NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98
ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

# LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
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TITLE (4)

Potential Overcooling of Charging Pump Lube Oil System Due to Failure of Air-Operated Temperature Control Valves

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT DATE (7) | | | OTHER FACILITIES INVOLVED (8) | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REVISION | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| 09 | 16 | 96 | 96 | 028 | 01 | 12 | 13 | 96 | FACILITY NAME | DOCKET NUMBER |

| OPERATING MODE (9) | 5 | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11) | | | |
|---|---|---|---|---|---|
| POWER LEVEL (10) | 000 | 20.2201(b) | 20.2203(a)(2)(v) | 50.73(a)(2)(i) | 50.73(a)(2)(viii) |
| | | 20.2203(a)(1) | 20.2203(a)(3)(i) | 50.73(a)(2)(ii) | 50.73(a)(2)(x) |
| | | 20.2203(a)(2)(i) | 20.2203(a)(3)(ii) | 50.73(a)(2)(iii) | 73.71 |
| | | 20.2203(a)(2)(ii) | 20.2203(a)(4) | 50.73(a)(2)(iv) | OTHER |
| | | 20.2203(a)(2)(iii) | 50.36(c)(1) | X 50.73(a)(2)(v) | Specify in Abstract below or in NRC Form 366A |
| | | 20.2203(a)(2)(iv) | 50.36(c)(2) | 50.73(a)(2)(vii) | |

LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| J.M. Peschel, MP3 Nuclear Licensing Manager | (860)437-5840 |

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS | | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |

| SUPPLEMENTAL REPORT EXPECTED (14) | | EXPECTED SUBMISSION | MONTH | DAY | YEAR |
|---|---|---|---|---|---|
| YES (If yes, complete EXPECTED SUBMISSION DATE). | X NO | | | | |


ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On August 22, 1996, with the plant in Mode 5 at 0-percent power, an engineering evaluation identified a failure scenario in which a loss of Instrument Air (IAS) to temperature control valves in the Charging Pump Cooling (CCE) system serving the charging pump lube oil coolers, coincident with 33 degrees Fahrenheit (°F) Service Water (SWP) temperature could potentially result in an overcooling of both trains of the charging pump lube oil system and challenge charging pump operability. On September 16, 1996 it was determined that this condition alone could have prevented the fulfillment of the safety function of the system. An immediate notification was made at 1144 hours on September 16, 1996, pursuant to 10CFR50.72(b)(2)(iii)(D).

The cause of charging pump inoperability is inadequate initial design. This condition would result from overcooling of the lube oil system following a failure of the non-QA IAS system coincident with worst case minimum SWP temperature and maximum flow and heat exchanger cleanliness. Under these conditions, the air-operated CCE valve(s) would fail open and excessive cooling of the lube oil system would occur. This particular combination of conditions was not considered in the initial design. Further evaluation by the pump vendor and by NNECO determined that the charging pumps are operable with 45 degrees Fahrenheit (°F) CCE water which corresponds to a SW temperature of 39°F. Compensatory action is required to maintain CCE temperature greater than or equal to 45°F when SW temperature decreases below 39°F until corrective actions are implemented or operability is established at a lower temperature. Corrective actions to resolve the design issues to qualify the pumps for this scenario are being evaluated and will be implemented prior to plant startup.





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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

I. Description of Event

On August 22, 1996, with the plant in Mode 5 at 0-percent power, an engineering evaluation identified a failure scenario in which a loss of Instrument Air (IAS) to temperature control valves in the Charging Pump Cooling (CCE) system serving the charging pump lube oil coolers, coincident with 33 degrees Fahrenheit ($^0$F) Service Water (SWP) temperature could result in overcooling of both trains of the charging pump lube oil system and challenge charging pump operability. Failure of the air-operated CCE valves to the full open position due to a loss of the non-safety related IAS system would adversely affect both trains of the charging pumps by allowing excessive cooling of the CCE system which cools the lube oil system. On September 16, 1996 it was determined that this condition alone could have prevented the fulfillment of the safety function of the system. An immediate notification was made at 1144 hours on September 16, 1996, pursuant to 10CFR50.72(b)(2)(iii)(D) for a condition that alone could have prevented the fulfillment of the safety function of the system.

The minimum CCE inlet temperature to the oil cooler was specified as 55 $^0$F by the pump manufacturer to assure operability of the pump. Subsequent correspondence with the pump vendor and an Operability Determination (OD) performed by NNECO determined that the pumps are operable with 45 $^0$F CCE water to the oil cooler; however, a engineering evaluation indicates that the CCE inlet to the oil cooler could go below 45 $^0$F under worst case conditions.

II. Cause of Event

The cause of the charging pump inoperability was inadequate original design. This condition would result from overcooling of the lube oil system from a failure of the non-safety related Instrument Air system coincident with a worst case minimum SWP temperature and maximum flow and heat exchanger cleanliness. Under these conditions, the air-operated CCE valves would fail open and excessive cooling of the lube oil system would occur. This particular combination of conditions was not considered in the initial design.

III. Analysis of Event

A review of the system, subsequently confirmed by engineering evaluation, indicated that the CCE temperature could be reduced to approximately 41 $^0$F when SW flow is at its maximum value, SW temperature at 33 $^0$F, and heat transfer surfaces clean. The pump vendor has provided assurance that the charging pumps are operable with 45 $^0$F CCE water to the inlet of the oil cooler. An Operability Determination performed by NNECO found no adverse effect on the CCE system piping or components due to the 45 $^0$F temperature. CCE temperature would remain above 45 $^0$F when SW temperature is 39 $^0$F or above. Compensatory action is therefore required to maintain CCE temperature above 45$^0$F when SWP is below 39$^0$Funtil corrective actions are implemented or operability is established at a lower temperature.

IV. Corrective Action

The potential for charging pump lube oil overcooling exists when SW temperature is below 39 $^0$F. The short term corrective action is to install a temporary modification to limit the failure position of the three way CCE temperature control valve to ensure sufficient bypass flow around the SW heat exchanger to maintain CCE temperature above 45 $^0$F. This temporary modification will be installed before SW temperature reaches 39 $^0$F to maintain Charging Pump

Cooling (CCE) system operability until no longer required as the result of either permanent modification or establishment of operability at a lower temperature.

Two options are currently being evaluated for permanent corrective action to preclude overcooling of the charging pump lube oil system. One option is to lower the CCE system design temperature to a new value as determined by an ongoing engineering evaluation by the pump vendor. The other option is to perform a physical modification to control the minimum CCE temperature when SW temperature is below 39 $^{0}$F. The permanent corrective action selected will be implemented prior to plant restart.

V. Additional Information

None

Similar Events

LER 96-013-00 Residual Heat Removal System Design Deficiency Due to Non-conservative Original Design Assumption: An engineering evaluation determined that a design deficiency in the Residual Heat Removal System ( RHS ) was a condition that was outside the design basis of the plant. The Safety Grade Cold Shutdown (SGCS) design requirements specify that the unit be capable of being brought to Cold Shutdown with limited operator action outside the control room. If RHS heat exchanger operation is initiated at a 350°F RCS temperature as currently assumed in the analysis, and if the RHS throttle control valves 3RHS*HCV606/607 were to fail open as the result of a loss of Control Air, the RHS heat exchanger Reactor Plant Component Cooling Water System (CCP) outlet temperature is estimated to be 250°F which is greater then the 125°F used in the system stress analysis. The original plant design did not consider that the RHS flow control valves failing open on a loss of air, could create unacceptably high RHS heat exchanger discharge temperatures. This would have created the potential for the CCP piping to not meet the ASME Appendix F stress criteria.

LER 96-006-00 Plant Shutdown Required by Technical Specifications, for Auxiliary Feedwater Containment Isolation Valves Declared Inoperable: This LER involved an original plant design discrepancy with a containment isolation valve not being capable of remaining closed against maximum accident pressure.

LER 96-007-00 Containment Recirculation Spray and Quench Spray System Outside Design Basis due to Design Errors: This LER involved an original plant design deficiency with piping and supports not being adequately designed for loads resulting from accident temperatures.

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

Manufacturer Data

EIIS System Code:
Chemical & Volume Control System - Charging Pump Cooling System - CB

EIIS Component Code:
Valve, Control, Temperature - TCV

Fisher Controls Co., air-operated 3-way temperature control valve
Model: 667NS-YS - Size: 2"