

November 21, 2000

Dr. Wade J. Richards, Chief
Nuclear Licensing and Operations
6335 Price Avenue
McClellan Air Force Base
Sacramento, CA 95652-2504

SUBJECT: NRC INSPECTION REPORT NO. 50-607/2000-202

Dear Dr. Richards:

On October 24-27, 2000, the United States Nuclear Regulatory Commission (NRC) conducted an announced inspection of the McClellan Nuclear Radiation Center Research Reactor. The enclosed report presents the results of that inspection.

Various aspects of your reactor operation and safeguards 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 NRC requirements were 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>. If you have any questions, please contact Mr. Stephen Holmes at 301-415-8583.

Sincerely,

/RA/

Ledyard B. Marsh, Chief
Events Assessment, Generic Communications and
Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-607

License No. R-130

Enclosure: NRC Inspection Report No. 50-607/2000-202

cc w/enclosure: Please see next page

McClellan AFB TRIGA Reactor

Docket No. 50-607

cc:

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

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

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NRR-056

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

Docket No: 50-607

License No.: R-130

Report No: 50-607/2000-202

Licensee: University of California, Davis

Facility: McClellan Nuclear Radiation Center

Location: McClellan Air Force Base
Sacramento, California

Dates: October 24-27, 2000

Inspector: Stephen W. Holmes, Reactor Inspector

Approved by: Ledyard B. Marsh, Chief
Events Assessment, Generic Communications and
Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

This routine, announced inspection included onsite review of selected aspects of the organizational structure and functions program, review and audit program, radiation protection program, radiation protection postings program, radiation protection survey program, personnel dosimetry program, calibration program, effluent program, environmental protection program, procedural control program, training program, events/operations program, transportation program, and emergency preparedness program.

The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements since the last NRC inspection of this program

ORGANIZATIONAL STRUCTURE AND FUNCTIONS

Health physics (HP) staffing and organizational structure and functions satisfied technical specification (TS) requirements.

REVIEW AND AUDIT

The review and audit program satisfied TS requirements.

RADIATION PROTECTION PROGRAM

The radiation protection program (RPP) satisfied the requirements of 10 CFR 19.12 and 10 CFR 20.1101.

RADIATION PROTECTION POSTINGS

Radiological postings satisfied regulatory requirements.

RADIATION PROTECTION SURVEYS

Surveys were performed and documented as required by 10 CFR Part 20, TS, and licensee administrative controls.

PERSONNEL DOSIMETRY

The personnel dosimetry program was acceptably implemented and doses were in conformance with licensee and 10 CFR Part 20 limits.

CALIBRATION OF RADIATION MONITORING EQUIPMENT

Portable survey meters, radiation monitoring, and counting lab instruments were being maintained according to TS and industry/equipment manufacturer standards and licensee procedures. Calibrations satisfied TS requirements.

EFFLUENT MONITORING AND RELEASE

The effluent monitoring and release program satisfied NRC requirements.

ENVIRONMENTAL PROTECTION

Environmental monitoring program (EMP) satisfied the radiation protection program requirements.

PROCEDURES-HP

The procedural control and implementation program satisfied TS requirements

TRAINING

HP training satisfied TS and regulatory requirements.

HP EVENTS/OPERATIONS

Events were handled and documented as required. Protective clothing and exit surveys were appropriate and adequately used.

TRANSPORTATION

Radioactive material was transferred and disposed of in accordance with licensee procedures, TS, 49 CFR and 10 CFR Part 20 requirements.

EMERGENCY PREPAREDNESS

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

REPORT DETAILS

Summary of Plant Status

Reactor operations were continuing with two shifts 16-hours a day. Activities included operator training, experimental irradiations, and TS inspections and surveillances. No safety concerns were noted.

1. ORGANIZATIONAL STRUCTURE AND FUNCTION

a. Inspection Scope (83743)

The inspector reviewed selected aspects of:

- HP organization and staffing
- qualifications
- management responsibilities
- administrative controls

b. Observations and Findings

The HP organizational structure had changed since the last inspection. The reactor HP staff consisted of the health physics supervisor (HPS), a radiochemist/health physicist, and three technicians (down from five). Qualifications of the staff met TS requirements. The HPS reports directly to the facility director. Coordination of HP activities between the staffs was acceptable. Review of records verified that management responsibilities were administered as required by TS and applicable procedures.

The Final Safety Analysis Report stated HP staffing for three shift operation is a HPS, two health physicists, and eight technicians. Based on this and observations by the inspector, the staffing is acceptable for the present minimal working two shift operation.

The facility director and HPS both stated that HP staffing would need to be augmented if operation work load increased or three shift operations were started.

c. Conclusions

The HP organizational structure and functions were consistent with TS requirements for current shift operations.

2. REVIEW AND AUDIT

a. Inspection Scope (40745)

The inspector reviewed selected aspects of:

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

b. Observations and Findings

The NSC meeting schedule and membership satisfied TS requirements and the Committee's procedural rules. Review of the minutes indicated the NSC provided guidance, direction and HP oversight of the reactor.

Records showed that the safety reviews were conducted at the TS required frequency. Topics of these reviews were also consistent with TS requirements to provide guidance, direction, and oversight, and to ensure satisfactory use of the reactor.

The audit records showed that reviews had been completed in those areas outlined in the TS and at the required frequency.

The inspector noted that the safety reviews and audits and associated findings were acceptably detailed and that the licensee responded and took corrective actions as needed. The safety review and audit personnel qualifications were consistent with licensee administrative controls.

c. Conclusions

The review and audit program satisfied TS requirements.

3. **RADIATION PROTECTION PROGRAM**

a. Inspection Scope (83743)

The inspector reviewed selected aspects of:

- The RPP
- ALARA reviews
- Radiation Protection Training

b. Observations and Findings

Although individual procedures had been altered, 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 were provided by the NSC as required by TS and licensee procedures. The inspector confirmed with the responsible NSC member that the review satisfied Part 20.110(c) and that this would be specifically stated in future reviews.

Records confirmed that the HPS specifically reviewed and approved RPP changes, experiments, and radiation protection related events/conditions as required by TS and licensee procedures.

Training records showed that personnel were acceptably trained in radiation protection practices commensurate for the facility and their work.

c. Conclusions

The RPP satisfied the requirements of 10 CFR 19.12 and 10 CFR 20.1101.

4. **RADIATION PROTECTION POSTINGS**

a. Inspection Scope (83743)

The inspector reviewed selected aspects of:

- radiological signs and posting
- facility and equipment during tours

b. Observations and Findings

Caution signs, postings and controls to radiation areas at the McClellan Nuclear Radiation Center (MNRC) were acceptable for the hazards involved and were as required in 10 CFR Part 20, Subpart J. Licensee personnel observed the indicated precautions for access to the radiation areas. Current copies of NRC Form-3 were posted in appropriate areas in the facility as were current notices to workers required by 10 CFR Part 19.

c. Conclusions

Radiological postings satisfied regulatory requirements.

5. **RADIATION PROTECTION SURVEYS**

a. Inspection Scope (83743)

The inspector reviewed selected aspects of:

- routine surveys and monitoring
- survey and monitoring procedures

b. Observations and Findings

Daily, weekly, monthly, quarterly, and other periodic contamination and radiation surveys, including pool water analyses, were performed and documented as required by TS and MNRC procedures. HP surveys required for specific reactor operations such as exposure door openings, experimental irradiations, etc. were also performed and documented as needed or required. Results were evaluated and corrective actions taken and documented when readings/results exceeded set action levels.

Survey results verified that contamination in the facility was infrequent and that both identified contamination and radiation levels were well below NRC and facility limits. Surveys were adequate to evaluate the magnitude, concentration, quantities and potential hazard of radiation levels or radioactive materials present.

Surveys were tracked in the HP log which included a comments section to annotate non-routine items or to provide additional or clarification information on HP activities. TS, licensee required surveys, and noncompulsory surveys were individually identified in this log. All TS required HP surveys/surveillances had been performed as required. With the exception of two minor non-safety significant surveys (of approximately 3,000+ performed each year), all MNRC procedurally required surveys were completed as required.

c. Conclusions

Surveys were performed and documented as required by 10 CFR Part 20, TS, and licensee administrative controls.

6. **PERSONNEL DOSIMETRY**

a. Inspection Scope (83743)

The inspector reviewed selected aspects of:

- licensee procedures
- dosimetry records

b. Observations and Findings

The use of dosimeters and exit frisking practices were in accordance with radiation protection requirements.

The licensee used a National Voluntary Laboratory Accreditation Program-accredited vendor to process personnel thermoluminescent dosimetry. The licensee's dosimetry program for declared pregnant women satisfied 10 CFR 20.1208 requirements. Records were reviewed by the HPS and doses above set administrative limits investigated or referred to the NSC as required. Radiological exposure records showed that occupational doses and doses to the public were within 10 CFR Part 20 limitations.

c. Conclusions

The personnel dosimetry program was acceptably implemented and doses were in conformance with licensee and 10 CFR Part 20 limits.

7. **CALIBRATION OF RADIATION MONITORING EQUIPMENT**

a. Inspection Scope (83743)

The inspector reviewed selected aspects of:

- maintenance and calibration of radiation monitoring equipment
- periodic checks, quality control, and test source certification records

b. Observations and Findings

The calibration and periodic checks of the portable survey meters, radiation monitoring, and counting lab instruments were performed in-house by the licensee's staff, through UCD, or offsite by certified contractors. Calibration frequencies and procedures were consistent with TS requirements and American National Standards Institute or the manufacturers' recommendations and licensee procedures. Calibration and check sources were traceable to the National Institute of Standards and Technology. The sources' geometry matched those used in actual analyses.

Some calibration procedures were not formally documented in whole. The radiochemist/HP stated that the procedures would be evaluated to determine what if any formal documentation would be necessary.

All instruments checked were in calibration. Calibration records were in order.

c. Conclusions

Portable survey meters, radiation monitoring, and counting lab instruments were being maintained according to TS, industry/equipment manufacturer standards, and licensee procedures. Calibrations satisfied TS requirements.

8. **EFFLUENT MONITORING AND RELEASE**

a. Inspection Scope (69004)

The inspector reviewed selected aspects of:

- release records
- counting and analysis program
- maintenance and calibration records
- annual reports

b. Observations and Findings

The program for the monitoring, storage and release of radioactive liquid and gases was consistent with applicable regulatory requirements. Gaseous releases were calculated from integrated power using the CAP 88-PC Code authorized in the facility Final Safety Analysis Report. Releases were acceptably documented well within the annual dose constraint of 10 CFR 20.1101(d), Appendix B concentrations, and TS limits.

Radioactive liquid releases were infrequent and were analyzed and released when below acceptable limits.

Records confirmed that releases met 10 CFR 20.2003 and Appendix B limits. ALARA principles were acceptably implemented to minimize radioactive releases. Monitoring equipment was acceptably maintained and calibrated. Records were current and acceptably maintained.

c. Conclusions

The effluent monitoring and release program satisfied NRC requirements.

9. **ENVIRONMENTAL PROTECTION**

a. Inspection Scope (69004)

The inspector reviewed selected aspects of:

- the EMP
- environmental records
- procedures
- periodic reports

b. Observations and Findings

The EMP consists of direct quarterly radiation measurements at selected locations adjacent to the MNRC and periodic vegetation, soil, and water sample analyses.

Direct radiation measurement results in unrestricted areas were not statistically different from background readings. Results of vegetation, soil, and water sample analyses also showed no statistical difference from background.

Although the frequency and content of the EMP continues to be evaluated and modified as appropriate, since transfer to the University of California, Davis (UCD), the frequency and depth of the EMP exceed that required by TS, regulatory requirements, or those normally implemented by comparable NPR's.

c. Conclusions

The EMP satisfied the radiation protection program requirements.

10. **PROCEDURES**

a. Inspection Scope (42745)

The inspector reviewed selected aspects of:

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

b. Observations and Findings

HP procedures were available for those tasks and items required by the TS, license, and facility directives. Administrative controls of changes and temporary changes to procedures, and associated review and approval processes were as required.

Training of personnel on procedures and changes was acceptable. Personnel conducted activities in accordance with applicable procedures. Records showed that procedures for potential malfunctions (e.g., radioactive releases and contaminations, and reactor equipment problems) were implemented as required.

Coordination between operation and HP staffs on procedures was acceptable.

c. Conclusions

The procedural control and implementation program satisfied TS requirements.

11. **TRAINING**

a. Inspection Scope (83743)

The inspector reviewed selected aspects of:

- training records and rosters
- training procedures

b. Observations and Findings

Part 19 training at UCD-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 i.e., staff, visitor, investigator, fire or police department, escorted, unescorted, etc.

Records confirmed that Part 19 training and that appropriate to individual status and work requirements was given. The inspector verified by observing HP activities and interviewing staff that the training had been received and understood.

Training for off-site fire, police, and other emergency responders and agencies is continuing during the transition from Air Force control to UCD.

c. Conclusions

HP training satisfied TS and regulatory requirements.

12. **HP EVENTS/OPERATIONS**

a. Inspection Scope (83743)

The inspector reviewed selected aspects of:

- reactor logs
- HP logs
- training records
- event/incident records

b. Observations and Findings

Since the last inspection no TS reportable events occurred. Two minor contamination events were documented.

The contamination was detected during normal exit surveys and monitoring required by procedure for the specific operation. Proper use of protective clothing limited to small skin contamination in one instant and minor hair contamination. Both were decontaminated as required.

c. Conclusions

Events were handled and documented as required. Protective clothing and exit surveys were appropriate and adequately used.

13. **TRANSPORTATION**

a. Inspection Scope (86740)

The inspector reviewed selected aspects of:

- radioactive materials shipping procedures
- radioactive materials transportation and transfer records

b. Observations and Findings

Production of solid radioactive waste at the facility was minimal. All transfers were recorded on the applicable forms. Transfer documentation was kept on file as required.

Materials transferred to other licensees were documented, and were in accordance with appropriate requirements.

c. Conclusions

Radioactive material was transferred and disposed of in accordance with licensee procedures, TS, 49 CFR and 10 CFR Part 20 requirements.

14. **EMERGENCY PREPAREDNESS**

a. Scope (82701)

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 Emergency Plan (E-Plan) in use at the reactor and emergency facilities was the same as the version most recently approved by the NRC. The E-Plan was audited and reviewed as required. Implementing procedures were reviewed and revised as needed to employ the E-Plan effectively. With one minor corrected inventory exception, all facilities, supplies, instrumentation and equipment were being maintained, controlled and inventoried as required by the E-Plan. Through records review and interviews with licensee personnel, emergency responders were determined to be knowledgeable of the proper actions to take in case of an emergency. Agreements with outside response organizations were being prepared as required during the transition from Air Force control. Emergency drills had been conducted as required by the E-Plan. Although minimal at this time, off-site support organization participation was as required by the E-Plan. 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. The results of these critiques were documented and filed. Emergency preparedness and response training was being completed as required. Training for off-site and reactor staff personnel was being developed to address the program without Air Force support.

The last drill, September 28, 1999, involved the UCD Medical Center treating an injury with no radiological contamination. This required interaction with police, ambulance and fire services. The drill provided a practical, reasonable, and effective test of the participants.

c. Conclusions

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

15. **EXIT MEETING SUMMARY**

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on October 27, 2000. 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
* B. Hasslett Radiochemist
D. Reap HP Technician
* W. Richards Reactor Director
G. Stoddard HP Technician
A. Weeks Training Coordinator/SRO

(*Attended Exit Meeting)

INSPECTION PROCEDURE (IP) USED

IP 40745 Class I Non-Power Reactor Review and Audit and Design Change Functions
IP 69004 Class I Non-Power Reactor Environmental Protection and Effluents
IP 83743 Class I Non-Power Reactors Radiation Protection
IP 86740 Transportation Activities
IP 82701 Emergency Preparedness Program
IP 42745 Class, Non-Power Reactor Procedures

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

NONE

Closed

NONE

PARTIAL LIST OF ACRONYMS USED

ALARA As Low As Reasonably Achievable
E-Plan Emergency Plan
EMP Environmental Monitoring Program
HP Health Physics
MNRC McClellan Nuclear Radiation Center
NRC Nuclear Regulatory Commission
NSC Nuclear Safety Committee
RPP Radiation Protection Program
TS Technical Specifications
UCD University of California, Davis