

# ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

## REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8912130027 DOC.DATE: 89/12/05 NOTARIZED: NO DOCKET #  
 FACIL:50-361 San Onofre Nuclear Station, Unit 2, Southern Californ 05000361  
 AUTH.NAME AUTHOR AFFILIATION  
 MORGAN,H.E. Southern California Edison Co.  
 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 88-007-01:on 880223,containment purge isolation sys  
 iodine channels inoperable due to detector nonlinearity.  
 W/8 ltr.

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*Southern California Edison Company*

SAN ONOFRE NUCLEAR GENERATING STATION

P. O. BOX 128

SAN CLEMENTE, CALIFORNIA 92672

H. E. MORGAN  
STATION MANAGER

December 5, 1989

TELEPHONE  
(714) 368-6241

U. S. Nuclear Regulatory Commission  
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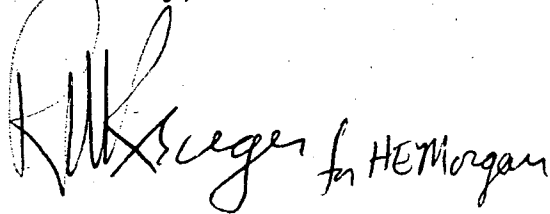
Subject: Docket No. 50-361  
Supplemental Report  
Licensee Event Report No. 88-007, Revision 1  
San Onofre Nuclear Generating Station, Units 2 and 3

Reference: Letter, H. E. Morgan (SCE) to USNRC Document Control Desk, dated  
January 9, 1987

The referenced letter provided the required 30-day Licensee Event Report (LER) pursuant to 10 CFR 50.73, for conditions involving the Units 2 and 3 Containment Purge Isolation Systems. This submittal provides additional information concerning the condition, causes and corrective actions. 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,

A handwritten signature in dark ink, appearing to read "H. E. Morgan", is written over the word "Sincerely,". The signature is stylized with a large, looped initial "H" and a trailing "Morgan".

Enclosure: LER No. 88-007, Revision 1

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 2										0   5   0   0   0   3   6   1			1   of   0   5										
Title (4)																							
CONTAINMENT PURGE ISOLATION SYSTEM IODINE CHANNELS INOPERABLE DUE TO DETECTOR NONLINEARITY																							
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	2	3	8	8	---	0	0	7	---	0	1	1	2	0	5	8	9	SONGS, UNIT 3		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 //////////////////// //////////////////// //////////////////// ////////////////////			<input type="checkbox"/> 20.402(b)				<input type="checkbox"/> 20.405(c)				<input type="checkbox"/> 50.73(a)(2)(iv)				<input type="checkbox"/> 73.71(b)								
			<input type="checkbox"/> 20.405(a)(1)(i)				<input type="checkbox"/> 50.36(c)(1)				<input type="checkbox"/> 50.73(a)(2)(v)				<input type="checkbox"/> 73.71(c)								
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			<input type="checkbox"/> 20.405(a)(1)(iii)				<input checked="" type="checkbox"/> 50.73(a)(2)(i)				<input type="checkbox"/> 50.73(a)(2)(viii)(A)				Abstract below and in text)								
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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	MANUFAC-TURER	REPORTABLE TO NFRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NFRDS														
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines). (16)																							

On 2/23/88, with both Units 2 and 3 at 100% power, during a review of isotopic calibration results, it was determined that the iodine channels of the Containment Purge Isolation System (CPIS) radiation monitors did not meet the linearity specification in the upper portion of their range. This non-linearity may render the iodine channel incapable of initiating an actuation signal. Since this condition has existed during periods when Unit 2 or Unit 3 was in Mode 6, the units may have operated contrary to Technical Specification (TS) 3.3.2 whenever containment purge has been in progress while in Mode 6. The iodine channels were declared inoperable and containment purge while in Mode 6 was prohibited until the iodine channels were returned to operable status.

The non-linearity resulted from an inadequate detector design. Corrective actions include: (1) Converting the detectors to gross counters to compensate for the effect of the non-linearity, and (2) a TS change will be proposed which would remove the CPIS iodine monitors from the TSs since they are not required to satisfy the CPIS safety function.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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Plant: San Onofre Nuclear Generating Station  
Unit: Two  
Reactor Vendor: Combustion Engineering  
Event Date: February 23, 1988

A. CONDITIONS AT TIME OF THE EVENT:

Mode: 1, Power Operation

B. BACKGROUND INFORMATION:

The Containment Purge System [VA] consists of two trains of supply and exhaust fan units [FAN] and valved pathways to supply filtered air to the Containment Building and/or exhaust Containment atmosphere to the Containment Purge Stack. A Containment Purge Isolation System (CPIS) actuation stops the fan units and closes the purge isolation valves [ISV] for the associated train. The CPIS can be actuated by a remote manual push button or by either high radiation or instrument failure sensed by the associated area radiation monitors or by process radiation monitors (RT-7804 or RT-7807) [IL]. Each of the process radiation monitors have detector channels which measure the quantities of radioactive particulate, noble gas and iodine in the containment atmosphere. The iodine detector channels are gamma scintillator single channel analyzers with a window set to count only pulses from the iodine-131 peak (i.e., 364+/-36.4 keV). The range of the iodine channels is from 1E+0 to 1E+7 counts-per-minute (cpm). Gammas with an energy which are outside of this range are not counted.

Technical Specification (TS) 3.3.2, "Engineered Safety Feature Actuation System," requires that at least one of the CPIS iodine monitors be maintained operable in Mode 6 while any containment purge penetration is open to the atmosphere. The CPIS iodine monitors are subject to electronic and isotopic calibration at refueling intervals pursuant to TS Table 4.3-2, Engineered Safety Feature Actuation System Instrumentation Surveillance Requirements." The isotopic calibration is performed at three points (approximately 6E+3, 8E+4 and 5E+5 cpm).

C. DESCRIPTION OF THE EVENT:

1. Event:

On 2/23/88, with both Units 2 and 3 at 100% power, during a review of isotopic calibration results, it was determined that the iodine channels of the CPIS radiation monitors did not meet the linearity specification in the upper portion of their counting range. This non-linearity may render the iodine channel incapable of initiating an actuation signal. Since this condition has existed during periods when Unit 2 or Unit 3 was in Mode 6, the units may have operated contrary

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to Technical Specification 3.3.2 whenever containment purge has been in progress while in Mode 6.

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

None.

3. Method of Discovery:

In an effort to improve the existing isotopic calibration program, high activity radioactive sources were rented in order to verify linearity of the iodine monitors in the upper part of their range. Following receipt of these sources in early 1988, calibration testing in the upper decades of the monitors revealed the above discussed non-linearity.

D. CAUSE OF THE EVENT:

1. Immediate Cause:

The detector design was inadequate. As a result, when the count-rate output of an iodine channel's pre-amplifier increases above  $1E+5$  cpm, the spectrometer window (through which the iodine gammas in the iodine peak are counted) shifted such that iodine counts are lost. The shift of the counting window away from iodine peak increases as the count-rate increases above  $1E+5$  cpm. As a result, in the upper limits of the monitors' range, the shift could result in a down scale failure.

During initial start-up-testing, the CPIS iodine channels were electrically and electronically tested, and electronically calibrated. An isotopic calibration was then performed at approximately  $4E+3$  and  $4E+5$  cpm which indicated that the iodine channels satisfied the specification linearity requirements at these two points. It is believed that the linearity of these channels were not checked at higher count-rates during start-up testing because of reliance on vendor conformance with the linearity requirements of the purchase specification.

2. Root Causes:

The vendor of the CPIS iodine monitors did not meet the specification requirement for supplying iodine monitors with a linear counting range which extends over seven decades of count-rate.

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E. CORRECTIVE ACTIONS:

1. Corrective Actions Taken:

- a. As an interim corrective action during Mode 6 operations, the CPIS iodine monitors are converted to gross counters which monitor iodine collected on silver zeolite iodine filters. As gross counters, the channel's spectrometer window is wide open. With the counting window wide open (i.e, not restricted to a narrow energy band around 364 KeV), the window is not capable of being shifted out of the counting spectrum. As a result, all incipient gamma particles are conservatively counted and, thus, the alarm and actuation functional requirements of the CPIS iodine channel are conservatively met.
- b. Administrative controls have been implemented which assure that any future purchase specification for radiation monitoring equipment, which fulfills a safety function, will require that vendors provide test data demonstrating that the equipment meets the specification requirements for range and linearity.

2. Planned Corrective Actions:

- a. A proposed change to TS 3.3.2 is being prepared which would remove the present requirements from the CPIS iodine monitors from TSs.
- b. In the event that these monitors cannot be removed from TS requirements either: (1) The CPIS iodine monitors will be modified to extend their range to satisfy the TS requirements, or (2) Other options will be considered such as re-analysis and FSAR and TS changes to reflect design limitations. Post-modification or replacement CPIS iodine monitor calibration will be verified over entire required range by testing.
- c. SCE is reviewing the procurement of these monitors to determine the cause(s) of the vendor supplying equipment which does not meet the specification requirements. Additionally, SCE is also reviewing the startup testing program to determine how these monitors were placed in service without meeting the design requirements. Since these monitors were placed in service there have been numerous enhancements to the QA program which could potentially prevent recurrence. In the event that additional corrective actions are necessary to prevent recurrence, this LER will be revised to provide that information.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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F. SAFETY SIGNIFICANCE OF THE EVENT:

There are no safety consequences of this condition since the noble gas channels remained operable and capable of performing the safety function of initiating CPIS.

G. ADDITIONAL INFORMATION:

1. Component Failure Information:

The component of the detectors which caused the non-linearity were model LA-74/85 pre-amplifiers which were manufactured by Nuclear Measurements Corporation.

2. Previous LERs on Similar Events:

None.

3. Results of NPRDS search:

The search did not provide useful information.