



Southern California Edison Company

SAN ONOFRE NUCLEAR GENERATING STATION

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December 4, 1992

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STATION MANAGER

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

Subject: Docket No. 50-362
Supplemental Report
Licensee Event Report No. 90-011, Revision 1
San Onofre Nuclear Generating Station, Unit 3

Reference: Letter, R. W. Krieger (SCE) to USNRC Document Control Desk, dated
August 21, 1990

The referenced letter provided Licensee Event Report (LER) No. 90-011, for a condition involving the Auxiliary Feedwater System. The enclosed supplemental LER provides additional information concerning the cause of the condition. Neither the health nor the safety of plant personnel or the public was affected by this condition.

If you require any additional information, please so advise.

Sincerely,

Enclosure: LER No. 90-011, Rev. 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 3						Docket Number (2) 0 5 0 0 0 3 6 2 1 of 0 4						Page (3) 1 of 0 4					
Title (4) AUXILIARY FEEDWATER VALVE INOPERABLE FOR MAIN STEAM ISOLATION RESULTING IN A TECHNICAL SPECIFICATION 3.0.3 ENTRY, REVISION 1																	

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	7	22	90	0	1	0	7	22	NONE		0 5 0 0 0 3 6 2 1						
OPERATING MODE (9) 2				THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)													
POWER LEVEL (10) 0 0 2				20.402(b)				20.405(c)				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	
				20.405(a)(1)(iii)				50.73(a)(2)(i)				50.73(a)(2)(viii)(A)				Abstract below and	
				20.405(a)(1)(iv)				50.73(a)(2)(ii)				50.73(a)(2)(viii)(B)				in text)	
20.405(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(ix)									

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	MANUFAC	REPORTABLE	CAUSE	SYSTEM	COMPONENT	MANUFAC	REPORTABLE								
			TURER	TO NPRDS				TURER	TO NPRDS								
X	B A	S O L	P 0 9 5	YES													
SUPPLEMENTAL REPORT EXPECTED (14)																	
Yes (If yes, complete EXPECTED SUBMISSION DATE)										xx NO		Expected Submission Date (15)		Month Day Year			

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

At 0315 on 7/22/90, with Unit 3 in Mode 2, while filling the steam generators, Auxiliary Feedwater (AFW) bypass control valve 3HV-4763 failed to close upon demand. As the valve was not capable of automatic closure by a Main Steam Isolation System (MSIS) signal within the minimum response time required by Technical Specification (TS) 3.3.2, "Engineered Safety Feature Actuation System Instrumentation," it was declared inoperable. Since there were no TS action statements which addressed the condition where an AFW valve cannot close on a MSIS signal, TS 3.0.3 was invoked. At approximately 0325, TS 3.0.3 was exited when operators manually isolated the valve.

3HV-4763 would not close due to a mechanical failure of a solenoid valve which must open to direct hydraulic fluid to the actuator which closes 3HV-4763. The actuator was sent to the manufacturer for an overhaul which included replacement of the failed solenoid valve. Upon disassembly and inspection of the solenoid valve, it was determined that the cause of the solenoid valve failure was hydraulic fluid contamination and a consequent mechanical failure of the actuator. The cause of the hydraulic fluid contamination has been attributed to the introduction of contamination sometime during the five-year service period of the actuator due to seal leakage.

The contaminated hydraulic fluid and all damaged components were replaced as part of the valve overhaul. The Units 2 and 3 AFW Hydraulic actuators will be overhauled on an every other refueling outage basis. The actuator hydraulic fluid for the AFW bypass control valves will be periodically sampled to ensure it remains free of damaging contaminants.

At the time of this event, TSs did not provide a Limiting Condition for Operation and Action statement applicable to this component, resulting in a TS 3.0.3 entry. Subsequently a TS amendment request was submitted and approved by the NRC to provide an action statement which will preclude similar entries into TS 3.0.3.

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Plant: San Onofre Nuclear Generating Station (SONGS)
 Unit: Three
 Reactor Vendor: Combustion Engineering
 Event Date: 07-22-90
 Time: 0315

A. CONDITIONS AT TIME OF THE EVENT:

Mode: 2, Startup
 RCS Temperature: 545 F

B. BACKGROUND INFORMATION:

The Emergency Feedwater Actuation System (EFAS) [JA] is an Engineered Safety Feature Actuation System (ESFAS) [JE] designed to automatically initiate Auxiliary Feedwater (AFW) [BA] system flow to the Steam Generator (SG) [SG] when the SG level is low resulting from a loss of main feedwater. The Main Steam Isolation System (MSIS) [JA] is an ESFAS designed to isolate faulted steam and/or feedwater lines from an intact SG train in the event of a Main Steam Line Break (MSLB) or Main Feedwater Line Break (MFLB) accident.

AFW flow to the SGs is controlled by two trains of valves [ISV] on discharge piping from three AFW pumps [P]. AFW bypass control valve 3HV-4763, provides bypass flow around the main AFW discharge valve which is used for the delivery of AFW during accident conditions. The AFW bypass control valves are designed to pass AFW at a low rate and are typically utilized during plant startup and shutdown when feedwater demand is low. The valve can be remotely operated by a hand switch and a hand indicating controller located in the control room. The hand switch, in the modulate mode, allows the hand indicating controller to be used to modulate the bypass control valve from 15 to 300 gpm. The valves will automatically close upon receiving either a MSIS or an EFAS. The electro-hydraulic operator to 3HV-4763 includes two twin directional solenoid [SOL] valves that control the position of the actuator. The solenoid valves are used to direct the flow of hydraulic fluid to the pistons that stroke the stem open and closed and are internal to the actuator assembly. To open the valve, one solenoid valve directs high pressure hydraulic fluid to the bottom of the piston while the other valve bleeds the fluid on the top side of the piston to the lower pressure reservoir. To close the valve, the roles of the solenoid valves are reversed. A manual override feature of the actuator permits closure of the valve if it fails to function automatically or remotely.

Although Technical Specification (TS) 3.3.2, "Engineered Safety Feature Actuation System Instrumentation," addresses MSIS operability requirements, including minimum ESFAS response times for the valves, the TS did not provide an action statement for the situation in which a MSIS-related valve could not satisfy the associated response time requirement. This condition was considered an entry into TS 3.0.3. In contrast, although the EFAS function overrides a MSIS, TS 3.7.1.2, "Auxiliary Feedwater System", provides a 72-hour action statement which applies when an AFW control valve is unable to open.

C. DESCRIPTION OF THE EVENT:

1. Event:

At 0315 on 7/22/90, with Unit 3 in Mode 2, while filling the SGs, AFW valve 3HV-4763 failed to close upon demand. Per TS 3.3.2 this valve has a MSIS response time requirement to close. Since the valve was not capable of automatic closure by a MSIS signal within the minimum response time required by TS 3.3.2, it was declared inoperable. Since there were no TS action statements which addressed the condition where an AFW valve could not close on a MSIS signal, TS 3.0.3 was invoked. At approximately 0325, TS 3.0.3 was exited when operators manually isolated the valve.

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

None

3. Sequence of Events:

TIME	ACTION
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0315	3HV-4763 failed to meet MSIS response time requirement to close. TS 3.0.3 entered.
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0325	3HV-4763 verified closed. TS 3.0.3 exited.
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4. Method of Discovery:

While filling the SGs and transferring the flow alignment from the AFW bypass line to the normal AFW line, Operators (utility, licensed) observing the control room indication of the actual valve position, noted the inability of 3HV-4763 to close within the MSIS response time requirement.

5. Personnel Actions and Analysis of Actions:

Operators responded properly by promptly isolating 3HV-4763, thereby exiting TS 3.0.3.

6. Safety System Responses:

Not applicable.

D. CAUSE OF THE EVENT:

3HV-4763 would not close due to a failed actuator solenoid valve which prevented it from closing as required. The actuator was sent to the manufacturer for an overhaul which included replacement of the failed solenoid valve. Upon disassembly and inspection of the solenoid valve, it was determined that the cause of the solenoid valve failure was hydraulic fluid contamination and a consequent mechanical failure of the solenoid valve.

SCE's review of the cause of this event involved the examination of three possible sources for the observed contamination: 1) improper flushing of the system prior to fill and installation, 2) introduction of contaminated hydraulic fluid when the system was initially filled, or 3) introduction of contamination sometime during the five-year service period through seal inleakage. None of these possible sources can be categorically ruled out; however, the first two possible sources are considered unlikely on the basis that such contamination would most likely have resulted in the actuator failing early in the five-year period that the actuator was in service. Thus it has been concluded that the most likely cause of the failure of the actuator was the introduction of contamination through seal inleakage.

As a contributing cause, at the time this event was reported, the TSs did not provide an Action Statement for 3HV-4763 when it was unable to meet the MSIS response time.

E. CORRECTIVE ACTIONS:

1. Corrective Actions Taken:

- Action was promptly taken to manually isolate 3HV-4763.
- The actuator was sent to the manufacturer for overhaul and investigation of the solenoid failure.

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- c. The solenoid valve for the actuator on 3HV-4763 was replaced and 3HV-4763 was stroke tested prior to returning the valve to operable status.
- d. A TS amendment request was previously submitted and was subsequently approved by the NRC to preclude entry into TS 3.0.3 for this condition (see also LERs 88-037, 88-030, 89-002 and 89-011, Docket No. 50-361).

2. Planned Corrective Actions:

- a. In order to improve the reliability of the AFW actuators, the overhaul frequency of the hydraulic actuators for AFW valves 2HV-4762, 2HV-4763, 3HV-4762, and 3HV-4763, will be increased from once each five years to once every other refueling outage (approximately every three to four years).
- b. The actuator hydraulic fluid for the actuators for AFW valves 2HV-4762, 2HV-4763, 3HV-4762, and 3HV-4763 will be sampled periodically to ensure that the actuator hydraulic fluid remains free of damaging contaminants. After an initial sampling period, the sample data will be assessed to determine if the every other refueling outage overhaul frequency is appropriate and the sampling frequency will be adjusted accordingly. (These four AFW valve actuators, 2HV-4762, 2HV-4763, 3HV-4762, and 3HV-4763, are the only actuators of this type installed at SONGS.)

F. SAFETY SIGNIFICANCE OF THE EVENT:

There was no safety significance to this event since a redundant set of isolation valves on the affected AFW train remained operable and capable of closure upon a MSIS actuation. The EFAS response of the AFW system remained operable during this condition.

G. ADDITIONAL INFORMATION:

1. Component Failure Information:

The component which failed was a Paul-Munroe 3-way, 2-position solenoid valve, part number PA89132-500.

2. Previous LERs for Similar Events:

LER 88-030 (Docket No. 50-361) reported an entry into TS 3.0.3 when a Plant Protection System (PPS) [JC] power supply produced a voltage spike causing four AFW valves to open in response to an EFAS, thereby preventing the valves from closing on a MSIS. Since there were no TS action statements which address the condition where an AFW valve can not close on a MSIS signal, TS 3.0.3 was invoked.

LER 88-037 (Docket No. 50-361) reported a voluntary entry into TS 3.0.3 when post maintenance testing on an AFW valve determined that the valve did not meet the MSIS minimum response time requirement.

LER 89-011 (Docket No. 50-361) reported a voluntary entry into TS 3.0.3 during planned PPS power supply replacement due to three AFW valves receiving an EFAS signal, thereby resulting in the valves opening and being unable to close upon receiving a MSIS.

LERs 89-002 (Docket No. 50-361) reported a voluntary entry into TS 3.0.3 due to a lack of action statements for Main Feedwater [SJ] Block Valves.