

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-002/93001(DRSS)

Docket No. 50-002

License No. R-28

Licensee: University of Michigan

Facility Name: Ford Nuclear Reactor

Inspection At: Phoenix Memorial Laboratory, Ann Arbor, Michigan

Inspection Conducted: January 19 - 22, 1993

Inspectors: *J.W. McCormick-Barger for*  
C. Cox

*2/8/93*  
Date

*J.W. McCormick-Barger for*  
T. Ploski

*2/8/93*  
Date

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Non-Power Reactor Section

*2/8/93*  
Date

Inspection Summary

Inspection on January 19-22, 1993 (Report No. 50-002/93001(DRSS))

Areas Inspected: Routine, announced inspection to review actions on: organization, logs, and records (39745); review and audit functions (40745); requalification training (41745); procedures (42745); surveillance (61745); experiments (69745); transportation activities (86740); fuel handling activities (60745); emergency planning (82745); radiation controls (83743); environmental protection (80745); licensee action on previous inspection findings (92701); licensee event reports (92700); and periodic and special reports (90713).

Results: Of the 14 areas inspected, no cited-violations were identified. One non-cited violation was identified due to a reactor startup with the power level deviation interlock being inadvertently defeated due to a wiring error associated with an acceptable modification that disabled another interlock (Section 4.b). One Inspection Follow-up Item (IFI) was identified concerning numerous record keeping problems (Section 5). The overall program remained good. Detailed independent external and internal audits and detailed administrative, operating, and health physics procedures were a strong aspect of their program.

## DETAILS

### 1. Persons Contacted

#### University of Michigan

- \*R. F. Fleming, Director, Michigan Memorial-Phoenix Project
- \*G. M. Cook, Assistant Manager for Reactor Operations
- \*P. Simpson, Assistant Manager, Research Support Activities
- \*M. Driscoll, Radiological Safety Officer
- L. Slay, Senior Reactor Operator
- \*A. Jackson, Health Physicist

\* Denotes those attending the exit meeting on January 22, 1993.

### 2. General

This inspection, which began on January 18, 1993, was conducted to examine the research reactor program at the University of Michigan. The facility was toured shortly after arrival. The general housekeeping of the facility was adequate.

The reactor operated on a biweekly cycle, shutting down on Friday for refueling and/or maintenance outages and restarting on Wednesday for a ten day run. The facility was used primarily for irradiation services and research activities.

There were approximately 15 unscheduled shutdowns during 1992. The unscheduled shutdowns were primarily momentary power losses and shim and control rod magnet problems. That number was the same for 1991. The licensee was working on a plant modification for the magnet problems. The actual number of unscheduled shutdowns in 1992 was not certain because the recorded number only included up to cycle 348 and the inspectors noted two missed unscheduled shutdowns in the cycle reports when the control room logs were reviewed.

During the course of the inspection, the inspectors observed routine operations including a control room shift turnover, removal of an experiment from the core, and a pool water sample being drawn. The operators and health physics technician appeared proficient and knowledgeable, demonstrated good procedural compliance, and made appropriate log entries for the observed evolutions.

No violations or deviations were identified.

### 3. Action on Previous Inspection Items (92701)

- a. (Closed) Open Item (50-002/91004-01): "Contamination control weakness." The licensee revised HP-101 "Facility Contamination Survey" to require mapping swipe locations over a one week period. The maps reviewed indicated that the new procedure was being

implemented and that found contamination areas were being decontaminated in accordance with the facility policy.

4. License Event Reports (92700)

- a. (Closed) Reportable Occurrence No. 15: Removal of a fuel element from a critical reactor core.

This reportable occurrence resulted in an Augmented Inspection Team (AIT) being sent to the facility in June 1992. The AIT report (50-002/92001) resulted in violations 92001-01 and 92001-02.

This item is closed as a result of being tracked as violations.

- b. (Closed) Reportable Occurrence No. 16: Reactor startup with power level deviation interlock out of commission.

On November 24, 1992, Modification 112 removed an unnecessary "Shim Range Defeated" scram interlock. Following the modification, a reactor pre-startup checklist was conducted to test the modification and to confirm the operation of the reactor control system. A wiring error had been made during the modification that disabled another interlock. That interlock would drop the reactor out of automatic control if the Linear Level neutron detection system indicated power was five per cent below the automatic control set point. Completion of the pre-startup checklist failed to detect the wiring error resulting in operation of the reactor with the interlock for dropping the reactor out of automatic control inadvertently defeated.

The wiring error was discovered on November 25, 1992, during another pre-startup checklist. Apparently the initial checklist failed to detect the error because a trainee, completing the step of the checklist testing the interlock, adjusted the setpoint too slowly. That resulted in the control rod dropping out of automatic control because it had traveled to its lower limit. Both the trainee and the senior reactor operator supervising the trainee mistakenly thought that the interlock for power being below five per cent of the automatic control set point was the interlock that had dropped the control rod out of automatic control. The operator completing the next pre-startup checklist found the interlock inadvertently defeated and the wiring error was found and corrected.

The consequence of operating the reactor without the power mismatch interlock was limited by the control rod worth of 0.00475-delta K/K. That rod worth being fully inserted to a critical reactor would result in a stable period of 6 seconds and would result in an automatic rundown of the shim-safety rods. The period scram at 5 seconds would not have been challenged.

Procedure changes were made to the pre-startup checklist to ensure the appropriate interlock is tested. The event report was timely, corrective actions were thorough, and met the requirements of Technical Specification (TS) 6.6.2.a.

The reactor startup with the power level deviation interlock being inadvertently disabled appears to be in violation of NRC requirements. However, the licensee's identification and corrective actions satisfied the criteria in 10 CFR Part 2, Appendix C. This is a non-cited violation.

No cited-violations or deviations were identified; however, one non-cited violation was identified.

5. Organization, Logs, and Records (39745)

There had been only minor changes in the facility's staff, primarily at the operator and health physics technician level. The organization was verified to be consistent with the Technical Specifications and Safety Analysis Report (SAR). The minimum staffing requirements were verified to be met during reactor operations and fuel handling or refueling operations by actual observation and log reviews. Selected reactor operator logs for 1992 through January 1993 were reviewed with a few minor concerns identified. While the operator logs were well maintained, the cycle reports using data from the operator logs contained minor errors in reporting the number of unscheduled shutdowns. Cycle 342 reported one unscheduled shutdown due to a tornado warning but the logs showed two such shutdowns during that cycle. Also, the number of unscheduled shutdowns due to rod drops were under-reported. These reporting errors and other record keeping errors in operating and health physics records described in the sections below indicated a laxness in the general record keeping at the facility which will require follow-up in future inspections. The problems noted in record keeping is considered an Inspection Follow-up Item (50-002/93001-01).

No violations or deviations were identified.

6. Reviews and Audits (40750)

The Safety Review Committee (SRC) met more frequently than on the semi-annual basis required by Technical Specifications. The SRC reviewed four modification packages (110, 111, 112 and 113) since the last inspection. The inspectors reviewed Modification 110, a modification to replace the shim-safety rod magnets to improve reliability, Modification 112, removal of the shim range control rod interlock, and Modification 113, replacement of log N, safety channel, and log count rate modules. The modification packages were well documented and the review by the SRC was thorough.

The inspectors reviewed two independent external audits of the facility operations and one of the facility health physics program. The audits were well documented and the responses to items identified in the audits



were appropriate. The licensee revised Maintenance Procedure MP-102 "Quality Assurance Audits" to better define the scope of the external audits and also to expand the use of an internal audit. The internal audit done in 1992 was very good and identified some of the record keeping problems noted in this inspection report.

No violations or deviations were identified.

7. Requalification Training (41745)

The inspectors reviewed procedures, logs, and training records and interviewed personnel to verify that the requalification training program was being carried out in conformance with the facility's approved plan and NRC regulations.

No violations or deviations were identified.

8. Procedures (42745)

The inspectors determined that the required procedures were available to the operators and the contents of selected procedures were found adequate. Operating Procedure OP-109 "Response to Scrams, Alarms, and Abnormal Conditions" was a new procedure reviewed by the inspectors and found to be especially noteworthy. Procedure changes were reviewed and approved by the SRC.

No violations or deviations were identified.

9. Surveillance (61745)

Calibration Procedure CP-101 "Reactor Maintenance Schedule" was the procedure used to schedule and track required surveillances. All required surveillances had been performed as required by CP-101. Minor discrepancies were noted in data sheets which included blanks not completed and some signatures missing which were indicative of the record keeping problem noted in Section 5.

No violations or deviations were identified.

10. Experiments (69745)

The SRC reviewed and approved one experiment, the material dose reference facility, since the last inspection. The inspectors reviewed the experiment package and the SRC meeting minutes.

No violations or deviations were identified.

11. Fuel Handling (60745)

The facility fuel handling procedures were reviewed by the inspectors. Several procedure changes were noted as corrective actions identified in the licensee's response to the Notice of Violation issued August 21,

1992. Records from two spent fuel shipments in 1992 were reviewed by the inspectors.

No violations or deviations were identified.

12. Emergency Planning (82745)

The licensee's emergency organization remained unchanged since the last inspection. Records indicated that annual training for 1992 had been accomplished by required reading. The annual emergency drill and annual meeting with emergency support organizations took place in May 1992. Corrective actions were completed on several improvement items identified during the drill.

Revision 9 to the Emergency Plan was approved by the NRC in December 1991. The annual review of the plan was completed in 1992 and the letters of agreement with the fire protection and ambulance services were updated in December 1992. The annual verification of emergency phone numbers were completed for 1992. Emergency equipment inventories were completed semi-annually with one inventory sheet missing but a letter to file indicating the inventory had been completed. The internal audit had identified the missing inventory. The missing inventory sheet was another example of the record keeping problem identified in Section 5.

No violations or deviations were identified.

13. Radiation Control (83743)

The Ford Reactor radiation control program essentially remained the same as described in Inspection Report No. 50-002/91004(DRSS). There was a minor personnel change with a new health physics technician replacing the one found falsifying contamination surveys. Posting, labeling and surveys were reviewed during tours of the facility with no problems noted. Instrument calibration records were reviewed. Procedures were selectively reviewed.

Contamination surveys completed using the revised HP-101 "Facility Contamination Survey" were reviewed. The inspectors noted that on several occasions, the break area used by the operators and the control room were found to have been contaminated. The surveys indicated low levels of activity generally less than 500 dpm. The apparent sources of contamination were from the reactor floor after handling experiments or from the pneumatic tube room adjacent to the break area. These few occurrences did indicate some poor practices for contamination control. However, since the installation of a hand and foot counter near the stairway to the reactor, the surveys for those areas have shown no recurrences of contamination.

The inspectors observed the collection of a pool water sample by the technician. Good contamination control practices and good coordination with control room personnel was demonstrated. The inspectors also

reviewed the records on previous pool water samples. Several records lacked review signatures indicative of the record keeping problem identified in Section 5.

External exposure records were reviewed. The Operations group continued to have the highest exposures with several of the operators with over 1 Rem whole body for 1992. All exposures were within 10 CFR Part 20 limits.

No violations or deviations were identified.

14. Environmental Protection (80745)

a. Liquid Effluents

The licensee adopted a zero discharge policy so there were no liquid discharges for 1992.

b. Airborne Effluents

Airborne effluent monitoring essentially remained as described in Inspection Report No. 50-002/91001(DRSS). The discharge records were reviewed for 1992 and indicated that releases were well within the TS limits. Several of the sample analysis records were missing review signatures. The missing signatures are indicative of the record keeping problem identified in Section 5.

No violations or deviations were identified.

15. Transportation Activities (86740)

The inspectors reviewed the licensee's spent fuel shipping program for compliance with the requirements in Department of Transportation (DOT) and NRC regulations, 49 CFR Parts 172 & 173 and 10 CFR Part 71, respectively.

Byproduct material was transferred from the byproduct and reactor licenses only to valid NRC or Agreement State licensees. Review of the shipping records did find some minor errors in the shipping papers. These errors are indicative of the record keeping problem identified in Section 5.

16. Review of Periodic and Special Reports (90713)

The inspectors reviewed the 1991 annual report for timeliness of submittal and adequacy of information submitted. Cycle reports were also reviewed. Minor problems in the cycle reports were identified in Section 5.

The annual report was submitted in a timely manner and contained the information required by Technical Specifications.

No violations or deviations were identified.

17. Exit Interview (30703)

The inspectors met with the licensee representatives denoted in Paragraph 1 at the conclusion of the inspection on January 22, 1993. The inspectors summarized the scope and results of the inspection and discussed the likely content of this inspection report. The licensee acknowledged the information and did not indicate that any of the information disclosed during the inspection could be considered proprietary in nature.



No violations or deviations were identified.

17. Exit Interview (30703)

The inspectors met with the licensee representatives denoted in Paragraph 1 at the conclusion of the inspection on January 22, 1993. The inspectors summarized the scope and results of the inspection and discussed the likely content of this inspection report. The licensee acknowledged the information and did not indicate that any of the information disclosed during the inspection could be considered proprietary in nature.