

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Fort St. Vrain, Unit No. 1										DOCKET NUMBER (2) 0 5 0 0 0 2 6 7										PAGE (3) 1 OF 0 7															
TITLE (4) Ultrasonic Detectors Inoperable Due To Instrument Drift																																			
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)					
DETERMINED																								N/A						0 5 0 0 0					
1 0			1 2			8 4			8 4		0 1 1		0 0		1 1			1 1			8 4									0 5 0 0 0					
OPERATING MODE (9) N						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)						50.33(a)(1)						X 50.73(a)(2)(v)						73.71(a)											
						20.406(a)(1)(ii)						50.36(a)(2)						50.73(a)(2)(vi)						OTHER (Specify in Abstract below and in Text, NRC Form 366A)											
						20.406(a)(1)(iii)						50.73(a)(2)(i)						50.73(a)(2)(vii)(A)						50.72(b)(2)(iii)											
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20.406(a)(1)(vi)						50.73(a)(2)(iv)						50.73(a)(2)(ix)																							
LICENSEE CONTACT FOR THIS LER (12)																																			
NAME Jim Eggebroten, Technical Services Engineering Supervisor																TELEPHONE NUMBER																			
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																																			
CAUSE		SYSTEM		COMPONENT		MANUFACTURER		REPORTABLE TO NPDOS				CAUSE		SYSTEM		COMPONENT		MANUFACTURER		REPORTABLE TO NPDOS															
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SUPPLEMENTAL REPORT EXPECTED (14)																EXPECTED SUBMISSION DATE (15)		MONTH		DAY		YEAR													
XX YES (If yes, complete EXPECTED SUBMISSION DATE)																NO				0 2		0 8		8 5											

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

During the performance of a scheduled Surveillance Test, five of twelve ultrasonic detectors for steam pipe rupture under the prestressed concrete reactor vessel (PCRVR), and one of twelve ultrasonic detectors for steam pipe rupture outside the PCRVR were found out of tolerance limits.

As a result of the detectors being out of tolerance, it was conservatively determined that a condition existed which could have prevented the fulfillment of a safety function needed to mitigate the consequences of an accident and is reportable per 10 CFR 50.72(b)(2)(iii) and 10 CFR 50.73(a)(2)(v).

The ultrasonic detectors are designed to identify the specific secondary coolant loop within the reactor building containing a steam leak by detecting and tripping at twice normal background noise level. Actuation of the ultrasonic detectors in combination with high reactor building pressure or temperature initiates a loop shutdown.

Instrument drift has been determined to be a generic problem for these detectors, and the problem is presently under investigation through engineering analysis.

Related Licensee Event Reports: 81-012, 82-040, and 82-051.

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## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/85

FACILITY NAME (1) Fort St. Vrain, Unit No. 1	DOCKET NUMBER (2)  0 5 0 0 0 2 6 7 8 4 - 0 1 1 - 0 0 0 2 OF 0 7				LER NUMBER (6)			PAGE (3)		
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TEXT (If more space is required, use additional NRC Form 368A's) (17)

EVENT DESCRIPTION:

The steam pipe rupture detection system involves a combination of ultrasonic detectors, differential pressure switches, and temperature switches (Figures 1 and 2). The basic system utilizes the ultrasonic detectors to establish in which of two secondary coolant loops a steam leak exists and differential reactor building pressure or temperature switches to confirm that the magnitude of the leak is such that automatic action is necessary. The logic system requires two out of three ultrasonic detectors to trip in the same area plus either a high building pressure or temperature trip.

The automatic action initiated is secondary coolant loop shutdown. This involves tripping of the two helium circulators and shutting off feedwater and steam to and from the steam generator of one loop. The source of feedwater/steam is also shut off.

It has been evaluated that small steam leaks (approximately 20 lb/sec. or less) can be handled by the normal building ventilation system and do not cause a building pressure rise sufficient to cause a trip. These small leaks would be detected by the ultrasonic detectors and action initiated upon an increase in building temperature.

On September 25, 26, and 27, 1984, a temporary surveillance, SR-RE-17-SA, "Ultrasonic Detector Check", was performed. The purpose for this temporary surveillance is to check for instrument drift in the ultrasonic detector channels. The test requires that a calibrated ultrasonic noise source be applied to the individual microphones (elements), and that the response of the channel falls between 40% and 90% of full scale meter reading for the elements located under the PCRV, and between 20% and 80% of full scale meter reading for the elements located outside of the PCRV. The data taken during the performance of the surveillance are given in Table 1.

The tolerance limits of SR-RE-17-SA are based on the Technical Specification surveillances SR-5.4.1.2.1j-R, "Steam Pipe Rupture (Pipe Cavity) Calibration", and SR-5.4.1.2.2j-R, "Steam Pipe Rupture (Under PCRV) Calibration", which are performed each refueling. The Technical Specification surveillances are calibration testing procedures for the ultrasonic detectors. These three surveillances test the lower limit of the acceptable range of noise necessary to identify small leaks.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

TABLE 1

## UNDER PCRV - RANGE 40% TO 90%

LOOP/ LOCATION	MICROPHONE	I-10 SWITCH	TRANSMITTER OUTPUT % (READ ON XSH METER)	
			AS FOUND	AS LEFT
Loop 1/ South Side	XE-93479-A	XSH-93471-A	0 1	80
	XE-93479-B	XSH-93471-B	80	80
	XE-93479-C	XSH-93471-C	0 1	40
Loop 1/ North Side	XE-93471-A	XSH-93471-A	80	80
	XE-93471-B	XSH-93471-B	40	40
	XE-93471-C	XSH-93471-C	40	40
Loop 2/ South Side	XE-93480-A	XSH-93470-A	0 1	65
	XE-93480-B	XSH-93470-B	50	50
	XE-93480-C	XSH-93470-C	>100 2	60
Loop 2/ North Side	XE-93470-A	XSH-93470-A	>100 2	65
	XE-93470-B	XSH-93470-B	85	85
	XE-93470-C	XSH-93470-C	70	70

## OUTSIDE PCRV - RANGE 20% TO 80%

LOOP/ LOCATION	MICROPHONE	I-10 SWITCH	TRANSMITTER OUTPUT % (READ ON XSH METER)	
			AS FOUND	AS LEFT
Loop 1/ South Wall	XE-93457-A	XSH-93457-A	60	60
	XE-93457-B	XSH-93457-B	20	20
	XE-93457-C	XSH-93457-C	60	60
Loop 1/ North Wall	XE-93455-A	XSH-93455-A	60	60
	XE-93455-B	XSH-93455-B	25	25
	XE-93455-C	XSH-93455-C	60	60
Loop 2/ South Wall	XE-93456-A	XSH-93456-A	10 1	25
	XE-93456-B	XSH-93456-B	60	60
	XE-93456-C	XSH-93456-C	50	50
Loop 2/ North Wall	XE-93454-A	XSH-93454-A	40	40
	XE-93454-B	XSH-93454-B	40	40
	XE-93454-C	XSH-93454-C	65	65

- 1 Instruments found out of limits (component failure)  
 2 Instruments found out of limits, but in a conservative direction

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

FACILITY NAME (1)

Fort St. Vrain, Unit No. 1

DOCKET NUMBER (2)

LER NUMBER (6)

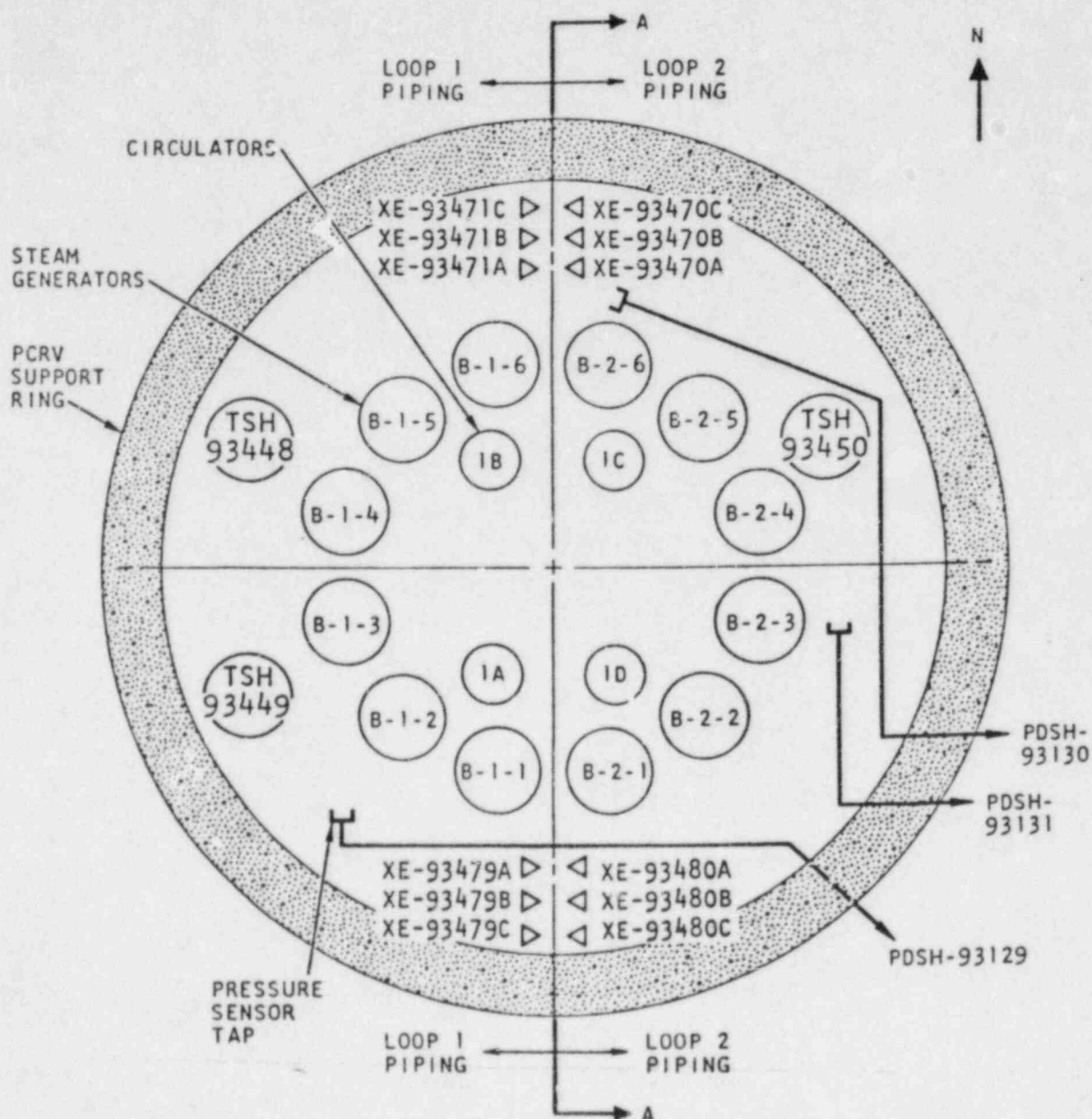
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0 5 0 0 0 2 6 7 8 4 - 0 1 1 - 0 0 0 4 OF 0 7

TEXT (If more space is required, use additional NRC Form 368A's) (17)



Pipe Rupture Detection System Below PCR - Plan View



## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/85

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DOCKET NUMBER (2)

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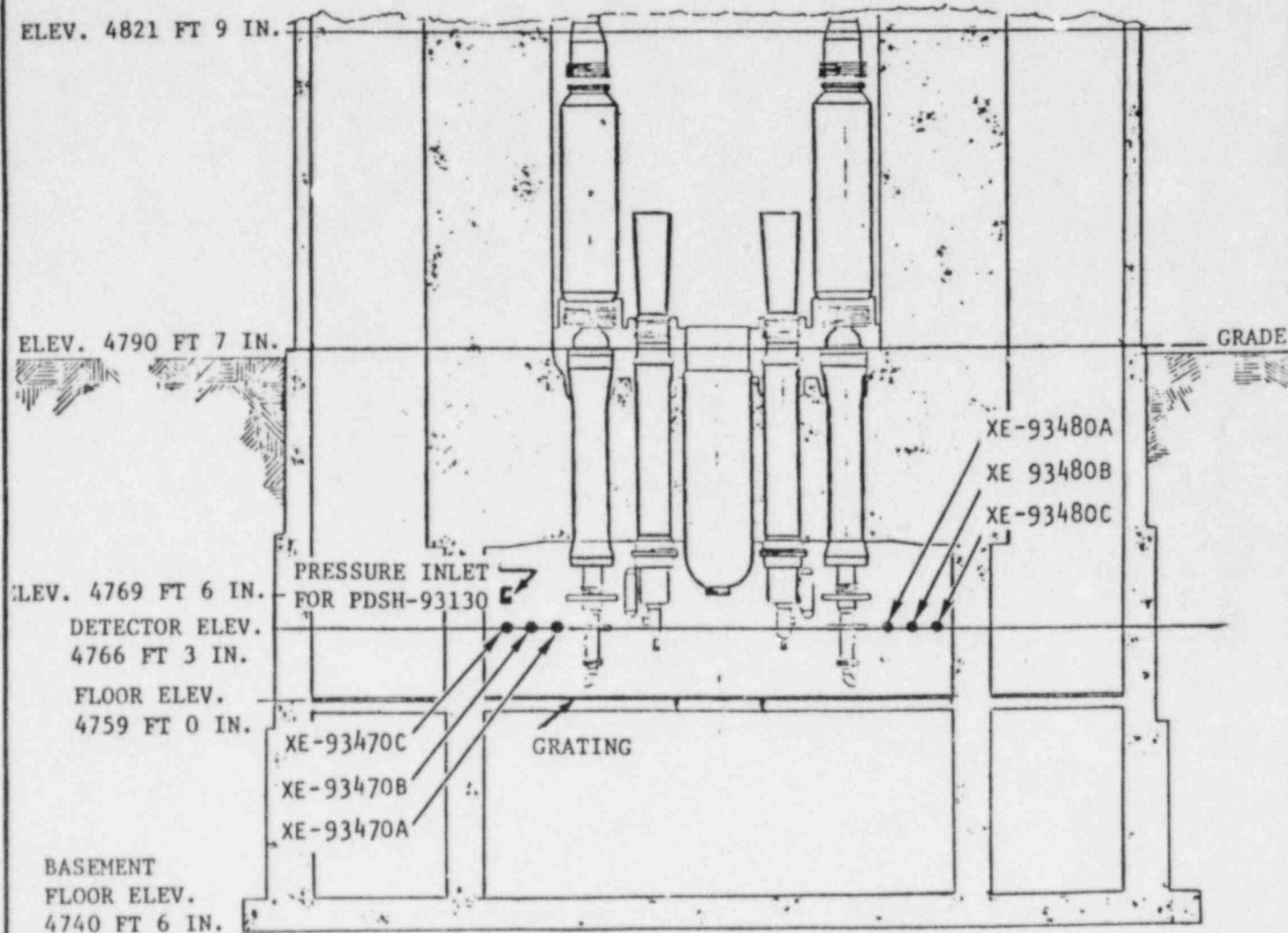
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PAGE (3)

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TEXT (If more space is required, use additional NRC Form 368A's) (17)



Pipe Rupture Detection System Below PCRVR - Elevation

## 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) 0500026784	LER NUMBER (6)			PAGE (3)		
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TEXT (If more space is required, use additional NRC Form 388A's) (17)

ANALYSIS OF EVENT:

Two of the elements were found with outputs above the acceptable limits required by Surveillance Test SR-RE-17-SA. This would not affect the safety function of these detectors; it would cause the logic channels to be actuated at less than the tested noise level.

The output of element XE-93480-A associated with logic channel XSH-93470-A, Loop 2 on the south side under the PCRV, and the output of element XE-93456-A associated with logic channel XSH-93456-A, loop 2 on the south wall outside the PCRV, were both found to be below the limits specified by Surveillance Test SR-RE-17-SA. In both cases, the output of the other two detectors associated with these areas were within or above the specified limits, thus they would have operated as designed, and satisfied the "two out of three" logic required to correctly identify a leaking loop.

The outputs of elements XE-93479-A and XE-93479-C were both below the allowable limits specified by SR-RE-17-SA, and both are associated with Loop 1 on the south side of the PCRV. These detectors protect the same area under the PCRV, and are associated with separate logic channels, XSH-93471-A and XSH-93471-C. Therefore, the two out of three logic would not have been satisfied for a small steam leak equivalent to that simulated by SR-RE-17-SA. Because these detectors, in combination with differential pressure and temperature switches, actuate the loop shutdown circuitry, and because the loop shutdown circuitry is considered part of the Plant Protective System, their inability to meet the surveillance acceptance criteria has been conservatively determined to constitute a condition which could have prevented the fulfillment of a safety function needed to mitigate the consequences of an accident.

If the ultrasonic detectors were unable to perform their safety function, reactor building temperature/pressure would increase and alarm in the control room. Operator's could then use other instrument parameters to determine which loop should be isolated and take the appropriate corrective action.

As evaluated in the FSAR, the detectors are designed to identify small leaks as well as large ruptures. For small leaks, the building pressure and temperature sensors are only postulated to actuate when the magnitude of the leak is such that automatic action is required. Fort St. Vrain FSAR analyses for worst case steam pipe ruptures and the subsequent bases for environmental qualification of safe shutdown equipment conservatively assume that the steam pipe rupture detection system fails to initiate automatic protective action (FSAR Sections 1.4.5.4, I.6). Due to equipment protection features and qualification testing it was verified that safe shutdown equipment will remain operable during and following all postulated steam pipe rupture accidents, assuming alternate detection and manual isolation actions.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3152-0104  
EXPIRES 8/31/85

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

CAUSE DESCRIPTION:

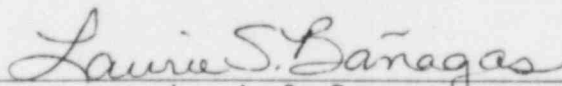
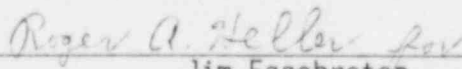
The cause of these instruments being out of tolerance has been attributed to instrument drift. This has been determined to be a generic problem with these detectors.

CORRECTIVE ACTION:

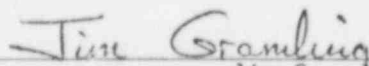
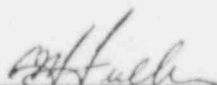
The microphones found out of tolerance were adjusted to acceptable values, and the surveillance was successfully completed.

Surveillance Test SR-RE-17-SA, "Ultrasonic Detector Check" is being performed as scheduled on a semi-annual basis. The next surveillance is scheduled for March, 1985.

The problem of instrument drift in the ultrasonic detectors is currently under engineering analysis and a supplemental report will follow.

Laurie S. Banagas  
Technical Services TechnicianJim Eggebroten  
Technical Services Engineering Supervisor

Licensing Review By:

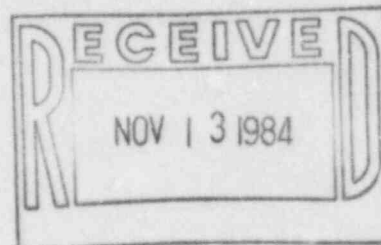
Jim Gramling  
Nuclear Licensing-Operations SupervisorC. H. Fuller  
Station ManagerJ. W. Gahm  
Manager, Nuclear Production



## Public Service Company of Colorado

16805 WCR 19 1/2, Platteville, Colorado 80651

November 9, 1984  
Fort St. Vrain  
Unit #1  
P-84486



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

REFERENCE: Facility Operating  
License No. DPR-34

Dear Mr. Johnson:

Enclosed, please find a copy of Licensee Event Report Number 50-267/84-011, Preliminary, submitted per the requirements of 10 50.73(a)(2)(v) and 50.72(b)(2)(iii).

Sincerely,

J. W. Gahm  
Manager, Nuclear Production

Enclosure

JWG/djm

H005  
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TO RIV  
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