Southern California Edison Company

SAN ONOFRE NUCLEAR GENERATING STATION

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February 16, 1993

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

Subject: Docket No. 50-362
30-Day Report
Licensee Event Report No. 93-001
San Onofre Nuclear Generating Station, Unit 3

Pursuant to 10 CFR 50.73(d), this submittal provides the required 30-day written Licensee Event Report (LER) for an occurrence involving an automatic reactor trip. Neither the health nor the safety of plant personnel or the public was affected by this occurrence.

If you require any additional information, please so advise

Sincerely,

R W Krieger

Enclosure: LER No. 93-001

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)

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LICENSEE EVENT REPORT (LER)

Facility Name (1)	Docket Number (2)	Page (3)
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Title (4)

AUTOMATIC TURBINE/REACTOR TRIP DUE TO MAIN GENERATOR STATOR GROUND PROTECTION ACTUATION CAUSED BY WATER INTRUSION

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)
										NONE	0 5 0 0 0
0 1	1 6	9 3	9 3	-	0 0 1	- 0 0	0 2	1 6	9 3		0 5 0 0 0

OPERATING MODE (9): 1

POWER LEVEL (10): 7 5

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)

___ 20.402(b)	___ 20.405(c)	X 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 Abstract below and in text)
___ 20.405(a)(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)	

LICENSEE CONTACT FOR THIS LER (12)

Name	TELEPHONE NUMBER
R. W. Krieger, Station Manager	AREA CODE 7 1 4 — 3 6 8 - 6 2 5 5

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)	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) (16)

On January 16, 1993, Unit 3 was operating at 75% power with a heavy rain storm occurring. At 1641, the Main Generator tripped on a stator ground protection signal, causing a turbine/reactor trip. The plant was stabilized in Mode 3 at normal temperature and pressure at approximately 1715.

Rain water leaked down from the turbine deck into the main generator terminal enclosure, which contains the transition from the main generator conductors to the isophase bus. The water accumulated on some insulating material and provided a low resistance path from the exposed B phase conductor to ground, actuating a Main Generator/Main Turbine trip signal.

Additional sealing was provided for the Main Generator terminal enclosure to minimize the possibility of rain water intrusion, and the insulating material was replaced. SCE will evaluate whether additional measures can be taken to minimize the possibility of rain water intrusion into the Main Generator components.

There is no safety significance to this event since all Reactor Protection System components operated as designed.

Plant: San Onofre Nuclear Generating Station
Unit: Three
Reactor Vendor: Combustion Engineering
Event Date: 01-16-93
Time: 1641

A. CONDITIONS AT TIME OF THE EVENT:

Mode: 1, Power Operation (75% Power)

B. BACKGROUND INFORMATION:

1. Main Generator:

The Main Generator [TB, GEN] at San Onofre is located on the turbine deck which is not an enclosed structure. The Main Generator is protected by relaying devices [RLY] designed to detect abnormal conditions, including stator grounds. The stator ground trip circuit protects the generator against a ground on the stator or on equipment connected to any of the stator phases (e.g., generator terminals, which are located in a terminal enclosure below the Main Generator). Upon sensing a ground, a stator ground protection signal is initiated to trip the Main Generator and the Main Turbine [TRB].

The Main Generator terminal enclosure is fabricated from aluminum and fiber board and is bolted between the underside of the Main Generator and the top of the Isophase Bus [EA, IPBU]. The enclosure contains six terminal bushings (one for each phase and three connected to the neutral ground). The bushings connect each phase of the Main Generator stator windings to the respective output conductors of the Isophase Bus.

The Isophase Bus conducts the power produced by the Main Generator to the main and unit auxiliary transformers [XFMR]. The transition from the Main Generator output conductors to the isophase bus is contained within the Main Generator terminal enclosure.

2. Reactor Protection System (RPS) [JC]:

When above 55% reactor power, a Main Turbine trip causes the RPS to initiate a Loss of Load signal to trip the reactor [AC].

3. Main Feedwater Pump (MFWP) [SJ, P] Speed Control [JK]:

Following a reactor trip, MFWP speed automatically slows to a minimum speed setting. This setting is intended to maintain MFWP discharge pressure higher than expected steam generator (SG) [SG] pressure, thereby maintaining flow to the SG's.

C. DESCRIPTION OF THE EVENT:

1. Event:

On January 16, 1993, Unit 3 was operating at 75% power with a heavy rain storm occurring. At 1641, the Main Generator tripped on a stator ground protection signal, causing a turbine/reactor trip. The plant was stabilized in Mode 3 at normal temperature and pressure at approximately 1715.

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

None

3. Sequence of Events:

TIME	ACTION
1641	Main Generator stator ground protection signal caused a turbine/reactor trip.
1715	Plant conditions were stabilized in Mode 3.

4. Method of Discovery:

Control room alarms and indications alerted the control room operators to the turbine/reactor trip.

5. Personnel Actions and Analysis of Actions:

Control room operators responded properly to the reactor trip, implementing normal post-trip procedures to stabilize the plant in Mode 3.

6. Safety System Responses:

The RPS components actuated as required by design.

D. CAUSE OF THE EVENT:

1. Immediate Cause:

A Main Generator stator ground protection signal caused a Main Generator/Main Turbine trip. The turbine trip caused a reactor trip on a loss of load signal.

2. Root Cause:

An inspection of the Unit 3 main generator terminal enclosure was performed. This enclosure contains the transition from the main generator conductor to the isophase bus. Rain water (the site received an unusually high amount of rainfall combined with high winds prior to the trip) leaked down from the turbine deck through openings into this enclosure. The water accumulated on

some insulating material and provided a low resistance path from the exposed B phase conductor to ground. This resulted in phase B to ground current being detected by the stator ground relay, actuating a Main Generator/Main Turbine trip signal.

E. CORRECTIVE ACTIONS:

1. Corrective Actions Taken:

Since the turbine building is open to the elements and due to the configuration of the main generator to isophase bus housing, it is not feasible to provide absolute protection against wind driven water intrusion. However, additional sealing was provided for the Main Generator terminal enclosure to minimize the possibility of rain water intrusion, and the insulating material was replaced. During the subsequent plant recovery, the Main Generator was monitored to ensure acceptable performance.

2. Planned Corrective Actions:

SCE will evaluate whether additional measures can be taken to minimize the possibility of rain water intrusion into Main Generator components.

F. SAFETY SIGNIFICANCE OF THE EVENT:

There is no safety significance to this event since all RPS components operated as designed.

G. ADDITIONAL INFORMATION:

1. Component Failure Information:

Not applicable

2. Previous LERs for Similar Events:

None

3. MFWP Response:

During the post trip response, MFWP minimum speed setting was such that MFWP discharge pressure was below SG pressure, causing SG levels to decrease. Control room operators (utility, licensed) properly took manual control of MFWP speed to maintain SG levels. The Main Feed Water Pump minimum speed settings were adjusted. During the subsequent plant recovery, the Main Feed Water Pump speed was monitored to ensure acceptable performance. SCE will evaluate whether additional measures should be taken to minimize the possibility of low MFWP speed during post trip conditions.