

**LICENSEE EVENT REPORT (LER)**

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

FACILITY NAME (1): Braidwood Unit 1

DOCKET NUMBER (2) 05000456

PAGE (3)  
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TITLE (4) Loss of Offsite Power Event due to an Electrical Fault caused by material dislodged by high winds.

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
09	06	1998	98	003	00	10	06	98	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9) 5  
POWER LEVEL (10) 000  
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

<input type="checkbox"/>	20.2201(b)	<input type="checkbox"/>	20.2203(a)(3)(i)	<input type="checkbox"/>	50.73(a)(2)(iii)	<input type="checkbox"/>	73.71(b)
<input type="checkbox"/>	20.2203(a)(1)	<input type="checkbox"/>	20.2203(a)(3)(ii)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)	<input type="checkbox"/>	73.71(c)
<input type="checkbox"/>	20.2203(a)(2)(i)	<input type="checkbox"/>	20.2203(a)(4)	<input type="checkbox"/>	50.73(a)(2)(v)	<input type="checkbox"/>	OTHER
<input type="checkbox"/>	20.2203(a)(2)(ii)	<input type="checkbox"/>	50.36(c)(1)	<input type="checkbox"/>	50.73(a)(2)(vii)	(Specify in Abstract below and in Text, NRC Form 366A)	
<input type="checkbox"/>	20.2203(a)(2)(iii)	<input type="checkbox"/>	50.36(c)(2)	<input type="checkbox"/>	50.73(a)(2)(viii)(A)		
<input type="checkbox"/>	20.2203(a)(2)(iv)	<input type="checkbox"/>	50.73(a)(2)(i)(B)	<input type="checkbox"/>	50.73(a)(2)(viii)(B)		
<input type="checkbox"/>	20.2203(a)(2)(v)	<input type="checkbox"/>	50.73(a)(2)(ii)	<input type="checkbox"/>	50.73(a)(2)(x)		
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>			

LICENSEE CONTACT FOR THIS LER (12)

NAME  
Robert Wegner, Operations Manager

TELEPHONE NUMBER (Include Area Code)

(815) 458-2801 Extension 2213

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)

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

MONTH DAY YEAR

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

On 9/6/98, Braidwood Station experienced a Loss of Offsite Power event at approximately 2107. Based on the root cause evaluation results, the event appears to be the result of a braided metal cable attached at the top of the Unit 1 containment structure becoming detached from its lower tether due to high winds (55 miles per hour) and contacting the energized Unit 1 Station Auxiliary Transformer (SAT).

Corrective Actions for this event include restoring equipment to operation, increasing inspection frequencies to ensure all material is secured, establishing "isolation zones" to control the storage of materials, revising maintenance contract specifications for housekeeping and material storage requirements, benchmarking with other nuclear plants and reinforcing housekeeping expectations to contractor personnel to increase their sensitivity to material control issues.

A previous Licensee Event Report for Braidwood Unit 2 (LER 96-001) was issued associated with a loss of offsite power due to the inadequate control of roofing materials.

This event is being reported pursuant to 10 CFR 50.72(a)(2)(iv), "Any event or condition that resulted in a manual or automatic actuation of any engineered safety feature (ESF), including the reactor protection system (RPS)."





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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
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Braidwood Unit 1	05000456	98	003	00	3 of 5

(If more space is required, use additional copies of NRC Form 366A)(17)

Nuclear Operational Analysis Department (NOAD) was called to inspect the SAT to assess the extent of damage. Following the inspection, NOAD determined that the SAT incurred no damage and the transformer could be returned to service.

The Unusual Event was terminated at 0555 on September 7, 1998, when the SATs were re-energized, thus restoring the normal offsite power source.

**C. CAUSE OF EVENT:**

Although the LOOP event was initially believed to be the result of a lightning strike with arcing to the transformer, Braidwood's investigation into the event has concluded that the most likely scenario is that a braided metal cable broke free from a tether rope due to high winds. Once free, the cable blew onto the transformer C phase corona ring, creating an electrical path between the transformer and the buttress. This resulted in the observed fault. This scenario is supported by the high winds on the order of 55 mph, the absence of a lightning strike in the vicinity of the transformer, the presence of fibrous material near the transformer and the absence of the cable after the event.

The Transmission Analysis Department (TAD) determined that the closest lightning strike during the period of 2045 to 2110 on 9/6/98, was approximately 7 miles from Braidwood Station. This strike occurred at approximately 2104. The National Weather Service was contacted to verify the locations of strikes during this period, but they could not provide any specific information on the location of strikes. Global Atmospheric, the supplier of the TAD lightning monitoring system, performed an independent review of the satellite data and confirmed the absence of an onsite strike coincident with the LOOP event onsite at Braidwood as originally suspected.

A walkdown of the area near the transformer was performed and a 6-foot section of 5/16" braided cable was found near the SAT. The cable was burned on one end and appeared to be a remnant from a cable hoist used on the C buttress of the Unit 1 containment. A 60 foot section of the same cable was hanging from the top of the buttress with burn marks on the loose end and at other places along the length of the cable. The individual conducting the walkdown remembered seeing the hoist cable tied off to an outside movable platform prior to the LOOP event, however the hoist cable was no longer tied to the platform and approximately 140 feet of the cable could not be found.

During subsequent walkdowns of the area, strands of fibrous material were found on the ground near the transformer, on the roof of the adjacent building, and embedded in the face of the buttress. One strand of this material was also found hanging from the transformer corona ring. Samples of the material were sent to the System Materials Analysis Department (SMAD) for identification. The properties of the material did not match samples of rope commonly used at the station.

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SMAD also performed a microscopic analysis of the fibrous material and found small metal balls embedded in it. These balls had similar properties to the braided metal cable used for the buttress hoist. The braided metal cable was cut exposing a core that appeared to match the material found around the transformer. SMAD performed additional testing on the core and confirmed that the material had identical physical and chemical properties as the fibrous strands found near the transformer.

**D. ASSESSMENT OF SAFETY CONSEQUENCES:**

This event had no effect on plant or public safety. Both Emergency Diesel Generators (1A and 1B) automatically started and all ESF safe shutdown loads sequenced onto the ESF buses as designed. The Residual Heat (RH) pumps were manually restarted at 2109, approximately two minutes after the event.

Had the event occurred under a more limiting set of circumstances, for example, at a reduced inventory, the consequences would have been unchanged. The diesel generators would have auto-started and sequenced on the safe shutdown loads, and shutdown cooling would have been expeditiously restored. A loss of offsite power is enveloped by the Station's Final Safety Analysis Report.

**E. CORRECTIVE ACTIONS:**

Following the event, equipment concerns were appropriately addressed by plant personnel (including the repair and re-installation of the non-ESF breakers), compensatory measures were taken in accordance with station procedures, and notifications were made to governmental agencies as required.

Nuclear Operational Analysis Department (NOAD) was called to inspect the SAT to assess the extent of damage. Following the inspection, NOAD determined that the SAT incurred no damage and the transformer was returned to service.

Walkdowns have been performed on a daily basis to ensure proper control of material in the area near the transformers. Items found during these walkdowns that have not met station expectations have been promptly removed or secured.

Housekeeping expectations for outside areas adjacent to the transformer yards have been reinforced to contractor personnel.

Maintenance contract specifications will be revised to establish requirements for housekeeping and material storage for outside work activities. This action is scheduled to be completed by 10/30/98 (NTS # 45618098SCAQ00003a-03).

Benchmarking will be done with other sites/utilities to determine if additional improvements can be made to protect transformers/switchyards. This action is scheduled to be completed by 11/12/98 (NTS # 45618098SCAQ00003a-04).

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Transformer isolation zones will be established with the intention of prohibiting the storage of materials in areas with increased potential to impact transformer operation. This action is scheduled to be completed by 1/21/99 (#45618098SCAQ0003a-01).

Operator rounds for the transformers and switchyard will be reviewed and revised as necessary to include specifics regarding storage in areas where there is a potential for transformers to be impacted. This action is scheduled to be completed by 2/15/99 (NTS # 45618098SCAQ00003a-02).

**F. PREVIOUS OCCURRENCES:**

Unit 2 LER 96-001: Loss of Offsite Power Due to Inadequate Control of Roofing Materials. On 01/18/96, Unit 2 lost offsite power due to a loss of both Station Auxiliary Transformers (SAT's). Foreign material, possibly flashing from the Service Building roof, caused a phase-to-ground arc on SAT 242-1.

The corrective actions for this event were reviewed. It was determined that the actions taken for the 1996 event would not have prevented this event because the actions specifically addressed the control of roofing activities and did not address other outside activities that could result in damage to the SATs.

**G. COMPONENT FAILURE DATA:**

MANUFACTURER ----- NOMENCLATURE      MODEL      MFG. PART NO.

Since no component failure occurred, this section is not applicable.