for Fiscal Year 2009 - 2010
- UWNR 020, "UWNR Modification Checklist," Rev. 2, dated May 30, 2012

- UWNR 020, “Replacement of Regulating Blade,” dated July 29, 2010
- UWNR 020, “Modification of Reactor Water Makeup System,” dated November 29, 2011
- RSC 1085, “LEU Core Shuffle Safety Analysis,” dated April 2011

b. Observations and Findings

Through review of applicable records and interviews with licensee personnel, the inspector determined that, since the previous inspection, modifications to the facility were acceptably reviewed in accordance with applicable administrative controls. UWNR Laboratory Modification Checklists were followed and completed for each modification. The modifications were reviewed by the RSC as required and found to be acceptable. The licensee determined that none of the changes met any of the criteria specified in 10 CFR 50.59(c)(2)(i) – (viii).

c. Conclusion

The design change program was being implemented as required by the TS and facility procedures.

6. Committees, Audits, and Reviews

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with the requirements of TS Section 6.2, “Review and Audit - The Reactor Safety Committee”:

- Minutes of the UWNR Safety Committee Meeting dated May 30, 2012
- Minutes of the UWNR Safety Committee Meeting dated June 3, 2011
- Minutes of the UWNR Safety Committee Meeting dated December 13, 2010
- RSC 1053, “Change in Operating Organization: Reaffirmation of RSC Members,” dated June 8, 2010
- RSC 1059, “HP Reports for May and June 2010,” dated May 25, 2010
- RSC 1049, “Monthly Operation Summary Report for March and April 2010”
- RSC 1075, “Monthly Operation Summary Report for November and December 2010”
- RSC 1090, “Report on 2011 Annual Maintenance Activities,” dated June 21, 2011
- RSC 1082, “HP Reports for January and February 2011,” dated January 6, 2011
- RSC 1124, “Appointment to the Operating Organization,” dated May 7, 2012
- UWNR Operator Requalification Program Audit for 2010, dated November 22, 2011

b. Observations and Findings

The inspectors verified that the UWNR RSC composition, meeting quorums, and meeting frequency were all in accordance with TS Section 6.2, "Review and Audit." Records of meeting proceedings were well-organized and included complete sets of materials distributed at meetings. The inspector verified that review functions prescribed in TS Section 6.2.3, "Review Function," were all reviewed by the committee. The inspector also verified that the audit function required by TS Section 6.2.4, "Audit Function," was conducted and that the audit reports were reviewed by the RSC.

c. Conclusion

The RSC provided the oversight required by the TS.

7. Transportation

a. Inspection Scope (IP 86740)

The inspector reviewed the following to verify compliance with regulatory and procedural requirements for shipping or transferring licensed material:

- Selected records of radioactive material transfers for 2008 and to present
- UWNR Laboratory Procedure No. 005, "UWNR Administrative Guide," Rev. 56, RSC approval dated May 20, 2012
- UWNR Laboratory Procedure No. 023, "Procedure for Receipt of Radioactive Material Shipments," Rev. 6, RSC approval dated December 16, 2009
- UWNR Laboratory Form No. 130, "Request for Isotope Production," Rev. 17, RSC approval dated November 21, 2007
- UWNR Laboratory Procedure No. 131, "Production of Radioisotopes in Nuclear Reactor," Rev. 21, RSC approval dated May 8, 2006
- UWNR Laboratory Form No. 134, "Request and Authorization for Services of the UW Reactor," Rev. 3, RSC approval dated May 12, 2005

b. Observations and Findings

Records showed that radioactive material produced in the reactor and destined to be shipped off site was typically transferred to UW Central Ordering, Receiving, and Distribution Office (CORD) through the UW EH&S Department. Material transfers were documented on UWNR Laboratory Form No. 130, "Request for Isotope Production." This radioactive material was then shipped by CORD under the campus's State broad scope license, State of Wisconsin Department of Health and Family Services, Radioactive Materials License No. 25-1323-01, Amendment No. 22, expiration date July 31, 2013.

Radioactive material to be used by UW authorized personnel was also transferred to the broad scope license and distributed by CORD. A list of UW authorized personnel was maintained by the licensee and documented on UWNR

Laboratory Form No. 134, "Request and Authorization for Services of the UW Reactor." The program for radioactive material transfer and transport was consistent with license and procedural requirements. The documents indicated the transfer of material had been signed for by UW EH&S personnel and distributed to authorized individuals as required. The other radioactive material produced in the reactor was maintained under the reactor license for use in laboratories and used for re-irradiation or held for decay.

c. Conclusion

Radioactive material produced in the reactor was typically transferred to the campus broad scope license and shipped under the auspices of that license, transferred to other authorized users on campus, or maintained at the reactor facility for use in laboratories in accordance with procedure.

8. Follow-up on Previously Identified Items

a. Inspection Scope (IP 92701)

The inspectors reviewed the licensee's actions taken in response to two previously identified Inspector Follow-up Items (IFIs).

b. Observation and Findings

IFI 50-156/2009-201-01 – Follow-up on the licensee's actions to complete a review of the "non controlled procedures" (NCPs) to determine whether or not they should be incorporated into the official UWNR, RSC-approved series of procedures.

During an inspection of the facility in 2009, the inspectors noted that the licensee had developed many NCPs to capture some of the "corporate" knowledge that was not documented in any other manner. These NCPs were helpful, but were not part of the official UWNR series of RSC-reviewed and -approved procedures. Thus they were not required to be reviewed annually and any changes were not subject to RSC review and approval. The licensee was aware of the need to review these NCPs and was considering whether or not they needed to be incorporated into the UWNR series of procedures. The licensee was informed that the issue of completing a review of the NCPs to determine whether or not they should be incorporated into the official UWNR, RSC-approved series of procedures would be followed by the NRC as an IFI.

The NCPs had been reviewed and the contents of the NCPs had been incorporated into existing UWNR procedures. This item is considered closed.

IFI 50-156/2011-201-01 – Follow-up on the licensee's actions to complete a review of Procedure No. 001 to meet the following TS requirement.

Section 6.1.3 of the newly issued TS states that:

1. The minimum staffing when the reactor is not secured shall be:

   - A licensed reactor operator in the control room (if licensed senior reactor operator, may also be the person required in c).

   - A second designated person present at the facility or readily available by phone or radio and within 1,000 feet capable of carrying out prescribed written instructions.

   - A designated senior reactor operator shall be readily available at the facility or on call. On call means the individual can be rapidly reached by phone or radio and is within 30 minutes or 15 miles of the reactor facility.

   The inspectors discussed the "new" TS staffing requirements noted above with the Reactor Director. The licensee has revised UWNR Procedure No. 001, "Standing Operating Instructions," which details the various duties and responsibilities of licensed personnel. This item is considered closed.

c. Conclusion

   Two IFIs identified during previous inspections were closed.

9. Exit Meeting Summary

The inspection scope and results were summarized on July 12, 2012, with licensee representatives. The inspectors discussed the findings for each area reviewed. The licensee acknowledged the results of the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

R. Agasie	Reactor Director
M. Blanchard	Reactor Supervisor
C. Edwards	Nuclear Reactor Technician/Electronics Technician

Other Personnel

B. Newman	UWPD Lieutenant

INSPECTION PROCEDURES USED

IP 69001	Class II Research and Test Reactors
IP 86740	Inspection of Transportation Activities
IP 92701	Follow Up Items

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

50-156/2011-201-01	IFI	Follow-up on the license's actions to document the specified staffing to comply with TS Section 6.1.3
50-156/2009-201-01	IFI	Follow-up on the licensee's actions to complete a review of the NCPs to determine whether or not they should be incorporated into the official UWNR, RSC-approved series of procedures.

PARTIAL LIST OF ACRONYMS USED

10 CFR	Title 10 of the *Code of Federal Regulations*
ALARA	As Low As Reasonably Achievable
CORD	Central Ordering, Receiving, and Distribution Office
DDE	Deep Dose Equivalent
EH&S	Environmental Health and Safety
IFI	Inspector Follow-up Item
IP	Inspection Procedure
mr	millirem
No.	Number
NCP	Non-Controlled Procedure
NRC	U. S. Nuclear Regulatory Commission
OSL	Optically-Stimulated Luminescent
Rev.	Revision

RSC	Reactor Safety Committee
SDE	Shallow Dose Equivalent
TLD	Thermoluminescent Dosimeter
TS	Technical Specifications
UW	University of Wisconsin
UWNR	University of Wisconsin Nuclear Reactor