February 2, 2018

Dr. Wesley D. Frey, Reactor Director
McClellan Nuclear Research Center
University of California-Davis
5335 Price Avenue, Building 258
McClellan, CA 95652-2504

SUBJECT: UNIVERSITY OF CALIFORNIA-DAVIS – U.S. NUCLEAR REGULATORY COMMISSION ROUTINE INSPECTION REPORT NO. 50-607/2018-201

Dear Dr. Frey:

From January 8-11, 2018, the U.S. Nuclear Regulatory Commission (NRC) 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 11, 2018, with Mr. Guy Steingass, Operations Manager, and Mr. David Reap, Radiation Safety Officer.

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 various activities, and interviewed various 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, 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).

If you have any questions concerning this inspection, please contact Craig Bassett at (240) 535-1842 or by electronic mail at Craig.Bassett@nrc.gov.

Sincerely,

/RA/

Anthony J. Mendiola, Chief
Research and Test Reactors Oversight Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Docket No. 50-607
License No. R-130

Enclosure:
As stated

cc: See next page

cc:

Mr. David Reap, Radiation Safety Officer
5335 Price Avenue, Bldg. 258
McClellan, CA 95652-2504

Mr. Walter Steingass, Reactor Supervisor
5335 Price Avenue, Bldg. 258
McClellan, CA 95652-2504

California Energy Commission
1516 Ninth Street, MS-34
Sacramento, CA 95814

Radiological Health Branch
California Department of Public Health
P.O. Box 997414, MS 7610
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Gainesville, FL 32611

SUBJECT: UNIVERSITY OF CALIFORNIA-DAVIS – U.S. NUCLEAR REGULATORY COMMISSION ROUTINE INSPECTION REPORT NO. 50-607/2018-201
DATE: February 2, 2018

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

Docket No:	50-607
License No:	R-130
Report No:	50-607/2018-201
Licensee:	University of California-Davis
Facility:	McClellan Nuclear Research Center
Location:	McClellan Park Sacramento, California
Dates:	January 8-11, 2018
Inspector:	Craig Bassett
Approved by:	Anthony J. Mendiola, Chief Research and Test Reactors Oversight Branch Division of Licensing Projects Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

University of California-Davis
McClellan Nuclear Research Center
Inspection Report No. 50-607/2018-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the University of California-Davis (the licensee's) two Megawatt Class I research reactor safety program including: (1) organization and staffing; (2) review and audit and design change functions; (3) radiation protection program; (4) effluent and environmental monitoring; (5) procedures; (6) emergency preparedness, and (7) transportation activities 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.

Organization and Staffing

- The organizational structure and staffing were consistent with the requirements specified in Section 6 of the technical specifications (TSs).

- The licensee is currently working on various license renewal submittals.

Review and Audit Functions and Design Change Functions

- The Nuclear Safety Committee was meeting at the required frequency, reviewing the topics outlined in TS Section 6.2, and conducting audits of facility programs as required.

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

Effluent and Environmental Monitoring

- Effluent and environmental monitoring satisfied license and regulatory requirements.

- Releases were within the specified TS levels and regulatory limits.

Procedures

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

- Procedural compliance was acceptable.

Emergency Preparedness

- The emergency preparedness program was conducted in accordance with the Emergency Plan (E-Plan).

- Emergency response equipment was being maintained and alarms were being tested as required.

- The memoranda of understanding between the licensee and its various support agencies were being maintained.

- Emergency drills were being conducted annually as required by the E-Plan.

- Emergency preparedness training for operations personnel was being completed.

Transportation of Radioactive Materials

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

REPORT DETAILS

Summary of Facility Status

The University of California-Davis (UC Davis, or the licensee) two megawatt training reactor and isotope production, General Atomics (TRIGA) 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 several hours per day at various power levels up to one megawatt 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 and staffing to ensure that the requirements of technical specification (TS) Section 6.1, Revision 13, dated March 28, 2003, were being met:

- Management responsibilities
- Current UCD/MNRC organizational structure and staffing
- Selected UCD/MNRC Operations Logs and UCD/MNRC Startup Checklists for 2017 documenting shift staffing
- UCD/MNRC 2015 Annual Report, submitted to the U.S. Nuclear Regulatory Commission (NRC) on June 29, 2016
- UCD/MNRC 2016 Annual Report, submitted to the NRC on June 27, 2017
- Facility Procedure UCD/MNRC-0045-DOC-04, “Quality Assurance Program for McClellan Nuclear Research Center (MNRC)”

b. Observations and Findings

The organization at the UCD/MNRC was as required by TS Section 6.0. The Vice Chancellor for Research was designated as the licensee for the university. The UCD/MNRC facility was under the direct control of the UCD/MNRC Reactor Director, who was accountable and reported 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.

The organization and staffing at the facility required for reactor operation were as specified in the TSs. It was noted that a new person had been hired to assist with the license renewal project. With this addition, the inspector noted that the staff was composed of five full-time personnel and one part-time staff member. Also, it was noted that five of the now six staff members were qualified senior reactor operators (SRO).

Review of various records demonstrated that management responsibilities were discharged as required by the TSs and applicable procedures.

It was noted during the inspection that the facility reactor license is due for renewal on August 20, 2018. Staff members are currently working to complete various documents in support of this renewal.

c. Conclusion

The organizational structure and staffing were consistent with the requirements specified in TS Section 6.1. The licensee is currently working on license renewal submittals.

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 controlled and evaluated as required in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.59, "Changes, tests, and experiments," and reviewed and approved as required by TS Section 6.2, the inspector reviewed selected aspects of:

- Nuclear Safety Committee (NSC) meeting minutes for 2016 through the present
- "MNRC UC Davis Audit," – the 2015 annual audit conducted by the Chair of the NSC on February 27, 2015, and a partial audit conducted on October 28, 2015
- "MNRC UC Davis Audit," – the 2016 annual audit conducted by the Chair of the NSC on January 11, 2017
- "2016 MNRC Radiation Safety Program Review Report," – the annual radiation protection program review conducted on October 25 and 28, 2016, by the UC Davis Environmental Health and Safety (EH&S) Research Safety Manager and Campus radiation safety officer (RSO)
- "2017 MNRC Radiation Safety Program Review Report," – the annual radiation protection program review conducted on August 24, 2017, by the UC Davis EH&S Campus Associate RSO
- UCD/MNRC "Facility Modification Notebook" containing the "Facility Modification Log" forms
- Selected "Facility Modification Installation Authorization Forms" and associated "Facility Modification Checklist" forms processed in the past
- Selected facility procedures including:
  - UCD/MNRC-0043-DOC-04, "Facility Modification Procedure," and,
  - UCD/MNRC-0045-DOC-04, "Quality Assurance Program for McClellan Nuclear Research Center (MNRC)"
- UCD/MNRC Annual Reports for the last two reporting periods

b. Observations and Findings

(1) Review and Audit Functions

Composition of the NSC and qualifications of committee members were as specified in TS Section 6.2.1. Minutes of the NSC meetings indicated that the committee continued to meet semiannually as required by TS Section 6.2.2 and provided review and oversight of the UCD/MNRC as specified in TS Section 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 TSs and the reviews provided sufficient guidance, direction, and oversight to ensure safe and acceptable use of the reactor.

The inspector reviewed the results of the two most recent annual audits conducted at the facility. The inspector noted that these audits were adequate and covered the activities specified in TS Section 6.2.4, including various aspects of the reactor facility operations and programs. To better ensure timely completion of these audits, they were added to the list of items in the licensee's system used to track TSs required surveillances and other periodic items.

(2) Design Change Functions

The regulatory requirements stipulated in 10 CFR 50.59, 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 site-specific conditions.

The inspector reviewed entries in the "Facility Modification Log," notebook for 2016. The notebook entries showed that no changes or modifications had been proposed since the last inspection.

c. Conclusion

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

3. Radiation Protection Program

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,

"Standards for Protection against Radiation," and TS Sections 4.7 and 6.4.2 were being met:

- Calibration records of selected radiation detection and monitoring instruments
- List documenting all MNRC personnel who were authorized to handle radioactive material, dated October 16, 2017
- Monthly Occupational Radiation Exposure Reports for UCD/MNRC personnel for 2016 and 2017
- Individual NRC Form 5's, "Occupational Exposure Record For A Monitoring Period," for UCD/MNRC personnel for 2015 and 2016 (2017 records were not yet available)
- "2016 MNRC Radiation Safety Program Review Report," completed by members of the Campus EH&S Department and dated October 28, 2016
- "2017 MNRC Radiation Safety Program Review Report," completed by a member of the Campus EH&S Department and dated August 24, 2017
- Lesson plans, training objectives, and qualification cards for training of personnel by the RSO
- Selected daily, weekly, and quarterly contamination and radiation survey results for the past 2 years documented on forms entitled: "RSO Daily Log," "Radiological Survey (Weekly)," and "Radiological Survey (Quarterly)"
- Selected facility procedures including:
  - UCD/MNRC-0029-DOC-20, "UCD/MNRC Radiation Protection Procedures," containing various Sections and Appendices which outlined the MNRC Radiation Protection Program, and
  - UCD/MNRC-0042-DOC-19, "MNRC Health Physics Instrumentation and Test Procedures," containing various Addenda which specified equipment calibrations and tests
- SAR, Revision 4, dated December 1999, Chapter 11, "Radiation Protection and Waste Management Program," Revision 2, dated April 3, 1998
- UCD/MNRC Annual Reports for the last two reporting periods
- American National Standard Institute/American Nuclear Society-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, the inspector conducted a radiation survey while accompanying the RSO as he completed a routine weekly survey. Licensee personnel were interviewed and radiological signs and postings were observed as well.

b. <u>Observations and Findings</u>

(1) Surveys

The RSO daily log sheets and weekly, quarterly, and special contamination and radiation surveys were being completed by the RSO or other qualified staff members as required. A review of these records indicated that any contamination detected in concentrations above established action levels was noted on the appropriate form 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 prior to entry.

It was noted that all facility personnel had been trained to use radiation detection instruments. The inspector verified that these individuals were performing limited radiation surveys using the appropriate meters while the shield doors to the radiography bays were opened. The use of survey meters appeared to be adequate.

During the inspection, the inspector accompanied the facility RSO and observed the completion of a weekly radiation and contamination survey. The inspector conducted a radiation survey alongside the RSO. Areas surveyed at the facility included the equipment room, the reactor room, and associated support areas. The RSO completed the survey using appropriate survey techniques. No anomalies were noted.

(2) Postings and Notices

Copies of current notices to workers were posted in appropriate areas of 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, “Notices, Instructions and Reports to Workers: Inspection and Investigations,” and was posted on a bulletin board near the main entrance to the facility where visitors are required to sign in using the licensee’s visitors log.

(3) Dosimetry

Personnel were observed to be wearing extremity and whole body dosimetry in the controlled areas in the appropriate manner and location. The dosimetry being used consisted of Optically-Stimulated Luminescence (OSL) dosimeters and thermoluminescent dosimeters (TLDs) processed monthly by a National Voluntary Laboratory Accreditation Program certified vendor. The OSL dosimeters were used for whole body monitoring and the TLDs were in finger rings which were used for extremity monitoring.

An examination of the OSL and TLD results which documented the radiological exposures at the facility for the past 3 years showed that the highest occupational doses, as well as doses to the public, were well within 10 CFR Part 20 limits. Individual copies of NRC Form 5 that had been issued to the various staff members in 2015 and 2016 were reviewed. (Forms for 2017 were not yet available.) No problems were noted.

(4) Calibration of 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 frequency of these calibrations satisfied the requirements established in TS Section 4.7 and 10 CFR 20.1501(b). All instruments checked by the inspector that were staged for in use at the facility 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 Section 6.4.2 and 10 CFR 20.1101(a). Annual audits of the radiation protection program had been completed by members of the Campus EH&S Department and documented in reports dated October 28, 2016 and August 24, 2017. These audits satisfied the periodic program review required by 10 CFR 20.1101(c). No significant issues were identified by the auditors 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 visit conducted or the type of work to be performed and whether or not the person would be required to enter any controlled area and/or handle radioactive material. The inspector determined that the appropriate training was being provided to individuals visiting or working at the facility. It was noted that Lesson Plan A (for visitors) had recently been updated and was now to be completed on-line prior to the visitor arriving at the facility.

The inspector reviewed the training given to various personnel, other than visitors, and noted that training was being completed as required. Specific supplemental training was also provided as needed to ensure that personnel understood the subjects. An annual radiation safety review emphasizing the “As Low As Reasonably Achievable” (ALARA) principle was provided to all facility staff members as well. The training appeared to be adequate.

(7) Radiation Work Permit Program

The inspector reviewed the radiation work permits (RWPs) that had been written and used during 2017. 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 2017 RWPs had been closed out at the end of the year as required and new RWPs had been issued for 2018. The 2018 RWPs were similar to the ones issued for 2017 and typically covered routine maintenance work as well as experiment disassembly. It was noted that no special RWPs had been issued during 2017.

(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 ALARA programs, as implemented by the licensee, satisfied regulatory requirements. Specifically, (1) periodic surveys were completed and documented acceptably to permit evaluation of the radiation hazards present, (2) postings and signs met regulatory requirements, (3) personnel dosimetry was being worn as required and recorded doses were within the NRC's regulatory limits, (4) radiation survey and monitoring equipment was being maintained and calibrated as required, and (5) the radiation protection training program was being implemented as stipulated in procedure.

4. 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 Section 6.4.2(d):

- Facility Procedure UCD/MNRC-0029-DOC-20, "UCD/MNRC Radiation Protection Procedures," including:
  - Section 3, "Environmental Radiation Monitoring Procedures,"
  - Section 4, "Radioactive Effluent Monitoring Procedures," and
  - Section 17, "Radioactive Waste Procedures"
- Quarterly Environmental TLD Reports for the last 2 years
- Radiochemical analysis data/results for the last year to check samples from the Radiography Bay 1 and the primary system water for tritium
- UCD/MNRC Annual Reports for the last two reporting periods

b. Observations and Findings

The inspector determined that gaseous releases continued to be monitored, acceptably analyzed, and documented in the annual operating report as required. To ensure that airborne concentrations of gaseous releases were: (1) within the concentrations stipulated in 10 CFR Part 20, Appendix B, Table 2; (2) below the

dose constraint specified in 10 CFR 20.1101(d) of 10 millirem per year; and (3) within TS levels, the licensee completed a calculation of the dose to members of the public as the result of reactor operations. This calculation, which was based on the concentration of effluent released from the stack, was performed using the Environmental Protection Agency's computer code, CAP88-PC, Version 3.0. The results indicated an annual dose to the public within the regulatory limits. The inspector verified that there were no liquid effluent releases from the facility during 2016 and 2017. It was also noted that, although many barrels of radioactive waste were being stored in various locations at the facility, no solid radioactive waste shipments had been made from the facility in 2017.

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 licensee's procedures as well. A review of these data indicated that measurable doses were all below regulatory limits.

c. Conclusion

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

5. Procedures

a. Inspection Scope (IP 69008)

To verify compliance with TS Section 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," showing 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
- Selected facility procedures including:
  - UCD/MNRC-0005-DOC-09, "MNRC Facility Document Control Plan,"
  - UCD/MNRC-0029-DOC-20, "UCD/MNRC Radiation Safety Procedures," and,
  - UCD/MNRC-0082-DOC-01, "Environmental Compliance and Health and Safety Plan"

b. Observations and Findings

According to TS Section 6.4, it was required that procedures be prepared and approved for the activities listed in that section. The procedures were required to be approved by the UCD/MNRC Director. Procedure UCD/MNRC-0005-DOC-09 stipulated that the UCD/MNRC staff perform a biennial review of each active

document to assure that it was current. The inspector determined that Operations and Health Physics procedures were typically being reviewed annually by licensee staff members, while maintenance and other procedures were reviewed biennially. It was noted that changes to procedures required the approval of the UCD/MNRC Director and all changes were required to be documented. The inspector also determined that no radiation protection procedural reviews were overdue at the time of the inspection.

The activities and operations observed by the inspector during this inspection were completed in accordance with the applicable procedures. These activities and operations included reactor operation checkouts, handling radioactive material, and, conducting surveys.

c. Conclusion

The current procedure review, revision, control, and implementation program satisfied TS requirements. Procedural compliance was acceptable.

6. Emergency Preparedness

a. Inspection Scope (IP 69011)

The inspector reviewed selected aspects of the following to verify compliance with the UCD/MNRC-0001-DOC-08, "University of California, Davis - McClellan Nuclear Research Center (UCD/MNRC) Emergency Plan," approved by the NSC Chairman on June 12, 2006:

- Documentation of the 2015 and 2016 emergency drills and critiques
- Memorandum of understanding (MOU) with the UCD Medical Center, dated May 1, 2006
- MOU between the County of Sacramento and McClellan Park, dated November 23, 2004, concerning fire protection services
- MOU between the Sacramento County Sheriffs' Department and the licensee, dated December 18, 2000
- Training Schedule for Maintenance of Qualifications for SROs for the 2014-2016 requalification cycle and to date in 2017
- Various Facility Emergency Procedures including:
  - UCD/MNRC-0018-DOC-07, "University of California, Davis/McClellan Nuclear Research Center Emergency Procedures"
  - UCD/MNRC-0078-DOC-02, "UCD/MNRC Emergency Procedures for Emergency Response Personnel – Class 0 Emergency-Personnel and Operation Events"
  - UCD/MNRC-0079-DOC-02, "UCD/MNRC Emergency Procedures for Emergency Response Personnel - Class I Emergency-Notification of Unusual Events"
  - Facility Procedure UCD/MNRC-0080-DOC-02, "UCD/MNRC Emergency Procedures for Emergency Response Personnel – Class II Emergency-Alert"

b. Observations and Findings

The inspector reviewed the Emergency Plan (E-Plan) in use at the reactor and verified that it was reviewed annually as required and updated as needed. Activities associated with the E-Plan (e.g., training, drills, etc.) were also reviewed annually by the NSC. The inspector reviewed the UCD/MNRC Emergency Procedures as well and noted that they were also typically reviewed annually and revised as needed to ensure effective implementation of the E-Plan.

Through records review and interviews with reactor staff personnel, the inspector determined that they were knowledgeable of the designated actions to take in case of an emergency. Training for facility personnel had been conducted and documented acceptably. Training for support organization personnel was provided whenever those organizations' schedules would permit.

The inspector verified that the MOU between the County of Sacramento and McClellan Park remained in effect. The MOU stipulated that the Sacramento Metropolitan Fire District would be available during an emergency and would provide support for the facility. The inspector also verified that the MOU between the facility and the UCD Medical Center, as well as the MOU with the Sacramento County Sheriff's Department, remained in effect.

Communications capabilities with support groups were acceptable and the various equipment (e.g., telephones and the building public address system) were in use daily. Portable public address devices were also available for use as needed and were checked semiannually. Emergency call lists had been revised and updated as needed and were available in the control room and in the various emergency cache kits as required. The inspector also verified that emergency equipment, including decontamination material, was available and was being inventoried semiannually as required by the E-Plan.

The documentation of the drills conducted for 2015 and 2016 was reviewed. Through drill scenario and record reviews, and personnel interviews, off-site emergency responders were determined to be knowledgeable of the proper actions to take in case of an emergency. Emergency drills had been conducted annually and had included the participation of off-site support groups every other year as required by the E-Plan. The scenarios written for the drills and the critiques held thereafter were well documented. The inspector determined that the drill for 2016 had been conducted in two parts. The first part involved the UC Davis Medical Center and took place during December 2016. The second part occurred at the facility and took place in January 2017.

It was noted that no drill had been conducted for the calendar year 2017. The licensee was informed that the issue of completion of the 2017 Emergency Drill would be designated as an inspector followup item (IFI) and would be reviewed during a subsequent inspection (IFI 50-607/2018-201-01).

c. Conclusion

The emergency preparedness program was generally being conducted in accordance with the requirements stipulated in the E-Plan.

7. Transportation Activities

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
- Records of the radioactive material shipments made during 2017 including completed radiological survey forms
- 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-20, "UCD/MNRC Radiation Protection Procedures," including:
  - Section 21, "Procedures for Shipping Radioactive Material," and,
  - Section 21 Appendix 21-A, "Limited Quantity of Class 7 (Radioactive) Materials Checklist"

b. Observations and Findings

Through records review and discussions with licensee personnel, the inspector determined that the licensee made three shipments of radioactive material during 2017. All the shipments had been designated as limited quantity shipments and had been shipped to a consignee in Australia. The records indicated that the radioisotope types and quantities were calculated and dose rates were measured as required. The 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, or possession authorization letters for Department of Energy customers, as required. The licenses were determined to be current or in timely renewal prior to initiating a shipment. The inspector also verified that the recipients were authorized to receive and possess the type and quantity of radioactive material shipped to them.

The inspector 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 specified requirements within the past three years as required by the regulations.

c. Conclusion

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

8. Exit Interview

The inspection scope and results were summarized on January 11, 2018, 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 during the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

H. Bollman	Radiography Supervisor and SRO
D. Byone	Executive Director, Business Administration
C. Dresser	New hire/Trainee
W. Frey	Facility Director and SRO
T. Essert	Electrical Engineer and SRO
D. Reap	Radiation Safety Officer, Security Officer, and SRO
W. Steingass	Associate Director for Reactor Operations, Operations Manager, and SRO

Other Personnel

C. Carter	Interim Vice Chancellor for Research, University of California - Davis
G. Max	Chancellor, University of California – Davis
M. Williams	Vice Admiral (Ret.) U.S. Navy, and Executive Director of Strategic Research Development, Office of Research, University of California- Davis

INSPECTION PROCEDURES USED

IP 69004	Class I Research and Test Reactor Effluent and Environmental Monitoring
IP 69006	Class I Research and Test Reactors Organization and 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 69011	Class I Research and Test Reactor Emergency Preparedness
IP 69012	Class I Research and Test Reactor Radiation Protection
IP 86740	Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-607/2018-201-01	IFI	Follow-up on the licensee's actions to conduct the facility annual Emergency Drill for 2017.

Closed

None

PARTIAL LIST OF ACRONYMS USED

10 CFR	Title 10 of the *Code of Federal Regulations*
ALARA	As Low As Reasonably Achievable
DOT	Department of Transportation
EH&S	Environmental Health and Safety

E-Plan	Emergency Plan
IFI	Inspector Followup Item
IP	Inspection Procedure
MNRC	McClellan Nuclear Research Center
NRC	U.S. Nuclear Regulatory Commission
NSC	Nuclear Safety Committee
OSL	Optically-Stimulated Luminescence
RSO	Radiation Safety Officer
RWP	Radiation Work Permit
SAR	Safety Analysis Report
SRO	Senior Reactor Operator
TLD	Thermoluminescent dosimeter
TRIGA	Training, Reactor and Isotope Production, General Atomics
TSs	Technical Specifications
UCD/MNRC	University of California-Davis/McClellan Nuclear Research Center