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

Subject: Catawba Nuclear Station
Docket No. 50-413
LER 413/96-012, REV. 01

Gentlemen:

Attached is Licensee Event Report 413/96-012, REV. 01, concerning **Auxiliary Feedwater System Found Outside Design Basis.** This LER was revised to provide additional information and corrective actions.

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

Cordially,

W. R. McCollum, Jr.

Attachment

cc: Mr. L.A. Reyes
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Mr. P. S. Tam
U.S. Nuclear Regulatory Commission
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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, Unit 1	05000413	1 of 7

TITLE (4): Auxiliary Feedwater System Found Outside Design Basis

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)
									Catawba Nuclear Station, Unit 2	05000414
12	11	96	96	- 012	- 01	01	17	97		05000

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

OPERATING MODE (9): 1
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 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)	X	50.73(a)(2)(iii)		50.73(a)(2)(x)		

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
X	YES (*If yes, complete EXPECTED SUBMISSION DATE*)	NO		02	14	97

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

EVENT DESCRIPTION: On December 11, 1996, Units 1 and 2 were at 100% Rated Thermal Power. While conducting a design review of the assured Nuclear Service Water (RN) System supply to the Auxiliary Feedwater (CA) System, it was determined that a single failure of one of the two parallel path assured makeup source valves could result in inadequate NPSH for all three CA pumps, due to only one train of RN being capable of supplying the three CA Pumps.

EVENT CAUSE: The root cause of this event is attributed to an initial design oversight. An unanticipated interaction for the failure to open of a single RN to CA suction supply valve, with three running CA pumps does not appear to have been considered.

CORRECTIVE ACTIONS: Minor Modifications were completed to add check valves to each unit to ensure that should one of the two RN assured supply source valves fail to open when required, then only two CA pumps would be supplied by the single remaining RN supply source. An investigation into the sequence of changes since the original design of the CA System will be completed to ensure all appropriate corrective actions are identified. A reconstitution of the electrical and mechanical system design basis for the Standby Shutdown System (SSS) interfacing systems will be conducted, and a consolidated Design Basis Document specific to the SSS will be generated. A review of the Operating Experience Database for SSS interfacing systems will be conducted to identify any other adverse trends or corrective actions.

BACKGROUND

The Nuclear Service Water [EIIS:BI](RN) System is the assured, safety related water source for the Auxiliary Feedwater [EIIS:BA](CA) System. Two trains of RN are designed to supply the three CA pumps[EIIS:P]. Motor [EIIS:MO] Driven CA Pumps 1(2)A are supplied from RN Train A, Motor Driven CA Pumps 1(2)B are supplied from RN Train B, and Turbine [EIIS:TRB] Driven CA Pumps #1(2)are supplied from both RN Train A and B.

The RN System is normally double isolated from the suction of the CA pumps by motor operated valves [EIIS:20] as follows:

CA Pump 1(2)A from RN Header A: 1(2)RN-250A and 1(2)CA-15A
CA Pump #1(2) from RN Header A: 1(2)RN-250A and 1(2)CA-116A

CA Pump 1(2)B from RN Header B: 1(2)RN-310B and 1(2)CA-18B
CA Pump #1(2) from RN Header B: 1(2)RN-310B and 1(2)CA-85B

NOTE: See ATTACHMENT 1, GENERAL ARRANGEMENT, for drawing of system.

The RN System aligns to supply the CA pumps on a 2/3 low CA pump suction pressure signal concurrent with a CA autostart signal and a motor driven CA pumps' running signal. There is no requirement for one RN train to supply all three CA pumps for accident mitigation.

EVENT DESCRIPTION

12/11/96

1046 hours During a design review of the assured RN supply to the CA System, it was determined that a single failure of one of the two assured makeup source valves, 1(2)RN-250A or 1(2)RN-310B, with all three CA Pumps running could result in inadequate NPSH for all three pumps, due to only one train of RN being capable of supplying the three CA Pumps.

1115 hours A 1 hour notification was made in accordance with 10CFR50.72 for Operations Outside of Design Basis for the Auxiliary Feedwater System. The Auxiliary Feedwater System for each unit was declared inoperable.

1207 hours Operations placed the CA System for each unit in an alignment that separated the A and B train RN suction sources for the Turbine Driven Auxiliary Feedwater Pump (TDCAP). This allowed each unit to recover from a condition of all three CA pumps being inoperable and provided for only the TDCAP being inoperable. This placed each unit in a 72 hour action statement.

12/12/96
1440 hours An Operability Notification Form was issued describing the Compensatory Actions required to permit the Auxiliary Feedwater System for each unit to be considered as "Operable But Degraded" for an indefinite period of time. Upon completion, the Compensatory Actions allowed each unit to exit the 72 hour action statement.

12/13/96
1735 hours Both units completed the alignments necessary to allow the CA System for each unit to be declared "Operable But Degraded" for an indefinite period of time.

CONCLUSION

The root cause of this event is attributed to an initial design oversight. An unanticipated interaction for the failure to open of a single RN to CA suction supply valve upon loss of the condensate grade sources, with three running CA pumps does not appear to have been considered. The initial (REV.0) flow schematic representing the initial conceptual design of the CA System was generated in 1974 and contained this oversight.

Due to the length of time that has elapsed since the occurrence of the design oversight and due to the numerous changes in personnel involved with the CA System since its original design, further investigation into the sequence of changes since the original design is warranted to ensure all appropriate corrective actions are identified. The CA System design underwent significant changes since the initial conceptual design (REV.0) and actual construction. The most prominent change was the addition of the SSS scope. It is highly probable that this scope addition was a contributor to the perpetuation of this design deficiency.

The Minor Modifications completed for each unit have added a check valve in each of the two train related RN suction lines that supply the TDCAP on each unit. The placement of these check valves ensure that should one of the two RN assured supply source valves fail to open when required, then only two CA pumps would be supplied by the single remaining RN supply source.

There are no NPRDS reportable equipment failures associated with this event.

A review of reportable events for a 24 month period prior to this event revealed two LERs that were associated with a system being found outside of its design bases, LER 413/96-004 and LER 414/96-005. LER 413/96-004 had as its root cause, misinterpretation of information used during the development of documents which described system design bases for the Standby Shutdown System. LER 414/96-005 had as its root cause the omission of pertinent information during the development of documents which describe system design bases, which led to the exclusion of certain valves from the preventive maintenance program for the Standby Shutdown System. The two events above and the event described in this LER all have as a common denominator both an event involving a system being outside its design bases, and were all related to the SSS interfacing systems. For this reason, a reconstitution of the electrical and mechanical system design basis for the SSS interfacing systems will be conducted, and a consolidated Design Basis Document specific to the SSS will be generated.

Although the root causes identified for each of the three above events are different, the difficulties encountered in verification of information from original design personnel warrants a broader investigation and corrective actions to ensure that no further problems exist.

CORRECTIVE ACTIONS

IMMEDIATE

1) Each unit's three Auxiliary Feedwater Pumps were declared inoperable and actions were initiated immediately to restore two pumps to operable status.

SUBSEQUENT

1) Approved compensatory actions were taken on each unit to place the Auxiliary Feedwater System in an "Operable But Degraded" configuration that provided for meeting the Limiting Conditions For Operation with all three CA Pumps being operable.

2) Minor Modifications CE-61239 and 61240 have been completed on Unit 1 and Unit 2 respectively.

PLANNED

1) An investigation into the sequence of changes since the original design of the CA System will be completed to ensure all appropriate corrective actions are identified.

2) A reconstitution of the electrical and mechanical system design basis for the SSS interfacing systems will be conducted, and a consolidated Design Basis Document specific to the SSS will be generated.

3) A review of the Operating Experience Database for SSS interfacing systems will be conducted to identify any other adverse trends or corrective actions.

SAFETY ANALYSIS

If an overcooling event were to occur that causes a significant reduction in steam generator pressures, and all three CA pumps were running, then the three nonsafety grade condensate quality sources (Auxiliary Feedwater Condensate Storage Tank [CACST], Upper Surge Tanks [USTs], and Condenser Hotwell) would have to be lost before an RN-to-CA swapover would occur. If the condensate sources remain intact, this volume would be sufficient to delay an RN-to-CA swapover until well into any event where CA flows would already be throttled such that no NPSH problems would exist if one RN-to-CA header was unavailable. Though not the assured sources for CA, the condensate quality sources are considered to be highly reliable.

In the event of a loss of the nonsafety grade condensate quality supply concurrent with or shortly following an overcooling event, an RN-to-CA swapover would be initiated prior to or during a period of high CA flows.

If one of the two RN supply valves failed to open, then an inadequate NPSH condition for all three CA pumps would occur. This would result in the loss of the pumps. Upon reaching steam generator inventory conditions that indicate an imminent loss of secondary heat sink, the Emergency Operating Procedures provide alternative means for re-establishing core heat removal.

Probabilistic Risk Assessment (PRA) analysis determined that the probability of a random piping failure in the nonsafety grade condensate quality sources in conjunction with a single failure on the RN supply source with all three CA pumps running would be a highly improbable condition.

Failures that could lead to a loss of an entire train of RN will also disable the associated Emergency Diesel Generator and Component Cooling (KC) System. Since these systems support CA pump operation, it is likely that only two CA pumps will continue to run following a loss of an entire train of RN. Therefore the failure of an RN to CA supply isolation valve to open is the most credible failure. The RN to CA isolations are motor operated gate valves.

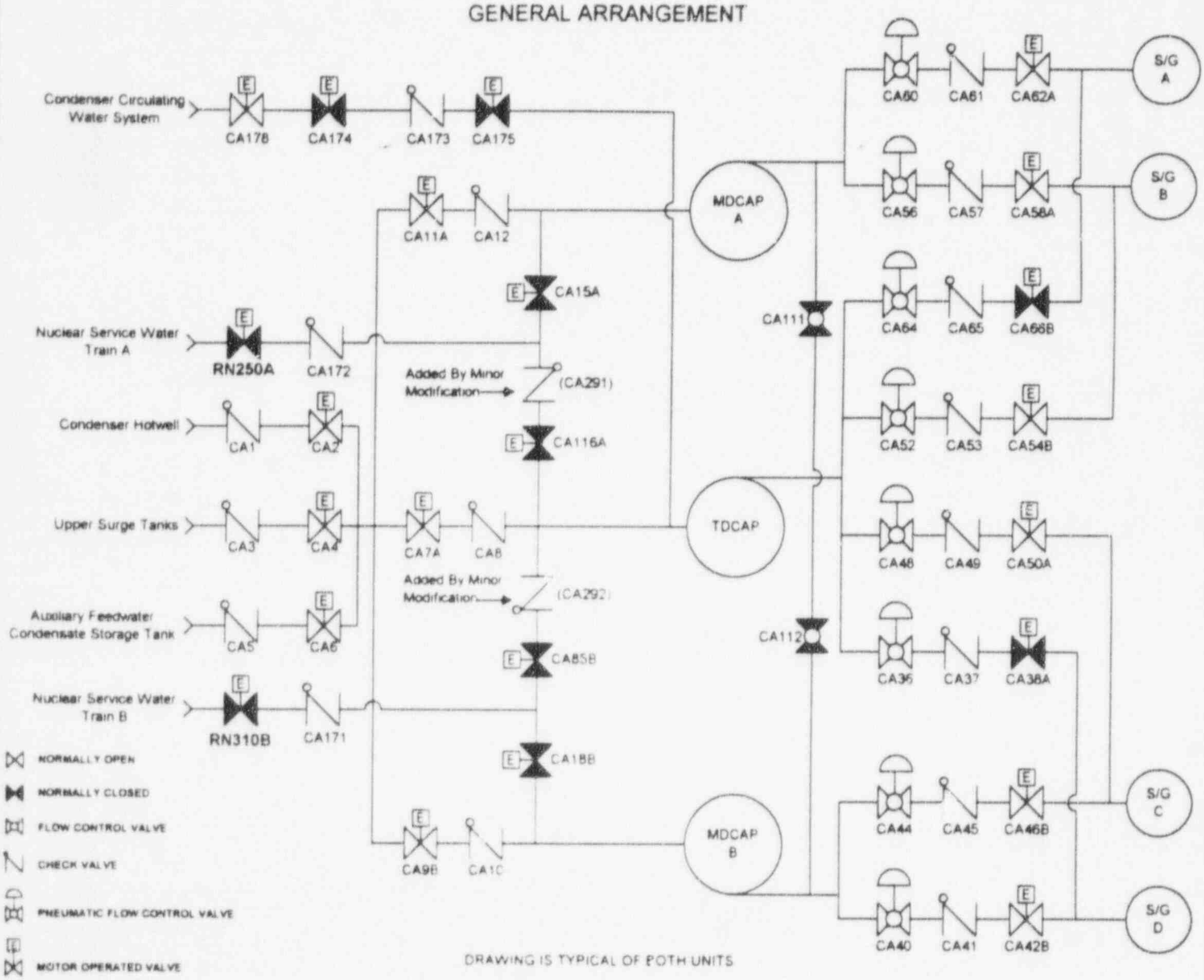
Their reliability is assured as part of the Generic Letter 89-10 MOV program. The history of these valves was investigated and there have been no failures recorded for the valves since implementation of the GL 89-10 program. It is concluded that the RN assured makeup is a reliable source.

PRA analysis was also performed for a seismic event concurrent with this event. When the effects of this event were considered in light of the limiting failures assumed for the Catawba seismic PRA analysis, this event was considered to have only a very small impact on the seismic PRA.

The health and safety of the public would not have been affected during this event.

ATTACHMENT 1

GENERAL ARRANGEMENT



DRAWING IS TYPICAL OF BOTH UNITS