

Southern California Edison Company

SAN ONOFRE NUCLEAR GENERATING STATION

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STATION MANAGER

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July 22, 1991

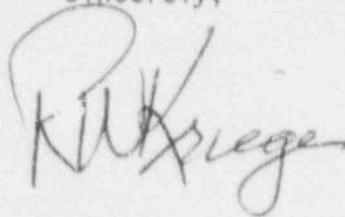
U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: Docket No. 50-361
30-Day Report
Licensee Event Report No. 91-008
San Onofre Nuclear Generating Station, Unit 2

Pursuant to 10 CFR 51.73(d), this submittal provides the required 30-day written Licensee Event Report (LER) for an occurrence involving an actuation of the Units 2 and 3 Toxic Gas Isolation System (TGIS). Since this occurrence involves shared systems, cause, and corrective actions applicable to Units 2 and 3, a single report for Unit 2 is being submitted in accordance with NUREG-1022. 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,



Enclosure: LER No. 91-008

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) SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 2										Docket Number (2) 0 5 0 0 0 3 6 1 1			Page (3) 1 of 6 6	
Title (4) Units 2/3 Spurious Toxic Gas Isolation System (TGIS) Actuation due to Train "A" Ammonia Analyzer Failure														
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 6	2 2	9 1	9 1	0 0 8	0 0	0 7	2 2	9 1	NONE			0 5 0 0 0 3 6 2		
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)											
POWER LEVEL (10) 1 0 0			<div style="display: flex; justify-content: space-between;"> <div> 20.402(b) 20.405(a)(1)(i) 20.405(a)(1)(ii) 20.405(a)(1)(iii) 20.405(a)(1)(iv) 20.405(a)(1)(v) </div> <div> 20.405(c) 50.36(c)(1) 50.36(c)(2) 50.73(a)(2)(i) 50.73(a)(2)(ii) 50.73(a)(2)(iii) </div> <div> X 50.73(a)(2)(iv) 50.73(a)(2)(v) 50.73(a)(2)(vi) 50.73(a)(2)(vii) 50.73(a)(2)(viii) 50.73(a)(2)(ix) </div> <div> 73.71(b) 73.71(c) Other (Specify in Abstract below and in text) </div> </div>											
LICENSEE CONTACT FOR THIS LER (12)														
Name R. W. Krieger, Station Manager										TELEPHONE NUMBER 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 NERDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NERDS					
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 0738 on 6/22/91, with Units 2 and 3 at 100% power, a Toxic Gas Isolation System (TGIS) actuation occurred in response to an apparent high ammonia signal as detected by the train "A" analyzer. All TGIS Train "A" components were verified to have actuated as required. TGIS Train "A" was reset at 1406.

Subsequent investigation by Operations found the TGIS Train "A" ammonia analyzer local indication to be spiking, indicative of an analyzer failure. The spiking was found to be due to erratic rotation of the ammonia analyzer chopper motor, which was later determined to be caused by corrosion of the motor internals.

The ammonia analyzer chopper motor was replaced and the analyzer re-calibrated. The failed chopper motor was sent to an offsite laboratory for failure analysis, which concluded that the observed corrosion of the chopper motor internals occurred prior to installation. The corrosion of the chopper motor internals has been attributed to either: 1) moisture introduced during storage for the five year period since SCE received the motor, or 2) moisture introduced during manufacture of the chopper motor resulting in corrosion, with the latter cause considered more likely. Inspection of other analyzers has shown no evidence of corrosion. TGIS analyzer chopper motors will be inspected for evidence of corrosion prior to installation until compelling evidence exists that the observed corrosion was an isolated occurrence.

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Plant: San Onofre Nuclear Generating Station
 Unit: Two
 Reactor Vendor: Combustion Engineering
 Event Date: 06-22-91
 Time: 0738

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) [VI] consists of two independent trains of: ammonia, butane, and chlorine analyzers [AI], emergency air conditioning units (EAC) [ACU]; cabinet area emergency air cooling units [ACU], and associated emergency isolation dampers [BDMP]. Upon receipt of a high signal from either 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 [FLT]), thus providing filtered and cooled air to control room personnel.

The ammonia analyzers (Figure 1), Beckman Model 865 Infrared Analyzers, operate by producing infrared radiation (heat) from two separate energy sources. The heat radiated from these sources is beamed separately through a chopper which interrupts it at a specified frequency. The beams then pass through two cells; one a sealed reference cell containing air, the other a sample cell containing a continuous flowing air sample. A portion of the infrared radiation is absorbed by the ammonia, with the percent of infrared radiation absorbed being proportional to the ammonia concentration. The two beams cause differential heating of the two sides of the ammonia-filled detector. The resulting pressure difference causes a change in the diaphragm position which results in a capacitance change. This capacitance change, which is proportional to ammonia concentration, is amplified and indicated on a meter.

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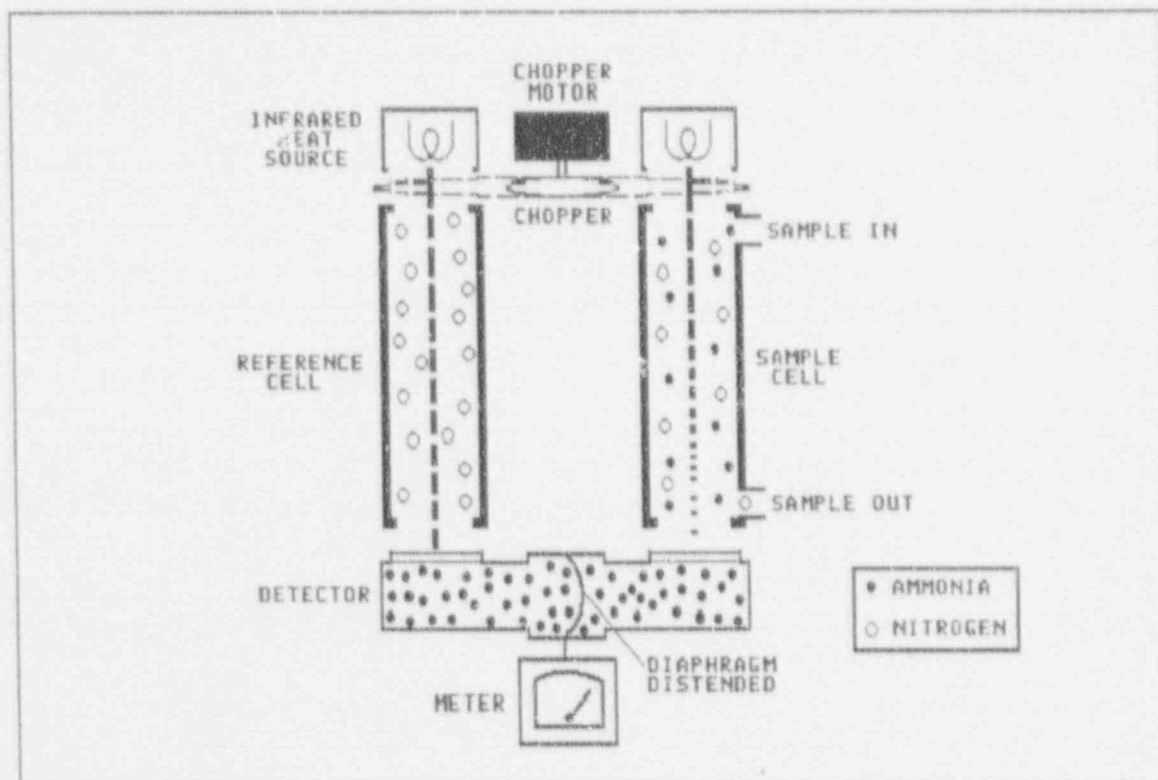


Figure 1 : Functional Diagram of Ammonia Detector

C. DESCRIPTION OF THE EVENT:

1. Event:

At 0738 on 6/22/91, with Units 2 and 3 at 100% power, a TGIS actuation occurred in response to an apparent high ammonia signal as detected by the train "A" analyzer. All TGIS Train "A" components were verified to have actuated as required.

Subsequent investigation by Operations found the TGIS Train "A" ammonia analyzer local indication to be spiking, indicative of an analyzer failure. Operations declared Train "A" inoperable and initiated repair efforts. TGIS Train "A" was subsequently reset at 1406.

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

None.

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3. Sequence of Events:

<u>TIME</u>	<u>ACTION</u>
0738	TGIS Train "A" actuation occurred. Operations verified proper system operation.
1406	TGIS Train "A" actuation reset.

4. Method of Discovery:

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

5. Personnel Actions and Analysis of Actions:

Operators (licensed, utility) responded to the actuation by: 1) verifying that each TGIS Train "A" component actuated as required and that CREACUS operated as designed, 2) verifying that TGIS Train "B" had not actuated, and 3) verifying control room and external ammonia gas levels were normal prior to resetting TGIS train "A" and returning the control room ventilation lineup to normal.

6. Safety System Responses:

Train "A" CREACUS started and operated as designed.

D. CAUSE OF THE EVENT:

1. Immediate Cause:

The TGIS Train "A" actuation was due to spiking of the ammonia analyzer.

2. Intermediate Cause:

The spiking resulted from erratic rotation of the ammonia analyzer chopper motor [MTR] due to corrosion of the motor internals. This erratic rotation occurred only intermittently, as the motor operated normally following the actuation. During bench and surveillance testing prior to installation there was no evidence of spiking or erratic motor operation, despite the apparent existence of the corrosion.

3. Root Cause:

The failed ammonia analyzer chopper motor, which had been replaced along with the analyzer three months before its failure, was sent to an offsite laboratory for failure analysis. This analysis concluded

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that the corrosion of the motor internals occurred prior to installation of the chopper motor.

The cause of the corrosion of the chopper motor internals has been attributed to either: 1) moisture introduced during storage for the five year period since SCE received the motor, or 2) moisture introduced during manufacture of the chopper motor resulting in the observed corrosion. SCE examined three chopper motors that had been stored under similar conditions and found no evidence of corrosion. In addition, SCE has not experienced any similar problems with chopper motors. It has therefore been concluded that receipt of the chopper motor with moisture introduced is the more likely cause of the observed corrosion. The supplier of the analyzer has been contacted, but has been unable to identify problems of a similar nature.

E. CORRECTIVE ACTIONS:

1. Corrective Actions Taken:

- a. The ammonia analyzer chopper motor was replaced and the analyzer re-calibrated.
- b. As noted above, the failed ammonia analyzer chopper motor was sent to an offsite laboratory for failure analysis, which established that the corrosion of the motor internals occurred prior to installation of the chopper motor.

2. Planned Corrective Actions:

TGIS analyzer chopper motors will be inspected for evidence of corrosion prior to installation until compelling evidence exists that the observed corrosion was an isolated occurrence.

F. SAFETY SIGNIFICANCE OF THE EVENT:

There is no safety significance to this event since all TGIS and CREACUS components operated as designed.

G. ADDITIONAL INFORMATION:

1. Component Failure Information:

The ammonia analyzer (Model No. 865) was manufactured by Beckman Instruments, Inc. The failed chopper motor (Part No. 636088) was manufactured by the North American Philips Control Corporation.

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2. Previous LERs for Similar Events:

LER 2-86-016 (Docket Number 50-361) reported a spurious TGIS actuation from a spiking ammonia channel due to a spurious signal in the Train "A" ammonia analyzer.

LER 2-86-016, Revision 1 (Docket Number 50-361), reported a spurious TGIS actuation due to a spiking ammonia channel signal caused by a failed integrated circuit chip.

LER 2-88-023 (Docket Number 50-361) reported a TGIS actuation due to a spiking ammonia channel signal caused by random electronic noise.

The corrective actions taken for the above LERs could not have prevented this event from occurring.

3. Results of NPRDS Search:

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