

ACCELEKATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9001040012 DOC.DATE: 89/12/21 NOTARIZED: NO DOCKET #
 FACIL:50-361 San Onofre Nuclear Station, Unit 2, Southern Californ 05000361
 AUTH.NAME AUTHOR AFFILIATION
 MORGAN,H.E. Southern California Edison Co.
 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 89-007-00:on 891121,diesel generator starting air sys
 requirements not adequately demonstrated.

W/8 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 2
 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:

RECIPIENT ID CODE/NAME	COPIES LTTR ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR ENCL
PD5 LA	1 1	PD5 PD	1 1
KOKAJKO, L.	1 1		
INTERNAL: ACRS MICHELSON	1 1	ACRS MOELLER	2 2
ACRS WYLIE	1 1	AEOD/DOA	1 1
AEOD/DSP/TPAB	1 1	AEOD/ROAB/DSP	2 2
DEDRO	1 1	NRR/DET/ECMB 9H	1 1
NRR/DET/EMEB9H3	1 1	NRR/DET/ESGB 8D	1 1
NRR/DLPQ/LHFB11	1 1	NRR/DLPQ/LPEB10	1 1
NRR/DOEA/OEAB11	1 1	NRR/DREP/PRPB11	2 2
NRR/DST/SELB 8D	1 1	NRR/DST/SICB 7E	1 1
NRR/DST/SPLB8D1	1 1	NRR/DST/SRXB 8E	1 1
NUDOCS-ABSTRACT	1 1	<u>REG FILE</u> 02	1 1
RES/DSIR/EIB	1 1	RGN5 FILE 01	1 1
EXTERNAL: EG&G WILLIAMS, S	4 4	L ST LOBBY WARD	1 1
LPDR	1 1	NRC PDR	1 1
NSIC MAYS, G	1 1	NSIC MURPHY, G.A	1 1
NUDOCS FULL TXT	1 1		

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK,
 ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION
 LISTS FOR DOCUMENTS YOU DON'T NEED!

FULL TEXT CONVERSION REQUIRED
 TOTAL NUMBER OF COPIES REQUIRED: LTTR 38 ENCL 38

R
I
D
S
/
A
D
S
/
A
D
D
S

A0-4

Southern California Edison Company

SAN ONOFRE NUCLEAR GENERATING STATION

P. O. BOX 128

SAN CLEMENTE, CALIFORNIA 92672

H. E. MORGAN
STATION MANAGER

December 21, 1989

TELEPHONE
(714) 368-6241

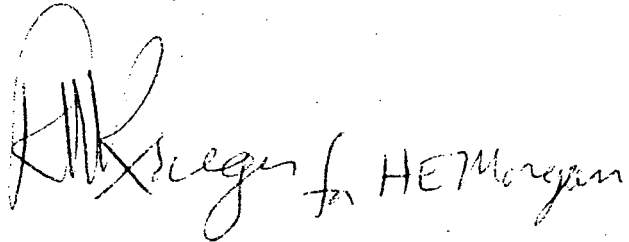
U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: Docket No. 50-361
30-Day Report
Licensee Event Report No. 89-007
San Onofre Nuclear Generating Station, Unit 2

Pursuant to 10 CFR 50.73(d), this submittal provides the required 30-day written Licensee Event Report (LER) for an occurrence involving the Diesel Generator Starting Air System. Neither the health and safety of plant personnel or the public was affected by this occurrence.

If you require any additional information, please so advise.

Sincerely,

A handwritten signature in dark ink, appearing to read "H. E. Morgan", is written over a faint, larger signature that appears to be "K. R. Morgan".

CACouser

Enclosure: LER No. 89-007

cc: C. W. Caldwell (USNRC Senior Resident Inspector, Units 1, 2 and 3)
J. B. Martin (Regional Administrator, USNRC Region V)
Institute of Nuclear Power Operations (INPO)

9001040012 891221
PDR ADOCK 05000361
S PDC

IE22

LICENSEE EVENT REPORT (LER)																				
Facility Name (1) SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 2 & 3												Docket Number (2) 0 5 0 0 0 3 6 1				Page (3) 1 of 0 6				
Title (4) DIESEL GENERATOR STARTING AIR SYSTEM REQUIREMENTS NOT ADEQUATELY DEMONSTRATED																				
EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)										
Month	Day	Year	Year	///	Sequential	///	Revision	Month	Day	Year	Facility Names					Docket Number(s)				
				///	Number	///	Number				San Onofre, Unit 3					0 5 0 0 0 3 6 2				
1	1	2	11		8	9	8	9												
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (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)				50.36(c)(1)				50.73(a)(2)(v)				73.71(c)					
			20.405(a)(1)(ii)				50.36(c)(2)				50.73(a)(2)(vii)				Other (Specify in					
			20.405(a)(1)(iii)				50.73(a)(2)(i)				50.73(a)(2)(viii)(A)				Abstract below and					
			20.405(a)(1)(iv)				X 50.73(a)(2)(ii)				50.73(a)(2)(viii)(B)				in text)					
			20.405(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(x)									
LICENSEE CONTACT FOR THIS LER (12)																				
Name H. E. Morgan, Station Manager												TELEPHONE NUMBER AREA CODE 7 1 4 3 6 8 - 6 2 4 1								
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																				
CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS											
SUPPLEMENTAL REPORT EXPECTED (14)										Expected Submission Date (15)		Month	Day	Year						
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)																				

On 11/21/89, during a review of Units 2 and 3 diesel generator (DG) design basis as part of an ongoing NRC inspection activity, it was determined that the design requirements of the DG Starting Air Systems (SAS) may not have been adequately demonstrated during startup testing. Specifically, The Final Safety Analysis Report (FSAR) states that "... each air receiver is capable of cranking a cold diesel engine five times without recharging the receiver. Each cranking cycle duration is approximately 3 seconds, or consists of 2 to 3 engine revolutions." SAS controls were set to maintain a minimum air receiver pressure of 182 psig based on initial startup testing, which demonstrated that each SAS, with a starting air receiver pressure of 175 psig, met the criteria of 3 second cranking duration on 5 attempts. However, upon review of the basis upon which the SAS test results were accepted, it was determined that although cranking cycles for all tests were at least 3 seconds in duration, the crankshaft revolutions in some tests were not sufficient to ensure that a DG start would occur. This had been demonstrated for only one air receiver at an initial pressure of 195 psig.

The root cause of this event was an error in understanding by responsible SCE personnel with respect to the basis upon which the SAS test results were accepted. Recent review of the test data has concluded that the test performed at 195 psig is the more conservative test and setpoints should be based on these results unless some other acceptable basis is established by analysis or further test.

As interim corrective action, the SAS air receivers for all DGs are being maintained at a minimum pressure of 195 psig. An engineering evaluation has been undertaken to determine additional corrective action necessary to establish the optimum operating pressure range for the SAS.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

SAN ONOFRE NUCLEAR GENERATION STATION
UNIT 2

DOCKET NUMBER
05000361

LER NUMBER
89-007-00

PAGE
2 OF 6

Plant: San Onofre Nuclear Generating Station
Units: Two and Three
Reactor Vendor: Combustion Engineering
Event Date: 11-21-89

A. CONDITIONS AT TIME OF THE EVENT:

Unit 2 was in Mode 4, Hot Shutdown with RCS temperature at approximately 335 degrees F

Unit 3 was in Mode 1, Power Operation, at 100% reactor power.

B. BACKGROUND INFORMATION:

1. Diesel Generator Starting Air System

Units 2 and 3 each have two emergency Diesel Generators (DG) [DG, EK] which on loss of off-site power will automatically start and provide electrical power to the plant vital equipment necessary to shutdown the reactor and maintain it in a safe condition. The Starting Air System (SAS) provides the initial motive force to rotate the engine crankshaft to a speed sufficient to initiate combustion. Each DG is equipped with two independent and redundant SASs. Each SAS consists of one air receiver, one air compressor, after cooler, dryer, four air start motors, two air start solenoids, associated piping, valves, and instrumentation. The pressure in each air receiver is maintained between 182 and 200 psig to ensure a minimum pressure of 180 psig is available for engine start. The air receiver pressure range was established based upon vendor supplied information.

2. Licensing Commitments

Section 9.5.6.2.1.3 of the FSAR states that "... each air receiver is capable of cranking a cold diesel engine five times without recharging the receiver. Each cranking cycle duration is approximately 3 seconds, or consists of 2 to 3 engine revolutions." This design requirement is based on the Standard Review Plan [NUREG 0800, formerly 75/087], 1975 revision, regarding general design and testing guidelines for sizing of diesel generator air receivers. The Standard Review Plan (SRP), dated May 1975, states that "As a minimum, each of the redundant starting systems should be capable of cranking a cold diesel engine five times without recharging the receiver. Each cranking cycle duration should be approximately 3 seconds, or consist of 2 to 3 engine revolutions."

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

SAN ONOFRE NUCLEAR GENERATION STATION UNIT 2	DOCKET NUMBER 05000361	LER NUMBER 89-007-00	PAGE 3 OF 6
-------------------------------------------------	---------------------------	-------------------------	----------------

As described in section 8.3 of the FSAR, in the event of a total loss of the preferred offsite power sources, the Class 1E AC system will be powered from the standby diesel generator power sources. As assumed in the accident analyses described in the FSAR, each DG is capable of starting, accelerating and accepting loads in 10 seconds. While the accident scenarios include restarting of the DGs upon a Loss of Voltage (LOV) to the 1E AC buses after they had been reset subsequent to auto-starting on a Safety Injection Actuation Signal (SIAS), there are no FSAR analyzed scenarios which require the capability to start the DGs 5 consecutive times.

3. Startup Testing

The Starting Air Receiver capacity test was intended to verify the ability of a DG to start in accordance with its design basis. The requirements of the FSAR were written to quantitatively provide such criteria. In November 1981, during the startup testing of Unit 2, SCE performed capacity tests on each of the four air receivers (T-274, T-275, T-276 and T-277) and their associated air compressors (C-12A, C-12B, C-13A and C-13B). These tests involved five cranking cycles with each of the air receivers at an initial pressure of 175 psig. This initial pressure was selected to be consistent with the operating pressure range of the air receivers (180 to 200 psig). For each cranking cycle, data were recorded for air receiver pressure, engine revolution and cranking cycle duration. With the exception of tests associated with T-275, each cranking cycle was at least 3 seconds in duration, thus meeting one of the two requirements of the FSAR and SRP; however, not all cranking cycles consisted of at least 2 crankshaft revolutions.

Subsequent to these tests, a broken shaft was discovered in one of the air motors connected to receiver T-275. The motors were replaced and tests were reperformed. These tests included one that was identical to those discussed above (initial air receiver pressure of 175 psig), and a second test which was performed at an air receiver starting pressure of 195 psig. The results of the tests run at 175 psig demonstrated that the capacity for receiver T-275 was similar to that of the other three receivers with respect to cranking cycle duration of 3 seconds. The testing performed with an initial pressure of 195 psig demonstrated that the 2 to 3 revolution criteria was met for 5 cranking cycles.

Startup testing of the Unit 3 air receivers were tested at 175 psig in the same manner.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

SAN ONOFRE NUCLEAR GENERATION STATION UNIT 2	DOCKET NUMBER 05000361	LER NUMBER 89-007-00	PAGE 4 OF 6
-------------------------------------------------	---------------------------	-------------------------	----------------

C. DESCRIPTION OF THE EVENT:

1. Event:

On November 21, 1989, during a review of Units 2 and 3 DG SAS as part of an ongoing NRC inspection activity, it was determined that the FSAR and SRP requirements of the SAS for the DGs may not have been adequately demonstrated. Specifically, upon review of the basis upon which the SAS test results were accepted, it was determined that although cranking cycles for all tests were at least 3 seconds in duration, the crankshaft revolutions in some tests were not sufficient to ensure that a DG start would occur. This had only been demonstrated for the Unit 2 air receiver T-275 at an initial pressure of 195 psig. Since SAS controls were set to provide for an air receiver pressure range of 182 to 200 psig, receiver pressure could be below that for which acceptable test results exist.

2. Inoperable Structures, Systems or Components that Contributed to the Event:

Not applicable.

3. Sequence of Events:

Not applicable.

4. Method of Discovery:

Discussions between the NRC staff and SCE concerning the FSAR requirements for the SAS led to the conclusion that such requirements had not been adequately demonstrated.

5. Personnel Actions and Analysis of Actions:

SCE personnel responded properly by immediately implementing administrative controls to maintain the air pressure in one of the two redundant air receivers for each of Units 2 and 3 DGs at 195 psig.

6. Safety System Responses:

Not applicable.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

SAN ONOFRE NUCLEAR GENERATION STATION
UNIT 2

DOCKET NUMBER
05000361

LER NUMBER
89-007-00

PAGE
5 OF 6

D. CAUSE OF THE EVENT:

1. Immediate Cause

The operating pressure range for the air receivers was not established on the basis of a test which conformed to the intent of the FSAR and SRP. This resulted in the operation of the Starting Air System at a pressure which had not been adequately tested to conform to these requirements.

2. Root Cause:

The root cause of this event was an error in understanding by responsible SCE personnel with respect to the basis upon which the SAS test results were accepted. The test results beginning at an initial pressure of 175 psig, were accepted based upon a cranking cycle duration of at least 3 seconds. It was concluded that the FSAR and SRP requirements for air receiver capacity was met. Upon further review, it has been concluded that the intent of the required testing is to demonstrate reasonable assurance that each cranking cycle would in fact result in a DG start. Since some cranking cycles (although meeting the 3 second duration criteria) did not produce a crankshaft rotation that would provide such assurance, it is now concluded that the test results should not have been accepted. Testing results performed at an initial pressure of 195 psig does provide such assurance; therefore, the operating pressure range of the air receivers should have been established based upon these results rather than the results of the 175 psig tests.

E. CORRECTIVE ACTIONS:

1. Corrective Actions Taken:

The pressure switch setpoints on the Units 2 and 3 DG starting air systems have been increased such that air receiver pressures are being maintained between 196 psig and 204 psig (+/- 1.0 psig). This action is considered conservative and will continue to be implemented until additional corrective actions as discussed below are implemented.

2. Planned Corrective Actions:

An engineering evaluation has been undertaken to determine additional corrective action necessary to establish the optimum operating pressure range for the SAS.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

SAN ONOFRE NUCLEAR GENERATION STATION
UNIT 2

DOCKET NUMBER
05000361

LER NUMBER
89-007-00

PAGE
6 OF 6

F. SAFETY SIGNIFICANCE OF THE EVENT:

There is no safety significance associated with operating the air receivers at 182 psig since the DGs have been demonstrated to start with an initial receiver pressure lower than 182 psig. At this receiver pressure, the DGs are fully capable of starting, accelerating and accepting load as described in the FSAR Chapter 15 accident scenarios. There are no FSAR accident scenarios which rely upon 5 consecutive DG starts.

G. ADDITIONAL INFORMATION:

1. Component Failure Information:

None.

2. Previous LERs for Similar Events:

There have been no previous LERs on the Diesel Generator Air Start System.

3. Results of NPRDS Search:

Not applicable.