UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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AEOD/E231

MEMORANDUM FOR: Carlyle Michelson, Director
Office for Analysis and Evaluation
of Operational Data

THROUGH: Karl V. Seyfrit, Chief
Reactor Operations Analysis Branch
Office for Analysis and Evaluation
of Operational Data

FROM: Matthew Chiramal, Lead Engineer
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SUBJECT: MILLSTONE UNIT 2 - LOSS OF SHUTDOWN COOLING DUE TO TRIP OF LOW PRESSURE SAFETY INJECTION PUMP

REFERENCE: Northeast Utilities Licensee Event Report: 81-043/3L-0 dated January 7, 1982. Millstone-2 Docket No. 50-336.

The event at Millstone 2 occurred on December 9, 1981 while the unit was in Mode 5 with Shutdown Cooling (SDC) maintaining Reactor Coolant System temperature at 90°F. The RCS was drained down to the center-line of the hot-leg and the steam generator primary manways were removed. Testing of 345 KV switchyard breakers caused actuation of a turbine generator trip scheme which provided a trip signal to the running Low Pressure Safety Injection (LPSI) pump. The trip of the LPSI pump caused RCS temperature to rise from 90°F to 208°F in approximately 2 minutes. The LPSI pump was restarted causing an RCS temperature drop of 130°F in approximately 7 minutes. As a result of the transient the heatup and cooldown limits of the plant Technical Specifications were exceeded. The licensee had conducted an engineering evaluation per 10CFR50 Appendix G and has concluded that the fracture toughness design basis limitations were not downgraded.

Our engineering evaluation of the event concentrated on the trip of the LPSI pump due to testing of the 345 KV switchyard breakers. The attachment to the referencedLER states that the circuitry in the Turbine Generator trip scheme provides a trip signal to the LPSI and HPSI pumps when not running with a Safety Injection Actuation Signal (SIAS) present. During the event the testing of the 345 KV switchyard breakers caused this circuitry to actuate thus tripping the running LPSI pump.

Additional communication with the licensee through the Project Manager provided us with further clarification of the trip interlocks involved. The tripping of the HPSI and LPSI pump is provided to eliminate all unnecessary electrical loads following a turbine-generator trip and subsequent fast-transfer of plant auxiliary loads from the Normal Station Service Transformer (NSST) to the Reserve Station Service Transformer (RSST). However, if the turbine generator trip occurs with an SIAS signal present, the HPSI and LPSI pumps will not be tripped. The trip interlocks to the HPSI and LPSI pumps are provided through the Turbine Generator fast-transfer trip scheme which includes breaker position interlocks from the 345 KV switchyard breakers. The tripping of the LPSI pump at Millstone-2 occurred because the fast-transfer trip scheme was actuated when the switchyard breakers were being tested with the turbine-generator tripped and no SIAS present.

The licensee's immediate corrective action was to bypass the trip scheme to the LPSI pump involved and to restart the pump. In addition plant Operation Procedures have been changed to include bypassing of this trip circuit when the LPSI is being used for Shutdown Cooling. In our communication with the licensee it was stated that a design modification is being made to remove this trip of the LPSI pumps.

Based on our review, we believe that the corrective actions taken by the licensee are adequate. By implementing the design modification of removing the trip interlock of the LPSI pump from the Turbine Generator trip scheme, the licensee has eliminated the possibility of inadvertent loss of shutdown cooling due to testing of the turbine-generator or switchyard breaker circuits. The trip scheme is being retained in the HPSI pump circuit, but the likelihood of testing of the turbine generator or generator circuit breakers while the HPSI pumps are performing a safety function is very low (the SIAS interlock will prevent HPSI pump trip when a SIAS signal is present). This problem does not appear to be a generic one, and no further AEOD action is recommended.

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