February 12, 2013

Dr. Barry M. Klein, Reactor Director
5335 Price Avenue, Bldg. 258
McClellan AFB, CA 95652-2504

SUBJECT: UNIVERSITY OF CALIFORNIA-DAVIS – NRC ROUTINE INSPECTION REPORT NO. 50-607/2013-201

Dear Dr. Klein:

From January 14 to 16, 2013, the U.S. Nuclear Regulatory Commission (NRC or the Commission) conducted an inspection at your University of California-Davis/McClellan Nuclear Research Center. The enclosed report documents the inspection results, which were discussed on January 16, 2013, with members of your staff, including Walter Steingass, Associate Director for Reactor Operations, and David Reap, Health Physics Technician.

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 Craig Bassett at (301) 466-4495 or by electronic mail at Craig.Bassett@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. 50-607
License No. R-130

Enclosure: NRC Inspection Report No. 50-607/2013-201
cc: w/encl: Please see next page

cc:

Dr. Wesley Frey, Radiation Safety Officer
5335 Price Avenue, Bldg. 258
McClellan AFB, CA 95652-2504

Mr. Walter Steingass, Associate Director
for Reactor Operations
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California Energy Commission
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Radiological Health Branch
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Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

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NAME	CBassett	GLappert	GBowman
DATE	1/24/2013	1/29/2013	2/12/2013

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

Docket No:	50-607
Report No:	50-607/2013-201
Licensee:	University of California-Davis
Facility:	McClellan Nuclear Research Center
Location:	McClellan Park Sacramento, California
Dates:	January 14–16, 2013
Inspector:	Craig Bassett
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 California-Davis
McClellan Nuclear Research Center
Report No: 50-607/2013-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the University of California-Davis (the licensee's) Class I research and test reactor safety program including: (1) organizational structure and staffing; (2) review, audit, and design change functions; (3) procedures; (4) radiation protection; (5) environmental monitoring; and (6) transportation of radioactive materials 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.

Organizational Structure and Functions

- The organizational structure and staffing were generally consistent with the requirements specified in Technical Specification Section 6.

- A new Radiation Safety Officer had been hired to oversee work in the Radioisotope Sciences Facility and the reactor facility.

Review and Audit and Design Change Functions

- The Nuclear Safety Committee was meeting at the required frequency, reviewing the topics outlined in the Technical Specifications, and conducting audits of facility programs as required.

- The design change program, including review, evaluation, and documentation of changes to the facility, satisfied NRC requirements.

Procedures

- The procedure review, revision, control, and implementation program satisfied Technical Specification requirements.

Radiation Protection Program

- Surveys were being completed and documented acceptably to permit evaluation of the radiation hazards present.

- Postings met the regulatory requirements specified in Title 10 of the *Code of Federal Regulations* Parts 19 and 20.

- Personnel dosimetry was being worn as required and doses were well within the licensee's procedural action levels and NRC's regulatory limits.

- Radiation survey and monitoring equipment was being maintained and calibrated as required.

- Acceptable radiation protection training was being provided to facility personnel using a graded approach.

Environmental Monitoring

- Effluent monitoring satisfied license and regulatory requirements and releases were within the specified Technical Specification and regulatory limits.

Transportation of Radioactive Materials

- Radioactive material was being shipped in accordance with the applicable regulations.

REPORT DETAILS

Summary of Plant Status

The University of California-Davis (UCD's or the licensee's) two megawatt (MW) TRIGA reactor continued to be operated in support of neutron radiography, medical isotope production, neutron tomography, and experimental sample irradiation. During the inspection the reactor was operated up to 8 hours per day at a nominal power level of one MW to support neutron radiography and sample irradiation.

1. Organization and Staffing

a. Inspection Scope (Inspection Procedure (IP) 69006)

The inspector reviewed the following regarding the University of California-Davis/McClellan Nuclear Research Center (UCD/MNRC) organization, staffing, and responsibilities to ensure that the requirements of Technical Specification (TS) 6.1, Revision (Rev.) 13, dated March 28, 2003, were being met:

- Management responsibilities
- Qualifications of facility personnel
- Current UCD/MNRC organizational structure and staffing
- Staffing requirements for safe operation of the research reactor facility
- Selected UCD/MNRC operations logs and UCD/MNRC startup checklists for 2012 documenting shift staffing
- University of California, Davis/McClellan Nuclear Radiation Center 2010 Annual Report, submitted to the NRC on June 28, 2011
- University of California, Davis/McClellan Nuclear Research Center 2011 Annual Report, submitted to the NRC on June 25, 2012
- Facility Procedure UCD/MNRC-0004-DOC-13, "Technical Specifications for the McClellan Nuclear Research Center (MNRC) Reactor Facility," Rev. 13, approval date March 28, 2003
- Facility Procedure UCD/MNRC-0045-DOC-01, "Quality Assurance Program for McClellan Nuclear Research Center (MNRC)," Rev. 1, approval date November 22, 1999
- American Nuclear Society Standard 15.4-1988, "Selection and Training of Personnel for Research Reactors," standard approval dated June 9, 1988

b. Observations and Findings

The organization at the UCD/MNRC was generally as required by TS Section 6. The Vice Chancellor for Research was the individual designated as the licensee for the university. The UCD/MNRC facility was under the direct control of the UCD/MNRC Reactor Director, who reported to and was accountable to the Vice Chancellor for the safe operation and maintenance of the facility. Individuals at the facility in management positions, such as the Reactor Supervisor and the Radiation Safety Officer, reported to the Reactor Director and were responsible for implementing UCD/MNRC policies, for operation of the facility, for

safeguarding facility personnel and the public from undue radiation exposure, and for adhering to the operating license and TSs.

As noted in NRC Inspection Report Number (No.) 50-607/2008-203, the licensee's organizational chart for the UCD/MNRC as shown in the TS indicated that the chain of command included an Operations Manager, who was to be in charge of reactor operations. The chart also indicated a staff position of Health Physics Supervisor. At the time of the inspection, these two positions were vacant. During a previous inspection, the inspector noted that the licensee had initiated, reviewed, and approved a TS change to modify the facility's organization structure. The licensee indicated that the change had been submitted to the NRC on July 15, 2011, and was awaiting NRC review. The inspector previously opened inspector follow-up item (IFI) 50-607/2006-201-01 to track completion of the update and correction of the organizational chart. This IFI remains open.

It was noted that staff changes had been made since the last NRC inspection, which occurred in July 2012 (refer to NRC Inspection Report No. 50-607/2012-203). Because of the future addition of a Radioisotope Sciences Facility (RSF) to the MNRC, a new Radiation Safety Officer (RSO) was recruited to oversee the radiological safety/work in both the RSF and the reactor facility. The person who had held the position of RSO for the MNRC continued to work at the facility as a health physics technician (HPT) and a senior reactor operator. The inspector reviewed the qualifications of the new RSO to ensure that the individual was qualified for the position.

c. Conclusion

The organizational structure and staffing were generally consistent with the requirements specified in Technical Specification Section 6. One IFI, which was previously opened, is being maintained open to track updates to the facility organization chart specified in the TS. A new RSO had been hired to oversee work in the RSF and the reactor facility.

2. Review and Audit and Design Change Functions

a. Inspection Scope (IP 69007)

To verify that the required reviews and audits were being completed and that facility changes were reviewed and approved as required by TS Section 6.2, the inspector reviewed selected aspects of:

- 2011 Annual Audit of the MNRC, completed December 9, 2011
- Nuclear Safety Committee (NSC) meeting minutes for June 2011 through the present
- UCD/MNRC "Facility Modification Notebook" containing the "Facility Modification Log" forms

- Selected “Facility Modification Installation Authorization Forms” and associated “Facility Modification Checklist” forms processed during 2012
- University of California, Davis/McClellan Nuclear Radiation Center 2010 Annual Report, submitted to the NRC on June 28, 2011
- University of California, Davis/McClellan Nuclear Research Center 2011 Annual Report, submitted to the NRC on June 25, 2012
- Facility Procedure UCD/MNRC-0043-DOC-04, “Facility Modification Procedure,” Rev. 4, approval dated January 8, 2008
- Facility Procedure UCD/MNRC-0045-DOC-01, “Quality Assurance Program for McClellan Nuclear Research Center (MNRC),” Rev. 1, approval dated November 22, 1999

b. Observations and Findings

(1) Review and Audit Functions

Composition of the NSC and qualifications of NSC members were as specified in TS 6.2.1. Minutes of the NSC meetings indicated that the committee continued to meet semiannually as required by TS 6.2.2 and provided the reviews and oversight specified in TS 6.2.3. Through records review the inspector determined that reviews were conducted by the NSC or designated representatives. Topics of those reviews were as required by the TS and provided sufficient guidance, direction, and oversight to ensure acceptable use of the reactor.

The inspector reviewed the results of the most recent annual audits conducted at the facility. It was noted that the 2012 annual audit had not yet been completed but was scheduled to be done in February. The 2011 audit appeared to be comprehensive and had reviewed the activities specified in TS 6.2.4, including various aspects of the reactor facility operations and associated programs. No discrepancies were found, but recommendations were made as a result of the audit. The licensee took actions as needed.

(2) Design Change Functions

The regulatory requirements stipulated in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.59 “Changes, tests, and experiments,” were implemented at the facility through Facility Procedure UCD/MNRC-0043-DOC-04, “Facility Modification Procedure.” The procedure was developed to address activities that affected changes to the facility as described in the Safety Analysis Report (SAR), changes to MNRC procedures, and changes to or development of new tests or experiments not described in the SAR. The procedure adequately incorporated criteria provided by the regulations with additional requirements mandated by local conditions.

The inspector reviewed entries in the "Facility Modification Log" notebook for 2012. The notebook entries showed that no modifications dealing with the radiation protection system had been proposed since the last inspection.

c. Conclusion

The NSC was meeting as required and reviewing the topics outlined in the TS. Audits of various reactor operations and programs were being conducted as required. The design change program satisfied NRC requirements.

3. Procedures

a. Inspection Scope (IP 69008)

To verify compliance with TS 6.4, the inspector reviewed selected portions of the following:

- Selected "Document Review" forms completed by staff members
- "UCD/MNRC Controlled Document Review and Approval Reference List"
- "MNRC Document List" listing all the licensee's current procedures and the date each was last reviewed
- Various memoranda from the Reactor Supervisor to the staff indicating document review assignments and responsibilities
- Facility Procedure UCD/MNRC-0005-DOC-09, "Document Control Plan," Rev. 9, approval dated February 16, 2007
- Facility Procedure UCD/MNRC-0029-DOC-18, "UCD/MNRC Radiation Protection Procedures," Rev. 18, approval dated January 29, 2008
- Various of the addenda located in Facility Procedure UCD/MNRC-0042-DOC-16, "MNRC Health Physics Instrumentation Calibration and Test Procedures," latest reviews of the addenda were completed on January 10, 2013

b. Observations and Findings

Procedures were required to be prepared and approved for the activities listed in TS 6.4. The procedures were required to be approved by the UCD/MNRC Reactor Director. Facility Procedure UCD/MNRC-0005-DOC stipulated that the UCD/MNRC staff perform a biennial review of each active document to assure that it was current. The inspector noted that operations and health physics procedures were typically being reviewed annually by assigned licensee personnel while maintenance and other procedures were reviewed biennially. Changes to the procedures required the approval of the UCD/MNRC Reactor Director and all changes were required to be documented.

The inspector determined that the UCD/MNRC procedures were being reviewed as required, that procedures were approved by the Director, and that changes were documented as required as well.

c. Conclusion

The current procedure review, revision, control, and implementation program satisfied TS requirements.

4. Radiation Protection

a. Inspection Scope (IP 69012)

The inspector reviewed selected portions of the following regarding the licensee's radiation protection program to ensure that the requirements of 10 CFR Part 20 and TSs 4.7 and 6.4.2 were being met:

- Calibration of selected radiation survey and monitoring instruments
- List documenting all MNRC personnel who were authorized to handle radioactive material, dated September 18, 2012
- The "Self-Inspection Checklist" completed by the RSO for 2012
- Personal monthly dosimetry results for 2010, 2011, and 2012
- "2011 MNRC Radiation Safety Program Review Report," completed by members of the NSC and dated November 28, 2011
- "2012 MNRC Radiation Safety Program Review Report," completed by members of the NSC and dated January 2, 2013
- Lesson plans, training objectives, and qualification cards for training of personnel by the RSO
- Selected daily, weekly, quarterly, and "special" contamination and radiation survey results for the past 2 years
- Licensee radiological investigation reports for 2012 – Numbers 12-01, 12-02, and 12-03, as documented in the special surveys notebook
- University of California, Davis/McClellan Nuclear Radiation Center 2010 Annual Report, submitted to the NRC on June 28, 2011
- University of California, Davis/McClellan Nuclear Research Center 2011 Annual Report, submitted to the NRC on June 25, 2012
- Facility Procedure UCD/MNRC-0029-DOC-18, "UCD/MNRC Radiation Protection Procedures," Rev. 18, approval dated January 29, 2008
- Facility Procedure UCD/MNRC-0042-DOC-16, "MNRC Health Physics Instrumentation and Test Procedures," which included:
  - Addendum No. 01, "Beta Dose Rate Calibration Procedure," Rev. 6, dated August 22, 2007
  - Addendum No. 25, "Hand and Foot Monitor Calibration Procedure," Rev. 0, dated September 12, 2012
  - Addendum No. 29, "Ludlum Model 177 Calibration Procedure," Rev. 3, dated October 11, 2012
  - Addendum No. 30, "Ludlum Model 177-54 Calibration Procedure," Rev. 3, dated April 6, 2012
  - Addendum No. 31, "Ludlum Model 3 Calibration Procedure," Rev. 4, dated September 18, 2007

  - Addendum No. 34, "RAM Calibration Procedure," Rev. 4, dated June 8, 2009
- Safety Analysis Report, Revision 4, dated December 1999, Chapter 11, "Radiation Protection and Waste Management Program," Revision 2, dated April 3, 1998
- American National Standard ANSI/ANS-15.11-1993, "Radiation Protection at Research Reactor Facilities," standard approval dated July 23, 1993

The inspector also toured the facility and observed the use of dosimetry and radiation monitoring equipment. In addition, licensee personnel were interviewed and radiological signs and postings were observed.

b. Observations and Findings

(1) Surveys

Daily checklists and weekly, quarterly, and special contamination and radiation surveys, outlined in the licensee's "UCD/MNRC Radiation Protection Procedures," were being completed by the RSO or other qualified staff members as required. Any contamination detected in concentrations above established action levels was noted and the affected area was decontaminated. Results of the surveys were typically documented on survey maps and posted at the entrances of the various areas surveyed so that facility workers could check and be knowledgeable of the radiological conditions that existed in those areas.

It was noted that various personnel, including radiographers, had been trained to use radiation monitoring instruments. The inspector verified that these individuals were performing radiation surveys using the appropriate meters whenever the shield doors to the radiography bays were being opened.

On Wednesday, January 16, 2013, the inspector accompanied the facility HPT and observed the completion of a weekly radiation and contamination survey. Areas surveyed at the facility included the equipment room, the reactor room, and associated support areas. No anomalies were noted.

(2) Postings and Notices

Copies of current notices to workers were posted in appropriate areas in the facility. The required radiological signs were posted at the entrances to controlled areas. Other postings also showed the industrial hygiene hazards that were present in the areas as well. The copy of NRC Form 3 noted at the facility was the latest issue, as required by 10 CFR Part 19, and was posted on a bulletin board near the main entrance to the facility where visitors are required to sign the visitor log.

(3) Dosimetry

Personnel were observed to be properly wearing extremity and whole body dosimetry in the controlled areas. The dosimeters being used were four chip thermoluminescent dosimeters (TLDs) processed monthly by a National Voluntary Laboratory Accreditation Program certified vendor (Mirion Technologies (formerly Global Dosimetry Solutions)). The TLDs were used for whole body monitoring and TLD finger rings were used for extremity monitoring.

An examination of the TLD results indicating radiological exposures at the facility for the past 3 years showed that the highest occupational doses, as well as doses to the public, were within 10 CFR Part 20 limits. The highest annual whole body exposure received by a single licensee employee for 2010 was 169 millirem (mrem) deep dose equivalent (DDE). The highest annual extremity exposure for 2010 was 562 mrem shallow dose equivalent (SDE) and the highest skin or other shallow dose was 171 mrem SDE. The highest annual whole body exposure received by a single person for 2011 was 50 mrem DDE. The highest annual extremity exposure for 2011 was 105 mrem SDE and the highest skin or other shallow dose was 96 mrem SDE. Through October 2012, the highest individual whole body exposure that had been received was 56 mrem DDE, the highest extremity exposure has been 99 mrem SDE, and the highest skin or other shallow dose was 154 mrem SDE.

(4) Radiation Monitoring Equipment

Selected calibration records of portable survey meters, friskers, fixed radiation detectors, and air monitoring instruments in use at the facility were reviewed. The records showed that the meters and detectors were either calibrated by reactor staff or the instruments were sent off site to be calibrated by a contractor. The calibrations were tracked and documented as required. The inspector confirmed that the frequencies of the calibrations satisfied the requirements established in the TS 4.7 and 10 CFR 20.1501(b). All instruments checked by the inspector had a current calibration sticker attached.

(5) Radiation Protection Program

The radiation protection program was described and controlled by procedures and policies that were well documented as required by TS 6.4.2 and 10 CFR 20.1101(a). Annual audits of the radiation protection program had been completed by the RSO on July 6, 2011, and June 18, 2012. These were documented in the form of a “Self-Identification Checklist.” Separate audits of the program were conducted by members of the NSC and documented in reports dated November 28, 2011, and January 2, 2013. These audits satisfied the periodic program review required by 10 CFR 20.1101(c). No problems were noted by the

NSC audit team, but various recommendations for improvements were made.

(6) Personnel Training

Personnel training required by 10 CFR 19.12, “Instruction to Workers,” was provided by the RSO. In a graded approach, there were five “levels” or plans for training, designated as “A” through “E”. The type of training provided to an individual was dictated by the type of work to be performed and/or what controlled area(s) the person would be required to enter. Plan A was training provided for visitors to the facility. Plan B was training provided to staff personnel who were also considered radiation workers. Plan C was initial training for reactor operators hired at the facility. Subsequent training on this material was provided to operators during their requalification training. Plan D was given annually to all facility faculty and staff. Plan E was for ancillary personnel, such as custodial service workers.

The inspector reviewed the training given to various personnel. During 2012, four individuals had received Plan B training, as well as job-specific training. One of these individuals was to be involved in the iodine-125 production program, two were interns, and the other worked part-time at the facility. One individual who was hired as the facility electrical engineer, as well as the newly hired RSO, had received Plan C training. The inspector noted that training was being completed as required and it appeared to be adequate.

(7) Radiation Work Permit Program

The inspector reviewed the radiation work permits (RWPs) that had been written and used during 2012. It was noted that no special RWPs had been issued recently. The inspector determined that the controls, precautions, and instructions specified in the RWPs appeared to be appropriate. It was also noted that the RWPs had been reviewed by the RSO as required. The 2012 RWPs had not been closed out as of the date of the inspection. No RWPs had been issued in 2013 to date.

(8) Facility Tours

The inspector toured the main staging or set-up area, the equipment room, the reactor room, and various support areas with licensee representatives on various occasions and observed on-going activities. It was noted that facility radioactive material storage areas were properly posted. No unmarked radioactive material was noted. Radiation and high radiation areas were posted as required and properly controlled.

c. Conclusion

The inspector determined that the radiation protection and as low as reasonably achievable programs, as implemented by the licensee, satisfied regulatory requirements because: (1) surveys were completed and documented acceptably to permit evaluation of the radiation hazards present, (2) postings at the facility met regulatory requirements, (3) personnel dosimetry was being worn as required and recorded doses were well within the NRC's regulatory limits, (4) radiation survey and monitoring equipment was being maintained and calibrated as required, (5) the radiation protection program was acceptable and was being reviewed annually as required, and (6) acceptable radiation protection program training was being provided to facility personnel.

5. Effluent and Environmental Monitoring

a. Inspection Scope (IP 69004)

The inspector reviewed the following to verify compliance with the requirements of 10 CFR Part 20 and TS 6.4.2(d):

- Solid radioactive waste logbook
- Quarterly environmental TLD reports for 2011 and 2012
- "Radioactive Material Discharged Into Sanitary Sewer" form maintained and updated for 2011 and 2012
- Radiochemical analysis data/results for 2012 to check samples from the radiography bay 1 and the primary system water for tritium
- University of California, Davis/McClellan Nuclear Radiation Center 2010 Annual Report, submitted to the NRC on June 28, 2011
- University of California, Davis/McClellan Nuclear Research Center 2011 Annual Report, submitted to the NRC on June 25, 2012
- Facility Procedure UCD/MNRC-0029-DOC-18, "UCD/MNRC Radiation Protection Procedures," Rev. 18, approval dated January 29, 2008
- Facility Procedure UCD/MNRC-0042-DOC-16, "MNRC Health Physics Instrumentation and Test Procedures," which included:
  - Addendum No. 08, "Stack CAM Alarm Setpoint Procedure," Rev. 7, dated May 30, 2012
  - Addendum No. 12, "Weekly Stack CAM Source Check Procedure," Rev. 4, dated October 27, 2005
  - Addendum No. 16, "Canberra 2404 Calibration Procedure," Rev. 7, dated May 14, 2008
  - Addendum No. 48, "Stack CAM Calibration Procedure," Rev. 2, dated May 10, 2007
  - Addendum No. 49, "Reactor CAM Calibration Procedure," Rev. 1, dated May 16, 2007
  - Addendum No. 50, "Bay CAM Calibration Procedure," Rev. 1, dated May 21, 2007

b. Observations and Findings

The inspector determined that gaseous releases continued to be monitored as required, were acceptably analyzed, and were documented in the annual operating reports. To ensure that airborne concentrations of gaseous releases were within the concentrations stipulated in 10 CFR Part 20, Appendix B, Table 2; below the dose constraint specified in 10 CFR 20.1101(d) of 10 mrem per year; and within TS limits, the licensee completed a calculation of the dose to members of the public as the result of reactor operations. This calculation was performed using the Environmental Protection Agency computer code, CAP88-PC, Version 3.0. The results indicated an annual dose to the public of 1.06E-2 mrem for 2011 and 1.31E-2 mrem for 2012.

There were no liquid releases from the facility during 2011 and 2012. It was also noted that no solid radioactive waste had been released or shipped from the facility during 2011 and 2012.

Environmental water samples were collected, prepared, and sent to a vendor for analysis consistent with procedural requirements. The results of these analyses were all within regulatory limits. On-site and off-site gamma radiation monitoring was completed using various environmental TLDs in accordance with the applicable procedures as well. The review of data indicated that there were no measurable doses above any regulatory limits. The highest unrestricted area dose measured during a monitoring period by an environmental TLD was 17 mrem for 2011 and 18 mrem for 2012.

c. Conclusion

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

6. Transportation

a. Inspection Scope (IP 86740)

To verify compliance with regulatory and procedural requirements for transferring or shipping licensed radioactive material, the inspector reviewed the following:

- Selected licenses of various UCD/MNRC consignees
- Selected records of various types of radioactive material shipments including completed radiological survey forms
- Selected training records for staff personnel authorized to ship hazardous material in accordance with the regulations specified by the Department of Transportation (DOT)
- Facility Procedure UCD/MNRC-0029-DOC-18, “UCD/MNRC Radiation Protection Procedures,” Rev. 18, approval dated January 29, 2008
- Appendix A, “Limited Quantity of Class 7 (Radioactive) Materials Checklist,” of Section 21 of Facility Procedure UCD/MNRC-0029-DOC-18

- NUREG-1660/RAMREG-002, "U.S.-Specific Schedules of Requirements for Transportation of Specified Types of Radioactive Material Consignments," published November 1998

b. Observations and Findings

Through records review and discussions with licensee personnel, the inspector determined that the licensee had shipped various types of radioactive material during 2012. The records indicated that the radioisotope types and quantities were calculated and dose rates were measured correctly. All radioactive material shipment records reviewed by the inspector had been completed in accordance with DOT and NRC regulations.

The inspector verified that the licensee maintained copies of shipment recipients' licenses to possess radioactive material as required and that the licenses were verified to be current prior to initiating a shipment. The inspector also reviewed the training of MNRC staff members responsible for shipping radioactive material. The inspector verified that licensee personnel designated as "shippers" had received the appropriate training covering the DOT, International Air Transport Association, and International Civil Aviation Organization requirements within the past 3 years.

c. Conclusion

Radioactive material was being shipped in accordance with the applicable regulations.

7. Follow-up on Previously Identified Items

a. Inspection Scope

The inspector reviewed the actions taken in response to an NRC-identified violation and an IFI.

b. Observation and Findings

(1) IFI-50-607/2012-201-01 – Follow-up on the licensee's actions to ensure that three procedures are reviewed and revised as needed as soon as possible and appropriate.

During a previous inspection in July 2012, it was noted that three of four procedures that were assigned to be reviewed by the Experiment Coordinator had not been reviewed within the 2 year timeframe specified by procedure. These procedures were: (1) Facility Procedure UCD/MNRC-0081-DOC-00, "Experiment Coordination Checklist," last review dated January 6, 2010; (2) Facility Maintenance Procedure UCD/MNRC-0058-OMM-00, "Neutron Irradiator," last review dated December 18, 2009; and (3) Facility Maintenance Procedure

UCD/MNRC-0064-OMM-01, “Central Facility,” last review dated December 18, 2009. The licensee indicated that the former Experiment Coordinator had not reviewed the procedures in a timely manner and at the time of the July 2012 inspection, the new individual hired for that position had not had sufficient time or experience to conduct the review.

During this inspection the inspector reviewed the procedural review process. As noted in Paragraph 3 above, procedures were being reviewed within the timeframe specified. The inspector also determined that the three procedures mentioned above had been reviewed in January 2013. This issue is considered closed.

(2) VIO-50-607/2012-201-02 – Failure to provide various MNRC facility personnel with NRC Form 5 information for the past 3 years as required by 10 CFR 19.13.

Regulation 10 CFR 19.13(b) states that each licensee shall make dose information available to workers as shown in records maintained by the licensee under the provisions of 10 CFR 20.2106. The licensee shall provide an annual report to each individual monitored under 10 CFR 20.1502 of the dose received in that monitoring year if: (1) the individual’s occupational dose exceeds 1 millisievert (100 mrem) total effective dose equivalent or 1 millisievert (100 mrem) to any individual organ or tissue; or (2) the individual requests his or her annual dose report.

Regulation 10 CFR 20.1502 states that each licensee shall monitor exposures to radiation and radioactive material at levels sufficient to demonstrate compliance with the occupational dose limits of this part. As a minimum, 10 CFR 20.1502 requires each licensee to monitor, in part, occupational exposure to radiation from licensed and unlicensed radiation sources under the control of the licensee and supply and require the use of individual monitoring devices by (1) adults likely to receive in 1 year from sources external to the body, a dose in excess of 10 percent of the limits of 10 CFR 20.1201(a); (2) minors…; (3) declared pregnant women…; and (4) individuals entering a high or very high radiation area.

During a facility inspection in July 2012, the inspector reviewed the MNRC radiation protection program, including the dosimetry records of those staff members working at the facility. It was noted that in 2009, 2010, and 2011, various individuals had received doses in excess 100 mrem. Because these doses exceeded the limit established that required an NRC Form 5 to be issued, the inspector asked to review the NRC Form 5 for these individuals. MNRC personnel indicated that the last annual report of dose that anyone had received was the one for the year 2008. The inspector was informed that the UC Davis Environmental Health and Safety (EH&S) Department handled the dosimetry for the facility and made arrangements (maintained a contract) with a vendor to issue and process the dosimetry. The vendor tracked exposures and

issued NRC Form 5s through the campus EH&S Department. Therefore, the EH&S Department was the group responsible for requesting and then issuing the proper forms to MNRC personnel. Monthly dosimetry results were generally forwarded from the campus EH&S office to the MNRC RSO. However, the campus EH&S office had decided not to request NRC Form 5s for the individuals at the MNRC as a cost-cutting measure. This issue was dispositioned as a Severity Level IV violation in NRC Inspection Report No. 50-607/2012-201.

During this inspection the licensee's corrective actions for this violation were reviewed. Specifically, the inspector reviewed the forms issued to the individuals who had received a dose to the whole body or the skin of 100 mrem or greater. The inspector verified that the campus EH&S Department had begun requesting NRC Form 5s for UCD/MNRC personnel. The proper forms for personnel working at the UCD/MNRC facility for the years 2009, 2010, and 2011 been requested and received as required. The doses recorded on each individual's form agreed with the data recorded on the monthly dose printouts received from the vendor. (No forms were available for 2012 to date.) This issue is considered closed.

c. Conclusion

One IFI was reviewed and closed. The corrective actions for one previously identified violation were reviewed. The licensee had taken proper corrective actions and this issued is also considered closed.

8. Exit Interview

The inspection scope and results were summarized on January 16, 2013, with members of licensee management. The inspector described the areas inspected and discussed the inspection findings. The licensee acknowledged the findings presented and did not identify as proprietary any of the material provided to or reviewed by the inspector during the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

H. Bollman	Radiography Supervisor and Senior Reactor Operator
T. Essert	Electrical Engineer and Reactor Operator Trainee
H. Egbert	Radiography/Education Supervisor and Senior Reactor Operator
I. Jackson	Radiographer and Reactor Operator Trainee
M. Lerche	Associate Director for Research and Users
B. Liu	Nuclear Scientist
B. Mehciz	RSF Laboratory Manager
R. Miller	Radiographer and Senior Reactor Operator
A. Ngo	Radiographer and Reactor Operator Trainee
D. Reap	Health Physics Technician, Security Officer, and Senior Reactor Operator
W. Steingass	Associate Director for Reactor Operations and Senior Reactor Operator
R. Walker	Radiographer

Other Personnel

J. Ching	Member, Nuclear Safety Committee

INSPECTION PROCEDURES USED

IP 69004:	Class I Research and Test Reactor Effluent and Environmental Monitoring
IP 69006:	Class I Research and Test Reactor Organization, Operations, and Maintenance Activities
IP 69007:	Class I Research and Test Reactor Review and Audit and Design Change Functions
IP 69008:	Class I Research and Test Reactor Procedures
IP 69012:	Class I Research and Test Reactor Radiation Protection
IP 86740:	Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

50-607/2012-201-01	IFI	Follow-up on the licensee's actions to ensure that three procedures are reviewed and revised as needed as soon as possible and appropriate.

50-607/2012-201-02	VIO	Failure to provide various MNRC facility personnel with NRC Form 5 information for the past 3 years as required by 10 CFR 19.13.

PARTIAL LIST OF ACRONYMS USED

10 CFR	Title 10 of the *Code of Federal Regulations*
DDE	Deep dose equivalent
DOT	Department of Transportation
HPT	Health Physics Technician
IFI	Inspector Follow-up Item
IP	Inspection procedure
mrem	millirem
MNRC	McClellan Nuclear Research Center
MW	megawatt
No.	Number
NRC	U.S. Nuclear Regulatory Commission
NSC	Nuclear Safety Committee
PDR	Public Document Room
Rev.	Revision
RSF	Radioisotope Sciences Facility
RSO	Radiation Safety Officer
RWP	Radiation Work Permit
SAR	Safety Analysis Report
SDE	Shallow dose equivalent
TLD	Thermoluminescent dosimeter
TS	Technical Specifications
UCD	University of California-Davis