

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

NRC Inspection Report: 50-602/90-04

Construction Permit: CPPR-123

Docket: 50-602

Licensee: Nuclear Engineering  
Teaching Laboratory  
10100 Burnett Road  
The University of Texas at Austin (UT)  
Austin, Texas 78758

Facility Name: Nuclear Engineering Teaching Laboratory (NETL)

Inspection At: Balcones Research Center, Austin, Travis County, Texas

Inspection Conducted: July 18-19, 1990

Inspector:

*Blaine Murray*  
Blaine Murray, Chief, Facilities Radiological  
Protection Section

*7/27/90*  
Date

Approved:

*A. Bill Beach*  
A. Bill Beach, Director, Division of Radiation  
Safety and Safeguards

*8/2/90*  
Date

Inspection Summary

Inspection Conducted July 18-19, 1990 (Report 50-602/90-04)

Areas Inspected: Routine, announced, preoperational inspection of the licensee's radiation protection, physical security, and emergency preparedness programs.

Results: Overall, the licensee's programs in the areas of radiation protection, physical security, and emergency planning were found to be in a proper state of readiness to support reactor operations. Repair and calibration of the Argon-41 monitoring system and in-place testing of the high efficiency particulate air (HEPA) filters will be identified as conditions of licensing items in the facility status letter submitted to the Office of Nuclear Reactor Regulation (NRR). (See paragraph 2)

All previous identified matters have been resolved and closed except for some portions of Open Items 8904-05, 8904-06, 8904-09, and 8904-10. The licensee had performed revisions and updates of facility implementing procedures in order to improve the quality of these documents. The documents reviewed during this inspection are listed in the Attachment to this report.

DETAILS

1. Persons Contacted

University of Texas

- \*H. L. Marcus, Chairman, Nuclear Reactor Committee
- \*T. L. Bauer, Assistant Director, NETL
- \*G. Masada, Chairman for Research, Mechanical Engineering Department
- \*J. G. Sanchez, Radiation Safety Inspector
- \*B. W. Wehring, Director, NETL
- \*R. E. Woodard, NETL Health Physicist

Others

- D. S. Gruell, Training Coordinator, Austin Emergency Medical Services
- \*M. E. Murphy, Reactor Inspector, NRC, Region IV
- \*W. C. Seidle, Chief, Test Programs Section, NRC, Region IV
- R. C. Van Niel, Section Chief, Emergency Preparedness Branch, NRR
- D. M. Carlson, Security/Safeguards Specialist, NRR

\*Denotes attendance at the exit interview on July 19, 1990.

2. Licensee Action on Previous Inspection Findings

(Closed) Open Item (602/8904-02): Qualifications and Training - This item was discussed in NRC Inspection Reports 50-602/89-04 and 50-602/89-07 and involved radiological protection training provided to persons allowed access into the reactor facility controlled area. The licensee had established a training program that included the specific items identified in 10 CFR 19.12 along with the recommendations of NRC Regulatory Guides 8.13 and 8.29.

The inspector noted that the training program did not include a written examination to evaluate the effectiveness of the training. The inspector discussed the need to have some means to ensure that the personnel receiving radiological training have a clear understanding of the material covered in the training session. The licensee stated that they would evaluate the need to include written examinations as part of their training program.

(Closed) Open Item (602/8904-04): External and Internal Exposure Control - This item was discussed in NRC Inspection Reports 50-602/89-04 and 50-602/89-07 and involved the issuance of personnel dosimetry for individuals allowed access into the reactor controlled area and surveys of waste material and contaminated areas. The licensee had established a contract with a commercial vendor to provide dosimetry devices that satisfied personnel monitoring requirements for beta-gamma and neutron

radiation. The licensee had revised Procedure HP-6, "Radioactive Material Control," to address specific survey requirements for waste material before unrestricted release. Procedure HP-6 presently states that a Geiger Muller (GM) detector will be used for release surveys. In addition, the licensee also plans to purchase a 2-inch x 2-inch NaI detector to be used with existing portable survey count-rate meters to enhance the waste material survey program.

(Open) Open Item (602/8904-05): Contamination Control and Instrument Calibration - This item was discussed in NRC Inspection Reports 50-602/89-04 and 50-602/89-07 and involved such matters as personnel survey procedures, laboratory counting instrumentation, portable instrument response tests and calibrations, and fixed instrument response tests and calibrations. Except for the Ar-41 monitoring system discussed below, the licensee had completed the necessary work to close this item.

The licensee had purchased several hand-held friskers to be used as part of the personnel survey program. A frisker will be located at personnel exits from the reactor controlled area. Each person will be required to perform a contamination survey using the hand-held probe. In addition, an automated hand and foot monitor will be located in the facility reception area. All persons will be required to perform a frisk survey upon exiting the reactor controlled area and also be counted by the hand and foot counter before leaving the facility. The licensee stated that friskers and the hand and foot counter will be placed in operation at least 2 weeks before fuel is received at the facility.

The licensee was experiencing some component failure problems with the Ar-41 monitoring system. This system is described in the Safety Analysis Report (SAR) and also included in the draft Technical Specifications. The system is designed to measure the concentrations of Ar-41 released from the facility and to alert reactor operators if concentrations exceed established limits. The licensee stated that they are in contact with the system vendor and hope to resolve the remaining problems in about 4 weeks. The licensee stated that the initial calibration will be performed with solid sources referenced to a gas calibration performed at the vendor's facility and that a primary calibration will be performed with Ar-41 gas about 6 months after the reactor achieves full power operation. The inspector stated that, unless alternate arrangements are made with NRR, the system must be installed, calibrated, and operational before initial criticality. Accordingly, the Ar-41 monitoring system will be identified as a condition for licensing item in the facility status letter to be transmitted from Region IV to NRR.

This item remains open pending further review of the Ar-41 monitor system.

(Open) Open Item (602/8904-06): Radiation Protection Facilities - This item was discussed in NRC Inspection Reports 50-602/89-04 and 50-602/89-07 and involved in-place testing of the HEPA filter system, reactor coolant

isolation valves, and an inventory/control program for byproduct material removed from the reactor. The licensee had completed work necessary to close the activities concerning the isolation valves and procedures for inventory and control of byproduct material removed from the reactor.

The HEPA filter system did not meet acceptance criteria for by-pass leakage during the initial in-place testing of the system. The HEPA filter system is described in the SAR and designed to reduce radioactive gaseous effluents released from the reactor facility. The licensee identified some defects in the filter mounting brackets that prevented a proper seal between the filter unit and mounting frame. The filter housing was shipped to the manufacturer for repairs. Repairs were completed and the housing unit returned to the licensee. The licensee stated installation and retesting of the unit should be completed within about 4 weeks. The inspector stated that, unless alternate arrangements are made with NRR, the HEPA filter system must be installed and meet in-place testing criteria, before initial criticality. The inspector stated that the HEPA filter system would be identified as a condition for licensing item in the facility status letter.

This item remains open pending review of the in-place test results.

(Closed) Open Item (602/8904-08): Emergency Preparedness - This item was discussed in NRC Inspection Reports 50-602/89-04 and 50-602/89-07 and involved stocking emergency response kits, training of emergency support personnel, obtaining letters of agreements with support agencies, and conducting a full scale emergency response exercise. The licensee had completed the necessary work to close this item. A full-scale exercise was conducted on May 21, 1990, and included participation with the UT Security Office, UT Fire Department, Austin Fire Department, Austin Emergency Medical Services, and UT Radiation Safety Office. A training and scenario development session was held with the participants before the exercise on May 17, 1990. Designated observers were used to evaluate the exercise. Detailed critiques were provided by the observers and participants. The critiques included identified problem areas along with suggestions for improvements.

(Open) Open Item (602/8904-09): Physical Security and Safeguards - This item was discussed in Attachment 1 to NRC Inspection Reports 50-602/89-04 and 50-602/89-07 and involved improvements that needed to be made regarding locking mechanisms, location of magnetic switches, freight motor door, unauthorized use of key cards, the physical security plan, and implementing procedures. The licensee had completed work to correct the problems associated with the locking mechanisms, magnetic switches, freight motor door, and key cards. The inspector discussed the status of the revised physical security plan, dated June 6, 1990, with NRR. The NRR representative responsible for reviewing the plan stated that some minor editorial changes are necessary, but that the plan should be approved by mid-September 1990.

This item remains open pending NRR approval of the security plan.

(Open) Open Item (602/8904-10): Transfer of Irradiated Reactor Fuel and Cobalt-60 Irradiator - This item was discussed in NRC Inspection Reports 50-602/89-04 and 50-602/89-07 and concerned the development of procedures and the training of personnel involved in the handling and transfer of reactor fuel and the irradiator from Taylor Hall to the Balcones Research Center. Procedures have been developed for the transfer of the reactor fuel. However, similar procedures have not been established for the transfer of the 450-curie cobalt irradiator. The licensee stated that detailed training will be conducted for all personnel involved with the transfer of both the fuel and the irradiator. The training will include mock-up along with dry-run training. The licensee stated that a transfer cask has not been identified for transferring the cobalt sources.

This item remains open pending further review of personnel training and irradiator transfer procedures.

(Closed) Open Item (602/8907-01): This item was discussed in NRC Inspection Report 50-602/89-07 and involved the lack of remote monitoring capabilities for the reactor facility during nonworking hours. The installation of a remote monitoring system is not a regulatory requirement; however, the licensee elected to install a 24-hour system to enhance their program. The licensee was in the process of installing the remote monitoring system. This system will monitor radiation and pool water levels. The remote alarm panel will be located at the UT Security Office.

### 3. Inspector Observations

The following are observations the inspector discussed with the licensee during the exit meeting on July 19, 1990. Inspector observations are not violations, deviations, unresolved items, or open items. These observations were identified for licensee consideration for program improvement, but have no specific regulatory requirements.

#### Training Examinations

The licensee had not established a means to evaluate the effectiveness of radiological training. (see paragraph 2, Open Item 8904-02)

#### Experiments

The NETL health physicist was not included in the review and approval chain for proposed reactor experiments. (see paragraph 7)

#### Area Radiation Monitor Alarm Set Points

A procedure had not been established that addresses the specific alarm set point for each area radiation monitor. (see paragraph 8)

### Program Reviews

The licensee had not determined if they will conduct audits of various program areas prior to reactor startup. (see paragraph 9)

#### 4. Radiation Protection Program

The inspector reviewed management involvement with the radiation protection program, facilities, instrumentation, equipment, supplies, and procedures necessary for the radiation protection program to support routine reactor operations. The radiation program appears to receive strong management support. The NETL health physicist has a separate reporting chain to the NETL director and the nuclear reactor committee. The health physicist appears to have the necessary authority to implement an effective radiation protection program. The health physicist is independent of the operations group and has direct recourse to University management in order to resolve questions related to the conduct of the radiation protection program. The University Radiation Safety Office also provides backup support to the NETL radiation protection program.

Except for the Ar-41 monitor and the HEPA filter systems, the radiation protection program was found to be in a proper state of readiness to support facility operations. A proper inventory of supplies, equipment, and instrumentation was available. Calibrations had been completed on the area radiation monitors and portable survey instruments. An adequate inventory of such items as step-off pads, rope, signs, and anti-contamination clothes was present in the facility. The licensee had made significant improvements in the radiation protection program since the previous inspection of this area and was continuing to make improvements to program procedures and facility work areas.

No violations or deviations were identified.

#### 5. Physical Security Program

The inspector reviewed the physical security program to determine agreement with the June 6, 1990, security plan. The security program has been in effect since the facility was locked down in late 1989. Some hardware problems were identified in NRC Inspection Report 50-602/89-07 which the licensee had subsequently corrected. The licensee stated that a few intermittent operational problems occur with the key card system, but the overall reliability of the system has been good. The status of the security program is also discussed in Open Item 8904-09.

No violations or deviations were identified.

6. Emergency Preparedness

The status of the emergency preparedness program is discussed in Open Item 8904-08. The emergency program was found to be in a proper state of readiness to support reactor operations. The inspector reviewed the status of the emergency plan with NRR and determined that NRR had no outstanding items in this area.

No violations or deviations were identified.

7. Experiments

The inspector noted that the NETL health physicist was not included in the experiment review and approval process. The licensee stated that Procedure ADM 5.0, "Experiment Authorization," was initially developed for the Mark I TRIGA located at Taylor Hall. A facility health physicist was not part of the Mark I facility staff and as such, the procedure did not include a health physics review responsibility. The licensee stated that Procedure ADM 5.0 will be revised to show that the NETL health physicist will: (1) review and concur on all proposed experiments before they are placed in the reactor or use of the beam-ports, and (2) designate those experiments that also require a radiation work permit.

8. Technical Specifications

The inspector reviewed the draft Technical Specification regarding those items related to radiation protection, emergency preparedness, and physical security. Technical Specification 3.3.3.c states that the area radiation monitors will be set to alarm at less than 100 mr/hr. The inspector expressed the opinion that the way the draft Technical Specification is written all monitors could be set at 100 mr/hr and still satisfy the requirement, but that serious problems concerning reactor operations and experiments could be present with some monitors showing only 5-10 mr/hr above normal background radiation levels. For example, at full power operation the monitor located near the top of the pool might be in a 60-70 mr/hr field where as the radiation levels at other detector locations could be 1-2 mr/hr. The licensee agreed with the inspector's observation and stated that it was not their intention to set all of the alarm set points monitors at 100 mr/hr. The licensee stated that the ambient radiation levels associated with each of the six monitors will be evaluated and a corresponding conservative alarm set point established for each location.

9. Audits

The inspector discussed the licensee's plans to have the nuclear reactor committee perform a detailed audit of the radiation protection, emergency preparedness, and physical security programs before initial reactor



startup. The licensee stated that no plans have been established regarding audits activities. The licensee stated that they recognized the benefits of performing such reviews and that this matter would be discussed during the next committee meeting.

10. Exit Interview

The inspector met with the licensee representatives denoted in paragraph 1 at the conclusion of the inspection on July 19, 1990. The inspector summarized the scope and findings as presented in this report. The licensee did not identify as proprietary any of the material provided to, or reviewed by, the inspector.

## ATTACHMENT

### Documents Reviewed

HP-1, "Radiation Monitoring - Personnel," Revision 0, November 1989  
HP-2, "Radiation Monitoring - Facility," Revision 1, April 1990  
HP-3, "NETL ALARA Program," Revision 1, April 1990  
HP-4, "Radiation Protection Training," Revision 1, April 1990  
HP-5, "Portable Radiation Monitoring Equipment," Revision 2, July 1990  
HP-6, "Radioactive Material Control," Revision 1, April 1990  
HP-7, "Radiation Work Permit (RWP)," Revision 0, April 1990  
HP-8, "Laboratory Counting" (no date)  
MAIN-4, "Area Radiation Monitoring System," Revision 0, April 1990  
"NETL Emergency Response Plan," July 1984  
PLAN-E, "Emergency Response," Revision 1, June 1990  
PLAN-O, "Call and Notification," Revision 1, June 1990  
RWP-90-001, "Repair Fuel Handling Tool," April 1990  
RWP-90-002, "Transfer of Radioactive Material," July 1990  
"NETL Physical Security Plan," June 1990  
"NETL Physical Security Plan Procedures," Revision 1, June 1990  
"Fuel Transfer Procedures" (no date)  
"Radiation Survey of Reactor Shield System" (no date)  
"Initial Startup and Testing of the UT TRIGA Reactor" (no date)  
ADM-5, "Experiment Authorization," July 1986  
draft Technical Specifications, February 1990 and July 1990  
"NETL Radiological Safety Course" (no date)