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10 CFR 50.73

June 23, 2009
BW090059

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

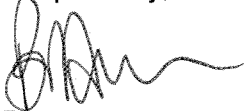
Braidwood Station, Unit 2
Facility Operating License No. NPF-77
NRC Docket No. STN 50-457

Subject: Licensee Event Report 2009-001-00 – Reactor Trip on Over Temperature Delta
Temperature due to a Signal Spike on One Channel With Another Channel Placed in the
Tripped Condition for Surveillance Testing

The enclosed Licensee Event Report (LER) is being submitted in accordance with 10 CFR 50.73, "Licensee event report system," paragraph (a)(2)(iv)(A), as an event that resulted in a valid actuation of the reactor protection system and auxiliary feedwater system. On April 24, 2009, Braidwood Station Unit 2 received an actuation of the reactor protection system (reactor trip) and the auxiliary feedwater system due to a momentary signal spike on one trip channel while a second channel was in a tripped condition in support of surveillance testing. 10 CFR 50.73(a) requires an LER to be submitted within 60 days following discovery of the event. Therefore, this report is being submitted by June 23, 2009.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this submittal, please contact Mr. David Gullott, Regulatory Assurance Manager, at (815) 417-2800.

Respectfully,



Bryan Hanson
Site Vice President
Braidwood Station

Enclosure: LER 2009-001-00

LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME

Braidwood Station, Unit 2

2. DOCKET NUMBER

05000457

3. PAGE

1 of 3

4. TITLE Reactor Trip on Over Temperature Delta Temperature due to a Signal Spike on One Channel With Another Channel Placed in the Tripped Condition for Surveillance Testing

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
04	24	2009	2009	- 001 - 00		06	23	2009	N/A	N/A

9. OPERATING MODE

1

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

- | | | | |
|---|---|--|---|
| <input type="checkbox"/> 20.2201(b) | <input type="checkbox"/> 20.2203(a)(3)(i) | <input type="checkbox"/> 50.73(a)(2)(i)(C) | <input type="checkbox"/> 50.73(a)(2)(vii) |
| <input type="checkbox"/> 20.2201(d) | <input type="checkbox"/> 20.2203(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(ii)(A) | <input type="checkbox"/> 50.73(a)(2)(viii)(A) |
| <input type="checkbox"/> 20.2203(a)(1) | <input type="checkbox"/> 20.2203(a)(4) | <input type="checkbox"/> 50.73(a)(2)(ii)(B) | <input type="checkbox"/> 50.73(a)(2)(viii)(B) |
| <input type="checkbox"/> 20.2203(a)(2)(i) | <input type="checkbox"/> 50.36(c)(1)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(iii) | <input type="checkbox"/> 50.73(a)(2)(ix)(A) |
| <input type="checkbox"/> 20.2203(a)(2)(ii) | <input type="checkbox"/> 50.36(c)(1)(ii)(A) | <input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A) | <input type="checkbox"/> 50.73(a)(2)(x) |
| <input type="checkbox"/> 20.2203(a)(2)(iii) | <input type="checkbox"/> 50.36(c)(2) | <input type="checkbox"/> 50.73(a)(2)(v)(A) | <input type="checkbox"/> 73.71(a)(4) |
| <input type="checkbox"/> 20.2203(a)(2)(iv) | <input type="checkbox"/> 50.46(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(v)(B) | <input type="checkbox"/> 73.71(a)(5) |
| <input type="checkbox"/> 20.2203(a)(2)(v) | <input type="checkbox"/> 50.73(a)(2)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(v)(C) | <input type="checkbox"/> OTHER |
| <input type="checkbox"/> 20.2203(a)(2)(vi) | <input type="checkbox"/> 50.73(a)(2)(i)(B) | <input type="checkbox"/> 50.73(a)(2)(v)(D) | |

Specify in Abstract below
or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME

David Gullott, Regulatory Assurance Manager

TELEPHONE NUMBER (Include Area Code)

(815) 417-2800

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE)☒ NO15. EXPECTED
SUBMISSION
DATE

MONTH	DAY	YEAR
N/A	N/A	N/A

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On April 24, 2009, a Technical Specification calibration of the 2B pressurizer pressure loop was being performed. In support of this surveillance, the 2B over temperature delta temperature (OTDT) bistable was placed in the tripped condition.

At 1141 hours, while the 2B pressurizer pressure channel calibration was in progress, a momentary/spurious signal spike occurred on the 2D OTDT channel. With the 2B OTDT bistable already placed in the tripped condition, the spike on the 2D OTDT channel satisfied the 2 of 4 trip coincidence, and initiated an automatic reactor trip.

The investigation for this event found no issues with human performance, equipment failure, or plant activities that could have caused the signal spike. The root cause of the Unit 2 reactor trip is determined to be the design of the Reactor Trip System and Engineered Safety Features Actuation System, which places a loop in a tripped condition for testing, increases vulnerability during testing conditions.

The corrective action to prevent recurrence is to pursue a modification which bypasses a tested channel rather than placing it in the tripped state during surveillances.

There were no actual safety consequences impacting plant or public safety as a result of this event.

This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv)(A) due to actuation of the reactor protection system (reactor trip) and the auxiliary feedwater system.

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NARRATIVE

A. Plant Operating Conditions Before The Event:

Event Date: April 24, 2009

Event Time: 1141

Unit: 2

MODE: 1

Reactor Power: 100 percent

Unit 2 Reactor Coolant System (RC) [AB]: Normal operating temperature and pressure

B. Description of Event:

There were no structures, systems or components inoperable at the beginning of the event that contributed to the severity of the event.

On April 24, 2009, a Technical Specification (TS) surveillance calibration of the 2B pressurizer [AB] pressure loop was being performed. This surveillance requires that the channel under test be placed in the tripped condition. In support of this surveillance, Operations entered TS 3.3.1 "Reactor Trip System (RTS) Instrumentation," Conditions A, E, and K for one channel being inoperable, and the 2B over temperature delta temperature (OTDT) bistable trip was placed in the tripped condition. Note: The OTDT trip is a 2 of 4 coincidence that will cause an automatic reactor trip. With the 2B OTDT bistable in the tripped condition, 1 coincidence of the 2 of 4 reactor trip logic coincidence is made up.

At 1141 hours, while the 2B pressurizer pressure channel calibration was in progress, a momentary/spurious signal spike occurred for indeterminate reasons on the 2D OTDT channel (narrow range cold leg temperature spiked low). With the 2B OTDT bistable already placed in the tripped condition, the spike on the 2D OTDT channel satisfied the 2 of 4 trip coincidence, and initiated an automatic reactor trip.

Operator response to the trip was proper and all safety related systems, structures, and components operated normally during this event. Following the reactor trip, all four Unit 2 steam generators [SJ] reached their low-2 reactor trip setpoints and the Unit 2 pressurizer reached its low pressure reactor trip setpoint, all of which are expected responses on a trip from full reactor power. The auxiliary feedwater system [BA] actuated on low-2 steam generator levels, as expected, to maintain steam generator levels.

This event is reportable under 10 CFR 50.73(a)(2)(iv)(A), any event or condition that resulted in manual or automatic actuation of any of the systems listed in 10 CFR 50.73(a)(2)(iv)(B) including any event or condition that results in actuation of the reactor protection system (RPS) when the reactor is critical, and actuation of the PWR auxiliary feedwater system.

C. Cause of Event

The Unit 2 reactor tripped due to a momentary/spurious signal spike on the 2D OTDT channel while the 2B OTDT bistable was in the tripped condition for 2B pressurizer pressure surveillance testing, making up the 2 of 4 trip logic. The investigation of this event found no issues with human performance, equipment failure, or plant activities that could have caused the signal spike.

By using redundant channel coincident trip logic, the 2 of 4 logic (2 of 3 for some protective functions) design of the Reactor Trip System and Engineered Safety Features Actuation System (RTS/ESFAS) [JE] protects against unplanned or stray trip signals on a single channel, which would otherwise result in a reactor trip, while still capturing legitimate trip signals seen by multiple channels. However, this design is not fault tolerant. During maintenance activities, one channel is manually placed in the tripped position. This converts a normal 2 of 4 (or 2 of 3) logic into a more vulnerable 1 of 3 (or 1 of 2) logic. During a maintenance activity, an unplanned human

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NARRATIVE

error, spurious transient, or channel failure in a coincident channel initiates an inadvertent reactor trip or safeguards actuation. This design has resulted in several events within the industry including unit trips while at power.

Therefore, the root cause of the Unit 2 reactor trip is determined to be the design of the RTS/ESFAS, which places a loop in a trip condition for testing, increases vulnerability during testing conditions.

D. Safety Consequences:

There were no safety consequences impacting plant or public safety as a result of this event.

The OTDT function is a RTS function. The OTDT function is provided to ensure that the design limit departure from nucleate boiling ratio is met. This trip function also limits the range over which the overpressure delta-temperature trip function must provide protection.

The reactor trip system responded automatically due to the OTDT trip signal received. During the reactor shutdown, all required safety systems responded appropriately. There was no loss of any function that would have prevented fulfillment of actions necessary to 1) Shutdown the reactor and maintain it in a safe shutdown condition, 2) Remove residual heat, 3) Control the release of radioactive material, or 4) Mitigate the consequences of an accident.

This event did not result in a safety system functional failure.

E. Corrective Actions:

The corrective action to prevent recurrence is to pursue a modification which bypasses a tested channel rather than placing it in the tripped state during surveillances.

F. Previous Occurrences:

There have been no similar Licensee Event Report events at Braidwood Station in the last three years.

G. Component Failure Data:

<u>Manufacturer</u>	<u>Nomenclature</u>	<u>Model</u>	<u>Mfg. Part Number</u>
NA	NA	NA	N/A