

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Sequoyah, Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 3 2 7 1 OF 0 4										PAGE (3) 1 OF 0 4										
TITLE (4) Design Error Resulting In Nonrepresentative Load Testing Of Diesel Generators																														
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(S)															
0	7	2	3	8	7	8	7	0	5	2	0	0	0	8	2	2	8	7	Sequoyah, Unit 2						0 5 0 0 0 3 2 8					
OPERATING MODE (9) 5			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)																											
POWER LEVEL (10) 0 0 0			20.402(b)				20.405(c)				50.73(a)(2)(iv)				73.71(b)															
			20.405(a)(1)(i)				50.38(a)(1)				50.73(a)(2)(v)				73.71(c)															
			20.405(a)(1)(ii)				50.38(c)(2)				50.73(a)(2)(vii)				XX OTHER (Specify in Abstract below and in Text, NRC Form 365A)															
			20.405(c)(1)(iii)				50.73(a)(2)(i)				50.73(a)(2)(viii)(A)																			
			20.405(a)(1)(iv)				50.73(a)(2)(ii)				50.73(a)(2)(viii)(B)																			
			20.405(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(x)				Voluntary Report															
LICENSEE CONTACT FOR THIS LER (12)																														
NAME J. L. Long, Plant Operations Review Staff										TELEPHONE NUMBER 6 1 5 8 7 0 - 1 7 2 5 4																				
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																														
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC																				
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)				MONTH		DAY		YEAR												
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)										<input checked="" type="checkbox"/> NO																				

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

This report is being submitted as a "voluntary LER" to identify potential problems with the emergency diesel generators and to keep NRC informed of ongoing activities at Sequoyah Nuclear Plant. A significant condition report (SCR) was initiated on March 20, 1986, with both units 1 and 2 in mode 5 (cold shutdown), describing a condition where the capability of emergency diesel generator 2B-B to recover from the transient of the containment spray pump starting following a phase B containment isolation with other random loads connected was uncertain. A remote possibility exists that the electric board room air handling unit could start at precisely the same time that the containment spray pump starts and result in the speed of the diesel generator to drop below the five percent limitation described in Final Safety Analysis Report (FSAR). A second SCR was initiated on January 14, 1987, with both units in mode 5, that identified a problem where the diesel generators' capability to provide adequate onsite power had not been demonstrated in accordance with the FSAR. Preoperational testing did not fully demonstrate that each diesel generator was capable of starting and accelerating to rated speed in the required sequence the needed engineered safety features and emergency shutdown loads. The cause of these conditions was a design error. Design engineers failed to properly evaluate the integrated operation and response of the diesel generators, their loading, and to specify the correct preoperational test. In mode 5, minimal loads would connect onto the diesel generators, and there is no possibility of overloading the diesel generators. Two diesel generators have already been tested, and the remaining two diesel generators will be tested before restart of unit 2. As a precautionary measure, the starting times of the containment spray pumps and the electric board room air handling unit have been modified. Procedures have been established to ensure adequate analyses exist to support design changes to prevent recurrence of such conditions.

8708310107 870822
PDR ADOCK 05000327
S PDR

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

FACILITY NAME (1) Sequoyah, Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 3 2 7	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8 7	— 0 5 2	— 0 0	0 2	OF	0 4

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

This report is being submitted as a "voluntary LER" to identify potential problems with the emergency diesel generators (EIIS Code EK) and to keep NRC informed of ongoing activities at Sequoyah Nuclear Plant.

SYSTEM DESCRIPTION

At 1.5 seconds after a loss of voltage on the 6.9 kV shutdown boards (EIIS Code EB), the diesel generators will start. Approximately five seconds after loss of voltage, the 6.9 kV shutdown board loads are shed with the exception of the 480 volt shutdown boards (EIIS Code ED). At approximately 10 seconds when the diesel generator has accelerated to a speed of 850 rpm, the supply breaker on the 6.9 kV shutdown board closes. The loads on the 480 volt shutdown boards are reenergized when the diesel generator supply breaker closes. Few of the 480 volt shutdown board loads are shed during a loss of voltage, and many of the loads can randomly start and stop. As a result, it is difficult to predict the loads on the 480 volt auxiliary power system that would be running; and therefore, it is difficult to determine the diesel generator loading. At 30 seconds after the supply breaker for the diesel generator closes, the containment spray pumps (EIIS Code BE) start if a phase B containment isolation (EIIS Code JM) signal is present.

DESCRIPTION OF CONDITION

A significant condition report (SCR) was initiated on March 20, 1986, with both units 1 and 2 in mode 5 (cold shutdown), describing a condition where the capability of emergency diesel generator 2B-B to recover from the transient of the containment spray pumps starting following a phase B containment isolation with other random loads connected was uncertain. A very remote possibility exists that the 480 volt electric board room air handling unit (EIIS Code VF) could start at 30 seconds after the diesel generator supply breaker has closed and at precisely the same time that the containment spray pump starts. Should this occur with all of the other connected loads that are sequenced on following a loss of offsite power running at full load, the speed of the diesel generator will drop below the five percent limitation as described in the Final Safety Analysis Report (FSAR).

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/86

FACILITY NAME (1) Sequoyah, Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 3 2 7	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8 7	0 5 2	0 0	0 3	OF	0 4

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

A second SCR was initiated on January 14, 1987, with both units in mode 5 (cold shutdown), that identified a problem where the diesel generators' capability to provide adequate onsite power had not been demonstrated in accordance with the FSAR. Preoperational testing that had been performed did not fully demonstrate that each of the four diesel generators was capable of starting and accelerating to rated speed in the required sequence the needed engineered safety features and emergency shutdown loads, and that the transient voltages and frequencies experienced during load sequence testing were within the limitations described in the FSAR. Specifically, the first loads applied to the diesel generator consist of Class 1E and non-Class 1E (EIIS Code EC) 480 volt loads that are not load shed and are applied to the diesel generator unit upon its connection to the 6.9 kV shutdown boards. This initial load was not defined, monitored, or measured to ensure proper loading of the diesel generator unit for the accident loading sequence test.

No immediate operator action was required because both units are in mode 5, and the automatic safety injection signal (EIIS Code JE) is blocked in this mode thus preventing automatic operation of the safety injection loads. The containment spray pumps are also prevented from starting in mode 5 by administrative controls. Therefore, minimal loads would be available to connect onto the auxiliary electric power system boards when the diesel generators are supplying emergency onsite power in mode 5, and there is no possibility of overloading the diesel generators.

CAUSE OF CONDITION

The cause of these conditions was a design error. Design engineers failed to properly evaluate the integrated operation and response of the diesel generators, their respective load sequences, the load groups, and the Class-1E auxiliary power system and to specify testing that would be representative of accident conditions.

ANALYSIS OF CONDITION

As previously stated, this report is being submitted as a "voluntary LER" to identify potential problems. The preoperational test scope, the actual test, and the test results were all approved. The aforementioned deficiencies in meeting FSAR commitments did not result in diesel generator inoperability.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Sequoyah, Unit 1	05000327	87	052	00	04	05	04

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

Preliminary results from recent data obtained during the testing (safety injection concurrent with a blackout with additional loading to simulate as much as practical an accident condition) of diesel generators 1A-A and 1B-B indicates that the diesel generators meet the intent of the requirements prescribed in the FSAR. Additionally, the probability of the containment spray pump and the electric board room air handling unit starting simultaneously is low. If this condition should occur with all other available loads running at full load, the analysis by the vendor indicates that diesel generator 2B-B may not recover from the overload. The analysis considered that several loads such as vital battery chargers and vital inverters, which are not normally fully loaded, to be loaded to their nameplate rating. This, coupled with the low probability of the simultaneous start of the containment spray pump and the electric board room air handling unit provides a high level of confidence that the diesel generators would have performed their intended function.

CORRECTIVE ACTIONS

As previously stated, two diesel generators have already been tested, and the remaining two diesel generators will be tested before restart of unit 2 to ensure the capability of the diesel generators. Additionally, as a precautionary measure, the starting of the containment spray pumps has been modified from 30 seconds to 3 minutes, and the 480 volt electric board room air handling unit start has been delayed until after the containment spray pump starts during a loss of offsite power concurrent with a safety injection and a phase B containment isolation.

Procedures have been established which require identification of the analyses or calculations required to support design changes. These procedures will prevent recurrence of such conditions.

ADDITIONAL INFORMATION

Diesel generators were supplied by Morrison-Knudsen Company.

0614Q



TENNESSEE VALLEY AUTHORITY
Sequoyah Nuclear Plant
Post Office Box 2000
Soddy-Daisy, Tennessee 37379

August 22, 1987

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

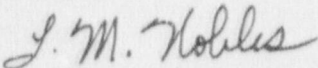
Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 1 - DOCKET NO.
50-327 - FACILITY OPERATING LICENSE DPR-77 - REPORTABLE OCCURRENCE REPORT
SQRO-50-327/87052

The enclosed voluntary licensee event report provides details concerning
design errors that resulted in nonrepresentative testing of the emergency
diesel generators.

Very truly yours,

TENNESSEE VALLEY AUTHORITY



L. M. Nobles
Plant Manager

Enclosure
cc (Enclosure):

J. Nelson Grace, Regional Administrator
U. S. Nuclear Regulatory Commission
Suite 2900
101 Marietta Street, NW
Atlanta, Georgia 30323

Records Center
Institute of Nuclear Power Operations
Suite 1500
1100 Circle 75 Parkway
Atlanta, Georgia 30339

NRC Inspector, Sequoyah Nuclear Plant

IE22
11