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SUBJECT: LER 88-032-00:on 881202,TGIS Train A spurious actuation due to failed ammonia analyzer oscillator circuit board.

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LICENSEE EVENT REPORT (LER)

Facility Name (1)	Docket Number (2)	Page (3)
SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 2	0 5 0 0 0 3 6 1	1 of 0 5

Title (4)

TOXIC GAS ISOLATION SYSTEM TRAIN A SPURIOUS ACTUATION DUE TO FAILED AMMONIA ANALYZER OSCILLATOR CIRCUIT BOARD

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)
1 2	0 2	8 8	8 8	---	0 3 2	--- 0 0	0 1	0 3	8 9	SONGS, UNIT 3	0 5 0 0 0 3 6 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
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
X	V I	A I	B 1 3 5	N					

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 1007 on 12/2/88, with Units 2 and 3 at 100% power, a Toxic Gas Isolation System (TGIS) Train A spurious actuation occurred. The actuation was verified to be spurious by observation of a failed low indication of the TGIS Train A ammonia channel. All TGIS Train A components were verified to have actuated as required.

A failed ammonia analyzer oscillator circuit board resulted in the downscale failure of the analyzer. This, in turn, caused a high alarm and actuation through capacitive coupling. The proximity of the alarm relays and contacts to the detector circuitry provided for the capacitive coupling.

The oscillator circuit board was replaced, and TGIS Train A was returned to service at 0930 on 12/4/88. The alarm relays will be moved away from the detector circuitry such that capacitive coupling will be minimized. A voltage suppressing circuit will be added, if necessary, to the alarm contacts to further minimize any additional capacitive coupling. Appropriate corrective actions will be implemented as necessary from the results of the analysis of the oscillator circuit board.

There is no safety significance to this event since ammonia levels remained normal and all components associated with TGIS Train A actuated as required.

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Plant: San Onofre Nuclear Generating Station
Unit: Two
Reactor Vendor: Combustion Engineering
Event Date: 12/02/88
Time: 1007

A. CONDITIONS AT TIME OF THE EVENT:

Mode: 1, Power Operation

B. BACKGROUND INFORMATION:

The Toxic Gas Isolation System (TGIS) and associated Control Room Emergency Air Cleanup System (CREACUS) (EIIS System Code VI) consists of two independent trains of: ammonia, butane, and chlorine analyzers (EIIS Component Code AI); emergency air conditioning (EAC) units (E-418 and E-419) (EIIS Component Code ACU); cabinet area emergency air cooling units (E-423, E-424, E-426, and E-427) (EIIS Component Code ACU); and associated emergency isolation dampers (EIIS Component Code BDMP). Upon receipt of a high signal from one of the analyzers, CREACUS is actuated in the isolation mode; i.e., the common Units 2 and 3 control room is isolated from outside air by closing the isolation dampers, and air is recirculated by the EAC units (which also contain filtration units (EIIS Component Code FLT)), thus providing filtered and cooled air to control room personnel.

Technical Specification 3.3.2 requires that within one hour of the time that both trains of TGIS instrumentation are determined to be inoperable, CREACUS must be initiated and maintained in the isolation mode.

C. DESCRIPTION OF THE EVENT:

1. Event:

At 1007 on 12/2/88, with Units 2 and 3 at 100% power, a TGIS Train A spurious actuation occurred. The actuation was verified to be spurious by observation of a failed low indication of the TGIS Train A ammonia channel. All TGIS Train A components were verified to have actuated as required.

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

Since TGIS Train B was out of service for a routine surveillance when the actuation occurred, CREACUS was operated in the isolation mode until after Train B was returned to service.

3. Sequence of Events:

TIME	DATE	ACTION
1007	12/2	Spurious TGIS Train A actuation occurred. CREACUS actuated in isolation mode.
1411	12/2	TGIS Train B, which had been out of service for a routine surveillance, was returned to service.
1440	12/2	Control Room ventilation lineup returned to normal.
0930	12/4	TGIS Train A returned to service.

4. Method of Discovery:

Control Room alarms and indications alerted the operators of the TGIS actuation.

5. Personnel Actions and Analysis of Actions:

The operators responded properly by verifying: 1) the actuation was spurious by observing the downscale failure of the ammonia channel; and 2) each TGIS Train A component actuated as required. The Control Room ventilation lineup was returned to normal after TGIS B was returned to service.

6. Safety System Responses:

All TGIS Train A components actuated as required.

D. CAUSE OF THE EVENT:

1. Immediate Cause:

A spurious high ammonia gas signal caused the actuation.

2. Intermediate Cause:

A failed oscillator circuit board resulted in the downscale failure of the ammonia analyzer. This, in turn, caused a contact in the low alarm circuit to open (causing the low alarm). The opening of the contact resulted in a high voltage in the relay circuitry, which in turn generated a spurious voltage signal in the detector circuitry due to capacitive coupling. This caused the analyzer signal to spike above the high alarm and actuation setpoint. The opening of a contact in the high alarm circuit also caused the analyzer signal to spike high (combining with the earlier spike) due to capacitive coupling. Although a time delay had been installed in the actuation circuitry, the decay of the signal spike combination was sufficiently long to cause the actuation.

3. Root Cause:

The ammonia analyzers provided to SCE are modified by the vendor to include alarm relays and contacts. It was noted after replacement of the Train A ammonia analyzer in February 1988 that the location of the alarm relays and contacts on the analyzer had been moved by the vendor from the external rear panel of the analyzer to inside a drawer near the detector circuitry. An evaluation that was performed at that time accepted the new configuration. It is now known, however, that the proximity of the alarm relays to the detector circuitry provides for the capacitive coupling mentioned above.

The failed oscillator circuit board has been retained for further analysis. If any significant additional information is identified by this analysis, a supplement to this report will be submitted.

E. CORRECTIVE ACTIONS:

1. Corrective Actions Taken:

The oscillator circuit board was replaced, and TGIS Train A was returned to service at 0930 on 12/4/88.

2. Planned Corrective Actions:

The alarm relays will be moved away from the detector circuitry such that capacitive coupling will be minimized.

A voltage suppressing circuit will be added, if necessary, to the alarm contacts to further minimize any additional capacitive coupling.

Appropriate corrective actions will be implemented as necessary from the results of the analysis of the oscillator circuit board.

F. SAFETY SIGNIFICANCE OF THE EVENT:

There is no safety significance to this event since ammonia levels remained normal and all components associated with TGIS Train A actuated as required.

G. ADDITIONAL INFORMATION:

1. Component Failure Information:

The ammonia analyzer (model no. 865) and oscillator circuit board (P/N 633296) are manufactured by Beckman Instruments, Inc.

2. Previous LERs on Similar Events (Docket No 50-361):

   a. LER 88-023 (8/25/88)

      A spurious TGIS Train B actuation was caused by a false high ammonia gas signal attributed to random electronic noise. The root cause was indeterminate. The corrective action was to extend the time delay in the actuation circuit from 5 sec to 15 sec. This action did not prevent this event (LER 88-032) since the decay of the signal spike combination was sufficiently long to cause the actuation. In addition, the evaluation of the current state of technology to determine if a superior design is available has been completed; the system presently in use will be retained.

   b. LER 88-005 (2/20/88)

      A spurious TGIS Train A actuation was caused by intermittent spiking of the ammonia analyzer, which was attributed to a defective heating element chip. A program is being implemented to perform annual replacements of the ammonia analyzers with new/refurbished analyzers. This program is expected to minimize (but cannot be expected to totally eliminate) actuations due to ammonia analyzer failures.

   c. LER 86-016, 85-047, and 85-043

      These spurious TGIS actuations were caused either by spurious electrical signals in the ammonia channel or by a failure in the ammonia analyzer. Corrective actions for these events are bounded by the above events (a. and b.).

3. Results of NPRDS Search:

   The failures of the ammonia analyzer or its circuit board are not reportable to NPRDS; therefore, no entries were found.

Southern California Edison Company

SAN ONOFRE NUCLEAR GENERATING STATION

P. O. BOX 128

SAN CLEMENTE, CALIFORNIA 92672

H. E. MORGAN
STATION MANAGER

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January 3, 1989

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

Subject: Docket No. 50-361
30-Day Report
Licensee Event Report No. 88-032
San Onofre Nuclear Generating Station, Units 2 and 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 Toxic Gas Isolation System. Since this event involved a system shared between Units 2 and 3, a single report is being submitted in accordance with NUREG-1022. This occurrence had no effect on the health and safety of either plant personnel or the public.

If you require any additional information, please so advise.

Sincerely,

HEMorg

Enclosure: LER No. 88-032

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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