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October 16, 1991

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Washington, D. C. 20555

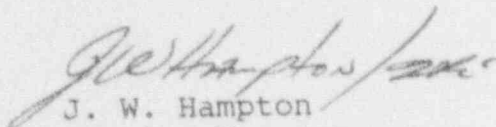
Subject: Catawba Nuclear Station
Docket No. 50-414
LER 414/90-11

Gentlemen:

Attached is Licensee Event Report 414/90-11, Revision 1 concerning TECHNICAL SPECIFICATION VIOLATIONS DUE TO INOPERABLE CONTAINMENT PENETRATIONS DUE TO LACK OF DOCUMENTATION.

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

Very truly yours,


J. W. Hampton
Station Manager

ken:LER-NRC.JWH

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LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-5.0), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

Catawba Nuclear Station, Unit 2

DOCKET NUMBER (2)

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PAGE (3)

TITLE (4) TECHNICAL SPECIFICATION VIOLATIONS DUE TO INOPERABLE CONTAINMENT

PENETRATIONS DUE TO LACK OF DOCUMENTATION

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)							
0	7	1	1	9	0	9	0	0	1	1	0	5	0	0	0		
									N/A	0	5	0	0	0			

OPERATING MODE (9)

0

POWER LEVEL (10)

0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)

20.402(b)

20.405(c)

50.73(a)(2)(iv)

73.71(b)

20.405(a)(1)(i)

50.36(a)(1)

50.73(a)(2)(v)

73.71(c)

20.405(a)(1)(ii)

50.36(a)(2)

50.73(a)(2)(vi)

OTHER (Specify in Abstract below and in Text, NRC Form 366A)

20.405(a)(1)(iii)

X 50.73(a)(2)(iii)

50.73(a)(2)(vii)(A)

20.405(a)(1)(iv)

50.73(a)(2)(iv)

50.73(a)(2)(vii)(B)

20.405(a)(1)(v)

50.73(a)(2)(v)

50.73(a)(2)(x)

LICENSEE CONTACT FOR THIS LER (12)

NAME

C. L. Hartzell, Compliance Manager

TELEPHONE NUMBER

AREA CODE

8 0 3 8 3 1 7 3 6 6 5

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

SUPPLEMENTAL REPORT EXPECTED (14)

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

☐ YES (If yes, complete EXPECTED SUBMISSION DATE)☒ NO

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

On July 11, 1990, with Unit 2 in No Mode, Defueled, a Catawba Safety Review Group (CSRG) staff member noted, during a review of tagouts, that the Tagout Record Sheet for the closure of 2NC-61, NC to Pzr Smpl Hx Isol Valve, had been active for some time. Valve 2NC-61 was specified to be locked open, and closing it could allow post-accident pressure inside the Pressurizer sample penetration to exceed design pressure. Further investigation revealed that 2NC-61 had previously been closed per procedure. This valve was closed, in both cases, to isolate Pressurizer steam from leaking into and diluting Pressurizer water samples being taken by Chemistry. The Unit operated in violation of the Technical Specification requiring this penetration to be operable from February 19, 1988 to April 27, 1988; from April 29, 1988, to March 11, 1989; and from June 2, 1989, to June 11, 1990. It was subsequently found that five other tagouts had isolated design relief paths when penetrations were required to be operable. This incident is attributed to a design deficiency due to a lack of documentation on these relief paths. Corrective actions will include training on the significance of valve positions as they relate to relief paths.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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TEXT (If more space is required, use additional NRC Form 365A's) (17)

BACKGROUND

The Reactor Coolant [EII:AB] (NC) System is designed to transfer heat from the Reactor to the Steam Generators [EII:HX], where heat is then transferred to the Feedwater [EII:SJ] (CF) and Main Steam [EII:SB] (SM) Systems. The Pressurizer provides pressure control for the NC System, by maintaining liquid and vapor in equilibrium.

The Nuclear Sampling [EII:KN] (NM) System provides samples for laboratory analysis of primary coolant chemistry, for information such as boron concentration, chloride concentration, fission gas content, pH, etc. One sample room is provided per Unit. For Pressurizer samples, one sample line is provided for the Pressurizer water space, and one sample line is provided for the Pressurizer steam space (see Figure 1). Prior to exiting Containment, both Pressurizer sample lines connect to form one Containment penetration. Three Containment Isolation Valves [EII:V] are provided to isolate the penetration on a Containment Isolation signal (see Figure 1): 2NM-3A, Pzr Liq Smpl Line Cont Isol Valve, 2NM-6A, Pzr Stm Smpl Line Cont Isol Valve, and 2NM-7B, Pzr Smpl Hdr Cont Isol Valve. 2NM-424, Pzr Smpl Line Byp Chk Valve, is provided to enable pressure relief for the penetration back to the Pressurizer through 2NC-61, NC to Pzr Smpl Hx Isol Valve, under design accident conditions when 2NM-3A, 2NM-6A and 2NM-7B are all closed.

Operating Procedure OP/2/A/6150/01, Filling and Venting the Reactor Coolant System, specifies that the position of 2NM-3A, 2NM-6A and 2NM-7B be closed. However, when Chemistry performs a Pressurizer water sample per OP/0/A/6200/11, Operating Procedure for the Primary Sampling System (NM), 2NM-3A and 2NM-7B must be opened, and when performing a Pressurizer steam space sample, 2NM-6A and 2NM-7B must be opened to obtain a sample.

Technical Specification 3.4.7 requires that NC System chemistry (dissolved oxygen, chloride and fluoride concentrations) be verified to be within limits at least once per 72 hours. OP/0/A/6200/11 is used to obtain the required samples.

Technical Specification 3.6.1.1 requires that primary Containment integrity be maintained in Mode 1, Power Operation, Mode 2, Startup, Mode 3, Hot Standby, and Mode 4, Hot Shutdown. Type C leak rate tests are required to be performed on several penetrations, one of which is M-235, Pressurizer Sample. This penetration is required to be operable to meet the intent of Technical Specification 3.6.1.1.

Operations Management Procedure (OMP) 2-18, Tagout Removal and Restoration (R&R) Procedure, describes the proper use of tagouts in removing equipment from service for maintenance or safety, and returning it to service. OMP 2-18 states the "long term system alignments outside the original system design should not be covered by an R&R."

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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TEXT (If more space is required, use additional NRC Form 386A's) (17)

Operations Management Procedure 2-1, Audit of Safety Tags and Tagout (R&Rs), provides instructions for auditing the use of tags and R&R sheets. A quarterly white tag audit ensures that tags placed for a period of 90 days or longer are legible, securely attached to the correct equipment, that they are in a condition to perform their functions until the next audit, and that the equipment tagged is in the position required by the tag. All untagged (R&R) sheets issued for greater than three months are reviewed by the Unit Coordinator (or his designee) to determine if the R&Rs are still required.

EVENT DESCRIPTION

Check valve 2NM-424 was installed to provide a pressure relief path for the Pressurizer sample penetration, M-235, in place of an existing relief valve. This was performed under Design Change Authorization (DCA) CN-2-M1471. The position of 2NC-61 was specified to be locked open on design drawings as part of this modification. This modification was also performed on Unit 1.

On February 5, 1988, OP/2/A/6150/01 was revised to change the position of valve 2NC-61 from Open to Closed in response to a request from Chemistry. Chemistry personnel had previously noted that, while taking Pressurizer water samples, steam was entering and diluting the samples. It was suspected that Pressurizer steam was leaking by 2NM-6A (see Figure 1), and Chemistry requested that 2NC-61 be closed to isolate the line. The 10CFR50.59 Safety Evaluation for this revision to OP/2/A/6150/01 did not take into account the significance of changing this valve's position.

On February 10, 1988, the valve checklist for OP/2/A/6150/01 was completed, with 2NC-61 in the closed position. Unit 2 was in Mode 5, Cold shutdown, at this time. On February 19, 1988, Unit 2 entered Mode 4. Unit 2 operated in Modes 1 through 4 from February 19 to April 27, 1988, and from April 29, 1988, to March 11, 1989, with 2NC-61 closed per OP/2/A/6150/01.

On April 28, 1989, OP/2/A/6150/01 was retyped. One of the changes was to return the position of 2NC-61 to Locked Open. The 10CFR50.59 Safety Evaluation recognized that 2NC-61 should remain open to provide a relief path for the penetration.

On May 3, 1989, the valve checklist for OP/2/A/6150/01 was completed, with 2NC-61 in the Locked Open position. Unit 2 was in Mode 6, Refueling, at this time.

Subsequently, Chemistry personnel again requested that 2NC-61 be closed, so that Pressurizer water space samples would not be diluted. In response to this request, an Operations Engineer initiated Removal and Restoration (R&R) 29-1511 to close 2NC-61. The Operations Engineer did not realize the safety significance of closing this valve.

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

On June 2, 1989, with Unit 2 in Mode 3, the Unit Supervisor ordered completion of R&R 29-1511, closing 2NC-61. The Unit Supervisor did not realize the safety significance of closing this valve. Unit 2 operated in Modes 1 through 4 between June 2, 1989, and June 11, 1990, with 2NC-61 closed per R&R 29-1511. During this period of time, R&R 29-1511 was audited periodically, as required by OMP 2-1.

On July 11, 1990, with Unit 2 in No Mode, Defueled, a Catawba Safety Review Group (CSRG) staff member noted, during a review of tagouts, that R&R 29-1511 had been active for a relatively long period of time. Since tagouts are to be used for relatively short term items, the CSRG staff member investigated the tagout and learned that 2NC-61 was designed to be locked open to provide a relief path back to the Pressurizer for liquid trapped in the Pressurizer sample Containment penetration under accident conditions. Further investigation revealed that 2NC-61 had been previously closed by OP/2/A/6150/01.

On July 12, 1990, Problem Investigation Report (PIR) No. 2-C90-0236 was initiated to perform a past operability evaluation, evaluate R&R 29-1511 per the requirements regarding proper use of an R&R, evaluate the need to issue a Work Request to repair possible seat leakage on 2NM-6A, and to review the 10CFR50.59 evaluation for the February 5, 1988 retype of OP/2/A/6150/01.

On July 27, 1990, Design Engineering issued a Past Operability Evaluation indicating that the Pressurizer sample penetration was inoperable during any time when 2NC-61 was closed, and Containment integrity systems were required to be in effect (Modes 1 through 4). With 2NC-61 closed, the design function of 2NM-424 was defeated, and under accident conditions, the penetrator could pressurize beyond design specifications, although not beyond ASME code limitations.

Between November 20 and 26, 1990, with Units 1 and 2 in Mode 1, it was found during a CSRG review of containment penetration relief paths that five additional tagouts had defeated relief capability since January 1, 1986. Two of these, R&R 26-5153 and R&R 27-7648, closed 2NC-61 prior to R&R 29-1511, to prevent dilution of Pressurizer samples. R&R 26-5153 was in place from July 22 to September 3, 1986, during which Unit 2 was in Modes 1, 2 and 3. R&R 7648 was in place from August 26 to December 31, 1987, during which Unit 2 was in Modes 1 through 4. Two other tagouts, R&R 17-6829 and R&R 17-9490, closed 1NC-61, also to prevent dilution of Pressurizer samples. R&R 17-6829 was in place from January 12 to October 3, 1987, during which Unit 1 was in Modes 1 through 5. R&R 17-9490 was in place from December 8, 1987, to December 4, 1988. The remaining tagout, R&R 29-1523, closed 2BB-17, S/G 2B Blowdown Smpl Valve, for 13 hours, 15 min. on June 4, 1989, with Unit 2 in Mode 3. This defeated the designed relief path for penetration M-338. All five of these additional tagouts occurred prior to the awareness gained from this incident, and their safety significance is bounded by that resulting from R&R 29-1511.

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TEXT (If more space is required, use additional NRC Form 368A's) (17)

CONCLUSION

This incident is attributed to a design deficiency, due to a lack of documentation concerning containment penetration relief paths. This lack of documentation at Catawba resulted in less-than-adequate understanding of the design significance of isolation valves associated with containment penetrations. The safety significance of closing 2NC-61 was not realized by the Unit Supervisor, Operations personnel developing R&R 29-1511, Operations personnel closing 2NC-61 in the revisor to OP/2/A/6150/06 or by Operations personnel completing the Mode 1 and 2 checklist for the Controlling Procedure for Unit Startup. To prevent recurrence of this incident, training is being provided to Operations personnel on the significance of valve positions with regard to providing penetration relief paths. Also, a list of valves which are locked in their design positions has been developed as part of a Design Study, which includes the reasons for each valve being locked. In addition, flow diagrams will include reason codes for these locked valves, so that the reason for valves being locked can also be obtained from a listing included with the diagrams. Training concerning containment penetration relief paths will be provided during operator requalifications. An attachment to the R&R Operations Management Procedure was added, which lists valves required to be open to provide over-pressure protection of specific Containment penetrations. The combination of documentation on locked valves, and the increased awareness from training on Containment penetration relief paths, should prevent this event from recurring. This incident has been discussed with the Unit Supervisor, Operations Procedure Groups, and the Operations Unit Coordinator Group.

This incident is assigned a contributing cause of inappropriate action, due to failure to follow management procedures. Operations personnel used R&Rs on a long term basis without other measures being taken. As reflected in the 10CFR50.59 Safety Evaluation for the April 28, 1989, retype of OP/2/A/6150/01, it was known by some Operations personnel that closure of 2NC-61 was undesirable. If other measures had been taken to solve the problem of steam entering the samples, it is likely that the period of inoperability would have been prevented during which R&R 29-1511 was in effect. An update has been issued to Operations personnel on the importance of proper reviews of tagouts, including the need to request the assistance of staff personnel when necessary. In the future, any R&R written on equipment to remain operable, and which is required to be operable, will be referred to the Operations Support Section prior to proceeding. At a minimum, the R&R will be reviewed by a SRO who is a Qualified Reviewer for operability concerns. A brief description of this review will be forwarded to the Operations Support Section. In addition, a review of R&Rs is being conducted to ensure no other R&R is being used that does not agree with the revised Operations Management Procedure guidance on proper use of R&Rs.

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TEXT (If more space is required, use additional NRC Form 306A's) (17)

It was noted during the investigation of this incident that the containment isolation valves for the Pressurizer sample penetration were not closed per the Chemistry Procedure following completion of the sample. From July, 1989, to the present, Chemistry has conducted a Procedure Upgrade Program. Critical Chemistry procedures (OP's, PT's, CP's), including the NM procedures, have been reviewed and revised. Procedure Upgrades included review and revision to assure valves are returned to proper positions after each operating sequence. Also, training is being provided to Chemistry personnel on the safety significance of closing valves required to provide design relief paths.

The Plant Design Basis Document (DBD) Specification has been revised to include a section on overpressure protection of Containment penetrations, to document the protection criteria, and to call attention to the controlling calculation. Each system DBD Specification will contain specific details concerning how that system's containment penetration meets the overpressure protection criteria. The valve replacement check will be modified to incorporate an entry to evaluate the replacement valve's potential impact on Containment penetration overpressure relief paths.

Technical Specification violations resulting from lack of documentation are a recurring problem at Catawba. However, no previous events involved a less than adequate review of a Containment penetration relief path. LER 414/90-002 described an incident in which operators were not aware of the Tech Spec requirements of Containment integrity involving manual valves (2SA-1 and 2SA-4). This LER is similar in that an unawareness of the requirements of Containment integrity involving manual valves (2BB-17, 1NC-61, and 2NC-61), was the cause of the event. Training on Containment penetration relief paths, along with the other corrective actions listed, should prevent the recurrence of this incident. The inappropriate actions involved in this incident occurred previous to the implementation of a human performance improvement program at Catawba. The emphasis which this program places on quality work should reduce the number of these types of inappropriate actions.

CORRECTIVE ACTIONSUBSEQUENT

- 1) This incident has been discussed with the Unit Supervisor, Operations Procedure Group, and the Operations Unit Coordinator Group.
- 2) Valve 2NM-6A was repaired under Work Request 46554 OPS.
- 3) Valve 2NM-424 was replaced under Work Request 3582 NSM.
- 4) Critical Chemistry procedures, including NM procedures, have been upgraded, ensuring that valves are properly realigned.

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TEXT (If more space is required, use additional NRC Form 368A's) (17)

- 5) An Update was issued to Operations personnel on the importance of proper reviews of tagouts, including the need to request the assistance of staff personnel when necessary.
- 6) Valve 2NC-61 was reopened prior to Mode 4.
- 7) An attachment to the R&R Operations Management Procedure was added which lists valves required to be open to provide over-pressure protection of specific Containment penetrations.
- 8) A review of R&Rs was conducted to ensure no other R&R is being used that does not agree with the revised Operations Management Procedure guidance on proper use of R&Rs.
- 9) A list of valves which are locked in their design positions has been developed. This list is part of a Design Study and includes the reasons for each valve being locked.
- 10) The Plant Design Basis Document (DBD) Specification has been revised to include a section on overpressure protection of containment penetrations, to document the protection criteria, and to call attention to the controlling calculation.
- 11) Training is being provided to Operations and Chemistry personnel concerning types of system relief paths and ASME code relief paths (pressure and vacuum reliefs), and Containment penetration relief paths.
- 12) Any R&R written on equipment to remain operable, and which is required to be operable, will be referred to the Operations Support Section prior to proceeding. At a minimum, the above R&R will be reviewed by an SRO who is a Qualified Reviewer for operability concerns. A brief description of this review will be forwarded to the Operations Support Section.

PLANNED

- 1) The valve replacement checklist is being modified to incorporate an entry to evaluate the replacement valve's potential impact on containment penetration overpressure relief paths.
- 2) Each system DBD Specification will contain specific details concerning how that system's containment penetration(s) meet the overpressure protection criteria.

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TEXT: If more space is required, use additional NRC Form 385A's (17)

SAFETY ANALYSIS

Design Engineering provided the following Past Operability Evaluation. The function of valve 2NM-424 is to provide overpressure protection for containment penetration M-235 due to thermal expansion of the fluid trapped between containment isolation valves 2NM-3A, 2NM-6A, 2NM-7B, and 2NM-424. This relief path from the penetration through 2NM-424 back to the pressurizer must remain open to prevent overpressurization of the containment penetration. For this reason, valve 2NC-61 was locked open. It is possible that Reactor Coolant at a temperature approximately that of normal containment atmosphere could be trapped between the previously referenced valves during an event which generates a containment isolation. This event (LOCA or Main Steam Line Break) could elevate the temperature of the trapped Reactor Coolant such that thermal expansion of the fluid could have caused containment penetration M-235 to be pressurized. Relief of this pressure is accomplished via 2NM-424. With valve 2NC-61 closed, the penetration relief path via 2NM-424 is inoperable. This, in turn, renders penetration M-235 inoperable because it can no longer prevent an overpressure condition from occurring as originally designed. However, during examination of the components which comprise this penetration, the following was realized. The piping involved has an ASME code allowable pressure of 7384 psia. The valves involved have been hydrotested to 5400 psig. Also, the valve orientation is such that normal flow is under the valve seat. In the scenario described above, this would result in pressure in the penetration building up over the seat of valves 2NM-3A and 2NM-6A, and under the seat of valve 2NM-7B. At a pressure of 4079 psi, valve 2NM-7B would start to leak past its seat and thus relieve the pressure caused by fluid thermal expansion. Since this scenario could only occur if all of the valves encompassing M-235 initially provided leak tight operation, and the only valve thought to relieve pressure is 2NM-7B, the inside containment isolation valves would maintain their seal and thus maintain containment integrity. (Note that if a single active failure of any of the containment isolation valves were to occur, no fluid would be trapped in the penetration.) In addition, the fluid leaking via 2NM-7B would be Reactor Coolant pressurizer fluid, not accident contaminated fluid. Therefore, there would be no adverse dose consequences as release of this small amount of fluid would not impact any release limits. Containment integrity at penetration M-235 would have been maintained during postulated accidents without the functioning relief path. Design Engineering determined that conditions of the corresponding penetration on Unit 1 (M-235) and the penetration rendered inoperable by closure of 2BB-17 (M-338) were within the boundary of the original safety analysis, i.e., Containment integrity at penetration M-235 on Unit 1 and M-338 on Unit 2 would have been maintained during postulated accidents without their functioning relief paths. The health and safety of the public were not affected by this incident.

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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

