NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Fort St. Vrain, Unit No. 1	0 5 0 0 0 2 6 7	1 OF 0 5

TITLE (4)
Inoperable Loss Of Bearing Water Switch - LCO 4.4.1

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)
									N/A	0 5 0 0 0
0 1	2 3	8 4	8 4	0 0 2	0 1	0 7	1 3	8 4		0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
N		20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.71(c)
0 0 0		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)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Frank Novachek, Technical Services Engineering Supervisor	AREA CODE 3 0 3 7 8 5 - 2 2 2 4

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	
X	J C	P D I S	B 0 8 1	Y							

SUPPLEMENTAL REPORT EXPECTED (14)

		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	NO				

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

On January 23, 1984, with the reactor and the 1A helium circulator shutdown, one of three bearing water pressure differential switches, which indicate loss of bearing water, was found inoperable while performing a routine surveillance test.

This is a repetitive event as reported in a previous LER and is being reported per the requirements of 10 CFR 50.73(a)(2)(v).

The problems experienced with the ITT Barton pressure differential switches in this application has been investigated, and the switches are now scheduled to be replaced with electronic transmitters and bistable switches during the fourth refueling outage.

The inoperable pressure differential switch was replaced and calibrated to the instrument operating requirements.

Related Licensee Event Reports: 79-011, 79-060, 81-005, 82-002, 82-025, 83-048.

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

EVENT DESCRIPTION:

The Fort St. Vrain helium primary coolant system is equipped with four identical helium circulators, two in each loop. The helium circulators are supplied with high pressure water sources for bearing lubrication. The bearing water supply system is monitored by three pressure differential indicating switches (PDIS) which monitor the pressure differential between the bearing water supply cavity and the main drain system. Back pressure in the main drain system is controlled by a high pressure controller system.

During performance of a scheduled surveillance calibration, with the plant shutdown for refueling and routine maintenance, one of three pressure differential indicating switches (PDIS-21175) was found inoperable. LCO 4.4.1, Table 4.4-3, specifies a trip setting of equal to or greater than 475 psid. The switches act to trip the circulator on sensing a pressure differential of less than 475 psid, indicating a loss of bearing water flow.

Referring to Figure 1, as the pressure differential between the water supply cavity and the main drain decreases, the pressure differential switches (PDIS) (1) will individually close at their respective setpoints. This applies a voltage to the switch input modules (XDIS) (2), tripping them. Each tripped XDIS module transmits a signal to both "A" and "B" logic channels (3). When either "A" or "B" logic receives inputs from any two of the three XDIS modules they will transmit a signal to the "A" or "B" logic OR gate (4) respectively. The OR gates transmit any input signal to the respective special control relay (XCR) (5) to energize auxiliary relays which trip the helium circulator and initiate the following helium circulator protective actions:

1. Isolation of the steam and water turbine supply and return lines.

2. Fire the bearing water accumulator system, which initiates a surge of bearing water, to allow coastdown of the circulator.

3. Apply the brake when speed has decreased below 700 RPM.

4. Apply the mechanical shutdown seal.

5. Isolate the remaining circulator auxiliaries.

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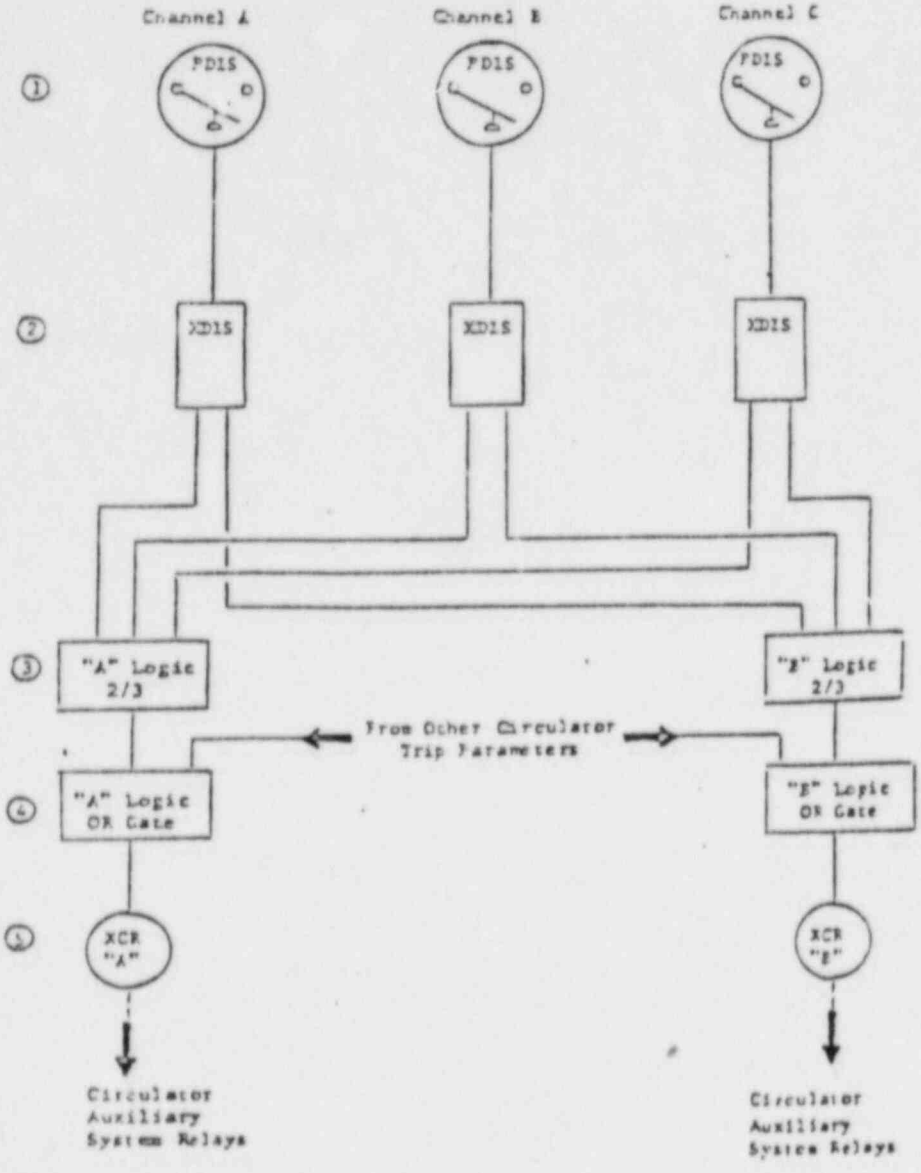
TEXT (If more space is required, use additional NRC Form 366A's) (17)

FIGURE 1



ANALYSIS OF EVENT

Since the helium circulator loss of bearing water circuitry is based on a 2 of 3 logic system, failure of one switch would not have prevented the redundant operable switches from initiating the circulator protection actions had an actual loss of bearing water condition occurred.

As mentioned previously, the repetitive nature of these types of failures has been investigated and a corrective action has been recommended.

Although the repetitiveness of these failures is of concern, from a plant reliability and power generation standpoint, they are not of concern from a plant safety stand point due to the basic design characteristics of the helium circulator system.

As with the other circulator auxiliary systems, the circulator bearing water system consists of two separate and independent recirculating loops, each loop is equipped with redundant supplies and flow paths to each of the two circulators in the loop. For the various types of failures which can be postulated for the bearing water system, this arrangement of supply lines, valves, and controls precludes a single failure from affecting the operation of more than one circulator.

Total loss of bearing water to a circulator, with failure of the protection system to initiate accumulator bearing water and circulator trip, resulting in bearing seizure, has been previously evaluated and determined not to endanger the other circulators, steam generators, or primary penetration closure.

Thus, individual system failures, as well as individual circulator inoperability, will not affect safe shutdown cooling which can be assured with only one operable circulator.

It is also considered incredible, with the redundancies provided by the four circulators, that all circulators could become simultaneously inoperable.

Thus, the loss of bearing water trip inputs, along with the other circulator trip inputs, are initiated to provide for individual circulator shutdown protection. Although the circulator trip circuitry has been designed in accordance with, and is considered part of, the overall Fort St. Vrain Plant Protective System (PPS), a single circulator trip in one loop does not initiate the basic PPS actions. The basic PPS actions are initiated upon trip of the required channels in the Loop Shutdown and Reactor Scram circuitries. The Loop Shutdown and Reactor Scram circuitries combined are the equivalent of the Reactor Protection System (RPS) at light water reactors in that they provide for automatic corrective action upon onset of an unsafe condition.

Based on the above analysis, there was no potential effect on the health and safety of the public.

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

CAUSE DESCRIPTION:

Component Failure.

Upon investigation of the instrument internals, the high alarm micro switch was found inoperable and incapable of generating a protective action signal. Failure of pressure differential indicating switch, PDIS-21175, is attributed to an accumulation of dirt and oil on the switch. Pressure differential indicating switch PDIS-21175 is manufactured by ITT Barton Model No. 288A.

CORRECTIVE ACTION:

The faulty micro switch was replaced and calibrated to a trip setting of 482 + 10 - 0 psig. The replacement switch was manufactured by ITT Barton, PSCo. N. Tag 14196, P.O. No. N-2834B, Switch No. 0257-0008-B.

The Public Service Company Nuclear Engineering Division has investigated the problems experienced with the ITT Barton pressure differential switches, and has recommended the replacement of the switch assemblies with electronic transmitters and bistable switches. Due to the nature of this modification, an extended shutdown will be required. Therefore, replacement of the ITT Barton switches has been scheduled to occur during the fourth refueling outage.

Robert A. Dickerson
Technical Services Senior Technician

Frank J. Novachek
Technical Services Engineering Supervisor

L. Milton McBride
L. M. McBride
Station Manager

Don Warembourg
Manager, Nuclear Production

Public Service Company of Colorado

16805 WCR 19 1/2, Platteville, Colorado 80651

50-267

July 16, 1984
Fort St. Vrain
Unit #1
P-84215

Mr. E. H. Johnson, Chief
Reactor Project Branch 1
Region IV
Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

REFERENCE: Facility Operating License
No. DPR-34

Docket No. 50-267

Dear Mr. Collins:

Enclosed please find a copy of Licensee Event Report No. 50-267/84-002, Final, submitted per the requirements of 10 CFR 50.73(a)(2)(v).

Very truly yours,

Don Warembourg
Manager, Nuclear Production

DWW/djm

Enclosure

cc: Director, MIPC

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