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)
Perry Nuclear Power Plant, Unit 1	0 5 0 0 0 4 4 0	1 OF 0 5

TITLE (4)

Electrical Noise Caused Spikes On IRMs Resulting In RPS Actuations

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 3	2 4	8 6	8 6	— 0 0 1	— 0 0	0 4	2 3	8 6		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)							
POWER LEVEL (10)	0 1 0 0		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	
Paul Russ, Compliance Engineer, ext. 6472	2 1 6	2 5 9 - 3 7 3 7

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
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		0 6	2 0	8 6

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

On March 24, 1986, at 0845, March 27 at 1258, March 31 at 1058 and April 20 at 1328, Reactor Protection System (RPS) actuations occurred due to upscale trips of the neutron monitoring system Intermediate Range Monitors (IRMs). All three RPS actuations were attributed to "noise" in the IRMs caused by grounding bus fluctuations. In each case, control room operators verified proper plant conditions, bypassed the Scram Discharge Instrument Volume high level trip and reset the RPS actuation. During the March 31 scram, one control rods' (22-31) position indicator reed switch was believed to have momentarily stuck shut causing a false position indication for the rod. The scram was reset and all rods indicated fully inserted. Rod 22-31 was subsequently stroked full out and then full in with all position indications operating as designed.

Modifications have been made to the grounding for the IRM cabinets and preamplifier housings.

The investigation reviewing these events is continuing. A supplemental report will be submitted discussing the results of the investigation including any additional planned corrective actions.

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

On March 24, 1986, at 0845, March 27 at 1258, March 31 at 1058 and April 20, at 1328, Reactor Protection System (RPS)[JC] actuations occurred due to upscale trips of the neutron monitoring system Intermediate Range Monitors (IRMs)[IG]. At the time of each event, the reactor was shutdown, the reactor vessel [RPV] and drywell heads removed, the cavity flooded and the Steam Dryer Storage Area/Reactor Well Gate [GATE] removed. Reactor temperature was approximately 75 degrees and pressure atmospheric.

Prior to the first event, the mode switch [HS] was in the "Refuel" position, core [AC] alterations were suspended for surveillance testing, thirty six new fuel bundles had been loaded into the core and all control rods [ROD] were inserted. Surveillance Test (SVI)-C51-T0022A "IRM A and E Neutron Flux Trips Channel Functionals" was in progress with the "A" IRM Channel in the tripped condition. On March 24 at 0845, an IRM spike occurred on IRM D causing a full Reactor Protection System actuation. The IRM spike did not originate from an actual neutron flux change since none of the four Source Range Monitors (SRM) [IG] showed any appreciable change in flux level. At 0849 in response to the actuation, operators bypassed the Scram Discharge Instrument Volume (SDIV) [AA] high level trip and reset RPS. At 0858, the SDIV high level trip was taken out of bypass. At 1043, in an attempt to discover the cause of the problem, the steps in SVI-C51-T022A where the actuation occurred were reperformed with IRM D bypassed. The IRM spike did not recur. SVI-C51-T0022A was subsequently completed satisfactorily at 1245. At 0600 on March 25, SVI-C51-T0022D "IRM D and H Neutron Flux Trips Channel Functionals" was performed satisfactorily. No problems were identified with either IRM.

An investigation of the problem determined the most probable cause of the spiking to be "noise" in the IRM caused by grounding bus [BUS] fluctuations. In order to reduce noise and prevent recurrence, the IRM cabinet [CAB] doors were to be grounded to the IRM cabinets. At 1258 on March 27, while preparing to install these grounding leads, one IRM cabinet door was opened and another set of IRM spikes (channels A, E and D, H) was received by RPS and another full actuation occurred. Again, all rods were inserted prior to the trip, and no change in neutron flux on source range neutron monitors was detected. The operators response was similar to their response in the first event. The cause of the actuation was again attributed to "noise" in the IRM caused by grounding bus fluctuations. The installation of the grounding leads for the IRM cabinets was subsequently completed.

At 1004 on March 31, 144 new fuel bundles had been loaded into the core, and the reactor mode switch was placed in "Startup" in accordance with Startup Test Instruction STI-J11-003 "Fuel Loading". Earlier that day, at 0528, the RPS shorting links [57] had been removed as required by Technical Specifications. This action would place RPS in a non coincidence mode and allow a single neutron monitoring instrument to cause a full RPS actuation.

At 1006, rod withdrawal began for the partial core shutdown margin verification. At 1053, a single channel RPS actuation occurred due to IRM spiking causing an upscale trip of IRMs C and G. The five control rods withdrawn at the time, inserted as designed. No neutron flux spike was detected on the source range neutron monitors.

At 1055, in response to the scram, the reactor mode switch was placed in shutdown. The Supervising Operator (SO) observed blank indications on the full core display for all rods except rod 22-31 which continued to indicate position 12 (its pre-scram position). Rod 22-31 had been selected and was being withdrawn at the time of the scram. No full in green lights were lit for any rod. Rod Control and Information System (RCIS) mode selection of data was cycled from raw data to processed data repeatedly in an attempt to obtain updated information on rod 22-31, in accordance with Off Normal Instruction (ONI)-C71 "Reactor Scram". No apparent change in rod position indication for rod 22-31 occurred. At 1058, the scram discharge instrument volume high level trip was bypassed and the scram reset. Within seconds of resetting the scram, all rods indicated "00" and all rod green "full in" lights were lit. STI-J11-003 was recommenced at approximately 1900 after the scram evaluation report determined no safety concerns existed. Between 1958 and 2041, rod 22-31 was again withdrawn (this time to its full out position) and then inserted per STI-J11-003 for the partial core shutdown margin verification. The rods' movement and indication were normal.

The spike on the IRMs was again attributed to "noise" and grounding bus fluctuations possibly originating from housekeeping activities in the area of the IRM preamplifiers [AMP]. When the scram occurred, all rods inserted as designed, including rod 22-31. This is evident by the fact that upon resetting the scram, its rod position indicated "00" (full in). The notch 12 reed switch for this rod was assumed to have momentarily stuck shut. Within seconds after the scram was reset, the reed switch reopened and the rods' position indicated "00". Three data input configurations are available to RCIS; single Channel 1, single Channel 2, or both Channels. A single channel was providing input to RCIS at the time of the event. In this mode of operation, only one (of two possible) reed switch was being monitored by RCIS per notch position. The blank full core display screen and no green "full in" lights occur at low reactor pressures until RPS is reset, because the control rods travel inward past the reed switches for the "full in" and "00" positions. Since no reed switches (except as noted for rod 22-31) were closed, no rod positions were indicated. In addition, resetting the scram eliminated the high differential pressure across the control rod pistons allowing the rods to "settle" to the "00" notch position.

On April 2, 1986 during a review of the existing IRM ground configuration, it was discovered that IRM preamplifier enclosures B/F and C/G were not grounded in accordance with reference drawings. Instead of being grounded

directly to the building ground bus, the enclosures were grounded to a steel structure which in turn was grounded to the building ground bus. The cause of the incorrect grounding was indeterminate. On April 4, the IRM preamplifier cabinet grounds were correctly grounded to the building ground bus.

On April 20, 1986 at 1328, another single channel RPS actuation occurred due to IRM spiking causing an upscale trip of IRM "G". Prior to the event, the RPS shorting links were removed, no core alterations were in progress and all control rods were fully inserted. Spikes were also observed on IRMs A, E, C, D and H. No appreciable changes in neutron flux were identified on SRMs. At 1334, the SDIV high level was bypassed and the RPS trip reset at 1335.

The IRM spikes were again attributed to electrical noise caused by grounding bus fluctuations.

IRMs are designed to provide neutron flux information during the reactor startup and heatup operations from the upper portion of the source range to the lower portion of the power range. The IRM system detects conditions that could lead to local fuel damage and provides trip signals which are used to prevent such damage. The system consists of eight identical neutron detection channels (A-H). The noise problem exhibited in the IRMs would not have detracted from its' ability to monitor neutron flux levels and transmit the necessary signals to the required protection and monitoring instrumentation. The problem could, however, cause unnecessary plant scrams during startup evolutions. An RPS trip signal is initiated when the IRM reaches 120/125 of scale for any scale selected. Once the plant enters Mode 1 ("Run") at >5% reactor power, the IRM trip function is bypassed in the RPS circuitry and the problem would not have effected further plant operations, consequently, the safety significance of these events was minimal. No previous similar events have been identified.

The following corrective actions have been or will be taken:

1) All cleaning and housekeeping activities which could generate electrical noise have been temporarily suspended in the penetration and IRM preamplifier rooms.

2) A walkdown of the IRM signal cable from the control rod drive room to the preamplifiers and on to the control room area was conducted by a technician keying a hand held radio. The IRM meters were observed for disturbances during this evolution but none were identified.

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

3) ONI-C71 "Reactor Scram" will be revised to provide additional guidance to operators for determining control rod positions following a scram.

The investigation reviewing these events is continuing. A supplemental report will be submitted that discusses the results of the investigation and include any planned corrective actions.

Energy Industry Identification System Codes are identified in the text as [XX].

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

P.O. BOX 5000 - CLEVELAND, OHIO 44101 - TELEPHONE (216) 622-9800 - ILLUMINATING BLDG. - 55 PUBLIC SQUARE

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MURRAY R. EDELMAN
VICE PRESIDENT
NUCLEAR

April 23, 1986
PY-CEI/NRR-0453L

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

Perry Nuclear Power Plant
Docket No. 50-440
LER 86-001-0

Dear Sir:

Enclosed is Licensee Event Report 86-001-0 for the Perry Nuclear Power Plant.

Very truly yours,

A. Kaplan for

Murray R. Edelman
Vice President
Nuclear Group

MRE:dlp

Enclosure: LER 86-001-0

cc: Jay Silberg, Esq.
John Stefano (2)
J. Grobe

U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL. 60137

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