Commonwealth Edison Company
Braidwood Generating Station
Route #1, Box 84
Braceville, IL 60407-9619
Tel 815-458-2801

ComEd

December 21, 1999
BW990090

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Braidwood Station, Unit 2
Facility Operating License No. NPF-77
NRC Docket No. STN 50-457

Subject: Submittal of Supplemental Licensee Event Report Number 1999-003-01

License Event Report (LER) number 1999-003-00 was submitted on June 16, 1999 to report a reactor trip of Braidwood Unit 2 caused by spiking of Intermediate Range Neutron Flux Channel N36. As part of that LER, Braidwood Station indicated a supplemental LER would be submitted with an expected submission date of February 15, 2000. The purpose of this letter is to provide the supplement to the original LER. The commitment to perform failure analysis on two specific components, that were potential root causes of the event, has been completed.

Should you have any questions concerning this letter, please contact Mr. T. W. Simpkin, Regulatory Assurance Manager, at (815) 458-2801, extension 2980.

Respectfully,

Timothy J. Tulon
Site Vice President
Braidwood Station

TJT/SB/daj

Attachment: Braidwood Station, Unit 2 LER Number 1999-003-01

cc: Regional Administrator - NRC Region III
NRC Senior Resident Inspector - Braidwood Station

IE22

NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Braidwood, Unit 2	STN 05000457	1 of 6

TITLE (4) Unit 2 Reactor Trip caused by spiking of Intermediate Range Neutron Flux Channel N36 due to unknown reasons

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 NAME	DOCKET NUMBER
									NONE	
05	19	1999	1999	-- 003 --	01	12	21	1999	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	MODE 2	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
POWER LEVEL (10)	003				
		☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(iii)	☐ 73.71(b)
		☐ 20.2203(a)(1)	☐ 20.2203(a)(3)(ii)	☒ 50.73(a)(2)(iv)	☐ 73.71(c)
		☐ 20.2203(a)(2)(i)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(v)	☐ OTHER
		☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)	☐ 50.73(a)(2)(vii)	
		☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(viii)(A)	(Specify in Abstract
		☐ 20.2203(a)(2)(iv)	☐ 50.73(a)(2)(i)	☐ 50.73(a)(2)(viii)(B)	below and in Text,
		☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(ii)	☐ 50.73(a)(2)(x)	NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME (Include Position Title)	TELEPHONE NUMBER (Include Area Code)
Terrence W. Simpkin, Regulatory Assurance Manager	(815) 458-2801 x-2980

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	IG	Power Isolation Trans.	B488	Y					
B	IG	High Voltage Power Supply	W120	Y					

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
☐ YES (If yes, complete EXPECTED SUBMISSION DATE)	☒	NO				

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

At 1917 on 05/19/99, spurious spiking of indication on the Intermediate Range Neutron Flux Channel N36 resulted in a Unit 2 reactor trip. The unit was in reactor startup following a refueling outage when the Reactor Coolant System (RCS) was being diluted to increase reactor power. At approximately 3% reactor power, as indicated by the four Power Range Nuclear Instruments, erratic behavior was noted on the startup rate meter for Intermediate Range Neutron Flux Channel N36. The Main Control Room (MCR) personnel were investigating the erratic behavior when the reactor trip signal occurred. The MCR personnel stabilized the reactor in a shutdown condition using appropriate emergency procedures. All systems functioned as designed. All appropriate notifications were made.

The root cause of this event is unknown. No personnel error was identified. Apparent causes include the comparator and rate transformer, high voltage power supply, detector signal cable, or cable connector degradation.

The safety significance of the event was minimal. The plant responded as designed, and the reactor was placed in a subcritical condition.

Corrective actions taken include: cleaning and testing of associated cables/connectors, replacing the Intermediate Range Neutron Flux Channel N36 High Voltage Power Supply, performing the High Voltage Plateau Surveillance and replacing the Neutron Flux N37 Comparator and Rate Drawer T401 Power Isolation Transformer.

This event is being reported pursuant to 10CFR50.73(a)(2)(iv).

A. Plant Conditions Prior to Event:

Unit: Unit 2 Event Date: 5/19/99 Event Time: 1917

MODE: MODE 2 Reactor Power: 3 percent RCS [AB] Temperature: 559 degrees F.
RCS [AB] Pressure: 2236 psig

B. Description of Event:

At 1917 on 05/19/99, spurious spiking of indication on Intermediate Range Neutron Flux Channel N36 [IG] resulted in a Unit 2 reactor trip. The unit was in reactor startup following a refueling outage when the Reactor Coolant System (RCS) [AB] was being diluted to increase reactor power. At approximately 3% reactor power, as indicated by the four Power Range drawers, erratic behavior was noted on the startup rate meter for Intermediate Range Neutron Flux Channel N36. The Main Control Room (MCR) personnel were investigating the erratic behavior when the Reactor Trip signal occurred. The MCR personnel stabilized the reactor in a shutdown condition using appropriate emergency procedures. All systems functioned as designed. All appropriate notifications were made.

Through a review of the Sequence of Events Recorder (SER), Main Control Room Recorders (MCR) and Operations Logs, the sequence of events was reconstructed. At 1853 on 5/19/99, Power Range Neutron Flux Channel N44 was restored to Operable status. At 1900 on 5/19/99, 100 gallons of primary water [CB] were added to the

RCS to increase reactor power. At this same time, erratic behavior of the Intermediate Range Neutron Flux Channel N36 startup rate (SUR) meter was identified. At 1905 on 5/19/99, another 500 gallons of primary water were added to the RCS to increase reactor power. At 1910 on 5/19/99, the Intermediate Range Neutron Flux Channel N36 SUR meter began spiking from full scale low to full scale high. At 1917 on 5/19/99, the Unit 2 reactor tripped on a high neutron flux signal from Intermediate Range Neutron Flux Channel N36 (1 of 2 coincidence). MCR personnel immediately stabilized the reactor in a shutdown condition using procedure 2BwEP-0 " Reactor Trip or Safety Injection Unit 2" . All systems functioned as designed. Main Feedwater (FW) [SJ] was restored prior to reaching the low Steam Generator water level setpoint for automatic Auxiliary Feedwater (AF) [BA] actuation.

A work request for the troubleshooting of Intermediate Range Neutron Flux Channel N36 was prepared and approved. Troubleshooting of Intermediate Range Neutron Flux Channel N36 began at 2102 on 5/19/99. The following actions were taken during the troubleshooting activities.

- Westinghouse representatives were contacted for additional input and analysis.
- The associated High Voltage Power Supply was replaced.
- All connectors feeding the associated Intermediate Range Neutron Flux Channel drawer were thoroughly cleaned and reconnected to the drawer. After this was performed, the erratic indication stopped.
- A High Voltage Plateau Surveillance was performed. The results were reviewed with a Westinghouse representative and determined to be acceptable.
- Time Domain Reflector testing was performed on all associated cables.
- Electrometer measurements were taken on all associated signal cables.

During the performance of these troubleshooting activities, the spiking on Intermediate Range Neutron Flux Channel N36 stopped. Based on the above actions and subsequent response of Intermediate Range Neutron Flux Channel N36, Operations started withdrawal of the Shutdown Banks of Control Rods at 1402 on 5/20/99 in preparation of a reactor startup. At 1437 on 5/20/99, the troubleshooting activities for Intermediate Range Neutron Flux Channel N36 were completed. Operations personnel believed the channel was responding properly and declared the channel operable. At 1603 on 5/20/99, the " Power Ascension procedure" was being performed when Intermediate Range Neutron Flux Channel N36 began spiking again. Intermediate Range Neutron Flux Channel N36 was declared inoperable and Condition F of LCO 3.3.1 " Reactor Trip System (RTS) Instrumentation" was entered. The channel was placed in " bypass" . At 1626 on

5/20/99, Required Action F.2 of LCO 3.3.1 was satisfied and Condition F of LCO 3.3.1 was exited due to reactor power being increased to greater than the P-10 interlock (Power Range Neutron Flux Interlock) setting (i.e. outside the Technical Specification Applicability for the affected channel).

On 5/28/99, an updated troubleshooting plan for Intermediate Range Neutron Flux Channel N36 was approved, which describes actions required if the spurious noise returns. This would include calibration and use of a spare Intermediate Range Neutron Flux Channel drawer. A separate plan was generated addressing those actions that can be performed with the noise absent.

C. Cause of Event:

The root cause of the spiking of indication on Intermediate Range Neutron Flux Channel N36 on Unit 2 is unknown. No personnel error was identified. Apparent causes include the comparator and rate transformer, high voltage power supply, detector signal cable, or cable connector degradation. The action plan developed to identify the root cause of the event has been completed. The original LER stated analysis of two components would be conducted.

The Power Isolation Transformer from the Neutron Flux N37 Comparator and Rate Drawer was analyzed. No fault was identified.

The High Voltage Power Supply for Intermediate Range Neutron Flux Channel N36 was tested and found to be within the normal testing criteria.

Based on the analysis of the components discussed above, the root cause of the event remains unknown. Since Unit 2 reached 100% power following the last refueling outage, no spiking has been observed on Intermediate Range Neutron Flux Channel N36.

D. Assessment of Safety Consequences:

The safety consequences associated with this event are minimal. The plant responded as designed, and the reactor was placed in a subcritical state. No equipment failures occurred which complicated the post-trip response, and no fission product barriers were challenged. The Intermediate Range Neutron Flux Channels are required to be operable in MODE 2 above the P-6 interlock setting (Source Range Block Permissive Interlock) and MODE 1 below the P-10 interlock setting to provide reactor protection from an unanticipated power increase. The Intermediate Range Neutron flux Channels provide redundant protection to the

Power Range Neutron Flux - Low Setpoint Channels. If the failure of Intermediate Range Neutron Flux Channel N36 occurred at a power level greater than the P-10 interlock setting, the trip function would have been blocked and no automatic actions would have occurred. Above the P-10 interlock setting, the Power Range Neutron Flux Channels provide reactor protection in the event of an unanticipated power increase. All the required Reactor Trip System functions were operable during the event and would have protected the reactor should an unanticipated power increase have occurred.

E. Corrective Actions:

Immediate actions were taken to verify proper response of the automatic protection systems following automatic actuation of a reactor trip, to assess plant conditions, and to identify the appropriate recovery procedure. After stabilizing the reactor in a shutdown condition, troubleshooting activities were initiated. Corrective actions were taken during the troubleshooting phase and were discussed previously. During the power ascension to 100%, a degraded condition of the Neutron Flux N37 Comparator and Rate Drawer T401 Power Isolation Transformer was identified. This transformer has been replaced. The N37 Comparator and Rate Drawer provides no protective functions. It provides indications and controls only.

Corrective actions to be taken include:

- A troubleshooting plan exists which details actions to be taken if the spurious noise condition returns to Intermediate Range Neutron Flux Channel N36.
- The detector for Intermediate Range Neutron Flux Channel N36 and Source Range Neutron Flux Channel N32 will be replaced during the next refueling outage.

F. Previous Occurrences:

There have been no LERs for similar occurrences in the past two years.

G Component Failure Data:

1. Intermediate Range Neutron Flux Channel N36 High Voltage Power Supply

   Manufacturer - Westinghouse Electric Company

   Manufacturer Part Number - 2384A23 (H04) Revision (D)

2. Neutron Flux N37 Comparator and Rate Drawer T401 Power Isolation Transformer

   Manufacturer - B.T.C Co.

   Manufacturer Part Number - BX-5287A`