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ACCESSION NBR: 8811080140 DOC. DATE: 88/11/04 NOTARIZED: NO DOCKET #
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 50-362 San Onofre Nuclear Station, Unit 3, Southern Californ 05000362
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SUBJECT: Forwards addl info re open items identified during 881017
 10CFR50, App R fire protection audit.

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November 4, 1988

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

Gentlemen:

Subject: Docket Nos. 50-361 and 50-362
San Onofre Nuclear Generating Station
Units 2 and 3
Appendix R Audit Open Items
(TAC Nos. 54814 and 54815)

During the week of October 17, 1988, NRC Region V conducted a 10 CFR 50, Appendix R fire protection audit of San Onofre Units 2 and 3. As a result of this audit, several open items were identified which require that SCE provide additional information to the NRC. This letter provides the requested information for: (1) operator actions, in addition to reactor scram, performed in the control room prior to evacuation, and (2) the analysis addressing spurious closure of the Volume Control Tank (VCT) outlet valve.

The first issue is addressed in Enclosure 1. This analysis is consistent with analyses which have been accepted by the NRC at other nuclear plants, and with the NRC's Safety Evaluation dated June 29, 1988. Enclosure 2 provides a discussion of the San Onofre Units 2 and 3 Appendix R alternative shutdown analysis and the approved design/licensing basis.

The other open item pertains to SCE's analysis for the potential loss of charging pump suction due to spurious closure of the VCT outlet valve. The NRC requested information regarding the consequences of the spurious closure of this valve. We have summarized the data contained in our SONGS 2 and 3 Appendix R Compliance Assessment analysis for fire areas containing circuits for the VCT outlet valve. The summary (Enclosure 3) identifies nine fire areas (seven alternate shutdown areas and two non-alternate areas) where a

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November 4, 1988

loss of pump suction could result if at least four postulated faults were to occur prior to operator action to trip the pumps. These multiple faults are not considered credible within the period of time in which the pumps are tripped subsequent to a fire in these areas. The remaining plant areas do not contain circuits which can spuriously start the charging pumps and cause the closure of all suction pathways. Therefore, the Appendix R analysis demonstrates that RCS charging pump capability will not be adversely impacted by spurious closure of the VCT outlet valve.

Information will be provided to the NRC for resolution of the remaining open items from the SONGS 2 and 3 Appendix R audit by November 30, 1988.

If you have any questions regarding this matter, please call me.

Very truly yours,



Enclosures

cc: D. E. Hickman, NRC Project Manager, San Onofre Units 2 and 3
J. B. Martin, Regional Administrator, NRC Region V
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FIRES IN ALTERNATE SHUTDOWN AREAS - CREDITING ADDITIONAL
OPERATOR ACTIONS INSIDE THE CONTROL ROOM

Plant Safety Assessment

In the event of a fire in an alternative shutdown area which requires evacuation of the control room, SCE credits four operator actions prior to control room evacuation. In addition to tripping the reactor, the operators trip the reactor coolant pumps, initiate main steam isolation and trip the charging pumps.

There are several factors which provide the basis for considering that the additional operator actions would be successful and that there would be no impact on safe shutdown.

1. There is adequate time available to perform the actions from inside the control room. The actions are performed at the main control board and can be completed in approximately 20 seconds. SCE considers that such actions are feasible even considering a condition requiring rapid evacuation of the control room. Following evacuation of the control room, additional actions are performed to ensure that spurious actuations do not negate the actions performed in the control room.
2. There are 8 alternate shutdown areas, the control room and 7 additional fire areas in the control building. A fire in one of the alternate shutdown areas outside the control room would not prevent the operators from completing the required actions. All of the alternate shutdown areas outside the control room are provided with early warning fire detection capability. In addition, heat detectors, which actuate the suppression systems in these areas, alarm in the control room. These indications would provide early information to the operator that a fire has started in an alternative shutdown area. If damage to equipment cabling were to occur in these areas, additional alarms and information would be utilized to confirm the need to initiate the alternate shutdown procedure. Due to the extensive fire protection capability in the alternate shutdown areas, the electrical separation between trains of equipment and the limited combustibles in the areas (the primary combustible is IEEE 383 cable), it is not likely that a fire of sufficient magnitude would cause the correct combination of events to occur which would preclude the immediate operator actions and initiate spurious actions to adversely affect safe shutdown. To adversely affect the operation of the charging pumps, the combination of events needs to involve the charging pump control circuits, the pressurizer level instrumentation, charging pump low pressure trip circuits, the VCT outlet valve circuits and a Safety Injection Actuation Signal (SIAS). To affect the cooling of the RCS due to the continued operation of the main steam system following the reactor trip would involve the redundant, fail safe

circuitry of the MSIS and the PPS channels for steam generator pressure. To affect the pressure control of the RCS would involve the control circuits of the RCPs and the control circuits for the pressurizer spray valves.

Even less probable is the possibility that in the period after the immediate operator actions are completed and before the outside control room actions are completed, that multiple combinations of circuit failures would occur that would negate the operator actions and spuriously initiate equipment operation with the potential of adversely affecting safe shutdown. The Time and Manpower study demonstrates that within 6 minutes of evacuating the control room, the operators would perform the functions to repeat the actions performed in the control room.

3. A fire in the control room would not prevent the operators from completing the required actions. The control room is continuously manned. In addition the control room is provided with early warning fire detection capability as described in the UFHA. A fire in the control room area not involving the main control panels would be detected in sufficient time to allow the operators to complete the credited actions.

A fire in a main control board panel would be limited since the panels are of metal construction with limited quantities of combustible material. The expected operator response is to use hand extinguishers to suppress the fire while making preparations to enter the alternate shutdown procedure in the event that it became necessary to evacuate the control room. A fire in a panel would not result in an unrecoverable event for the following reasons:

Main Steam Isolation System Action - MSIS may be actuated from two locations, panel CR53 and panel CR56. These panels also contain the redundant reactor trip switches. A fire in one panel would not preclude the operator access to the alternate panel to initiate MSIS. The MSIS is designed to be fail safe (each of the redundant hydraulic dump valves for each MSIV will move to the trip position to close the MSIVs upon loss of power). Circuit failures are likely to result in MSIV closure.

RCP Trip Action - The switches for tripping the RCPs are located in panel CR56. If a fire in this panel prevented access to the panel, alternate means are available in the control room to trip the RCPs by deenergizing the 6.9 kV buses which supply power to the RCPs. While the operators responded to a fire in panel CR56, there would be adequate time to trip the RCPs from the alternate control room location at panel CR63.

Charging Pump Trip Action - The switches for tripping the charging pumps are located on panel CR58. If a fire in this panel prevented access to the panel, a low pressurizer level signal could start the three charging pumps. In the event that a spurious actuation caused the Volume Control Tank outlet valve to close, the charging pump low pressure trips would protect the pumps. Some circuits for the charging pump low pressure trip circuits are routed in the control room fire area, but not in the vicinity of the panel containing the pump or VCT valve hand switches.

In summary, the occurrence of a fire in an alternate shutdown area would not preclude operator actions in the control room nor lead to equipment damage adversely affecting safe shutdown. Therefore, taking credit for these operator actions in the control room prior to evacuation is not a safety concern.

SAN ONOFRE UNITS 2 AND 3
APPENDIX R DESIGN/LICENSING BASIS
FOR OPERATOR ACTIONS IN THE CONTROL ROOM

Background

San Onofre Units 2 and 3 received full power operating licenses from the NRC in 1982 and 1983, respectively. Subsequently, the NRC issued generic letters which provided additional clarification to implement the requirements of 10 CFR 50, Appendix R to assist licensees in performance of plant-specific Appendix R analyses. As a result of the guidance in these generic letters, including draft Generic Letter 85-01 (formally issued as Generic Letter 86-10), SCE informed the NRC, by letter dated September 19, 1985, that additional analyses were to be conducted for San Onofre Units 2 and 3 relative to the technical requirements of Appendix R. This reassessment of Appendix R compliance was performed consistent with Generic Letter 86-10 guidance and where the analyses may have differed from this guidance, SCE informed the NRC to verify that such differences were acceptable.

By letter dated May 31, 1987, SCE transmitted the San Onofre Units 2 and 3 Compliance Assessment Report (CAR) for NRC review and approval. The CAR documented the criteria, methodology and results of SCE's reassessment of compliance with the requirements of Appendix R in light of NRC guidance provided in Generic Letter 86-10. Also included in SCE's May 31, 1987 letter were responses to the NRC's Request for Additional Information (RAI) dated October 6, 1986, and formal requests for deviation from the requirements of Appendix R. The CAR documented that the San Onofre Units 2 and 3 safe and alternative shutdown analysis methodology is based on specific time frames to restore safe shutdown system operations. These restoration times are based on FSAR analyses and the ability to maintain the RCS process variables within those predicted for a loss of normal A.C. power, consistent with Appendix R, Section III.L.

Discussion

The SONGS 2 and 3 Appendix R alternative shutdown analysis identifies and credits three operator actions to be performed in the control room prior to evacuation in addition to tripping the reactor. These actions are to manually trip the RCPs and the charging pumps, and to initiate a MSIS thereby closing the main steam isolation valves and the main feedwater isolation valves. The alternative shutdown procedure identifies that similar operator actions will be performed outside the control room, to reverify these control room actions, in a matter of minutes following control room evacuation.

SCE clarified this issue in letters submitted November 20, 1987 and January 21, 1988 in response to NRC RAIs. The SCE response stated that, while the additional operator actions were to be performed in the control room, the capability to perform these actions outside the control room would also be

available. As part of the Appendix R analyses, a time and manpower study was performed to assess the time required to accomplish operator actions. Included in SCE's response and clarification to NRC RAI #16 were time lines depicting the operator action requirements for a fire requiring alternative shutdown, the time action is required, and the location of the action. SCE's revised response to NRC RAI #32 further clarified this position.

"Sufficient time is available to accomplish these actions since a fire would be expected to spread slowly and the operators should have time to perform the actions.

"To ensure that these actions are accomplished, the alternative shutdown procedure includes followup actions which are to be performed following evacuation of the control room. These followup actions repeat the trip and isolation functions which were performed prior to control room evacuation."

To support this, SCE's alternative shutdown procedure identifies that these actions will be reverified by the operators as the first set of actions to be performed outside the control room. The corresponding pages of the alternative shutdown procedure, documenting performance of these actions both inside and outside the control room, are included with this enclosure. SCE expects these actions to be completed within 6 minutes after control room evacuation.

In discussions between SCE and the NRC on this issue, SCE pointed out that SONGS 2 and 3 was not the first PWR to take credit for such operator actions in the control room, and that other plants had had their analysis reviewed and approved by the NRC. SCE demonstrated that the actions approved by the NRC for other plants are similar to those which the SONGS 2 and 3 alternative shutdown analysis credits.

The NRC's Safety Evaluation dated June 29, 1988 for San Onofre Units 2 and 3 reiterates SCE's submittals and documents NRR acceptance of this issue. This position is discussed on pages 18 and 19, which in part, state:

"During the review of post-fire safe shutdown methodology, the staff requested a summary of manual actions required for safe shutdown and the time limit to accomplish the action before an unrecoverable plant condition occurs. The staff had several concerns in this area. The first was that certain actions would have to be implemented outside of the fire area within a relatively brief period of time without a sufficient safety margin to account for unexpected delays. The staff was specifically concerned with actions within the first hour after the fire occurred. The licensee provided a response to this issue in the original CAR with

subsequent revisions in the November 20, 1987 and January 21, 1988 letters. Operator actions required outside of the fire area within the first half hour include: starting the diesel generator locally and closing the output breaker at the switchgear; de-energizing AFW and CVCS pumps at the switchgear or load center; tripping certain breakers and de-energizing certain valves as delineated in the CAR. Manual actions outside the fire area that need to be completed within the first hour include recovering the CCW, SWC, ECW and CVCS systems. All of the above-referenced actions were incorporated into a timeline to reflect the manpower required to complete those actions within the specified time. The licensee determined that manual actions required for safe shutdown can be completed in the time required so that safe plant shutdown could be achieved."

"The staff was also concerned that the licensee identified certain manual actions within the control room that must be taken prior to evacuation due to a fire. They include: tripping the reactor coolant pumps; tripping the charging pumps and closing the MSIVs and MFIVs by manually initiating a main steam isolation signal. These and other similar actions have been previously approved by the staff at other power plants. The actions can be performed outside the control room, regardless of circuit damage in the control room. They will prevent a very unlikely series of events, which includes spurious actuations, the failure of specific automatic functions, and the operations of other specific automatic functions from causing RCS process variables to exceed those limits predicted for a loss of normal AC power. In the event the operations cannot be performed before leaving the control room, the operations can be performed at the remote shutdown stations by local manual operation to de-energize components."

Conclusion

In conclusion, SCE considers the operator actions to be performed in the control room prior to evacuation in the event of a fire, as described in the SONGS 2 and 3 Appendix R alternative shutdown analysis, to be consistent with nuclear industry practices and NRC policy. Acceptable resolution of this issue has been previously documented in the NRC's Safety Evaluation dated June 29, 1988.

SDMS NO.: 000CR0 (If Applicable)

REFERENCE: SO123-VI-1.0.1

TEMPORARY CHANGE NOTICE

Page 1 of 1

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Originator

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(IF THE ANSWER TO A, B, C, D OR E IS YES, A TCN IS NOT AUTHORIZED.)

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SPS Date

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REVIEWED AND APPROVED BY: (AT LEAST ONE (1) SRO ON THE UNIT AFFECTED)

1) Plant Management Staff - Unit 1 Date _____ Time _____	2) Plant Management Staff - Units 2&3 Date _____ Time _____
Could this TCN affect or does it represent a change to a plant operation in progress? YES ___ NO <input checked="" type="checkbox"/>	Could this TCN affect or does it represent a change to a plant operation in progress? YES ___ NO <input checked="" type="checkbox"/>
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FINAL APPROVAL

REVIEWED AND APPROVED BY:

5) Cognizant/Functional Division Manager Date _____	6) Quality Assurance - Units 1, 2 and 3 Date _____
--	---

CONTROL

ISSUED

*If a document is Not QA Affecting, obtain initial approval from the Cognizant Supervisor(s) on the affected Unit(s) (signs Plant Management Staff/line(s)) and final approval from the CFDM prior to submittal to COM. No other signatures are required.

**If QA Affecting, approval shall be by one member of the Plant Management Staff, and one SRO Licensed on the unit or units affected. (For TCN approval, members of the Plant Management Staff are defined as the supervisor in charge of the shift, or as designated in writing by the CFDM, exercising responsibility in the specific area and unit(s) addressed by the change.)

***If YES, the Shift Superintendent shall provide the required SRO approval.

NUCLEAR GENERATION SITE
 UNITS 2 AND 3
 COMPLETE REVISION
 EFFECTIVE DATE August 12, 1988

ABNORMAL OPERATING INSTRUCTION
 REVISION 2
 TCN 2-2
 S023-13-2
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SHUTDOWN FROM OUTSIDE THE CONTROL ROOM

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QA PROGRAM AFFECTING

NOTE: PERTINENT STEPS ANNOTATED WITH (*)

NUCLEAR GENERATION SITE
UNITS 2 AND 3

ABNORMAL OPERATING INSTRUCTION S023-13-2
REVISION 2
TCN 2-2 PAGE 2 OF 204

SHUTDOWN FROM OUTSIDE THE CONTROL ROOM

1.0 SYMPTOMS

NOTE: Entry into this Abnormal Operating Instruction may have been directed by S023-13-21, "Fire".

- 1.1 Any condition that renders continued operation from the Control Room impossible.
- 1.1.1 Dense smoke or uncontrolled fire.
 - 1.1.2 Massive damage to Instrumentation and Control cables.
 - 1.1.3 High Radiation source inside the Control Room Area.
 - 1.1.4 Toxic Gas source inside the CREACUS Envelope.

CAUTION

Control Room Evacuation is an extreme measure. Reasonable effort should be made to maintain the Control Room manned. Utilize available respiratory and fire-fighting equipment as appropriate. Address component failures on an individual basis. (The SS/CRS may direct selected local manual actions, called out in this instruction to be performed as necessary without evacuating the Control Room.) IF all attempts to operate from the Control Room prove inadequate, THEN proceed to step 2.0 and perform this entire Instruction.

2.0 IMMEDIATE OPERATOR ACTIONS

- 2.1 Manually Trip the Reactor.
- 2.2 Manually Initiate MSIS.
- 2.3 Select MANUAL and Stop all Charging Pumps.

CAUTION

DO NOT complete the following step until all previous steps have been completed.

- * 2.4 Stop all RCPs.

(Closes MSIV's
and MFIV's) *

*

*

NUCLEAR GENERATION SITE
UNITS 2 AND 3

ABNORMAL OPERATING INSTRUCTION
REVISION 2
ATTACHMENT 1
TCN 2-2

S023-13-2
PAGE 13 OF 204

SHIFT SUPERINTENDENT DUTIES

PERF. BY
INITIALS

1.0 At the SSD Locker, obtain an emergency lantern,
Steam Tables and SS Keypad (SSD KIT: SS).

2.0 Establish the Control Room Command Function at the EVSD:

2.1 Unlock and Open Procedures Locker outside (west wall)
EVSD (Key No. 55).

2.2 Enter EVSD Room (Key No. 1).

2.3 At the EVSD, take actions as follows:

(2.4)*

2.3.1 Select all RCPs to STOP for BOTH UNITS.

U2: _____

U3: _____

2.3.2 Select all LOCAL/CONT RM Switches
to LOCAL for BOTH UNITS.

U2: _____

U3: _____

2.3.3 When status indication is illuminated
(indicating that Fire Isolation Switches
have been selected to LOCAL), then Stop
Emergency Chillers E-335 and E-336
and ECW Pumps P-160 and P-162.

U2: _____

U3: _____

3.0 Activate the Emergency Plan:

3.1 Determine event classification and reporting requirements
as follows:

CAUTION

Performing alignments specified in Operator
Checklists will result in disabling ESFAS
equipment. Deviation from Technical
Specifications 3.5.2, 3.6.2.1, 3.8.1.1 and
3.8.2.1 will result. Action which departs
from license conditions or Technical
Specifications is permitted to protect
the public health and safety per 10 CFR 50.54(x).
NRC notification is required within one hour
per 10 CFR 50.72.

NUCLEAR GENERATION SITE
UNITS 2 AND 3

ABNORMAL OPERATING INSTRUCTION
REVISION 2
ATTACHMENT 2
TCN 2-2

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PAGE 19 OF 204

UNIT 2 CRS DUTIES

PERF. BY
INITIALS

1.0 At the SSD Locker, obtain an emergency lantern, screwdriver for electrical panel access, Headset and CRS 2 Keypad (SSD KIT: CRS 2).

NOTES: 1. Do not delay these actions for any Health Physics, Security, or any other concerns; however, personnel shall not intentionally exceed 25 rem exposure to the whole body in order to protect plant equipment. Due to the seriousness of the emergency, prompt completion of these actions overrides all other Procedures, Documents, Work Plans, Technical Specifications, Technical Manuals, and/or Verbal Directions given by any person and/or group of people other than the Operations Shift Superintendent or Station Emergency Director.

2. Action which departs from license conditions or Technical Specifications is permitted to protect the public health and safety per 10 CFR 50.54 (x).

CAUTION Performing alignments specified in Operator Checklists will result in disabling ESFAS equipment. NRC notification is required within one hour per 10 CFR 50.72.

2.0 In the 2D2 Vital Power Distribution Room (Key No. 2):

2.1 At 2D2P1, Ensure Closed ESF Equipment DC Control Power:

2.1.1 2D2P1-01 (2A06)

2.1.2 2D2P1-02 (2B06)

2.1.3 2D2P1-11 (2G-003 Panel 2L-161)

2.1.4 Ensure Open all other breakers on 2D2P1:

.1 2D2P1-03, RTCB Cabinet 2L-033

.2 2D2P1-04, NSSS Cabinet 2L-071-3R

.3 2D2P1-05, 1E Aux. Relay Cabinet 2L-421

.4 2D2P1-08, 1E Aux. Relay Cabinet 2L-345

(2.2) *

(This action will serve to close Unit 2 MSIV's & MFIV's.)

NUCLEAR GENERATION SITE
UNITS 2 AND 3

ABNORMAL OPERATING INSTRUCTION
REVISION 2
ATTACHMENT 3
TCN 2-2

S023-13-2
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UNIT 3 CRS DUTIES

PERF. BY
INITIALS

1.0 At the SSD Locker, obtain an emergency lantern, screwdriver for electrical panel access, Headset and CRS 3 Keypad (SSD KIT; CRS 3).

- NOTES: 1. Do not delay these actions for any Health Physics, Security, or any other concerns; however, personnel shall not intentionally exceed 25 rem exposure to the whole body in order to protect plant equipment. Due to the seriousness of the emergency, prompt completion of these actions overrides all other Procedures, Documents, Work Plans, Technical Specifications, Technical Manuals, and/or Verbal Directions given by any person and/or group of people other than the Operations Shift Superintendent or Station Emergency Director.
2. Action which departs from license conditions or Technical Specifications is permitted to protect the public health and safety per 10 CFR 50.54 (x).

CAUTION Performing alignments specified in Operator Checklists will result in disabling ESFAS equipment. NRC notification is required within one hour per 10 CFR 50.72.

2.0 In the 3D2 Vital Power Distribution Room (Key No. 4):

2.1 At 3D2P1, Ensure Closed ESF Equipment DC Control Power:

- 2.1.1 3D2P1-01 (3A06) _____
- 2.1.2 3D2P1-02 (3B06) _____
- 2.1.3 3D2P1-11 (3G-003 Panel 3L-161) _____
- 2.1.4 Ensure Open all other breakers on 3D2P1:
 - .1 3D2P1-03, RTCB Cabinet 3L-033 _____
 - .2 3D2P1-04, NSSS Cabinet 3L-071-5R _____
 - .3 3D2P1-05, 1E Aux. Relay Cabinet 3L-421 _____
 - .4 3D2P1-08, 1E Aux. Relay Cabinet 3L-345 _____

(2.2) *

(This action will serve to close Unit 3 MSIV's & MFIV's.)

NUCLEAR GENERATION SITE
UNITS 2 AND 3

ABNORMAL OPERATING INSTRUCTION
REVISION 2
ATTACHMENT 4
TCN 2-2

SO23-13-2
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UNIT 2 CO DUTIES

PERF. BY
INITIALS

1.0 At the SSD Locker, obtain an emergency lantern, Steam Tables, Alarming Dosimeter, Headset and 21 Keyset (SSD KIT: 21).

NOTES: 1. Do not delay these actions for any Health Physics, Security, or any other concerns; however, personnel shall not intentionally exceed 25 rem exposure to the whole body in order to protect plant equipment. Due to the seriousness of the emergency, prompt completion of these actions overrides all other Procedures, Documents, Work Plans, Technical Specifications, Technical Manuals, and/or Verbal Directions given by any person and/or group of people other than the Operations Shift Superintendent or Station Emergency Director.

2. Use Key No. 4 to access Penetration Area 45'.

3. Any necessary abnormal circuit breaker operations should be conducted per Attachment 21 to prevent personnel injury or equipment damage.

2.0 Proceed to Penetration Area 45' by way of the Unit 2 Train A 1E Swgr Room and Cable Riser Gallery.

(2.4) *

(This action will trip RCP's.)
for Unit 2

2.1 At 2A01, Ensure Open RCP Breakers per Attachment 21:

2.1.1 2A01-01, 2P-001

2.1.2 2A01-03, 2P-004

3.0 Proceed to Penetration Area 63' by way of the Fuel Handling Building Stairwell.

(2.4) *

(This action will trip RCP's.)
for Unit 2

3.1 At 2A02, Ensure Open RCP Breakers per Attachment 21:

3.1.1 2A02-01, 2P-002

3.1.2 2A02-03, 2P-003

NUCLEAR GENERATION SITE
UNITS 2 AND 3

ABNORMAL OPERATING INSTRUCTION
REVISION 2
ATTACHMENT 5
TCN 2-2

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UNIT 3 CO DUTIES

PERF. BY
INITIALS

1.0 At the SSD Locker, obtain an emergency lantern, Steam Tables, Alarming Dosimeter, Headset and 31 Keyset (SSD KIT: 31).

NOTES: 1. Do not delay these actions for any Health Physics, Security, or any other concerns; however, personnel shall not intentionally exceed 25 rem exposure to the whole body in order to protect plant equipment. Due to the seriousness of the emergency, prompt completion of these actions overrides all other Procedures, Documents, Work Plans, Technical Specifications, Technical Manuals, and/or Verbal Directions given by any person and/or group of people other than the Operations Shift Superintendent or Station Emergency Director.

2. Use Key No. 4 to access Penetration Area 45'.

3. Any necessary abnormal circuit breaker operations should be conducted per Attachment 21 to prevent personnel injury or equipment damage.

2.0 Proceed to Penetration Area 45' by way of the Unit 3 Train A IE Swgr Room and Cable Riser Gallery.

(2.4) *

2.1 At 3A01, Ensure Open RCP Breakers per Attachment 21:

(This action will trip RCP's for Unit 3)

2.1.1 3A01-02, 3P-001

2.1.2 3A01-04, 3P-004

3.0 Proceed to Penetration Area 63' by way of the Fuel Handling Building Stairwell.

(2.4) *

3.1 At 3A02, Ensure Open RCP Breakers per Attachment 21:

(This action will trip RCP's for Unit 3)

3.1.1 3A02-02, 3P-002

3.1.2 3A02-04, 3P-003

NUCLEAR GENERATION SITE
UNITS 2 AND 3

ABNORMAL OPERATING INSTRUCTION
REVISION 2
ATTACHMENT 6
TCN 2-2

S023-13-2
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UNIT 2 ACO DUTIES

PERF. BY
INITIALS

1.0 At the SSD Locker, obtain an emergency lantern, screwdriver for electrical panel access, Headset and 22 Keypad (SSD KIT: 22).

NOTE: Do not delay these actions for any Health Physics, Security, or any other concerns; however, personnel shall not intentionally exceed 25 rem exposure to the whole body in order to protect plant equipment. Due to the seriousness of the emergency, prompt completion of these actions overrides all other Procedures, Documents, Work Plans, Technical Specifications, Technical Manuals, and/or Verbal Directions given by any person and/or group of people other than the Operations Shift Superintendent or Station Emergency Director.

2.0 In the 2D1 Vital Power Distribution Room (Key No. 2):

2.1 At 2D1P1, Ensure Closed ESF Equipment DC control power:

2.1.1 2D1P1-01 (2A04)

2.1.2 2D1P1-02 (2B04)

2.1.3 2D1P1-11 (2G-002 Panel 2L-160)

2.1.4 Ensure Open all other breakers on 2D1P1:

.1 2D1P1-03, RTCB Cabinet 2L-033

.2 2D1P1-04, NSSS Cabinet 2L-071-3F

.3 2D1P1-05, 1E Aux. Relay Cabinet 2L-420

.4 2D1P1-06, 1E Aux. Relay Cabinet 2L-344

(2.2) *

(This action is redundant to Step 2.1.2 on p.19 of 204).

2.2 At 2D1 Switchboard, Open 2D1-05, 2HV-4705 and 2HV-4730 Power Supply.

3.0 In the Unit 2 Train A 1E Swgr Room:

3.1 Unlock and Open Fire Isolation Panel 2L-412 (Key No. 93).

(2.3) *

3.1.1 Select all Fire Isolation Switches to LOCAL.

(This action isolates Unit 2 CR circuits.)

NUCLEAR GENERATION SITE
UNITS 2 AND 3

ABNORMAL OPERATING INSTRUCTION
REVISION 2
ATTACHMENT 6
TCN 2-2

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PAGE 38 OF 204

UNIT 2 ACO DUTIES (Continued)

PERF. BY
INITIALS

3.2 Open Second Point of Control Cubicle 2A04-01.

NOTE: E-336 Second Point of Control is at EVSD.

3.2.1 Select all Control Switches to STOP/TRIP.

(2.3)*

3.3 At 2B04 select 2P-190 and 2P-191 Auxiliary Control Switches to STOP.

(This action will trip the charging pumps for Unit 2).

3.4 At 2B04 select 2B04-01, Supply from 2A04 Auxiliary Control Switch (Test Switch) to TRIP.

3.5 Connect Headset to CKT No. 1 Jack on west face of south column and establish communications with the Unit 2 CRS.

4.0 Ensure Open 2A04 breakers from Second Point of Control:

4.1 2A04-03, 2P-012

4.2 2A04-04, 2P-141

4.3 2A04-05, 2P-024

4.4 2A04-06, 2P-025

4.5 2A04-07, 2P-015

4.6 2A04-08, 2P-017

4.7 2A04-09, 2P-018

4.8 2A04-10, 2P-112

4.9 2A04-11, 2P-307

4.10 2A04-12, E-336 (Check breaker locally)

4.11 2A04-13, 2G-002 Output

4.12 2A04-16, Non-1E UPS

4.13 2A04-20, Supply to 2B04

NUCLEAR GENERATION SITE
UNITS 2 AND 3

ABNORMAL OPERATING INSTRUCTION
REVISION 2
ATTACHMENT 7
TCN 2-2

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UNIT 3 ACO DUTIES

PERF. BY
INITIALS

1.0 At the SSD Locker, obtain an emergency lantern, screwdriver for electrical panel access, Headset and 32 Keyset (SSD KIT: 32).

NOTE: Do not delay these actions for any Health Physics, Security, or any other concerns; however, personnel shall not intentionally exceed 25 rem exposure to the whole body in order to protect plant equipment. Due to the seriousness of the emergency, prompt completion of these actions overrides all other Procedures, Documents, Work Plans, Technical Specifications, Technical Manuals, and/or Verbal Directions given by any person and/or group of people other than the Operations Shift Superintendent or Station Emergency Director.

2.0 In the 3D1 Vital Power Distribution Room (Key No. 4):

2.1 At 3D1P1, Ensure Closed ESF Equipment DC control power:

2.1.1 3D1P1-01 (3A04)

2.1.2 3D1P1-02 (3B04)

2.1.3 3D1P1-11 (3G-002 Panel 3L-160)

2.1.4 Ensure Open all other breakers on 3D1P1:

.1 3D1P1-03, RTCB Cabinet 3L-033

.2 3D1P1-04, NSSS Cabinet 3L-071-5F

.3 3D1P1-05, 1E Aux. Relay Cabinet 3L-420

.4 3D1P1-06, 1E Aux. Relay Cabinet 3L-344

2.2 At 3D1 Switchboard, Open 3D1-05, 3HV-4705 and 3HV-4730 Power Supply.

3.0 In the Unit 3 Train A 1E Swgr Room:

3.1 Unlock and Open Fire Isolation Panel 3L-412 (Key No. 93).

3.1.1 Select all Fire Isolation Switches to LOCAL.

(2.2) *

(This action is redundant to Step 2.1.2 on p. 22 of 204).

(2.3) *

(This action isolates Unit 3 control room circuits).

NUCLEAR GENERATION SITE
UNITS 2 AND 3

ABNORMAL OPERATING INSTRUCTION
REVISION 2
ATTACHMENT 7
TCN 2-2

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UNIT 3 ACD DUTIES (Continued)

PERF. BY
INITIALS

3.2 Open Second Point of Control Cubicle 3A04-01.

NOTE: E-336 Second Point of Control is at EVSD.

3.2.1 Select all Control Switches to STOP/TRIP.

3.3 At 3B04 select 3P-190 and 3P-191 Auxiliary Control Switches to STOP.

3.4 At 3B04 select 3B04-01, Supply from 3A04 Auxiliary Control Switch (Test Switch) to TRIP.

3.5 Connect Headset to CKT No. 1 jack on west face of north column and establish communications with the Unit 3 CRS.

4.0 Ensure Open 3A04 breakers from Second Point of Control:

4.1 3A04-02, E-336 (Check breaker locally)

4.2 3A04-03, 3P-012

4.3 3A04-04, 3P-141

4.4 3A04-05, 3P-024

4.5 3A04-06, 3P-025

4.6 3A04-07, 3P-015

4.7 3A04-08, 3P-017

4.8 3A04-09, 3P-018

4.9 3A04-10, 3P-112

4.10 3A04-11, 3P-307

4.11 3A04-12, Non-1E UPS

4.12 3A04-13, 3G-002 Output

4.13 3A04-17, Supply to 3B04

(2.3) *
(This action trips Unit 3 charging pumps.)

ENCLOSURE 3

**Chemical and Volume Control System
Charging Pump Loss of Suction
Evaluation Summary Report**

**San Onofre Nuclear Generating Station
Units 2 and 3**

**Southern California Edison Company
2244 Walnut Grove Avenue
Rosemead, California 91770**

November, 1988

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Charging Pump Loss of Suction Evaluation Summary	

1.0 INTRODUCTION

This report provides a summary of the 10CFR50 Appendix R Section III.G/III.L Compliance Assessment documentation evaluation for the protection of the chemical and volume control system charging pumps from loss of suction flow subsequent to closure of the volume control tank suction valve.

2.0 BACKGROUND

The SONGS 2/3 Chemical and Volume Control System charging pump suction paths are shown on Figure 1. Five paths are available to provide borated water to the suction of the charging pumps. These paths are: one path via the volume control tank, one path via the refueling water storage tank, two paths via gravity feed from the boric acid make-up tanks and a path via boric acid make-up pump feed from the boric acid make-up tanks.

The chemical and volume control system consists of 3 charging pumps (one train A pump, one train B pump and one swing pump which can be powered from train A or B). All pumps are started by a safety injection actuation signal (SIAS). Each pump is provided with a suction pressure trip which will protect the pump from loss of suction. The suction pressure trip is overridden by a SIAS start of the pumps. One charging pump is operating during normal plant operation. All three charging pumps start on a pressurizer low level signal. However, this signal does not override the pump suction pressure trip, as does SIAS.

Normal suction to the charging pumps is via the VCT. LV-0227B is the VCT suction isolation valve which is normally open but closes on a SIAS. Charging pump suction from the Refueling Water Storage Tank (RWST) is via LV-0227C which is normally closed but opens on SIAS. LV-0227B closes on low VCT level while LV-0227C opens on low VCT level. The Boric Acid Make-up (BAMU) system also provides borated water to the charging pumps. The BAMU system is automatically aligned to the charging pumps on a SIAS. BAMU system flow is available via gravity feed from either BAMU tank via HV-9235 or HV-9240. Flow is also available via BAMU pumps P-174 or P-175 via HV-9247. BAMU gravity feed is powered from train B while BAMU pump feed is powered from train A.

Control Room indication is available for charging pumps (running status lights), LV-0227B/LV-0227C position and for low pressurizer level.

2.0 BACKGROUND

The SONGS 2/3 10CFR50 Appendix R Compliance Assessment credits manual trip of the charging pumps prior to damage due to spurious closure of the VCT isolation valve. This manual action would be taken in the control room and therefore can be taken shortly after operator identification of potential fire damage which may cause closure of the VCT isolation valve. Credit for this manual action is considered to be acceptable based on the rapid operator response and indications available in the control room.

This report utilizes data from the SONGS 2/3 10CFR50 Appendix R evaluation to assess the extent of fire damage required to cause closure of the VCT isolation valve without realignment of suction flow to another available flow path.

3.0 EVALUATION SUMMARY

A summary table (Table 1) has been compiled for all fire areas in which cabling associated with LV-0227B is routed. The table identifies for each fire area the type of cable routed in the area for each component identified in Figure 1. Also included in this table is the cable routing for the cooling units required for operation of the charging pumps and the boric acid make-up pumps. Power cables (P), Control cables (C) and interlock cables (N) in each area are identified. Fire areas which contain cables required for the pump suction pressure trip as well as those areas containing the Volume Control Tank (VCT) LV-0227B/C interlock are also identified in separate columns of Table 1. This data was obtained from the CABLE Report - System/Component/Cable/Fire Area Report (SCE Document No. 90035BG). In addition, all fire areas in which a spurious safety injection actuation signal may be initiated are identified (SIAS actuation is identified in the 10CFR50 Appendix R Compliance Assessment, SCE Document No. 90035AP, at the end of each fire area).

4.0 RESULTS

The summary of this evaluation on a fire area basis is provided in Table 2. Manual action from the control room to trip the charging pumps in order to ensure their availability subsequent to a potential spurious closure of the volume control tank isolation valve has been shown to be available for all fire areas in the SONGS 2/3 Appendix R evaluation. Charging pump suction pressure trip or automatic alignment of the charging pump suction to a viable flow path are also available for all plant fire areas except as noted below. For alternative shutdown fire areas (2/3-20, 2-5, 3-6, 2-14, 3-7, 2-28, 3-21) and fire areas 2-63, and 3-65, at least four faults must occur prior to deenergizing a charging pump in order to cause damage to all three pumps. The minimum required faults are 1) spurious SIAS, spurious closure of LV-0227C, HV-9235, HV-9240 and HV-9247 or 2) spurious closure of LV-0227B, failure of 2 charging pump suction pressure trip circuits, spurious pressurizer low level initiation of the charging pumps and failure of a charging pump or its support system circuits. The probability of initiating these faults as a result of a fire prior to securing the charging pumps is extremely low. Manual action to secure the charging pumps is taken within minutes of detection of a fire in the area. In addition ionization and heat detectors are provided in these fire areas in conjunction with a water spray system for all fire areas except the control room which is continually manned and contains manual fire fighting equipment. Therefore, at least one charging pump will remain available for all fire areas.

5.0 CONCLUSIONS

Manual tripping of the charging pumps from the control room is available for all fire areas as documented in the SONGS 2/3 10CFR50 Appendix R Compliance Assessment.

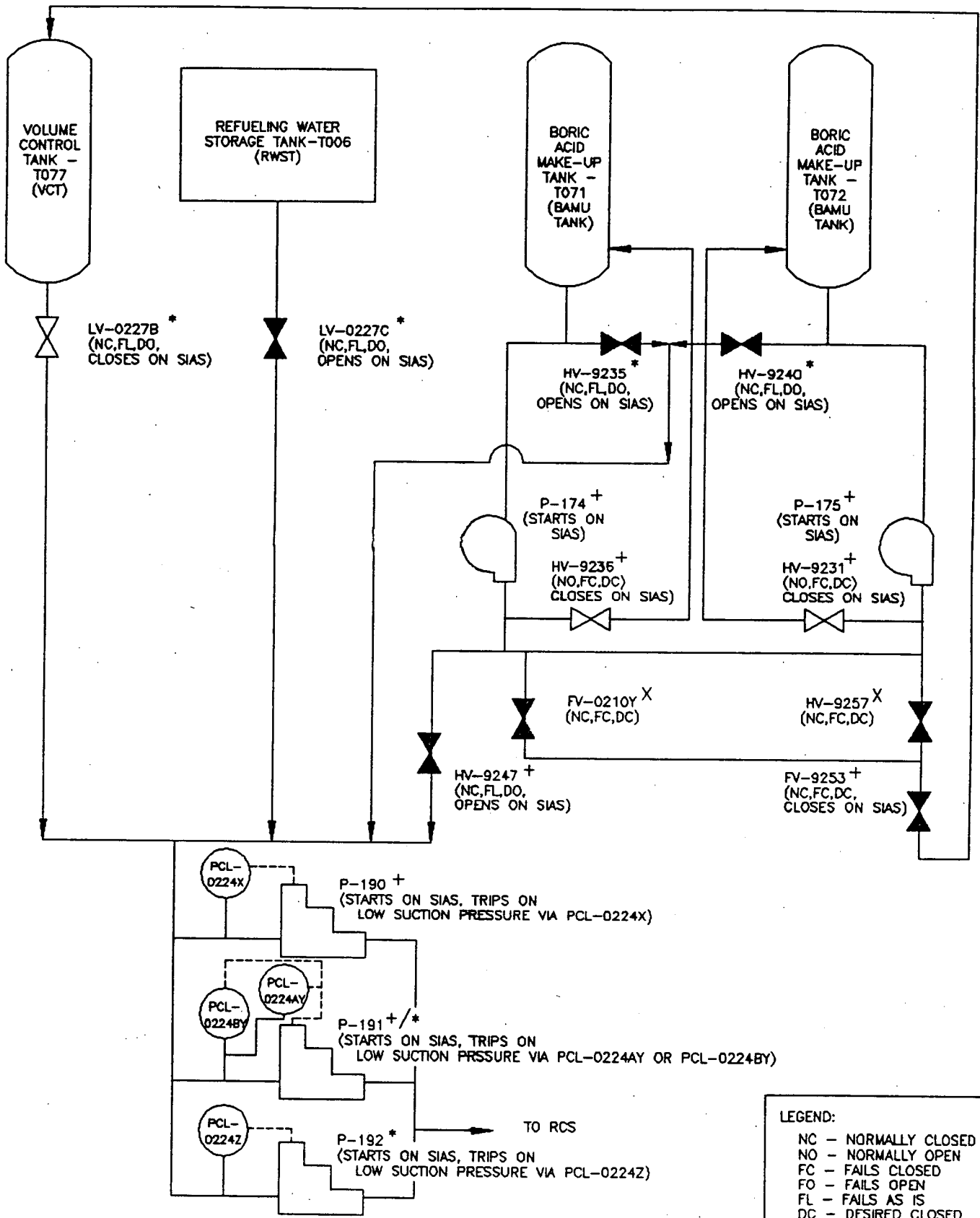
Charging pump loss of suction is not credible based upon the provisions of the charging pump low suction pressure trip or automatic realignment of the charging pump suction path. The possibility of damaging a charging pump is not possible in any fire area based on credit of control room trip of the pumps. In addition in most fire areas, based on the routing of the pump suction pressure trip and the BAMU system components, pump damage due to loss of suction is prevented without credit for control room action. For nine fire areas (identified in section 4.0) damage to all three charging pumps would only be possible if a manual action to trip the pumps was not taken until after a minimum of four independent faults occurred as a result of a fire. It is not considered credible that these faults could occur prior to deenergizing the credited charging pump. Manual action to deenergize the charging pump is taken within minutes of detection of a fire in the area and initiation of post fire shutdown procedures. Early detection is ensured by ionization and heat detectors in the fire areas of concern. Therefore, at least one charging pump will be available for a fire in any plant fire area.

6.0 REFERENCES

- 1 - Safe Shutdown Component Evaluation, SCE Document Number 90035AH, Revision 1
- 2 - CABLE Report - System/Component/Cable/Fire Area Report, SCE Document Number 90035BG, Revision 1
- 3 - 10CFR50 Appendix R III.G/III.L Compliance Assessment, SCE Document Number 90035AP, Revision 1
- 4 - Circuit Analysis, SCE Document Number 90035AN, Revision 1

FIGURE 1

SIMPLIFIED PIPING AND INSTRUMENTATION DIAGRAM FOR CHEMICAL AND VOLUME CONTROL SYSTEM CHARGING PUMP SUCTION PATHS



LEGEND:

- NC - NORMALLY CLOSED
- NO - NORMALLY OPEN
- FC - FAILS CLOSED
- FO - FAILS OPEN
- FL - FAILS AS IS
- DC - DESIRED CLOSED
- DO - DESIRED OPEN
- + - TRAIN A COMPONENT
- * - TRAIN B COMPONENT
- X - TRAIN X COMPONENT
- INTERLOCK

TABLE 1 - CHEMICAL AND VOLUME CONTROL SYSTEM COMPONENT ROUTING SUMMARY (PAGE 1 OF 1)

SONGS UNIT 2

FIRE AREA	P-190		P-192		P-191(A)		P-191(B)		P-192		LV-0227B/C VCT LVL INT	SPURIOUS SIAS	E-439		E-440		E-435		E-436		E-437		E-438		
	ENTL/PHR	CNTL/PHR	PHS. SW.	PHS. SW.	PHS. SW.	PHS. SW.	PHS. SW.	PHS. SW.	PHS. SW.	PHS. SW.			HW-9235	HW-9236	HW-9231	HW-9232	HW-9237	FW-9253	FW-9210Y	HW-9257	HW-9257	HW-9257	HW-9257	HW-9257	HW-9257
2-5	CM	CM	C	C	C	C	C	C	C	C	C	YES	C	C	C	C	C	C	C	C	C	C	C	C	C
2-14	CM	CM	C	C	C	C	C	C	C	C	C	YES	C	C	C	C	C	C	C	C	C	C	C	C	C
2-17-20	CM	CM	C	C	C	C	C	C	C	C	C	YES	C	C	C	C	C	C	C	C	C	C	C	C	C
2-28												NO													
2-27												NO													
2-28	CM	CM	C	C	C	C	C	C	C	C	C	YES	C	C	C	C	C	C	C	C	C	C	C	C	
2-29	N	N										YES	C	C	C	C	C	C	C	C	C	C	C	C	C
2-35	N	N										YES	C	C	C	C	C	C	C	C	C	C	C	C	C
2-36	N	N										YES	C	C	C	C	C	C	C	C	C	C	C	C	C
2-37	PCM	PCM	C	C	C	C	C	C	C	C	C	YES	C	C	C	C	C	C	C	C	C	C	C	C	C
2-43	N	N										YES	C	C	C	C	C	C	C	C	C	C	C	C	C
2-78	P	P										YES	C	C	C	C	C	C	C	C	C	C	C	C	C
2-94	P	P										NO													
2-98	P	P										NO													
2-102A												NO													
2-111A												YES	C	C	C	C	C	C	C	C	C	C	C	C	C
2-116												NO													
2-119	P	P										NO													

SONGS UNIT 3

FIRE AREA	P-190		P-192		P-191(A)		P-191(B)		P-192		LV-0227B/C VCT LVL INT	SPURIOUS SIAS	E-439		E-440		E-435		E-436		E-437		E-438		
	ENTL/PHR	CNTL/PHR	PHS. SW.	PHS. SW.	PHS. SW.	PHS. SW.	PHS. SW.	PHS. SW.	PHS. SW.	PHS. SW.			HW-9235	HW-9236	HW-9231	HW-9232	HW-9237	FW-9253	FW-9210Y	HW-9257	HW-9257	HW-9257	HW-9257	HW-9257	HW-9257
2-22												NO													
2-23												NO													
2-29	N	N										YES	C	C	C	C	C	C	C	C	C	C	C	C	C
2-78	P	P										NO													
2-78	P	P										NO													
2-102A												YES	C	C	C	C	C	C	C	C	C	C	C	C	C
2-111A												NO													
2-116												NO													
3-6	CM	CM	C	C	C	C	C	C	C	C	C	YES	C	C	C	C	C	C	C	C	C	C	C	C	C
3-7	CM	CM	C	C	C	C	C	C	C	C	C	YES	C	C	C	C	C	C	C	C	C	C	C	C	C
2/3-20	CM	CM	C	C	C	C	C	C	C	C	C	YES	C	C	C	C	C	C	C	C	C	C	C	C	C
3-21	CM	CM	C	C	C	C	C	C	C	C	C	YES	C	C	C	C	C	C	C	C	C	C	C	C	C
3-32	PCM	PCM	C	C	C	C	C	C	C	C	C	YES	C	C	C	C	C	C	C	C	C	C	C	C	C
3-33	PCM	PCM	C	C	C	C	C	C	C	C	C	YES	C	C	C	C	C	C	C	C	C	C	C	C	C
3-34	PCM	PCM	C	C	C	C	C	C	C	C	C	YES	C	C	C	C	C	C	C	C	C	C	C	C	C
3-65	N	N										YES	C	C	C	C	C	C	C	C	C	C	C	C	C
3-94	P	P										YES	C	C	C	C	C	C	C	C	C	C	C	C	C
3-118	P	P										NO													

(1) THE FOLLOWING CABLES ASSOCIATED WITH THE CHARGING PUMPS CAN DISABLE THE CHARGING PUMP SUCTION PRESSURE TRIP WITHOUT AFFECTING CHARGING PUMP CONTROL:

- 2131P-190 2131B06130E, 2131B06130L
- 2131P-191 2131B06130E, 2131B06130L
- 2131P-192 2131B06130E, 2131B06130L

Table 2 (Page 1 of 8)
Charging Pump Loss of Suction Evaluation Summary

Unit 2 Equipment Evaluation

Fire Area

Basis for Acceptability

2-5

Spurious SIAS, in conjunction with faults in the cabling for LV-0227C, HV-9235, HV9240 and HV-9247 or spurious closure of LV-0227B in conjunction with faults in the suction pressure trip for two charging pumps and a spurious low pressurizer level start of all charging pumps would be required prior to manual action to deenergize pumps. This combination of events is not considered credible before securing the pumps.

2-14

Spurious SIAS, in conjunction with faults in the cabling for LV-0227C, HV-9235, HV9240 and HV-9247 or spurious closure of LV-0227B in conjunction with faults in the suction pressure trip for two charging pumps and a spurious low pressurizer level start of all charging pumps would be required prior to manual action to deenergize pumps. This combination of events is not considered credible before securing the pumps.

2/3-20

Spurious SIAS, in conjunction with faults in the cabling for LV-0227C, HV-9235, HV9240 and HV-9247 or spurious closure of LV-0227B in conjunction with faults in the suction pressure trip for two charging pumps and a spurious low pressurizer level start of all charging pumps would be required prior to manual action to deenergize pumps. This combination of events is not considered credible before securing the pumps.

2-26

Spurious SIAS is not possible. Spurious closure of LV-0227B will not affect charging pump operation since suction pressure trip of at least two pumps will be unaffected by a fire in this area.

2-27

Spurious SIAS is not possible. Spurious closure of LV-0227B will not affect charging pump operation since suction pressure trip of at least two pumps will be unaffected by a fire in this area.

Table 2 (Page 2 of 8)
Charging Pump Loss of Suction Evaluation Summary

Unit 2 Equipment Evaluation (continued)

Fire Area

Basis for Acceptability

2-28

Spurious SIAS, in conjunction with faults in the cabling for LV-0227C, HV-9235, HV9240 and HV-9247 or spurious closure of LV-0227B in conjunction with faults in the suction pressure trip for two charging pumps and a spurious low pressurizer level start of all charging pumps would be required prior to manual action to deenergize pumps. This combination of events is not considered credible before securing the pumps.

2-29

Spurious SIAS would align both train A and train B BAMU system feed to the charging pumps. Spurious closure of LV-0227B would require credit for train A or train B charging pump suction pressure trips. Separation of train A and B in this fire area has been credited and documented in a deviation.

2-35

Spurious SIAS would align BAMU system feed to charging pumps, BAMU feed via BAMU pumps will be available. Faults on BAMU pump cables in the area will not disable the pumps. Spurious closure of LV-0227B will not affect charging pump operation since suction pressure trip of at least two pumps will be unaffected by a fire in this area.

2-36

Spurious SIAS would align BAMU system feed to charging pumps, BAMU feed via BAMU pumps will be available. Faults on BAMU pump cables in the area will not disable the pumps. Spurious closure of LV-0227B will not affect charging pump operation since suction pressure trip of at least two pumps will be unaffected by a fire in this area.

2-37

Spurious SIAS would align BAMU system feed to charging pumps, BAMU feed via gravity feed valves will be available. Spurious closure of LV-0227B may occur as a result of damage to the VCT level interlock circuit. Damage to this circuit causing LV-0227B to close would also cause LV-0227C to open, thereby realigning RWST flow to the charging pumps and preventing pump damage.

Unit 2 Equipment Evaluation (continued)

Fire Area	Basis for Acceptability
2-63	Spurious SIAS would align BAMU system feed to charging pumps. BAMU system feed via BAMU pumps will be available. Faults on BAMU pumps cables in the area will not disable pumps. Spurious closure of LV-0227B in conjunction with faults in the suction pressure trip for two charging pumps and a spurious low pressurizer level start of two charging pumps would be required prior to manual action to deenergize pumps. This combination of events is not considered credible before securing the pumps.
2-76	Spurious SIAS is not possible. Spurious operation of LV-0227B is not possible. Charging pump and associated HVAC Unit cables are routed in embedded conduit.
2-94	Spurious SIAS is not possible. Spurious operation of LV-0227B is not possible. Charging pump and associated HVAC Unit cables are routed in embedded conduit.
2-98	Spurious SIAS is not possible. Spurious closure of LV-0227B will not affect charging pump operation since suction pressure trip of at least two pumps will be unaffected by a fire in this area.
2-102A	Spurious SIAS will align RWST to charging pumps since LV-0227C is unaffected by a fire in this area. Spurious closure of LV-0227B will not affect charging pump operation since spurious operation of the charging pumps, without spurious SIAS initiation, is not possible in this fire area.
2-111A	Spurious SIAS is not possible. Spurious closure of LV-0227B will not affect charging pump operation since spurious operation of the charging pumps is not possible in this fire area.
2-116	Spurious SIAS is not possible. Failure of interlock cable will cause spurious operation of LV-0227B and LV-0227C which results in realignment to RWST.

Table 2 (Page 4 of 8)
Charging Pump Loss of Suction Evaluation Summary

Unit 2 Equipment Evaluation (continued)

Fire Area

Basis for Acceptability

2-119

Spurious SIAS is not possible. Train B charging pump cables for P-191 and P-192 are wrapped in this area. Spurious pump start of the charging pumps is not possible.

Table 2 (Page 5 of 8)
Charging Pump Loss of Suction Evaluation Summary

Unit 3 Equipment Evaluation

Fire Area

Basis for Acceptability

2-22

Spurious SIAS is not possible. Spurious closure of LV-0227B will not affect charging pump operation since suction pressure trip of at least two pumps will be unaffected by a fire in this area.

2-23

Spurious SIAS is not possible. Spurious closure of LV-0227B will not affect charging pump operation since suction pressure trip of at least two pumps will be unaffected by a fire in this area.

2-29

Spurious SIAS would align both train A and train B BAMU system feed to the charging pumps. Spurious closure of LV-0227B is not possible in this area. Separation of train A and B in this fire area has been credited and documented in a deviation.

2-76

Spurious SIAS is not possible. Spurious operation of LV-0227B is not possible. Charging pump and associated HVAC Unit cables are routed in embedded conduit.

2-94

Spurious SIAS is not possible. Spurious operation of LV-0227B is not possible. Charging pump and associated HVAC Unit cables are routed in embedded conduit.

2-102A

Spurious SIAS would align BAMU system feed to charging pumps. BAMU system feed via BAMU pumps will be available. Faults on BAMU pump cables in the area will not disable pumps. Spurious closure of LV-0227B will not affect charging pump operation since spurious operation of the charging pumps, without spurious SIAS initiation, is not possible.

Table 2 (Page 6 of 8)
Charging Pump Loss of Suction Evaluation Summary

Unit 3 Equipment Evaluation

Fire Area

Basis for Acceptability

2-111A

Spurious SIAS is not possible. Spurious closure of LV-0227B will not affect charging pump operation since spurious operation of the charging pumps is not possible.

2-116

Spurious SIAS is not possible. Spurious closure of LV-0227B will not affect charging pump operation since spurious operation of the charging pumps is not possible.

3-6

Spurious SIAS, in conjunction with faults in the cabling for LV-0227C, HV-9235, HV9240 and HV-9247. Spurious closure of LV-0227B is not possible. This combination of events is not considered credible before securing the pumps.

3-7

Spurious SIAS, in conjunction with faults in the cabling for LV-0227C, HV-9235, HV9240 and HV-9247 or spurious closure of LV-0227B is not possible. This combination of events is not considered credible before securing the pumps.

2/3-20

Spurious SIAS, in conjunction with faults in the cabling for LV-0227C, HV-9235, HV9240 and HV-9247 or spurious closure of LV-0227B in conjunction with faults in the suction pressure trip for two charging pumps and a spurious low pressurizer level start of all charging pumps would be required prior to manual action to deenergize pumps. This combination of events is not considered credible before securing the pumps.

Table 2 (Page 7 of 8)
Charging Pump Loss of Suction Evaluation Summary

Unit 3 Equipment Evaluation

Fire Area

Basis for Acceptability

3-21

Spurious SIAS, in conjunction with faults in the cabling for LV-0227C, HV-9235, HV9240 and HV-9247 or spurious closure of LV-0227B in conjunction with faults in the suction pressure trip for two charging pumps and a spurious low pressurizer level start of all charging pumps would be required prior to manual action to deenergize pumps. This combination of events is not considered credible before securing the pumps.

3-32

Spurious SIAS would align BAMU system feed to charging pumps, BAMU feed via gravity feed valves will be available. If the circuits for LV-0227C were not protected in the area, spurious closure of LV-0227B could occur without coincident opening of LV-0227C since LV-0227B/C interlock and LV-0227C are routed in this area. LV-0227C cables, however, are wrapped in this area.

3-33

Spurious SIAS would align BAMU system feed to charging pumps, BAMU feed via BAMU pumps will be available. Faults on BAMU pump cables in the area will not disable the pumps. Spurious closure of LV-0227B will not affect charging pump operation since suction pressure trip of at least two pumps will be unaffected by a fire in this area.

3-34

Spurious SIAS would align BAMU system feed to charging pumps, BAMU feed via BAMU pumps will be available. Faults on BAMU pump cables in the area will not disable the pumps. Spurious closure of LV-0227B will not affect charging pump operation since suction pressure trip of at least two pumps will be unaffected by a fire in this area.

Table 2 (Page 8 of 8)
Charging Pump Loss of Suction Evaluation Summary

Unit 3 Equipment Evaluation

Fire Area

Basis for Acceptability

3-65

Spurious SIAS would align BAMU system feed to charging pumps. BAMU system feed via BAMU pumps will be available. Faults on BAMU pumps cables in the area will not disable pumps. Spurious closure of LV-0227B in conjunction with faults in the suction pressure trip for two charging pumps and a spurious low pressurizer level start of all charging pumps would be required prior to manual action to deenergize pumps. This combination of events is not considered credible before securing the pumps.

3-96

Spurious SIAS is not possible. Spurious closure of LV-0227B will not affect charging pump operation since suction pressure trip of at least two pumps will be unaffected by a fire in this area.

3-118

Spurious SIAS is not possible. Train B charging pump cables for P-191 and P-192 are wrapped in this area. Spurious pump start of the charging pumps is not possible.