LICENSEE EVENT REPORT (LER)

Facility Name (1)	Docket Number (2)	Page (3)
San Onofre Nuclear Generating Station (SONGS) Unit 2	0 5 0 0 0 3 6 1	1 of 0 4

Title (4)

Design Inadequacy In Backup Nitrogen Supply To Component Cooling Water Surge Tanks

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)
									SONGS Unit 3	0 5 0 0 0 3 6 2
0 8	1 4	9 7	9 7	0 1 2	0 0	0 9	1 2	9 7		

OPERATING MODE (9): 1

POWER LEVEL (10): 1 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (CHECK ONE OR MORE OF THE FOLLOWING) (11)

___ 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 Abstract below and in text)
___ 20.405(a)(1)(iii)	X 50.73(a)(2)(i)	___ 50.73(a)(2)(viii)(A)	
___ 20.405(a)(1)(iv)	___ 50.73(a)(2)(ii)	___ 50.73(a)(2)(viii)(B)	
___ 20.405(a)(1)(v)	___ 50.73(a)(2)(iii)	___ 50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (AREA CODE)
R.W. Krieger, Vice President, Nuclear Generation	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 NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
Yes (If yes, complete EXPECTED SUBMISSION DATE)	X No				

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

In response to NRC Generic Letter 96-06 and an open item from the design document reconstitution program, an investigation was conducted of the adequacy of the design of the backup nitrogen system (BNS) to the component cooling water (CCW) surge tanks. A scenario not previously considered was identified which could deplete the BNS after a postulated accident.

On 8/14/97 (the discovery date), plant management (other utility personnel) concluded that under the postulated scenario there may not be sufficient bottled nitrogen to ensure the CCW surge tank remains pressurized for 7 days following a postulated accident as required by the Technical Specifications (TS). Because this condition may have existed since the TS for BNS operability was approved in 1995, Southern California Edison is reporting this condition in accordance with 10CFR50.73(a)(2)(i).

Plant personnel promptly declared both trains of BNS inoperable for both Units and took compensatory action to restore system operability by requiring, during the postulated scenario, a dedicated operator to be stationed to maintain CCW surge tank level. This action restored the BNS to operable status.

Design engineers (other utility personnel) did not recognize the postulated scenario when sizing the BNS during a 1991-1992 CCW surge tank upgrade [NRC Cause Code: cognitive personnel error].

This LER will be required reading for design engineers, and a topic in their continuing training program. Design changes are being considered to minimize backup nitrogen consumption during the postulated scenario.

Plant: San Onofre Nuclear Generating Station (SONGS) Units 2 & 3
Reactor Vendor: Combustion Engineering
Event Date: August 14, 1997
Event Time: 1530
Mode: both Units were in Mode 1, power operation
Power: both Units were at approximately 100% power

Background

The component cooling water (CCW) [CC] system for each of the SONGS 2 and 3 Units consists of two independent trains, each train equipped with a 6,658 gallon (approximate) surge tank [TK]. See Figure 1. Each surge tank is pressurized to approximately 38 psig with nitrogen gas to prevent void formation at high points in the system and to minimize the potential for water hammer in the event of a rapid drawdown in surge tank level together with a CCW pump trip and restart transient. Each surge tank is equipped with a back pressure control valve designed to vent the tank if pressure increases above the control valve set point of approximately 41 psig.

To ensure availability of nitrogen pressure following a seismic event, in 1991-1992 the surge tank design was upgraded to include a safety-related, seismically qualified backup nitrogen system (BNS). Each BNS consists of bottled nitrogen gas sized for 7 days of post-accident surge tank pressurization without bottle replacement. (The bottle location is assumed to be inaccessible due to post-accident radiation levels.) The original sizing of the BNS assumed a constant surge tank level, consistent with historically low CCW leak rate data.

Surge tank level is controlled by automatic or manual makeup which occurs should tank level decrease to approximately 5 feet (43.5%). Makeup stops when level increases to approximately 9 feet (75%).

The Technical Specifications (TS) for SONGS 2 and 3 require both trains of CCW to be operable in Modes 1 through 4. If BNS train(s) become(s) inoperable, the TS require operators to restore the BNS train(s) to operable status within 8 hours, or declare the associated CCW train(s) inoperable within 8 hours.

Description of Event

In response to NRC Generic Letter 96-06 and an open item from the SONGS 2 and 3 design document reconstitution program, an investigation was conducted of the adequacy of the BNS design during certain postulated accident scenarios. One such scenario is a loss of coolant accident coincident with a loss of offsite power, when the normal nitrogen supply to the Component Cooling Water (CCW) surge tanks is unavailable.

When CCW system leakage causes surge tank level to decrease, backup nitrogen gas expands into the tank to maintain system pressure. During the ensuing makeup, the nitrogen gas is compressed by the rising water level, and is vented by the back pressure control valve.

At 1530 on 8/14/97 (the discovery date), plant management (other utility personnel) reviewed the preliminary results of the design investigation and concluded that level cycling was credible because of recent CCW leak rates. Because level cycling was not considered in the original BNS sizing calculation, management concluded there may not be sufficient bottled nitrogen to ensure the CCW surge tank remains pressurized for the requisite 7 days following the postulated event. Plant personnel promptly declared both trains of BNS inoperable for both Units.

Because this condition may have existed since the TS requirement for BNS operability was approved in 1995, Southern California Edison (SCE) is reporting this condition in accordance with 10CFR50.73(a)(2)(i).

Cause of the Event

Design engineers (other utility personnel) did not recognize the potential for surge tank level cycling when sizing the BNS bottled nitrogen gas during the 1991-1992 CCW surge tank upgrade [NRC Cause Code: cognitive personnel error].

Corrective Action

Upon declaring the BNS inoperable, plant personnel immediately took compensatory action to restore system operability by requiring, during the postulated scenario, a dedicated plant operator to be stationed at the local CCW makeup controls to maintain surge tank levels relatively constant. This action minimizes level cycles in the CCW surge tanks during the postulated scenario, thereby minimizing the consumption of backup nitrogen gas. This compensatory action restored the BNS to operable status.

To address the personnel error, this LER will be required reading for design engineers, and a topic in their continuing training program.

Design changes are being considered to minimize backup nitrogen consumption during the postulated scenario.

Safety Significance

The condition described above could have impacted plant safety in the unlikely event of a loss of coolant accident, if the normal nitrogen system was unavailable and a CCW pump was stopped and restarted after surge tank pressure was depleted. SCE has conservatively estimated the probability of this event sequence to be about 2E-5 per year. Consequently, SCE believes this condition had low safety significance.

Additional Information

In the past three years, SCE has reported one other instance related to inadequate design activities by SCE engineering staff. LER 2-96-010, "Containment Escape Hatch Not Closed While Performing Core Alterations," reported a failure to recognize that an emergency escape hatch modification during steam generator chemical cleaning did not provide containment closure.

The design activity reported herein occurred prior to the error reported in LER 2-96-010. Therefore, corrective actions for LER 2-96-010 could not have prevented the condition reported in this LER.

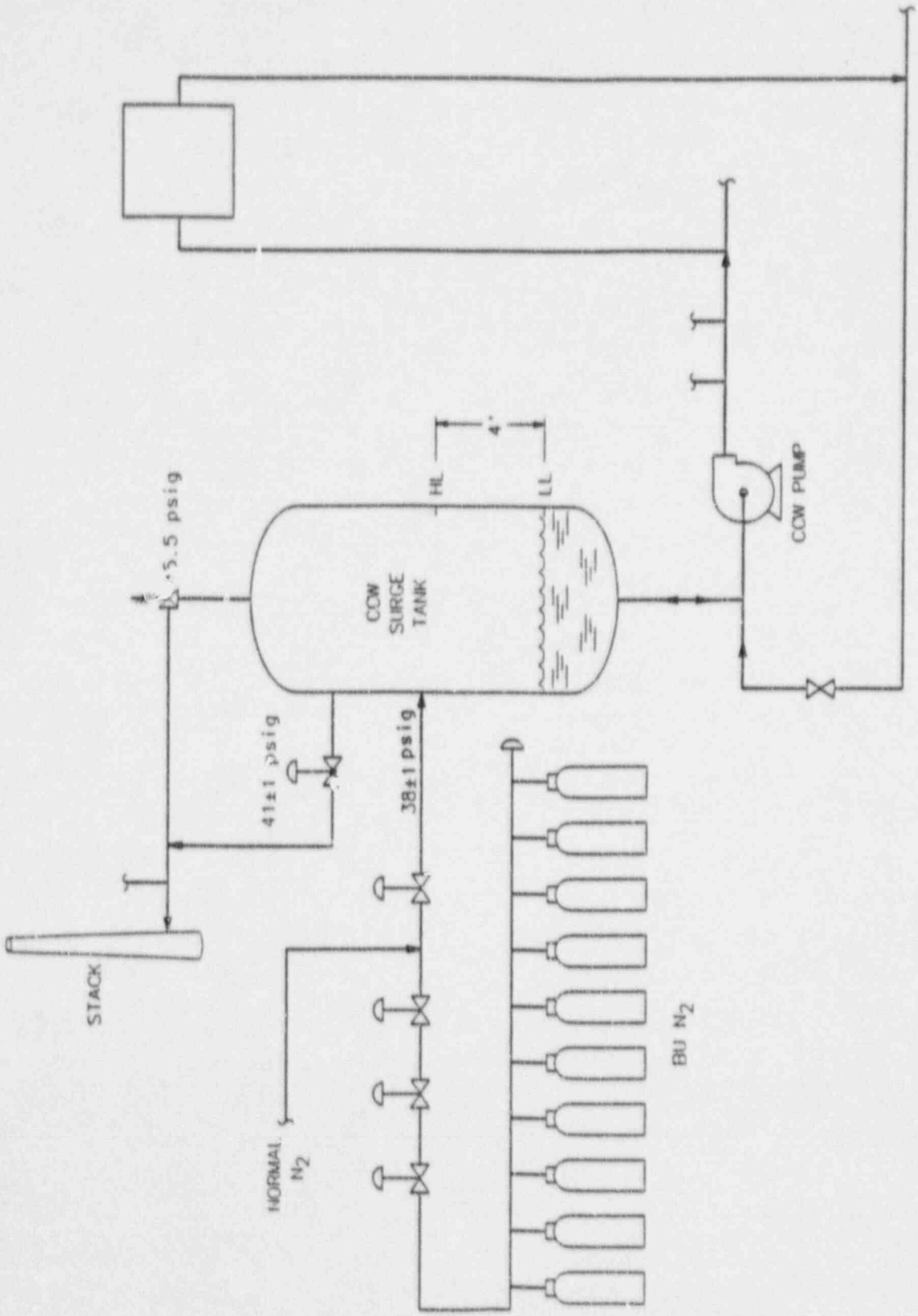
5.5 psig
CCW SURGE TANK
HL
LL
4'
CCW PUMP
41±1 psig
38±1 psig
STACK
NORMAL N_2
BU N_2

Figure 1