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August 2, 1985

Dr. J. Nelson Grace, Regional Administrator
U.S. Nuclear Regulatory Commission - Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Subject: McGuire Nuclear Station - Unit 1
Docket Number 50-369
Loose Parts Monitor Channel Failure

Dear Dr. Grace:

In accordance with McGuire Nuclear Station's Technical Specifications 3.3.3.10 and 6.9.2, attached is a report of a failure of a channel of the loose parts monitoring system.

The event had no impact on the health and safety of the public.

Very truly yours,

Hal B Tucker

Hal B. Tucker

JBD/hrp

Attachment

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

Mr. W. T. Orders
NRC Resident Inspector
McGuire Nuclear Station

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1100 Circle 75 Parkway, Suite 1500
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IE 22

Duke Power Company

McGuire Nuclear Station
Loose Parts Detection System Channel Inoperable

INTRODUCTION: On June 24, 1985, channel 4 of the vibration and loose parts detection system was declared inoperable when station personnel noticed the lack of normal background sounds during operator surveillance. The sensor for channel 4 is located on the reactor vessel head and is not accessible for repair except during cold shutdown with the missile shields removed.

This incident is attributed to component failure.

Unit 1 was in Mode 3 (Hot Standby) in preparation for a unit startup at the time of discovery.

EVALUATION: The vibration and loose parts monitor system consists of eight piezoelectric sensors with preamplifiers, a signal processor unit, and other peripheral equipment which monitor the reactor vessel and steam generators for loose metallic parts. The sensors detect vibration from rotating equipment sources, flow induced sources, and loose parts in the reactor coolant system. The signals from the vibration sensors provide both high vibration and loose part alarms at preset noise levels.

The piezoelectric sensor (accelerometer) on channel 4 is located on the upper vessel to quantitatively monitor the control rod extensions and vessel internals for vibration. The sensor is manufactured by Endevco (model no. 2276) and is mounted on a special mounting block attached to the upper ring above the lifting eye.

Low noise coaxial (hardline) cable is used to connect the sensor to the preamplifier. This cable is 36 inches long, flame retardant and radiation hard. This cable is 1/16 inches in diameter and is sheathed to prevent grounding. The sensor is mounted on an insulating material to prevent grounding. The hardline cable terminates into microdot connectors on both ends.

It is probable that the hardline cable or sensor is shorted. This is the typical problem found when there is no noise heard at the monitor panel except for a hum. The exact cause cannot be determined until an outage occurs and the missile shields can be removed for access to the upper reactor.

The channel 3 sensor had been repaired during the 1985 refueling outage following a failure that had occured on June 12, 1984. The channel 3 sensor is also mounted on the reactor head 180 degrees from the channel 4 sensor. In that failure, the problem was in the hardline coaxial cable.

All eight channels of the vibration and loose parts monitor system were checked out and calibrated during the 1985 Unit 1 refueling outage. The channel 4 test was normal during this checkout on June 12, 1985.

Because of their small size and semirigid construction, the hardline cables are the source of most failures to the vibration and loose parts system. The cables are difficult to connect in the field because of the small microdot connectors and close working space in the junction box. The use of anti-contamination clothing (gloves) also contributes to the difficulty in connecting theses microdot connectors to the sensors. The close cable bends and repeated flexing during periodic maintenance are believed to have contributed to the degradation of the cables.

A review of the Nuclear Plant Reliability Data System (NPRDS) did not reveal similar failures at other operating units.

CORRECTIVE ACTIONS:

Immediate: Vibration and loose parts monitor channel 4 was declared inoperable and a work request was written to repair it.

Subsequent: It was determined that the failure was inside containment near the reactor vessel head. The work request was rescheduled to be completed during the next refueling outage.

Planned: The work request to repair channel 4 loose parts detector will be completed during the next refueling outage or next appropriate outage in which the reactor is accessible.

Solutions to increase the reliability of the vibration and loose parts monitoring system will continue to be investigated.

SAFETY ANALYSIS: The vibration and loose parts system provides alarms to operators in the event of abnormal sounds in the primary coolant system. The system does not provide a reactor protection signal and is not required to safely shutdown the reactor. This failure along with previous channel failures on the reactor head appear to be related to the fragile hardline cable construction or possible abuse. In each of the previous cases, the failed components have been identified and repaired as soon as the equipment was accessible. The remaining three operable loose part channels on the reactor vessel will provide operators with vibration data and loose parts alarms until channel 4 is repaired.

The health and safety of the public were not affected by this incident.