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Braidwood Station  
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Braceville, IL 60407-9619

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10 CFR 50.73

August 27, 2007  
BW070066

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

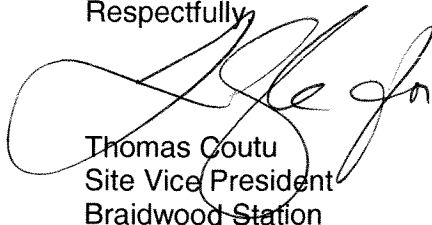
Braidwood Station, Unit 1  
Facility Operating License No. NPF-72  
NRC Docket No. STN 50-456

Subject: Licensee Event Report Number 2007-001-00 – Unit 1 Reactor Trip Following a 345 Kv  
Transmission Line Lightning Strike

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). 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 August 27, 2007.

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

Respectfully,



Thomas Coutu  
Site Vice President  
Braidwood Station

Enclosure: LER Number 2007-001-00

<b>NRC FORM 366</b> (6-2004)		<b>U.S. NUCLEAR REGULATORY COMMISSION</b>		APPROVED BY OMB: NO. 3150-0104  Estimated burden per response to comply with this mandatory collection request: 50 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.		EXPIRES: 06/30/2007																																									
<h2 style="margin: 0;">LICENSEE EVENT REPORT (LER)</h2> <p style="margin: 5px 0 0 40px;">(See reverse for required number of digits/characters for each block)</p>																																															
<b>1. FACILITY NAME</b> Braidwood Station, Unit 1				<b>2. DOCKET NUMBER</b> 05000456		<b>3. PAGE</b> 1 of 3																																									
<b>4. TITLE</b> Unit 1 Reactor Trip Following a 345 Kv Transmission Line Lightning Strike																																															
<b>5. EVENT DATE</b>			<b>6. LER NUMBER</b>			<b>7. REPORT DATE</b>			<b>8. OTHER FACILITIES INVOLVED</b>																																						
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER																																					
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<b>9. OPERATING MODE</b>  <div style="text-align: center; font-size: 1.2em;">1</div>			<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)</b> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> 20.2201(b)</td> <td><input type="checkbox"/> 20.2203(a)(3)(i)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(C)</td> <td><input type="checkbox"/> 50.73(a)(2)(vii)</td> </tr> <tr> <td><input type="checkbox"/> 20.2201(d)</td> <td><input type="checkbox"/> 20.2203(a)(3)(ii)</td> <td><input type="checkbox"/> 50.73(a)(2)(ii)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(vii)(A)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(1)</td> <td><input type="checkbox"/> 20.2203(a)(4)</td> <td><input type="checkbox"/> 50.73(a)(2)(ii)(B)</td> <td><input type="checkbox"/> 50.73(a)(2)(vii)(B)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(i)</td> <td><input type="checkbox"/> 50.36(c)(1)(i)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(iii)</td> <td><input type="checkbox"/> 50.73(a)(2)(ix)(A)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(ii)</td> <td><input type="checkbox"/> 50.36(c)(1)(ii)(A)</td> <td><input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(x)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(iii)</td> <td><input type="checkbox"/> 50.36(c)(2)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(A)</td> <td><input type="checkbox"/> 73.71(a)(4)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(iv)</td> <td><input type="checkbox"/> 50.46(a)(3)(ii)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(B)</td> <td><input type="checkbox"/> 73.71(a)(5)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(v)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(C)</td> <td><input type="checkbox"/> OTHER</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(vi)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(B)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(D)</td> <td></td> </tr> </table>									<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)(vii)(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)(vii)(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)	
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<b>10. POWER LEVEL</b>  <div style="text-align: center; font-size: 1.2em;">100</div>																																															
<b>12. LICENSEE CONTACT FOR THIS LER</b>																																															
NAME Michael Smith, Engineering Director									TELEPHONE NUMBER (Include Area Code) (815) 417-3800																																						
<b>13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT</b>																																															
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	N/A	N/A	N/A	N/A	N/A																																						
<b>14. SUPPLEMENTAL REPORT EXPECTED</b>								<b>15. EXPECTED SUBMISSION DATE</b>		MONTH	DAY	YEAR																																			
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE)								<input checked="" type="checkbox"/> NO																																							
<b>ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)</b>																																															
<p>On June 27, 2007, at 0921 hours, Braidwood Unit 1 reactor tripped from 100% power following a grid disturbance on a 345 Kv transmission line due to a lightning strike . This disturbance caused an actuation of protective relays for the 1D reactor coolant pump. The shutdown of the reactor coolant pump (RCP) resulted in a rapid reduction of coolant flow in the 1D reactor coolant loop and subsequent Reactor Protection System actuation to trip the Unit 1 reactor. Operator response to the trip was proper and all safety related systems, structures and components operated normally during this event.</p> <p>The Root Cause of the Unit 1 trip was determined to be a latent design weakness in the RCP protective scheme that permitted the existence of an undetected component failure creating a grid disturbance-intolerant vulnerability. Corrective actions in response to this issue include revising identified procedures to perform monitoring of the integrity of critical fuses within trip-sensitive protective relaying circuits, and implementation of design changes to reduce or eliminate the identified vulnerability from the RCP protective relaying system, or if design changes are not appropriate, develop alternate actions to address the vulnerability.</p> <p>There were no safety consequences impacting plant or public safety as a result of this event.</p> <p>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.</p>																																															

## LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Braidwood, Unit 1	05000456	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 3
		2007	- 001	- 00	

## NARRATIVE

**A. Plant Operating Conditions Before The Event:**

Event Date: June 27, 2007

Event Time: 0921

Unit: 1 MODE: 1

Reactor Power: 100 percent

Unit 1 Reactor Coolant System (RCS) [AB] Temperature: 587 degrees F, Pressure: 2236 psig

**B. Description of Event:**

Prior to the event, an in-series impedance relay was in a tripped state due to a failed fuse in a potential monitoring circuit of the 1D reactor coolant pump (RCP). There were no additional structures, systems or components inoperable at the beginning of the event that contributed to the severity of the event.

On the morning of June 27, 2007, Braidwood Unit 1 was operating at full power.

At 0921 hours, Braidwood Unit 1 experienced an automatic reactor trip from full power. A lightning strike in close proximity to the site caused a grid disturbance that resulted in actuation of protective relays for the 1D RCP. The shutdown of the 1D RCP resulted in a rapid reduction of coolant flow in the 1D reactor coolant loop and subsequent Reactor Protection System (RPS) [JG] actuation to trip the Unit 1 reactor.

Operator response to the trip was proper and all safety related systems, structures and components operated normally during this event. The auxiliary feedwater system [BA] actuated, as expected, in this event to maintain steam generator levels.

**C. Cause of Event**

The event was initiated by a lightning strike 4.3 miles from the plant that created a single phase to ground fault on a 345 kV transmission line. The ground fault suppressed the B-phase voltage to 48% of nominal until 345 kV protective breakers at Braidwood and the East Frankfort Transmission Substation isolated the line about 3 cycles (0.051 seconds) after fault initiation. The suppressed B-phase voltage created a momentary phase imbalance on the Braidwood RCPs resulting in elevated current on the unaffected A and C-phase. The C-phase current on the 1D RCP exceeded the trip setpoint of an instantaneous overcurrent protective relay. Normally, the RCP trip on momentary overcurrent would have been blocked by an in-series impedance relay; however, at the time of the event, the impedance relay was in a tripped state due to a failed fuse in a potential monitoring circuit.

The Root Cause of the Unit 1 trip was determined to be a latent design weakness in the RCP protective scheme that permitted the existence of an undetected component failure creating a grid disturbance-intolerant vulnerability. Contributing to this event, the Bus 159 potential transformer secondary side C-phase fuse open-circuited preventing proper voltage application to the 1D RCP impedance protective relay.

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		2007	- 001	- 00	

## NARRATIVE

**D. Safety Consequences:**

There were no safety consequences impacting plant or public safety as a result of this event. All safety related systems, structures and components operated normally during this event.

The actuation of the Reactor Protection System was valid for this plant condition and occurred without incident. The reactor trip is designed to prevent Departure from Nucleate Boiling caused by the reduction in total core flow. This event is explicitly described under Updated Final Safety Analysis Report section 15.3.1, Partial Loss of Reactor Coolant Flow.

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.

For a short period of time following the reactor shutdown, Unit 1 entered Limiting Condition of Operation Action Requirement (LCOAR) 3.7.5, Condition A for the 1B Auxiliary Feedwater Pump when the diesel oil Day Tank level dropped to 74%. Operators were dispatched to add fuel to the Day Tank to exit the LCOAR. Although the 1B AFW pump was declared inoperable during this time, the pump remained in operation until it was no longer needed to maintain steam generator levels. The 1B LCOAR was entered at 10:07 am and exited at 10:45 am when the Day Tank low-level alarm cleared. The 1B AFW pump day tank level was above the Technical Specification limit prior to the event so the 1B AFW pump was capable of performing its design function.

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

**E. Corrective Actions:**

Corrective actions in response to this issue include:

- Revising identified procedures to perform monitoring of the integrity of critical fuses within trip-sensitive protective relaying circuits, and
- Implementing design changes to eliminate the identified vulnerability from the RCP protective relaying system, or if design changes are not appropriate, developing alternate actions to address the vulnerability.

**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>
N/A	N/A	N/A	N/A