

December 6, 2001

Dr. David K. Wehe, Director
Phoenix Memorial Laboratory
Ford Nuclear Reactor
University of Michigan
2301 Bonisteel Boulevard
Ann Arbor, MI 48109-2100

SUBJECT: NRC ROUTINE, ANNOUNCED INSPECTION REPORT NO. 50-02/2001-202

Dear Dr. Wehe:

This letter refers to the inspection conducted on October 22-26, 2001 at the Ford Nuclear Reactor. 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 concern or noncompliance to 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. Thomas Dragoun at 610-337-5373.

Sincerely,

/RA/

Patrick M. Madden, Section Chief
Non-Power Reactors and Financial Section
Operational Experience and Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-02
License No. R-28

Enclosure: NRC Inspection Report No. 50-02/2001-202

cc w/enclosure: Please see next page

University of Michigan

Docket No. 50-02

cc:

Special Assistant to the Governor
Office of the Governor
Room 1 - State Capitol
Lansing, MI 48909

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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

Docket No: 50-02

License No: R-28

Report No: 50-02/2001-202

Licensee: University of Michigan

Facility: Ford Nuclear Reactor

Location: Ann Arbor, Michigan

Dates: October 22-26, 2001

Inspector: Thomas F. Dragoun

Approved by: Patrick M. Madden, Section Chief
Non-Power Reactors and Financial Section
Operational Experience 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 operations program, review and audit program, operator requalification program, and surveillance program since the last NRC inspection of this program.

The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

OPERATIONS

The operations program satisfied Technical Specification requirements.

REVIEW AND AUDIT

The review and audit program satisfied Technical Specification requirements.

OPERATOR REQUALIFICATION

Operator requalification was conducted as required by the Requalification Program.

SURVEILLANCE

The surveillance program satisfied Technical Specification requirements.

Report Details

Summary of Plant Status

During the inspection the reactor was operated continuously at full power until Friday when the routine 10 day around-the-clock operations schedule ends. Steps were taken to minimize the dose to maintenance workers repairing the reactor building roof. Refurbishment and improvement in housekeeping in office and laboratory spaces was continuing. Sections of the beam port floor area were cleared in anticipation of the installation of new apparatus. Friskers on the reactor operating floor were relocated as part of the effort to improve radioactive contamination control. Alarm setpoints on the permanent area radiation monitoring system were significantly lowered.

1. OPERATIONS

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

The inspector reviewed selected aspects of:

- beam port drain event
- compliance with safety limits
- safety system settings
- compliance with limiting conditions for operations
- fission density calculation program
- operational logs and records
- staffing for operations

b. Observations and Findings

Beam tubes that are not in use have a long concrete plug inserted and the remaining volume flooded with water for radiation shielding. On October 5, 2001, a radiation level of approximately 1.5 rem/hr TEDE was found at beam port "H" after the shield water inadvertently drained. The licensee estimated that the condition may have existed for up to two hours but concluded that no personnel doses occurred. The cause of the drainage was not known. Immediate corrective actions and proposed long term corrective actions were appropriate.

Logs and records indicated that the facility was operated within the safety limits specified in TS 2.1 and the reactor license conditions. The inspector noted that the four reactor power/flux level detectors were physically located above the top of the core. At this location the shadowing effect of the shim rods on the indicated power level was significant. Therefore, the only reliable measurement of reactor power level was by calorimetry. To compensate for this condition, the licensee used administrative controls and procedural requirements to ensure that the safety limit on reactor power was not exceeded due to erroneous indication. These actions were satisfactory.

Records showed that limiting safety system settings (LSSS) were as specified in TS 2.2. The LSSS for reactor power in forced convection mode was given as

2.60 Mw. However, the limiting condition for operations (LCO) given in TS table 3.1 requires the A and B level safety channels be set to scram at 2.45 Mw. Annual calibration and quarterly check records confirmed this setting. TS 3.2(1) also required verification of this setting prior to each reactor startup. The inspector noted that the test current used during performance of the startup checklist to test the scram corresponded to 2.60 Mw. Since this was a prompt jump current and not a ramp, verifying by console power indications that the scram occurs at 2.45 Mw was difficult. For the interim, the Nuclear Reactor Laboratory Manager (NLRM) changed the calibration and reactor startup procedures to lower the scram test signal to correspond to 2.45 Mw. To ensure a reliable scram with this signal, the safety channel scram settings were reduced to a nominal 2.40Mw. These changes were approved by the Safety Review Committee (SRC) at its regularly scheduled meeting on October 25, 2001. The NLRM stated that, in the future, the test signal may be changed to a ramp function to avoid the operational restrictions resulting from these changes. Action on this matter will be reviewed in a future inspection (Inspector Follow up Item 50-02/2001-202-01). Logged data demonstrated that the remaining LCO conditions were satisfied during reactor operations.

TS 3.8 specifies the LCO limit on the fuel fission density. The source code of the computer program used to calculate the fission density was found to employ generally accepted assumptions and techniques. Data printouts demonstrated that the TS criterion was satisfied.

Logs and records reviewed showed that operational conditions and parameters were consistent with license and Technical Specification requirements. The current staffing level of 10 Senior Reactor Operators, 2 Reactor Operators, and 3 trainees was adequate to support current and future operational activities.

c. Conclusions

The operations program satisfied Technical Specification requirements.

2. REVIEW AND AUDIT

a. Inspection Scope (IP 40745)

The inspector reviewed selected aspects of:

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

b. Observations and Findings

Membership and composition of the SRC was as specified in TS 6.2(2). Minutes of meeting demonstrated that the committee met at least semiannually as

required by TS 6.2(3) and provided the reviews and oversight specified in TS 6.2(7). The inspector observed the routine SRC meeting held on October 25, 2001, with 11 members present. Prior to the meeting, each member was given an agenda and copies of the documents scheduled to be discussed. Under direction of the chairman, the meeting was business-like and effective.

The annual audit by a consultant required by TS 6.2(8) was completed in July 2001. The auditor was a board certified health physicist and current director at a TRIGA reactor. The audit was an in-depth review the health physics program and several areas for improvement were noted. The audit findings and the proposed and completed corrective actions were discussed in detail during the SRC meeting. The licensee was responsive to the audit.

c. Conclusions

The review and audit program satisfied Technical Specification requirements.

3. OPERATOR REQUALIFICATION

a. Inspection Scope (IP 69003)

The inspector reviewed selected aspects of:

- the Requalification Program
- operator licenses
- operator training records
- operator physical examination records
- operator examination records
- operator active duty status

b. Observations and Findings

The Requalification Program in effect was revision 3 dated September 1993. The program was reviewed biennially from the issuance date through 2001 by the NLRM or the Assistant Manager for Reactor Operations in accordance with program requirements. Operator license issue dates and progress in the requalification program demonstrated that twelve operators maintained active status. Biennial physical examinations of the operators were conducted and reported on Form NRC 396. The forms were signed by medical practitioners licensed by the State of Michigan. Records showed that biennial written and operating examinations of the operators were conducted as required. Content of the examinations was technically challenging and covered the subject matter specified in the NRC approved program. Logs and personnel records showed that operators performed licensed activities and reactor manipulations at the periodicity and for the duration required by the program to maintain active duty status. The inspector noted that there was no training provided during the two year cycle and none was required. However, the RLM stated that he planned to

conduct training on an as-needed basis in the future. The first of these sessions was planned November 2001.

c. Conclusions

Operator requalification was conducted as required by the Requalification Program.

4. SURVEILLANCE

a. Inspection Scope (IP 61745)

The inspector reviewed selected aspects of:

- surveillance and calibration procedures,
- surveillance, calibration and test data sheets and records

b. Observations and Findings

Surveillances and calibrations required by TS sections 4.1, 4.2, 4.3, and 4.7 were completed at the required intervals during the period January 2000 to date. The associated procedures: CP-201, CP-202, CP-301, CP-203, CP-205, CP-208, and CP-301 were available, including applicable checklists, and were approved by the SRC as required by TS 6.4(6). All the recorded results were within the TS and procedurally prescribed parameters. The records and logs reviewed were complete and were being maintained as required by TS 6.5.1(c). The quarterly calculation of fission density was performed using procedure MP-501, which specified the use of a computer program. The uncompiled, heavily "commented" computer program given in Appendix B of MP-501 employed generally accepted calculation techniques. The program implemented the basic nuclear fission reactions given in MP-501 Appendix A and incorporated measured core flux profile data. The programmer remained on staff and had periodically ported the program to a current language.

c. Conclusions

The surveillance program satisfied Technical Specification requirements.

5. EXIT INTERVIEW

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on October 26, 2001. The licensee acknowledged the findings presented.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

C. Becker, Ford Nuclear Reactor Manager
M. Driscoll, Director, Radiation Safety
B. DuChamp, Assistant Manager, Reactor Operations
H. Griffin, Member, Safety Review Committee
J. King, Member, Safety Review Committee
J. Lee, Chair, Safety Review Committee
W. Lipton, Member, Safety Review Committee
W. Martin, Member, Safety Review Committee
R. Nichols, Chair, Radiation Policy Committee
J. Nowack, Office of the Vice President for Research
R. Robertson, Member, Safety Review Committee
P. Simpson, Assistant Manager, Research
D. Wehe, Director, Michigan Memorial Phoenix Project
D. Wood, Member, Safety Review Committee

INSPECTION PROCEDURES USED

IP 39745	CLASS I NON-POWER REACTORS ORGANIZATION AND OPERATIONS AND MAINTENANCE ACTIVITIES
IP 40745	CLASS I NON-POWER REACTOR REVIEW AND AUDIT AND DESIGN CHANGE FUNCTIONS
IP 61745	CLASS I NON-POWER REACTOR SURVEILLANCE
IP 69003	CLASS I NON-POWER REACTOR OPERATOR LICENSES, REQUALIFICATION, AND MEDICAL ACTIVITIES

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-02/2001-202-01 IFI Verify reactor safety system scram at 2.45 Mw

Closed

none

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
IFI	Inspector Follow up Item
IP	Inspection procedure
LCO	Limiting Conditions for Operations
LSSS	Limiting Safety System Setting
NLRM	Nuclear Reactor Laboratory Manager
NRC	Nuclear Regulatory Commission
SRC	Safety Review Committee
TEDE	Total Effective Dose Equivalent
TS	Technical Specifications