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 MORGAN,H.E. Southern California Edison Co.
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SUBJECT: LER 87-022-01:on 871027,fuel handling isolation sys Train A
 & B suprious action.

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Southern California Edison Company

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December 15, 1989

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

Subject: Docket No. 50-361
Supplemental Report
Licensee Event Report No. 87-022, Revision 1
San Onofre Nuclear Generating Station, Unit 2

Reference: Letter H.E. Morgan (SCE) to USNRC Document Control
Document Control Desk, dated November 25, 1987.

The referenced letter provided Licensee Event Report (LER) No. 87-022 for an occurrence involving an actuation of the Fuel Handling Isolation System. The enclosed supplemental LER provides additional information concerning the cause of the event and associated 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,

HE Morgan

Enclosure: LER No. 87-022, 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) SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 2												Docket Number (2) 0 5 0 0 0 3 6 1				Page (3) 1 of 0 5			
Title (4) FUEL HANDLING ISOLATION SYSTEM (FHIS) TRAIN A AND B SPURIOUS ACTUATION																			
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	0	27	87	---	0 2 2	---	0 1	1	2	15	NONE				0 5 0 0 0				
OPERATING MODE (9) 5				THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)															
POWER LEVEL (10) 0 0 0 //////////////////////////////////// //////////////////////////////////// //////////////////////////////////// //////////////////////////////////// ////////////////////////////////////				<input type="checkbox"/> 20.402(b)				<input type="checkbox"/> 20.405(c)				<input checked="" type="checkbox"/> 50.73(a)(2)(iv)				<input type="checkbox"/> 73.71(b)			
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LICENSEE CONTACT FOR THIS LER (12)																			
Name H. E. Morgan, Station Manager												TELEPHONE NUMBER 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 NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)																			

At 1050 on October 27, 1987, with Unit 2 in Mode 5, Fuel Handling Isolation System (FHIS) monitors 2RT-7822 and 2RT-7823, Train 'A' and 'B', respectively, were spuriously actuated from an apparent noise spike. At approximately the same time, the Component Cooling Water monitor 2RT-7819, which has no control functions, and Containment Airborne monitor (CPIS) 2RT-7804, which had been removed from service, also alarmed. After verifying Fuel Handling Building radiation levels were below the actuation setpoint, the FHIS was reset/secured.

Evident on each monitor's recorder was a large instantaneous rise and drop of recorded radiation levels, indicative of a noise spike. Subsequent investigations into the cause of this and other spurious actuations determined that the design of the monitors' circuitry provided insufficient noise suppression on relays and noise coupling due to close proximity of the FHIS and CPIS monitors within each train. Corrective actions have been completed which have eliminated these noise related problems.

During verification that all FHIS components functioned as designed, it was discovered that the normally running sample pumps for both trains had stopped, resulting in a low sample flow indication. SCE's investigation has been unable to determine a mechanism associated with the spurious actuation which could cause the sample pumps to stop.

There was no safety significance to this event since all FHIS components operated in accordance with design.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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Plant: San Onofre Nuclear Generating Station
Unit: 2
Reactor Vendor: Combustion Engineering
Event Date: 10-27-87
Time: 1050

A. PLANT CONDITIONS AT TIME OF THE EVENT:

Mode: (5) Cold Shutdown

B. BACKGROUND INFORMATION:

The Fuel Handling Isolation System (FHIS) (EIIS System Code VG) consists of two independent "trains" of radiation monitors (2RT-7822 and 2RT-7823) (EIIS Component Code RIT), associated dampers and recirculation filtration units. Each monitor contains a particulate/iodine channel and a noble gas channel. When one channel of either monitor senses high activity, the remote manual push button is depressed, the monitor fails, or there is a loss of power, a FHIS actuation occurs which isolates normal ventilation to the Fuel Handling Building (FHB) and initiates recirculation.

C. DESCRIPTION OF THE EVENT:

1. Event:

At 1050 on October 27, 1987, with Unit 2 in Mode 5, FHIS monitors 2RT-7822 and 2RT-7823, Train 'A' and 'B', respectively, were spuriously actuated from an apparent noise spike. At approximately the same time, the Component Cooling Water (CCW) (EIIS System Code CC) radiation monitor 2RT-7819, which has no control functions, and Containment Airborne monitor 2RT-7804 (EIIS System Code VA), which had been removed from service, also alarmed. After verifying FHB radiation levels were below the actuation setpoint, the FHIS was reset/secured.

Evident on each monitor's recorder was a large instantaneous rise and drop of recorded radiation levels, indicative of a noise spike.

An inspection of the communication/control cabinet (2L-103) containing instrumentation for all four of the monitors identified that meggaring of cables within the cabinet was in progress at the time of the noise spike and subsequent FHIS actuation. At the time, this was believed to be the source of the noise spike and all work within the cabinet was stopped.

During verification that all FHIS components functioned as designed, it was discovered that the low flow alarm lights on both FHIS Trains 'A' and 'B' were illuminated and that the FHIS sample pumps (EIIS System Code VG) (EIIS Component Code P) were not running. The pumps were subsequently restarted and the low flow alarms cleared on both trains. During the shiftly surveillance performed approximately one hour prior to the actuation, the low flow alarm lights were not illuminated.

The sample pumps are required to be operable for FHIS monitor operability. Technical Specification section 3.9.12 requires that if neither FHIS train is

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operable, all operations involving movement of fuel within the storage pool or operation of the fuel handling machine over the storage pool be discontinued. During the approximate one hour in which the status of the pumps was indeterminate, records indicate that no activities involving fuel movement or operation of the fuel handling machine were in progress.

2. Inoperable Structures, Systems or Components that Contributed to the Event:
None.

3. Sequence of Events:

DATE	TIME	ACTION
10/27/87	1050	FHIS Train 'A' and 'B' actuated. 2RT-7804 and 2RT-7819 alarmed.
10/27/87	1050 (subsequent to)	Meggarling in 2L-103 cabinet stopped.
10/27/87	1218	FHB ventilation returned to normal alignment.

4. Method of Discovery:

Control Room indication of the FHIS actuation.

5. Personnel Actions and Analysis of Actions:

Operators responded properly to the FHIS actuation by verifying proper system operation (whereupon it was discovered that the FHIS sample pumps for both trains were not running) and ensuring airborne activities were below the actuation setpoint prior to resetting FHIS.

6. Safety System Responses:

All FHIS components functioned as designed.

D. CAUSE OF THE EVENT:

1. Immediate Cause:

Electrical noise causing spikes in the FHIS actuation circuitry of monitor 2RT-7822 and monitor 2RT-7823.

2. Root Cause:

The initial investigation into the source of the electrical noise had initially focused on the meggarling being performed in the 2L-103 cabinet as the most probable cause. Performance of testing to duplicate the meggarling and its

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associated activities (i.e., use of battery powered telephones), however, was unable to duplicate the spurious noise spikes.

All four of the monitors, as well as having a common communication/control cabinet, are located in the 45 ft. penetration area. Walkdowns of the area were performed to determine if welding activities, which are a potential source of noise on sensitive monitor circuits, were occurring at the time of the noise spike. No welding equipment was observed and there was no record of welding taking place in the area at that time.

A review and inspection of the 2L-103 cabinet internals was performed and no loose terminations, abnormalities or design deficiencies were identified.

Subsequent to this event, design changes were implemented to reduce electrical noise problems. Due to these design changes, it is not possible to conclusively determine the cause of these spurious actuations. It is, however, believed that the actuations were caused by electrical noise produced by the testing or by other unidentified source(s) which was coupled to the monitors circuitry.

SCE's investigation of the low sample flow alarms included a review of the as-built design for the sample pump control and power circuitry, and the low sample flow alarm circuitry. Our investigation has been unable to determine a mechanism associated with the spurious actuation which could cause the sample pumps to stop. SCE believes the alarms are not spurious but are a consequence of the pumps having stopped.

There have been no subsequent instances in which either: 1) Both trains of FHIS have spuriously actuated simultaneously or 2) FHIS sample pumps have tripped or stopped, either individually or simultaneously, for no apparent cause.

E. CORRECTIVE ACTIONS:

As discussed by LERs 87-021 and 88-012 (50-362), corrective action for spurious actuations caused by induced voltage surges include the installation of voltage surge suppression devices and separation of wiring in the FHIS cabinets to reduce noise coupling on all Units 2 and 3 Engineered Safety Feature process radiation monitors. There have been no subsequent spurious actuations due to these causes since implementation of these corrective actions.

F. SAFETY SIGNIFICANCE OF THE EVENT:

The health and safety of the public and plant personnel were not affected by this occurrence since all FHIS components operated as designed.

G. ADDITIONAL INFORMATION:

1. Component Failure Information:

Not applicable.

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2. Previous LERs on Similar Events:

- a. LER 87-021 (Docket No. 50-361) reported a spurious actuation of Unit 2 Train "B" FHIS . Deenergization of a CPIS Train "B" alarm relay during implementation of a design change is believed to have induced an actuation signal in the FHIS Train "B" circuitry. The root cause investigation revealed that signal coupling can occur downstream of the alarm defeat switch and that more separation of the wiring would be required to prevent recurrence.
- b. LER 88-012 (Docket No. 50-362) reported a spurious Train "A" CPIS and FHIS actuation which occurred when the Train "A" FHIS monitor was reset. The FHIS reset caused the reset/test lamp to be extinguished and the lamp power supply transformer to dissipate stored magnetic energy by discharging high-voltage into the CPIS Train "A" circuitry. The CPIS Train "A" voltage surge induced a current in the FHIS circuitry by electromagnetic wave, radiative interference, causing the FHIS Train "A" actuation relay to trigger. Corrective action include adding surge suppression devices to appropriate monitors.