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) High Moisture Plant Protective System Actions - 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)
0 5	0 4	8 4	8 4	—	0 0 6	— 0 1	0 6	2 6	8 4	N/A	0 5 0 0 0
											0 5 0 0 0

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 0	20.402(b)	20.405(c)	X 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)	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 - 1 2 1 2

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)

On May 4, 1984, following refueling shutdown, operators began to withdraw control rods to achieve initial cycle 4 criticality when high moisture levels in the primary coolant (helium) were detected by the Plant Protective System (PPS) moisture monitoring system. This initiated automatic actuation of the PPS Loop I shutdown and reactor scram circuitry.

The automatic actuation of the PPS circuitry is being reported per 10 CFR 50.73 (a)(2)(iv).

Following the automatic actuation of the PPS scram circuitry, the Control Room Operator inserted a manual scram by placing the reactor mode switch in the "off" position as required by procedure.

The Control Room operators recovered the shutdown steam generator loop and returned the system to normal two loop operation.

The primary coolant purification system was utilized to remove core moisture to allow reactor startup.

H005
1/1

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Fort St. Vrain, Unit No. 1	0 5 0 0 0 2 6 7	8 4	— 0 0 6	— 0 1	0 2 OF 0 5

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

EVENT DESCRIPTION:

The primary coolant system at Fort St. Vrain incorporates the circulation of helium through the reactor core to transfer heat to the secondary coolant system while maintaining acceptable temperatures in the core.

Since there are potential sources of H_2O (as water and/or steam) leakage into the primary coolant which could result in oxidation of lump burnable poison and core graphite, or result in undesireable Prestressed Concrete Reactor Vessel internal pressure increases, primary coolant moisture content is constantly monitored during low power and power operation. The Plant Protective System (PPS) primary coolant moisture monitoring system consists of two sets (three each) of low level monitors (set at 27°F dewpoint) and two high level monitors (set at 67°F dewpoint). Each loop has three low level monitors sampling the primary coolant from that loop's helium circulator sample rakes. The high level monitors are not loop orientated and sample the gas leaving each helium circulator.

Actuation of the PPS "high moisture actions" requires either two of the three low level monitors in a loop combined with one of the high level monitors, or both high level monitors. The first situation (two of three lows combined with one of two highs) initiates a loop shutdown, steam/water dump, and reactor scram, while the second initiates a reactor scram. Note that the steam/water dump action only occurs if feedwater flow is greater than 20%.

On May 4, two of the three Loop I low level monitors, MIS-1117 and MIS-1116, were manually placed in the tripped condition (while preparations were made for returning them to service) prior to withdrawing control rods and attempting to take the reactor critical. Under these circumstances, all that was needed to initate the high primary coolant moisture PPS action was a trip of one high level monitor. Operators began withdrawing control rods, and at 1417 hours, high level monitor MIS-1119 tripped. This action completed the minimum PPS actuation logic and initiated a Loop I trouble trip, and a Two Loop Trouble scram. However, since feedwater flow was less than 20%, a steam/water dump was inhibited by design. The automatic PPS actions occurred prior to reaching reactor criticality. Operators followed up these actions by inserting a manual scram as required.

Loop I was recovered in approximately 15 minutes, but at 1445 hours, following actions to reset the high level monitor, MIS-1119, high primary coolant moisture levels again caused MIS-1119 to trip. Since the two low level monitors were still tripped, the "high primary coolant moisture" PPS actions were actuated as before. The reactor mode switch remained in the "off" position, however, due to insertion of the manual scram described above. This inhibited actuation of the scram circuitry (by design) but allowed actuation of the loop shutdown. The PPS circuitry functioned as designed in both incidents.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Fort St. Vrain, Unit No. 1	0 5 0 0 0 2 6 7	8 4	— 0 0 6	— 0 1	0 3 OF 0 5

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

ANALYSIS OF EVENT:

The reactor has been maintained in the shutdown condition for several months while Cycle 4 refueling and plant maintenance/modification activities were conducted. The Prestressed Concrete Reactor Vessel (PCRV) had been maintained at approximately atmospheric pressure for the majority of the refueling shutdown. These conditions allowed a gradual ingress of moisture into the primary coolant, vessel liner insulation, and core graphite. The actual source of this moisture is not positively known, but due to the limited number of potential sources, it is speculated that moisture was introduced into the primary coolant from the circulator bearing water system. The primary coolant purification system was being utilized to remove moisture from the primary coolant to allow plant startup. However, due to the hygroscopic properties of the reactor core graphite and absorption into the reactor vessel liner insulation, moisture removal was retarded.

The PPS actions that are initiated by high primary coolant moisture levels are intended to mitigate the consequences of increased PCRV internal pressure due to a large steam leak into the core during power operation. Primary coolant moisture also affects the oxidation of core graphite and lumped burnable poison. However, the reactor remained shutdown during both incidents and core temperatures remained well below those at which PCRV pressure increases or graphite oxidation would be of concern.

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

CAUSE DESCRIPTION:

High moisture levels in the primary coolant.

Since MIS-1117 and MIS-1116 were inoperable and placed in the tripped condition, the two of three logic for the Loop I low level moisture monitors was complete prior to the initial rise to criticality attempt. Under these conditions, all that was needed to complete the minimum actuation logic of high primary coolant moisture PPS actions was the trip of one high level moisture monitor. High level monitor, MIS-1119, then tripped while the Control Room Reactor Operators were withdrawing control rods. This completed the minimum PPS actuation logic and initiated the Loop I shutdown and Two Loop Trouble scram. Shortly after, while the reactor mode switch was in the "off" position, and Loop I had been recovered, MIS-1119 was reset and high moisture levels caused it to trip again. This initiated a second Loop I shutdown. Due to the reactor mode switch being in the "off" position, however, a second scram signal was inhibited.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Fort St. Vrain, Unit No. 1	0 5 0 0 0 2 6 7	8 4	— 0 0 6	— 0 1	0 4 OF 0 5

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

CORRECTIVE ACTION:

Following the automatic actuation of the PPS scram circuitry, the Control Room Operator inserted a manual scram by placing the reactor mode switch in the "off" position as required by procedure.

The Control Room Operators recovered the shutdown steam generator loop and returned the system to normal two loop operation.

The primary coolant purification system was utilized to remove core moisture to allow reactor startup.

No further corrective action is anticipated or required.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Fort St. Vrain, Unit No. 1	0 5 0 0 0 2 6 7	8 4	— 0 0 6	— 0 1	0 5 OF 0 5

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

Jim Hill
Techical Services Technician

Frank J. Novachek
Technical Services Engineering Supervisor

L. M. McBride
Station Manager

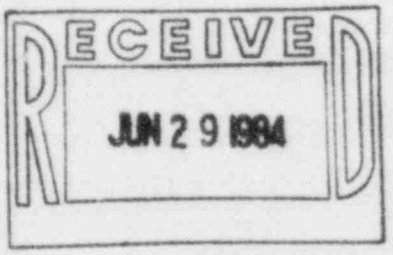
Don Warembourg by L. M. McBride
Don Warembourg
Manager, Nuclear Production

Public Service Company of Colorado

16805 WCR 19 1/2, Platteville, Colorado 80651

50-267

June 26, 1984
Fort St. Vrain
Unit #1
P-84189



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

REFERENCE: Facility Operating License
No. DPR-34

Docket No. 50-267

Dear Mr. Johnson:

Enclosed please find a copy of Licensee Event Report No. 50-267/84-006, Revised Final, submitted per the requirements of 10 CFR 50.73(a)(2)(iv).

Very truly yours,

Don Warembourg by L. Milton McBride

Don Warembourg
Manager, Nuclear Production

DWW/djm

Enclosure

cc: Director, MIPC

H005
1/1