Southern California Edison Company
SAN ONOFRE NUCLEAR GENERATING STATION
P. O. BOX 128
SAN CLEMENTE, CALIFORNIA 92674-0128

R. W. KRIEGER
STATION MANAGER

TELEPHONE
(714) 368-6255

June 15, 1992

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

Subject: Docket No. 50-362
30-Day Report
Licensee Event Report No. 92-003
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 of San Onofre Nuclear Generating Station, Unit 3. 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,

RWKrieger

Enclosure: LER No. 92.003

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)
SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 3	0 5 0 0 0 3 6 2	1 of 0 5

Title (4)

AUTOMATIC UNIT 3 REACTOR TRIP DUE TO FAILED REACTOR COOLANT PUMP MOTOR SURGE CAPACITOR

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 5	1 5	9 2	9 2	0 1 3	0 0	0 6	1 5	9 2		0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)					
POWER LEVEL (10)	1 0 0	___ 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 AREA CODE
R. W. Krieger, Station Manager	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
X	E A	C A P	W 1 2 0	Y					

SUPPLEMENTAL REPORT EXPECTED (14)		Expected Submission Date (15)	Month	Day	Year
___ Yes (If yes, complete EXPECTED SUBMISSION DATE)	XX NO				

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

At 1006 on May 15, 1992, with Unit 3 at 100% power, reactor coolant pump (RCP) 3P003 tripped, causing an automatic reactor trip on a low departure from nucleate boiling ratio (DNBR) signal. The plant was stabilized in Mode 3 at approximately 1020. Emergency feedwater actuation signals (EFAS) were generated for both steam generators (SGs) due to the expected decrease in SG level following the trip. There is no safety significance to this event since all reactor protection system and EFAS components actuated as designed.

A short circuit failure of the RCP 3P003 motor phase "C" surge protection capacitor occurred due to long term, vibration-induced abrasion damage to the mylar plastic insulation within the capacitor assembly.

The RCP motor preventive maintenance program will be modified to include periodic replacement of the capacitors. The surge capacitors for the Unit 2 RCPs will be replaced during the next outage of sufficient duration.

Plant: San Onofre Nuclear Generating Station
Unit: Three
Reactor Vendor: Combustion Engineering
Event Date: 05-15-92
Time: 1006

A. CONDITIONS AT TIME OF THE EVENT:

Mode: 1, Power Operation, 100% reactor power

B. BACKGROUND INFORMATION:

1. Reactor Coolant Pumps (RCPs) [P]:

Four RCPs are provided to circulate coolant through the reactor coolant system (RCS) [AB]. Each RCP motor is provided with a set of surge capacitors [CAP] (one for each motor winding phase) to prevent damage to the RCP motor windings during voltage transients. A short circuit across one (or more) of these capacitors would result in a trip of the RCP due to a sensed neutral differential overcurrent condition. The RCPs are not required to operate to mitigate the consequences of any design basis accident; therefore, the RCP motor surge capacitors are non-safety related equipment.

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

The core protection calculators (CPCs), which are part of the RPS, calculate departure from nucleate boiling ratio (DNBR) based on calculated reactor power and RCS flow. RCS flow is calculated based on RCP speed. A trip of an RCP would result in the CPCs generating a reactor trip signal on low DNBR.

3. Feedwater Control System (FWCS) [JB]:

The FWCS is the non-safety related control system that automatically maintains steam generator (SG) [SG] levels during power operation. In addition, following a reactor trip, the FWCS generates a reactor tripped override (RTO) signal to minimize plant cooldown and recover SG levels. An RTO signal causes: 1) the two main feedwater pumps (MFPs) [SJ,P] to decrease speed from approximately 4700 rpm to 3600 rpm, 2) the two main feedwater regulating valves (MFRVs) [FCV] to close, and 3) the two main feedwater regulating bypass valves (MFBVs) [FCV] to reposition from fully open to approximately 50 percent open.

Following a reactor trip from 100% power, SG level normally decreases below the emergency feedwater actuation system (EFAS) actuation setpoint, initiating the auxiliary feedwater system (AFWS). The AFWS is designed to provide all of the feedwater requirements, if necessary due to loss of main feedwater, for decay heat removal following a reactor trip.

4. MFP High Discharge Pressure Trip:

Both MFPs will automatically trip if the MFP common discharge header pressure reaches 1500 psig. The normal discharge header pressure during full power operation is approximately 1050 psig. Following a reactor trip from 100% power, the peak MFP discharge header pressure normally increases to a range of approximately 1150 to 1200 psig.

C. DESCRIPTION OF THE EVENT:

1. Event:

At 1006 on May 15, 1992, with Unit 3 at 100% power, RCP 3P003 tripped, causing an automatic reactor trip on low DNBR. The plant was stabilized in Mode 3 by approximately 1020.

EFAS signals were generated for both SGs due to the expected decrease in SG level following the trip. All AFWS components actuated as designed.

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

None.

3. Sequence of Events:

TIME	ACTION
1006	Automatic reactor trip occurred.
~1020	Plant conditions were stabilized.

4. Method of Discovery:

Control room alarms and indications alerted the control room operators (utility, licensed) to the RCP 3P003 trip and the 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.

Control room operators also properly verified correct system response to the EFAS signals.

6. Safety System Responses:

The RPS and EFAS (AFWS) components actuated as designed.

D. CAUSE OF THE EVENT:

1. Immediate Cause:

RCP 3P003 tripped due to phase "C" differential relay operation on the RCP supply breaker. This caused a reactor trip signal to be generated by the CPCs on low DNBR.

2. Root Cause:

A short circuit failure of the RCP 3P003 motor phase "C" surge protection capacitor occurred due to long term vibration-induced abrasion damage to the mylar plastic insulation within the capacitor assembly. The vibration was a result of normal operation of 3P003. The surge capacitors in the other Unit 3 RCPs were found to be degraded as well, although not to the extent of the 3P003 motor phase "C" capacitor.

The capacitors had been installed during initial plant operation in the early 1980's. A periodic inspection of the capacitors was accomplished on a refueling interval in accordance with the RCP motor vendor's service manual. However, this inspection was ineffective in identifying incipient failure because the inspection was for an oil-filled capacitor rather than the dry type capacitor actually installed.

SCE has identified that under normal usage conditions, the recommended in-service life for the RCP motor surge capacitors is four years. Although available as early as 1987, this information was not included in the RCP motor vendor manual.

E. CORRECTIVE ACTIONS:

1. Corrective Actions Taken:

a. The surge capacitors for all four Unit 3 RCPs were replaced with in-kind parts. The capacitors were subjected to the overvoltage test and capacitance measurement prior to their installation.

b. The RCP motor vendor manual has been changed to include an appropriate periodic examination, including an overvoltage test and capacitance measurement, of the surge capacitors.

2. Planned Corrective Actions:

a. The RCP motor preventive maintenance program will be modified to include an appropriate periodic examination of the surge capacitors.

b. The surge capacitors will be periodically replaced.

c. The surge capacitors for the Unit 2 RCPs will be replaced during the next outage of sufficient duration.

F. SAFETY SIGNIFICANCE OF THE EVENT:

There is minimal safety significance to this event since all RPS and EFAS (AFWS) components actuated in accordance with design.

G. ADDITIONAL INFORMATION:

1. Component Failure Information:

The RCP surge protection capacitor is a mylar plastic film, dry type capacitor, Westinghouse part number 633A918A01B.

2. Previous LERs for Similar Events:

None.

3. Trip of MFPs Following Reactor Trip

Following the Unit 3 reactor trip, the FWCS properly generated an RTO signal. Contrary to the expected response, however, both MFPs tripped on high combined MFP discharge pressure. This condition was determined to have been caused by a slow response of the MFPs to the RTO signal. Specifically, the decrease in speed of the MFPs following the reactor trip was not sufficient to prevent an increase in discharge pressure to the trip setpoint as a result of the closing of the MFRVs (and partial closing of the MFBVs).

FWCS dynamic testing, which would normally have been performed following the return to service from the recently completed refueling outage, would most likely have identified the slow response of the MFP's. This testing could not be performed upon return to service due to MFP speed oscillation problems noted during the startup. The speed oscillations were being investigated and resolved when the trip occurred. Dynamic testing has now been completed, and appropriate adjustments have been made to assure a proper MFP response to an RTO signal. No further corrective actions are planned.