

NORTHEAST UTILITIES



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Docket No: 50-423
Re: 10CFR50.36
May 22, 1991
MP-91-430

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Gentlemen:

Millstone Nuclear Power Station, Unit No. 3
Malfunctioning Loose Parts Monitor Channel

This Special Report is being submitted pursuant to Millstone Unit 3 Technical Specification 3.3.3.8.a, Loose Parts Detection System. Plant Technical Specification 3.3.3.8.a requires that a Special Report be submitted to the NRC 10 days following one or more channels of the Loose Parts Detection System being declared inoperable for more than 30 days, while in Mode 1 (Power Operation) or 2 (Startup).

On April 12, 1991, at 0855 hours with the plant in Mode 3 (Hot Standby), LPM Channel 3 went into Alarm. Channel 3 monitors Loose Parts activity in the Reactor Head. LPM Channel 3 was taken out of service at that time due to repetitive spurious alarms. Channel 3 was turned off to clear the main control board alarm and the data acquisition disk was removed from the system computer. This procedure enables the operators to re-boot the LPM computer with a new disk which allows subsequent valid loose parts impacts to be detected and recorded.

On April 13, 1991, at 1743 hours when the plant entered Mode 2 (Startup) at 0% power, 2250 psia, and 557 degrees Fahrenheit, LPM Channel 3 was declared inoperable. The other eleven (11) LPM channels were operating normally.

Loose parts impacts in the Reactor Coolant System (RCS) are detected by accelerometers attached to major RCS components. An impact generates an electrical signal from one or more accelerometers, which triggers the LPM to record information from all twelve channels on a computer disk, and actuates an alarm on the main control board.

All detector cables and connectors were examined during the recent refueling outage for ruptures of the external cable sleeves, which would result in a loss of signal transmission capabilities. The signal transmission data was compared with the current signal data which indicated that neither signal nor cable sleeve degradation had occurred.

The results of the examination of the previous channel failure also determined that the accelerometer was functioning properly. The accelerometer had been tested along with similar accelerometers on a vibration test fixture. The resulting performance data was compared with the current performance data and the results fell within the normal operating parameters, and Channel 3 was declared operable to support plant startup at the completion of the refueling outage.

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Further investigation of the failure was initiated upon receipt of a subsequent Channel 3 failure on April 12, 1991 during power ascension from the third refueling outage. This review investigated the output data from the channel and determined that the spurious alarms were generated due to excessive noise on the channel. This noise source was isolated to a malfunctioning pre-amplifier unit. The amplifier unit was injecting its output signal back into its input channel thereby amplifying the signal, causing the resulting output signal to exceed the channel's high setpoint parameter subsequently generating an alarm signal.

The conclusion of this investigation determined that the root cause of the Channel 3 failure was the malfunctioning pre-amplifier unit and that Loose Parts impacts were not actually occurring. Redundant LPM channels monitoring the Reactor Head were operating satisfactorily and did not indicate that any impacts were occurring.

The pre-amplifier unit was replaced and the channel was declared operational on May 14, 1991, at 1517 hours. As of this date, the channel is functioning properly and has not displayed any further problems.


The Loose Parts Monitoring trouble shooting procedure is currently under review. The present procedure requires that the LPM output data on the computer disk be forwarded to an off-site location for analysis. This is very time consuming and has a significant impact upon the Instrumentation & Control Department's work prioritization to address and repair failures. The revised procedure will increase the response time for impact analysis and any subsequent channel repairs.

The Licensee contact for this Special Report is Burtel N. Forrest, who may be contacted at (203) 444-5442.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

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