March 12, 2009

Dr. Robert G. Flocchini, Director
UC-Davis/McClellan Nuclear Radiation Center
5335 Price Avenue, Building 258
McClellan, CA 95652

SUBJECT: UNIVERSITY OF CALIFORNIA, DAVIS/MCCLELLAN NUCLEAR RADIATION CENTER - NRC ROUTINE INSPECTION REPORT NO. 50-607/2009-201

Dear Dr. Flocchini:

On February 17–19, 2009, the U.S. Nuclear Regulatory Commission (NRC, the Commission) completed an inspection at the University of California, Davis/McClellan Nuclear Radiation Center (Inspection Report No. 50-607/2009-201). The enclosed report documents the inspection results, which were discussed on February 19, 2009, with Mr. Walter Steingass, Reactor Supervisor, 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 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 NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

Should you have any questions concerning this inspection, please contact Craig Bassett at 404-358-6515 or by electronic mail at craig.bassett@nrc.gov.

Sincerely,

/RA/

Johnny H. Eads, Chief
Research and Test Reactors Branch B
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

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

Enclosure: NRC Routine Inspection Report No. 50-607/2009-201

cc w/enclosure: See next page

cc:

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

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

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

Docket No:	50-607
Report No:	50-607/2009-201
Licensee:	University of California, Davis
Facility:	McClellan Nuclear Radiation Center
Location:	McClellan Park Sacramento, California
Dates:	February 17–19, 2009
Inspector:	Craig Bassett
Accompanied by:	Shungo Nakamura
Approved by:	Johnny H. Eads, Chief Research and Test Reactors Branch B Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

University of California, Davis
McClellan Nuclear Radiation Center
Report No: 50-607/2009-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the University of California, Davis (the licensee's) 2 Megawatt (MW) Class I research and test reactor safety program including: 1) organization and staffing, 2) review and audit and design change functions, 3) operator requalification, 4) reactor operations, 5) maintenance and surveillance, 6) fuel handling, 7) experiments, 8) procedures and procedural control, and 9) emergency preparedness 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.

Organization and staffing

- The organizational structure and staffing was generally consistent with Technical Specification (TSs) requirements.

Review and Audit and Design Change Functions

- The Nuclear Safety Committee was meeting semiannually and reviewing the topics outlined in the TSs and conducting annual audits of facility programs as required.

- The review, evaluation, and documentation of changes to the facility generally satisfied NRC requirements.

Reactor Operations

- Reactor operations were conducted in accordance with procedure and the appropriate logs were being maintained.

- Because of the age of the core, the licensee had only limited operational capacity.

Operator Requalification

- Operator requalification was conducted as required by the Requalification Program and the program was being maintained up-to-date.

Maintenance and Surveillance

- The Preventive Maintenance Program was being used to effectively accomplish various maintenance and required surveillance activities at the facility.

Fuel Handling

- Fuel movements and inspections were conducted in accordance with TS and procedural requirements.

Experiments

- The program for reviewing and conducting experiments satisfied procedural and TS requirements.

Procedures

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

Emergency Preparedness

- The emergency preparedness program was conducted in accordance with the Emergency Plan.
- Emergency response equipment was being maintained and alarms were being tested as required.
- The Memorandum of Understanding between the County of Sacramento and McClellan Park and the one between the facility and the University of California, Davis Medical Center were being maintained.
- Emergency drills were being conducted annually as required by the Emergency Plan.
- Emergency preparedness training for Senior Reactor Operator personnel was being completed through the Requalification Program.

REPORT DETAILS

Summary of Plant Status

The University of California, Davis McClellan Nuclear Radiation Center 2 megawatt (2 MW) TRIGA Mark-II research and test reactor continued normal, routine operations in support of neutron radiography, medical isotope production, neutron tomography, and sample/product irradiation. During the inspection, the reactor was operated several hours per day to support neutron radiography.

1. Organization and Staffing

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

The inspector reviewed the following regarding the University of California, Davis McClellan Nuclear Radiation Center (UCD/MNRC) organization, staffing, and responsibilities to ensure that the requirements of License Amendment No. 6 (which outlined Technical Specification (TS) Section 6.1, Revision (Rev.) Number (No.) 13) dated November 25, 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
- Facility Procedure UCD/MNRC-0004-DOC-13, "Technical Specifications for the University of California, Davis McClellan Nuclear Radiation Center (UCD/MNRC)," Rev. 13, approval dated March 28, 2003
- Facility Procedure UCD/MNRC-0045-DOC-01, "Quality Assurance Program for McClellan Nuclear Radiation Center (MNRC)," Rev. 1, approval dated November 22, 1999
- University of California, Davis McClellan Nuclear Radiation Center 2006 Annual Report submitted May 24, 2007
- University of California, Davis McClellan Nuclear Radiation Center 2007 Annual Report submitted June 13, 2008
- American Nuclear Society Standard (ANS/ANSI) 15.4 - 1988, "Selection and Training of Personnel for Research Reactor," approved June 9, 1988

b. Observations and Findings

During a previous NRC inspection of facility staffing in January 2008, it was noted that the reactor operations staff consisted of five licensed Senior Reactor Operators (SROs). The inspector noted that this had not changed and that all of the SROs also served in other capacities at the facility. One SRO was the Reactor Supervisor, another was the Building Manager, one SRO was the Radiography Supervisor, one was also a qualified radiographer, and the other had been designated as the facility Radiation Safety Officer. From a review of records and interviews with the staff, the inspector determined that the staff members satisfied the training and experience requirements associated with their respective positions.

It was noted that, in addition to the two radiographers noted above, there was one other individual employed at the facility who was a qualified radiographer. Also, all facility operations personnel had received additional training in radiation protection survey techniques and instrumentation as well. Staffing appeared to be adequate for the current level of operation but any increase in workload would likely necessitate an increase in the number of staff to provide for safe operation of the facility.

The inspector noted that the licensee was still working on a TS change (to be submitted to the NRC) that would bring the organizational structure specified in the TS into agreement with actual conditions at the facility (see Section 10 below).

c. Conclusions

The licensee's organization and staffing remain in general compliance with the requirements specified in TS Section 6.

2. Review and Audit and Design Change Functions

a. Inspection Scope (IP 69007)

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

- Annual Audits conducted in 2007 and 2008
- Nuclear Safety Committee meeting minutes for 2007 through the present
- UCD/MNRC Facility Modification Notebook containing Facility Modification Log Forms
- Selected Facility Modification Installation Authorization Forms and the associated Facility Modification Checklist Forms processed during 2008
- 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 Radiation Center (MNRC),” Rev. 1, approval dated November 22, 1999
- University of California, Davis McClellan Nuclear Radiation Center 2006 Annual Report submitted May 24, 2007
- University of California, Davis McClellan Nuclear Radiation Center 2007 Annual Report submitted June 13, 2008

b. Observations and Findings

(1) Review and Audit Functions

Composition of the Nuclear Safety Committee (NSC) and qualifications of NSC members were as specified in TS 6.2.1. Minutes of NSC meetings demonstrated that the committee met 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 safety reviews were conducted by the NSC or a designated representative. 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 noted that the annual audit for 2007 was adequate and reviewed the activities specified in TS 6.2.4 including various aspects of the reactor facility operations and programs. It was noted that the audit had been completed by the Chair of the NSC in December of that year. The audit appeared to be adequate and included recommendations concerning the use of some radiation monitoring equipment and an independent review of the proposed use of a new type of fuel at the facility. An independent review had been initiated and was ongoing at the time of this inspection. The 2008 facility audit had also been conducted by the Chair of the NSC and was completed August 1, 2008. The audit appeared to be adequate. There were no recommendations made as a result of the audit.

(2) Design Change Functions

To satisfy the regulatory requirements stipulated in Section 50.59 of Title 10 of the *Code of Federal Regulations*, "Changes, tests, and experiments," the licensee had implemented Facility Procedure UCD/MNRC-0043-DOC-03, "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 verified that, as required by procedure, all proposed facility modifications were presented to a Modification Review Committee (MRC) for screening and classification. The MRC classified the modifications (mods) as Class I, Class II, or Class III. The various proposed mods and the supporting documentation were compiled into modification packages. These were then processed through and controlled by the Reactor Supervisor. In addition to the MRC screening, the packages were required to be reviewed by the Reactor Supervisor, a Health Physics representative, and approved by the Facility Director. All Class I and II changes and modifications were reviewed and approved by the Nuclear Safety Committee.

The inspector reviewed selected Facility Modification Installation Authorization Forms and the associated Facility Modification Checklist forms processed during 2007, 2008, and to-date in 2009. The completed forms showed that the proposed modifications were acceptably reviewed in accordance with the procedure. It was noted that all the modifications proposed recently were designated as Class III and therefore no 50.59

evaluations were required to be completed. Also, none of the changes or modifications was determined to constitute a safety question or concern and none required a license or TS amendment.

c. Conclusions

The NSC was meeting semiannually and reviewing the topics outlined in the TS and conducting annual audits of facility programs as required. The design change program satisfied NRC requirements.

3. Reactor Operations

a. Inspection Scope (IP 69006)

To verify that the licensee was operating the reactor and conducting operations in accordance with TS Section 3 and procedural requirements, the inspector reviewed selected portions of the following:

- Selected UCD/MNRC Operations Log Pages from Log Books No. 117 - 122
- Various UCD/MNRC Startup Checklist Forms for 2008 and to-date in 2009
- Selected UCD/MNRC Shutdown Checklist Forms for 2008 and to-date in 2009
- Various UCD/MNRC Facility Rounds Log Forms for 2008 and to-date in 2009
- Facility Procedure UCD/MNRC-0016-DOC-11, "UCD/MNRC Operating Instructions" Rev. 11, approval dated January 16, 2002
- Facility Procedure UCD/MNRC-0073-DOC-03, "UCD/MNRC Reactor Control Room Computer Operating Instructions" Rev. 3, approval dated June 27, 2006
- University of California, Davis McClellan Nuclear Radiation Center 2006 Annual Report submitted May 24, 2007
- University of California, Davis McClellan Nuclear Radiation Center 2007 Annual Report submitted June 13, 2008

b. Observations and Findings

(1) Routine Operations

The inspector reviewed selected UCD/MNRC Startup and Shutdown forms, Rounds Log sheets, and Operations Log entries dating from 2008 through the date of this inspection. The operating logs and checklists were complete and provided an acceptable indication of operational activities. The logs and checklists showed that operational conditions and parameters were consistent with license and TS requirements and that TS operational limits had not been exceeded. The logs were also used to record problems with equipment resulting in "call backs" (when licensee personnel had to return to the facility after hours to respond to an alarm)

and to record abnormal events or anomalies. Emergency shutdowns and inadvertent scrams were also noted in the logs. These were then documented in the licensee's Monthly Reports and reported in their Annual Reports submitted to the NRC.

The inspector observed facility activities on various occasions during the week including routine reactor operations and the handling of items that were being radiographed. The operations and item handling were conducted in accordance with the applicable procedures and the actions were documented in the required logs. The inspector was also able to observe a reactor startup and/or a reactor shutdown on two separate occasions during the inspection. These activities were completed according to procedure and the appropriate checklists and logs were filled out as well.

(2) Limited Operational Capacity

During the review of the daily operations of the facility, it was noted that normal reactor operations was limited to 2 MW by the facility license, the TS, and the Safety Analysis Report (SAR). In order to achieve that power level the licensee required a certain amount of excess reactivity. At the beginning of the week (with essentially a xenon free core), the licensee needed $3.12 of excess reactivity. To achieve equilibrium xenon at 2 MW, the licensee needed an additional $2.77 in excess reactivity not including any experiments that might reduce reactivity. Due to fuel burnup over the years, the amount of excess reactivity with the current core was noted to be $3.89. Therefore, after approximately one shift of continuous operation at 2 MW, there was insufficient excess reactivity to continue operation at that power level. As a result, the licensee had made adjustments to the operating schedule and typically operated at 1 MW on a daily basis. Because of this, some experiments required more time to complete. Although additional new fuel has been requested, none has been made available to the facility to date.

c. Conclusions

UCD/MNRC reactor operations were conducted in accordance with procedure and the appropriate logs were being maintained. Because of the age of the core, the licensee had limited operational capacity.

4. Operator Requalification

a. Inspection Scope (IP 69003)

To verify that the licensee was complying with the facility Operator Training and Requalification Program, the inspector reviewed selected aspects of:

- Status of active operator licenses
- Selected operator physical evaluation records for the past three years

- Training Schedule for Maintenance of Qualifications for SROs for the 2008-2009 requalification cycle
- Operator active duty status documented on MNRC Personnel Reactivity Manipulations and Active Duty Performance Record forms for 2006 and 2007
- Operator training and lecture attendance records for 2008 and 2009 documented on MNRC Training Attendance Record forms
- Selected records for 2008 and 2009 documented on UCD/MNRC Reactor Facility annual Operating Test for Senior Reactor Operators and Reactor Operators Forms and MNRC Senior Reactor Operator Requalification Written Examination Forms
- Facility Procedure UCD/MNRC-0009-DOC-04, "Selection and Training Plan for Reactor Personnel," Rev. 4, approval dated January 18, 2000
- University of California, Davis McClellan Nuclear Radiation Center 2006 Annual Report submitted May 24, 2007
- University of California, Davis McClellan Nuclear Radiation Center 2007 Annual Report submitted June 13, 2008
- ANS/ANSI Standard 15.4-1988, "Selection and Training of Personnel for Research Reactors," approved June 9, 1988

b. Observations and Findings

As noted above, there were five qualified SROs on staff at the facility. As of the date of the inspection, no new individuals were officially designated as being in training to become Reactor Operators. The inspector noted that the Requalification Program was being implemented and maintained as required and SRO licenses were current. MNRC Personnel Reactivity Manipulations and Active Duty Performance Records and logs showed that operators were maintaining active duty status as required.

A review of the logs and records also showed that training was being conducted in accordance with the licensee's requalification and training program. Procedure reviews and examinations had been documented as required. Records of quarterly reactor operations, reactivity manipulations, other operations activities, and Reactor Supervisor activities were being maintained. Records indicating the completion of the annual operations tests and supervisory observations were also being maintained as required. Biennial written examinations were being completed by the operators as required as well. In addition, the inspector noted that all operators were receiving the biennial medical examinations required by the program in accordance with ANS/ANSI 15.4-1988.

c. Conclusions

Operator requalification was being completed and being maintained up-to-date as required by the Requalification Program.

5. Maintenance and Surveillance

a. Inspection Scope (IP 69006, 69010)

To verify that the licensee was meeting the requirements of their Preventive Maintenance Program and complying with TS Section 4, the inspector reviewed selected aspects of:

- UCD/MNRC Reactivity Tables
- Danger/Caution Tag Issue Forms and log
- Selected UCD/MNRC Control Rod Calibration Forms for 2008
- Various UCD/MNRC Calorimetric Power Calibration Forms for 2008
- Selected UCD/MNRC Reactor Shutdown Margin Data Sheets for 2008
- Selected UCD/MNRC Work Order Tracking Sheets for 2008 and 2009
- Various UCD/MNRC Operations Log pages from Log Books No. 117 - 122
- UCD/MNRC Preventive Maintenance Schedule for the Month of January 2009
- Preventive Maintenance Program database maintained on the Control Room computer which included entries denoting equipment history
- McClellan Nuclear Radiation Center Preventive Maintenance System - Twelve Month Schedule for the period from March 2008 through February 2009
- Selected MNRC Work Order forms documenting various completed and pending maintenance tasks
- Facility Procedure UCD/MNRC-0007-DOC-05, “Maintenance Procedures,” Rev. 5, approval dated November 23, 2005
- Facility Procedure UCD/MNRC-0030-DOC-05, “MNRC Tag-Out Procedure,” Rev. 5, approval dated January 24, 2007
- Operation and Maintenance Manual (OMM) procedures including:
  - Facility Procedure UCD/MNRC-0012-*OMM-5110*-05, “Primary Cooling System,” Rev. 5, approval dated November 12, 1999
  - Facility Procedure UCD/MNRC-0013-*OMM-5140*-04, “Control Rod Drives,” Rev. 4, approval dated November 3, 2000
  - Facility Procedure UCD/MNRC-0071-*OMM-5160*-00, “Emergency Core Cooling System,” Rev. 0, approval dated June 29, 1998
  - Facility Procedure UCD/MNRC-0061-*OMM-5310*-01, “Control System Console,” Rev. 1, approval dated September 17, 2008
  - Facility Procedure UCD/MNRC-0038-*OMM-5330*-01, “Nuclear Instrumentation,” Rev. 1, approval dated November 18, 2008
  - Facility Procedure UCD/MNRC-0063-*OMM-5340*-01, “Reactor Protection System,” Rev. 1, approval dated November 14, 2008
  - Facility Procedure UCD/MNRC-0025-*OMM-5360*-01, “Uninterruptible Power Supply,” Rev. 1, approval dated April 14, 1997
  - Facility Procedure UCD/MNRC-0036-*OMM-5510*-04, “MNRC Pneumatic Transfer System,” Rev. 4, approval dated May 3, 2000
- University of California, Davis McClellan Nuclear Radiation Center 2006 Annual Report submitted May 24, 2007
- University of California, Davis McClellan Nuclear Radiation Center 2007 Annual Report submitted June 13, 2008

b. Observations and Findings

The inspector reviewed the Preventive Maintenance Program that the licensee had developed to schedule and track maintenance activities. The program was maintained on an EXCEL database system and was designed to ensure that all maintenance activities were completed as required. It was also used to ensure that post maintenance testing was conducted and that the entire process was documented appropriately. In addition, the database was also set up to enable the licensee to maintain equipment histories for the various systems, components, and instruments in the program.

The inspector noted that periodic surveillance activities such as tests, checks, verifications, and calibrations were scheduled through the Preventive Maintenance Program as well. The program was set up to generate a work schedule for facility personnel. Weekly, monthly, and annual schedules were available as needed. The work schedules listed all the maintenance and surveillance activities that needed to be completed during the specified time interval.

The inspector also noted that a similar program had been established for periodic health physics activities, as well as a separate program for radiography activities. All these programs not only produced weekly/monthly work schedules, but were designed to generate MNRC Work Orders (MWOs) that were used to complete the maintenance and/or surveillance activities. Most work was completed on Mondays during the routine scheduled reactor shutdown. It was noted that the MWOs were assigned to a lead SRO who was responsible to ensure that the work was performed and the results were recorded on the MWO. The data from each MWO was typically entered into the computerized tracking system by the Building Manager. The inspector reviewed selected data recorded in the database and on the MWOs for various TS required surveillances. The records indicated that the required tests, checks, verifications, and calibrations had been completed on schedule and in accordance with licensee procedures. The results reviewed by the inspector were noted to be within the TS and procedurally prescribed parameters.

c. Conclusions

The MNRC Preventive Maintenance Program was being used to effectively accomplish maintenance and surveillance activities at the facility.

6. Fuel Handling

a. Inspection Scope (IP 69009)

To ensure that the licensee was following the requirements of TS Sections 3.2.4, 4.2.4, and 5.3, the inspector reviewed selected aspects of the following:

- Selected Fuel Inspection Sheets for 2008
- Various UCD/MNRC Fuel Transfer Forms
- Selected UCD/MNRC Present Element Location Forms

- Fuel Handling Checklists for fuel handling in October 2008
- Selected entries in the UCD/MNRC Fuel Measurements Notebook
- Various Fuel Movement Sheets - developed prior to fuel movements
- Selected UCD/MNRC Fuel Element Tracking Information Log Sheets
- Various entries in the UCD/MNRC Fuel Measurements Data Notebook
- Selected UCD/MNRC Operations Log pages from Log Books No. 117 - 122
- Selected Visual Inspection Forms completed for fuel elements inspected in 2008
- Core and Storage Boards located in the Control Room and in the Reactor Room
- Facility Procedure UCD/MNRC-0019-*OMM-5220*-04, "Fuel Handling Tools," Rev. 4, approval dated January 12, 2009
- Facility Procedure UCD/MNRC-0011-*OMM-5240*-05, "Fuel," Rev. 5, approval dated April 19, 2001

b. Observations and Findings

The inspector reviewed the fuel movement process and verified that fuel was moved according to established procedure and in conjunction with the specific fuel movement sheets developed by an SRO for each core loading. The inspector reviewed fuel movement sheets for 2008. They had been developed and used for fuel inspection and for transferring fuel from the core to storage and from storage to the core. The inspector also compared the location of fuel elements in the reactor core with the information maintained on the Fuel Status Board in the Control Room and on the fuel movement sheet for the latest core, the Mixed "J" Core, dated December 12, 2007 and updated on February 17, 2009. No problems were noted.

The inspector also reviewed selected fuel inspection sheets that had been completed for 2008. The inspections were completed in compliance with TS Section 3.2.4.

c. Conclusions

Fuel movements and inspections were conducted in accordance with TS and procedural requirements.

7. Experiments

a. Inspection Scope (IP 69005)

The inspector reviewed selected aspects of the following to verify compliance with TS Sections 3.8, 4.8, and 6.5:

- Selected Facility Use Authorization Forms
- Various UCD/MNRC Irradiation Request Forms
- Selected UCD/MNRC Experiment Request Forms
- Various UCD/MNRC Irradiation Summary Forms

- Listing of current experiments and authorized users
- Selected UCD/MNRC Experimenter Certification Forms
- Various UCD/MNRC Experimenter Approval Request Forms
- Selected UCD/MNRC Irradiation Tracking Sheets for 2008 and 2009
- Selected Amendment for an Approved UCD/MNRC Experiment Forms
- Selected UCD/MNRC Irradiation Request Forms for Silicon Ingot Doping
- Various UCD/MNRC Operations Log pages from Log Books No. 117 - 122
- Facility Procedure UCD/MNRC-0027-DOC-07, "Utilization of the University of California, Davis/McClellan Nuclear Radiation Center Research Reactor Facility," Rev. 7, approval dated January 18, 2000
- Facility Procedure UCD/MNRC-0033-DOC-05, "University of California, Davis/McClellan Nuclear Radiation Center Research Reactor Facility Experiment Review and Authorization Process," Rev. 5, approval dated July 2, 2003
- University of California, Davis McClellan Nuclear Radiation Center 2006 Annual Report submitted May 24, 2007
- University of California, Davis McClellan Nuclear Radiation Center 2007 Annual Report submitted June 13, 2008

b. Observations and Findings

The experiments conducted at the facility were well established and had been reviewed and approved several years ago. The inspector noted that any new experiments would be required to be reviewed and evaluated by the Experiment Review Board (ERB) using the process stipulated in Facility Procedure UCD/MNRC-0027-DOC-07, "Utilization of the University of California, Davis/McClellan Nuclear Radiation Center Research Reactor Facility." The procedure required any approved experimenter who proposed a new experiment to complete an Experiment Request Form and submit it to the Experiment Coordinator at the facility. The Experiment Request Form required an evaluation of the target material. This was to verify that, if performed within the guidelines stated in the safety analysis, the irradiation experiment would remain within the TS limits for experiments. The evaluation included a safety analysis which consisted of a review of various operational, radiological, and safety considerations and limitations. The experimenter had to ensure that the proposed experiment would meet the conditions established for one of four approved Facility Use Authorizations. The request then had to be reviewed by the Experiment Coordinator, and by the ERB (as noted above), and be approved by the MNRC Facility Director. All new or revised experiments were also required to be reviewed and approved by the NSC.

The inspector reviewed several of the most recent experiments or revisions that had been submitted. The evaluation/safety analysis for each had been performed and the reviews and approvals completed by the ERB, the MNRC Facility Director, and the NSC. The experiments were conducted using an approved Irradiation Request Form (IRF), under the cognizance of the Reactor Supervisor and the SRO, and in accordance with TS requirements (e.g., reactivity limitations). The inspector noted that the IRFs documented the conditions of the irradiation and the radiological survey results of the material when removed from

the reactor. They also typically included information on the final disposition of the irradiated material.

c. Conclusions

The program for reviewing and conducting experiments satisfied TS and procedural requirements.

8. Procedures

a. Inspection Scope (IP 69008)

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

- "MNRC Document List"
- "Document Review" forms completed by staff members
- "UCD/MNRC Controlled Document Review and Approval Reference List"
- 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

b. Observations and Findings

Technical Specification Section 6.4 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. Changes to the procedures also required the approval of the UCD/MNRC Director and all changes were required to be documented.

The inspector noted that UCD/MNRC procedures had been developed for the activities as required by the TS and had been approved by the Director. Also, recent changes had been approved by the Director as well.

Various members of the UCD/MNRC staff were required to perform periodic reviews of the procedures to assure that they were current. The completion of these reviews was tracked by the Reactor Supervisor. The inspector determined that biennial reviews of the operation and maintenance procedures and annual reviews of the other types of procedures were being completed as required.

c. Conclusions

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

9. 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, "Emergency Plan for the University of California, Davis - McClellan Nuclear Radiation Center (UCD/MNRC)," Rev. 8, approval dated June 12, 2006:

- Assistance to be provided by offsite support groups
- 2007 and 2008 emergency drill documentation and critiques
- Memorandum of Understanding with the UCD Medical Center dated May 1, 2006
- Memorandum of Understanding dated November 23, 2004, between the County of Sacramento and McClellan Park
- Training Schedule for Maintenance of Qualifications for SROs for the 2008-2009 requalification cycle
- Facility Procedure UCD/MNRC-0018-DOC-07, "University of California, Davis/McClellan Nuclear Radiation Center Emergency Procedures," Rev. 7, approval dated November 11, 2007
- Facility Procedure UCD/MNRC-0078-DOC-02, "UCD/MNRC Emergency Procedures for Emergency Response Personnel - Class 0 Emergency - Personnel and Operation Events," Rev. 2, approval dated October 27, 2005
- Facility Procedure UCD/MNRC-0079-DOC-02, "UCD/MNRC Emergency Procedures for Emergency Response Personnel - Class I Emergency - Notification of Unusual Events," Rev. 2, approval dated October 27, 2005
- Facility Procedure UCD/MNRC-0080-DOC-02, "UCD/MNRC Emergency Procedures for Emergency Response Personnel - Class II Emergency - Alert," Rev. 2, approval dated October 27, 2005
- UC Davis Health System (UCDHS) Department of Emergency Medicine, Policy and Procedures Manual, latest revision dated February 1, 2009

b. Observations and Findings

The inspector reviewed the Emergency Plan (E-Plan) in use at the reactor and verified that the E-Plan was reviewed annually as required. The UCD/MNRC Emergency Procedures were reviewed and revised as needed to ensure effective implementation of the E-Plan.

Through records review and interviews with SRO personnel (e.g., emergency responders), the inspector determined that they were knowledgeable of the proper actions to take in case of an emergency. Training for these individuals had been conducted annually through the Requalification Program and documented acceptably. Training for support organization personnel was provided whenever those organizations' schedules would permit.

The inspector verified that the Memorandum of Understanding (MOU), dated November 23, 2004, between the County of Sacramento and McClellan Park

remained in effect. The MOU stipulated that the Sacramento Metropolitan Fire District (SMFD) would be available during an emergency and would provide support for the facility. The inspector also verified that the MOU between the UCD/MNRC facility and UC Davis Medical Center (UCDMC) remained in effect. The MOU indicated that the UCDMC would provide the MNRC with needed support in case of a radiological event involving a medical emergency.

Communications capabilities with support groups were acceptable and the various items of equipment (e.g., telephones and the building public address [PA] system) were in use daily. Portable radios and a portable PA device 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 training and drills conducted during the past two years was reviewed. Emergency preparedness and response training was being completed typically just prior to the drills during the meetings held to prepare for the drills. 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 participation of off site support groups every other year as required by the E-Plan. Critiques were written following the drills to document the strengths and weaknesses identified during the exercise. Action items were developed to correct the problems noted.

The inspector visited the UC Davis Medical Center, observed the facilities and equipment at that location, and interviewed Environmental Health and Safety (EH&S)/Health Physics personnel. The inspector determined that there were adequate supplies and equipment available at the hospital to handle an emergency at the MNRC. Through talking with EH&S staff, the inspector noted that they were very knowledgeable of their duties and responsibilities with respect to the MNRC. There appeared to be a good working relationship between the licensee and the UCDMC support personnel.

c. Conclusions

The emergency preparedness program was being conducted in accordance with the Emergency Plan.

10. Follow-up on Previous Identified Items

a. Inspection Scope (IP 92701)

The inspector reviewed the licensee's actions taken in response to previously identified Inspector Follow-up Items (IFIs) in NRC Inspection Report No. 50-607/2006-201, dated August 23, 2006.

b. Observation and Findings

(1) (Open) IFI 50-607/2006-201-01 - Follow-up on the licensee's actions to update and correct the organizational chart specified in the TS by submitting the appropriate TS change request.

During an inspection in August 2006, the inspector determined that the licensee's organizational chart for the UCD/MNRC stipulated that the chain of command included an "Operations Manager" who would be in charge of reactor operations and to whom the Reactor Supervisor would report. The chart also included a staff position designated as "HP Supervisor." Since these two positions were not part of the current organization, the inspector questioned the licensee about this. The licensee indicated that a TS change had been prepared but had not been submitted as of the date of that inspection.

The inspector reviewed this issue with the licensee. The inspector learned that the licensee had decided to develop another separate change to the TS and submit it along with the one concerning the organization. The additional change proposed the use of 30/20 fuel elements at the facility. The licensee completed an analysis of the new fuel and concluded that it would be safe and appropriate to use the fuel under certain restrictions. When this proposal to use 30/20 fuel was submitted to the NSC for review and approval, the NSC voted to have an independent review conducted to confirm the results obtained by the licensee. This independent review was still in progress at the time of this inspection and no final TS change had been completed for submittal to the NRC. This issue remains open.

(2) (Open) IFI 50-607/2006-201-02 - Follow-up on the licensee's actions to update facility drawings so that they reflect current plant conditions.

During the inspection referenced above, the inspector also reviewed selected Facility Modification Installation Authorization Forms and the associated Facility Modification Checklist Forms. The completed forms showed that the proposed modifications (mods) were acceptably reviewed in accordance with the procedure. However, the inspector noted that some of the 2005 facility modification packages had not been closed out. The licensee indicated that this was because the mods required a change to specific facility drawings and that those changes had not been completed. Other modification work was still ongoing.

This issue was reviewed with the licensee during this inspection. The licensee had taken steps to close out the open mod packages but, in one case, new electronics or other parts had recently been received and the modification work was still not complete. Although progress had been made, this issue remains open.

c. Conclusions

Two Inspector Follow-up Items identified during a previous inspection were reviewed during this inspection but neither was closed.

11. Exit Interview

The inspection scope and results were summarized on February 19, 2009, with members of licensee management and staff. The inspector described the areas inspected and discussed in detail 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. No dissenting comments were received from the licensee.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

H. Bollman	Building Manager and SRO
M. Boussoufi	Experiment Coordinator
H. Egbert	Radiography Supervisor and SRO
R. Flocchini	MNRC Facility Director
R. Miller	Level II Radiographer and SRO
D. Reap	Radiation Safety Officer and SRO
W. Steingass	Reactor Supervisor and SRO

Other Personnel

M. Hartman	Environmental Health and Safety Specialist II, Department of Environmental Health and Safety, University of California, Davis Medical Center

INSPECTION PROCEDURE USED

IP 69003	Class I Research and Test Reactor Operator Licenses, Requalification, and Medical Activities
IP 69005	Class I Research and Test Reactor Experiments
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 69009	Class I Research and Test Reactor Fuel Movement
IP 69010	Class I Research and Test Reactor Surveillance
IP 69011	Class I Research and Test Reactor Emergency Preparedness
IP 92701	Follow-up on Previously Identified Items

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed

50-607/2006-201-01	IFI	Follow-up on the licensee's actions to update and correct the organizational chart specified in the TS by submitting the appropriate TS change request.

50-607/2006-201-02	IFI	Follow-up on the licensee's actions to update facility drawings so that they reflect current plant conditions.

PARTIAL LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
E-Plan	Emergency Plan
ERB	Experiment Review Board
HP	Health Physics
IFI	Inspector Follow-up Item
IP	Inspection procedure
IRF	Irradiation Request Form
LOA	Letter of Agreement
MNRC	McClellan Nuclear Radiation Center
Mod	Modification
MOU	Memorandum of Understanding
MRC	Modification Review Committee
MW	Megawatt
MWO	MNRC Work Order
NRC	Nuclear Regulatory Commission
NSC	Nuclear Safety Committee
PA	Public Address (system)
Rev.	Revision
SMFD	Sacramento Metropolitan Fire District
SRO	Senior Reactor Operator
TS	Technical Specifications
UCD	University of California, Davis
UCDHS	University of California, Davis Health System
UCDMC	University of California, Davis Medical Center
UCD/MNRC	University of California, Davis/McClellan Nuclear Radiation Center