

LICENSEE EVENT REPORT

CONTROL BLOCK: 1 2 3 4 5 6

(PLEASE PRINT ALL REQUIRED INFORMATION)

LICENSEE NAME 01 C O F S V 1	LICENSE NUMBER 0 0 - 0 0 0 0 0 - 0 0	LICENSE TYPE 4 1 1 2 0	EVENT TYPE
CATEGORY 01 CONT	REPORT TYPE T	REPORT SOURCE L	DOCKET NUMBER 0 5 0 - 0 2 6 7
EVENT DATE 0 5 0 6 7 7	REPORT DATE 0 7 1 2 7 9		

EVENT DESCRIPTION

02	During plant startup at 15% power, an incorrect feedwater flow trip existed in 1 of 2	80
03	PPS logics due to a malfunction. This single failure would have prevented all four	80
04	steam water dump valves from opening automatically. The logic module was repaired,	80
05	tested, and reinstalled. Failure modes and effects analyzed. Relay interlocks revised	80
06	to eliminate undesirable single failure inhibit problem. RO 77-17A	80

SYSTEM CODE 07 I B	CAUSE CODE E	COMPONENT CODE I N S T R U	PRIME COMPONENT SUPPLIER N	COMPONENT MANUFACTURER G 3 0 5	VIOLATION N
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CAUSE DESCRIPTION

08	The malfunction was logic chip failure in the circulator trip module, CT-2B2, con-	80
09	sidered to be of a random nature. The single failure inhibit was due to a design	80
10	problem.	80

FACILITY STATUS 11 C	% POWER 0 1 5	OTHER STATUS N/A	METHOD OF DISCOVERY A	DISCOVERY DESCRIPTION N/A
FORM OF ACTIVITY RELEASED 12 Z	CONTENT OF RELEASE Z	AMOUNT OF ACTIVITY N/A	LOCATION OF RELEASE N/A	

PERSONNEL EXPOSURES

NUMBER 13 0 0 0	TYPE Z	DESCRIPTION N/A
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PERSONNEL INJURIES

NUMBER 14 0 0 0	DESCRIPTION N/A
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OFFSITE CONSEQUENCES

15	N/A	80
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LOSS OR DAMAGE TO FACILITY

16	TYPE Z	DESCRIPTION N/A	80
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PUBLICITY

17	N/A	80
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ADDITIONAL FACTORS

18	N/A	80
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19	 	80
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REPORT DATE: July 12, 1979

REPORTABLE OCCURRENCE 77-17A

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OCCURRENCE DATE: May 6, 1977

PORT ST. VRAIN NUCLEAR GENERATING STATION
PUBLIC SERVICE COMPANY OF COLORADO

P. O. BOX 361

PLATTEVILLE, COLORADO 80651

REPORT NO. 50-267/77-17(14)A

Final

IDENTIFICATION OF
OCCURRENCE:

On May 6, 1977, an incorrect feedwater flow trip existed in one of two Plant Protective System logics due to a malfunction. This single failure would have prevented all four steam/water dump valves from opening if a condition existed which called for them to open. This situation has been identified as a reportable occurrence per Fort St. Vrain Technical Specification AC 7.5.2(a)5.

EVENT
DESCRIPTION:

During plant startup with the reactor power at 15% on May 6, 1977, it was determined that steam/water dump valve HV-2218 could not be opened. HV-2218 was being exercised as part of a checkout after safety related maintenance had been performed on the valve. Investigation found a Plant Protective System feedwater flow low relay (CR-174-1B) had incorrectly tripped and inhibited HV-2218 from opening.

The low feedwater relay was tripped because of a failure in the CT-2B2 logic module. It was determined that this malfunction would have inhibited all four steam/water dump valves (HV-2215, HV-2216, HV-2217, and HV-2218) from opening automatically. However, the steam/water dump valves could have been opened manually by the operator from the control room following a loop shutdown, if required.

The faulty CT-2B2 logic module was repaired and the plant startup continued.

CAUSE
DESCRIPTION:

The circuitry of HV-2218 (see Figure 1), which was typical of each of the steam/water dump valves, contained among other interlocks, two contacts in series from the feedwater flow low relays (CR-174-1A and CR-174-1B). Feedwater flow is monitored by the Plant Protective System on each secondary coolant loop and when flow is below 20% on either loop, CR-174-1A is tripped (energized) by the A logic and CR-174-1B is tripped (energized) by the B logic thus preventing the steam water dump valves from opening.

CAUSE

DESCRIPTION:

Failure of three integrated circuit logic chips in logic module CT-2B2 caused CR-174-1B to energize opening the series contact on all dump valves, even though the feedwater flow was greater than 20% on both loops. See Figure 1 for HV-2218 (typical).

As a result, attention was drawn to the details of the interlocks in the steam/water dump circuitry. The logic chip failures caused XCR-93174B output relay CR-174-1B to be energized. This relay interlock was for the purpose of inhibiting dumping of either steam generator loop if feedwater flow was less than 20% in either loop and to facilitate safe shutdown cooling by maintaining forced circulation cooling. The circuit is described in Final Safety Analysis Report Section 7.1.2.5. Normally closed contacts from the output relays of CR-174-1A and CR-174-1B were in the series circuit of each of the four steam water dump valves. The interlocks were redundant in that a single interlock failure would not allow dump of a steam generator loop if feedwater flow was less than 20%. The problem was that a single failure (accidental energization of XCR-93174A or XCR-93174B control relay) could inhibit both the A logic and B logic dump capability of a loop thereby adversely affecting the steam water dump capability if required when both loops were operating.

Interruption of continuity to the A logic dump capability (and the redundant B logic dump capability) are monitored by continuous current monitors and actuate annunciators.

APPARENT CAUSE
OF OCCURRENCE:

The cause of the logic module malfunction was a logic chip failure considered to be of a random nature.

The single failure which could have prevented all four steam/water dump valves from opening if a condition existed which required them to open was due to a design problem.

CORRECTIVE
ACTION:

The following actions have been taken:

1. The CR-2B2 logic module was repaired by replacing three logic chips, tested, and reinstalled.
2. Failure modes and effect analysis was performed. For the steam/water dump circuit as it existed, the analysis did not identify any other unacceptable system consequences than were known to exist. These were (1) the potential for a concurrent dump of Loops 1 and 2 with the permissible number of moisture monitors out of service and tripped accompanied by an instrument bus failure, and (2) dump inhibit of Loops 1 and 2 due to single integrated circuit chip failures. For the proposed modified design, the analysis indicated both the unacceptable system consequences stated above were eliminated and no others were introduced.

CORRECTIVE
ACTION (continued):

2. (continued)

Based on the results of these analyses, it was concluded that the design modifications to the steam water dump system satisfy all Plant Protection System requirements and are consistent with the original design basis of the plant.

3. With Nuclear Regulatory Commission concurrence, the relay interlocks have been revised to eliminate an undesirable single failure inhibit problem.
4. The interlock circuits have been functionally tested successfully.

The interim measure of recording the dump logic trouble alarm conditions on a once per shift basis when feedwater flow is greater than 20% is no longer required.

No further corrective action is anticipated or required.

FAILURE DATA/SIMILAR REPORTED OCCURRENCES:

Reportable Occurrence Report No. 50-267/76-01 reported a condition affecting all steam water dump valves, but due to a different cause.



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