

# ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

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FACIL:50-362 San Onofre Nuclear Station, Unit 3, Southern Californ      05000362  
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RECIP.NAME      RECIPIENT AFFILIATION

SUBJECT: LER 88-012-00:on 881228,FHIS Train A spurious actuation induced during testing of CPIS Train A monitor.

W/8                    ltr.

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LICENSEE EVENT REPORT (LER)

Facility Name (1) DOWRE NUCLEAR GENERATING STATION, UNIT 3										Docket Number (2) 0   5   0   0   0   3   6   2				Page (3) 1   of   0   7					
FUEL HANDLING ISOLATION SYSTEM (FHIS) TRAIN 'A' SPURIOUS ACTUATION INDUCED DURING TESTING OF CONTAINMENT PURGE ISOLATION SYSTEM (CPIS) TRAIN 'A' MONITOR																			
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)				
12	28	88	88	---	0   1   2	---	0   0	0	1	2	NONE				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				<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)			
				<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)			
				<input type="checkbox"/> 20.405(a)(1)(ii)				<input type="checkbox"/> 50.36(c)(2)				<input type="checkbox"/> 50.73(a)(2)(vii)				<input type="checkbox"/> Other (Specify in			
				<input type="checkbox"/> 20.405(a)(1)(iii)				<input type="checkbox"/> 50.73(a)(2)(i)				<input type="checkbox"/> 50.73(a)(2)(viii)(A)				Abstract below and			
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				<input type="checkbox"/> 20.405(a)(1)(v)				<input type="checkbox"/> 50.73(a)(2)(iii)				<input type="checkbox"/> 50.73(a)(2)(x)							
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	/////								
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)																			

On 12/28/88, at 1655, with Unit 3 at 100% reactor power, a Fuel Handling Isolation System (FHIS) Train "A" spurious actuation occurred during testing of Containment Purge Isolation System (CPIS) radiation monitor 3RT-7804. At 1745, after observing no indication of increased radiation levels in the Fuel Handling Building (FHB), the FHB ventilation system alignment was returned to normal. At 1800, FHB cooling equipment was secured. There is no safety significance to this event since FHB activity levels remained normal and FHIS components responded to the spurious actuation in accordance with design.

Ongoing investigations of previous spurious FHIS actuations resulting from interactions between FHIS and CPIS circuitry (most recently reported in LER 88-016, Docket No. 50-361) has revealed that the FHIS Train "A" actuation relay was most likely triggered by the induction of current in the FHIS circuitry as a result of resetting CPIS radiation monitor 3RT-7804. The reset causes 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.

As previously planned, a surge suppression device has now been installed on 3RT-7804. This will preclude spurious actuations due to high-voltage surges when the lamp is extinguished. This action is also being taken for all Units 2 and 3 Engineered Safety Feature process radiation monitors.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

SAN ONOFRE NUCLEAR GENERATION STATION UNIT 3	DOCKET NUMBER 05000362	LER NUMBER 89-001-00	PAGE 2 OF 7
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Plant: San Onofre Nuclear Generating Station  
Unit: Three  
Reactor Vendor: Combustion Engineering  
Event Date: 12/28/88  
Time: 1655

A. CONDITIONS AT TIME OF THE EVENT:

Mode: 1, Power Operation at 100%

B. BACKGROUND INFORMATION:

The Fuel Handling Isolation System (FHIS) (EIIS System Code VG) consists of two independent "trains" of radiation monitors (3RT-7822 for Train "A" and 3RT-7823 for Train "B") (EIIS Component Code RIT), associated dampers (EIIS Component Code DMP), alarms (EIIS Component Code ALM), recirculation air filtration units (EIIS Component Code AHU), chillers (EIIS Component Code CHU), and cooling water pumps (EIIS Component Code P). Each monitoring train consists of a particulate/iodine channel (3RI-7822A1 and 3RI-7823A2, Train "A" and "B", respectively) and a gas channel (3RI-7822B1 and 3RI-7823B2, Train "A" and "B", respectively). Only one channel (i.e. detector, signal processor, power supply and channel actuation relay) is required to initiate a train actuation. Each train actuation relay (EIIS Component Code RLY) is triggered by either a remote manual push-button or by one of the radiation monitor channel actuation relays in response to either high radiation, instrument failure, or loss of power. A FHIS actuation isolates normal ventilation to the Fuel Handling Building (FHB) and initiates recirculation.

The Containment Purge Isolation System (CPIS) (EIIS System code VA) consists of two independent trains of area radiation monitors (3RT-7856 and 3RT-7857, Train "A" and "B" respectively), and process radiation monitors (3RT-7804 and 3RT-7807, Train "A" and "B" respectively). 3RT-7804 (Train "A" CPIS) and 3RT-7822 (Train "A" FHIS) are housed in the same cabinet and are in close proximity with each other. Both monitors are supplied with power from a common bus.

FHIS and CPIS train actuation circuits are similarly removed from service, tested and returned to service by: 1) turning the normal/bypass switch (EIIS Component Code HS) from "normal" to "bypass", which extinguishes a reset/test lamp (EIIS Component Code IL); 2) depressing the reset/test push-button, which illuminates the reset/test lamp; 3) releasing the reset/test push-button, which extinguishes the reset/test lamp; and 4) turning the normal/bypass switch to "normal", which illuminates the reset/test lamp. Observation of the reset/test lamp during this process ensures that the train actuation relays are not in the actuated state and are capable of actuation by a channel actuation relay.

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C. DESCRIPTION OF THE EVENT:

1. Event:

On 12/28/88, at 1655, with Unit 3 at 100% reactor power, a FHIS Train "A" spurious actuation occurred during testing of CPIS radiation monitor 3RT-7804. At 1745, after observing no indication of increased radiation levels in the FHB, the FHB ventilation system alignment was returned to normal. At 1800, Train "A" FHB cooling equipment was secured.

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

3. Sequence of Events:

<u>DATE</u>	<u>TIME</u>	<u>ACTION</u>
12/28/88	1655	FHIS Train "A" actuated while testing CPIS monitor 3RT-7804.
12/28/88	1740	Operation of FHIS Train "A" components observed in control room.
12/28/88	1745	Normal FHB ventilation restored.
12/28/88	1800	FHB cooling equipment secured.

4. Method of Discovery:

At 1740, during routine review of plant conditions, a control room operator (utility, licensed) observed control room indication of FHIS Train "A" component operation. In addition, it was observed that the Train "A" chiller (3ME-336) had not started, and the FHIS control room actuation alarm had not annunciated.

5. Personnel Actions and Analysis of Actions:

The operator responded properly to the FHIS actuation by verifying system operation and ensuring FHB activity levels were below the actuation setpoint prior to resetting FHIS. When it was observed that chiller 3ME-336 did not automatically start, operators verified chiller operability by manually starting the chiller via the remote hand-switch.

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6. Safety System Responses:

As described in section D, "CAUSE OF THE EVENT", the FHIS actuation was spuriously initiated by a voltage surge in CPIS components which briefly induced a current in the FHIS circuits. The following FHIS responses were observed; however, these responses are in accordance with FHIS design.

- a. Chiller 3ME-336 did not actuate because the brief signal generated in the FHIS cabling, while of a duration sufficient to actuate the dampers, recirculation air filtration unit, and chilled water pump, was not sufficient to overcome the chiller start control scheme time delay characteristics.
- b. The FHIS control room actuation alarm, which is initiated from the channel actuation relays up-stream of the train actuation relay, did not annunciate. The channel circuitry, which contains a power supply module that effectively filters current surges from the power supply bus and is separated further from the CPIS than is the train circuitry, is less susceptible to CPIS-induced current.

D. CAUSE OF THE EVENT:

1. Immediate Cause:

Ongoing investigations of previous spurious FHIS actuations resulting from interactions between FHIS and CPIS circuitry (see section G, ADDITIONAL INFORMATION) has revealed that the Train "A" actuation relay was most likely triggered by the induction of current in the FHIS circuitry as a result of resetting CPIS radiation monitor 3RT-7804. Current was induced in the FHIS circuit because the FHIS and CPIS were coupled by electromagnetic wave, radiative interference, since common train cables are in close proximity, in the same cabinet, and are powered from a common power supply bus. Resetting 3RT-7804 causes the reset/test lamp to be extinguished and the lamp power supply transformer (EIIS Component Code XFMR) (which converts 120 volt AC power to 6.3 volts AC) to dissipate stored magnetic energy by discharging high-voltage into the CPIS Train "A" circuitry.

2. Root Cause:

The high-voltage surge, which has been measured to be as high as 800 volts during previous testing, was generated since there was no dissipating circuit for the energy in the CPIS train actuation circuitry and cabling. Design changes which would provide surge suppression for the reset/test lamp transformer and train actuation relay circuits were installed for 3RT-7822, but had not been installed for 3RT-7804.

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E. CORRECTIVE ACTIONS:

1. Corrective Actions Taken:

- a. 3RI-7822 and 3RI-7804 were functionally checked and verified to be operating as designed.
- b. As previously planned, a surge suppression device has now been installed for 3RT-7804 reset/test lamp transformer, which will dissipate the stored energy in the transformer without generating high-voltage in the train cabling.

2. Planned Corrective Actions:

The installation of surge suppression devices in all Units 2 and 3 Engineered Safety Feature process radiation monitors is continuing. This action is expected to be completed by end of February, 1989.

F. SAFETY SIGNIFICANCE OF THE EVENT:

There is no safety significance to this event since FHB activity levels remained normal and FHIS components responded to the spurious actuation in accordance with design.

G. ADDITIONAL INFORMATION:

1. Component Failure Information:

Not applicable.

2. Previous LERs on Similar Events:

The following LERs are similar to this event in that they all involve spurious actuations of ESF related monitors due to induced signals during manipulation of monitor switches or the reset/test push-button.

a. LER 87-003 (Docket No. 50-361)

On 3/10/87, a spurious actuation of Unit 2 FHIS Train "B" occurred when the CPIS Train "B" reset push-button was depressed, resetting the CPIS relays and inducing a FHIS actuation signal. FHIS and CPIS relay coil wires were found to be routed in common wire bundles, allowing signal coupling to occur. The wiring for one CPIS relay was rerouted for separation. This corrective action did not completely decouple the systems.

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b. LER 87-010 (Docket No. 50-362)

On 5/23/87, a spurious actuation of Unit 3 FHIS Train "B" occurred. 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. Previous corrective action was not sufficient to prevent recurrence, and further evaluation of the CPIS/FHIS circuitry interaction was undertaken. As an interim corrective action, the FHIS Train "B" radiation monitor was placed in "alarm defeat" (effectively removing the monitor from service) during subsequent CPIS Train "B" design work. This corrective action was not sufficient to preclude spurious actuations of adjacent monitors during normal/bypass switch or reset/test push-button manipulations.

c. LER 87-021 (Docket No. 50-361)

On 10/26/87, a spurious actuation of Unit 2 FHIS Train "B" occurred. 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. The corrective action of separating the CPIS and FHIS wiring currently routed in common wire bundles was not completed prior to the event.

d. LER 87-029 (Docket 50-361)

On 12/12/87, a spurious FHIS Train "B" actuation occurred when the CPIS Train "B" monitor was actuated as part of the monthly channel functional surveillance test. A design change was implemented in late 1987 which installed "bypass" switches. These switches allow the actuation function of the FHIS and CPIS radiation monitors to be defeated. The evaluation of the FHIS/CPIS signal coupling, including application of these switches, was ongoing when this actuation occurred. Interim corrective action resulting from this event was to "bypass FHIS or CPIS, when appropriate, during CPIS or FHIS testing or other activity having a potential to cause a spurious actuation". This corrective action was not sufficient to preclude spurious actuations of adjacent monitors during normal/bypass switch or reset/test push-button manipulations.

e. LER 88-013 (Docket No. 50-361)

On 6/6/88, a spurious actuation of FHIS Train "B" occurred when one of its radiation monitors was returned to service. A spurious signal was generated by manipulating the normal/bypass switch or the reset/test push-button. As a result, further investigation was undertaken to identify the appropriate corrective action. The results of the investigation are described in "f.", below.

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f. LER 88-016 (Docket No. 50-361)

On 6/29/88, a spurious actuation of CPIS Train "B" occurred during investigative testing of a FHIS Train "B" radiation monitor. The cause of the sharp voltage transient could not be determined, and further evaluation was continued. Subsequent to transmittal of this LER, the evaluation has revealed that the reset/test lamp transformer generates a large (greater than 800 volt) voltage spike when the lamp is extinguished.

3. Results of NPRDS Search:

Not applicable.

*Southern California Edison Company*

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H. E. MORGAN  
STATION MANAGER

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January 27, 1989

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

Subject: Docket No. 50-362  
30-Day Report  
Licensee Event Report No. 88-012  
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 Fuel Handling Isolation System. 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. 88-012

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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