

DUKE POWER COMPANY

POWER BUILDING

422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

USNRC REGION II  
ATLANTA, GEORGIA

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April 22, 1982

WILLIAM O. PARKER, JR.  
VICE PRESIDENT  
STEAM PRODUCTION

TELEPHONE AREA 704  
373-4083

Mr. James P. O'Reilly, Regional Administrator  
U. S. Nuclear Regulatory Commission  
Region II  
101 Marietta Street, Suite 3100  
Atlanta, Georgia 30303

Re: McGuire Nuclear Station Unit 1  
Docket No. 50-369

Dear Mr. O'Reilly:

Please find attached Reportable Occurrence Report RO-369/82-24. This report concerns T.S.3.4.1.4, "Two residual heat removal (RHR) loops shall be operable and at least one RHR loop shall be in operation". This incident was considered to be of no significance with respect to the health and safety of the public.

Although my letter of April 8, 1982 stated that this report would be submitted by April 19, in the interest of completeness it is being submitted 3 days later. We regret any inconvenience this delay may have caused.

Very truly yours,

  
William O. Parker, Jr.

PBN/jfw  
Attachment

cc: Director  
Office of Management and Program Analysis  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Records Center  
Institute of Nuclear Power Operations  
1820 Water Place  
Atlanta, Georgia 30339

Mr. P. R. Bemis  
Senior Resident Inspector-NRC  
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DUKE POWER COMPANY  
McGUIRE NUCLEAR STATION  
REPORTABLE OCCURRENCE REPORT NO. 82-24

REPORT DATE: April 22, 1982

FACILITY: McGuire Unit 1, Cornelius, NC

IDENTIFICATION: Partial Air-Binding of Residual Heat Removal (ND) Pump 1A  
While the Reactor Coolant (NC) System was being Drained for  
Maintenance

DISCUSSION: While draining Unit 1 NC System on March 2, 1982 for steam generator inspection, investigation of an ND pump low discharge pressure alarm resulted in ND pump 1A being stopped due to signs of cavitation. During the fifty minutes it was secured, no means existed for removing core residual heat because the redundant pump, 1B, was out of service for maintenance. Upon restart, normal ND flow could not be maintained without signs of cavitation reappearing. The control board level gauge indicated that NC system water level was 250-270 inches above the bottom of the NC pump suction loops (175 inches is the minimum for ND operation). However, a later check of tygon tubing connected to a loop drain and vented to a RTD manifold vent indicated that level was 4 to 6 inches below that specified for ND operation. Draining (to hot leg centerline - 175 inches on the level gauge) was being accomplished, per procedure, with a nitrogen (N<sub>2</sub>) overpressure on the Pressurizer Relief Tank (PRT) and Power Operated Relief Valve (PORV) open to admit N<sub>2</sub> to the pressurizer (PZR).

This incident resulted from inaccurate indication by the transmitter for the level gauge, due to a misapplication of the level transmitter.

EVALUATION: To insure pump 1A could be restarted safely after showing signs of cavitation, it was vented, and the fueling water storage tank supply to ND valve (a source of make-up water) opened briefly. An attempt was made to verify level at or above the RTD manifold which would have insured proper level for pump operation. Water was reported present when the RTD manifold vent was opened, and the level in a tygon tube vented to the atmosphere agreed with the level gauge. Although cause for the pump's behavior could not be determined, it was returned to service as soon as possible per Technical Specification 3.4.1.4. Pump parameters soon began to oscillate, and flow was throttled to 1,500 gpm. Later, flow was throttled to just above 500 gpm after parameters had begun to oscillate again. After flow was throttled to 500 gpm, level was observed (using tygon tubing vented to the RTD manifold vent) below that specified for ND operation. The operator that checked level earlier had been misled by a small amount of water present in the vent piping. The low water level was allowing air into the ND suction, causing partial air-binding of the pump, with symptoms similar to cavitation. As level was later increased, ND flow was increased, without signs of air-binding, until level was 175 inches and flow approximately 3,000 gpm.

The only instrument indicating water level while draining or filling the NC system is the control board level gauge. The transmitter for this gauge is referenced to atmosphere because its design function is to indicate water level during refueling. Pressures other than 0 psig are possible during draining and filling because the system is not directly vented to atmosphere. During draining, NC is vented to the

PRT where a N<sub>2</sub> overpressure can exist per procedure, "Draining the Reactor Coolant System". The PRT is monitored using a 0-100 psig pressure transmitter and the computer video display (low Pressures cannot be accurately read on this 0-100 psig control board gauge) to insure no pressure deviation occurs that would significantly affect indicated level. NC pressure can differ significantly from PRT pressure if the drain or fill rate is high because the N<sub>2</sub> must pass through a small hole in the PORV discharge line inside the PRT. When ND flow was throttled to 500 gpm, PRT pressure indicated 0 psig with the drain secured. A pressure of 2.89 psig would cause a 170 inch level to indicate 250 inches on the level gauge. Calibration of the pressure transmitter on March 3 revealed it was within tolerance.

SAFETY ANALYSIS: In the fifty minutes ND was off, incore thermocouples indicated core coolant temperature rose from approximately 105°F to 130°F. A conservative linear extrapolation shows that ND could be shutdown almost four hours before the onset of boiling. This boiling would not be detrimental provided make-up was available (one centrifugal charging pump was operable) and any vapor generated was not released to containment (vapor would be condensed in the PRT). Public health and safety were not affected by this incident.

CORRECTIVE ACTION: Immediate corrective action was to raise level to 175 inches and resume normal ND flow. After its N<sub>2</sub> supply was secured, the PRT was vented to containment atmosphere to insure the control board level gauge would indicate level accurately. A work request initiated to calibrate PRT pressure indication was completed on March 3.

Statements will be incorporated into the procedure "Draining the Reactor Coolant System" warning that the 5-7 psig PRT overpressure can greatly affect the levels indicated on the control board gauge. A modification to have the reference leg of the level transmitter connected to the PORV discharge line is planned. This avoids problems associated with a pressurizer tap and is satisfactory since a PORV is required open during draining. The modification will also entail redundant level indication and an expanded scale(s) in the normal NC level range for ND operation. A narrow range PRT nitrogen purge pressure indication is also planned.

A limit and precaution will be added to the Equipment and Removal and Restoration Procedure stating redundant components are not to be taken out of service prior to a major plant evaluation when possible.