

LICENSEE EVENT REPORT (LER)

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

TITLE (4):
EXPANSION JOINT FAILURE CAUSING LOSS OF CIRCULATING WATER RESULTING IN A MANUAL SCRAM

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 4	0 7	8 8	8 8	0 0 6	0 0 0	0 5	0 9	8 8	N/A			0 5 0 0 0
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11):												

OPERATING MODE (9) N	20.402(b)	20.406(c)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 0 1 7 1 1	20.406(a)(1)(i)	50.36(e)(1)	<input type="checkbox"/>	50.73(a)(2)(iv)	73.71(c)
	20.406(a)(1)(ii)	50.36(e)(2)	<input type="checkbox"/>	50.73(a)(2)(iv)	OTHER (Specify in Abstract below and in Text, NRC Form 106A)
	20.406(a)(1)(iii)	50.73(a)(2)(i)	<input type="checkbox"/>	50.73(a)(2)(vi)(A)	
	20.406(a)(1)(iv)	50.73(a)(2)(ii)	<input type="checkbox"/>	50.73(a)(2)(vi)(B)	
	20.406(a)(1)(v)	50.73(a)(2)(iii)	<input type="checkbox"/>	50.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12):

NAME Mark A. Joseph, Technical Services Supervisor	TELEPHONE NUMBER
	AREA CODE: 3 0 3 6 2 0 1 - 1 2 0 3

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13):

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPPDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPPDS

SUPPLEMENTAL REPORT EXPECTED (14):

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
--	--	-------------------------------	-------	-----	------

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

At 0505 on April 7, 1988, with the reactor at 71% power, the Reactor Operator was increasing power when a "Circulating Water Pump [1A] Trip" alarm came up. The Operator began to reduce load and dispatched an Auxiliary Tender to investigate. The Auxiliary Tender reported the circulating water pump pit was full of water and smoke. At the same time, a "Circulating Water Pump [1B] Trip" alarm was received. The Operator manually scrammed the reactor realizing that all circulating water would be lost. The Operator then went to the "Low Power" position and placed one circulator per loop on self-turbining to conserve steam. The Reactor Operator manually shutdown Loop I and put "C" circulator on condensate. The decay heat exchanger was cleared out so steam was routed through "D" circulator and out the reheat power relief valves. Reactor depressurization was initiated and the decay heat exchanger was returned to service at approximately 0600 hours.

The expansion joint on circulating water pump "1A" in the circulating water pump pit failed due to degradation and has been replaced. All similar expansion joints in the plant have been or will soon be inspected and replaced if necessary.

This event is being reported herein pursuant to the requirements of 10CFR50.73(a)(2)(iv).

IE22
 1/1

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

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

DESCRIPTION OF EVENT:

Initial Conditions

Reactor

Reactor Power: 71%
Average Core Inlet Temperature: 676 degrees Fahrenheit
Average Core Outlet Temperature: 1445 degrees Fahrenheit
Reactor Pressure: 635 PSIA

Primary Coolant:

"A" Circulator Speed: 7041 RPM
"B" Circulator Speed: 6876 RPM
"C" Circulator Speed: 6900 RPM
"D" Circulator Speed: 6876 RPM

Total Percent Helium Flow: 74.9% (2612 KPPH)

Secondary Coolant:

Loop I Feedwater Flow: 760.9 KPPH
Loop II Feedwater Flow: 774.0 KPPH

Circulating Water Pump Pit Description:

The circulating water pump pit is located south of the circulating water tower. The pit dimensions are 29.5 feet wide, 77 feet long, and 17 feet deep, with a total volume of approximately 38,615 cubic feet. The circulating water pump pit sump located in the southeast corner is 5 feet by 5 feet by 5 feet deep with a volume of 125 cubic feet. Total volume of both the pit and the sump is 38,740 cubic feet. The pit contains two large circulating water pumps (1A and 1B) with a pumping capacity of 67,000 GPM each, two smaller circulating water pumps (1C & 1D) with a pumping capacity of 11,000 GPM each, and two circulating water pump pit sump pumps with a pumping capacity of 150 GPM each.

EVENT CHRONOLOGY:

At 1207 on April 6, 1988, a Station Service Request (SSR# 88502258) was written against the level switch LS-7510-2 for the circulating water pump pit sump because it allowed the sump pumps to run continuously. The pumps were placed in manual and the Auxiliary Tender was responsible for checking the sump and pumping it out on a periodic basis. This switch discrepancy caused the alarm to remain permanently lit in the control room, therefore defeating the only level alarm for the pit.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

TEXT (If more space is required, use additional NRC Form 366A 3) (17)

At approximately 0440 hours on April 7, 1988, the Auxiliary Tender made a routine check of the circulating water pump pit and manually pumped down the sump. Nothing abnormal was observed at that time.

Minutes before the event, the "Circulating Water Pump Pit Sump High Level" alarm cleared momentarily, but came right back on so no action was taken at that time.

At 0505 hours on April 7, 1988, the Reactor Operator received a "Circulating Water Pump Tripped" alarm on Circulating Water Pump "1A". The Reactor Operator began to reduce load and dispatched an Auxiliary Tender to investigate the problem.

At 0508 hours, the Auxiliary Tender reported the circulating water pump pit was full of water and smoke. At the same time, another "Circulating Water Pump Tripped" alarm was received on Circulating Water Pump "1B". A "Circulating Water Pressure (low pressure)" alarm was also received.

At 0509 hours, the Reactor Operator manually scrammed the reactor due to the loss of the condenser as a heat sink (see FSAR Section 10.3.4). One circulator per loop was placed on self-turbining to conserve steam.

At 0535 hours, the Reactor Operator manually shutdown Loop 1 and put "C" helium circulator on condensate to maintain it at self-turbining speed. The Operator maintained "D" helium circulator on steam from the bypass flash tank and continued venting to atmosphere out of the hot reheat power operated relief valves. Only the one circulator was used on steam to conserve the condensate inventory.

At 0605 hours, depressurization of the reactor (primary coolant) was started and circulators "C" and "D" were placed on pelton wheel drive with emergency feedwater, again to conserve the condensate inventory. The decay heat exchanger was placed in service.

At 0610 hours, it was noted that reactor plant exhaust stack radiation monitor RT-7324-1 was showing increased activity readings. The release was calculated to be 5.3% of the Technical Specification ELCO 8.1.1(a) limits resulting in a total dose of 4.45E-5 REM at the Exclusion Area Boundary. The cause and corrective actions associated with this release were identified in LER 88-004.

At 0650 hours, the Loop II Economizer-Evaporator-Superheat section (EES) was put on condensate and circulators "C" and "D" were put on condensate. At the same time, a Notice of Unusual Event (NOUE) was declared because of the unplanned release indicated in the reactor plant exhaust stack.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Fort St. Vrain, Unit No. 1	DOCKET NUMBER (2) 0 15 0 0 0 2 6 7 8 8	LER NUMBER (6)			PAGE (3) 4 OF 6
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	

TEXT (4) more space is required, use additional NRC Form 365A (1/77)

CAUSE OF EVENT:

The event was caused by a catastrophic failure of an expansion joint on the discharge side of circulating water pump "1A". The expansion joint is rated at 55 psi (the pump is rated at 32.6 psi). Circulating water pumps "1A" and "1B" were running at the time of the event. Assuming 20% of pump flow passed through the 24 inch tear in the expansion joint, it would have taken 21.7 minutes to completely fill the circulating water pump pit, and only 14.4 minutes to fill the pit to the point at which it was discovered. The expansion joint which failed can be isolated but the pump suction valve is manually operated, and the valve has a high gear ratio due to its size. It would have taken six to ten minutes just to shut the valve. Also, access into the pit would have required the Auxiliary Tender to pass across the leak and become exposed to an electrocution hazard from the 480V and 4160V sources. Therefore, isolation of the leak required all power to be shut off in the pit, which would shut off all circulating water pumps, and result in a complete loss of condenser vacuum. The subsequent reactor scram was inevitable.

The expansion joint on the discharge of circulating water pump "1A" apparently failed due to weakening of the internal reinforcing fibers, due to age and exposure to the weather. The root cause of this failure was the lack of an adequate preventive maintenance program for the plant rubber expansion joints. An inspection of the other joints in the circulating water pump pit revealed degradation (in the form of weak spots, cracking, or surface abrasion) on four joints in addition to the one that failed. All five of these joints have now been replaced, as well as four others on the circulating water system at the condenser inlet and outlet waterboxes.

The expansion joint which failed was manufactured by the Uniroyal Company, Model Number CH-4140, and was 54 inches in diameter. It was approximately 15 years old. The design life expectancy on these joints is approximately ten years.

The high activity indication on RT-7324-1 was the result of the core support floor vent line relief valve, V-6389, lifting due to excess pressure and discharging unpurified helium into the reactor plant exhaust stack. The cause and corrective action were addressed in LER 88-004.

ANALYSIS OF EVENT:

This event resulted in a manual scram and cooldown of the reactor, and is reported herein per 10CFR50.73(a)(2)(iv).

As a result of the failure of the one expansion joint, all circulating water pumps became inoperable. In response to this, the plant operations personnel manually scrambled the reactor and stabilized the plant in accordance with standard operating procedures. No unusual problems were encountered during the plant shutdown. There would have been no difference in consequences if this failure had occurred at a higher power level. Therefore, it is concluded that this incident posed no threat to the health and safety of the public.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

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

CORRECTIVE ACTION:

All eight expansion joints in the circulating water pit will be replaced. Five were replaced prior to plant restart on April 21, 1988, and the remainder will be replaced during the helium circulator outage presently scheduled for July 5, 1988. In addition, all similar expansion joints in the plant in critical service functions have been inspected for acceptability with the remainder to be inspected as soon as possible. These expansion joints will be replaced as necessary.

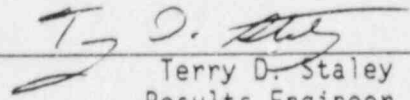
The level switches on the circulating water pump pit sump pumps have been repaired and restored to operation.

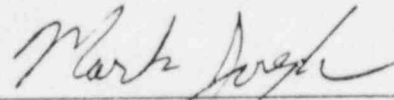
A Preventive Maintenance program for the inspection and periodic replacement of the expansion joints will be developed. Estimated implementation date for this program is the end of the helium circulator outage, scheduled for October 1988.

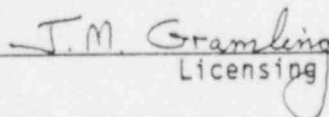
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

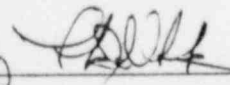
FACILITY NAME (1) Fort St. Vrain, Unit No. 1	DOCKET NUMBER (2) 0 5 0 0 0 2 6 7	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8 8	- 0 0 6	- 0 0	0 6	OF	0 6

TEXT (If more space is required, use additional NRC Form 364A's) (17)


 Terry D. Staley
 Results Engineer


 Mark Joseph
 Technical Services Supervisor


 J.M. Gramling
 Licensing


 C. H. Fuller
 Manager, Nuclear Production



Public Service™

Public Service
Company of Colorado

16805 WCR 19 1/2, Platteville, Colorado 80651

May 9, 1988
Fort St. Vrain
Unit No. 1
P-88160

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

Docket No. 50-267

SUBJECT: Licensee Event Report
88-006-00, Final Report


REFERENCE: Facility Operating
License No. DPR-34

Gentlemen:

Enclosed please find a copy of Licensee Event Report
No. 50-267/88-006-00, Final, submitted per the requirements of
10 CFR 50.73(a)(2)(iv).

If you have any questions, please contact Mr. M. H. Holmes at (303)
480-6960.

Sincerely,

C. H. Fuller by 
C. H. Fuller
Manager, Nuclear Production

Enclosure

cc: Regional Administrator, Region IV
ATTN: Mr. T. F. Westerman, Chief
Projects Section B

Director Nuclear Reactor Regulation
ATTN: Mr. J. A. Galvo, Director
Project Directorate IV

Mr. R. E. Farrell
Senior Resident Inspector, FSV

CHF/djm

IE22
11