

NRC Form 308  
(9-83)U.S. NUCLEAR REGULATORY COMMISSION  
APPROVED OMB NO. 3150-0104  
EXPIRES 8/31/85

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Grand Gulf Nuclear Station - Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 4 1 6				PAGE (3) 1 OF 0 4	
TITLE (4) Reactor Scram Due to Main Output Transformer Fault															
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 NAMES		DOCKET NUMBER(S)				
0	1	1	0	8	8	8	8	8	NA		0 5 0 0 0				
0	1	1	0	8	8	8	8	8	0 5 0 0 0						
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)													
1		20.402(a)		20.406(a)		X		50.73(a)(2)(iv)		73.71(b)					
POWER LEVEL (10)		20.406(a)(1)(i)		50.36(a)(1)				50.73(a)(2)(v)		73.71(a)					
0 9 1 5		20.406(a)(1)(ii)		50.38(a)(2)				50.73(a)(2)(vi)		OTHER (Specify in Abstract below end in Text, NRC Form 306-A)					
		20.406(a)(1)(iii)		50.73(a)(2)(i)				50.73(a)(2)(vii)(A)							
		20.406(a)(1)(iv)		50.73(a)(2)(ii)				50.73(a)(2)(vii)(B)							
		20.406(a)(1)(v)		50.73(a)(2)(iii)				50.73(a)(2)(ix)							
LICENSEE CONTACT FOR THIS LER (12)															
NAME								TELEPHONE NUMBER							
Ronald Byrd/Licensing Engineer								6 0 1 4 3 7 - 1 2 1 4 9							
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)															
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS						
X	EJL	XIFMIR	W11210	N											
SUPPLEMENTAL REPORT EXPECTED (14)										MONTH	DAY	YEAR			
YES (If yes, complete EXPECTED SUBMISSION DATE)										X	NO				
ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (15)															
<p>On January 10, 1988 the "B" phase generator output transformer failed causing the generator output breakers to open on a transformer differential tripping the main turbine/generator. The reactor automatically scrambled on the turbine control valve fast closure signal.</p> <p>An investigation determined that a winding fault occurred on the high voltage side of the transformer. The "B" phase transformer was disconnected and a spare transformer connected to the "B" phase. Electrical tests and oil samples of the "A" phase, "C" phase, and the spare transformers indicated acceptable insulation levels and oil characteristics. Previous test results of the "B" phase transformer were reviewed to determine if the failure could have been anticipated. Based on the data available, a preliminary investigation concluded that the fault could not have been anticipated or prevented and that the existing preventative maintenance program of oil sampling and analysis is adequate. Although System Energy Resources, Inc. believes its current program is adequate, an independent review by high voltage specialists will be performed to see if any enhancement to the current program would be beneficial.</p>															
<p>8802170077 880209 PDR ADOCK 05000416 S DCD</p> <p>J16AECM88020901 - 3</p>															

NRC Form 366A  
(9-83)

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 5/31/88

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TEXT (if more space is required, use additional NRC Form 366A's) (17)

## A. REPORTABLE OCCURRENCE

On January 10, 1988 at 1508 a main generator output transformer failed causing a trip of the main generator and turbine. The reactor scrambled on the turbine control valve fast closure signal. This Reactor Protection System (RPS) actuation is reported pursuant to 10CFR50.73(a)(2)(iv).

## B. INITIAL CONDITIONS

The plant was operating at 95 percent power with a generator output of 1226 megawatts.

## C. DESCRIPTION OF OCCURRENCE

The main generator was synchronized to the grid at 0315 on January 6, 1988 to begin the third cycle of operation. Power was incrementally increased for fuel preconditioning until reaching an output of 1226 megawatts on January 10. At 1508 on January 10, the "B" phase main transformer (EIS code: GG-1EL-XFMR-S001B) failed causing the generator output breakers to open on a transformer differential tripping the main turbine/generator. The reactor automatically scrambled on the turbine control valve fast closure signal. The reactor recirculation pumps tripped on the Anticipated Transient Without a Scram (ATWS) high pressure trip signal. Reactor pressure reached a maximum of 1109 psig while reactor water level reached a minimum of 2.5 inches below instrument zero (164.2 inches above the top of active fuel). No Emergency Core Cooling System (ECCS) actuation setpoints were reached.

Operators responded to the scram in accordance with the scram off-normal event procedure. The feedwater control system automatically recovered reactor water level. The turbine bypass valves automatically throttled to maintain reactor pressure at approximately 957 psig after the turbine control valve fast closure. Reactor recirculation pumps were re-started to minimize vessel stratification.

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## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  Grand Gulf Nuclear Station - Unit 1	DOCKET NUMBER (2)  050004116	LER NUMBER (3)			PAGE (3)	
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		88	002	00	03	OF 04

TEXT (if more space is required, use additional NRC Form 305A w/ (17))

## D. APPARENT CAUSE

The initial investigation into the cause of the generator trip revealed that the main transformer for generator output phase "B" had experienced an internal fault. Personnel in the vicinity of the switchyard reported hearing a loud noise. An inspection revealed that the transformer casing was slightly distorted, oil was leaking from pump fittings and the pressure relief, and an insulator was broken. The damage was limited to the high voltage side of the transformer.

A subsequent inspection determined that the cause was due to a winding fault on the high voltage side. The root cause of the winding fault has not been determined. The transformer is a Westinghouse step-up class FOA, shell form, outdoor, single phase, 455,000 KVA, 60 hertz, with a low voltage side of 20,900V and a high voltage side of 288,615V.

There have been no previous occurrences of a main output transformer failure at Grand Gulf Nuclear Station.

## E. SUPPLEMENTAL CORRECTIVE ACTIONS

The "B" phase transformer was replaced with a spare transformer of the same type and manufacturer. Electrical tests and oil samples of the "A" phase, "C" phase, and the spare transformers indicated acceptable insulation levels and oil characteristics.

Previous test results of the "B" phase transformer were reviewed to determine if the failure could have been anticipated. Based on the data available, a review concluded that the "B" phase transformer failure could not have been anticipated or prevented by any actions or program. It was also determined that the existing preventative maintenance program of oil sampling and analysis is adequate. Although System Energy Resources, Inc. believes its current program is adequate, an independent review by high voltage specialists will be performed to see if any enhancement to the current program would be beneficial.

Reactor restart commenced on January 13, 1988. The generator was successfully synchronized to the grid at 2210 on January 15.

## F. SAFETY ASSESSMENT

There were no adverse safety consequences to the plant or personnel. Since the transformer fault was limited to the high voltage side there was no threat of damage to the generator. All safety systems responded properly during the event. Reactor water level was controlled without the use of any ECCS systems. Reactor pressure was controlled by the turbine bypass valves.

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## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT (if more space is required, use additional NRC Form 388A's (17))

During the 10CFR50.72 immediate notification, operators reported that some main steam line safety relief valves (SRVs) had lifted. This determination was based on tail pipe temperature readings. A later investigation determined that there was some weeping past the seats of some SRVs as reactor pressure peaked but no SRV lifts occurred. The Technical Specifications requires the normal lift setting of SRV F051D to be 1103+/-15 psig. Another SRV, F051B, also has an initial lift setting of 1103+/-15 psig if the logic for the low-low set function seals in at that pressure. The "A" and "B" channels tripped since the reactor pressure peaked at 1109 psig as indicated by the post-trip transient recording system. This instrumentation is separate from the instrumentation that provides SRV actuation. Since neither the "E" nor "F" channel tripped, the actuation logic was not completed for the normal lift of F051D or to seal in the low-low set logic.

A review was performed on the latest SRV pressure instrumentation calibration data obtained in December 1987 and the latest functional test data obtained January 9, 1988. Both sets of data verified all four channels were within Technical Specification allowed values. This data also indicated that the "A" and "B" channels should trip at a slightly lower pressure than the "E" and "F" channels, thus confirming the conditions observed following the scram. The SRV logic operated as designed.



OLIVER D. KINGSLEY, JR.  
Vice President  
Nuclear Operations

February 9, 1988

U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Attention: Document Control Desk

Gentlemen:

SUBJECT: Grand Gulf Nuclear Station  
Unit 1  
Docket No. 50-416  
License No. NPF-29  
Reactor Scram Due to Main Output  
Transformer Fault  
LER 88-002-00  
AECM-88/0036

Attached is Licensee Event Report (LER) 88-002-00 which is a final report.

Yours truly,

ODKINGSLEY, JR

ODK:bms  
Attachment

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