

50-2

9 March 2002

Docket 50-2, License R-28

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

Re: **Reportable Occurrence No. 23 -- Violation of Technical Specification 3.4.3 Primary Coolant Conditions.**

This is the 24-hour Notification regarding a violation of Technical Specification 3.4.3. Following a major refueling and rod calibrations, the reactor was started up in accordance with Operating Procedure 101, *Reactor Startup*. The reactor reached 2 MW on 6 March 2002 at 19:22 hours. The following morning, 7 March 2002 at 08:16 hours, the reactor was promptly shut down when the Day shift operating staff noted that core location 77 was open, and did not contain a fuel element, reflector, sample holder or experimental facility as required by Technical Specification 3.4.3.

We have identified safety concerns with respect to Technical Specifications 2.1.1 (Safety Limits in the Forced Convection Mode), 2.1.1 (Safety Limits in the Natural Convection Mode), and 3.1.4 (Reactivity Limits). This occurrence may also involve unanalyzed conditions with respect to our Safety Analysis Report. The safety concerns and unanalyzed conditions include: reactor operation in forced convection at 2 MW with an open grid location providing bypass flow; a fuel element being in natural convection cooling mode with the reactor operating above 100 KW; and a fuel element outside the normal configuration while the reactor is critical.

Description of Occurrence

4-5 March-Refueling during dayshifts.

5 March 18:15-Commence reactor startup in forced convection mode for Rod Calibrations between 5 and 50 KW.

6 March 16:05-Complete Rod Calibrations, shut down reactor.

17:10-Reactor Startup

17:29-500 KW Checks

17:32-1 MW, Calorimeter commenced

18:50-Calorimeter completed

19:22-Raise reactor power to 2 MW

7 March 08:16-Reactor Shutdown

During this time indicated primary coolant flow was between 1053 to 1073 gallons per minute. A review of all nuclear instrument channel recorders showed no unusual indications. The core excess reactivity and measured rod worths were all normal.

Core inspections were performed by many members of the operating staff as required by procedures during this time. During refueling, all fuel handling was done with at least two persons observing. A core inspection was performed immediately after refueling was completed. In addition, three core inspections were performed during building checks while rod calibrations were in progress, a core inspection was made during the Reactor Startup's 500 KW checks, and core inspections were made by the Swing and Mid shifts during building checks while operating at 2 MW. No abnormalities were noted on any of these inspections. Shortly after 08:00 on March 7, the Day shift operating staff inspected the core and noted that location 77 was open. The shift supervisor

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promptly shut down the reactor and informed both the On-Call Supervisor and the Reactor Manager.

A review of this occurrence has concluded that when grid location 77 was refueled, fuel element #304 ended up with its bottom nose cone outside the grid plate, while the bottom edge of the fuel element came to rest on the outside edge of the grid plate. The top of the slightly tilted fuel element was directly over location 77. Thus the element appeared, when inspected from above, to be correctly seated. Eventually, the element shifted to a vertical orientation, caught between the edge of the grid plate and the nearby pneumatic tube bundle. Once the element shifted, the open location 77 became apparent and the reactor was shut down.

Safety Implications

Two main issues have been identified: (1) The effect of an open grid location on forced convection operation at 2 MW; and (2) the effect on the fuel element #304 of operating it in natural convection mode. Analyses are being performed on both issues. A pool water sample was taken and analyzed. The pool water analysis was compared to past analyses of fuel element cladding failures. No fission products were noted. Fuel element #304 has been temporarily secured with a line to prevent falling off the grid plate. Procedures are being developed to remove the fuel element and will receive approval of the Safety Review Committee prior to implementation. The reactor remains in operation as required by Technical Specifications, but is shutdown (zero power). Analyses are being performed on these conditions to determine their full impact

Root Causes

The Reactor Manager and Operations staff reviewed the occurrence. The root cause investigation is ongoing.

Immediate Corrective Actions

The reactor was shut down and will not be restarted for sustained operation until an operational review of this reportable occurrence is made and presented to the Safety Review Committee. An initial outside review of this occurrence has been made by Mr. Ward Rigot of the Dow Chemical Company, Midland, Michigan. A closed-mouth hook (carabiner) has been lowered on a line with a stainless steel leader and attached to the handling bail of element #304 to ensure it does not fall off the grid plate.

Sincerely,

Christopher W. Becker
Reactor Manager Ford Nuclear Reactor

CC: Alexander Adams, Reactor Project Manager
Thomas Dragoun, Reactor Inspector
Safety Review Committee, Ford Nuclear Reactor

File: Reportable Occurrence No. 23 – Violation of Technical Specification 3.4.3, *Primary Coolant Conditions*.