

February 27, 2002

Dr. Wade J. Richards  
UCD/MNRC  
6335 Price Avenue  
McClellan Air Force Base  
Sacramento, CA 95652-2504

SUBJECT: NRC INSPECTION REPORT NO. 50-607/2001-201

Dear Dr. Richards:

This letter refers to the inspection conducted on October 1-5, 2001, at the McClellan Nuclear Radiation Center Research Reactor. The enclosed report presents the results of that inspection.

Various aspects of your reactor operations and security programs were inspected, including selective examinations of procedures and representative records, interviews with personnel, and observations of the facility.

Based on the results of this inspection, no safety concern or noncompliance with Nuclear Regulatory Commission (NRC) requirements was identified. No response to this letter is required.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) <http://www.nrc.gov/NRC/ADAMS/index.html>. Should you have any questions concerning this inspection, please contact Mr. Stephen Holmes at 301-415-8583.

Sincerely,

*/RA/*

Patrick M. Madden, Section Chief  
Non-Power Reactors Section  
Operating Reactor Improvements Program  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

Docket No. 50-607

Enclosure: NRC Inspection Report No. 50-607/2001-201  
cc w/enclosure: Please see next page

University of California - Davis/McClellan MNRC

Docket No. 50-607

cc:

Dr. Kevin Smith, Vice Chancellor  
Office of the Chancellor  
University of California, Davis  
One Shields Avenue  
Davis, CA 95616-8558

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: 50-607/2001-201

Licensee: University of California, Davis

Facility: McClellan Nuclear Radiation Center

Location: McClellan Air Force Base  
Sacramento, California

Dates: October 1-5, 2001

Inspector: Stephen W. Holmes, Reactor Inspector

Approved by: Patrick M. Madden, Section Chief  
Non-Power Reactors Section  
Operating Reactor Improvements Program  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

## EXECUTIVE SUMMARY

University of California, Davis  
McClellan Nuclear Radiation Center Research Reactor Facility  
Report No: 50-607/2001-201

The primary focus of this routine, announced inspection was the on-site review of selected activities at the University of California-Davis' McClellan Nuclear Radiation Center Research Reactor facility. This facility is a 2 Megawatt Class I research reactor. The activities audited during this inspection included: organization and staffing; review and audit functions; plant operations; procedures; maintenance and surveillance; radiation protection program; effluent and environmental monitoring; the shipment of radioactive material; emergency preparedness; the safeguards and security program; the material control and accounting program; and training.

### Organizational and Staffing

- The organizational structure and functions of the operations staff were consistent with Technical Specification Section 6.O-Administrative Controls.

### Review and Audit Functions

- The review and audit program satisfied Technical Specification requirements.

### Plant Operations

- Reactor operations, shift turnover, and logs were acceptable.
- The control and performance of experiments were being performed in accordance with procedural requirements.
- Fuel handling activities and documentation were in accordance with procedural and Technical Specification requirements.

### Procedures

- The procedural control and implementation program was being satisfactorily administered.

### Maintenance and Surveillance

- The licensee's program for surveillance and limiting conditions for operation satisfied Technical Specification requirements.
- The maintenance program was being implemented as required by McClellan Nuclear Radiation Center Research Reactor procedures.
- The licensee's design change procedures were in place and implemented as required.



### Radiation Protection Program

- The radiation protection program satisfied the requirements of 10 CFR Part 19.12 and 10 CFR Part 20.1101
- Radiological postings satisfied regulatory requirements.
- Surveys were performed and documented as required by 10 CFR Part 20.1501(a), Technical Specifications, and licensee procedures.
- The personnel dosimetry program was acceptably implemented and doses were in conformance with licensee and 10 CFR Part 20 limits.
- Portable survey meters, radiation monitoring, and counting lab instruments were being maintained in accordance with Technical Specifications, industry/equipment manufacturer standards, and licensee procedures.
- The stack continuous air monitor event was handled and documented as required.

### Effluent and Environmental Monitoring

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

### Transportation of Radioactive Materials

- Transportation of byproduct material by the licensee satisfied the applicable NRC and Department of Transportation regulations and followed McClellan Nuclear Radiation Center Research Reactor procedures.

### Emergency Preparedness

- The emergency preparedness program was conducted and implemented in accordance with the Emergency Plan.

### Security

- Security facilities, equipment, and procedures satisfied the facility's Physical Protection Plan.

### Material Control and Accountability

- The licensee was in compliance with the possession and use limits specified by the facility's license and demonstrated effective control over this material.

### Training

- The 10 CFR Part 19 training was performed in accordance with established procedures.

- The operator requalification program was being implemented in a satisfactory manner.

## REPORT DETAILS

### Summary of Plant Status

During this inspection, the McClellan Nuclear Radiation Center's two megawatt (2 MW) research reactor was operated 16-hours a day, five days a week. Activities included operator training, experimental irradiations, and Technical Specification (TS) and surveillance requirements.

#### 1. Changes, Organization, and Staffing

##### a. Inspection Scope (Inspection Procedure (IP) 39745)

The inspector reviewed selected aspects of:

- organizational structure
- staffing requirements for safe operation of the research reactor facility
- qualifications
- administrative controls

##### b. Observations and Findings

The organizational structure of the operations staff had not functionally changed since the last inspection. Operators included the Facility Director, the Operations Supervisor, and a number of Senior Reactor Operators (SRO) and Reactor Operators (RO). The inspector verified that the reactor staff satisfied the training and experience required by Safety Analysis Report (SAR) Section 12.1.4. Operation logs and records confirmed that shift staffing met the duty and on-call personnel requirements outlined in SAR Section 12.1.3.

The health physics (HP) organizational structure had changed since the last inspection. The reactor HP staff now consisted of the HP supervisor (HPS), a radiochemist/health physicist, and two technicians (down from five). The inspector verified that the reactor staff satisfied the training and experience requirements specified by SAR Section 11.1.2.1. The HPS reports directly to the Facility Director.

##### c. Conclusions

The operations organizational structure and functions were consistent with TS Section 6.0, Administrative Controls, amendment 4, dated August 9, 2001.

#### 2. Review and Audit Functions

##### a. Inspection Scope (IP 40745)

The inspector reviewed selected aspects of:

- Nuclear Safety Committee (NSC) minutes
- safety review records

- audit records
- responses to safety reviews and audits
- review and audit personnel qualifications

b. Observations and Findings

Review of the NSC membership and semiannual meeting schedule confirmed that they met TS Section 6.2.1 and 6.2.2 and the Committee's charter. The inspector reviewed the minutes of the NSC and determined that they provided guidance, direction, and operations oversight. The NSC reviewed and approved experiments and 10 CFR 50.59 requests as required.

Committee minutes and audit records showed that safety reviews and audits were conducted as required by TS Sections 6.2.3 and 6.2.4 and the Committee's charter. The content of the safety reviews were found by the inspector to be consistent with the TS. These reviews provided guidance, direction, and oversight to ensure satisfactory use of the reactor.

Through examination of the committee review of the new Iodine-125 loop experiment, the stack Continuous Air Monitor (CAM) calibration event, and audits of the operations and training programs, the inspector determined that the safety reviews and audits and associated findings were satisfactory and that the licensee took the appropriate corrective actions in response to these findings.

The inspector reviewed selected experiment and facility change approvals and performed an in-depth review of the evaluation and approval of the Iodine-125 production loop experiment and its associated Facility Change Package FM 1-01-01. The inspector determined that the NSC review and approval of this experiment and associated facility change was adequately performed.

c. Conclusions

Audits being conducted by the NSC were found to be in accordance with the requirements specified in TS Section 6.2, amendment 4, dated August 9, 2001.

### 3. **Plant Operations**

a. Inspection Scope (IPs 39745, 69005, and 60745)

The inspector reviewed selected aspects of:

- operational logs and records
- staffing for operations
- selected operational, startup, or shutdown activities
- experimental program requirements
- experiment approval and operations procedures
- experiment logs and records
- approved reactor experiments

- Nuclear Safety Committee minutes
- an experimental neutron radiographic run
- MNRC fuel handling procedures
- fuel handling equipment and instrumentation
- fuel handling and examination records

b. Observations and Findings

(1) Reactor Operations

The inspector reviewed 24 operations logs for the past year. Additionally, the inspector observed selected reactor startups, shutdowns, steady state operations, and a shift turnover. Reactor operations were carried out following written procedures as required by TS Section 6.4.1. Information on operational status of the facility was recorded clearly in log books and/or checklists as required by MNRC operation procedures and provided a record of operational activities and events. Scrams were identified in the logs and records, and were reported and resolved as required before the resumption of operation. During shift turnovers, the oncoming staff was briefed on the status of the reactor, maintenance, and HP operations. Operation logs and records confirmed that shift staffing met the minimum requirements for duty and on-call personnel as required by TS Section 6.1.3.

(2) Experiments

The inspector's review of selected experiment authorizations and the approval for the Iodine-125 production loop experiment confirmed that experiments were pre-screened/reviewed and approved by the Experimental Review Board or referred to the NSC as required. Review of current experiment authorizations, procedures, and related reactor log book entries by the inspector along with the observation of two radiographic runs, confirmed that experiments were installed, performed, and removed as specified by the approved experiment authorizations.

The inspector also performed an in-depth review of the evaluation and approval of the Iodine-125 production loop experiment. The inspector confirmed that the facility authorization approval had been performed as required by TS sections 3.8, 4.8, 6.3.2, and 6.5 as well as the licensee's experiment approval procedures.

(3) Fuel Handling

The inspector reviewed MNRC procedures for refueling, fuel shuffling, and TS Section 3.2.4 required inspections/surveillances as well as fuel movement logs and inspection records. The licensee's fuel movement procedures were found to have sufficient detail to ensure appropriate fuel handling operations. Fuel movement, inspection, log keeping, and data recording followed licensee procedures and met the requirements

of TS Section 6.8. Data recorded for fuel movement was clear and cross referenced in fuel and operations logs. As required by procedure and TS Section 6.1.3, the log entries identified that at least two persons were present when performing fuel movement operations.

c. Conclusions

Based on the procedures and records reviewed and the observations made during the inspection, the inspector determined that reactor operations, shift turnover, and logs; the control and performance of experiments; and the fuel handling activities and associated documentation were acceptable and in accordance with procedural and TS requirements.

#### 4. Procedures

a. Inspection Scope (IP 42745)

The inspector reviewed selected aspects of:

- administrative controls
- records for changes and temporary changes
- procedural implementation
- logs and records

b. Observations and Findings

The inspector confirmed that written HP and operations procedures were available for those tasks and items required by TS Section 6.4. Procedures were routinely updated while "Pen & Ink" changes and Special Operating Procedures were used for interim/temporary changes. The licensee controlled temporary changes to procedures, and their associated review and approval processes, by use of a computerized tracking system. Additionally, the procedures or changes were not release for use until the appropriate training had been given and documented.

After review of the 2001 training records and interviews with staff, the inspector determined that the training of personnel on procedures was adequate. During the inspector's tours of the facility, it was observed that personnel performing radiation surveys, conducting instrument checks, issuing dosimetry, installing and removing experiments, and operating the reactor were doing so in accordance with applicable procedures.

c. Conclusions

Based on the procedures and records reviewed and observations of staff during the inspection, the inspector determined that the procedural control and implementation program was being satisfactorily administered.



## 5. Maintenance and Surveillance

### a. Inspection Scope (IPs 39745, 61745, and 40745)

The inspector reviewed selected aspects of:

- maintenance procedures
- equipment maintenance records
- surveillance and calibration procedures
- surveillance, calibration, and test data sheets and records
- Reactor operations, periodic checks, tests, and verifications were observed.
- facility design changes and records
- facility configuration

### b. Observations and Findings

#### (1) Maintenance

The inspector reviewed the Preventative Maintenance System (PMS) implementing procedures. Additionally, the inspector performed an in-depth review of two individual maintenance activities and interviewed the MNRC staff member who maintained the PMS.

This review indicated that routine/preventive maintenance was controlled and documented in the PMS and/or operations log consistent with the TS and licensee procedures. Verifications and operational systems checks were performed to ensure system operability before return to service.

#### (2) Surveillance

The computerized PMS was used to track surveillance checks, and required system/component inspections. This included the date last performed, date presently completed, information on where documented and by whom, overdue status, trends, full system historical records, etc. The PMS was found to provide adequate control over the reactor operational tests and surveillance checks.

The inspector reviewed PMS records of all TS required surveillances and LCO verifications performed since November 2000. Additionally, the inspector performed an in-depth review of four individual surveillances; 5140 A14-Control Rod Worth, 5140 S1-Control Rod Drop Times, 5330 A3-Reactor Power Calibration, and 5330 A2-NPP-1000 Calibration. This review indicated that the periodic checks, tests, and verifications for TS required LCOs were completed as required. The results of these surveillances were within prescribed TS limits and

procedure parameters and in close agreement with the previous surveillance results.

(3) Design Control

Design related changes required a facility staff review, an NSC review, and were recorded and stored in individual change binders. Questions from the committee and replies from the reactor and HP staffs were documented and incorporated into the individual modification change packages.

The inspector reviewed the change packages for all open Class I facility modifications. In addition, the inspector performed an review of Iodine-125 production loop approval package FM-1-01-01. From these reviews, the inspector determined that change evaluations were technically complete and adequately documented. Additionally the inspector determined that NSC's reviews and approvals of 10 CFR 50.59 evaluations were focused on safety, and met licensee program requirements.

c. Conclusions

The licensee's program for surveillance and limiting conditions for operation satisfied TS requirements. The licensee's maintenance and design change programs were in place and were being implemented as required by MNRC procedures.

**6. Radiation Protection**

a. Inspection Scope (IP 88743)

The inspector reviewed selected aspects of the radiation protection program (RPP):

- The RPP
- As Low As Reasonably Achievable (ALARA) reviews
- Radiation Protection Training
- radiological signs and posting
- facility and equipment during tours
- routine surveys and monitoring
- survey and monitoring procedures
- licensee procedures
- dosimetry records
- maintenance and calibration of radiation monitoring equipment
- periodic checks, quality control, and test source certification records
- event/incident records

b. Observations and Findings

(1) Radiation Protection Program

Although individual procedures had been revised, the RPP had not appreciably changed since the last inspection. The licensee reviewed the RPP at least annually in accordance with 10 CFR 20.1101(c). This review and oversight was provided by the NSC as required by TS Section 6.2.4.

Review of procedure change records, experiment authorizations, and confirmed that the HPS specifically reviewed and approved RPP changes, experiments, and radiation protection related events/conditions as required by TS 6.3, SAR Section 11.1.2.3.

Training records showed that personnel were adequately trained in radiation protection practices as required by SAR Section 11.1.2.4.

(2) Radiation Protection Postings

The inspector observed that caution signs, postings and controls for radiation, high radiation, and contaminated areas at the MNRC were acceptable for the hazards involved and were being implemented as required by 10 CFR Part 20, Subpart J. The inspector observed licensee personnel and verified that they complied with the indicated precautions for access to these areas. The inspector confirmed that current copies of NRC Form-3 and notices to workers were posted in appropriate areas in the facility as required by 10 CFR Part 19.

(3) Radiation Protection Surveys

The inspector audited the daily, weekly, monthly, quarterly, and other periodic contamination and radiation surveys, including pool water analyses, and determined they were performed and documented as required by TS Section 6.3-Radiation Safety, SAR Section 11.1.4 and MNRC HP procedures. HP surveys required for specific reactor operations such as exposure door openings, experimental irradiations, etc., were also performed and documented as required. Results were evaluated and corrective actions taken and documented when readings/results exceeded set action levels.

The inspector's review of the survey records issued since November 2000, confirmed that contamination in the facility was infrequent and well below MNRC HP limits (<1000 dpm/100 cm<sup>2</sup> beta-gamma and <20 dpm/100 cm<sup>2</sup> alpha). Surveys were tracked in the HP survey log which included a comment section. This comment section was used to document non-routine items or to provide additional information on HP activities. The TS required surveys were individually identified in the

log. The inspector's review of the HP log did not identify any missed surveys.

(4) Dosimetry

The inspector confirmed that dosimetry was being issued to staff and visitors as outlined in licensee procedures. The licensee's dosimetry issuing criteria specifies that dosimetry should be issued to individuals who might receive a dose equivalent exceeding 10% of the annual limits specified in 10 CFR Part 20.1201(a). This criteria meets the requirements of 10 CFR 20.1502 for individual monitoring. During the inspection, the inspector observed that visitors and staff wore their dosimetry, including extremity dosimeters, as required.

The licensee used a National Voluntary Laboratory Accreditation Program-accredited vendor to process personnel thermoluminescent dosimetry. Dosimetry results were reviewed by the HPS and doses above the ALARA limits were investigated or referred to the NSC as required. The inspector's reviewed 12 radiological exposure records for 2001 and verified that occupational doses to the staff and visitors were within 10 CFR Part 20 limitations.

(5) Radiation Monitoring Equipment

The calibration and periodic checks of the portable survey meters and radiation monitoring and counting lab instruments were performed by the licensee's staff, University of California-Davis calibration facilities, or offsite by certified contractors. The inspector confirmed that the licensee's calibration procedures and their biannual, annual and semiannual calibration frequencies satisfied TS Section 4.7, Reactor Radiation Monitoring Systems, and 10CFR20.1501(b) requirements, and the American National Standards Institute (ANSI) N323, Radiation Protection Instrumentation Test and Calibration, or the instrument's manufacturers' recommendations. The inspector verified that the calibration and check sources used were traceable to the National Institute of Standards and Technology and that the sources' geometry and energies matched those used in actual detection/analyses.

The inspector reviewed the facility calibration list for 2001 and confirmed that the calibration for the survey meters in use had been performed. The inspector specifically verified the calibration of the reactor room CAM, the facility stack CAM, two count rate meters, and one portable ion chamber. All instruments checked had current calibrations. The calibrations were appropriate for the types and energies being detected and or measured by those instruments.

(6) Reportable Events

Since the last inspection one TS Section 6.7.2 reportable event occurred.

On June 6, 2001, the reactor was operating at 2 MWs for experiments 01-0162 (Argon- 41 production for bay CAM calibration) and 01-0131 (bay neutron radiography). The HP Technician on-duty reported to the SRO that the argon cylinder used the previous day as part of the stack CAM calibration was still in the stack CAM and that the normal shield plug was not installed. The HP Technician on-duty removed the argon cylinder and installed the shield plug. The SRO shut down the reactor upon notification and reported the condition to the Reactor Manager and Acting HP Manager.

The Reactor Manager suspended all reactor operations until further notice and notified the Facility Director of the possible TS violation.

The licensee's investigation determined that the individual performing the calibration did not follow the procedure in that calibration procedure Step 21 was not followed. This step requires the removal of the Argon-41 counting container. The licensee verified that the procedure instruction was clear and contained the appropriate signature and data entry blocks for this step. The HP Technician did not perform or sign off on Step 21 and thus did not follow the procedure.

The corrective actions taken by the licensee were to require calibration of CAMS be independently verified and a second person to re-verify the completion of procedure Step 21. In addition, the SRO on duty shall perform an independent check, before the reactor is put into operation, anytime the HP Staff works on TS required equipment.

The inspector confirmed that the licensee made the required NRC notifications and determined that during this event the Argon-41 concentrations did not exceed 10 CFR 20, Appendix B limits.

This event constituted a violation of TS Section 3.7.1 Monitoring Systems which require that the reactor shall not be operated unless the stack CAM, reactor room CAM, reactor room radiation area monitor (RAM), and the demineralizer RAM are operable, the readings are below the alarm set points (stack CAM particulate of 4,220 cpm and argon of 198 cpm, reactor room CAM particulate of 126,000 cpm and iodine of 2,920 cpm, reactor room RAM of 10,000 mR/hr, and the demineralizer RAM of 200 mR/hr), and the instrument readings are displayed in the control room. Table 3.7.1 identifies the stack CAM as one of the required channels. This event resulted in a Violation of TS Section 3.7.1. The licensee identified and immediately corrected the condition. Therefore, this violation is being treated as a Non-Cited Violation,

consistent with Section VI.A.8. of the NRC Enforcement Policy  
(NCV 50-607/2001-201-01)

c. Conclusions

The inspector determined that, because: 1) surveys were being completed and documented as required by 10 CFR Part 20.1501(a), Technical Specifications, and licensee procedures; 2) postings met regulatory requirements; 3) the personnel dosimetry program was acceptably implemented and doses were in conformance with licensee and 10 CFR Part 20 limits; 4) portable survey meters and radiation monitoring and lab counting instruments were being maintained and calibrated as required, the Radiation Protection Program being implemented by the licensee satisfied regulatory requirements.

**7. Effluent and Environmental Monitoring**

a. Inspection Scope (IP 69004)

The inspector reviewed selected aspects of:

- release records
- counting and analysis program
- maintenance and calibration records
- annual reports
- environmental records
- procedures
- periodic reports

b. Observations and Findings

The inspector audited the gaseous releases for 2000 and 2001. Doses were calculated from integrated power using the CAP 88-PC Code. This code is a set of computer programs, databases, and associated utility programs for estimation of dose and risk from radionuclide emissions to air which uses a modified Gaussian plume equation to estimate the average dispersion of radionuclides released for up to six emitters sources and is specified by the SAR as an acceptable analytical methodology. The inspector's review of these releases confirmed that they met the annual dose constraint specified by 10 CFR 20.1101(d), Appendix B concentrations, and TS Section 3.7.2. discharge limits.

The inspector verified that radioactive liquid releases were infrequent and liquid releases were below 10 CFR Part 20, Appendix B limits. Liquid release records since November 2000, were reviewed through September 2001, confirming that these releases met 10 CFR 20.2003 and 10 CFR Part 20, Appendix B limits.

The environmental monitoring program (EMP) consists of direct quarterly radiation measurements at selected locations adjacent to the MNRC and periodic

vegetation, soil, and water sample analyses as described in SAR Section 11.1.7, Environmental Monitoring.

These direct radiation measurements resulted in readings within the unrestricted areas being statistically the same as background readings. Results of vegetation, soil, and water sample analyses also showed no statistical difference from the background readings.

c. Conclusions

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

## 8. **Transportation of Radioactive Materials**

a. Inspection Scope (IP 86740)

The inspector reviewed selected aspects of:

- radioactive materials shipping procedures
- radioactive materials transportation and transfer records for 2000-2001
- interviewed staff
- observed package preparations and operations

b. Observations and Findings

The requirements of 10 CFR 30.41, Transfer of Byproduct Material, obligates the shipper, prior to transferring byproduct material to another entity, to verify that the transferee is authorized under 10 CFR Part 30.41(b) (1)(7) to receive byproduct material and that their license authorizes the receipt of the type, form, and quantity of byproduct material being transferred.

The inspector reviewed all six shipments in 2001 and confirmed compliance with the requirements of 10 CFR Part 30.41(d) (1)-(5).

The MNRC, in addition to NRC regulations, is required by 10 CFR 71 Packaging and Transportation of Radioactive Material to comply with the applicable requirements of the DOT regulations in 49 CFR parts 170 through 189.

Shipping paper documentation required by 49 CFR must include the proper shipping name and hazard class, the words "Radioactive Material," the applicable identification number, and the name, physical/chemical form/description, and activity in SI units of each nuclide. Additionally, the category of label applied to each package and the Transport Index assigned to each Yellow-II or III package must be included. If tendered to a common carrier an appropriate signed shipper's certificate is required and if by aircraft additional statements as to acceptability are also needed.

The inspector confirmed by review of shipping records for 2001 that the licensee properly prepared the shipping paper documentation. Emergency response information and monitored telephone contacts were as required.

The 10 CFR 20.1906 establishes the requirements for receiving and opening packages containing quantities of radioactive material in excess of Type A quantities. These requirements include arrangements for package receipt or pickup, monitoring of external surfaces and radiation levels, notifications when package limits are exceeded, and requirements for package-opening procedures.

The inspector reviewed the receipt records for 2001. The inspector confirmed that receipt/pickup and monitoring activities for incoming packages were performed in accordance with 10 CFR 20.1906 and with established licensee procedures.

The 49 CFR 173 requires that each shipper of a type 7A package maintain on file, a written document of the test and engineering evaluation or other data showing the package complies with the specification. Additionally, if the shipper makes any changes to the packaging, a supplemental evaluation must be performed and documented. The documented evaluation must demonstrate that the packaging still meets the specifications.

Packages used at the MNRC are normally purchased from a vendor or provided by the entity requesting the radioactive material produced. The inspector confirmed the manufacturers' testing and evaluation documentation along with their packaging instructions are kept on file at the Licensee's Facility.

The 49 CFR 172.704 requires triennial training for MNRC staff. The inspector verified that the training had been performed and that proper training records were being kept.

c. Conclusions

Based on the records reviewed, the inspector found the transportation of byproduct material by the licensee satisfied the applicable NRC and DOT regulations.

## 9. Emergency Preparedness

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- the emergency plan
- implementing procedures
- emergency response facilities, supplies, equipment and instrumentation
- training records
- offsite support

- emergency drills and exercises

b. Observations and Findings

The inspector reviewed the Emergency Plan (E-Plan), Revision 6, dated January 2001, and confirmed that this E-Plan was the same as the version most recently approved by the NRC. The E-Plan was audited and reviewed annually by the licensee. The licensee also reviewed the implementing procedures on an annual basis and revised them as needed to ensure the effectiveness of the E-Plan. Through random checks of the emergency cart inventories, decontamination facilities, and portable detection instrumentation, the inspector determined they were being maintained as required by the plan. Through reviews of training, drill records, and interviews with MNRC personnel, the inspector confirmed that emergency response training was given as required by the E-Plan and that emergency responders were knowledgeable of the proper actions to take in case of an emergency. The inspector also reviewed the current E-Plan support agreements with off-site response organizations (e.g., County Fire and Sheriff Departments, local ambulance services, and the UCD Medical Center) and determined adequate. Emergency drills had been conducted as required by the E-Plan. The last drill was performed on October 3, 2001, and involved an injury with radiological contamination and resulted in interaction with off-site law enforcement, ambulance and fire services. The drill provided a practical, reasonable, and an effective test of the participants. Critiques were held following the drills to discuss the strengths and weaknesses identified during the exercise and to develop possible solutions to any problems identified.

c. Conclusions

Based on the audit of the E-Plan and the emergency planning drill, the inspector confirmed that the licensee's emergency preparedness program was being satisfactorily implemented.

## 10. Security

a. Inspection Scope (IPs 81401 and 81421)

The inspector reviewed selected aspects of:

- the Physical Protection Plan
- security systems, equipment and instrumentations
- implementation of the Physical Protection Plan
- security audits

b. Observations and Findings

The Physical Protection Plan (PPP) dated July 18, 2000, was the same as the latest approved by the NRC. The inspector toured the facility and confirmed that the physical protection systems (barriers and alarms), equipment, and

instrumentation were in place as required by the PPP. The inspector also confirmed that the security checks, tests, verifications, and periodic audits were performed and tracked as required by the PPP and that corrective actions were taken when required. Specifically, the licensee identified that the control room alarm panel did not have an audible alarm as required by the PPP. The licensee took prompt actions and installed the required alarm. The inspector observed that access control was implemented in accordance with licensee implementing procedures.

In addition, the inspector contacted the County Sheriff's department and interviewed two Deputies who patrol the area around the reactor facility. The Deputies were knowledgeable of their response responsibilities.

c. Conclusions

Based on the observations, the inspector found the physical protection features of the MNRC facility, the equipment, and procedures satisfied PPP.

## 11. Material Control and Accountability

a. Inspection Scope (IP 85102)

The inspector reviewed selected aspects of:

- Special Nuclear Material accountability program
- inventory and locations
- accountability records and reports

b. Observations and Findings

The inspector reviewed the semiannual inventory of Special Nuclear Material (SNM). The inspector confirmed that the material control and accountability program tracked locations and content of SNM against the operating license possession limits. Fuel burn-up and related measurements/calculations were found by the inspector to be acceptable and properly documented. The material control and accountability forms (DOE/NRC Forms 741 and 742) were properly prepared and fuel inventory and movement records were cross referenced and matched to operations logbooks.

c. Conclusions

Based on the inspector's review of the MNRC safeguards program, the possession and use of SNM were limited to the locations and purposes authorized under the license.

## 12. Training

a. Inspection Scope (IP 83743 and 69003)

The inspector reviewed selected aspects of:

- radiation protection training records and rosters
- radiation protection training procedures
- the operator requalification program
- operators licenses
- operator training records
- operator physical examination records
- operator examination records
- operator active duty status

b. Observations and Findings

(1) Radiation Protection

The 10 CFR 19 training at MNRC is separated into categories A to E and special. The training is focused on what is required based on the individuals status and need (e.g., staff, visitor, investigator, fire or police department, escorted, unescorted).

The inspector's reviews of these records for the last year confirmed that Part 19 and specific training appropriate to individual status and work requirements had been provided to staff and visitors. The inspector confirmed by interviewing and observing the staff performing reactor operations, experiments, calibrations, and surveys, that the training had been effective. Additionally, the inspector specifically verified the initial training of the two newest facility employees. All training records reviewed were current.

(2) Operator Requalification

The inspector reviewed the licensee's requalification plan and performed an individual review of six operator requalification records.

The requalification program master record showed that all currently licensed SROs had successfully completed their emergency procedure and abnormal events training, the reactivity manipulations, and were participating in the ongoing training as required by the requalification plan. The inspector reviewed training records and confirmed that licensed operators attended lectures on the appropriate subject material required by the program and that competence evaluations, annual operator performance exams, and biennial comprehensive requalification exams had been given as required by the plan. The inspector confirmed that 1) past test questions covered the subject matter specified by the program and demonstrated technical depth; 2) required quarterly operation hours for ROs and SROs were being tracked; 3) biennial medical exams had been performed and certified as required by 10 CFR 55 Subpart C; and 4) training was provided to the

reactor operators on maintenance operations and 10 CFR 50.59 design changes and evaluations.

c. Conclusions

Based on the records reviewed and the observations made, the inspector determined that 1) the 10 CFR Part 19 training was performed in accordance with established procedures and 2) the Requalification program was being acceptably implemented.

**13. Exit Meeting Summary**

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on October 6, 2001. 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

J. Ching	Health Physics Supervisor
H. Egbert	Maintenance Coordinator/RO
B. Hasslett	Radiochemist
*C. Heidel	Reactor Operations Supervisor
D. Newell	Nuclear Engineer/SRO
D. Reap	HP Technician
*W. Richards	Reactor Director
A. Heidel	Training Coordinator/SRO

(\*Attended Exit Meeting)

## INSPECTION PROCEDURE (IP) USED

39745	Class I Non-Power Reactors Organization and Operations and Maintenance Activities
40745	Class I Non-Power Reactor Review and Audit and Design Change Functions
42745	Class I Non-Power Reactor Procedures Environmental Protection and Effluents
60745	Class I Non-Power Reactor Fuel Movement
61745	Class I Non-Power Reactor Surveillance
69003	Class I Non-Power Reactor Operator Licenses, Requalification, and Medical Activities
69005	Class I Non-Power Reactor Experiments
81401	Plans, Procedures, and Reviews
81420	Fixed Site Physical Protection of MSNM
83743	Class I Non-Power Reactors Radiation Protection
85102	Material Control and Accounting - Reactors
86740	Transportation Activities

## ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

NCV 50-607/2001-201-01      Reactor operated with the stack CAM inoperable.

### Closed

NCV 50-607/2001-201-01      Reactor operated with the stack CAM inoperable.

### DISCUSSED

None

## PARTIAL LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
CAM	Continuous Air Monitor
DOT	Department of Transportation
E-Plan	Emergency Plan
EMP	Environmental Monitoring Program
HP	Health Physics
HP S	Health Physics Supervisor
LCO	Limiting Conditions for Operations
NSC	Nuclear Safety Committee
MNRC	McClellan Nuclear Radiation Center
NRC	Nuclear Regulatory Commission
OS	Operations Supervisor
PMS	Preventive Maintenance System
PPP	Physical Protection Plan
RAM	Radiation Area Monitor
RO	Reactor Operator
RPP	Radiation Protection Program
SAR	Safety Analysis Report
SNM	Special Nuclear Material
SRO	Senior Reactor Operator
TS	Technical Specifications
UCD	University of California, Davis