

DUKE POWER COMPANY

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April 13, 1983

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Mr. James P. O'Reilly, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street NW, Suite 2900
Atlanta, Georgia 30303

Re: McGuire Nuclear Station
Docket Nos. 50-369 and 50-370

Dear Mr. O'Reilly:

On February 12, 1982, both centrifugal charging pumps were lost due to hydrogen entrainment while restoring the positive displacement pump to service at McGuire Unit 1. Reportable Occurrence Report RO-369/82-15 detailing this event was submitted on March 24, 1982, at which time it was indicated that an update to the report would be submitted when the final corrective action had been determined. Additionally, your March 25, 1982 letter indicated, among other things, that an evaluation of system design changes to prevent recurrence of this type of event was to be submitted for your review prior to returning the PD pump and suction dampener to service.

Please find attached the requested evaluation, and an updated LER form for RO-369/82-15. Note that the attached evaluation should be used to supplement the original attachment to RO-369/82-15. The PD pump and suction dampener system will be returned to service following completion of the indicated modifications.

Very truly yours,

H.B. Tucker / BT

Hal B. Tucker

PBN:jfw
Attachments

cc: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Records Center
Institute of Nuclear Power Operations
1100 Circle 75 Parkway, Suite 1500
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Mr. W. T. Orders
NRC Resident Inspector
McGuire Nuclear Station

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DUKE POWER COMPANY
McGUIRE NUCLEAR STATION
EVALUATION OF POSITIVE DISPLACEMENT CHARGING PUMP SYSTEM DESIGN CHANGES

Introduction: The McGuire Nuclear Station positive displacement (PD) Charging Pumps and suction piping are currently in the stage of redesign to correct problems discovered after a release of hydrogen to the suction piping on February 12, 1982 (reference Reportable Occurrence Report RO-369/82-15).

Incident Review: A review of the incident revealed that the hydrogen released to the common suction piping of the two Centrifugal Charging Pumps and Positive Displacement Charging Pump was due to a failure of the PD pump suction dampener level control system. This failure allowed the hydrogen which supplies the PD pump suction dampener overpressure to be released to the suction piping, and subsequently cause loss of charging.

Design Review: A complete review of the charging system, equipment, piping and instrumentation was performed. In addition to the review, a series of tests were performed at McGuire to measure PD pump suction and discharge pressures and piping accelerations.

As a result of this review, it was found that the existing suction dampener provided adequate pump net positive suction head (NPSH), but it would be almost impossible to assure that the present or any modified hydrogen gas overpressure system would not fail and inadvertently release large amounts of gas to the pump suction piping.

Testing also showed that the location of the existing PD pump suction dampener was a source of problems. An analysis of the data indicated that although the dampener was working, there were still substantial suction problems present due to suction pressure pulsations. This problem is related to the location of the dampener, since it is located several feet from the pump suction flange and not adjacent as recommended. This location reduces the dampener's attenuation capability and can cause the release of hydrogen gas from solution in the suction piping due to the reduction in available NPSH.

It was also determined that the suction piping was routed in such a manner that small pockets had been created which could serve to collect any gas released in the suction piping and could eventually fill and restrict flow to the point of pump failure on loss of suction. As a related problem, the suction piping for each charging pump (centrifugal and PD) is common up to the tee to each pump. This allows any PD pump problems, including the release of hydrogen gas, to potentially affect the operation of the centrifugal pumps.

Modifications: Based on the Design Review, the following modifications are now in progress on both McGuire Units 1 and 2:

- New PD Pump Suction Dampener

A new suction dampener will be installed. This dampener is of the type produced by Fluid Kinetics. It incorporates a heater and steam dome to pressurize the

dampener, rather than hydrogen gas. This unit is in satisfactory use at several similar nuclear installations at this time. The heater style dampener is inherently more reliable than the hydrogen overpressure model and does not have the potential to release large amounts of non-condensable gases to the charging pump suction.

- Location of Suction Dampener

The suction dampener will be designed and so located as to be connected directly to the pump suction flange. This will make the dampener much more effective than the current installation.

- Pump Suction Piping

The pump suction piping will be modified to eliminate loops that may trap gas. In addition, the piping will be changed to allow any gas which may be released from solution in the PD pump suction to vent back to the Volume Control Tank rather than filling the centrifugal charging pump suction piping with gas.

Summary: Based on Design Review and Testing, the above modifications will make the PD Charging Pump both more reliable as a charging source and also eliminate any danger to the centrifugal charging pumps.