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FACIL:50-362 San Onofre Nuclear Station, Unit 3, Southern Californ 05000362
AUTH.NAME AUTHOR AFFILIATION
MORGAN,H.E. Southern California Edison Co.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 88-002-00:on 880219,spurious ESF actuation occurred during surveillance testing.

W/8 ltr.

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TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

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EXTERNAL:	EG&G GROH,M	4	4	FORD BLDG HOY,A	1	1
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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 6

Title (4)
SPURIOUS ENGINEERED SAFETY FEATURES (ESF) ACTUATION DURING SURVEILLANCE TESTING AND SUBSEQUENT MANUAL REACTOR TRIP

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 2	1 9	8 8	8 8	--- 0 0 2 ---	0 0	0 3	1 8	8 8	NONE	0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	1
POWER LEVEL (10)	1 0 0

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
H. E. Morgan, Station Manager	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	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)	Expected Submission Date (15)	Month	Day	Year
X Yes (If yes, complete EXPECTED SUBMISSION DATE) ___ NO		0 8	3 1	8 8

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

On February 19, 1988 at 1300, with Unit 3 in Mode 1 at 100% power, Trains "A" and "B" of both the Safety Injection Actuation System (SIAS) and Containment Cooling Actuation System (CCAS) were actuated during performance of 31-day Engineered Safety Features Actuation System (ESFAS) matrix logic relay testing. All components actuated as designed. There was no High Pressure Safety Injection System (HPSI) flow into the Reactor Coolant System (RCS) since RCS pressure remained above the shutoff head of the HPSI pumps.

At 1304, the reactor was manually tripped in accordance with procedures. As the result of steam generator water level "shrink" following the reactor trip, the Emergency Feedwater Actuation Systems (EFAS) 1 and 2 initiated feed water flow to the steam generators. All safety systems performed as required and operators satisfactorily completed standard post-trip action and stabilized the unit in Mode 3.

To date, SCE has been unable to positively determine the cause of this ESF actuation, however, it is suspected that a push button switch is responsible. Reliability testing of the suspect push button switch (which has been replaced) is being conducted and further testing of the involved ESFAS and its testing circuitry is being planned for the refueling outage which begins in April 1988. Comprehensive testing and investigation to date have not detected any problems in the testing circuitry. The results of these ongoing investigations and the resulting corrective action will be reported in a revision to this report.

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PDR ADOCK 05000362
S DCD

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TITLE: Spurious Engineered Safety Features (ESF) Actuation during Surveillance Testing and Subsequent Manual Reactor Trip

Plant: San Onofre Nuclear Generating Station
Unit: Three
Reactor Vendor: Combustion Engineering
Event Date: February 19, 1988
Time: 1300

A. CONDITIONS AT TIME OF THE EVENT:

Mode: 1, Power Operation

B. BACKGROUND INFORMATION:

The Engineered Safety Features Actuation System (ESFAS) (EIIS System Code JE) monitors selected plant parameters and, when necessary, automatically actuates those systems necessary to mitigate the consequences of a postulated accident when plant conditions have exceeded normal operational limits.

The ESFAS design includes testing circuits which allow on line testing in order to insure that the ESFAS remains capable of performing its design function without actuating the associated ESF system(s). This periodic testing is performed at least every 31 days pursuant to Technical Specification Surveillance Requirement 4.3.2.1.

The ESFAS circuitry is designed to preclude any single failure within the logic and logic actuation circuitry from spuriously initiating an ESFAS function during normal operation. During testing, however, ESFAS is susceptible to spurious actuation by the following types of failures:

1. A failure in any other measured channel, ESFAS logic matrix or actuation channel of the same function being tested; or

2. A failure in the testing circuitry being used for the test.

C. DESCRIPTION OF THE EVENT:

1. Event:

On February 19, 1988 at 1300, with Unit 3 in Mode 1 at 100% power, Trains "A" and "B" of both the Safety Injection Actuation System (SIAS) and Containment Cooling Actuation System (CCAS) actuated during performance of the 31-day ESFAS matrix testing. All components actuated as designed. There was no High Pressures Safety Injection System (HPSI) (EIIS System Code BQ) flow into the Reactor Coolant System (RCS) (EIIS System Code AB) since RCS pressure remained above the shutoff head of the HPSI pumps.

At 1304, the reactor was manually tripped in accordance with procedures. As a result of steam generator water level "shrink" following the reactor trip, the Emergency Feedwater Actuation Systems (EFAS) (EIIS System Code BA) 1 and 2 initiated feedwater flow to the steam generators. All safety systems performed as required and operators satisfactorily completed standard post-trip action and stabilized the unit in Mode 3.

On February 22, 1988 at 0230, following completion of the preliminary investigations discussed in detail below and satisfactory completion of the ESFAS surveillance tests, Unit 3 entered Mode 1.

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

None.

3. Sequence of Events.

TIME	ACTION
2/19/88	
1300	SIAS and CCAS actuates during surveillance testing.
1304	Operators manually trip the reactor. EFAS channels 1 and 2 actuate on low steam generator water levels initiating feed water flow to the steam generators.
1312	Operators complete the standard post trip action procedure, determine that the SIAS/CCAS actuation was spurious and begin reactor trip recovery.
2/22/88	
0230	Unit 3 enters Mode 1.

4. Method of Discovery:

Control room annunciation of the systems actuated by ESFAS.

5. Personnel Actions and Analysis of Actions:

Operators promptly verified proper operation of actuated systems and components. In accordance with procedures, operators verified that plant operating parameters were normal and that the ESF actuations were spurious, and then tripped the reactor.

6. Safety System Responses:

All safety and protective systems actuated by the SIAS, CCAS, RPS and EFAS operated in accordance with their design.

D. CAUSE OF THE EVENT:

1. Immediate Cause:

Spurious actuation of the ESFAS logic matrix "AB" SIAS and CCAS circuitry occurred during surveillance testing.

2. Root Cause:

As discussed in the background section of this report, ESFAS is susceptible to spurious actuation during testing. The circumstances of this event suggest the cause of the spurious actuation to be a momentary power interruption to the matrix logic actuation relay coils. Such actuations can result from certain types of failures in either the ESFAS circuitry or the ESFAS testing circuitry.

In order to determine the root cause of this event, the following preliminary investigations were completed:

a. The test circuitry, test power supply and the matrix actuation relay hold coil connections were inspected and tested for loose connections. None were found.

b. The matrix test power supply output tests indicated that its AC voltage was within specification.

c. The two power supplies for the involved matrix logic relays were tested. One power supply was found to be within specification. The other power supply was found to have a slow 0.2 volt oscillation in its output. This voltage oscillation is not sufficient to have caused the actuation.

d. The various switches in the test circuitry were tested and found to operate properly.

e. Inspection and testing of the AC power sources, switches and connections to the above power supplies revealed nothing abnormal.

Due to the fact that testing of ESFAS logic matrix "AB" relays was in progress at the time of the actuation, and as a result of information from another nuclear power plant having a similar ESFAS design, it is suspected that a mechanical and/or electrical mis-operation of the Matrix Relay Hold push button switch may have caused the actuation.

The suspect push button switch has a number of contacts, some of which operate when the button is partially depressed, and others which operate when the button approaches full depression. The primary functions of this contact arrangement are to sequentially: 1) Prevent the matrix from actuating during the tests, and 2) energize the matrix test circuitry while the button is depressed so that the tests may be performed. A defect in switch contact(s), or in their sequencing, could cause a spurious actuation.

This switch was removed and bench tested on-site. The observed contact closure and opening sequence has been determined to be correct within the limits of the tests permitted by on-site resources.

Following instrumentation of the involved matrix test circuitry with recorders, ESFAS surveillance testing was satisfactorily completed. The recorded data indicated normal operation of the test circuitry.

E. CORRECTIVE ACTIONS:

1. Corrective Actions Taken:

The Matrix "AB" Hold push button switch has been replaced. The original switch has been sent to an independent reliability testing laboratory to determine if a switch malfunction caused the event.

2. Planned Corrective Actions:

a. In the event that the above mentioned Matrix Relay Hold push button testing does not conclusively identify a cause for this event, further testing of the ESFAS circuitry which could have caused this spurious actuation is being planned. This testing will be conducted before the end of the next refueling outage which is currently scheduled to begin in April 1988.

b. In the event that the Matrix Relay Hold switches are determined to have caused or contributed to this event:

1) The five remaining Unit 3 Matrix Relay Hold switches will be replaced before the end of the next refueling outage; and,

2) The six Unit 2 Matrix Relay Hold push button switches will be replaced following receipt of additional switches.

c. As described above, SCE's investigation into the cause of this spurious actuation is continuing and will be reported, along with the corrective action taken, in a supplement to this LER.

F. SAFETY SIGNIFICANCE OF THE EVENT:

Since all safety systems performed as required, there was no impact on the health and safety of plant personnel or the public as a result of this event.

G. ADDITIONAL INFORMATION:

Previous LERs on Similar Events:

1. LER 86-19 (Docket number 50-361) reported a main steam and feedwater isolation and subsequent reactor trip during ESF surveillance testing due to a pitted contact on an actuation relay. High resistance in the contacts resulted in actuation of the Main Steam Isolation System.

2. LER 86-22 (Docket number 50-361) reported a Main Steam Isolation System actuation during ESFAS testing due to failure of one of the two actuation relay power supplies. Closure of the main steam and feedwater isolation valves resulted in a reactor trip.

Southern California Edison Company

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STATION MANAGER

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March 18, 1988

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

Subject: Docket No. 50-362
30-Day Report
Licensee Event Report No. 88-002
San Onofre Nuclear Generating Station, Unit 3

Pursuant to 10 CFR 50.73(a)(2)(iv), this submittal provides the required 30-day written licensee Event Report (LER) for an occurrence involving a spurious actuation of the Safety Injection System and Containment Cooling System. Subsequently, the reactor was manually tripped. 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,

HEMorgan

Enclosure: LER No. 88-002

cc: F. R. Huey (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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