May 28, 2003

Dr. Wade J. Richards
6335 Price Avenue, Bldg. 258
McClellan Air Force Base
Sacramento, CA 95652-2504

SUBJECT: NRC INSPECTION REPORT NO. 50-607/2003-201

Dear Dr. Richards:

This letter refers to the inspection conducted on March 31 to April 4, 2003, at the University of California, Davis Nuclear Radiation Center. The inspection included a review of activities authorized for your facility. The enclosed report presents the results of that inspection.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations of activities in progress. Based on the results of this inspection, no safety concerns or noncompliances of 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/reading-rm/adams.html.

Should you have any questions concerning this inspection, please contact Mr. Thomas Dragoun at 610-337-5373.

Sincerely,

/RA/

Patrick M. Madden, Section Chief
Research and Test Reactors Section
Operating Reactor Improvements Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

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

Enclosure: NRC Inspection Report No. 50-607/2003-201

cc w/enclosure: See next page

cc:

Dr. Barry Klein, 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:	50-607/2003-201
Licensee:	University of California, Davis
Facility:	McClellan Nuclear Radiation Center
Location:	McClellan Air Force Base Sacramento, California
Dates:	March 31 to April 4, 2003
Inspector:	Thomas F. Dragoun
Approved by:	Patrick M. Madden, Section Chief Research and Test Reactors Section Operating Reactor Improvements Program Division of Regulatory Improvement Programs Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

University of California, Davis
Report No: **50-607/2003-201**

The primary focus of this routine, announced inspection was the on-site review of selected aspects of the licensee's Class 1 research reactor programs including: organization and staffing, radiation protection, effluent control and environmental monitoring, and transportation activities.

Organization and Staffing

- The licensee successfully made a transition of the facility staff from contractor status to direct employees. The management and organizational structure required by Technical Specification 6.1.2 was maintained intact. The staffing requirements for reactor operation as specified in Technical Specification 6.1.3 were satisfied.

Radiation Protection

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

- Postings met the regulatory requirements specified in 10 CFR Parts 19 and 20.

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

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

- Annual reviews of the Radiation Protection Program were being completed by the licensee as required by 10 CFR Part 20.

- Licensee Health Physics procedures and changes thereto were being reviewed and approved by the Nuclear Safety Committee as required.

Effluent Control and Environmental Monitoring

- The licensee's environmental monitoring program was conducted in accordance with the requirements in Technical Specification 6.4.2(d) and 10 CFR Part 20. Monitoring results demonstrate that doses to the public from effluent releases are below the NRC limits.

Transportation Activities

- The shipment was completed in accordance with NRC and DOT requirements.

REPORT DETAILS

Summary of Plant Status

The licensee's two megawatt custom designed TRIGA research reactor was operated 16 hours (2 shifts) per day, 5 days per week, in support of neutron radiography, medical isotope production, neutron tomography, experimental sample irradiation, and reactor operator training.

1. Organization and Staffing

a. Inspection Scope (Inspection Procedure [IP] 39745)

A contractor (Science Applications International Corporation - SAIC) provided all personnel to staff and operate the facility except for the Director and his two assistants. The contract with SAIC was terminated by the licensee a few days before the start of this inspection. To determine if the Technical Specification (TS) requirements in Section 6.1.2 - "Responsibilities" and Section 6.1.3 - "Staffing" continued to be satisfied, the inspector interviewed personnel and observed activities in progress.

b. Observations and Findings

No appreciable change to the operations schedule was noted as a result of the contract termination. Many contractor personnel accepted job offers to become University of California employees and continued performing current job. The number of licensed reactor operators, health physics personnel, supervisors, and certified radiographers making the transition appeared to be adequate to satisfy the staffing requirements for routine reactor operations and the production schedule. A few University administrative personnel were added to the site but the inspector did not ascertain their function. Negotiations to fill a few vacancies in the technical staff were underway.

c. Conclusions

The licensee successfully made a transition of the facility staff from contractor status to direct employees. The management and organizational structure required by TS 6.1.2 was maintained intact. The staffing requirements for reactor operation as specified in TS 6.1.3 were satisfied.

2. Radiation Protection

a. Inspection Scope (Inspection Procedure [IP] 83743)

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

- Safety Analysis Report Revision 4, dated December 1999, Chapter 11, "Radiation Protection and Waste Management Program" Section 11.1.2, "Radiation Protection Program"

- Letter from A. G. Johnson, Chairperson, UCD/MNRC Nuclear Safety Committee, to W. J. Richards, Director, UCD/MNRC, dated July 15, 2002, "Results of the 2002 Annual Nuclear Safety Committee Audit of the UCD/MNRC"
- Response letter to above audit, from Director, UCD/MNRC, to Chairman, NSC, dated August 13, 2002
- Annual reports for 2000 and 2001
- Personnel dosimetry records for 2002
- Procedure "Personnel Monitoring Procedures," Revision 7, undated
- Procedure "MNRC Health Physics Instrument Calibration Procedures," revision 7, undated
- Procedure "Radiation Survey Procedures," Revision 10, undated. Data for the 12 week period between January 9 and March 28, 2003. Daily and shiftily data, and daily and weekly equipment check data for the months of January, February, and March 2003 and September, October, and November 2002
- Procedure "RAM Calibration Procedure," Document Number: MNRC-0042-DOC, Addendum No. 34, Revision No. 03. Data for July 22, 2002, October 7, 2002, and May 6, 2002
- Procedure "Iodine CAM Calibration Procedure," Document Number: MNRC-0042-DOC, Addendum No. 51, Revision No. 00. Data for June 6, 2002
- Procedure "Bay CAM Calibration Procedure," Document Number: MNRC-0042-DOC, Addendum No. 50, Revision No. 00. Data for May 31, 2002
- Procedure "Stack CAM Alarm Setpoint Procedure," Document Number: MNRC-0042-DOC, Addendum No. 08, Revision No. 04. Data for July 31, 2002, and June 4, 2002
- Procedure "Reactor CAM Calibration Procedure," Document Number: MNRC-0042-DOC, Addendum No. 49, Revision No. 00. Data for March 12, 2003, and September 3, 2002
- Radiation Work Permit (RWP) 03-001, "Insert/Remove Tools In/Out of Reactor Tank," dated January 2, 2003. Expires December 31, 2003
- RWP 03-002, "Change and Pump Down Demineralizer Resin Bottle," dated January 2, 2003. Expires December 31, 2003
- RWP 03-003, "Change Out Reactor Room Ventilation Prefilter/HEPA Filter," dated January 2, 2003. Expires December 31, 2003
- Procedure "Thyroid Counter Calibration Procedure," Document Number: MNRC-0042-DOC, Addendum No. 52, Revision No. 00
- Procedure "Bioassay Procedure," Document Number: MNRC-0042-DOC, Addendum No. 53, Revision No. 00. Weekly data for the "iodine 125 crew" for the period January 14 to March 19, 2003
- Campus respiratory protection program as described on the University web page

The inspector also toured the facility and observed the se of dosimetry and radiation monitoring equipment. Licensee personnel were interviewed and radiological signs and postings were observed as well.

b. Observations and Findings

(1) Surveys

Radiological conditions in the controlled areas were surveyed on the procedurally specified schedule using appropriate portable radiation detection instruments. Survey records were reviewed by supervisor and maintained as required by TS 6.8.

(2) Postings and Notices

Observation of warning signs and postings during tours of the controlled areas indicated that the postings were appropriate for the radiological conditions found during the surveys and met the requirements specified in 10 CFR 20.1901 and 20.1902. Current versions of NRC Form 3, "Notice to Employees" were posted as required by 10 CFR 19.11(c)(1).

(3) Dosimetry

Personnel were observed properly wearing extremity and whole body dosimetry in the controlled areas. The staff associated with the production of iodine are subjected to a thyroid bioassay each week to measure the thyroid organ dose. A respiratory protection program, as specified in 10 CFR 20.1703, was administered by the main campus and included the research reactor staff. However, no respirators were currently issued within the research reactor facility. The reported dosimetry results indicated that personnel doses were controlled to levels below the NRC limits specified in 10 CFR 20.1201.

(4) Radiation Monitoring Equipment

Portable radiation detection instruments were calibrated in accordance with the manufacturers recommendations by an off site contractor and the self reading pocket dosimeters checked for charge leakage by the same contractor (Southern California Edison) in accordance with approved procedures. Random checks of survey instruments in the field demonstrated that instruments available for use were in calibration. Calibration of the permanently installed radiation area monitors and the continuous air monitors was completed in accordance with requirements specified in TS 4.7.

(5) Radiation Protection Program

The radiation protection program as described and controlled by the procedures and policies listed above was found to be well documented as required by Technical Specification (TS) 6.4.2. and 10 CFR 20.1101(a). An annual audit reported in July 2002 and responded to in August 2002 satisfied the periodic program review required by 10 CFR 20.1101(c).

The content of the general employee training program satisfied the requirements in 10 CFR 19.12. Specific radiological hazards and the protective measures for a particular job were described in a document called a radiation work permit (RWP). The information contained in the RWP met the requirements specified in 10 CFR 19.12(a)(2).

(6) ALARA Policy

An ALARA program that satisfied the requirements in 10 CFR 20.1101(d) was available but did not appear to be aggressive. The inspector informed management of this observation.

c. Conclusions

The inspector determined that, because: 1) surveys were being completed and documented acceptably to permit evaluation of the radiation hazards present; 2) postings met regulatory requirements; 3) personnel dosimetry was being worn as required and doses were within the licensee's procedural action levels, and NRC's regulatory limits; 4) radiation monitoring equipment was being maintained and calibrated as required; 5) annual reviews of the Radiation Protection Program were being completed by the licensee as required by 10 CFR Part 20; and 6) licensee Health Physics procedures and changes thereto were being reviewed and approved by the Nuclear Safety Committee as required. The Radiation Protection Program being implemented by the licensee satisfied regulatory and TS requirements.

3. Reactor Effluent and Environmental Monitoring

a. Inspection Scope (IP 69004)

The inspector reviewed the following to determine if the licensee's environmental monitoring program has been effectively maintained to meet regulatory requirements:

- Procedure "Environmental Radiation Monitoring Procedures," Revision 11, undated
- Annual reports for 2000 and 2001
- Environmental dose rate measurements on December 3, November 4, October 2, September 3, August 1, and July 1, 2002
- Quarterly environmental TLD results reported on January 1, April 1, July 1, and October 1, 2002
- Environmental air sample results for October 2, July 1, and April 1, 2002
- Environmental surface water samples taken on November 21, July 29, and April 29, 2002
- Environmental soil sample taken on August 22, 2002
- Six vegetation samples taken on September 14, 2001

b. Observations and Findings

The inspector accompanied the Health Physics Technician during the change-out of TLDs and dose rate measurements at environmental monitoring Stations Nos. 38, 39, 40, 31, 27, 28, 42, 12, and 13. In addition, a high volume particulate air sample was taken at station No. 13. Most monitoring stations were located inside locked water pumping stations surrounded by a substantial fence. Station No. 12, which was in an area where the fence was recently removed, had been vandalized and the TLDs were destroyed. There are 47 total monitoring stations both on-site and off-site.

Environmental samples were analyzed to identify the type and amount of radioactive material by a contractor (STL Richland). The environmental monitoring results and measurement of airborne releases to the exhaust stack demonstrated that doses to the public were below the NRC limits.

c. Conclusions

The licensee's environmental monitoring program was conducted in accordance with the requirements in the TS 6.4.2(d) and 10 CFR Part 20. Monitoring results demonstrate that doses to the public from effluent releases are below the NRC limits.

4. Transportation Activities

a. Inspection Scope (IP 86740)

The inspector reviewed the following to verify that shipment of flasks containing Argon 41 was in compliance with the requirements in 10 CFR Part 71 and DOT regulations 49 CFR 171 - 178:

- Type A package testing and certification for model TTSEAR by Tru-Tec Services, Inc., LaPorte, Texas dated December 12, 2001
- quality controls
- closure and sealing of the packaging
- packaging marking and labeling
- shipping manifest
- radiation surveys of the transport truck
- placarding the truck
- bracing and cribbing of the load
- instructions to the driver

b. Observation and Findings

This was a routine shipment that has been repeated periodically. The staff was aware of the expected radiological conditions and was experienced with the preparations required by DOT regulations specified in 49 CFR 173.474 and 173.475 and NRC requirements in 10 CFR 71.87. The packaging was an overpack for the gas cylinders, custom designed, and certified as type A for this

unique application in accordance with 49 CFR 173.465. Radiological controls during the transfer and loading of the radioactive material were satisfactory. The package was labeled RADIOACTIVE YELLOW-III as required by 49 CFR 172.403. The shipment was by exclusive use vehicle. The package and vehicle contamination and radiation levels were measured by the licensee and found to be below the levels specified in 49 CFR 173.441 - 443 and 10 CFR 71.87. Vehicle placarding complied with the requirements in 49 CFR 172 Subpart F. The shipping manifest and instructions to the driver were satisfactory. The driver produced documentation that indicated he completed the HAZMAT training specified by 49 CFR 172.704.

c. Conclusion

The shipment was completed in accordance with NRC and DOT requirements

5. Exit Interview

The inspection scope and results were summarized on April 3, 2003, with members of licensee management. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

J. Ching	Health Physics Supervisor
D. Reap	Health Physics Technician
W. Richards	Reactor Director
G. Stoddard	Health Physics Technician

INSPECTION PROCEDURE USED

IP 39745	Class I Non-Power Reactor Organization and Operations and Maintenance Activities
IP 69004	Class I Non-Power Reactor Effluent and Environmental Monitoring
IP 83743	Class I Non-Power Reactor Radiation Protection
IP 86740	Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

none

Closed

none

Discussed

none

PARTIAL LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
DOT	US Department of Transportation
IP	inspection procedure
NRC	Nuclear Regulatory Commission
RWP	radiation work permit
SAIC	Science Applications International Corporation
TLD	thermoluminescent dosimetry
TS	Technical Specifications
UCD	University of California, Davis