

Public Service Company of Colorado
P. O. Box 361, Platteville, Colorado 80651

June 18, 1975

Mr. E. Morris Howard, Director
Nuclear Regulatory Commission
Region IV
Office of Inspection and Enforcement
Suite 1000
Arlington, Texas 76012

Ref: Facility Operating License
No. DPR-34

Docket No. 50-267

Dear Mr. Howard:

Enclosed please find a copy of Unusual Event Report No. 50-267/75-10,
Preliminary, submitted per the requirements of the Technical
Specifications.

Very truly yours,

H. Larry Brey
H. Larry Brey
Superintendent-Operations
Fort St. Vrain Nuclear
Generating Station

HLB:il

cc: Mr. Angelo Giambusso

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PDR ADOCK 05000267
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DISTRIBUTIONS

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ERG Committee		1		
Philadelphia Electric Company				
2301 Market St.				
Philadelphia, Pa. 19101				

REPORT DATE: June 11, 1975

UNUSUAL EVENT

OCCURRENCE DATE: April 28, 1975

FORT ST. VRAIN NUCLEAR GENERATING STATION
PUBLIC SERVICE COMPANY OF COLORADO
P. O. BOX 361
PLATTEVILLE, COLORADO 80651

REPORT NO. 50-267/75/10

Preliminary

IDENTIFICATION
OF EVENT: _____

During routine analysis of PCRV liner cooling tube outlet temperatures, as required by SUT B-3, four individual cooling tubes in the top head region of the PCRV were observed to be indicating a temperature rise of 24°F. The expected temperature rise should be on the order of 3 to 5°F.

CONDITIONS

PRIOR TO EVENT: X Steady State Power Routine Shutdown
 Hot Shutdown Routine Load Change
 Cold Shutdown Other (specify)
 Refueling Shutdown
 Routine Startup

The major parameters at the time of the event were as follows:

Power	Rtr.	<u>13</u>	MWth
	Elect.	<u>0</u>	MWe
Secondary Coolant	Pressure	<u>1212</u>	psig
	Temperature	<u>316</u>	°F
	Flow	<u>240,000</u>	#/hr
Primary Coolant	Pressure	<u>411</u>	psig
	Temperature	<u>274</u>	°F Core Inlet
		<u>370</u>	°F Core Outlet
	Flow	<u>312,000</u>	#/hr.

DESCRIPTION OF
EVENT: _____

The four tubes which showed larger-than-expected temperature rises are associated with the lower end of each of the 39 top head penetrations which communicate with the PCRV cavity upper plenum. It was thought that hot gas from the upper plenum was being drawn into the annulus between the control rod drive housing and the refueling penetration. In normal operation, such a flow of gas could result from the lower static pressure which exists inside the control rod drive housing relative to the static pressure associated with the core inlet plenum.

APPARENT CAUSE
OF EVENT: _____

<input checked="" type="checkbox"/> Design	<input type="checkbox"/> Unusual Service Cond. Including Environ.
<input type="checkbox"/> Manufacture	<input type="checkbox"/> Component Failure
<input type="checkbox"/> Installation/Const.	<input type="checkbox"/> Other (specify)
<input type="checkbox"/> Operator	_____
<input type="checkbox"/> Procedure	_____

The static pressure inside a control rod drive housing is slightly greater than that at the core outlet, but less than that of the core inlet plenum. These pressure differences are intended to cause the normal purge flow into the drive housing to flow downward to exit the control rod guide tubes, flow over the control rods for cooling, and discharge into the core outlet plenum. Due to the equipment maintenance access holes in the control rod drive housing, plus the articulated lower guide tube and orifice valve assembly, no positive seal exists between the annulus surrounding the drive unit and its encased internals. Therefore, a pressure difference sufficient to draw hot gas from the upper plenum into the annulus is present whenever the primary coolant is being circulated. The temperatures of the hot gas is equal to the core inlet primary coolant temperature, which varies from 210°F at zero power, up to 760°F at full power.

The four hot cooling tubes are physically welded to the refueling penetration nozzles at the upper headliner, and therefore they responded promptly to the presence of hot helium flowing into the penetration between the CRD assembly and the penetration liner.

ANALYSIS OF
EVENT: _____

The leakage of hot gas into the annulus between the control rod drive housing and the refueling penetration liner has been determined to be the cause of the unusual temperature rise associated with top head tubes T-39, T-40, T-41, and T-42. This gas flow is caused by pressure differentials which exist between the inside and outside of a control rod drive unit.

Analysis of Event (continued)

To determine the specific flow paths that exist in the CRD assembly, a series of diagnostic tests were performed on a spare control rod drive unit. The results indicated that the flow entered the drive housing through numerous access and maintenance ports, and exited from the control rod guide tubes and from the duct which directs the reserve shutdown material from the drive unit into the receiver channel in the core.

Subsequent to these mechanical flow tests, a computer simulation of the various flow processes was developed and used to further analyze the physical situation and to evaluate the effects of proposed modifications designed to alleviate the situation.

CORRECTIVE ACTION:

The design of corrective seals at specific locations both inside and outside of the control rod drive unit is currently in progress. Basically, the drive housings are expected to be modified as follows:

- 1) A modified flexible seal will be installed at the lower outside end of the housing in place of the existing anti-convection ring currently in use.
- 2) A spring-loaded piston ring/cable bushing assembly will be positioned at the upper end of each control rod guide tube.
- 3) A seal welded piston ring seal will be positioned between the inner and outer feed pipes below the rupture disc assembly of the reserve shutdown hopper contained in the control rod drive unit. This seal is so designed that it in no way impedes the flow of reserve shutdown material which would flow through this tube if released by the rupture disc above.

These three seals are expected to reduce the leakage flow to an acceptable level.

FAILURE DATA/
SIMILAR REPORTED EVENTS:

None

PROGRAMMATIC IMPACT:

Not known - modifications to be performed in parallel with other program objectives. We do not know at this time what item will be controlling.

CODE IMPACT:

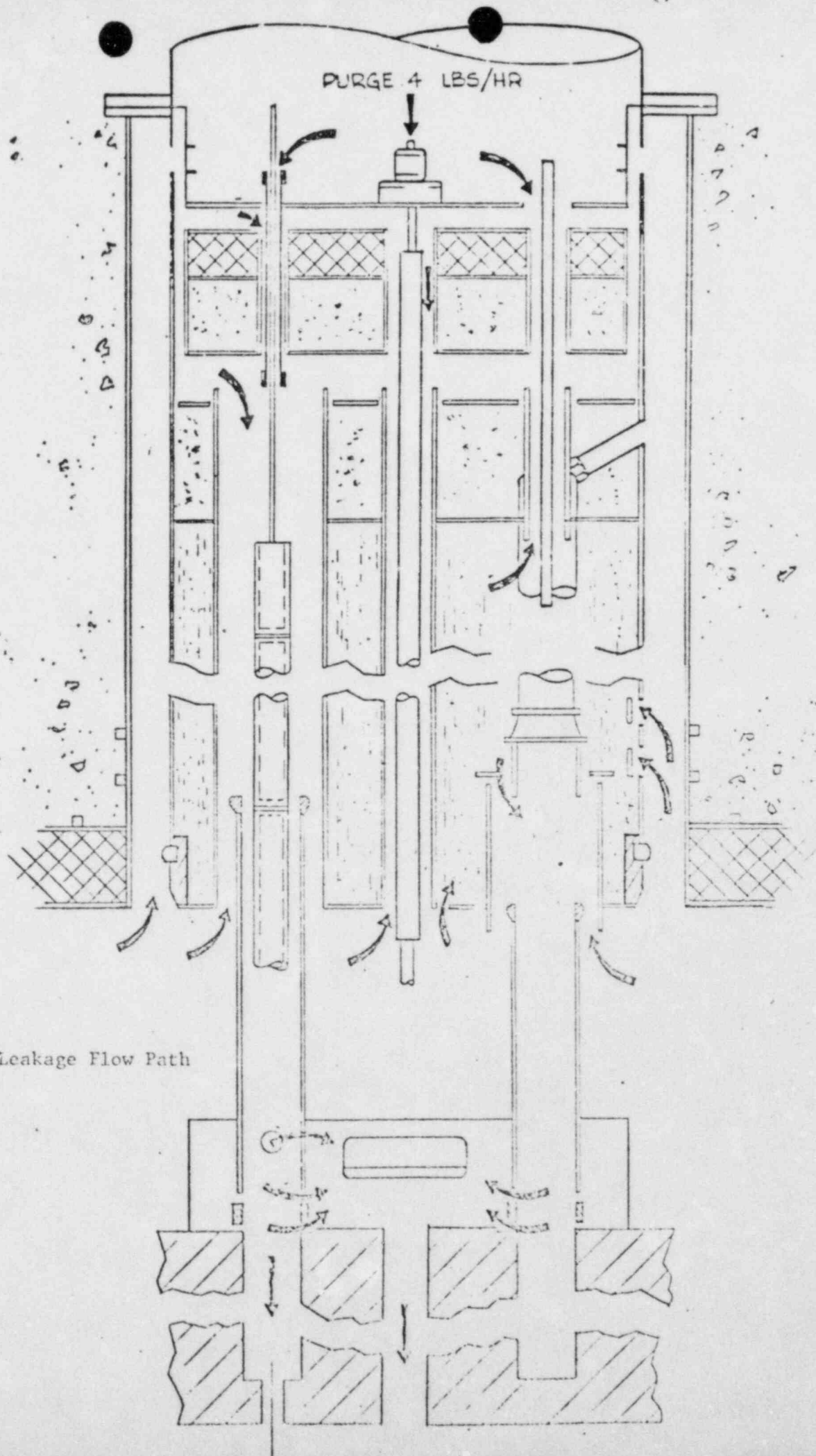
None

Recommended:

H. Larry Brey
H. Larry Brey
Superintendent-Operations
Fort St. Vrain Nuclear
Generating Station

Approved:

Frederic E. Swart
Frederic E. Swart
Supt. Nuclear Production
Public Service Company
of Colorado



SKETCH - Leakage Flow Path

IE FILE COPY

Public Service Company of Colorado

P. O. Box 361, Platteville, Colorado 80651



February 16, 1977
Fort St. Vrain
Unit No. 1
P-77063

Mr. E. Morris Howard, Director
Nuclear Regulatory Commission
Region IV
Office of Inspection and Enforcement
Suite 1000
Arlington, Texas 76012

REF: Facility Operating License
No. DPR-34

Docket No. 50-267

Dear Mr. Howard:

Enclosed please find a copy of Unusual Event Report No. 50-267/75-10B, Final Supplement, submitted per the requirements of the Technical Specifications.

Also, please find enclosed one copy of the Licensee Event Report for Unusual Event Report No. 50-267/75-10B.

Very truly yours,

A handwritten signature in cursive script that reads 'Frederic E. Swart'.

Frederic E. Swart
Nuclear Production Manager

FES/alk

cc: Director, Office of Management Information
and Program Control

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