

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)

Fort St. Vrain, Unit No. 1

DOCKET NUMBER (2)

0 5 0 0 0 2 1 6 1 7 1 OF 0 1 8

PAGE (3)

TITLE (4)

Stress Corrosion Of Helium Circulator Bolting

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	2	1	5	8	5	0	0	2	N/A	0 5 0 0 0 0 1 1		
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OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (11)									
POWER LEVEL (10)	0 0 0	20.402(b)		20.406(a)		50.73(a)(2)(iv)		73.71(b)			
		20.406(a)(1)(i)		50.38(a)(1)		50.73(a)(2)(v)		73.71(a)			
		20.406(a)(1)(ii)		50.38(a)(2)		50.73(a)(2)(vi)		07:46R (Specify in Abstract below and in Text, NRC Form 386A)			
		20.406(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(vii)(A)					
		20.406(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(vii)(B)					
		20.406(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(viii)					

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Jim Eggebroten, Technical Services Engineering Supervisor	AREA CODE 3 0 3 7 8 5 1 - 1 2 1 2 1 4

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC
X	A	B B L O	G O 6 3	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
XX			0	6	1 4 8 5

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

One of twenty-four bolts which secure the bearing assembly of the compressor rotor to the "A" helium circulator unit (C-2102) failed while being reassembled following refurbishment. The bolt failure was determined to have resulted from stress corrosion cracking. Preliminary chemical analysis indicated a high level of chloride and sulphate present on the bolts. Evaluations into the source of chloride in the Fort St. Vrain primary circuit, and the effects on metallic components exposed to primary coolant are underway.

At the time of the bolt failure, the reactor was shutdown for control rod drive refurbishment, as identified in LER 50-267/84-008.

This is being reported per 10 CFR 50.73(a)(2)(v).

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

FACILITY NAME (1) Fort St. Vrain, Unit No. 1	DOCKET NUMBER (2) 05000267	LER NUMBER (5)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		85	002	00	02	OF	08

TEXT (If more space is required, use additional NRC Form 385A's) (17)

EVENT DESCRIPTION:

In January, 1984, Circulator C-2104 was removed and sent to GA Technologies for refurbishment. C-2104 was replaced with circulator C-2102. A bearing water to interspace leak was recently discovered in C-2102 during operation of the circulator. In December, 1984, C-2102 was removed from the reactor and returned to GA Technologies for refurbishment. GA Technologies initially determined that one of the bolts on the bolt flanges on the bearing water supply system had failed (see Figure 1). That bolt failure was analyzed and determined to be due to a manufacturing defect in the bolt material, and was unrelated to the stress corrosion cracking bolt failure, found later. As indicated in Figure 1, this bolt is not exposed to primary coolant.

There are four penetrations for the helium circulators in the PCRV bottom head. The primary closure member for each of these is formed by parts of the helium circulator casing and support structure with a flanged and bolted joint, sealed by two metal gaskets.

Twenty-four bolts (3/4" diameter, high strength ferritic cadmium-plated) secure the bearing assembly of the compressor rotor to the helium circulator unit forming part of the primary closure (See Figure 1, Bolt 90C2101-300-40). When GA Technologies reassembled C-2102 following repair of the leak in the bearing water supply line, one of the twenty-four bolts failed before reaching the installation torque of 450 ft-lbs.

EVENT ANALYSIS:

The bolt fracture occurred at the third thread, starting from the head up the shank, causing the bolt to separate into three pieces. Macroscopic and metallographic examinations performed on the bolt revealed pitting and stress corrosion cracks in the threads. The remaining twenty-three bolts from C-2102 were examined for surface defects using the fluorescent liquid penetrant technique, and no defects were found, indicating how tight the cracks are. A sample bolt was then randomly selected for metallographic examination. Longitudinal sections were taken and revealed stress corrosion cracks in the roots of the first and second threads. In all cases, the cracks were typical of stress corrosion.

Four additional bolts were selected at random for metallographic examination. One of these bolts was found to have indication of stress corrosion cracking. The remaining three bolts had no indications.

In the same area of C-2104, six bolts were selected at random and examined for comparison purposes. There was no indication of cracking on any of the bolts from C-2104.

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APPROVED OMB NO. 3150-0104

EXPIRES 6/31/85

FACILITY NAME (1) Fort St. Vrain, Unit No. 1	DOCKET NUMBER (2) 0500026785	LER NUMBER (6)			PAGE (3)	
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TEXT (If more space is required, use additional NRC Form 388A's) (17)

Six out of twelve bolts in the stator holddown bolt circle of C-2102 were metallographically examined (Bolt 90C2101-380-10, 7/16" diameter, A-286, austenitic stainless steel silver plated). Four of these bolts had linear indications, and two had no defects at all. Six bolts from the stator holddown bolt circle of C-2104 were randomly selected and examined. There was no indication of cracking on any of these bolts.

Two of the twelve bolts from the duct holddown bolt circle of C-2102 were selected at random (Bolt 90C2101-340-9, 5/8" diameter, A-286). These bolts had no indication of cracking. There were no indications on the bolts pulled from C-2104 in the same location.

Two of the rotor bolts (Bolt 90C2101-310-4) were pulled from C-2102, and no indication of cracking was found. The bolts from C-2104 were not examined, primarily because the rotor bolts are made of Inconel 718, and there were no expectations of stress corrosion cracking with this type of material.

Failure of the stator holddown bolts, the duct holddown bolts, and the rotor bolts would affect the functional capability of the affected circulator. Failure of the inner diameter primary closure bolts could release primary coolant into the steam piping. The two steam isolation valves downstream of the circulator would inhibit a release of primary coolant to the environment. Based on engineering evaluation of the circulator, these four bolt circles are the primary areas that would be subject to this kind of stress corrosion in the primary circuit.

Chemical analyses have indicated that chloride and sulphate levels on the failed bolt from the C-2102 circulator were significantly higher than those from C-2104. C-2104 was removed from the reactor in January, 1984, but had been installed in the reactor for approximately ten years prior to its removal.

As reported in LER 50-267/84-008, chloride stress corrosion of a control rod drive cable was discovered during control rod drive refurbishment. As part of the corrective action for this LER, an investigation has been initiated into possible sources of chlorides into the primary coolant circuit of the reactor, and possible effects on metallic components that are in contact with the primary circuit.

CAUSE DESCRIPTION:

The cause of failure of the primary closure bolt from C-2102 was stress corrosion cracking.

CORRECTIVE ACTION:

Investigations into possible sources of chloride in the reactor continue, and are being reported to the Nuclear Regulatory Commission through a separate submittal.

An overall evaluation of Fort St. Vrain metallic components exposed to primary coolant chloride contamination is underway, and an independent report is scheduled to be submitted to the Nuclear Regulatory Commission in March, 1985.

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TEXT (If more space is required, use additional NRC Form 365A's) (17)

The bolting material in circulators C-2102 and C-2104 will be replaced with Inconel 718. Evaluations of previous circulator and core condition operating histories, along with possible effects on other circulators, are being performed and will be reported in a supplemental report.

The "B" Circulator, C-2105, will be removed from the PCRV and the condition of bolts 90C2101-300-40, 90C2101-380-10, and 90C2101-340-9 will be evaluated prior to startup. Further information on this evaluation will be submitted in a supplemental report.

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TEXT (if more space is required, use additional NRC Form 288A 8/1/77)

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT (If more space is required, use additional NRC Form 388A's) (17)

PCRV
INTERIOR
CAVITY

DIFFUSER

HELIUM
SHUTOFF
VALVECOMPRESSOR
ROTORBEARING
ASSEMBLYTURBINE
ROTOR

PELTON WHEEL

FIGURE 2 Helium Circulator Installation

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FIGURE 3 PCRV Helium Circulator Penetration

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TEXT (If more space is required, use additional NRC Form 365A's) (17)

Laurie S. McKittrickLaurie S. McKittrick
Technical Services TechnicianJim EggebrotenJim Eggebroten
Technical Services Engineering Supervisor

Licensing Review By:

Jim GramlingJim Gramling
Nuclear Licensing-Operations SupervisorC. H. FullerC. H. Fuller
Station ManagerJ. W. GahmJ. W. Gahm
Manager, Nuclear Production



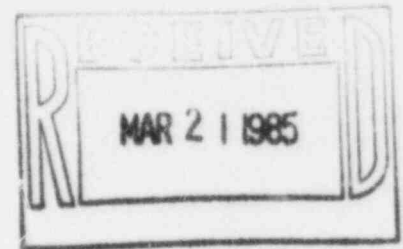
Public Service Company of Colorado

16805 WCR 19 1/2, Platteville, Colorado 80651

March 15, 1985
Fort St. Vrain
Unit #1
P-85085

Regional Administrator
Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

ATTN: Mr. E. H. Johnson



Docket No. 50-267

REFERENCE: Facility Operating
License No. DPR-34

SUBJECT: Licensee Event
Report 85-002,
Preliminary Report

Dear Mr. Johnson:

Enclosed please find a copy of Licensee Event Report
No. 50-267/85-002, Preliminary, submitted per the requirements of
10 CFR 50.73(a)(2)(v).

Sincerely,

J. W. Gahm
Manager, Nuclear Production

Enclosure

cc: Director, MIPC

JWG/djm

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