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April 30, 1990

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

Subject: Catawba Nuclear Station
Docket No. 50-413
LER 413/90-15

Gentlemen:

Attached is Licensee Event Report 413/90-15 concerning TECHNICAL SPECIFICATION 3.0.3 ENTERED WHEN BOTH TRAINS OF CONTAINMENT VALVE INJECTION WATE SYSTEM RENDERED INOPERABLE DUE TO INCORRECT VALVE POSITIONING.

This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Tony B Owen/TBO

Tony B. Owen
Station Manager

keb\LER-NRC.TBO

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1/1

NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

# LICENSEE EVENT REPORT (LER)

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
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TITLE (4) Technical Specification 3.0.3 Entered When Both Trains of Containment Valve Injection Water System Rendered Inoperable Due to Incorrect Valve Positioning

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT DATE (7) | | | OTHER FACILITIES INVOLVED (8) | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | MONTH | DAY | YEAR | FACILITY NAMES | DOCKET NUMBER(S) |
| | | | | | | | | | N/A | 0 5 0 0 0 |
| 0 4 | 0 2 | 9 0 | 9 0 | 0 1 5 | 0 0 | 0 5 | 0 3 | 9 0 | | 0 5 0 0 0 |

| OPERATING MODE (9) | 3 | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11) | | | |
|---|---|---|---|---|---|
| POWER LEVEL (10) | 0 0 | 20.402(b) | 20.405(c) | 50.73(a)(2)(iv) | 73.71(b) |
| | | 20.405(a)(1)(i) | 50.36(c)(1) | 50.73(a)(2)(v) | 73.71(c) |
| | | 20.405(a)(1)(ii) | 50.36(c)(2) | X 50.73(a)(2)(vii) | OTHER (Specify in Abstract below and in Text, NRC Form 366A) |
| | | 20.405(a)(1)(iii) | 50.73(a)(2)(i) | 50.73(a)(2)(viii)(A) | |
| | | 20.405(a)(1)(iv) | 50.73(a)(2)(ii) | 50.73(a)(2)(viii)(B) | |
| | | 20.405(a)(1)(v) | 50.73(a)(2)(iii) | 50.73(a)(2)(x) | |

LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER |
|---|---|
| | AREA CODE |
| R.M. Glover, Compliance Manager | 8 0 3 8 3 1 - 3 2 3 6 |

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 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
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| SUPPLEMENTAL REPORT EXPECTED (14) | | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
|---|---|---|---|---|---|
| YES (If yes, complete EXPECTED SUBMISSION DATE) | X NO | | | | |

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


On April 2, 1990, at 1350 hours, Unit 1 underwent an operating mode change from Cold Shutdown, Mode 5, to Hot Shutdown, Mode 4, with both trains of the Containment Valve Injection Water (NW) System inoperable due to isolated assured makeup supply from the Nuclear Service Water (RN) System. The Unit was subject to the action requirements of Technical Specification 3.0.3 due to failure to meet the limiting conditions for operation as specified by Technical Specification 3.6.6 pertaining to the NW System. The incident is attributed to an Inappropriate Action in that the Unit Supervisor, for the purpose of equipment protection, intentionally denoted the incorrect return valve position on a Removal & Restoration (R&R) sheet for the RN makeup to the NW Surge Chambers manual isolation valves. The action was contrary to established R&R policy and practice. The valves were opened and Technical Specification 3.0.3 was exited at 1457 hours on April 5. As planned action, Operations management personnel will re-define independent verification requirements to include verification of the "return" position associated with removal and restoration of equipment.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

BACKGROUND

The Containment Valve Injection Water [EIIS:JM] (NW) System is a safety-related system designed to inject water between the two seating surfaces of selected gate valves [EIIS:V] used for Containment isolation. The injection pressure is higher than Containment design peak pressure during a LOCA. The injection prevents leakage of the Containment atmosphere through the gate valves, thereby reducing potential offsite dose following the postulated accident.

Each train of the NW System includes a water-filled surge chamber pressurized with nitrogen. Makeup water is provided from the Demineralized Water Storage Tank for testing and surge chamber makeup during normal plant operation. Assured 30-day makeup water is provided from the Nuclear Service Water [EIIS:BI] (RN) System essential header. The surge chamber receives automatic RN makeup through NW System isolation solenoid valves (1NW-8A and 1NM-61B for Surge Chambers 1A and 1B, respectively), which open either when the respective surge chamber water level drops below the low-low level or if the surge chamber nitrogen pressure drops below the low-low pressure setpoint, either coincident with a Containment Phase A Isolation signal. RN assured makeup is supplied at a pressure such that injection water pressure at the Containment isolation valves is greater than 110% of peak Containment accident pressure. The assured makeup supply line is also equipped with a manual isolation valve (1RN-494 and -493 for Trains A & B) upstream of the solenoid valves.

Prior to this incident, verification that RN is capable of supplying the required flow to the NW System was accomplished by periodic test PT/1/A/4200/62, RN to NW Piping Flush. The NW surge chamber was isolated while flow was directed to and measured from a system vent line. It became evident that RN flow measured by this method was not necessarily representative of flow to the surge chamber, as revealed in LER 414/90-06 which documents the discovery of insufficient flow to NW Surge Chamber 2A.

In the interest of preventing RN water from entering the NW System, an alternative test method was developed and incorporated for NW Surge Chambers 2B, 1A, and 1B. In the alternate test arrangement, the RN supply line is disconnected from the surge chamber and the vent line remains isolated.

Technical Specification 3.6.6 states that both trains of the NW System are to be operable in Modes 1, Power Operation, 2, Startup, 3, Hot Standby, and 4, Hot Shutdown. System operability requires the availability of RN to maintain the necessary system pressure for at least 30 days. With both trains of NW inoperable, a Unit shutdown as applicable to Technical Specification 3.0.3 is required.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

DESCRIPTION OF INCIDENT

On March 30, 1990, at 2100 hours, with Unit 1 in Mode 5, Cold Shutdown, Trains A and B of the NW System were removed from service in order to conduct a verification test of adequate RN flow to the NW surge chambers. Proper entries were made in the Tech Spec Action Item Log to ensure work was completed prior to Mode 4. The test had formerly been performed as PT/1/A/4200/62, but it became necessary to alter the test arrangement by work requests after pipe [EIIS:PSP] clogging was discovered on Unit 2. Equipment tag-outs necessary for disconnecting the NW surge chamber tubing were issued by Operations. The RN flow verification test was conducted by Performance. Maintenance and testing were conducted according to work requests 52548 OPS and 52549 OPS for A and B Trains, respectively. Included in the associated tag-out for the maintenance activity were valves 1RN-494 and -493 in the CLOSED position. It was necessary during the flow test that these valves be temporarily re-opened for RN supply by lifting the safety tags. When the testing was completed and the surge chamber tubing reconnected, the system was returned to the lineup designated by the return positions on the R & R sheet. The return position designated for both valves was CLOSED while the normal and correct position should have been specified as OPEN.

On April 5, at 1440 hours, shortly after entering Mode 3, valves 1RN-494 and -493 were discovered in the closed position. Three days earlier on April 2 (at 1350 hours), Unit 1 entered Mode 4, Hot Shutdown, in which it is required that both NW trains be operable. Since it was necessary to declare both NW trains inoperable, Unit 1 was subject to the ACTION requirements of Technical Specification 3.0.3. The two subject valves were immediately placed in the OPEN position and both trains of NW were declared operable.

CONCLUSION

The cause of this incident was determined to have been due to Inappropriate Action on the part of the Unit 1 Supervisor in incorrectly denoting on the R&R sheet the return position of the subject valves. Even though designation of CLOSED for the isolation valves was in error, the intent of the Unit Supervisor was that the valves should remain closed at that time (Mode 5) to ensure that raw RN water was not needlessly admitted to the NW surge tanks. The decision was to have been followed-up with appropriate White (equipment protection) Tags, which would have provided the necessary documentation to account for valve positions prior to entering Mode 4. The caution being taken by the Unit Supervisor was due to uncertainty that the RN to NW flow testing was complete, even though Maintenance personnel had reconnected the surge chamber tubing and had signed-off the associated safety tags. Similar flow testing had been an ongoing evolution on Unit 2 (which resulted in LER 414/90-06 documenting insufficient makeup capability due to a mud-clogged line) and was subsequently made a Mode 4 item for Unit 1.



*U.S. GPO: 1988-520-589/00070

Issuance of the intended White Tag R&R was subsequently overlooked and was never completed, resulting in the undocumented positioning of the subject valves. Even if the White Tags had been issued, designation of the out-of-normal position as the R&R return position is contrary to accepted practice. Therefore, the closed-out R&R could not serve as documentation of valve position since CLOSED was indicated as normal.

The discovery of the closed valves was through a proactive effort for ensuring plant configuration control utilizing PT/1/A/4400/02C, Nuclear Service Water Valve Verification.

A search of the OEP data base revealed two similar events to the subject event. LER 413/88-029, which occurred October 25, 1988, involved entering Technical Specification 3.0.3 due to inoperability of both trains of the NW System as a result of a defective procedure. LER 414/88-003 occurred February 9, 1988, which involved a failure to follow the tagout removal procedure. The incident involved a Safety Injection actuation due to tag removal and switch repositioning without possession of the signed tag stub. Additionally, the tagout sheet had not been signed by the Supervisor to allow tag removal. The subject event is therefore considered to be recurring.

CORRECTIVE ACTION

SUBSEQUENT

1) Valves 1RN-493 and -494 were opened and both trains of NW were declared operable.

2) For critical systems, all R&Rs completed since valve checklists were run were reviewed to verify the correct restoration positions.

3) Operations management personnel instituted additional verification of "return" positions through meetings with each shift.

4) This incident was reviewed with all Operations Shifts.

PLANNED

1) Operations management personnel will revise Operations Management Procedures to re-define Independent Verification requirements to include verification of "return" positions.

2) This incident will be reviewed in Operator License Requalification training.

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SAFETY ANALYSIS

The NW surge chambers are normally maintained with a pressurized volume corresponding to 72% level, or approximately 67 gallons. Upon receipt of a Phase A Containment Isolation signal, the chamber outlet isolation valve would open to inject water into the cavity between the seating surfaces of certain gate valves used for containment isolation. One noted difference between a system test and actual system operation is that the cavities of the majority of the valves served would already be filled with water at a pressure higher than Containment design pressure, thereby minimizing depletion of the surge chamber. Based on the maximum allowable valve seal injection flow rate of 1.29 gpm (Unit 1-Train A), it can be expected that with no chamber makeup provided, the available surge chamber volume of 67 gallons would be depleted in approximately 52 minutes. The most recent actual leakage test results have indicated an injection flow rate to be approximately 0.8 gpm, which would yield a chamber depletion time of approximately 84 minutes following an actuation of the NW System. It is therefore reasonable to assume that adequate sealing of the affected containment isolation valves would have been provided for at least 84 minutes. Symptoms indicating isolation of assured NW makeup would not be evident at least until low-low chamber level was reached, set to occur at 25% level and approximately 44 minutes into an accident.

At the low-low chamber level setpoint with the Containment Isolation signal present, automatic makeup from RN would normally occur. With that source isolated, the contents of the surge chamber would in fact be depleted, but not before control room computer alarms would be received for surge chamber low level and pressure. Position status of the RN supply isolation valve (1NW-8A or 1NW-61B) would indicate OPEN on the computer at the low-low level signal. Analog computer indication of chamber level, as well as control board gauges of pressure and level are also available to the Operator. Indication of low surge chamber level and pressure, open status for the RN supply isolation valve, and normal RN essential header pressure would be evidence of either a closed valve or blockage in the suppy line to the surge chamber. These symptoms could reasonably be expected to be evident on both trains and at different times due to a difference in train leakage rates.

With the situation recognized, manual makeup of a limited volume from the Makeup Demineralized Water [EIIS:KJ] (YM) System, coordinated with the proper nitrogen overpressure from the available nitrogen supply, would have remained as a viable but limited option. The limitation of resorting to YM in an accident situation is in view of the 30-day capacity and minimum pressure requirement placed on the NW surge tank assured makeup.

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The undocumented closure of valves 1RN-493 and -494 resulted in a condition whereby assured RN makeup to both trains of NW surge chambers was not available. The condition was created in Mode 5 when the associated Technical Specification did not apply. In subsequent applicable Modes 4 and 3, the condition existed for approximately 73 hours. A leak on the Reactor Vessel Head forced the Unit to return to Mode 5. The subsequent return to Mode 4 entailed another performance of the test; misalignment of the RN valves would have been discovered at that time, if not discovered sooner. If the closed valve discrepancy had not been discovered during these plant configuration reviews, it would have been identified during performance of the next monthly periodic test PT/1/A/4400/02C, Nuclear Service Water Valve Verification.

The postulated event of concern is a Loss of Coolant Accident (LOCA) occurring during the period of time in which both trains of NW were inoperable. Thus, the low probability of a large break LOCA (7E-4) is further reduced by the brief period of inoperability. The overall probability of the postulated event is extremely low, approximately 6E-6.

If the postulated event were to occur, seal injection flow would have been available until depletion of the surge chambers. After this time, with no makeup assumed, offsite dose limits specified in 10CFR100 could have been exceeded due to increased leakage of Reactor coolant outside Containment.

An additional factor that would limit onsite and offsite doses in a LOCA event is that the Unit only achieved heatup to Mode 3 before the situation was corrected. There was essentially no decay heat load since this was the initial heatup from refueling and the source term available for release was diminished by the 1/3 core that had zero burnup.

During the period of time in which both trains of NW were inoperable, an accident requiring operation of NW did not occur. Thus, there were no radiological consequences as a result of this incident and the health and safety of the public were not affected.