

Nebraska Public Power District

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NLS960219

November 25, 1996

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

Dear Sir:

Cooper Nuclear Station Licensee Event Report 96-015 is forwarded as an attachment to this letter.

Sincerely,

M. F. Peckham
Plant Manager

/wrv

Attachment

cc: Regional Administrator
USNRC - Region IV

Senior Project Manager
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector
USNRC- Cooper Nuclear Station

NPG Distribution

INPO Records Center

W. Turnbull
MidAmerica Energy

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LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)

COOPER NUCLEAR STATION

DOCKET NUMBER (2)

05000298

PAGE (3)

1 OF 4

TITLE (4)

Reactor Water Sample Valves Inoperable Due to Potential for Single Active Failure.

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
10	25	96	96	-- 015	-- 00	11	25	96	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)		100	20.2201(b)		20.2203(a)(2)(v)		<input checked="" type="checkbox"/>		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)				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

William R. Victor, Licensing and Compliance Specialist

TELEPHONE NUMBER (Include Area Code)

(402) 825-3811

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)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On October 25, 1996, it was established that a postulated single active failure of the common pneumatic pressure regulator to the normally open Reactor Water Sample Line isolation valves (RR-AOV-740AV and RR-AOV-741AV) could prevent them from closing on demand due to excessive differential pressure on their associated solenoid pilot valves. The Primary Containment Isolation System (PCIS) is required to be capable of performing its function assuming the failure of a single active component. Accordingly, RR-AOV-740AV/741AV were declared inoperable and isolated per Cooper Nuclear Station (CNS) Technical Specification (TS) 3.7.D.2. However, it is apparent that this unrecognized condition has existed since April 1993, and is therefore reportable since associated Technical Specification requirements for inoperable Primary Containment Isolation Valves (PCIVs) had not been carried out.

The cause of this condition was an inadequate plant modification performed in 1993 to address concerns raised in Generic Letter (GL) 91-15, "Operating Experience Feedback Report, Solenoid-Operated Valve Problems At U.S. Reactors." Assessments have been performed which have: a) verified that the other solenoid valves found vulnerable to excessive differential pressure through the previous GL 91-15 review had been appropriately resolved, and b) validated that the present design change process provides appropriate barriers to prevent recurrence. The design of the pneumatic supplies to RR-AOV-740AV/741AV will be corrected to eliminate this single failure vulnerability prior to restoring their operability. This reportable event will be discussed with Engineering personnel.

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

PLANT STATUS

The plant was operating at power at the time of discovery.

EVENT DESCRIPTION

On October 25, 1996, it was established that a postulated single active failure of the common pneumatic pressure regulator [EIIS: RG] to air-operated valves RR-AOV-740AV and RR-AOV-741AV [ISV, CBA] could prevent them both from closing on demand due to excessive differential pressure on their associated solenoid pilot valves [PSV]. CNS was designed in accordance with the Atomic Energy Commission (AEC) draft 1967 General Design Criteria (GDC). GDC 41 requires that Engineered Safety Features (such as PCIS [JM]) be designed such that the safety function can be fulfilled assuming the failure of a single active component. In the CNS Safety Evaluation Report, the AEC stated that they reviewed the station's PCIVs and their control systems to provide assurance that no single failure can result in a loss of containment integrity.

The pneumatic supply lines to the RR-AOV-740AV/741AV air operators diverge from a common nitrogen header. PC-PRV-PCV632 is a safety grade pressure regulator that has an active function of reducing the line pressure for this header from 200 psig to 100 psig. Stemming from this common header are two parallel lines providing nitrogen to the solenoid pilot valves. Each supply line is configured with a nonsafety-related regulator reducing the pneumatic pressure from 100 psig to 90 psig. The manufacturer's Maximum Operating Differential Pressure (MODP) for RR-SOV-SPV740/741 (RR-AOV-740AV/741AV solenoid pilot valves) is 110 psid. A failure of PC-PRV-PVC632 in concert with the assumed failure of both nonsafety-related regulators could result in exceeding the MODP of the solenoids. Accordingly, RR-AOV-740AV/741AV were declared inoperable and repositioned to their isolated condition in accordance with CNS TS 3.7.D.2. A 4-hour non-emergency report was then made to the NRC.¹

SAFETY SIGNIFICANCE

RR-AOV-740AV/741AV have safety functions to automatically close on a Group 7 isolation signal to support Primary Containment Integrity during accident conditions, as required. However, the unrecognized inoperability of these valves was of minimal safety significance for the following reasons:

- Downstream of RR-AOV-740AV/741AV is a tubing circuit for reactor water sampling. Although this tubing is nonsafety-related, the accident-induced stresses are similar to those seen during normal operating conditions and would not exceed tubing design pressures. The assumed integrity of this tubing is evident since the reactor water sample line is credited with providing a flowpath for post-accident sampling. In any event, the outflow of coolant from the passive failure of the downstream unqualified Reactor Sampling tubing is comparable with the 0.25 inch instrument tubing break assumed during the design basis accident.

1. In reviewing the guidance of NUREG-1022, "Licensee Event Reporting System," with Supplements, it appears that the criteria of 10CFR50.72(b)(2)(iii) do not apply since the non-conformance was a postulated (versus actual) single failure. However, the inoperability of RR-AOV-740AV/741AV has existed since April 1993 which is reportable as a condition prohibited by the CNS Technical Specifications per 10CFR50.73(a)(2)(i).

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SAFETY SIGNIFICANCE (continued)

- During the prior period of unrecognized inoperability, RR-AOV-740AV/741AV were nevertheless functional in that PC-PRV-PCV632 and the branch supply line regulators were properly regulating the downstream nitrogen pressure.
- Pneumatic pressure regulators are highly reliable components. Therefore, postulated failure of PC-PRV-PCV632 concurrent with the two supply branch regulators after an accident occurs is non-credible. Similarly the likelihood of these three regulators failing within the same surveillance interval that RR-AOV-740AV/741AV are tested is low. Even so, had this combination of failures occurred prior to accident initiation, it would have been self-disclosing as the header relief valve would lift, creating an audible indication that would likely be detected by Station operators.

CAUSE

In response to the concerns raised by GL 91-15, CNS concluded in March 1993 that RR-SOV-SPV740 and RR-SOV-SPV741 were individually susceptible to excessive differential pressure, assuming the failure of the non-safety-related pressure regulators in their pneumatic supply line. PC-PRV-PCV632 (the common regulator) was reconfigured with a safety-related model so that credit could be taken for its pressure reducing active safety function. In this manner the design problem (as defined in the associated CNS non-conformance report) was adequately resolved in that the postulated failures of non-essential components would not prevent the safety function of the individual air-operated valves listed. However, it was not recognized by the cognizant design engineers that the scope of the configuration issue with RR-SOV-SPV740/741 was also that they shared a common nitrogen supply header and that the postulated failure of common components required meaningful consideration of single active failure. It is possible that they considered the concurrent failure of PC-PRV-PCV632 and both downstream regulators to be non-credible within the quarterly surveillance intervals, but this thought process was not discussed in the modification package.

CORRECTIVE ACTION

Several other components were identified in 1993 as being potentially susceptible to exceeding MODP limits for solenoid valves as part of the GL 91-15 resolution. The corrective actions for these other components were reverified to be appropriate in resolving any related operability concerns. This provides a basis for confidence that the implications of this event are limited to the operability of the Reactor Water Sample Valves.

Relevant portions of the Design Change process were assessed to determine if improvements were needed to help prevent this type of discrepancy in the future. A comparison was made between the Design Input Checklist items currently in place versus in 1993 when the modification was performed. While there were previous requirements to consider redundancy, separation and component failure effects, the current requirements explicitly require consideration of the effects of single active failure.

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

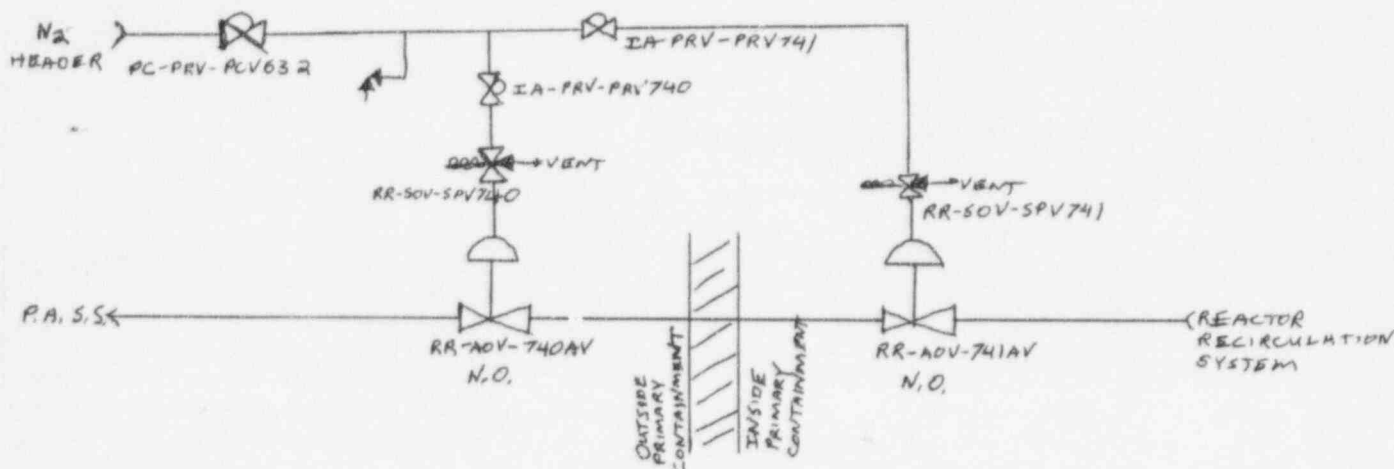
CORRECTIVE ACTION (continued)

Additionally, a Design Criteria Document on Single Failure has recently been issued which provides the design engineer with a better understanding of the CNS design basis with respect to this topic.

Prior to the restoration of RR-AOV-740AV/741AV operability, the pneumatic configuration will be modified to resolve the single failure vulnerability associated with PC-PRV-PCV632. Additionally, this reportable event will be discussed with Engineering personnel to increase their awareness of the subtleties involved in defending against single active failures in the design change process.

SIMILAR EVENTS

LER 93-009 Potential Inoperability of Solenoid Operated Valves Due To Overpressurization Discovered During Design Review.



Simplified Sketch

SEQUENCE FOR SINGLE ACTIVE FAILURE SCENARIO

- 1) Single active failure of PC-PRV-PCV632 within quarterly surveillance interval.
- 2) Concurrent (or possibly consequent) failure of IA-PRV-PRV740/741 resulting in exceeding MODP of RR-SOV-SPV740/741.
- 3) Loss of Coolant Accident concurrent with Loss of Offsite Power prior to detection of previous failures by Operations.
- 4) Failure of RR-SOV-SPV740/741 to reposition to vent reactor water sample valves' air operators.

Correspondence No: NLS960219

The following table identifies those actions committed to by the District in this document. Any other actions discussed in the submittal represent intended or planned actions by the District. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Licensing Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITTED DATE OR OUTAGE
Prior to the restoration of RR-AOV-740AV/741AV operability, the pneumatic configuration will be modified to resolve the single failure vulnerability associated with PC-PRV-PCV632.	None
This reportable event will be discussed with Engineering personnel to increase their awareness of the subtleties involved in defending against single active failures in the design change process.	None