NRC FORM 366 (4-95)			U.S. NUCLEAR REGULATORY COMMISSION							APPROVED BY OMB NO. 3150-0104 EXPIRES 04/30/98						
		LICEN	SEE EVE	NT R	EPORT	(LER)			INFORM. LESSONS PROCESS REGARD RECORD RECORD	ATION S LEAD S AND ING B S MAD TORY	N COLLECT RNED ARE FED BACH URDEN ES NAGEMEN COMMISS	R RESPONSE TON REQUES INCORPORA' TO INDUSTI TIMATE TO 'I BRANCH (M ION, WASHIN DUCTION PRO	T: 50.0 HRS TED INTO T RY. FORWA THE INFORM INBB 7714), IGTON, DC	. REPO HE LICI RD CO ATION U.S. NU	RTED ENSING MMENTS AND JCLEAR	
FACILF			Braidwoo						DOCKET	T NUM	IBER (2)	05000456		1 0	GE (3)	
TITLE (4) L h	oss of igh wi	Offsite nds.	Power	r Event	due to	an E	lect	rical F	Faul	t cause	ed by mat	erial d	isloc	iged by	
EVE	NT DA	FE (5)	LERM	UMBER	1 (6)	REPORT	DATE	(7)	[OTHER	FACILITIES	INVOLVED	(8)		
MONTH	DAY	YEAR		UENTIAL UMBER	REVISION NUMBER	MONTH	DAY	YEA	FACI	LITY	NAME		and the second se		NUMBER	
09	06	1998	98	003	00	10	06	98	ACII	LITY	NAME		DO	CKET	NUMBER	
OPERATI MODE (S POWER	9)	5 000	THIS REP	ORT IS	SUBMITT	ED PURSU	ANT T	O TH	E REQUI	REM	ENTS OF	10 CFR §: (Check one c	or more)	(11)	
LEVEL (I	(0)		20.2201	l(b)	T	20.2	203(a)(3)(i)		1	50.73(a)(2)(iii)		73.71(()	
			20.2203	3(a)(1)		-	203(a)(3			1 M	50.73(a)(2			73.71(
			20.2203	3(a)(2)(i)			203(a)(4			P	50.73(a)(2			OTHE		
			20.2203	3(a)(2)(ii)		50.3	6(c)(1)				50.73(a)(2)(vii)				
			20.2203	3(a)(2)(iii))	50.3	6(c)(2)				50.73(a)(2)(viii)(A)	(Spe	cify in A	bstract	
			20.2203	3(a)(2)(iv)		50.7.	3(a)(2)(i)(B)		-	50.73(a)(2			w and in		
			20.2203	B(a)(2)(v)		50.7	3(a)(2)(i	i)			50.73(a)(2)(x)	NRC	Form 3	66A)	
			ah		LI	CENSEE CO	NTACT	FOR	THIS LER	(12)						
NAME Robert	Wegne	er, Operat	tions Manage	er								458-2801				
			COMPLE					T FAI	LURE DES	CRIB	ED IN THI	S REPORT (1.	3)			
CAUSE		SYSTEM	COMPONENT	MANU	FACTURER	REPORTABLE NPRDS	10		C	AUSE	SYSTEM	COMPONENT	MANUFACT	URER	REPORTABLE TO NPRDS	
			SUPPLEM	ENTAL	PEROPTE	XPECTED (1		•			1	DECTED	MONTH		1 2015	
YE	S		SUFFLEM	ENTAL	ing instant and along the second second second	X NO	-4)					PECTED MISSION	MONTH	DAY	YEAR	
		plete EXPE	ECTED SUBMI	ISSION D		1.10						TE (15)				

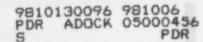
ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines 16)

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 eregized 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)."



NRC FORM 366A (4-95)	A U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB NO. 3150-0104 EXPIRES 04/30/98					
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION			ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSIN PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMEN REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, A TO THE PAPERWORK REDUCTION PROJECT						
FACILITY NA	ME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)			
			YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	anna an ann an Anna an Anna ann an Anna an Anna			
Braidwood I	aidwood Unit 1 05000456		98	003	00	2 of 5			

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit(s): 1	Event Date: 9/6/98	Event Time: 2107 Hours
Reactor Mode(s): 5	Power Level(s): 000	RCS [AB] Temp./Press.
		150 degrees / 345 psig

B. DESCRIPTION OF EVENT:

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

This event is being reported purfuant to 10CFR50.72(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)."

On Sunday, September 6, 1998, at approximately 2100, personnel working outside on Steam Generator Replacement Project (SGRP) activities noticed strong winds and lightning near the station. The wind speed rose from approximately 16.8 miles per hour (mph) at 2058 to approximately 55 mph at 2105. The Operations Department was contacted and the SGRP personnel began a walkdown to ensure equipment was secured. Minutes later, at 2107, a Loss of Offsite Power (LOOP) occurred on Unit 1 when System Auxiliary Transformers (SATs) 142-1 and 142-2 tripped offline due to a momentary Phase C to ground fault on the SAT bus. Both the 1A and the 1B Diesel Generators started on the undervoltage signal reenergizing busses 141 and 142 and sequencing on the safe shutdown loads. All equipment responded as expected with the exception of four non-ESF 480 volt breakers. These breakers failed to reclose when the attempt was made. Unit 2 remained at power during the transient and Unit 1 remained in Mode 5 with the Reactor Coolant System (RCS) filled.

SGRP contingency actions previously developed included a requirement for the Operations department to notify contract personnel of high winds anytime a wind speed of 50 mph is reached. In this case, there was insufficient time for this notification to be made prior to the event because the wind speed rose rapid'y.

Procedure 1BwOA ELEC-4, "Loss of Offsite Power Unit 1," was entered for the loss of ESF buses and actions were taken to maintain primary coolant temperature at 150 degrees Fahrenheit. Equipment concerns were appropriately addressed by plant personnel and compensatory measures were taken in accordance with station procedures.

At 2115, a Generating Station Emergency Plan (GSEP) Unusual Event MU-1 for a LOOP greater than 15 minutes was declared in accordance with procedure BwZP 200-1A1, "Emergency Action Levels". A NRC Emergency Notification System (ENS) notification was made for the GSEP Unusual Event declaration and the ESF actuations. In addition, a State of Illinois Nuclear Accident Notification System (NARS) notification was made at 2129.

NRC FORM 366A (4-95)	U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB NO. 3150-0104 EXPIRES 04/30/98					
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION			ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSIN PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMEN REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, 4 TO THE PAPERWORK REDUCTION PROJECT						
FACILITY NA	FACILITY NAME (1) DOCKET NUMBER (2)			LER NUMBER (6)					
			YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	are not in the data when we have not many and			
Braidwood	Unit 1	05000456	98	003	00	3 of 5			

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 ar , 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.

NRC FORM 366A 4-95)	U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB NO. 3150-0104 EXPIRES 04/30/98					
	EE EVENT RE TEXT CONTINUA		INFORMATIC LESSONS LE/ PROCESS AN REGARDING RECORDS M/ REGULATOR	BURDEN PER RESH DN COLLECTION RI ARNED ARE INCOR D FED BACK TO IN BURDEN ESTIMAT ANAGEMENT BRAI Y COMMISSION, W RWORK REDUCTI	EQUEST: 50.0 HE RPORATED INTO IDUSTRY. FORW TE TO THE INFOR NCH (T-6 F33), U. /ASHINGTON, DO	S. REPORTED THE LICENSING ARD COMMENTS MATION AND S. NUCLEAR			
FACILITY	NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)			
			YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	where the second s			
Braidwoo	d Unit 1	05000456	98	003	00	4 of 5			

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 chemica? oroperties 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).

NRC F/3RM 366A (4-95)	4 U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB NO. 3150-6104 EXPIRES 04/30/98					
	EE EVENT RE	· · · · · · · · · · · · · · · · · · ·	INFORMATIC LESSONS LE/ PROCESS AN REGARDING RECORDS M/ REGULATOR	BURDEN PER RESP ON COLLECTION RI ARNED ARE INCOM D FED BACK TO IN BURDEN ESTIMAT ANAGEMENT BRAI Y COMMISSION, W RWORK REDUCTION	EQUEST: 50.0 HF RPORATED INTO IDUSTRY. FORM TE TO THE INFOR NCH (T-6 F33), U. (ASHINGTON, DO	REPORTED THE LICENSING ARD COMMENTS MATION AND S. NUCLEAR			
FACILITY NAME (1) DOCKET NUMBER		DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)			
			YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	and a series of the second of the second			
Braidwood	Unit 1	05000456	98	003	00	5 of 5			

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.