The University of Michigan

MICHIGAN MEMORIAL – PHOENIX PROJECT
PHOENIX MEMORIAL LABORATORY FORD NUCLEAR REACTOR
ANN ARBOR, MICHIGAN 48109-2100

24 November 1999

Docket 50-2, License R-28

U.S. Nuclear Regulatory Commission
Attn: Document Control Room
Washington, DC 20555

Re: **Reportable Occurrence No. 21 – Violation of Technical Specification 3.5, *Airborne Effluents*.**

This a follow up report on a violation of Technical Specification 3.5.2.a and 3.5.2.b initially reported on 13 November 1999. Due to an improper range setting of the Radiation Recorder, the Mobile Air Particulate monitors (MAPs) provided incorrect lower readings of Airborne Effluent Concentration (AEC) for approximately seven days during the week of 5 November at the Ford Nuclear Reactor (FNR). Review of alternate radiation instrumentation data indicates that during this period the airborne effluent releases from the facility did not exceed our normal, particulate release of less than 1% of the AEC specified in 10 CFR 20.

Description of Occurrence

Friday, 5 November 1999, the Radiation Recorder was retested following repairs. The retest consisted of a channel check of the Radiation Monitors listed in Technical Specification Table 3.2 and verification of signals present on the remaining 5 channels.

Monday, 8 November 1999, the reactor was placed into operation to perform core reloading activities.

Tuesday, 9 November 1999, the reactor was placed into operation to perform the remaining portions of the core reloading and remained in operation at zero power. At 1840 a reactor startup to 20kW was performed for rod testing followed by continued operation at 2MW.

Thursday, 11 November 1999, at 1037, the health physics staff reported that during the weekly checks of the MAPs the indication in the control room was 25 – 30% of the locally indicated count rates. A review by the Assistant Manager for Operations and the Shift Supervisor concluded that the MAPs were operational and that 24 hours were allowed for review of the operability determination.

Friday, 12 November 1999, at 0738, the Reactor Manager was notified of the discrepancy between the local and control room readings for the MAPs and at 0900 ordered a reactor shutdown. A review board reversed the operability determination and determined that this incident is reportable as per Technical Specification 6.6.2.a.

Safety Implications

It has been determined that the pool floor MAP was indicating one half the actual reading and that the stack MAP was indicating one fifth the actual reading. In this condition, the AEC necessary to exceed the alarm set point had been increased by a factor of two and five respectfully. These decreased indications and increased alarm set points would have still allowed for the MAPs to notify the operator upon release of a significant quantity of particulate radioactivity which would have threatened to increase the yearly averaged AEC. The area radiation monitoring system and gaseous activity detectors (GADs) would have also provided the operators an indication of a significant release. A review of the count rates recorded showed that during this period, the airborne effluent from the facility did not exceed our normal, particulate release of less than 1% of the AEC specified in 10 CFR 20. Analysis of the isokinetic sampling locations showed that no abnormal emissions occurred during this period.

Root Causes

An investigation of the event was conducted by the Nuclear Reactor Laboratory Manager. This investigation reviewed not only this specific event, but also looked at a multitude of scenarios where maintenance could be performed on a system, structure or component used to meet a Technical Specification. This review examined all systems, structures or components mentioned in Technical Specification 3.2, *Reactor Safety System,* and those not explicitly mentioned in a Limiting Condition for Operation. Additionally, the incident reported to the Commission in Reportable Occurrence No. 19, *Reactor Operation with In-Operable Alarm Circuit on the Bridge Radiation Monitor,* was reviewed. Four root causes have been identified:

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Inadequate Controls for Preventive Maintenance – there existed no formal process to document what was done under corrective maintenance and to ensure that the corrective maintenance was effective.

Inadequate Procedures for Routine Calibration and Maintenance – not all of the preventive maintenance procedures have steps to perform a channel calibration (where applicable), channel check, and channel test. Many have the steps, but they are not clearly identified in a manner to allow for their use in post maintenance testing. Some equipment has separate procedures for each activity or relies upon the startup checklist to perform the channel test and channel check. Additionally, there exist several channel calibration, channel check and channel test procedures for systems, structures or components which are required by Technical Specifications but are performed by the health physics staff, without direct supervision of licensed staff. (These procedures also do not clearly identify channel calibration, channel check and channel test).

Inadequate Review of Preventive and Corrective Maintenance Activities by the Shift Supervisors – a process does not exist for shift review of corrective and preventative maintenance prior to a reactor startup. Additionally, there is not a clear manner to ensure the documentation for preventative maintenance is independently reviewed in a timely manner. Some shift supervisors review preventive maintenance documentation during their first shift, but this practice is not observed by all.

Inadequate Knowledge of Operation Personnel – licensed personnel responsible for the MAP maintenance believed that neither the MAP control room indication nor control room alarm is required to satisfy operability requirements of Technical Specification 1.0, *Definitions*. Licensed personnel assumed that as neither the control room indication nor alarm setting is specifically mentioned in a Technical Specification, they were not required to meet operability requirements. Additionally, the activities that the health physics staff perform to meet requirements of Technical Specifications are not familiar to the operations crews, in particular the calibration and checking of the MAPs and the GADs.

Immediate Corrective Actions

The reactor was shutdown, the Radiation Recorder repaired and fully channel tested or channel checked prior to resuming reactor operation. This event has been reviewed with the operations staff. Additionally, until permanent corrective actions are implemented all corrective maintenance and post maintenance testing will be documented to the Assistant Manager for Operations and retained.

Actions to Prevent Recurrence

Based on the root causes identified above, the corrective actions to prevent recurrence are:

Procedural controls will be instituted to allow for documentation of corrective maintenance performed, post maintenance testing, and results of post maintenance testing for a system, structure or component required to meet a technical specification or required to support a system, structure or component required by a technical specification.

All maintenance procedures will be reviewed to ensure that each instrument or channel has a clearly identified channel calibration (where applicable), channel check, or channel test. Each procedure will be reviewed to ensure that the resulting procedure clearly verifies all indicators and alarms. This review will also include the instrument calibrations conducted by the health physics staff to meet a technical specification.

Procedural controls will be instituted to provide for an independent review of corrective maintenance, post maintenance testing, and results of the post maintenance testing on an system, structure or component required to meet a technical specification or required to support a system, structure or component required by a technical specification. A process will be established to ensure a timely independent review of corrective maintenance and maintain a summary record of the materiel deficiencies for the reactor facility. This summary record will allow for review of materiel deficiencies by operating crews before shift turnover.

A formal training session will be given to the operations staff to improve the understanding of 1) how the Limiting Conditions for Operation are to be applied, 2) requirements for operability of a system structure or component, 3) conservative decision making, and 4) regulatory reverence. This training will include all areas of the licensing basis, applicable regulatory guidance issued by the Commission, and other industry relevant materials.

A preliminary effectiveness review of these corrective actions will be completed within three months from the date of this letter. A final effectiveness review of these corrective actions will be completed within one year from the date of this letter. The results of these effectiveness reviews will be available for review during the annual audit of reactor operations prescribed by Technical Specification 6.2.8.

Review of Reportable Occurrence No. 19

Due to the similarity with Reportable Occurrence No. 19 (30 July 1998), the licensee conducted an additional review of the incident reported and the corrective actions identified in the report to the Commission. This review concluded that the investigation into the event concentrated on the specific type of instrument whose calibration procedure was deficient and failed to apply the review to other instrumentation required to meet a Technical Specification. Additionally, the root cause failed to address the lack of a documentation for the corrective maintenance conducted to immediately correct the materiel deficiency. The root cause concentrated on the fact that there was a materiel deficiency in the Bridge Radiation Monitor and that a member of the operating staff bypassed the local alarm without the necessary review of facility management. The licensee did state "A further, more broad modification will be made to CP-308, after due consideration, that will provide reactor management a mechanism to track actions taken to repair or replace faulty equipment in a timely manner." During the subsequent "due consideration" by the new Nuclear Reactor Laboratory Manager, the lack of a documented retest was not adequately addressed. Additionally, the improvements to CP-308, *Equipment Out of Operation,* were not aggressively pursued by FNR management.

An additional corrective action will be for the Nuclear Reactor Laboratory Manager to review the status of implementation of corrective actions to the recent reportable occurrences, any concerns that appear in the agendas of the Safety Review Committee, and recommendations of the annual audits conducted by the outside consultant as described in Technical Specification 6.2.8. During this review, the reactor manager may assign effectiveness reviews to the reactor staff or an outside consultant for those corrective actions whose effect is not readily apparent.

The licensee considers the event described in this report to be significant due the similarity with Reportable Occurrence No. 19 and due to the importance of effective and timely corrective actions. The licensee will make a concerted effort to ensure that the corrective actions identified in this report are completed in a timely manner and reviewed for effectiveness. As such, the licensee may submit an update to this report as further actions are identified.

Sincerely,

John C. Lee

John C. Lee, Director
Michigan Memorial Phoenix Project

CC: Theodore Michaels, Reactor Project Manager
Thomas Dragoun, Reactor Inspector
Safety Review Committee, Ford Nuclear Reactor

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Reportable Occurrence No. 21 – Reactor Operation in Violation of Technical Specification 3.5, *Airborne Effluents*
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