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June 3, 1996

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

Subject: Catawba Nuclear Station
Docket No. 50-413
LER 413/96-002

Gentlemen:

Attached is Licensee Event Report **Technical Specification 3.0.3 Entries Due to Inconclusive Surveillance Testing.**

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

Very truly yours,

Mark E. Patrick for

W. R. McCollum, Jr.

Attachment

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

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Catawba Nuclear Station	05000413	1 OF 9

TITLE (4)
Technical Specification 3.0.3 Entries due to Inconclusive Surveillance Testing

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 NAME	DOCKET NUMBER(S)
										Unit 2	05000414
05	03	96	96	-	002	- 00	06	03	96		05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (Check one or more of the following) (11)			
POWER LEVEL (10)	100	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)	50.73(a)(2)(vii)	OTHER (Specify in
		20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	Abstract below and
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	in Text, NRC Form
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER	
	AREA CODE	
D. P. Kimball, Safety Review Group Manager	(803)	831-3743

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 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)

Unit Status: Units 1 and Unit 2 - Mode 1, Power Operation, at 100 percent power.

Event Description: On May 3, 1996, at 0100 hours, Engineering identified that in the test configuration, multiple continuity paths existed in the control circuitry for both trains of the containment sump recirculation isolation valves for both units. These multiple continuity paths, combined with incorrect multimeter usage by test personnel in circuit continuity verification, rendered surveillance results inconclusive. Additional research by Engineering identified two other instances in which surveillance testing was inconclusive.

Root Cause: This event is attributed to two root causes. Omission of relevant information is cited due to procedure PT/1(2)/A/4200/09A not identifying multiple continuity paths which could affect continuity verification. The second root cause is attributed to Operations Test Group (OTG) personnel not being adequately trained in the use of multimeters which are used to verify circuit continuity.

Corrective Action: Applicable components were declared inoperable, PT/1(2)/A/4200/09A was revised to eliminate multiple continuity paths or provide specific instructions on multimeter use to ensure conclusive testing, and continuity verification was successfully performed on all affected circuitry. Planned corrective actions include additional review of test procedures and formal training for OTG personnel in multimeter use.

BACKGROUND

PT/1(2)/A/4200/09A, Auxiliary Safeguards Test Cabinet Periodic Test, is a quarterly surveillance performed per the requirements of Technical Specification 3.3.2 and tests that part of the Engineered Safety Features Activation System (ESFAS) [EIIS:JE] from the point at which the solid state protection system testing is stopped to the actual operation of the final output device. One test cabinet is provided for each of the two protection trains, designated train A and train B. Several final devices which cannot be operated during plant operation without disturbing the plant or causing equipment damage are provided with blocking relays [EIIS:RLY] to block final actuation of the device. The components noted in this Licensee Event Report (LER) do not have blocking devices and are tested with the power removed. Continuity of the control circuit of the final device is checked instead of actual operation of the device.

The Component Cooling (KC) system [EIIS:CC] is a closed loop treated water system which dissipates waste heat from motor [EIIS:MO] coolers [EIIS:CLR] and intersystem heat exchangers [EIIS:HX] serving various systems supporting plant startup, normal, and shutdown activities. The safety related function of the KC system is to provide an intermediate nuclear safety related heat sink for components of various systems essential in the mitigation of design basis events which require Emergency Core Cooling System (ECCS) operation and to support normal unit operation. The KC system is comprised of two redundant trains designated train A and train B.

Valves [EIIS:V] 1KC2B, 1KC18B, 1KC53B, and 1KC228B are isolation valves [EIIS:ISV] associated with the B train non-essential header. 1KC81B is the KC to residual heat removal (ND)system [EIIS:BP] heat exchanger B train supply isolation valve.

Valves 1(2)KC338B are reactor coolant (NC) [EIIS:AB] pumps [EIIS:P] supply containment isolation valves and are used to isolate the KC supply header for the NC pump cooler and the drain line to the KC drain sump. 1(2)KC424B and 1(2)KC425A are NC pump return header containment isolation valves and serve to isolate the KC return header for the NC pumps cooling flow.

The Safety Injection (NI)system [EIIS:BQ] constitutes a major portion of the ECCS. The NI system provides emergency, borated cooling water to the reactor [EIIS:RCT] core in the event of a break in either the primary (reactor coolant) system or the secondary (steam) systems.

Valves 1(2)NI185A and 1(2)NI184B are containment recirculation sump to Residual Heat Removal (ND) pump isolation valves for train A and B and are tested per PT/1(2)/A/4200/09A, enclosures 13.23 and 13.24, respectively.

Valves 1(2)NI54A, 1(2)NI65B, 1(2)NI76A, and 1(2)NI88B are cold leg accumulator (CLA) [EIIS:ACC] discharge isolation valves for cold leg accumulators A, B, C, and D, respectively and are tested per PT/1(2)/A/4200/09A, enclosures 13.25, 13.26, 13.21, and 13.22, respectively. These valves are normally open, with power disconnected to prevent inadvertent closure, ensuring the CLAs are available.

Technical Specification 3.0.3 is required to be entered when a unit is operating in a condition prohibited by Technical Specifications. It exists when a Limiting Condition for Operation (LCO) is not met except as provided in the associated action requirements. It requires that within one hour action shall be initiated to place the unit in a mode in which the specification does not apply by placing the unit, as applicable, in:

a) At least hot standby in the next 6 hours,
b) At least hot shutdown within the following 6 hours, and
c) At least cold shutdown within the subsequent 24 hours.

Technical Specification 4.0.3 states that failure to perform a surveillance requirement within the allowed surveillance interval, defined by Technical Specification 4.0.2, shall constitute noncompliance with the operability requirements for a LCO. The action requirements may be delayed for up to 24 hours to permit the completion of the surveillance when the allowable outage time limits of the action requirements are less than 24 hours.

EVENT DESCRIPTION

May 2, 1996

~1200 hours During the performance of Unit 1 auxiliary safeguards testing per enclosure 13.24 of PT/1/A/4200/09A, valves 1KC2B, 1KC18B, 1KC53B, 1KC81B, and 1KC228B failed to reposition automatically.

Operations Test Group (OTG) personnel completed the remaining sections of the procedure enclosure successfully, which included the continuity verification for valve 1NI184B. Given the failure of the KC valves, this verification should not have indicated that the slave relay contact to this valve was closed.

2047 hours During the subsequent investigation, Mechanical Systems Engineering (MSE) determined, through the review of electrical elementary drawings and observation of additional testing, that multiple continuity paths existed which, combined with

the multimeter setup used to test circuit continuity, could provide inconclusive test results.

May 3, 1996

0100 hours MSE concluded that the continuity verification to ensure that an open signal is sent to valves 1(2)NI184B and 1(2)NI185A during the performance of PT/1(2)/A/4200/09A, enclosures 13.23 and 13.24, was not adequate. The valves were declared inoperable and both units entered Technical Specifications 3.0.3 and 4.0.3.

MSE continued reviewing the electrical drawings for all slave relays associated with PT/1(2)/A/4200/09A to determine if additional multiple continuity paths existed which could render continuity testing inconclusive.

0300 hours Procedures PT/1(2)/A/4200/09A, enclosures 13.23 and 13.24, were revised to open an additional sliding link to eliminate the multiple continuity paths affecting the continuity testing of 1(2)NI184B and 1(2)NI185A.

1530 hours Valves 1(2)NI184B and 1(2)NI185A were successfully retested and declared operable.

2050 hours MSE determined that the multiple continuity paths existed in the circuitry for the cold leg accumulator (CLA) discharge valves for both units. Thus, the continuity verification did not conclusively verify that the slave relays for valves 1(2)NI54A, 1(2)NI65B, 1(2)NI76A, and 1(2)NI88B changed state when actuated during testing. The valves were declared inoperable and both units entered Technical Specifications 3.0.3 and 4.0.3 due to all CLA discharge valves being declared inoperable.

May 4, 1996

0429 hours PT/1(2)/A/4200/09A, enclosures 13.21, 13.22, 13.25, and 13.26 were revised to perform an additional continuity verification of the slave relay contacts prior to circuitry actuation and specific instructions for OTG personnel for the use of the multimeter used in performing the continuity verification. These measures ensure conclusive verification of the operation of the slave relay contacts.

0700 hours CLA discharge valves for both units were successfully retested and declared operable.

May 6, 1996

1120 hours MSE determined that valves 1(2)KC338B, 1(2)KC424B, and 1(2)KC425A control circuitry for both units contain multiple continuity paths which may have rendered the continuity verification inconclusive. The valves were declared inoperable and both units entered Technical Specifications 3.0.3 and 4.0.3.

PT/1(2)/A/4200/09A, enclosures 13.45 and 13.46, were revised to perform an additional continuity verification of the slave relay contacts prior to circuitry actuation and specific instructions for OTG personnel for the use of the multimeter used in performing the continuity verification. These measures ensure conclusive verification of the operation of the slave relay contacts.

2225 hours Unit 1 valves 1KC338B, 1KC424B, and 1KC425A were successfully retested and declared operable.

May 7, 1996

1050 hours Unit 2 valves 2KC338B, 2KC424B, and 2KC425A were successfully retested and declared operable.

CONCLUSION

This event is attributed to two root causes. The first root cause is omission of relevant information. Omission of relevant information in PT/1(2)/A/4200/09A is cited due to unidentified multiple continuity paths within the tested configuration.

A second root cause is attributed to inadequate training. OTG personnel are qualified to perform PT/1(2)/A/4200/09A per training and qualification guide PF-135-C. This task does not specifically instruct OTG personnel in the use of multimeters during performance of continuity verification. This, combined with multiple continuity paths, creates a scenario in which a failed open slave relay contact could be interpreted to be closed.

During the troubleshooting activities associated with the determination of why valves 1KC2B, 1KC18B, 1KC53B, 1KC81B, and 1KC228B failed to reposition automatically, slave relay K649 was suspected to be the problem. Slave relay K649 actuates these valves as well as 1NI184B. The continuity

verification for 1NI184B was documented as being acceptable during the initial surveillance on May 2, 1996. This would indicate that the relay was closed and that a close signal had been sent to 1NI184B. MSE's investigation could not reconcile why the continuity verification for valve 1NI184B was acceptable and the other KC valves failed to actuate to their proper position.

MSE reviewed the electrical elementary drawings associated with slave relay K649 and identified that multiple continuity paths exist which could give a false indication of continuity depending on how the continuity was checked. Observation of OTG personnel recreating the test identified that the continuity testing methodology utilized a multimeter setting which was on too high of a range to conclusively identify the existence of a potentially open continuity path thus rendering the continuity test results inconclusive.

MSE reviewed the electrical elementary drawings associated with all slave relays which are continuity tested during the performance of PT/1(2)/A/4200/09A. Slave relays with multiple continuity paths were identified for valves 1(2)NI54A, 1(2)NI65B, 1(2)NI76A, 1(2)NI88B, 1(2)KC338B, 1(2)KC424B, and 1(2)KC425A. In each case, the circuit continuity verification could not be determined to be conclusive.

With respect to the issue of training of personnel in the performance of continuity verification, this is an isolated instance. Performance of continuity verification by OTG personnel is minimal. The majority of continuity verifications at the station are performed by the Instrument and Electrical group. Appropriate training in the use of multimeters is provided to these personnel.

Corrective actions included revising PT/1(2)/A/4200/09A to provide assurance that continuity verifications produce conclusive results, instruction on multimeter usage for OTG, and retesting of all affected circuitry for both units following the before mentioned procedure changes. All testing verified operability of the tested components.

Planned corrective actions include the review of applicable surveillance procedures to ensure that multiple continuity paths and/or training concerns do not exist, additional evaluation of PT/1(2)/A/4200/09A to determine if other long term enhancements are warranted, and additional training for OTG personnel in the performance of continuity verification.

A review of the operating experience database for the two years preceding this event identified three events which had similarities with respect to the root cause of omission of relevant information:

- Licensee Event Report (LER) 414/94-007 details an event which occurred on October 21, 1994, involving the discovery of both motor driven auxiliary feedwater (CA) system [EIIS:BA] pumps being inoperable due to closed valves. The CA system valve lineup was not returned to the proper alignment following pump reset. This event was attributed to omission of relevant information in the applicable procedures.

- LER 414/94-004 details a missed surveillance event due to the failure to increase the surveillance frequency of two valves which had increased stroke times, but were within their applicable acceptance criteria. This event occurred on August 30, 1994, and was attributed to omission of relevant information due to a change in the method of updating test frequency due to a procedure change.

- LER 414/96-002 details an event which occurred on March 22, 1996, involving two inoperable hydrogen igniters [EIIS:BB] in the same region. This event was attributed to omission of relevant information in that there was less than adequate provision procedurally to contact Operation when Maintenance identified that one ignitor was inoperable.

The current event is unique in that it involves inadequate design of a test procedure and inadequate training. The corrective actions to the previous events are not applicable to the current event and would not have prevented this event. Additionally, the review of previous events did not identify any events attributed to inadequate training.

This event is not considered recurring.

CORRECTIVE ACTION

SUBSEQUENT

1) Engineering reviewed electrical elementary drawings for all tested circuitry in PT/1(2)/A/4200/09A to determine if multiple continuity paths existed.

2) PT/1(2)/A/4200/09A was revised to provide direction to perform the continuity verification.

   - Enclosures 13.23 and 13.24, which verify the continuity of the circuitry for 1(2)NI185A and 1(2)NI184B, respectively, were changed to remove the parallel flowpaths.

   - Enclosures 13.21, 13.22, 13.25, and 13.26 were revised to perform an additional continuity verification of the slave relay contacts

prior to circuitry actuation and specific instruction for OTG personnel check for the use of the multimeter used in performing the continuity verification.

- Enclosures 13.45 and 13.46 were revised to perform an additional continuity verification of the slave relay contacts prior to circuitry actuation and specific instruction for OTG personnel for the use of the multimeter used in performing the continuity verification.

3) OTG personnel qualified to perform PT/1(2)/A/4200/09A received instructions on the appropriate method of multimeter setup for continuity verification.

4) Following the revisions to the affected enclosures to PT/1(2)/A/4200/09A, surveillance testing was successfully performed ensuring all components were operable.

PLANNED

1) Revise the Operations Test Group (OTG) qualification guide for performance of PT/1(2)/A/4200/09A and ensure proper training is provided to OTG personnel performing continuity verification.

2) Review applicable surveillance procedures to ensure that multiple continuity paths and/or training concerns, which could provide inconclusive continuity verifications, do not exist.

3) Engineering and OTG will evaluate, from a long term perspective, the changes made to PT/1(2)/A/4200/09A and revise as necessary with respect to the use of sliding links to remove alternate continuity paths and specific instructions for performing continuity verification.

Safety Analysis

This LER details three separate instances in which surveillance testing was identified to be inconclusive. In each case, multiple continuity paths existed such that even if a slave relay contact failed to actuate, the alternate path would have provided a false indication of circuit continuity with respect to the multimeter setup used to verify the continuity.

Valves 1(2)NI184B and 1(2)NI185A function to provide a suction source of water from the containment sump to the ND pumps during the sump recirculation phase of a Loss of Coolant Accident (LOCA).

Valves 1(2)KC338B, 1(2)KC424B, and 1(2)KC425A function to isolate containment on receipt of a hi-hi containment pressure signal.

Valves 1(2)NI54A, 1(2)NI65B, 1(2)NI76A, and 1(2)NI88B function to provide a passive system for injection of borated water into the NC system cold legs once depressurization has occurred at approximately 600 pounds per square inch gauge during a LOCA. These valves are normally open, with power removed, during reactor power operation, but do receive an open signal upon receipt of a safety injection signal.

Although the quarterly surveillance testing of these valves per PT/1(2)/A/4200/09A would not conclusively ensure the valves would have performed as designed, additional testing supports that these valves would have functioned as designed. Each of these valves have been successfully tested per PT/1(2)/A/4200/09, Engineered Safety Features Actuation Periodic Test, during each of the past refueling outages. Retests performed following the revisions to PT/1(2)/A/4200/09A also support the operability of the valves.

The health and safety of the public were not affected by this event.