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 7

TITLE (4)
During SR 5.1.2c-X, Only ½ Of Total RSD Material Was Discharged From CRD#21

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)
1 1	0 5	8 4	8 4	—	0 1 2	— 0 0	1 2	0 5	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)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	XX 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
Jim Eggebroten, 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	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
XX YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		0 3	0 5	8 5

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

At 0830 hours on November 5, 1984, with the reactor shutdown for control rod drive (CRD) inspection and maintenance, the reserve shutdown hopper of control rod drive and orifice assembly (CRDOA) #21 was functionally tested in the hot service facility per SR 5.1.2c-X, "Reserve Shutdown Assembly Functional Test". During performance of the test, it was discovered that about 40 pounds of reserve shutdown material (40 weight percent boron) had been discharged from the hopper assembly. The reserve shutdown hopper is designed to release approximately 80 pounds of material containing neutron absorbing boron carbide into the core upon rupture of the hopper rupture disc.

The event was reported to the Nuclear Regulatory Commission at 1225 hours on November 5, 1984, per the requirements of 10 CFR 50.72(b)(2) "four hour report".

The failure of the CRDOA #21 hopper assembly to discharge an acceptable amount of reserve shutdown material during performance of SR 5.1.2c-X is being reported pursuant to the requirements of 10 CFR 50.73(a)(2)(v).

The reactor remained in a cold shutdown condition throughout this event.

An investigation is presently underway to determine why some of the reserve shutdown material was retained inside the CRDOA #21 hopper assembly.

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

EVENT DESCRIPTION:

The purpose of the reserve shutdown system is to provide a means of admitting sufficient negative reactivity into the core to ensure an adequate core shutdown margin from any reactor operating condition completely independent of the control rod system.

The reserve shutdown system is composed of a storage hopper located between the control rod drive mechanism and the thermal shield at the lower end of each refueling penetration. Each hopper contains nominally spherical neutron absorber material composed of boron and graphite. This absorber material is held inside the hopper by a rupture disc.

A steel guide tube extends from the underside of the hopper to the top control reflector block of the associated core region. The guide tube engages the top reflector block, forming a clear passageway for the reserve shutdown material to fall from the hopper, through the guide tube, and into the core (see Figures 1 and 2).

Rupture of the hopper rupture disc and subsequent release of the absorber material into the core is initiated by pressurizing the hopper with helium. Each hopper is connected to a separate high pressure helium bottle (2200 psi nominal) by a pressurizing line that allows helium flow from the bottle into the hopper immediately above the rupture disc (Figure 3). These bottles have an alarm system associated with them that will actuate when the bottle pressure drops below approximately 1640 psig, at which time the bottles are replaced. Section 3.8.3.2 of the FSAR analyzes reserve shutdown system performance with a minimum helium bottle pressure of 1500 psig. In this case, if the rupture discs fail to burst at the design differential pressure of 165 ± 50 psi, the hopper pressure could build to a maximum of 1015 psia. Since the reactor pressure is 700 psia, a minimum differential pressure of 315 psi can be imposed across the disc, assuring its rupture.

SR 5.1.2c is performed to determine the reliability of the differential burst pressure of the disc, and detect any tendancy of the poison material to bridge or deteriorate in the hoppers over extended periods of time. The surveillance consists of placing the CRDOA inside the hot service facility over a pre-weighed container, so that the reserve shutdown material will fall into the container when the rupture disc bursts. A helium line and pressure guage are connected to the CRDOA hopper assembly, and the hopper is pressurized until the rupture disc bursts. The container is then weighed to determine the amount of reserve shutdown material released during the test. Eighty ±eight pounds of reserve shutdown material must be released in order to satisfy SR 5.1.2c-X acceptance criteria.

Upon discovering that only forty pounds of reserve shutdown material had been released during the test, maintenance personnel performed a visual inspection of the hopper internals using a borescope. The material that failed to discharge from the hopper was removed, and samples were collected for internal analysis. Samples were also sent to Los Alamos National Laboratories for Nuclear Regulatory Commission independent analysis.

ANALYSIS:

The reserve shutdown system is designed to provide sufficient negative reactivity control to achieve hot shutdown conditions from any operating condition without movement of the control rods. This condition can be met with two of the thirty-seven reserve shutdown hoppers inoperable per LCO 4.1.6, providing for a total negative reactivity insertion of at least .088ΔK in the equilibrium core.

The capability of pressurizing the reserve shutdown hoppers is demonstrated once each quarter, during normal plant operation. The "low bottle pressure" alarm circuitry is functionally tested once per quarter, and calibrated annually to insure that any loss of the minimum required rupture gas pressure is readily detected (see SR 5.1.2).

An off-line functional test of a reserve shutdown assembly has been performed following each of the three refueling cycles to date, as required per the Fort St. Vrain Technical Specifications. During each of these tests, the rupture disc burst pressure was below 300 psid as required per Section 3.8.3.5 of the FSAR, and acceptable amounts of absorber material were released from the hoppers.

FSAR Section 3.8.3.4 analyzes the reserve shutdown neutron absorber material and concludes that bridging and deterioration are not anticipated under the temperature, radiation, and helium environment in which the material is stored inside the hoppers during operation.

Two reserve shutdown hoppers have been functionally tested as a result of control rod drive problems recently encountered (see LER #84-008). The two reserve shutdown hoppers tested were on CRDOA #26 and CRDOA #21. During testing of CRDOA #26, all of the reserve shutdown material (20 weight percent boron) was released from the hopper as designed, however, the hopper assembly of CRDOA #21 (40 weight percent boron material) did not function properly as outlined in this report.

The potential safety consequences of this event are currently being investigated and will be analyzed further once the cause and extent of the problem are known.

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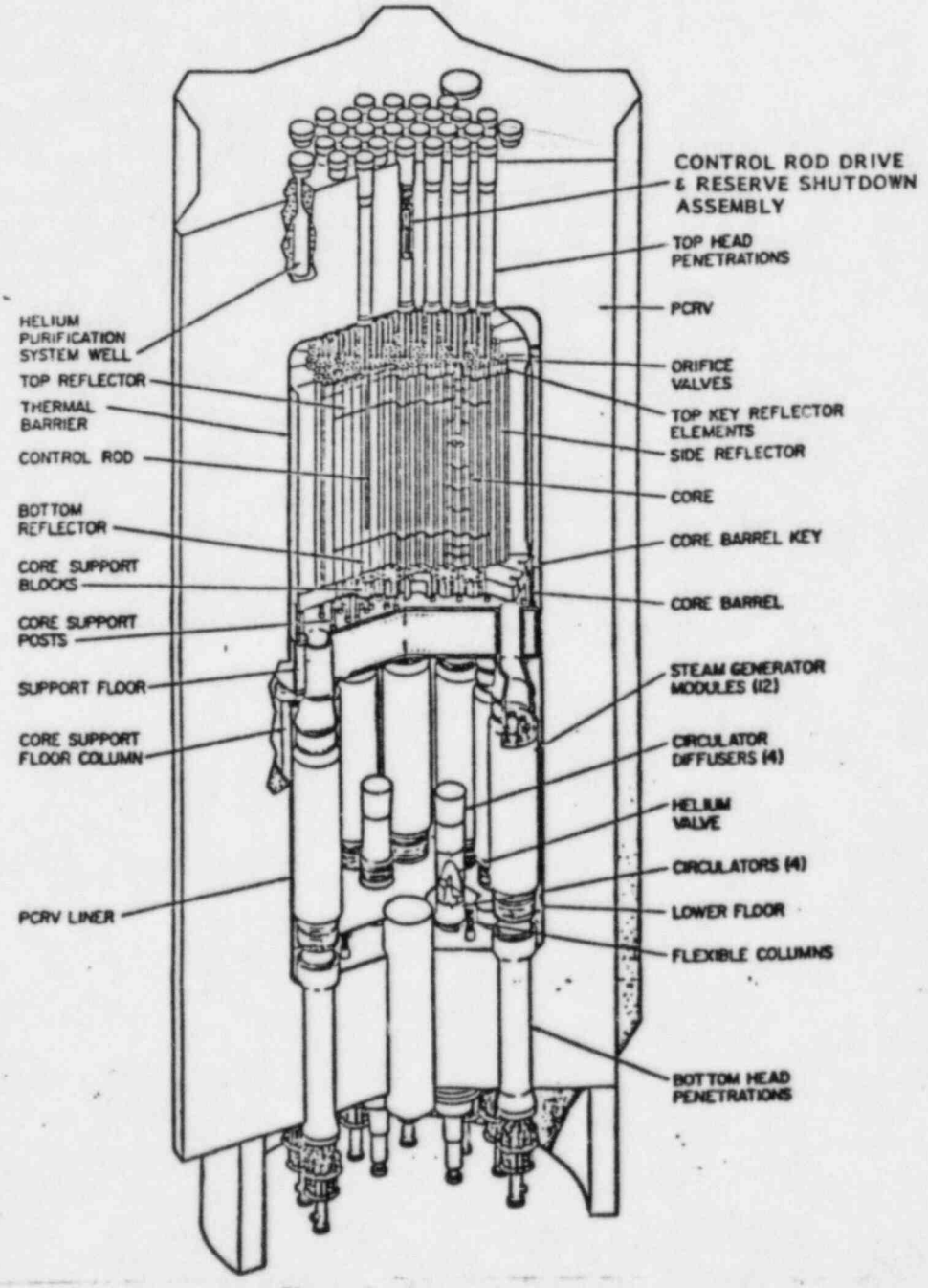

Figure. 1. Reactor Arrangement

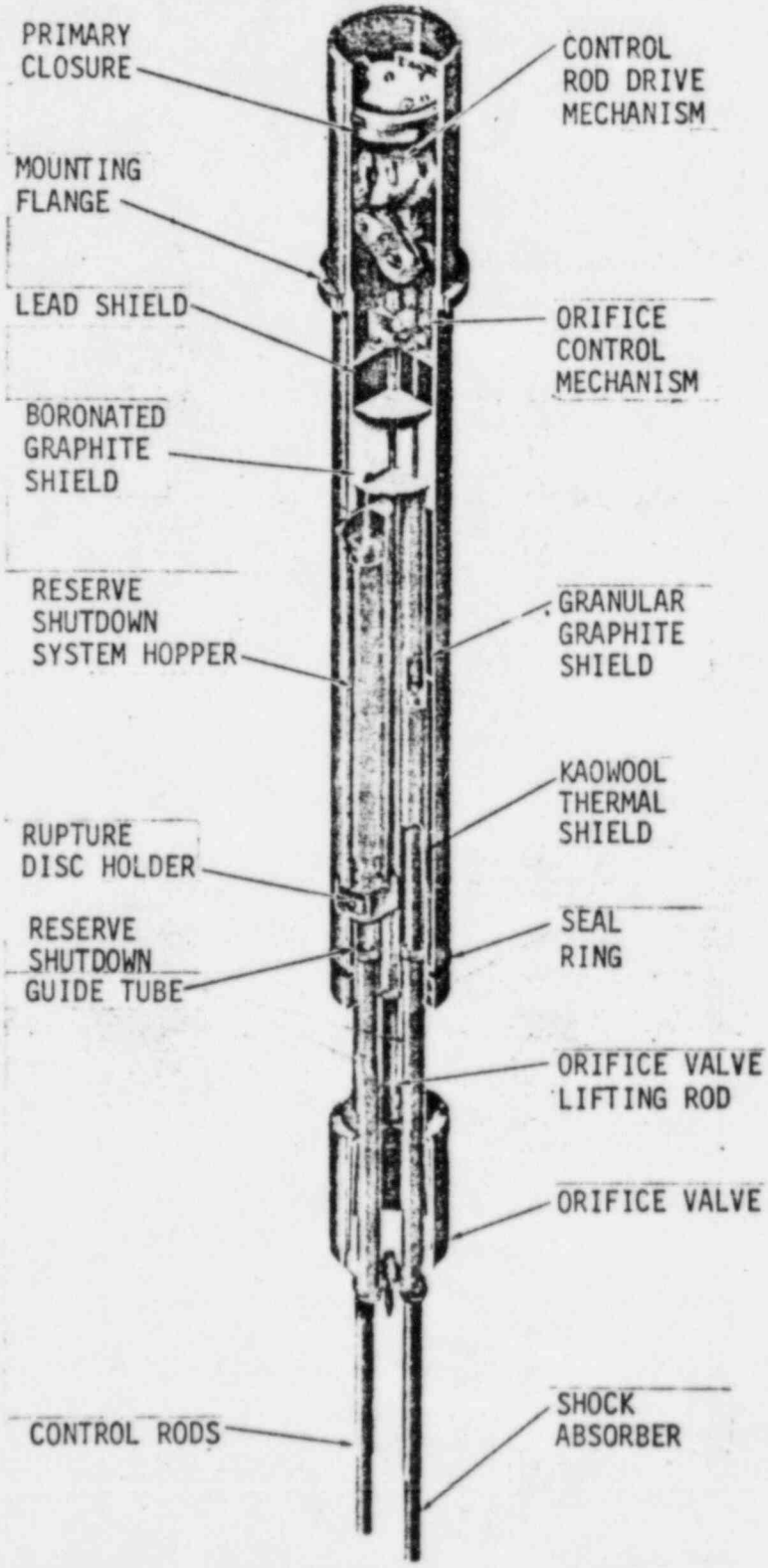

FIG. 2 CONTROL AND ORIFICING ASSEMBLY

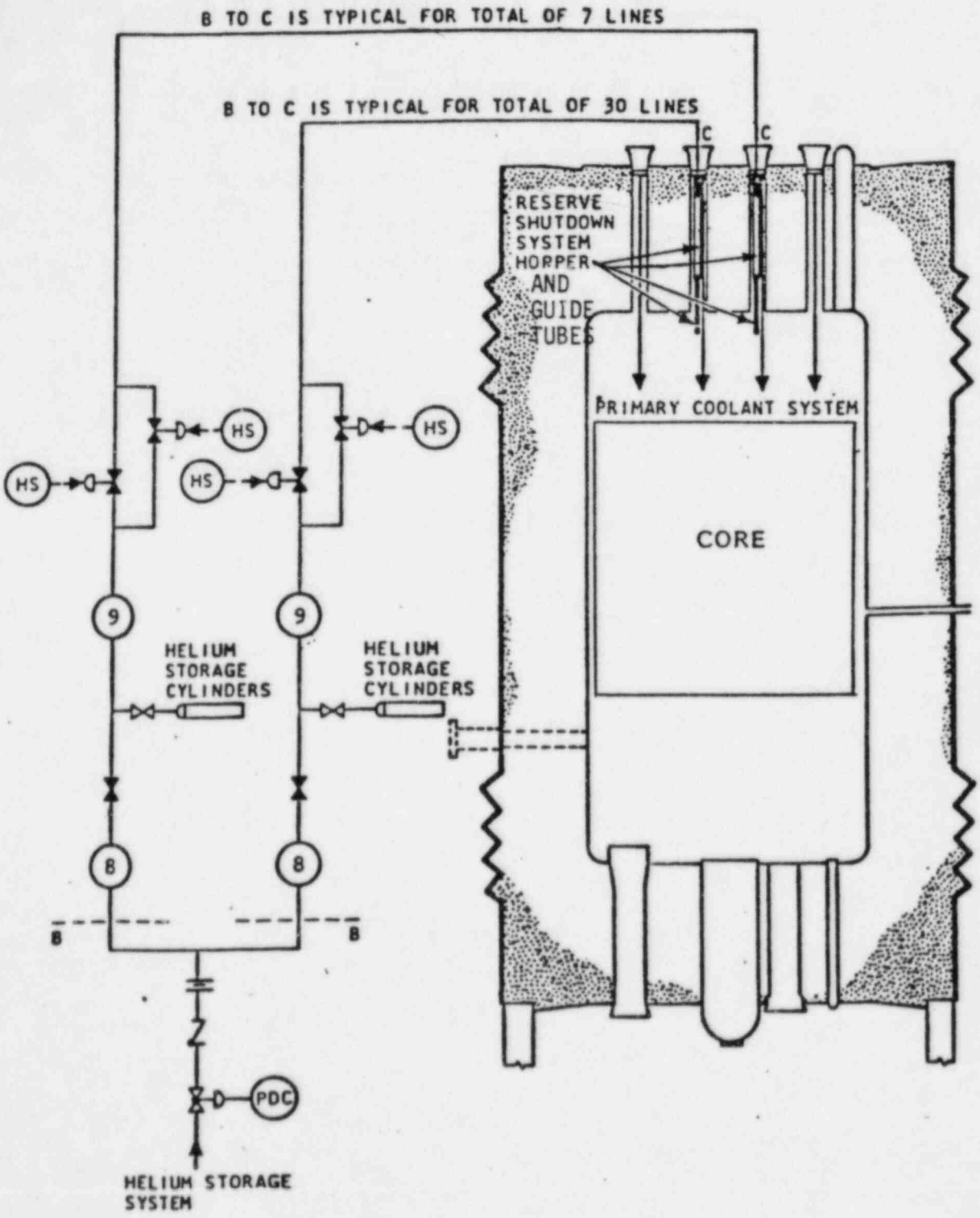

Fig. 3. Reserve shutdown system flow diagram.

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CORRECTIVE ACTION:

As mentioned previously, the cause and extent of this anomaly are presently under investigation, along with the development of an appropriate plan for corrective action prior to returning the plant to operation.

A supplemental report will be submitted March 5, 1985.

Jim Hill
Technical Services Technician

Jim Eggebroten
Technical Services Engineering Supervisor

Licensing Review By:

Jim Gramling
Jim Gramling
Nuclear Licensing-Operations Supervisor

C. H. Fuller
Station Manager

J. W. Gahm
Manager, Nuclear Production

Public Service Company of Colorado

16805 WCR 19 1/2, Platteville, Colorado 80651

50-267

December 4, 1984
Fort St. Vrain
Unit #1
P-84515

Mr. Robert Martin, Regional Administrator
Reactor Project Branch 1
Region IV
Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

ATTN: Mr. E. H. Johnson

REFERENCE: Facility Operating License
No. DPR-34

Docket No. 50-267

Dear Mr. Collins:

Enclosed please find a copy of Licensee Event Report No. 50-267/84-012, 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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