NRC Form 366* (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

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 5

TITLE (4)
WIDE RANGE NUCLEAR CHANNEL UPSCALED FROM NOISE SOURCE AND ACTUATED SCRAM CHANNEL

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 5	0 9	8 8	8 8	0 1 0	0 1	0 7	1 4	8 8	N/A	0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9): N

POWER LEVEL (10): 0 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	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 (AREA CODE)
Mark A. Joseph, Technical Services Supervisor	3 0 3 6 2 0 - 1 2 0 3

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
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

At 0900 hours on May 9, 1988, and again at 1505 hours on May 10, 1988, the Plant Protective System (PPS) reactor scram circuitry was spuriously actuated. In each case, a single channel reactor scram was already tripped for surveillance test purposes when nuclear instrumentation spiked upscale causing another reactor scram channel to trip. Actuation of two scram channels completes the minimum actuation logic and initiates a reactor scram. At the time of these events, the reactor was shutdown with all thirty-seven control rod pairs fully inserted into the core.

The cause for the upscale response and trip of the nuclear instrumentation was electronic noise induction into the channels. The specific source of this noise could not be identified.

This revised final report includes an actuation that occurred on May 10, 1988. The May 10th. actuation was not addressed in the original LER due to apparent discrepancies identified during the initial event investigation. These discrepancies indicated that the scram circuitry did not fully actuate. Further investigation determined that the discrepancies did not provide enough evidence to conclude that an actuation did not occur.

A change notice (CN-2762) is being developed to modify the wide range channels and reduce their susceptability to electronic noise.

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

EVENT DESCRIPTION:

On May 9, 1988, the reactor was shutdown with the "B" helium circulator [AA] operating on steam and the Loop I reheater [AA] in service. Average reactor core outlet temperature was approximately 250°F. All thirty-seven control rod pairs [AB] were fully inserted into the core. At approximately 0800 hours on the morning of May 9, instrument and control technicians began performing the monthly reheat steam temperature scram test (SR 5.4.1.1.8.b-M). This test requires that each of the three reheat scram channels be tripped, only a single channel being tripped at any one time, thereby verifying trip setting, alarms, and proper indication. By tripping a single reheat temperature scram channel, a single channel reactor scram is initiated. In this configuration (i.e., one scram channel tripped and the remaining two channels not tripped), a trip on either of the remaining two scram channels will complete the "two of three" actuation logic and initiate a reactor scram. On May 9, 1988, at 0900 hours, with scram channel "A" tripped as part of the reheat temperature scram test, wide range nuclear channel IV upscaled in response to electrical noise, and caused a "rate of change high" trip on scram channel "B". This trip on the scram channel "B" in conjunction with the trip already up on scram channel "A" for reheat testing completed the minimum actuation logic and initiated a reactor scram signal. Since all thirty-seven control rod pairs were fully inserted into the core at the time of this event, no control rod movement occurred as a result of the scram signal.

On May 10, 1988, the reactor was shutdown with the "B" helium circulator [AA] operating on steam and the Loop I Economizer-Evaporator-Superheater [AA] operating on emergency condensate. Average core outlet temperature was approximately 145°F. All thirty-seven control rod pairs [AB] were fully inserted into the core. At 1505 hours, with scram channel "B" tripped as part of the monthly linear power channel scram test (SR 5.4.1.1.4.b-M), wide range nuclear channel V upscaled in response to electrical noise, and caused a "rate of change high" trip on scram channel "C". This trip of scram channel "C" in conjunction with the trip already up on scram channel "B" for linear power channel testing completed the minimum actuation logic and initiated a reactor scram signal. As on May 9, 1988, all thirty-seven control rod pairs were fully inserted into the core at the time of this event and therefore no control rod movement occurred.

During the initial investigation of this May 10th actuation, conflicting information obtained from plant records and involved personnel strongly suggested that the scram circuitry did not actuate but that only the scram channel beta alarm panels lit. Based on these findings the May 10th incident was not included in LER 88-010 as originally intended. However during further followup investigation, it was determined that the apparent conflicts identified in the original investigation did not provide enough evidence to conclude that the scram circuit was not actuated and it was determined that the May 10th incident was reportable per 10CFR50.73.

Following both events, control room operators verified normal shutdown core flux readings on control room nuclear instrumentation.

CAUSE DESCRIPTION:

The pulse sensing design of the wide range nuclear channels, in combination with the low core count rate during reactor shutdown conditions, makes the wide range channel "rate of change high" scram function susceptible to induced electrical noise. During reactor operation (i.e., Reactor Mode Switch in the "RUN" position) the increased core count rate negates the effects of electrical noise disturbances within the wide range nuclear channels, and reactor scram actuations due to plant electrical noise are extremely unlikely. At approximately 5% power during power ascension, the Interlock Sequence Switch (ISS) is taken from "STARTUP" to "LOW POWER" position. This ISS movement to "LOW POWER" disables the wide range nuclear channel "rate of change high" scram function.

The wide range nuclear channels sense and respond to electrical pulses, but do not have the capability to distinguish a valid pulse generated from a detector from an invalid pulse generated from plant noise. On May 9 and 10, 1988, wide range channels IV and V responded to invalid noise pulses and automatically initiated single channel reactor scrams. In each case, another reactor scram channel was already tripped for surveillance testing and therefore the "rate of change high" trips of wide range channels IV and V completed the minimum actuation logic and initiated a reactor scram signal.

ANALYSIS:

Since these actuations of the PPS reactor scram logic and alarm circuitry were not part of a pre-planned sequence, they are reportable pursuant to the requirements of 10CFR50.72(b)(2)(ii) and 10CFR50.73(a)(2)(iv).

At the time of these actuations, the reactor was shutdown with all thirty-seven control rod pairs fully inserted in the core. The Interlock Sequence Switch (ISS) was in the "STARTUP" position. The wide range nuclear channels scram function is armed and capable of completing the actuation logic when the ISS is in the "STARTUP" position. The pulse signal induced into channels IV and V from electrical noise was similar to that generated from a neutron detector and therefore did not cause either wide range nuclear channel to operate in a manner outside of its design. During these events, wide range channels IV and V responded to noise pulses and initiated automatic protective action. These unnecessary actuations of the reactor scram circuitry did not degrade the operational capability of the wide range channels to monitor reactor neutron flux and initiate automatic protective action, as designed.

Based on this analysis, it is concluded that these events had no impact on safe plant operation and posed no threat to the health and safety of the public.

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Similar events were reported in LER's 84-003, 85-001, 85-008, 85-025, 86-004, 86-014, 86-015, 86-028, 87-010, 87-021, 87-024, 87-027, 87-029, 88-003, and 88-005.

CORRECTIVE ACTION:

Public Service Company is actively pursuing the identification and suppression of noise sources within the plant electrical system. Investigations of past noise related actuations of the PPS have resulted in the completion of several successful corrective actions including installation of zero crossing switches that eliminated spurious rod withdrawal prohibit actuations, and the grounding of unterminated and abandoned cables communicating with the control room. These completed actions have greatly reduced noise interference problems within PPS instruments, and such efforts will continue whenever problem noise sources are identified.

The noise source that resulted in these particular actuations of the wide range channel "rate of change high" scram function could not be specifically identified, and therefore no specific action to eliminate or suppress the source(s) can be taken at this time. However, a Change Notice (CN-2762) is being developed to modify the existing wide range channels in an attempt to reduce the effects of electrical noise induction in the channel instrumentation. Investigative testing to identify the primary noise sources and how these sources interface with the wide range channels is currently scheduled to begin during the circulator outage in July 1988.

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

Jim Hill
Technical Services Engineer

Mark Joseph
Technical Services Supervisor

J. M. Granling
Licensing

C. H. Fuller
Manager, Nuclear Production

Public Service™

Public Service
Company of Colorado

16805 WCR 19 1/2, Platteville, Colorado 80651

July 15, 1988
Fort St. Vrain
Unit No. 1
P-88264

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

Docket No. 50-267

SUBJECT: Licensee Event Report 88-010-01, Revised Final Report

REFERENCE: Facility Operating License No. DPR-34

Gentlemen:

Enclosed please find a copy of Licensee Event Report No. 50-267/88-010-01, 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
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. Calvo, Director
Project Directorate IV

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

CHF/djm

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