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### EMERGENCY CORE COOLING SYSTEMS SINGLE FAILURE ANALYSIS

SAN ONOFRE NUCLEAR GENERATING STATION

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UNIT 1

M-41383 REVISION 1 DECEMBER 1990

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#### RECORD OF REVISIONS

REVISION 0: Original issue.

REVISION 1: Adds Appendix B to identify Revision 0 errata and Appendix C to identify the action items resulting from each of the 26 categories of Revision 0 findings. Miscellaneous changes also made to the report text to clarify assumptions used in Revision 0. The Revision 0 FMEA and Boundary Valve Analysis tables are not updated as part of Revision 1. (Update of the FMEA and Boundary Valve Tables, including Cycle 11 modifications, will be performed as part of Revision 2.)

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### EMERGENCY CORE COOLING SYSTEMS SINGLE FAILURE ANALYSIS SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 1

#### I. INTRODUCTION AND BACKGROUND:

- A. In response to the NRC (R. A. Purple) letter to SCE dated April 8, 1976, a single failure analysis was performed for the systems required to mitigate a postulated loss of coolant accident (LOCA), including safety injection, charging, containment spray and recirculation, component cooling water, salt water cooling, and the auxiliary power system. This analysis, which used failure modes and effects methodology, was submitted by SCE letter dated December 21, 1976. However, the analysis did not evaluate the single failure susceptibility of the main feedwater isolation function associated with emergency core cooling systems (ECCS) operation during a LOCA or secondary system rupture, and was never updated to reflect subsequent plant design changes, including those implemented as a result of the analysis findings.
- B. On July 30, 1986, a failure of main steam pressure transmitter PT-459 at SONGS 1 caused a transient in all three channels of the feedwater control system and concurrent inoperability of all three channels of the steam/feedwater flow mismatch scram in the Reactor Protection System. In response to this event, SCE committed to several actions, including completion of single failure analyses (SFAs) for the SONGS 1 Reactor Protection System (RPS) and Engineered Safety Features (ESF) Systems to determine susceptibility of the SONGS 1 design to single failures.
- C. The RPS single failure analysis, submitted to the NRC by SCE letter dated March 11, 1987, identified single failure and event-specific failure susceptibilities in the steam/feedwater flow mismatch and RCS low flow scram functions.
- D. The ESF single failure analysis, submitted to the NRC by SCE letter dated November 6, 1987, included: 1) a failure modes and effects evaluation of the design changes which had been implemented to correct the single failure susceptibilities identified by the 1976 ECCS Single Failure Analysis, 2) a failure modes and effects analysis of the ESF functions not addressed by the 1976 ECCS single failure analysis (including containment isolation, main feedwater isolation, overpressure mitigation, and auxiliary feedwater), and 3) an event-specific single failure response analysis of those ESF functions identified as having potential common-cause, time— or event-dependent

failure susceptibilities. Single failure and event-specific failure susceptibilities were identified in the main feedwater isolation function and in realignment of swing 480 V Switchgear #3 (affecting recirculation and charging), reflecting errors in the 1976 ECCS analysis.

- E. An environmental qualification related review of outside containment equipment, in February 1988 (during the midcycle outage), identified that the modifications implemented as a result of the 1976 ECCS single failure analysis insufficient to correct the single susceptibilities of refueling tank isolation valve MOV-Additionally, as a result of reviews performed in response to NRC Generic Letter 88-14, dated August 8, 1988, single and common-cause failure susceptibilities were identified for the component cooling water system (ie, TCV-601A/B), and a follow-up review of other ESF systems for similar susceptibilities identified a single failure susceptibility in containment recirculation and spray (ie, CV-92).
- F. All identified RPS and ESF single and common-cause failure susceptibilities were corrected prior to restart from the Cycle 10 refueling outage, and the applicable single failure analyses updated as applicable. Additionally, as a result of the identification of errors and omissions in the 1976 ECCS analysis, SCE, in a letter to NRC Region V dated March 17, 1989, committed to reanalyze the ECCS for single failures within 9 months of restart from the Cycle 10 refueling outage.

#### II. SCOPE:

The reanalysis of the SONGS 1 Emergency Core Cooling Systems (ECCS) for single failures addresses the ECCS functions required for LOCA, SGTR and MSLB, both with and without a loss of offsite power. These events are bounding for the ECCS functions required for other events and involve the most limiting common-cause effects. The following ECCS functions were evaluated:

- Safety Injection, including main feedwater isolation and auto-termination of SI/FW flow on low RWST level
- o Cold Leg Recirculation (required for LOCA only)
- o Hot Leg Recirculation (required for cold leg LOCA only)
- Secondary Recirculation (required for MSLB or FWLB-D inside containment only)

- o Containment Spray and Hydrazine Injection (required for LOCA, MSLB or FWLB inside containment only)
- o Component Cooling Water
- o Saltwater Cooling
- o Safety Injection Actuation System
- O Containment Spray Actuation System (required for LOCA, MSLB or FWLB inside containment only)
- o Standby Power System (Diesel Generators)
- o Vital and Regulated Power System
- o Auxiliary Power System

The Reactor Protection System (RPS), Auxiliary Feedwater (AFW) system, Residual Heat Removal (RHR) system, Main Steam Dump system, Power Operated Relief Valves (PORVs), Reactor Coolant Pumps (RCPs) and various Ventilating/Cooling (HVAC) systems may also be required in some ECCS-initiating events.

Two of these additional systems, RPS and AFW, are addressed in existing single failure analyses M39405 and M39416 (respectively) and event-specific analysis M39419. The availability of RCPs (for SGTR events) and HVAC is evaluated as part of the ECCS Auxiliary Power System review. The PORVs, RHR and Main Steam Dump systems have not been specifically evaluated, since they were previously identified as not meeting single failure criteria for accident conditions.

#### III. METHODOLOGY:

- A. The ECCS Single Failure Analysis was performed per the criteria discussed in Section IV below, in five sequential, overlapping parts:
  - O A boundary valve analysis of each ECCS fluid system function
  - A failure modes and effects analysis of each ECCS fluid system function, including interface device and power supply dependencies
  - A failure modes and effects analysis of each ECCS actuation system
  - O A failure modes and effects analysis of the vital, regulated and auxiliary power systems common to the ECCS fluid and actuation systems

- o Identification of ECCS functions potentially susceptible to time or event-specific single failures (as discussed in Section IV, below). The ECCS single failure response evaluations are part of a separate document, the Event Specific Single Failure Response Evaluation (M-39419).
- B. The detailed methodology was as follows:
  - 1. The piping and instrumentation diagrams (P&IDs) for each ECCS function were marked up to show process flow path and boundary devices, based on the Emergency Operating Instructions (EOIs) and other applicable references. Instruments essential to the ECCS function (eg. flow rate indication required for valve modulation) were included as flow path devices.
  - 2. A boundary valve analysis was performed for each ECCS function. This analysis tabulated the branch line isolation valve configurations as to:
    - Normal valve position (open, closed or automatically closed),
    - o Whether the valve is locked,
    - o Safety related backups (valves, caps or blind flanges) and their normal positions, and
    - o Non-safety related backups and their normal positions.

Boundaries were taken at the first normally or automatically closed safety related valve or at the safety related/non-safety related class boundary valve, whichever comes first. Check and relief valves were included but treated as passive devices. A DBASE program (included in Appendix A) was then used to automatically sort the boundary valve analysis database and flag those configurations which do not meet single failure criteria.

- 3. For each power-operated device (including essential instruments) identified in Step 1 above, the applicable elementary diagrams were marked up to show interface devices and dependencies (eg. Sequencer inputs, interlock inputs/outputs, power supplies, etc.). The circuits were otherwise treated as black boxes for simplicity.
- 4. For each train, the flow path and boundary devices, including interface device and power dependencies, were

evaluated in the Failure Modes and Effects Analysis (FMEA). To limit the FMEA database to a workable size, manual valves and check valves for each function were grouped into flow path and boundary entries for each train and backup boundary devices were included in the FMEA database only if both the first boundary device and its backup are power-operated. Check valves were included in the data base, but identified as "passive" devices. The electrical devices from Step 3 above as well as the applicable power sources (air, backup nitrogen, electrical bus, etc.) were included as "loop" devices for each power-operated item, similar to the RPS SFA. Differences between SIS and SISLOP actuation and common-cause (eg. EQ or seismic) susceptibility, were identified where applicable.

- 5. An automated sort of the FMEA database for all ECCS functions was performed to identify the ECCS actuation device dependencies.
- 6. The applicable elementaries, load schedules, etc. for the ECCS actuation systems were marked up similar to Steps 1 and 3 above. Using the automated sort from Step 5, the applicable devices were evaluated in the FMEA, including differences between SIS and SISLOP actuation and common-cause susceptibility, where applicable.
- 7. An automated sort of the FMEA database for all ECCS functions was performed to identify the control and motive power dependencies.
- 8. The one line diagrams and applicable elementaries for the Vital/Regulated Power and Auxiliary Power systems were marked up similar to Steps 1 and 3 above. Using the automated sort from Step 7, the applicable devices were evaluated in the FMEA, including differences between SIS and SISLOP events and common-cause susceptibility, where applicable.
- 9. Using the criteria discussed in Section IV below, the ECCS functions which are potentially susceptible to time or event-specific single failures were identified for further evaluation in M-39419 (Event-Specific Single Failure Response Evaluation).

#### IV. CRITERIA:

A. To the extent practical, the single failure analyses for the ECCS functions were performed using notation, format and assumptions consistent with the RPS and ESF single failure analyses submitted to the NRC on March 11, 1987 and November 6, 1987, respectively. Specifically: 1. The module level failure mode and effects analyses were performed in accordance with the applicable criteria of IEEE Standard 279-1971. Specifically, Parts 2, 4.2 and 4.7 of the Standard were applied as follows:

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- a. Single failures were postulated at the level of tag-numbered devices (modules) which resulted in the most limiting effects or combination of effects on the ECCS functions. Credit was conservatively not taken for module internal design features (components) which could preclude such failures except where specifically identified. All tag-numbered and interface devices which could affect the ECCS output functions (ie, not excluded by the "black box" methodology and criteria addressed in paragraph III.B.3 above and IV.A.1.c below) were so addressed.
- b. The failure modes for each device which result in the most limiting effects or combination of effects were selected so that all pertinent ECCS output and interface (including isolation device) failure combinations were bounded. The failure modes typically considered for each type of device were:
  - o Transmitter (eg. PT, LT, FT): SIGNAL HIGH or LOW
  - o Power Supply (eg. YE): OUTPUT VOLTS HIGH or ZERO
  - o Indicator (eg. PI, LI, FI): INPUT OPEN or SHORT
  - o Test Switch (eg. Y): OPEN or SHORT (CLOSED)
  - O Controller or Bistable (eg. PC, LC, FC): INPUT OPEN or SHORT; OUTPUT TRIPPED or UNTRIPPED, HIGH or LOW
  - o Relay: INPUT OPEN or SHORT; OUTPUT TRIPPED or UNTRIPPED, ON or OFF, CONTACTS OPEN or CLOSED as applicable. Combinations such as CONTACTS OPEN (ON) were used as needed for clarity.
  - o Valve/Actuator: OPEN or CLOSED
  - o Pump/Motor: OUTPUT LOW

In addition, single pole or phase GROUNDS were postulated in all grounded circuits. In some cases, another failure mode (eg. INPUT SHORT) was identified as bounding for the affected circuit, rather than creating a separate database entry.

c. Where a portion of a channel had only a single output and the net effect of the failures could be expressed in terms of that output, the devices in that portion of the circuit were permitted to be treated as a single entity. For example: a) postulated failures of the pressure regulating valve or solenoid operated pilot valve for a pneumatically actuated isolation valve are bounded by failures of the isolation valve itself, and b) postulated failures of control components in a manually-controlled power operated valve are bounded by those of the valve/actuator and its control power and interlock dependencies.

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- d. The failure modes for any channel-common or traincommon devices (eg. selector switches, transfer
  switches, auctioneering or signal comparison devices)
  were conservatively considered to result in
  channel-common or train-common failures, respectively, if unisolated signals were present in the
  device and channel/train separation and identity were
  not maintained through the device. The postulated
  failure modes were:
  - o OPEN (at all input channels/trains)
  - o SHORT (of all like poles or phases, resulting in paralleling of all inputs)
  - o GROUND (of all like poles or phases)
- e. It was assumed that events requiring ECCS actuation could be initiated from any applicable plant condition.
- f. The only applicable ECCS actuation instrumentation which have control functions are associated with the Reactor Protection System, and have been previously analyzed for control/protection interactions. Accordingly, a control/protection system interaction (multiple failure) analysis was not performed as part of the ECCS evaluation.
- B. Because the ECCS systems include fluid system components (eg. pumps and valves) as actuated devices, the applicable criteria of ANSI Standard N658-1976 (Single Failure Criteria for PWR Fluid Systems) were also applied to the single failure analyses for these functions. Specifically, Parts 2, 3.4, 3.5, 3.6, 3.7, 3.10 and 4 were applied as follows:
  - Single failures were postulated in all ECCS process flow path and flow path boundary devices, including manual

valves and applicable valve control circuits, considering both failure to actuate and spurious actuation (eg. due to operator error), except as provided in item 2 and as follows:

- a. Passive devices such as orifice plates, flanges and similar pressure boundary parts were excluded.
- b. Check valves were included, but considered passive devices, in accordance with the SONGS 1 design basis.
- c. Credit was taken for administrative controls (including valve locking) to preclude spurious actuation of applicable manual valves.
- d. Credit was taken for the provisions of NRC Branch Technical Position ICSB-18 to preclude spurious actuation of applicable manually-controlled electrically operated valves.
- 2. Only active failures were considered as single failures, in accordance with the SONGS 1 design basis. Failure of passive devices or process pressure boundaries were not postulated in addition to the initiating event.
- 3. Compressed air (ISA) system failure was considered as a potential failure for pneumatically actuated valves. Failure of non-seismic systems, including ISA, was conservatively considered as a common-cause effect except where credit was specifically permitted by the Standard Review Plan (eg. SRP Section 15.1.5 for secondary pipe rupture inside containment).
- C. Common Cause and Pre-Existing Failures
  - 1. Except as specifically provided above, loss of non-seismic systems and of any devices not qualified for the applicable post-accident harsh environment were considered to be potential common-cause failures.
    - a. Common-cause failures of the non-seismic 220kV Switchyard were considered to result in a loss of offsite power. Failures of individual 220kV switchyard components were evaluated as described in Table 12-1.
    - b. Common-cause seismic failure was not postulated for systems and devices qualified to Seismic Interaction B/A criteria (in accordance with Regulatory Guide 1.29 position C.2).

- 2. The probability of a loss of offsite power (LOP) to the San Onofre switchyard due to failure of the offsite distribution system was previously determined to be less than 10<sup>-12</sup> per year (eg. San Onofre Units 2/3 UFSAR Section 8.2.2.3), which is insignificant relative to the probability of a LOP due to failure of onsite equipment (ie, breakers, transformers, cabling, etc.). Consequently, common-cause failure of non-safety related Auxiliary Transformer C was considered as a potential cause of the postulated LOP for SISLOP events.
- 3. Transfer switches, disconnect switches, etc. whose positions are not alarmed, indicated or otherwise supervised in the control room were considered to be potential pre-existing failures unless included in an administratively controlled locking and/or periodic surveillance program.
- 4. Credit was taken for indirect indication of failures to preclude an undetected pre-existing condition. For example, loss of power ("VOLTS LOW") to a valve or pump control circuit is considered detectable by the dimming or loss of the associated control room status indication, and is therefore identified as CONTROL ROOM INDICATION in the method of detection field in the FMEA.
- 5. Common-cause and pre-existing failures were considered to occur in addition to the random single active failure, consistent with the provisions of ANSI Standard N658-1976.

#### D. Other Assumptions

- 1. Except as otherwise stated, it was assumed that operation in accordance with existing procedures (including EOIs) would preclude equipment damage due to overheating, pump gas-binding, minimum flow conditions, run-out or cavitation.
- 2. Other assumptions and criteria pertinent to a given system were applied as stated in the NOTES for each Section.

#### E. Notation / Numbering

1. Each item in the boundary valve analysis was assigned a unique item number, made up of:

[system].[train].[device]

and each item in the module-level FMEA was assigned a unique item number, made up of:

[system].[train].[device].[dependency].[failure mode]

similar to the RPS and ESF Single Failure Analyses. Train (or channel) common devices for a system were generally addressed following the items for each train; for example, in a system with 2 trains or channels:

[system].3.[device].[dependency].[failure mode]

would be a train-common or third-of-a-kind device in the FMEA table.

- 2. Due to the field length limitations of DBASE III (ie, 254 characters), abbreviations were needed in the FMEA tables. The meaning is generally clear from the context (eg. ALT for ALTERNATE, BRKR for BREAKER, SEQ for Safeguards Load SEQUENCER System, SWYD for SWITCHYARD, etc.).
- E. Screening Criteria for Event-Specific Susceptibilities

Based on the analyses previously completed (eg. in M-39419), an evaluation of event-specific single failure response is required if:

- 1. The flow requirements for a system are dependent on the response of another system which is actuated from separate instrumentation (eg. the RPS/AFWS integrated response evaluation in M-39419). This requires an event-dependent evaluation of the integrated response of the applicable systems. Or,
- 2. The system has two or more safe states for the same equipment (eg. must be on during one part of the accident but off during another part, or in different alignments for different events, etc.) This requires a time-dependent evaluation of the response to applicable single failures. Or,
- 3. System components or supporting equipment are susceptible to location-dependent common-cause failures (eg. due to the environment for inside vs. outside containment line breaks). This requires a location-dependent evaluation of the response to applicable single failures. Or,
- 4. The system has train-common suction or discharge piping in which misoperation of one train could divert flow from or otherwise adversely impact operation of the redundant train. This requires a time-dependent

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evaluation of the response to applicable single failures.

#### V. SUMMARY OF RESULTS

A. FMEA and Boundary Valve Analysis Results

Revision 0 of this analysis identified 283 potential single failure susceptibilities and 428 other items, such as procedure changes and calculation revisions (472 total FMEA line item findings), falling into the 26 categories listed below. Action items were developed to address each of the 26 categories to support SONGS 1 restart. The resolution of each of the individual line item findings by the specified action items is tabulated in Appendix C.

1. The common-header ECCS fluid systems (Safety Injection, Cold Leg, Hot Leg and Secondary Recirculation, Containment Spray and Component Cooling Water) could be disabled by flow or inventory diversion through boundary valves which are not locked or provided with a backup isolation valve, cap or blind flange. These are principally vent and drain valves, which as a category were excluded from the valve locking procedure.

Unlocked boundary valves with only a non-safety related backup are considered acceptable based on the scoping criteria for Systematic Evaluation Program (SEP) Topic III-6, "Seismic Design Considerations".

- 2. Potentially unacceptable diversion of post-LOCA recirculation inventory could occur through RCS boundary valves (eg. CV-202, 203, 204) and critical valves in the post-LOCA recirculation systems (eg. RWST outlet check valve CRS-301) which are not seat leakage tested as part of the ASME Section XI Inservice Test Program for valves.
- 3. Several manual valves which must be operated locally to mitigate single failures in the Safety Injection and Recirculation systems following a small break LOCA would be inaccessible with TMI source terms, although core damage would not occur for these failures.
- 4. Potential inventory diversions to the Reactor Coolant Drain Tank, Pressurizer Relief Tank and Radioactive Liquid Waste system, due to normal operation of check and relief valves in the Safety Injection and Letdown system boundaries, are not presently accounted for in the calculations for the Technical Specification RWST

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level and low-low level trip setpoint for the Safety Injection (SI) and Main Feedwater (MFW) pumps.

- 5. RWST boron dilution could occur just prior to a MSLB, due to a failure open of the RWST miniflow valve for either MFW pump during normal operation. This case (with operation of 2 SI/MFW pump trains and 2 SI paths open) has not been considered in the present MSLB analyses.
- 6. Loss of recirculation and spray could occur due to spurious opening of either recirculation pump discharge valve (MOV-866A, MOV-866B) prior to reaching the minimum containment flood level for post-accident recirculation pump operation.
- 7. Loss of both charging pumps from gas binding could occur prior to a SIS/SISLOP signal during a small break LOCA, due to failure of the VCT level control loop or isolation valve (MOV-1100C). Loss of both charging pumps from suction isolation due to spurious closure of MOV-1100C is presently prevented only by a non-safety related (NSRFP) suction bypass.
- 8. It could not be determined from the FMEA whether potentially unacceptable Cold Leg Recirculation (CLR) and Hot Leg Recirculation (HLR) primary path flow imbalances could occur due to failure of the flow monitoring instruments or control valves. An event-specific response evaluation is needed to determine if redundant instrumentation is required to distinguish between valve and instrument failures post-LOCA.
- 9. Potential common-cause loss of the charging pumps could occur during combined Hot and Cold Leg Recirculation due to pump run-out following a failure open of seal injection valves FCV-1115A, B and C on loss of the non-safety related Instrument and Service Air (ISA) system.
- 10. The Hot Leg Recirculation deficiencies previously identified to the NRC will be corrected by DCP 1-3548.
- 11. Common-mode loss of both charging pumps could occur from loss of NPSH during post-LOCA recirculation, due to failure of a recirculation pump or failure open of one or more control valves, if only one recirculation pump is run at a time as per the current EOIs.
- 12. Secondary Recirculation, for a MSLB inside containment, could be disabled due to failure as-is of the normally closed manual RWST recirculation valve, or failure to reset of AFWAS or SIS/SISLOP control relays which

prevent reopening the MFW bypass regulating valves (CV-142, -143, -144). The MFW bypass regulating valves could also be disabled by a common-mode failure of both Sequencer block permissive relay circuits, due to inadequate electrical isolation between the two trains at the block permissive relay circuits.

- 13. Common-mode loss of both charging pumps could occur from loss of NPSH during post-LOCA recirculation, due to failure to close or spurious reopening of CV-517 or CV-518, if only one recirculation pump is run at a time as per the current EOIs.
- 14. Component Cooling Water heat removal from critical loads could be degraded or disabled due to flow imbalances resulting from mispositioning of unlocked throttling or critical load isolation valves.
- 15. Component Cooling Water (CCW) heat removal for all loads could be degraded due to an unisolable 50% flow bypass of the operable CCW heat exchanger resulting from a loss of one train of 480V electrical power post-LOCA.
- 16. The Saltwater Cooling (SWC) system could be disabled by a common-cause failure of the non-Seismic circulating water system intake gate (MOV-9) or intake recirculation gate (MOV-11, during heat treatment) resulting in intake drawdown below the SWC pump suctions by the circulating water pumps.
- 17. Both electrical trains could be subjected to an unanalyzed bus voltage transient during SISLOP due to out-of-sequence starting of the CCW and SWC pumps. These pumps were determined to auto-start on low-discharge pressure concurrently with Load Group A instead of waiting for the SISLOP in Load Group D.
- 18. Both trains of ECCS actuation, electrical power or Cold Leg Recirculation could be subjected to an unanalyzed common-mode loss of cooling for critical equipment in the control room, switchgear rooms and reactor auxiliary building, due to failure of the non-redundant HVAC or its power supply for these areas. (The HVAC review performed as part of Systematic Evaluation Program Topic IX-5 did not address accident conditions.)
- 19. A loss of redundant actuation and control could occur following a spurious auto-transfer of Vital Bus #1, 2 or 3/3A caused by common-cause failure of unqualified Vital Bus loads. (Automatic re-transfer capability from the Train B backup source to the normal Train A inverter source is not presently provided.) The reliability of

- all Vital, Regulated and 125 VDC busses could be degraded by the lack of Regulatory Guide 1.75 or IEEE Standard 384 isolation provisions for unqualified loads (ie, presently isolated only by overcurrent trips).
- 20. Potential loss of both electrical trains or containment integrity could occur due to common-cause faults of the reactor coolant pump (RCP) motors or main generator exciter, fed by the main generator and main transformer, following a loss of 125 VDC Bus #1.
- 21. Both electrical trains could be degraded or disabled:
  a) during a SISLOP event if Bus #1C or 2C is energized from the alternate offsite source with the main generator on line (with or without a single failure), b) during a SISLOP event if the periodic diesel generator surveillance test is in progress and the diesel generator breaker fails in the closed position, or c) during a SIS with degraded offsite voltage and the normal feeder breaker for either bus (11CO2 or 12CO2) fails in the closed position. (Loss of both electrical trains occurs in these cases because the Sequencers will detect loss of voltage on only one of the two redundant 4 kV busses but require detection on both busses to satisfy the SISLOP logic for diesel generator loading.)
- 22. A potential loss of long-term electrical power for both trains could occur in a SIS event with a postulated concurrent Auxiliary Transformer-C related Loss of Offsite Power (LOP) and a single failure of the Main Transformer or other components for the alternate offsite source. (The diesel generators would remain available to provide power electrical power in this scenario, but have only a 7 day supply of fuel stored onsite.)
- 23. A potential loss of both ECCS trains could occur due to a fire or explosion resulting from a common-cause fault of the Main Transformer or Auxiliary Transformer-C, with concurrent failure of the redundant 125VDC control power for the SCE 220 kV Switchyard breakers. (Both switchyard control power busses for the affected breakers are presently fed from the same 125VDC distribution panel, DP2.)
- 24. The Residual Heat Removal (RHR) system could be disabled for Steam Generator Tube Rupture (SGTR) events by failure of any of 5 valves (MOV-813, 814, 833, 834 or HCV-602) in the closed position. The Reactor Coolant Pumps (RCPs) could also be disabled for SGTR events by a concurrent LOP or failure of the Main Transformer, due to the inability of the electrical system to support

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restart of an RCP from Auxiliary Transformer-C or the diesel generators while running ECCS loads.

- 25. The ventilation and cooling fans inside containment could be disabled by a common-cause failure of their unqualified motors or by a loss of electrical power (eg. on SISLOP), leaving only containment spray and the hydrogen recombiners available for post-LOCA hydrogen mixing.
- 26. Other miscellaneous changes to procedures were identified as needed to clarify surveillance requirements and Technical Specification action entry for specific single failures.
- B. Single Failure Response Screening Evaluation Results

In Revision 0 of this analysis, six ECCS functions were identified by the screening criteria as requiring an event-specific single failure response evaluation, four of which were already addressed in the SONGS 1 event-specific analysis document, M-39419:

- 1. The SI and MFW pumps, and MFW realignment valves meet the screening criteria for time-dependent failures affecting inadvertent injection of condensate, low-low RWST level pump trip, and Secondary Recirculation. (The associated event-specific evaluations were previously performed as part of M-39419 and a supporting Bechtel calculation.)
- 2. The main feedwater isolation function of Safety Injection meets the screening criteria for event-dependent failures relative to LOCA, MSLB and SIS/SISLOP dependencies. (The associated event-specific evaluation was previously performed as part of M-39419.)
- 3. The charging pumps, suction valves and normal charging path meet the screening criteria for time and initial alignment-dependent failures affecting the availability the charging pumps for Hot and Cold Recirculation. (The associated event-specific evaluation previously performed as part of M-39419 was revised to address the charging system modifications scheduled for implementation prior to restart from the Cycle 11 refueling outage.)
- 4. The recirculation pumps, refueling water (containment spray) pumps and spray flow limiter valves meet the screening criteria for time-dependent and interactive failures affecting containment spray, charging pump and recirculation pump flow and NPSH. (These effects were

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addressed in the FMEA, but M-39419 was revised to include an associated event-specific evaluation.)

- 5. The Cold Leg Recirculation (CLR) and primary path Hot Leg Recirculation (HLR) flow control valves and flow indication meet the screening criteria for interactive failures affecting CLR and HLR flow balance and charging pump NPSH. (M-39419 was revised to include an event-specific evaluation of this function.)
- 6. The re-alignment of swing 480V Switchgear #3 meets the screening criteria for time and initial alignment-dependent failures affecting the ability to re-energize the MOV-358/850C UPS battery charger. (The associated event-specific evaluation previously performed as part of M-39419 was revised to address the 480V system reconfiguration scheduled for implementation prior to restart from the Cycle 11 refueling outage.)

The recirculation and spray evaluation confirmed the susceptibilities identified in the FMEA. The CLR/HLR flow balancing evaluation identified new susceptibilities resulting from the inability to distinguish between time-dependent valve and flow rate indication failures in the cold leg recirculation lines. The event-specific evaluations for these functions will be revised to address the modifications and procedure changes which resolve the susceptibilities, prior to restart from the Cycle 11 refueling outage.

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VI. ANALYSIS TABLES

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SECTION 1: SAFETY INJECTION

#### SAFETY INJECTION SYSTEM NOTES

1. Item numbers in this section have been assigned as follows:

O1.1: Train A SI/MFW pumping, SI flow path to RCS Loop B and boundary devices

01.2: Train B SI/MFW pumping, SI flow path to RCS Loop A

and boundary devices

01.3: SI flow path to RCS Loop C and boundary devices

01.4: Common flow path and boundary devices.

- 2. Table 1-1 is the Failure Modes and Effects Analysis (FMEA) for the SI function. Table 1-2 is the associated boundary valve analysis.
- 3. The functions evaluated in Table 1-1 are:
  - a. Alignment of pumps and valves for safety injection flow,
  - .b. Auto-termination of safety injection flow on low-low RWST level, and
  - c. Realignment of pumps and valves for secondary recirculation flow to the steam generators following termination of safety injection flow. (Secondary recirculation is used for long-term cooling following an MSLB inside containment.)
- 4. Flow control and alignment of valves unique to the secondary recirculation function are addressed in Section 4 of this analysis.
- 5. Potential single failure susceptibilities in the FMEA table are flagged with "\*" as the first character of the associated ECCS EFFECTS field. Other open items (eg. required procedure or calculation changes) are flagged with "\*" as the first character of the REMARKS field.
- 6. Potential single failure susceptibilities in the Boundary Valve Analysis table are flagged with "\*" in the unlabelled field adjacent to REMARKS. Items flagged with "#" in the unlabelled field adjacent to REMARKS are acceptable from a single failure standpoint subject to credit for SEP Topic III-6 seismic boundary criteria.

#### SAFETY INJECTION SYSTEM REFERENCES

Piping and Inst	rumentation Diagrams
5178100	Reactor Coolant System
5178115	Safety Injection System
5178120	Containment Spray and Recirculation System
5178130	Letdown and Residual Heat Removal System
5178135	Volume Control and Charging (Sh 1)
5178150	Reactor Cycle Sample System
5178167	Radwaste Liquid Processing System (Sh 3)
5178201	Condensate System (Sh 1)
5178205	Main Feedwater System (Sh 1)
5178206	Main Feedwater System (Sh 2)
5178207	Main Feedwater System (Sh 3)
5178211	First, Second and Third Point FW Htrs (Sh 2)
5178213	First, Second and Third Point FW Htrs (Sh 4)
5178220	Auxiliary Feedwater System (Sh 1)
5178403	Gaseous Nitrogen System (Sh 4)
5178409	Gaseous Nitrogen System (Sh 10)
5178410	Gaseous Nitrogen System (Sh 11)
Elementary Diag	rams
	FCV-456 and CV-142
	MOV-850A and MOV-850B
455370 (Sh 1-2)	G-50A and G-50B (Safety Injection Pumps)
455371	MOV-356, MOV-357, MOV-358
455372	HV-853A and HV-853B
	HV-851A and HV-851B
455374	HV-854A and HV-854B
455375	HV-852A and HV-852B
455379	MOV-20, MOV-21, MOV-22
455448	CV-202, CV-203, CV-204, CV-287
455516	MOV-850C
5149858	G-3A and G-3B (Main Feedwater Pumps), CV-36,
	CV-37, CV-875A, CV-875B
5149918	G-36A and G-36B (Heater Drain Pumps)
5149970	G-1A, G-1B, G-1C, G-1D (Condensate Pumps)
5151796	MOV-833 and MOV-834
5159551	Containment Isolation Valves, CIS Train A
5159552	Containment Isolation Valves, CIS Train B
	Containment Isolation Valves, CIS
5159559	MOV-1204
5159757	SV-702B and SV-702D
5159758	SV-702A and SV-702C
5159760	Containment Isolation System, Train A
5159776	Containment Isolation System, Train B
5159802	SV-3302
5159842 (Sh1-2)	Auxiliary Feedwater Actuation (AFWAS), Train A
5159843	Auxiliary Feedwater Actuation (AFWAS), Train B
5180714	CV-955 and CV-956
5202910 (Sh1-3)	FCV-457, FCV-458, CV-142, CV-143, CV-144

Other Drawings	
237700	Loop: Steam Generator NR Level, Loop A
237702	Loop: Steam Generator NR Level, Loop B
237704	Loop: Steam Generator NR Level, Loop C
5112416	Schematic: Auxiliary Relay Rack R12 (Front)
5149178	Load Sequence Table, Train 1 (Sh 1)
5149179	Load Sequence Table, Train 1 (Sh 2)
5149181	Load Sequence Table, Train 2 (Sh 1)
5149182	Load Sequence Table, Train 2 (Sh 2)
5149957	Emergency Operating Condition, Train 1
5149958	Emergency Operating Condition, Train 2
<u>Procedures</u>	
SO1-1.0-10	Reactor Trip or Safety Injection
SO1-1.0-12	SI Termination
SO1-1.0-20	Loss of Reactor Coolant
SO1-1.0-23	Transfer to Cold Leg Injection and Recirculation
SO1-1.0-30	Loss of Secondary Coolant
SO1-1.0-32	Loss of RHR Following Loss of Secondary Coolant
	in Containment
SO1-1.0-40	Steam Generator Tube Rupture
SO1-12.3-7	Monthly Sequencer Testing
SO1-14-40	Control of Locked Valves
Other Beamerts	
Other Documents	
SD-S01-580	System Description: Safety Injection, Recircula-
an an an	tion and Containment Spray Systems
SD-S01-590	System Description: Safeguard Load Sequencing
W80048	System Company Table 20 14 HTm throws and Nice
M89048	Response to Generic Letter 88-14, "Instrument Air
•	Supply System Problems Affecting Safety Related
	Systems", dated July 5, 1989

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TABLE 1-1: SAFETY INJECTION FMEA



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# EMBEGENCY CORE COOLING SYSTEM SINGLE FAILURE AMALTRIS SAM OMORRS UNIT 1. TABLE 1-1: SAFETY INJECTION / MAIN PM ISOLATION PMPA

LTRH #	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL BEFRETS AND DEPENDENT PAILURES	METHOD OF DRIBCTION	ENHERENT COMPRUSATING PROVISIONS	BFFRCT ON BCCS	REMARKS
	BABUAL YALYBS. TRAIN A PLON		_ OPBN		PRRIODIC SURVEILLANCE	NONE BEGUIRED	MONB	MORMAL POSITION. INCLUDES
	TRAIN A PLON		CLOSED	TRAIN A SI PUMP SUCTION OR BISCHARGE BLOCKED	PERIODIC SURVEILLANCE	REDUNDANT TRAIN	INOPERABILITY OF TEAIN A PUMPING FOR SI AND SECONDARY	313-301
	TRAIN A PLON		MOME (PASSIVE)		PERIODIC TESTING		RECIEC	INCLUDES 515-301, 010, PWS-439
01.1.02.01.1	ABVIN V BONNDYBA		OPEN	DIVERSION OF TRAIN A SE PLOY	PRRIODIC SURVEILLANCE	BEDUNDANT TRAIN FOR FLOW, BACEUP VALVES AND/OR ADMINISTRATIVELT CONTROLLED	FINOPREABILITY OF TRAIN A PUMPING FOR SI AND SECONDARY	SBB TABLE 1-2 POR DETAILED BOUNDARY VALVE ANALYSIS.
						ANTAN POCETAC LOS EAST	RECIEC, DIVERSION OF RUST	DIVERSION BOUNDED BY CV-36/37 PAILURE WITH LOCAL HANGAL BACRUP ISOLATION AFTER 39 HINUTES: LOCATION INACCESSIBLE
01.1.02.01.2	MANUAL VALVES TRAIN A BOUNDARY		CLOSED	NO EPPECT ON INJECTION, AUTO-TERMINATION OF SI PLOW OR	PERIODIC SURVEILLANCE	NONE SEGUISED	NONE	WITH THE SOURCE TREMS NORMAL POSITION
<u></u> <u>y</u>	CHRCE OR RELIEF VALVES, TRAIN A		MORHAL (PASSIVE)	SECONDARY RECIRCULATION				THRES ARE NO VALVES IN THIS CATEGORY
01.1.03.01.1 G	IOUNDART G-508 F	PUMP/MOTOR	FOR ATON	REDUCED SI PUMP OUTPUT TO	PERIODIC TESTING	HIAST TRACKUESS	(M)PERABILITY OF TRAIN A PUMPING FOR SI AND SECONDARY	VAISOVI
01.1.03.02.1 6	· -	IUS #1C  152-11C05	OPBN	TRAIN A SI PUMP PAILS TO START OR TRIPS APTER STARTING	PERIODIC TESTING	REDUNDANT TRAIN	ERCISC INOPERABILITY OF TRAIN A	HORMAL POSITION. SI PUMP BREAKER.
01.1.03.02.2 G		US \$1C 152-11C05)	CLOSED	PAILS TO TRIP ON LOW BUST	CONTROL BOOM INDICATION	REDUNDANT MOV-850A/B/C CLOSURE	RECIEC MONE FOR SI, REDUCED REDUNDANCY FOR AUTO-TERMINATION OF SI ON	SECONDARY RECIEC DUE TO
87 T 45 45 . 18		<del></del>		LEVEL		POR LO-LO RWST LRVEL, REDUNDANT TRAIN FOR SECONDARY RECIRC	LO-LO BUST LEVEL, INOPERABILITY OF TRAIN A PUMPING FOR	CAVITATION PAILURE FOLLOWING DEPLETION OF RWST BY CONTAINMENT SPEAY
01.1.03.03.1 G	L	SL/LSLX-2215 SL/LSLX-2216 SL/LSLX-2217	OPP (NIGH)	1/3 LOW BUST LEVEL TRIP INPUTS DISABLED TO TRAIN A SI AND PW PUMP. TRAIN A TRIP LOGIC	PRRIODIC TRETING		MOME FOR SI, REDUCED REDUMBANCY FOR AUTO-TERMINATION OF SI OM LO-LO ENST LEVEL, REDUCED	MORNAL POSITION. INCLUDES TEST
01.1.03.03.2 G			ON (FON)		ANNUNCIATION		RELIABILITY OF TRAIN A PUMPING FOR SECONDARY RECIRC REDUCED REDUNDANCY AGAINST	RELATS EMERCIZED ON LOW BUST
an man	L:	8L/L3L1-2016 SL/L8L1-2011	_	TRIPPED TO TRAIN A. TRAIN A TRIP LOGIC BECOMES 1/2 ON REMAINING IMPUTS				LRVSL
01.1.03.04.) G		TI (PV) TI (SI)	CONTACTS CLOSED (OFF)	DISABLED FOR TRAIN A INPUT TO LOW BUST LEVEL TRIP OF	PBB LODIC TESTING	(SAMS AS 1.1.3.2.2)	(SAMR AS 1.1.3.2.2)	NORMAL RELAY POSITION
			•	NOV-850A/B/C. LÓGIC TO RTIBI, RTIAI, RTICI BROOMBY 1/1 ON REMAINING RTE			***	

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### EMBRGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALTSIS SAN GNOPRE UNIT 1 TABLE 1-1: SAFETY INJECTION / MAIN PM ISOLATION PHEA

ITEH #	DEVICE ID	COMPONENT ID	PAILURE MODE	LOCAL EPFECTS AND DEPENDENT PAILUESS	METHOD OF DETRCTION	INBREBAT COMPRASATING PROVISIONS	BPFECT ON BCCS	REMARES
01.1.03.04.2 G-	50A	RTI (PN) BTI (SI)	CONTACTS OPEN	TRAIN A LOW RUST LEVEL SIGNAL TO HOW-850A/8/C WIA BTIBL, STIAL, BTICL AND TRIP OF APPRICTED PUMP		FOR SI, MONE REQUIRED FOR SECONDARY RECIEC	TRAIN B EMPUT TO BACK VALVE)	RELAT SHEEGIZED ON 2/3 LQ-LQ RWST LEVEL WITH SIS/SISLOP IN RESPECTIVE PURP CONTROL CIRCUIT
01.1.01.05.1 G-	50B	RTIBI BTIAL RTICI	OBS (FOR)	TRAIN A LOW RWST LEVEL SIGNAL TO ONE OF BOV-850A/B/C. NO REFECT ON SI PUMP	PERIODIC TESTING	REDUNDANT VALVES FOR SI, NONE	BECIEC	INCLUDES TEST SWITCH HS-2850. RELATS DS-RHERGIZE ON LO-LO
01.1.07.05.2.G-	SQI	BTSSI BTIAI BTICI	_OM. (BIGE)	TRAIN 4 TON BAST INDAL	SEBTODIC INSTINC		FOR SECONDARY RECIEC	MOBRAL POSITION
01.1.03.06.1 G-	508	85-2216 88-2216A	CONTACTS CLOSED (OPF)	SI SBAL-IN TO TRAIN A SI AND PW PUMPS CANNOT BE RESET APTER SEQ REQUE/RESET (QNE SWITCE)		NOWE REQUIRED FOR INJECTION OR LO-LO RWST LEVEL, REDUNDANT		OP SITHER SWITCH PREVENTS
01.1.03.08.2 G-	508	89-2218 89-22184	CONTACTS OPEN	TRAIN A SI SRAL-IN REDUNDANCE POR LON SUST LEVEL TRIP	PERIODIC TESTING	(SAME AS 1.1.3.2.2)	(SAME AS 1.1.3.3.1)	RRCIRC POR SECONDARY
01.1.03.01.1 G-	508	380 1 (37-1, 3)	CONTACTS OPEN (OPP)	REDUCED TO 1/1 ON REMAINING RESET SWITCE TRAIN A SI PUMP FAILS TO START. NO REPECT ON LOW RWST LEVEL TRIP AFTER START DUE TO SEAL-IN MITHEN PUMP CONTROL	PRRIODIC TRSTING	(SAMB AS 1.1.3.1.1)	(SAMB AS 1.1.3.1.1)	MORMAL POSITION: PAILURE OF SI PUMP TO AUTO-START COULD RESULT IN CAVITATION FAILURE OF PW PUMP
U1.1.03.01.2 G-	508	980 I (37-1, 3)	CONTACTS CLOSED	CIRCUIT TRAIM A SI PUMP STARTS, OR CANNOT BE RESTARTED APTER LOW RWST LEVEL TRIP	CONTROL BOOM INDICATION PREIODIC TESTING	NOWS REQUIRED FOR SI OR LO-LO RMST LEVEL, REDUMDANT TRAIN FOR SECONDARY RECIRC	NONE FOR SI OR AUTO-TERMINATION OF SI ON LO-LO REST LEVEL, INOPERABILITY OF TRAIN A PUMPING FOR SECONDARY RECIRC	
01.1.03.08.1 G-	50B	SRQ 1 (41-9, 11)	CONTACTS CLOSED (OPP)	TRAIN A SI PUMP OVERLOAD TRIP NOT DEPRATED UNTIL 83-5 CONTACTS OPEN UPON 8V-853B NOT CLOSED		REDUNDANT TRAIN FOR 31 AND SECONDARY RECISC, NUMB REQUIRED FOR LO-LO ENST LEVEL TRIP	REDUCED RELIABILITY OF TRAIN A PUMPING FOR SI AND SECONDAST RECIEC, NOME FOR AUTO-TERMINATION OF SI ON LO-LO	
01.1.03.08.2 G-	508	SBQ 1 (41-9, 11)	CONTACTS OPEN	TRAIN A SI PUMP OVERLOAD TRIP DEFRATED	PBRIODIC TESTING	(SAMB AS 1.1.3.0.1)	EWST LEVEL (SAME AS 1.1.3.8.1)	INCREASED RISE OF 31 PUMP
01.1.03.39.1 G-	509	83-5 (BBLAT)	CONTACTS CLOSED	TRAIN A SI PUNP OVERLOAD TRIP	PRRIODIC TESTING	(SAHB AS 1.1.3.8.1)	(SAMB AS 1.1.3.3.1)	SURVEILLANCS TESTING NORMAL BELAT POSITION . INTERLOCE FROM SUCTION VALVE
01.1.01.09.2 G-		83-5 (RBLAT)	CONTACTS OF BN	BLOCK/RESET (SAME AS 1.1.3.8.2)	PHRIODIC TESTING	(SAME AS 1.1.3.8.1)	(SANS AS 1.1.3.8.1)	HV-8538 POSITION (SAMB AS 1.1.3.8.2)



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### BMBRGBNCT CORE COOLING SYSTEM SINGLE FAILURE AMALTSIS SAM OMOPRE UNIT 1

TABLE 1-1: SAPETY INJECTION / MAIN FM ISOLATION PHEA

178H #	DBATCS TO	COMPONENT ID	FAILURE MODE	LOCAL REPECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INSERBUT COMPENSATING PROVISIONS	BFFRCT ON BCCS	REMARES
01.1.01.10.1	G:108	CONTROL SOMES  BUS SIC 152AGC	AOLIS FOR	TRAIN A SI PUMP CARNOT BE	CONTROL BOOM INDICATION	REDUMDANT TRAIM FOR SI AND SECONDARY RECIEC, REDUMDANY MOV-850A/B/C CLOSURE FOR LO-LO		
01.1.04.01.1	84-8538	VALVE/ACTUATOR	OPEN	CONDENSATE PLOW DIVERTED TO BUST VIA SE MINIPLOW IF PRICE	CONTROL BOOM INDICATION	ADMINISTRATIVE CONTROLS ON RWST BORON CONCENTRATION	PREDUCTION IN RWST BORON CONCENTRATION IP PRIOR TO	INCLUDES SV-1, SV-2, SV-530. TRUMNICAL SPECIFICATIONS 3.3.3
				TO BIS/BISLOP. NO BPPECT APTER BIS/BISLOP			319/313LOP. NO RPPECT IP APTER	AND 4.1.1 GOVERN THE EVST
01.1.04.01.2	17-1533	VALVE/ACTUATOR	CLOSED	PN PUMP SUCTION BLOCKED	PRRIODIC TRATING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A PUMPING FOR SI AND SECONDARY	NORMAL POSITION (FW PUMP IN FW
01.1.04.02.1	#V_8518	83-1 (RELAY)	OM	MONE. CONTACTS JUMPERED TO	PERIODIC TESTING	NONE DECITORS	RECIEC	881.1 848884888 88 84 86 88
		44 ( [88141]	- YF	TRAIN A MEATER DRAIN PUMP	LESTANIC INSTITUT	NONE REQUIRED	NONS	RBLAY BUBRGIZED BY MV-853B OPEN LIMIT SWITCHES
01.1.04.02.2	84-923B	81-1 (RBLAT)	OPP	(SAME AS 1.1.4.2.1)	PERIODIC TESTING	(SAME AS 1.1.4.2.1)	(SAME AS 1.1.4.2.1)	BORMAL POSITION
01.1.04.01.1		83-2 (BELAT)	OM		PERIODIC TESTING	REDUNDANT TRAIN	TRAIN A PU PUMP WILL TRIP 30	RELAY EMERGIZED BY MV-853B
				SIGNAL WILL NOT CLEAR TO TRAIN A PW PUMP PROTECTIVE TRIP CIRCUIT APTER SIS/SISLOP			SEC APTER SIS/SISLOP	CLOSED LINET SWITCHES
01.1.01.03.2	EV-8538	83-2 (RBLAY)	OPP	SUCTION VALUE AV-8538 CLOSED PROTECTIVE TRIP DISABLED FOR TRAIN A PW PUMP	PERIODIC TESTING	NONE BEQUIERD	NONE	
01.1.04.04.1	BV-953B	83-3 (RBLAY)	ON	NONE. CONTACTS JUMPERED IN CONDENSATE PUMP CIRCUITS	MONE BEGUIEED	NONE BEQUIRED	MONE	BBLAT BMBRGIZED BY HV-8538 OPEN LIMIT SWITCHSS
01.1.04.04.2	HV-8538	83-3 (RELAT)	OPP	NORB. CONTACTS JUMPERED IN	NONE REQUIRED	MONE REQUIRED	MONE	
01.1.04.05.1	8V-453A	83-5 (RELAT)	OM	CONDENSATE PUMP CIRCUITS TRAIN A SI/FW PUMP OVERLOAD TRIPS DEFRATED, FW PUMP	CONTROL BOOM INDICATION PERIODIC TESTING	(SAMS AS 1.1.4.1.1)	*(SAME AS 1.1.4.1.1)	RELAT EMBEGIZED BY HV-8518 NOT CLOSED LIMIT SWITCHES
				MINIFLOW BRALIGHS TO EWST. NO EFFECT AFTER SIS/SISLOP				
01.1.04.05.2	AA-8239	83-5 (RBLAT)	OPP	TRAIN A PW PUMP MINIPLOW VALVE REALIGNMENT AND SI/PW PUMP	PERIODIC TRATING	ABDUNDANT TRAIN FOR SI PLOW.	PROB TRAIN A APTER SEQ	NORMAL POSITION. RUST INVENTORY CALCULATION INCLUDES
				OVERLOAD TRIP DEPENTS NOT SEALED IN, RESULTING IN		ISOLATION VALUES (PMS-473), 477) FOR RMST INVENTORY	· ·	CV-36/37 FAILURB, LOCAL MANUAL BACKUP ISOLATION AFTER 30
				REALIGNMENT OF MINIPLOW TO CONDENSER AFTER SEQ BLOCK/RESET				MINUTES. LOCATION NOT ACCESSIBLE WITH THI SOURCE TERMS
01.1.04.06.1	BV-8538	38Q 1 (19-1, 3)	CONTACTS OPEN (OPP)	NV-8538 PAILS TO OPEN (SENAINS CLOSED) ON SIS/SISLOP, NO RPPECT IF APTER SIS/SISLOP, DUE TO SIGNAL SEAL-IN VIA 83-4		(SAMB AS 1.1.4.(.2)	(SABB AS 1.1.4.T.2)	NORMAL POSITION
				RELAT CONTACTS WITHIN VALVE CONTROL CIRCUIT				
01.1.04.06.2	84-8218	989 1 (19-1, 3)	CONTACTS CLOSED (ON)	•	CONTROL BOOM INDICATION PERIODIC TESTING	(1.1.4.1.1)	*(SAMB AS 1.1.4.1.1)	
01.1.04.07.1 (	ĤA- <b>9</b> 238	125VDC BUS \$1 (72-130)	VOLTS LOW	HV-8538 FAILS TO OPEN (REMAINS CLOSED) ON SIS/SISLOP, RELAT 81-2 FAILS OPE, DISABLING TRAIN A FW PUMP SUCTION VALVE CLOSED PROTECTIVE TRIP	CONTROL BOOM INDICATION	MITAL LATORIDAS	IMPPERABILITY OF TRAIN A PUMPING FOR ST AND SECONDARY RECISE	

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#### BMSBBBNCY CORE COULING STATEM SINGLE FAILURE ANALTSIS SAN ONOFRE UNIT 1 TABLE 1-1: SAFBTY INJECTION / MAIN PV ISOLATION FMSA

ITEN 4	DRVICE ID	COMPONENT ID	FAILURE MODE	LOCAL RPPRCTS AND DRPENDENT PAILURES	MBTHOD OF DBTECTION	INHERENT COMPRISATING PROVISIONS	BPFRCT ON BUCS	REMARES
Q1-1.04-00:1 BY	-8538		PRESSURB LOY	ISA UNAVAILABLE TO REPOSITION VALVE CLOSED FOR STSTEM RESET APTER INJECTION TERMINATED	CONTROL ROCH ANNUNCLATION	NONE REQUIRED	MOMB	AIR OPERATED HIDRAULIC PUMP IN ACTUATOR ISOLATED BY SV-530. VALVE REQUIRED TO REMAIN OPEN FOR SI AND SECONDARY RECIRC
01.1.05.01.1 HV	- 8548	VALVS/ACTUATOR	OPSM	TRAIN A PW PUMP SUCTION NOT ISOLATED FROM CONDRUSATE AND MEATER DRAIN PUMPS ON	PERIODIC TESTING	REDUNDANT TRAIN FOR SI PLOW. CONDENSATE, HEATER DRAIN PUNP TRIPS AND DISCHARGE VALVE	INOPERABILITY OF TRAIN A PUMPING FOR SI AND SECONDARY BECIEC	NORMAL POSITION (PM PUMP IN FW HODB). INCLUDES SV-1, SY-2, SV-5):
				SIS/SISLOP. VALUE POSITION INTERLOCE BLOCES BY-8518 OPENING	-,	INTERLOCE PREVENT COMORNALS		
01.1.05.01.2 BV		VALVE/ACTUATOR		LOSS OF CONDENSATS PLOW TO TRAIN A FW PURP IF PRIOR TO SIS/SISLOP, IMABILITY TO RESET TO PW ALIGNMENT POLLOWING IMJECTION IF APTRE SIS/SISLOP	CONTROL ROOM INDICATION	REDUNDANT TRAIN	INOPSRABILITY OF TRAIN A PUMPING FOR 31 AND SECONDARY ESCIEC IP PW PUMP FAILURE OCCURS	TRAIN A PW PUMP FAILURE COULD OCCUR DUR TO CAVITATION PRIOR TO SIS/SISLOP
Q1.1.05.02.1 <u>N</u> V	- <b>154B</b>	2SC-285181 2SC-285183	CONTACTS OPEN (OPP)	REDUCED REDUNDANCY FOR SEAL-IN OF VALVE CLOSE SIGNAL AFTER SEE BLOCE/RESET (ONE LIBIT SWITCH). NO EFFECT ON SIS/SISLOP SIGNAL SEAL-IN OR COMBENSATE, BRATER DRAIN PUMP TRIPS	CONTROL ROOM INDICATION PROTODIC TRSTING	NOME BRQUERED	NONE	NORMAL POSITION. WALVE POSITION INTERLOCE FROM HV-6518. INTERLOCE BLOCES MANUAL ACTUATION OPEN AFTER SEQ BLOCE/BESET AND RESET OF SIS/SISLOP SIGNAL SEAL-IN BY RV-8548 HANDSWITCH
01.1.05.02.2 BV	-	2SC-2851B1 2SC-2851B3 SV-3900	CONTACTS CLOSED (ON) OFF (CLOSED)	(SAME AS 1.1.5.1.2) LOSS OF INTER-DISC PRESSURE VENT/RELIEF FOR AV-8516. NO REFECT ON EV-8548	CONTROL ROOM INDICATION PERIODIC TESTING	(SAME AS 1.1.5.1.2)  REDUNDANT TRAIN FOR SI, NOME BEQUIRED FOR SECONDARY RECIRC	(SAME AS 1.1.5.1.2) INOPERABILITY OF TEAIN A PUMPING FOR ST, NOWE FOR SECONDARY RECIRC	MORNAL POSITION. INTERDISC CAUITT VENTIARLISP BRAUTERD TO OPEN RV-8518 POR SI. MV-8518 CLOSED IS NORMAL POR SECONDART
01.1.05.03.2 HV	-8548	SA-3800	OR (OBER)	HV-8518 INTER-DISC CAVITY CONTINUOUSLY VENTED TO PM PUMP SIDE. NO RPPRCT ON EV-8518 OR EV-8548 REALIGNMENT, RUT DISABLES CONTAINMENT ISOLATION	PBRIODIC TESTING	NONS BESCHEED	NONS	ERCIAC  CONTAINMENT ISOLATION  PUNCTION EVALUATED IN ESP SPA.  MOV-8501/8/C TRR REDUNDINY  CONTAINMENT ISOLATION VALVES  TO EV-8511/8 AND SV-2300/3300,
			· · · · · · · · · · · · · · · · · · ·	PUNCTION OF EV-851B				BUT PRESTATIONS AND VALVES NOT TYPE C LEAR TESTED PER LOCPESO APPENDIX J
01.1.05.04.1 BV	-854B	ZSO-2854B2 230-2854B4	CONTACTS OPEN (OPP)	REDUCED REDUNDANCE FOR HY-8548 Closed interloce to by-8518 Circuit (one switch).	PRRIODIC TRATING	(SAME AS 1.1.5.3.1)	RELIABILITY REDUCED FOR TRAIN A SI PUMPING, NOWE FOR SECONDARY RECIEC	RORRAL POSITION, VALVE PUSITION INTERLOCE TO NV-851B. CONTACTS CLOSED WEEN HV-854B CLOSED
01-1-c5-04-2 HV	- <u>85 (B</u>		CONTACTS CLOSED (ON)	REMAINING SWITCH PROVIDES SIGNAL AS REQUIRED HY-8548 CLOSED ENTERLOCE TO HY-8518 DEPEATED. 8V-8518 WILL BEGIN OPENING CONCURRENTLY WITH RY-8548 CLOSING		MONE REQUIRED (MSLE ANALYSIS BOUNDS POTENTIAL COMBENSATE ENJECTION)	INJECTION OF CONDENSATE FROM ONB TRAIN DUBING PW PUMP BRALIGHMENT	

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TABLE 1-1: SAFETY INJECTION / HAIN FW ISOLATION PHEA

	DRVICE ID	COMPONENT 10	PAILURE MODE	LOCAL BFFECTS AND DBFBHDBNT FAILURES	METHOD OF Detection	INBERENT COMPRESATING PROVISIONS	RFFRCT ON RCCS	REMARES
_01.1.0\$.0\$.1 HY:	8548	SBQ 1	CONTACTS OPEN (OPP)	(REMAINS OPEN) ON \$13/313LOP. NO EFFECT IF AFTER 313/313LOP. DUE TO SIGNAL SEAL-IN IN VALVE		(SAHR AS ].1.5.1.1}	(SAHR AS J.1.5.1.1)	NORMAL POSITION
01.1.05.05.2 MV-	-8548	98Q 1 (20-5, 1)	CONTACTS CLOSED	CIRCUIT (SAME AS 1.1.5.1.2)	PERIODIC TESTING	(SAME AS 1.1.5.1.2)	(SAMS AS 1.1.5.1.2)	
01.1.05.06.1 89-	-4543	125VDC 8U8 41 (12-130)	NOTA FOR	BY-1548 FAILS TO CLOSE (REMAINS OPEN) ON SIB/SISLOP	CONTROL ROOM ENDICATION	REDUNDANT TRAIN POR PLON, CONDENSATE, REATER DRAIN PUMP TRIPS AND DISCHARGE VALVE INTERLOCE PREVENT CONDENSATE	INOPERABILITY OF TRAIN A PUMPING FOR SI AND SECONDARY RECIRC	
01.1.05. <u>07.1 By</u> -	-8510		Letaines ron	ISA UNAVAILABLE TO REPOSITION VALVE OPEN FOR STATEM RESET AFTER INJECTION TERMINATED	CONTROL ROOM ANNUNCIATION	NOME SEGUISED  [MISCATION	NONE	AIR OPERATED HYDRAULIC PUMP IN ACTUATOR ISOLATED BY SY-531. VALVE REQUIRED TO CLOSE FOR SI AND SECONDARY RECIRC
01.1.06.01.1 G-1	18	PUMP/MOTOR	LOW PLOW	REDUCED TRAIN A PW PUMP PLOW	CONTROL ROOM INDICATION PRECODIC TESTING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A PUMPING FOR SI AND SECONDARY RECIEC	INCLUDES LUBE OIL FAM COOLER E-178. PUMP REQUIRED FOR SECONDARY RECIEC UNTIL SI PUMP CAN DELIVER REQUIRED PLOW VIA
01.1.06.0 <u>2.1</u> G-3	<u> </u>	BUS \$1C (152-11CO4)	OPBN	TRAIN A FW PUMP FAILS TO RESTART FOR SI (ON SIS/SISLOP) OR FOR SECONDARY RECIEC (MANUALLY) OR TRIPS AFTER	PRRIODIC TRATING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A PURPING FOR 31 AND SECONDARY RECIEC	IDES/MINDRIFFING SA SOMS
)1.1.06.02.2 G-3	18	8US 81C (152-11C04)	CLOSED	STARTING TRAIN A PW PUMP FAILS TO TRIP DURING SIS/SISLOP STARTING SEQUENCE OR ON LO-LO RWST	Pariodic testing		INOPERABILITY OF TRAIN A PUMPING FOR SI AND SECONDARY BECIEC, INCREASED RESPONSE TIME	NORMAL POSITION. BREAKER TRIPPED AND RECLOSED ON 11 SEC TIME DELAY POLLOWING
<del></del>				LEVEL. MAINTAINS DIFFERENTIAL PRESSURE ON NV-8518 VALVE DISC AND DECRADES TRAIN A BUS VOLTAGES BURING LOAD SEQUENCE		RWST LEVEL	FOR TRAIN A MOTOR-OPERATED VALUES (MOV-8508, MOV-20, MOV-21), REDUCED RELIABILITY FOR AUTO-TERMINATION OF SI ON LO-LO RWST LEVEL	SIS/SISLOP. PUMP UMAYAILABLE FOR SECONDARY RECIEC DUB TO CAVITATION FAILURE APTER SI PUMP TRIP ON LO-LO RUST LEVEL
1.1.06.03.1 G-3	8	LSL1-2215 LSL/LSL1-2216 LSL/LSL1-2217	OPP (HIGH)	1/3 LOW BUST LEVEL TRIP (NPUTS DISABLED TO TRAIN A PW PUMP. TRAIN A PW PUMP TRIP LOGIC BECOMES 2/2 ON BRHAIMING IMPUTS	PERIODIC TESTING	NON3 BEGUISED	MONE	NORMAL POSITION. INTERLOCE PROM G-508 CONTROL CIRCUIT
1.1.06.01.8_G-3	<u>B</u>	LSL1-2215 LSL/LSL1-2216 LSL/LSL1-2211	ōn (ròā)	1/3 LOW RWST LEVEL IMPUTS TRIPPED, TRAIN A PW PUMP TRIP LOGIC BECOMES 1/2 ON REMAINING IMPUTS	PRRIODIC TRSTING	REQUIRED FOR SECONDARY RECIRC	PUMPING POR SI, NOWS POR SECONDARY BECER:	
)1.1.06.04.1 G-3	18	RTI (PV)	OPP	TRAIN A PE PUMP TRIP ON LOW RAST LEVEL AND TRAIN A PM PUMP LMPUT TO MOV-850A/B/C CLOSURE DISASLED	PBBLODIC TESTING	NONE REQUIRED FOR SI,  REDUNDANT INPUT PROM SI PUMP FOR MOV CLOSURE ON LO-LO RWST LEVEL	MONE FOR SI, REDUCED RELIABILITY OF AUTO-TERMINATION OF SI ON LO-LO RWST LEVEL	NORMAL POSITION



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# EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OMORRE UNIT 1 TABLE 1-1: SARRY INJECTION / MAIN PW ISOLATION FREA

ETSH #	DRVICE ID	COMPONENT ID	PAILURE HODE	LOCAL REFECTS AND DEPENDENT PAILURES	MBTHOD OP Detection	INHERENT COMPENSATING PROVISIONS	BFFBCT ON BCC3	BEMARES
_01.1.96.01.2 G	- 38	. RTE (FW)		TRAIN A PN PUMP IBIPS, CANNOT	PBB(ODIC TESTING	REQUIDENT TRAIN FOR SI AND SECONDARY RECIRC PUMPING, INPUTS PROM REDUNDANT TRAIN TO PREVENT PREMATURE MOY-5594/8/C	,,,	
01.1.06.05.1 G	-38	NS-2218 NS-2218A	CONTACTS CLOSED	SIS/SISLOP SIGNAL SEAL-IN TO TRAIN A SI/PW PUMPS CANNOT BE	PBRIODIC TESTING	BUST LEVEL TRIP, REDUNDANT	OF SE ON LO-LO RWST LBVBL,	MORNAL POSITION. BOTH SWITCHES MUST OPEN FOR RESET, RESET
				ABSET APTER SEQ BLOCE/RESET (ONE SWITCH)				REQUISED TO PERMIT PUMP RESTART POR SECONDARY RECIEC APTER LO-LO RWST LEVEL TRIP
01.1.06.05.2 G	- 38	US-2218 US-2218A	CONTACTS OPEN (ON)	TRAIN A STRYSISLOP SIGNAL SRAL-IN REDUNDANCY FOR LOW RWST LEVEL TRIP REDUCED TO 1/1 ON REMAINING RESET SWITCH	PBRIODIC TESTING	LEVEL, MONE REQUIRED FOR SI	REDUCED RELIABILITY FOR AUTO-TERMINATION OF SI ON LO-LO RWST LEVEL, NOME FOR SI OR SECONDARY RECIEC	
01.1.06.06.1 G	- 33	152-11CO4 "b" CONTACT	OPBN	TRAIM A MEATER DRAIN PUMP DORS NOT TRIP AUTOMATICALLY ON PM	PRRIODIC TRATING		HONS	NORMAL POSITION. BEATER DRAIN PUMP TRIPS ON SEPARATE SEQ
				PURP TRIP. SIS/SISLOP TRIP UNIFFRETED				IMPUT FOR SI, CAN ALSO BE TRIPPED MANUALLY FOR SECONDARY BECIRC
01.1.06.06.2 G	-36	152-11CO4 "b" CONTACT	CLOSED	TRIPPED	CONTROL BOOM INDICATION	(SAMB AS 1.1.6.6.1)	(SAME AS 1.1.6.6.1)	
01.1.06.01.1 G	· 31	83-2 (BELAT)	CONTACTS OPEN (OPF)	TRIEM A PW PUMP PROTECTIVE TRIP ON SUCTION VALVE RV-853B CLOSED DISABLED	PARTODIC TRATING	(SAHE AS 1.1.6.6.1)	(SAHE AS 1.1.6.6.1)	NORMAL POSITION
01.1.06.07.2 G	- 38	83-2 (BELAT)	CONTACTS CLOSED	SUCTION VALUE NV-8538 CL0980 SIGNAL WILL TRIP TRAIN A PW PUMP 30 88C APTER 913/31910P	PRREADUC TRATING	REQUIRED FOR SECONDARY RECIEC	INOPERABILITY OF TRAIN A PUMPING FOR SI, NOME FOR SECONDARY RECIRC	SIS/SISLOP BLOCE/RESET WOULD OCCUR REFORE PUMP RESTART FOR SECONDARY RECIRC
01.1.06.08.1 G	-11	83-5 (BBLAT)	088	SIS/SISLOP BRAL-IN DISABLED TO TRAIN A PW PUMP SUCTION VALVE PROTECTIVE TRIP, OVERLOAD TRIP	PRRIODIC TRATING	REDUNDANT TRAIN FOR SI PLOW, BACKUP MANUAL MINIFLOW	SPARTIAL DIVERSION OF TRAIN A	
				DEPEAT AND BUST HIMIPLOW VALVE CV-8758. PW PUMP HIMIPLOW VALVES WILL REALIGH TO CONDENSER APTER SEQ			CONDENSES	BACRUP INDUSTRIAN APTER 10 MINUTES LOCATION NOT ACCESSIBLE WITE THE SOURCE TRENS
01.1.06.08.2 G	- 18	83-5 (RBLAY)	ON	BLOCE/RESET  915/919LOP SEAL-IN SIGNAL TO TRAIN A PW PUMP HIMIPLOW VALVE		ADMINISTRATIVE CONTROLS ON BYST BORON CONCENTRATION	*REDUCTION IN RWST BORON CONCENTRATION IF PRIOR TO	TRUMNICAL SPRUIFICATIONS 1.1.1 AND 4.1.1 GOVERN THE RYST
				CV-8758 AND OVERLOAD TRIP DEFRATS, CAUSING REALIGMENT OF TRAIN A PW PUMP MINIPLOW TO BWST. NO REFECT AFTER SIS/SISLOP			SIS/SISLOP. NO RPPRCT IF APTRE.	
01.1.06.69.1 C	- 1 <u>B</u>	CV-8758	OPBN	PARTIAL DIVERSION OF CONDRISATE FLOW PROM TRAIN A PW PUMP TO RWST IF PRIOR TO	CONTROL BOOM INDICATION	{SAMB AS 1.1.6.8.2}	#(SAME AS 1.1.6.8.2)	[RCLUDES SV-875B, LS-2 [ZSC-1875B]
				SIS/SISLOP. NO BFFRCT IF AFTRÉ	•			•



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### EMBRUBNCT CORE COOLING SYSTEM SINGLE FAILURS AWALTSIS SAM ONOPRE UNIT 1 TABLE 1-1: SAFETT INJECTION / MAIN PW ISOLATION PHEA

1110 /	DEVICE ID COMPO	EMBRIT ID FAILURE MOI	LOCAL REFECTS AND DE DEPENDENT PAILURES	MBTHOD OF Detection	INUBERAT COMPRASATING PROVISIONS	BPFECT ON BCCS	REMARES
01.1.06.09.2.G-30		CLOSED	LOSS OF TRAIN A PW PUMP MINIPLOW PROTECTION FOLLOWING	PERIODIC TESTING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A	NORMAL POSITION. MINIFLOW
			SIS/SISLOP			PUMPING FOR SI AND SECONDARY RECIRC	REQUIRED TO PREVENT PUMP PAILURE FOR SOLOCA AND MILE
01.1.06.10.1 G-30	CV-11	OPIN .	DIVERSION OF TRAIN A PW PUMP	PRRIODIC TRATING	REDUNDANT TRAIN POR SI PLOW.	SPARTIAL DIVERSION OF TRAIN A	PARCEUDES SV-18, 18A. BVST
			MINIPLOW TO COMDENSEE		BACKUP MANUAL BINIFLON	PW PUMP PLOW TO CONDENSER VIA	INVENTORY CALCULATION INCLUOSS
					[SOLATION VALUES (PMS-47), 477) FOR RMST INVENTORY	BIRIFLOR ANTAR CA-33	LOCAL MANUAL BACEUP ISOLATION APTER 30 MINUTES. LOCATION NOT
							ACCESSIBLE DITH THE SOURCE
01.1.06.10.2 G-38	CV-37	CLOSED	LOSS OF TRAIN A PW PUMP	PARIODIC TRATING	REDUMBANT TRACH	DRAWPR DRIVATION AR SOLIN .	TRAS
			MINIPLOW PROTECTION DURING	LEBIODIC 1991ING	SECONDARI IRALE	REDUCED RELIABILITY OF TRAIN A PUMPING FOR SI AND SECONDARY	
			MORHAL OPERATION			RECIRC	VALVE OPENS PREUMATICALLY ON LOW CONDENSATE PLOW (EG.
						880180	FOLLOWING PW PUMP TRIP)
01.1.06.11.1 G-38	1 P86	CONTACTS OPEN	TRAIN A PW PUMP PAILS TO TRIP	PERIODIC TESTING	REDUNDANT TRAIN FOR SI AND	INOPERABILITY OF TRAIN A	MORMAL POSITION. PW PUMP TRIP
	(20-9,	11) (OFF)	ON SIS/SISLOP, MAINTAINING		SECONDARY RECIRC, REDUNDANT	PUMPING FOR SI AND SECONDARY	BEQUIRED FOR BY-8514/8
			DIFFERENTIAL PRESSURE ON		IMPUTS FROM SI PUMP FOR MOV	BECIEC, INCREASED RESPONSE TIME	REALIGNMENT. PUMP COULD BE
			AV-8518 VALVE DISC AND		CLOSURE ON LO-TO BARL FRANK	OF TRAIN A MOTOR OPERATED	UNAVAILABLE FOR SECONDARY
			DEGRADING TRAIN A BUS VOLTAGES			VALVB9 (NOV-8500, MOV-20,	BRCIRC DUR TO CAVITATION
			DURING LOAD SEQUENCE.			MOA-55) BEDUCED BELIVEITIA	PAILUEB AFTER SI PUMP TRIP ON
			AUTO-TRIP ON LO-LO BUST LEVEL			FOR AUTO-TERMINATION OF SI ON	FO-TO BASA TEART
01.1.06.11.2 G-38	319 1	CONTACTS CLOSES	ALSO DEFEATED TRAIN A PW PUMP TRIPS,	COMPROL BANK THREE-PION	200 HUNIUM	LO-LO RUST LEVEL	BUILDE GORDON DATE DA
	(20-9,		RESTARTS 11 SEC LATER. CANNOT	CONTROL BOOM INDICATION	REDUNDANT TRAIN FOR SI AND SECONDARY RECIEC, NOME	INOPERABILITY OF TRAIN A PUNPING FOR SI AND SECONDARY	PAILURE OCCURING PRIOR TO
	100 01	, (4-,	BE RESTARTED AFTER LOW RWST	1861ADIC 1831180	REQUIRED FOR LO-LO RUST LEVEL		SIS/SISLOP WOULD BAVE SAME RPPRCT ON SI PUNCTION AS
			LEVEL TRIP			AUTO-TERMINATION OF SI ON LO-LO	
					<u> </u>	BUST LEVEL	
01.1.06.12.1 G-30	310 1	CONTACTS CLOSED		PERIODIC TRATING	REDUNDANT TRAIN	REDUCED RELIABILITY OF TRAIN A	MORMAL POSITION
	(42-1,	<u> </u>	DEPEAT DISABLED UNTIL EV-8538			SI PUMPING	
)1.1.06.12.2 G-38	400 1	004B+080 0004	BRGINS TO OPEN	88814814 <b>8</b> 838144			
11.1.00.12.2 0-35	989 1 (42-1,	CONTACTS OPEN 3) (ON)	TRAIN A PW PUMP OVERLOAD TRIP	PRRIODIC TRETING	(SAME AS 1.1.6.12.1)	(SAMS AS 1.1.6.12.1)	
11.1.06.13.1 G-3A		CONTACTS OPEN	TRAIN A PU PUMP HINIPLON DORS	BRDIONIC PROPING	(SAME AS 1.1.6.10.1)	*(SANE AS 1.1.6.10.1)	HARMAL BOOLETON
	(53-1,		NOT ISOLATE TO CONDENSES ON	PRECODIC INSTITUT	(3486 43 1.1.0.10.1)	-(8202 A3 1.1.4.10.1)	NORMAL POSITION
	(** *,	, (4,1)	SIS/SISLOP, PW PUMP PROTECTIVE				
·· <del>··········</del>			TRIP ON SUCTION VALVE BY-853B				
			CLOSED ALSO BISABLED				
1.1.06.13.2 G-3B	38Q 1	CONTACTS CLOSED		CONTROL ROOM INDICATION	NOME RECALIBED	NONE	TRAIN A VALVES WILL RESPOND
	(55-1,	(on)	SEC AND PROVIDES CLOSE				HORMALLY AND PW PUMP VILL
			PERHISSIVE TO TRAIN A PW PUMP				RESTART AS REQUIRED
			BINIPLOW VALVE CV-37 IF PRIOR				
			TO SIS/SISLOP. AFTER				
			919/818LOP, NV-853B OPRNING Will Clbar PW PUMP PROTECTIVE				
			TRIP SIGNAL				
D1.1.06.11.1 G-3B	380 1	CONTACTS OPEN	TRAIN A PW PUMP MINIFLOW	PRRIODIC TESTING	REDUNDANT CONTACT PROP MY-8518	REDUCED BELIABILITY OF TRAIN A	MOSMAL POSITION
	(38-9,		VALUES WILL NOT REALIGN TO			PUMPING FOR SI, MOMB FOR	. 4810508
	.: "!	•	RAST UNTIL MY-853B BBCINS TO			SECONDARY RECINC	
			OPEN		RECIRC		

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118	B 1	DEALCE ID	COMPONENT ID	FAILURE MODE	LOCAL RPPRCTS AND DRPRNDENT PAILURES	METHOD OF	INHERBUT COMPRUSATING PROVISIONS	RPPRCT ON BCCS	PRIMARES
01.10	6.14.2 G	:1B	380 L (38-9, 11)	CONTACTS CLOSED (ON)	ATTARS SENTION TO SASE	CONTROL ROOM INDICATION. PERIODIC TESTING	ADBINISTRATIVE CONTROLS ON BUST BORON CONCENTRATION	PREDUCTION IN RWST BORGN CONCENTRATION IS PRIOR TO SIS/SISLOP. NO REPRET IS AFER	TRCHNICAL SPECIFICATIONS 1.1.1 AND 4.1.1 GOVERN TRE BUST
91.1.0	6.12.1 E	1L:	CONTROL POWER	NOTES TON	TRAIN A FW PUMP CANNOT BR TRIPPED OR RESTARTED, AND ITS MINIFLOW REMAINS ALIGNED TO CONDENSES		REQUIDANT TRAIN FOR SI AND SECONDARY RECIRC PUMPING, BACEUP NAMUAL MINIFLOW ISOLATION VALUES (PUS-173,	PUMPING POR SE AND SECONDASS BECIEC, OR PARTIAL DIVERSION OF	SERVET CALCULATIONS INCLUDE CV-36/37 PAILURE, LOCAL MANUAL BACEUP ISOLATION APTER 30 BINUTES. LOCATION NOT
01.1.0	5.15 <u>.1</u> 0	- 38	HCC-1A	VOLTS LOV	LOSS OF TRAIN A FM PUMP LUBE	CONTROL ROOM INDICATION	477) FOR RWST INVENTORY REDUNDANT TRAIN	CV-31	ACCESSIBLE WITH THE SOURCE TRANS LUBE OIL PAN COOLER 8-178
			(42-11A15)		OIL COOLER	,		PUMPING FOR SI AND SECONDARY RECIEC	REQUIRED FOR RITEMDED FW PUMP OPERATION DURING SBLOCA OR MSLB INSIDE CONTAINMENT
01.1.0	6.11.1 G	- 38	ISA	PRESSURE LOW	EST THAN TITLE TO BEFORE TO THE CA-31 WAS CA-31 ON THE CA	•	BACEUP NITROGEN	UNING SAPRTY RELATED BACK-UP	
01.1.0	6.18.1 G	- 38	CMT	PRESSURE LOW	BIGGSIATON EN SAMB MINIETON STEEND MILBOCEN ANYAVITABLE LO	PERIODIC SURVEILLANCE	REDUNDANT TRAIN FOR SI AND RECONDARY BECIEC PUMPING.	*IMOPREABILITY OF TRAIN A PUMPING FOR SI AND SECONDARY	PTRAIN A PW PUMP MAT PAIL DURING SPLOCA OR MSLB IP
.: }				····	VALUES CV-31 AND CV-815B		MANUAL BACEUP MINIPLON ISOLATION VALVES (PNS-473, 411) FOR RNST INVENTORY	RECIRC, OR PARTIAL DIVERSION OF TRAIN A PLOW TO CONDENSER	CALCULATIONS INCLUDE CV-36/37 PAILUPE OPEN. LOCAL MANUAL BACKUP ISOLATION APTER 30
			N. I. I. S. A. S.		BALLY A DIA BLOW ALLOWS BO OF	COMPONE BOOM FURTOURION	DEDITIONAL POLICE PLAN		MINUTES. LOCATION INACCESSIBLE WITH THI SOURCE TREMS
01.1.0	7.01.1	A-8318	VALVE/ACTUATOR	· · · · ·	TRAIN A PW PLOW ALIGNED TO SI MEADER (IP PARTIALLY OPEN) OR SUCTION VALVE BY-8548 CLOSES		REDUNDANT TRAIN FOR SI PLON, REDUNDANT NOV-850A/8/C CLOSURE FOR SECONDARY BECIRC BOUNDARY.	PUMPING FOR SI AND SECONDARY RECIEC, REDUCED REDUNDANCY	TRAIN A PM PUMP PACLURE MAT OCCUR DUB TO CAVITATION IP INTRICCE CLOSES BY 8548 PRIOR
					(VIA INTRRLOCE IP BV-8518 PULLT OPEN) IP PRIOR TO SIS/SISLOP. NO BPFECT ON SI ATTER BIS/SISLOP. BUT CANNOT		CONDENSATE INJECTION	AGAINST INJECTION OF CONDENSATE TO BCS	10 313/313LUF
					BE RECLOSED FOR SECONDARY RECERC	DESCRIPTION OF STREET	ARDINOANS SOATH SOR SI MONS	SHOODS STATES AS POLIN A	NOSMAL POSITION. PAILURE CAN
01.1.0	7.01.2 H	A-8918	VALVE/ACTUATOR		BLOCEED  BLOCEED	PERIODIC 182118G	REDUNDANT TRAIN FOR 31, NONE REQUIRED FOR SECONDARY RECIEC		RESULT PROM IMADEQUATE ACTUATOR THRUST TO OVERCOME DRAG PORCES IF 8V-2900/1900
<u></u>	<u> </u>							AND LANGUAGE CONTRACTOR OF THE	PAILS TO VENT INTER-DISC CAVITY OR PU PUMP PAILS TO TRIP
01.1.0	7.02.1 H	V-8518 	280-285482 250-285484	CONTACTS OPEN (OPP)	PROVIDES SIGNAL AS BEQUIRED PROVIDES SIGNAL AS BEQUIRED	PERIODIC TESTING		RELIABILITY ENDUCED FOR TRAIN A SI PUMPING, MONE FOR SECONDARY RECIEC	



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# EMBEGENCY CORE COOLING STOTEM SINGLE PAILURE AWALTSIS SAM OMOPRE UNIT 1 TABLE 1-1: SAPETT INJECTION / MAIN PW ISOLATION PHEA

ITEM #	DRVICE ID	COMPONENT ID	PAILURE MODE	LOCAL REPRETS AND DEPRIDENT PAILURES	METHOD OF DETECTION -	IMMERRAT COMPRESSITING PROVISIONS	RFFRCT ON ECCS	ERNARES
Q1.1.07.Q2.2 B		ZSQ-285482 Z8Q-285484	CONTACTS CLOSED	LINTERLOCE PROM MY-AS4R DEFRATED, BY-8518 WILL SEGIN OPENING CONCURRENTLY WITE MY-8548 CLOSING	CONTROL ROOM INDICATION PERIODIC TRATING	INJECTION)  NOME BROWLERD INSTE VATILITIES	INJECTION OF CONDENSATE PROM TRAIN A DURING DW PUMP REALLIGUMENT	····
01.1.07.01.1 8	V-8518	25C-2851B1 25C-2851B3	CONTACTS OPEN (OFF)	REDUCED REDUNDANCY POR CLOSE SIGNAL REAL-IN TO NV-8548 APTER SEQ BLOCE/RESET (ONE	CONTROL ROOM INDICATION PERIODIC TRATING	REDUNDANT LIMIT SWITCH, CONDENSATE AND MEATER DRAIN PUMP TRIPS	REDUCED REDUNDANCY AGAINST CONDENSATE INJECTION PROM TRAIN A PN PUMP	NORMAL POSITION
01.1.07.03.2 8	V-8518	29C-285181 29C-285183	CONTACTS CLOSED	LIMIT SWITCH) CLOSE INTERLOCE SIGNAL TO SW-354B, CAUSING LOSS OF CONDENSATE PLOW TO TRAIN A PW	CONTROL BOOM INDICATION PERIODIC TESTING	REDUNDANT TRAIN	(NOPBRABILITY OF TRAIN A	TRAIN A PW PUMP PAILURE MAT REGULT PROM CAVITATION PRIOR
01.1.07.04.1 #	7-0510	384 1 (11-1, 3)	CONTACTS CLOSED (ON)	PUMP PRIOR TO RESISTENCE  BY-8518 WILL OPEN AS REQUIRED ON BY-8548 CLOSED INTERLOCE  SIGNAL. VALVE CANNOT BE  BECLOSED FOR CONTAINENT  ESCLATION OR SECONDARY  RECIECULATION	PRBLODIC TRATING	NONE REQUIRED FOR 31.  REDUMDANT MOV-850A/B/C CLOSURI FOR SECONDARY RECIEC BOUNDARY	AGAINST CONDENSATE INJECTION TO	TO SIS/SISLOP  MOV-850A/8/C PROVIDE REDUNDANT ISOLATION
01.1.07.04.2 BV		SBQ 1 (17-1, 3) 1254DC DUS 81 (12-130)	CONTACTS OPEN (OPP) VOLTS LOW	(SAME AS 1.1.7.1.2)  TRAIN A PU PUMP SI FLOW PATE BLOCKED	PRRIODIC TRSTING CONTROL ROOM INDICATION	(SAME AS 1.1.7.1.2)  REDUMDANT TRAIN FOR SI, NONE REQUIRED FOR SECONDARY RECIRC	(SAME AS 1.1.7.1.2)  INOPERABILITY OF TRAIN A	MORMAL POSITION
01.1.07.05.1 HV	-8518	ISA	PRESSURE LOW	ISL UNAVAILABLE TO REPOSITION VALVE CLOSED FOR CONTAINMENT ISOLATION OF RECONDARY RECERCULATION AFTER INJECTION TRAHENATED	CONTROL ROOM ANNUNCIATION	BACRUP BITROGRA	SECONDARY RECIRC  UNDER VALUE WILL REPOSITION AS REQUIRED USING SAPETY-RELATED  RACEUP BITROGEN	
01.1.07.07.1 BV	-8518	CNI	PRESSURE LOW	BACEUP MITROCEN UNAVAILABLE TO REPOSITION VALUE CLOSED POR CONTAINMENT ISOLATION OR SECONDARY RECIECULATION APTER INJECTION TREMINATED	PBBIODIC SURVBILLANCE	NOWE REQUIRED FOR SI, ISA AND REDUNDANT MOV-3504/8/C FOR SECONDARY RECIRC SOUNDARY	RELIABILITY FOR SECONDARY RECIEC ALIGNMENT	NON-SAFETT RELATED ISA STSTEM CAN BE CERDITED POR MSLB IN CONTAINMENT PER SEP SECTION 15.1.5
01.1.08.01.1 11	-1521	VALVB/ACTUATOR	OPEN	SI PLOW PROM BOTE TRAINS DIVERTED INTO NON-SEISHIC PORTION OF MAIN PM WEADER UNTIL BACRUP VALVES CLOSED.	PERIODIC TESTING	PCV-456, 457, 458, CV-142, 143, 144, HOV-ZO, 21, 22 ASSUMED IN LOCA/HSLB ANALYSES.	NON-SBISHIC PORTION OF PW BRADBR).	SV-1, SV-2, SV-529. BACRUP Valves are safett related, SBISHIC CATEGORY A. VALVE
01.1.08.91.2 <b>ay</b>	-1528	VALVE/ACTUATOR	CLOSBO	REQUIRED POSITION FOR SECONDARY RECIBCULATION VALVE CANNOT BE OPENED FOR SISTEM RESET OF SECONDARY BECERCULATION AFTER INJECTION	CONTROL BUOM INDICATION PERIODIC TESTING	NORE FOR NON-SEISMIC MEADER DURING SI NOME REQUIRED FOR SI, REDUNDANT TRAIN FOR SECONDARY RECIRC	NOME FOR SI, INOPERABILITY OF	OPEN HORMAL FOR SECONDARY RECIEC
01.1.08.02.1 BV		9EQ 1 (17-5, 1) SBy 1 (17-5, 7)	CONTACTS OPEN (OPF) CONTACTS CLOSED (ON)	TRANIMATED [SAMB AS 1.1.8.1.1] (SAMB AS 1.1.8.1.2)	PARIODIC TESTING PERIODIC TESTING	(SAME AS 1.1.8.1.1)	0(SAME AS 1.1.8.1.1) (SAME AS 1.1.8.1.2)	NORMAL POSITION



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### BMBAGSMCT CORB COOLING STATEM SINGLE FAILURE AMALTSIS SAM OMORRE UMIT 1 TABLE 1-1: SAFETT IMJECTIOM / MAIN FW ISOLATIOM PHEA

ITRE	BBAICS ID	COMPONENT ID	FAILURE MODE	LOCAL REFECTS AND DEPENDENT FAILURES	METHOD OP Detection	INMESENT COMPENSATING	BFFRCT ON BCCS	REMARES
	IV-8528	125VDC_BUS_#1 {72-130}	VOLTS LOW	DIVERTED INTO MON-SEISMIC POSTION OF MAIN PN BEADER	CONTROL ROOM INDICATION PERIODIC TESTING	REDUNDANT PW ISOLATION VALUES PCW-456, 459, 458, CW-242, 143, 144, MOW-20, 21, 22	ASI DELIVERT TIME INCREASED, SI RELIABILITY REDUCED (VIA NON-SEISHIC PORTION OF PW	VALVE OPEN NORMAL FOR SECONDARY RECIEC
01.1.08.01.1 N	IV-8528	ISA	beezangs for	UNTIL BACKUP VALUES GLOSSO, SECONDARY RECIRCULATION ISA UNAVAILABLE TO REPOSITION	CONTROL BOOM ANNUNCIATION	ASSUMED IN LOCA/MOLE ANALYSES  MONE FOR NON-SEISMIC MEADER  DURING SI  MONE REQUIRED FOR SI,	NOME FOR SI, INOPERABILITY OF	MON-SAFETY BELATED ISA SPSTEM
		<del></del>		ASTRIBUTED  ASTRIBUTED  ASTRIBUTED		REDUNDANT TRAIN FOR SECONDARY RECIEC	TRAIN A PURPLING FOR BECONDARY RECIEC	CAN BE CREDITED FOR MELD IN CONTAINMENT PER SEP SECTION 15.1.5. AIR-OPERATED STORAULIC FUMP IN VALVE ACTUATOR
01.1.01.01.1.1	OV-8508	VALVE/ACTUATOR	OPEN	NO SPEECT ON INJECTION. VALVE CANNOT BE RECLOSED ON LO-LO RMIT LEVEL TO TERMINATE	CONTROL ROOM INDICATION	RMAL FRARE' BEORDONE AVEARS		190LATED BY SV-529
01. i. 09. 01. Z MON	OV-8508	VALVE/ACTUATOR	CLOSED	ENDECTION PLOW OR RENOTE-MANUALLY FOR RECONDARY BECIRC BOUNDARY INJECTION PATH BLOCKED TO RCS LOOP 8	PERIODIC TESTING	POR SECONDARY RECIEC SOUNDARY  REDUNDANT PLOW PATHS TO BCS  LOOPS A AND C POR SI, MONE  REQUIRED FOR SECONDARY RECIEC OR LO-LO RUST LEVEL	INJECTION REDUCED TO 1/2 LOOPS FOR LOCK (ONE LOOP SPILLING), 1/1 LOOPS FOR MSLB (LOOP C	ASSURBD COMMON-CAUSE PATTURE DURING MELE OUTSIDE
							RECIRC OR AUTO-TERMINATION OF SI ON LO-LO BMST LEVEL	CONTAINMENT DUE TO UNQUALIFIED POURE SUPPLY IN TURBINE BUILDING
61.1.05.02.1 HO	OV-8508	BTIAI BTIAZ	CONTACTS CLOSED (OPP)	REDUCED REDUNDANCY AGAINST AUTO-CLOSURE OF MOV-8508 ON LO-LO BUST LEVEL (ONE RELAY)	CONTROL ROOM ANNUNCIATION, INDICATION	ARBUNDANT PLOW PATES TO LOOPS A AND C FOR SI, NOWE REQUIRED POR LO-LO RWST LEVEL OR FOR SECONDARY RECIEC	REDUCED RELIABILITY OF LOOP B INJECTION PATH POR SI, NOWE POR AUTO-TREMINATION OF SI ON LO-LO RUST LEVEL OR POR SECONDARY	
01.1.09.02.2 M	04-8508	RTIAL RTIAL	CONTACTS OPEN (ON)	AUTO-CLOSURE OF MOV-8508 ON LO-LO RUST LEVEL DEPETED	PBRIODIC TESTING	MONE REQUIRED FOR SI OR  SECONDARY BECIEC, BEDUNDANY PURP TRIPS FOR LO-LO RWST LEVEL	RECIRC HENDE OF POR SECONDARY BRCIRC, REDUCED REDUMPINCY POR AUTO-TERMINATION OF SI ON LO-LO RUST LEVEL	MOITIZON LAMRCM
01.1.09.03.1 H	OV-850B	SBQ 1 (21-1,3)	CONTACTS OPEN (OPF)	(SAMB AS 1.1.9.1.2)	PRRIODIC TRATING	(SANB AS 1.1.9.1.2)		NORMAL POSITION
11.1.09.03.2 g	UV-8503	SEQ 1 (21-1,3)	CONTACTS CLOSED (ON)	MOV-8508 OPENS DURING WORMAL OPERATION NO REPERT ON INJECTION OR AUTO-CLOSURE ON LOW RWST LEVEL	CONTROL BOOM INDICATION	MORS SEGUISED		PAILURE MAY RESULT IN TUCREASED MAIN FO POMP ACCELERATION TIME DURING LBLOCA, BUT STAINS WOULD DO NATH LBLOTH TRAINS
11.1.03.04.1 # ·	)V-859B 	125VDC BUS #1 [72-130]	VOLTS LOW	INJECTION PATH NOT LOOP B ON SIS/SISLOP	CONTROL ROOM INDICATION	REDUNDANT FLOW PATHS TO RCS LOOPS A AND C FOR SI, NOME REQUIRED FOR LO-LO RUST LEVEL OR FOR SECONDARY RECIRC	INJECTION REDUCED TO 1/2 LOOPS FOR LOCA (ONE LOOP SPILLING),	BB_VAYITYBEB_ALIQ_1813_bylfobb_
							AUTO-TERMINATION OF SI ON LO-LO BAST LEVEL OR FOR SECONDARY RECIEC	

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### SHEEGEBUCE CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OMOFRE UNIT 1 TABLE 1-1: SAFETT INJECTION / MAIN FO ISOLATION PREA

(TBH #	DEVICE 10	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	BFFBCT ON BCCS	BEHIEFS
_01.1_09.05.1 #	Y:850B	MCC-1 (42-1180)		AVIAR AILT MOL'OLEM ON TOA		REDUNDANT PLOW PATHS TO RCS LOOPS A AND C FOR SI, REDUNDANT PURP TRIPS FOR LO-LO RUST LRYRL, REDUNDANT YALYRS [RV-8514/8] FOR SECONDRY RECIRC BOUNDARS	FOR LOCA (ONE LOOP SPILLING), 1/1 LOOPS FOR MALE (LOOP C BLOCARD DUE TO COMMON-CAUSE FAILURE). REDUCED REDUNDANCY FOR AUTO-TRENIMATION OF SI ON LO-LO RWST LEVEL AND FOR	
01.1.10.01.1 [	IOT USED						SECONDARY RECIRC	
01.1.11.01.1_G		(152-11C06) (152-11C08)		1 OF 3 COMPRISATE PUMPS 10F 3 COMPRISATE PUMPS 1 OF 3 COMPRISATE PUMPS CANNOT	CONTROL BOOM INDICATION PROCODIC TESTING		NOMB  NOMB FOR INJECTION PLON.	TRAIN A POWERED COMDENSATE PUMP WOULD BE TRIPPED ON SIS/SISLOP IF RUNNING
		(152-11C06) (152-11C08)		BE TRIPPED TO TRAIN A PH PUMP SUCTION	TANKED INDICATE	CLOSURE OF SUCTION VALVE RV-854B PREVENTS CONDENSATE	BEDUCED REDUNDANCY ACAINST INJECTION OF CONDENSATE BY TRAIN A	MORMAL POSITION
01.1.11.02.1 G-	1C, G-1D	194-5 (BELAT)	CONTACTS OPEN (OFF)	TRAIN A CONDRINGATE PUMPS WILL NOT TRIP ON BUS UNDERVOLTAGE.  SIS/SISLOP TRIP PROB SEQ  UNAPPECTED	PRRIODIC TESTING	(SAME AS 1.1.11.1.2)	(SAHB AS 1.1.11.1.2)	NORMAL POSITION
01.1.11.02.2 G-		194-5 (RBLAT)	CONTACTS CLOSED	BOTH TRAIN A COMDENSATE PUMPS TRIPPED	CONTROL ROOM INDICATION	MONE SEQUISED	PMOM	
01.1.11.03.1 G		58Q 1 (19-6,8) (19-9,11)	CONTACTS OPEN (OPP)	TRAIN A CONDRIBATE PUMPS WILL NOT TRIP ON SEQ SIGNAL. BUS UNDERVOLTAGE TRIP UNAPPECTED	PRRIODIC TRATING	(SAMB AS 1.1.11.1.2)	(SAMB AS 1.1.11.1.2)	NORMAL POSITION
61.1.11.03.2 G-		82Q 1 (19-6,0) (19-9,11)	CONTACTS CLOSED (OM)	I OF 2 TRAIN A CONDRUSATE PUMPS TRIPPED	CONTROL BOOM INDICATION	NOME BEGILESD	MOMB	
01.1.11.04.1 G-	IC, G-10	AUS AIC 125VDC CONTROL POWSE	VOLTS LOW	TRAIN A COMDRHAATE PUMPS WILL NOT TRIP ON SEQ OR BUS UNDBEVOLTAGE SIGNALS	CONTROL BOOM INDICATION		NOWE FOR INJECTICA FLOW. REDUCED RELIABILITY AGAINST INJECTION OF CONDENSATE BY	
01.1.12.01.1 G-		OUS #1C [152-11C09]	OPEN	BRATER DRAIN PUMP TRIPPED TO TRAIN A PM PUMP SUCTION	CONTROL ROOM INDICATION	NORE BEQUIEED	TRAIN A NOME	HEATER DRAIN PUMP TRIPPED ON SIS/SISLOP
01.1.12.01.2 G-	168	8US (152-11COS)	CLOSED	MEATER DRAIN PUMP CANNOT BE TRIPPED TO TRAIN A PW PUMP SUCTION	PERIODIC TESTING		NOMB FOR INJECTION PLOW. REDUCED REDUNDANCY AGAINST INJECTION OF CONDENSATE BY	MORMAL POSITION
01.1.12.02.1 G-	36B 	152-11C04 *b* CONTACT	OPBN	MEATER DRAIN PUMP WILL NOT TRIP ON TRAIN A PW PUMP TRIP. SRQ TRIP UMAPPECTED	PRRIODIC TRSTING	INJECTION (SAME AS 1.1.12.1.2)	TRAIN A. (SANB AS 1.1.12.1.2)	NORMAL POSITION DURING POWER OPERATION
01.1.12.02.2 G-	168	152-11CO4 "b" CONTACT	CLOSED		CONTROL ROOM INDICATION	· ·	MON3	
01.1.12.03.1 G-	168	194 (BBLAT)	CONTACTS OPEN (OFF)	TRAIN A BRATER DRAIN PUMP WILL NOT TRIP ON BUS UNDERVOLTAGE, SEQ AND FW PUMP TRIPS UNAFFECTED	PBRIODIC TESTING	(SAHS AS 1.1.12.1.2)*	[SAMB AS 1.1.12.1.2]	NORMAL POSITION

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#### EMBEGRACY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONOFRE UNIT 1. SAN ONOFRE UNIT 1. TABLE 1-1: SAFETY INJECTION / HAIN FW ISOLATION FREA

ITEM A	DRAICE ID	COMPONENT ED	FAILURE MODE	LOCAL BFFECTS AND DEPENDENT PAILURES	MBTHOD OF DBTECTION	INUBERNT COMPRESATING PROVISIONS	APPECT ON BUCS	PSBAR28
01.1.12.03.2 (	G-168		CONTACTS CLOSED	TRAIN A HEATER DRAIN PUMP	_CONTROL ROOM LINDICATION	MONE BEGATERO	MOVE	e de la companya de l
)1.1.12.04.1 (	6-168	489 1 [18-10, 12]	CONTACTS OPEN	TRAIN A BRATER DRAIN PUMP WILL MOT TRIP ON SEQ SIGNAL, TRIP	PRRIODIC TESTING	(SAME AS 1.1.12.1.2)	(SAMB AS 1.2.12.1.2)	MODITEON JAMES
1.1.12.04.2 (		SEQ 1 	CONTACTS CLOSED	ON PW PUMP TRIP UMAPPROTED TRAIN A MEATER DRAIN PUMP TRIPPED	CONTROL BOOM INDICATION	NONE BEGUIEED	NOME	
1.1.12.05.1 (	3-168 	CONTROL POWER	AOTIS FOR	JUID SIGNATA NO. 1816 OR SEG OR EA SIND LEVIR Y SEVERS DEVIN SIND MILT	CONTROL BOOM INDICATION	NOME REQUIRED FOR SI PLOW. CLOSURE OF SUCTION VALUE EV-8548 PREVENTS CONDENSATE	NOME FOR INJECTION PLOW. REDUCED REDUMDANCY AGAINST INJECTION OF CONDENSATE BY	
	IANUAL VALVES,		OPRN	MOMB	PERIODIC SURVEILLANCE	NORE BEGNESSO	TRAIN A NOME	NURMAL POSITION. INCLUDES SIS-JUZ
1	TANUAL VALVES, PRAIN B PLON		CLO3BO	TRAIN 8 SI PUMP SUCTION OR DISCHARGE SLOCEED	PERIODIC SURVEILLANCE	RROUNDANT TRAIN	INOPERABILITY OF TRAIN B PUMPING FOR SI AND SECONDARY RECIRC	
-	RAIN & PLON		MOME (BYSSIAE)		PERIODIC TRATING			INCLUDES SIS-304, 003, FWS-438
	BAIN B BOUNDARY	· · · · · · · · · · · · · · · · · · ·	OPBN	DIVERSION OF TRAIN 8 31 FLOW	PERIODIC SUSVEILLANCE	ESDUNDANT TRAIN FOR 31 FLOW,  BACEUP VALUES AND/OR  ADMINISTRATIVELY CONTROLLED  VALUE LOCEING FOR EWST	*(NOPERABILITY OF TRAIN B 31 PUMPING, DIVERSION OF RWST INVENTORY	ISSE TABLE 1-2 FOR DETAILED BOUNDARY VALVE ANALYSIS. DIVERSION BOUNDED BY CV-36/37 FAILURE WITH LOCAL MANUAL
	ANUAL VALVES	<del></del>	CLOSSD	NO REPERT ON INJECTION, AUTO-TREMINATION OF 21 FLOW OR SECONDARY RECIRCULATION	PRRIODIC SURVEILLANCE	NORS BESOTERED	MOMB	BACRUP ISOLATION AFTER 10 HINUTES: LOCATION INACCESSIBLE WITH THI SOURCE TERMS WORMAL POSITION
٧	BBCE OR RBLIBP ALVES, TRAIN B OUNDART		MORMAL (PASSIVE)		The second secon			THERE ARS NO VALVES IN THIS CATBGORY
.2.03.01.1 G	-504	PUMP/HOTOR	FOR BFOR	BEDUCED SI PUMP OUTPUT TO TRAIN B FM PUMP	PRREODIC TESTING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN & PUMPING FOR SI AND SECONDARY RECIEC	
.2.03.02.1 0	-50A	BUS #2C (152-12C05)	CPRW	TRAIN B SI PUMP PAILS TO START OR TRIPS AFTER STARTING	PERIODIC TESTING	BEDUNDANT TRAIN	INOPERABILITY OF TRAIN B PUMPING FOR SI AND SECONDARY RECIRC	NORMAL POSITION. SI PUMP BRBAEBR.
.2.01.02.2 G	-504	BUS #20 (152-12005)	CLOSED	TRAIN B SI PUMP STARTS, OR PAILS TO TRIP ON LOW RWST LBVBL	CONTROL ROOM INDICATION	POR LO-LO RUST LEVEL,	NOME FOR SI, REDUCED REDUNDANCY FOR AUTO-TERMINATION OF SI ON LO-LO RWST LEVEL, INOPERABLLITY	SECONDARY RECIRC DUE TO CAVITATION FAILURE POLLOWING
.2.03.23.1 g	- 50 A	F3F\F3F1 - 3080 F3F\F3F1 - 3083	985 (HIGH)	1/3 LOW RWST LEVEL TRIP IMPUTS DISABLED TO TRAIN 8 SI AND PW PUMP. TRAIN 8 TRIP LOGIC BECOMES 2/2 OM REMAINING INPUTS	PBRIODIC TESTING	REDUNDANY TRAIN POR SECONDARY RECIEC (SAME AS 1.2.3.2.2)	OF TRAIN B PUBPING FOR  BECCHDARY RECIRC  FOR SI, REDUCED REDUNDANCY  FOR AUTO-TRENINATION OF SI ON  LO-LO RWST LEVBL, REDUCED  BELIABILITY OF TRAIN B PUBPING  FOR SECHNOARY RECIRC	



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## EMERCENCY CORP COOLING SYSTEM SINGLE FAILURE AMALYSIS SAM OMOPRE UNIT I TABLE 1-1: SAFETY IMBETION / MAIN FW ISOLATION FMSA

[TB# #	DEATCR 10	COMPONENT ID	FAILURE MODE	LOCAL BPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	INNERBUT COMPRESSIONS PROVISIONS	REPECT ON BOOS	REMARES
<u>01.2.03.03.2 G-</u>	50A	LSL/LSLI - 3088 LSL/LSLI - 3089 LSL/LSLI - 3090	ON (FOA)	1/3 LOW RWST LEVEL IMPUTS TRIPPED TO TRAIN B. TRAIN B	ANNUNCIATION	BRDUNDANT TRAFN	REDUCED REDUNDANCY AGAINST TRAIN 8 SI/PU PUNP TRIP	RYLAYS EMBRGIZED ON LOW BYST LEVEL
01.2.01.04.1 G-	50A	BTE (81)	CONTACTS CLOSED	BREATRING INPUTS  PN OR ST PURP TRIP AND INPUT TO LOW REST LEVEL TRIP OF	PRRIODIC TRATING	{SAME AS 1.2.3.2.2}	(SAME 43 1.2.3.2.2)	NORMAL POSITION
				BOV-456A/B/C. LOGIC TO BTIAZ, RTIBZ, RTICZ BECOMES 1/1 ON REMAINING RTE		· ·		· · · · · · · · · · · · · · · · · · ·
01.2.03.04.2 G-	50A	RTE (SE)	CONTACTS OPEN (ON)	TRAIN & LOW BUST LEVEL SIGNAL TO MOV-850A/B/C VIA RTIAZ, RTIBZ, RTICZ AND TRIP OF APPROTED PURP	CONTROL ROOM ENDICATION	INPUTS FROM RECURDANT PRAIN FOR SI, NOWE REQUIRED FOR SECONDARY RECIRC	BROUGED BROUNDAYCT AGAINST HOV-850A/B/C CLOSURB (1/1 ON TRAIN A INPUT TO RACH VALVE) FOR ST, NOWE FOR BECONDERT	RELAY BURREIZED ON 273 LOW RUST LEVEL WITH SIS/SISLOP IN RESPECTIVE PUMP CONTROL CIRCUIT
01.2.43.65.1 G-5	504	BTIAZ BTIBZ BTICZ	OPP (LOW)	TRAIN & LOW RWST LEVEL SIGNAL TO ONE OF MOV-850A/8/C. NO SPERCT ON SI PUMP	PERIODIC TESTING	REDUNDANT VALVES FOR SI, NONE REQUIRED FOR SECONDARY RECURC	MOV-850A, B, OR C CLOSURE (1/1 ON TRAIN A INPUT) POR SI, NOME	
01.2.03.05.2 G-5	01	BTIAZ BTIBZ BTECZ	ON (NICE)	TRAIN & LOW ENST INPUT DISABLED TO ONE OP HOV-850A/B/C	PRRIODIC TRAFFING	NOME REQUIRED FOR SE OR SECONDARY RECIRC, REDUNDANY PURP TRIPS FOR LO-LO RWST	FOR SECONDARY RECIEC  MONE FOR EL OR SECONDARY  RECIEC, REDUCED REDUNDANCY FOR AUTO-TERMINATION OF SI ON LO-LO	NORMAL POSITION
01.2.03.06.1 G-5	04	83-3091 83-3091A	CONTACTS CLOSED (OPF)	SI SEAL-IN TO TRAIN B SI AND PN PUMPS CANNOT BE RESET APTER BRO BLOCK/RESET TONE SWITCHS		LEVEL  MONE ERQUIRED FOR INJECTION OR  LO-LO RWST LEVEL, REDUNDANT  FRAIN FOR RECONDING RECIPE	AUTO-TERMINATION OF SI ON LO-LO	
** ***********************************						TABLE FOR SHOURDER ENCIRC	ENST LEVEL, INOPERABILITY OF TRAIN & PUMPING FOR SECONDARY RECIEC	OF RITHER SWITCH PREVENTS RESTART OF PUMP AFTER LO-LO RWST LEVEL TRIP (POST-MSLB IN
)1.2.03.06.2 G-5	04	89-3091 89-3091A	CONTACTS OPEN	TRAIN 8 SI SRAL-IN REDUNDANCY POR LOW RWS? (EVEL TRYP	PERIODIC TESTING	(SAME AS 1.2.3.3.1)	(SAME AS 1.2.3.3.1)	CONTAINMENT POR SECONDARY RECIEC
01.2.03.01.1 G-5	<u> </u>			REDUCED TO 1/1 ON REMAINING				
	····	98Q 2 (37-1, 3)	CONTACTS OPEN (OPP)	TRAIN B ST PUMP FAILS TO START. NO RPPECT ON LOW BUST LEVEL TRIP AFTER START DUR TO SRAL-IN WITHIN PUMP CONTROL	PBREGOTE TESTING	(SAME AS 1.2.3.1.1)		NORMAL POSITION PAILURE OF ST PUMP TO AUTO-START COULD RESULT IN CAVITATION PAILURE OF PW PUMP
11.2.03.07.2 G-5	04	SRQ 2 (31-1, 3)	CONTACTS CLOSED	CIRCUIT TRAIN 8 SI PUMP STARTS, OR CANNOT SE RESTARTED AFTER LOW RWST LEVEL TRIP	CONTROL ROOM INDICATION PERIODIC TRSTING	RWST LEVEL, REDUNDANT TRAIN FOR SECONDART RECIRC	NOMB FOR 31 OR AUTO-TERMINATION OF 31 ON EO-EÖ RÜST EBVBL, INOPERABILITY OF TRAIN B	
31.2.03.08.1 G-50	0 &	•	CONTACTS CLOSED (OFF)	TRAIN B'SI PUMP OVERLOAD TRIP MOT DEPRATED UNTIL 83-5 CONTACTS OPEN UPON EV-85JA MOT CLOSED	P8BIODIC T8STING	BROUNDANT TRAIN FOR BI AND	PUMPING FOR SECONDARY RECIRC REDUCED RELIABILITY OF TRAIN 8" PUMPING FOR SI AND SECONDARY RECIRC	NORMAL POSITION



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### EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE AWALTSIS SAN ONOFRE UNIT I TABLE 1-1. SAFETT INJECTION / MAIN FW ISOLATION FMSA

[TBN #	DRVICE ID	COMPONENT (D	PAILURR MODB	LOCAL RPFRCTS AND DRPRNDRNT PAILURES	METHOD OF Detection	INHERENT COMPRESATING - PROVISIONS	BPFBCT ON BCCS	RSMARES
01.2.03.0a.2 G	-104	<u>559</u> 2	_CONTACTS OPEN	TRAIN B SI PUNY OVERLOAD TRIP	PERLODIC TESTING	ISANR AS.1.2.).#.11	(\$443.45.J.2.2.H.11	INCHRASED RISE OF 31 PUMP MOTOR DANAGE DURING MORNAL SURVEILLANCE TESTING
01.2.03.09.1 G	- 50A	83:5 (88LAT)	CONTACTS CLOSED (OFF)		PRRIODIC TESTING	19ANR AS 1.2.3.4.11	_ (\$488 .45. 1.4. ). [1, 0.1]	NORMAL POSITION . INTERLOCE PROM
01.2.03.09.2.G	- 504	01-5_(BBLAT) _	CONTACTS OF BU		PERIODIC TRATING	19ANE AS 1.2.3.8.1)	(SAMB AS 1.2.3.8.1)	(SAMB 49 1.2.3.8.2)
01.2.03.10.1 G	-50a 	CONTROL POWER	FOLTS LOW	TRAIN S SI PUMP CANNOT BE STARTER_OR_IRIPPER	CONTROL BOOM ENDICATION	REDUNDANT TRAIN FOR SI AND SECONDARY RECIRC, REDUNDANT MOV-6501/8/C CLOSURE FOR LO-LO RUST LEVEL	INOPERABILITY OF TRAIN 8 PUNPING FOR 31 AND \$8CONDARY RECIGC, REDUCED REDUNDANCY FOR AUTO-TERMINATION OF 31 ON LO-LO	
01.2.04.01.1 H	V-853A	VALVE/ACTUATOR	OPEN	CONDENSATE FLOW DEVERTED TO ENST VIA BE MEMIFICON IF PRIOR TO \$18/818LOP, NO REFECT AFTER	CONTROL ROOM INDICATION PERIODIC SURVEILLANCE	SAST BOSON CONCENTRATION TOURISTERATION	EWST LEVEL  PERDUCTION IN RWST BORON  CONCENTRATION IP PRICE TO  SIS/SISLOP. NO BEFRET IP APTER	INCLUDES SV-1, SV-2, SV-526. TROUNICAL SPECIFICATIONS 3.3.3 AND 4.1.1 GOVERN THE BUST
01.2.04.01.2 #	V-853A	VALVE/ACTUATOR	CLOSBO	SIS/SISLOP TRAIN & SI PUMP DISCHARGE TO PM PUMP SUCTION BLOCKED	PERIODIC TESTING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B PUMPING FOR SI AND SECONDARY	NORMAL POSITION (FW PUMP IN PW
01.2.04.02.1 8	V-853A	83-1 (BBLAT)	ON	NOME. CONTACTS JUMPERED TO TRAIN & MEATER DRAIN PUMP	PERIODIC TESTING	NONE BEGUIRED	RBCIRC Mode	RELAY ENERGIZED BY HV-853A OPEN LINIT SWITCHES
01.2.04.02.2 H 01.2.04.03.1 B		83-1 (RBLAT) 83-2 (RBLAT)	OFF ON	(SAME AS 1.2.4.2.1)	PRRIODIC TESTING PRRIODIC TESTING	(SAME AS 1.2.4.2.1) REDUNDANT TRAIN	(SAME AS 1.2.4.2.1) TRAIN B FW PUMP WILL TRIP 30 SBC AFTER SIS/SISLOP	MORMAL POSITION RELAT EMERGIZED BY HV-853A CLOSED LIMIT SWITCHES
				B PW PUMP PROTECTIVE TRIP CIRCUIT AFTER SIS/SISLOP				
		A2-2 (ABLAT)		PROTECTION VALVE EV-853A CLOSED TRAIN B PW PUMP	PRRIODIC TRATING	NORE SECRETED	NONE	<del></del>
<u> </u>	1-1514		<u>OH</u>	NOME. CONTACTS JUMPERED IN COMDENSATE PUMP CIRCUITS	MONE SEGUISSO	HOME REQUERED	MONB	RELAT BUERGIZED BY HV-853A OPEN LIMIT SWITCHES
01.2.04.04.2 8	/-853A	\$3-1 (RBLAT)	088	NOME. CONTACTS JUMPERED IN CONDENSATE PUMP CIRCUITS	NOME EEGUIRED	NOWE EEQUIEED .	NONB	
01.2.04.05.1 8	/-8534	83-5 (RELAT)		TRAIN & SI/PW PUMP OVERLOAD TRIPS DEPRATED, PW PUMP MINIFLOW &BALLIGNS TO RWST. NO	CONTROL ROOM INDICATION PERIODIC TESTING	(SAMB AS 1.2.4.1.1)	*(SAMB AS 1.2.4.1.1)	RELAT BURRGIZED BY HV-853A NOT CLOSED LINIT SWITCHES
01.2.04.05.2 1	/-8534	83-5 (RBLAT)	OFF	BPPBCT APTER SIS/SISLOP TRAIN B FW PUMP MINIPLOW VALVE RRALIGMHENT AND SI/FW PUMP	PRRIODIC TRATING	REDUNDANT TRAIN FOR SI PLOY.  BACEUP MANUAL MINIFLOY	FROM TRAIN B APTER SEQ	INORNAL POSITION. RWST INVENTORY CALCULATION INCLUDES
				OVERLOAD TRIP DEPEATS NOT SEALED IN, RESULTING IN REALIGNMENT OF MINIFLOW TO CONDENSER APTER SEQ		ISOLATION VALVES (PWS-472, 476) POR BUST INVENTORY		BACKUP ISOLATION APTER 30 MINUTES. LOCATION NOT ACCESSIBLE WITH THE SOURCE
01.2.04.05.1 <u>B</u> Y	I-823V	(13-6' 8) 2ñd 5	CONTACTS OPEN (OFF)	BLOCK/RESET BY-831A FAILS TO OPEN (BEHAINS CLOSED) ON SIS/SISLOP, NO DUB TO SIGNAL SEAL-IN VIA 83-4 RELAY CONTACTS WITHIN VALVE	PRRIODIC TESTING		(SAMA AS 1.2.4.1.2)	TERMS NORMAL POSITION

CONTROL CIRCUIT



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#### EMBRGENCT CORE COOLING SYSTEM SINGLE FAILURE ANALTSIS SAN ONOPRE UNIT 1 TABLE 1-1: SAFETY INJECTION / MAIN FY ISOLATION FREA

178H #	DBAICE ID	COMPONENT ID	FAILURE MODE	LOCAL BPPECTS AND DBPEADENT PAILURES	MBTNOD OF DRTECTION	INHERBNY COMPRINGATING PROVISIONS	EFFECT ON BUCS	RSMARES
DL.2.04.06.2 HY	-1534	880 Z	CONTACTS CLOSED	(SAME 45.1.2.4.1.1)		(SAMR_AN_1.2.4.1.1)	_F[SAMR_AS_1.2.4.1.1]	
61.2.04.07.1 BV	-853A	(19-6, 8) 125VDC RUS 82 172-211)	VOLTS LOW	EV-853A PAILS TO OPEN (BENAINS CLOSES) ON SIS/SISLOP, ARLAY	PERIODIC TRATING CONTROL ROOM INDICATION	REDUNDANT TRAIN	INOPERABLLITY OF TRAIN B.	
				83-2 PAILS OPP, DISABLING TRAIN 8 PN PUMP SUCTION VALVE CLOSED PROTECTIVE TRIP			RECIRC	
1.2.04.08.1 BV	-1574	184	PRESSURE LOW	TEA UNIVAILABLE TO REPOSITION ATTRE CHISCIPPE TO REPOSITION	CONTROL BOOM ANNUNCIATION	NOME REQUIRED	NONE	AIR OPERATED HIDRAULIC PUMP IN ACTUATOR ISOLATED BY SY-526. VALVE REQUIRED TO BEHAIN OPEN
.2.05.01.1 HV	-1544	WALVE/ACTUATOR	OPRN,	TRAIN S PN PUMP SUCTION NOT ISOLATED FROM CONDENSATE AND	PERIODIC TRATING	REDUNDANT TRAIN POR FLOW. CONDENSATE, HEATER DRAIN PUMP	INOPERABILITY OF TRAIN B PUMPING FOR SI AND SECONDARY	FOR 91 AND SECONDARY RECIEC MORNAL POSITION (FW PUMP IN FW MODE), INCLUDES SV-1, SV-2,
				ABATER DRAIN PUMPS ON SIS/SISLOP. VALVE POSITION INTERLOCE BLOCES NV-851A	- as the same training addition for the same for	INTERLOCE PREVENT CONDENSATE	RECIBC	8v-521
.2.05.01.2 HV	·1544	VALVE/ACTUATOR	CLOSED	OPENING LOSS OF CONDENSATE FLOW TO TRAIN B FW PUMP IF PRIOR TO	CONTROL BOOM INDICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B PUMPING POR SI AND SECONDARY	TRAIN B FW PUMP FAILURB COULD OCCUR DUR TO CAVITATION PRIOR
				SIS/SISLOP, INABILITY TO RESET TO PW ALIGHBERT POLLOWING INJECTION IF AFTER SIS/SISLOP	•		RECIRC IS SO PUMP PAILURE OCCURS	to SIS/SISLOP
.2.05.02.1 WV-	8544	29C-3851A1 29C-3851A3	CONTACTS OPEN (OPP)	BROUGED BEDUNDANCY FOR SEAL-IN	CONTROL BOCK INDICATION PERIODIC TESTING	NONE BEGNIESD	MONB	NORMAL POSITION. VALVE POSITION INTERLOCE PROM NV-851A. INTERLOCE BLOCES
				SWITCH). NO RPPRCT ON SIS/SIBLOP SIGNAL SEAL-IN OR CONDENSATE, REATER DRAIN PUMP				MANUAL ACTUATION OPEN APTER 880 BLOCK/RESET AND RESET OF 813/819LOP SIGNAL SEAL-IN ST
.2.05.02.2 HV-	4544	Z9C-3851A1 Z9C-3851A3	CONTACTS CLOSED	TRIPS (SAMB AS 1.2.5.1.2)	CONTROL ROOM ENDICATION	(SAME AS 1.2.5.1.2)	(SAME AS 1.2.5.1.2)	BV-854A MANDSWITCH
.2.05.03.1 BV-	4544	8V-2500	OFF (CLOSED)	LOSS OF INTER-DISC PRESSURE VENT/RELIEF FOR MY-851A. NO RFFECT ON BY-854A	PRBLODIC TESTING	REDUNDANT TRAIN FOR SI, NOWE REQUIRED FOR SECONDARY RECIEC		NORMAL POSITION. INTER-DISC CAVITY VENT/RELIEF REQUIRED TO OPEN 84-8514 FOR SI. EV-8518
. 2.05.03.2 HV-	.8511	SV-2900	ON (OPEN)	MV-8514 INTER-DICS CAVITY	PERIODIC TESTING	MOME SEGUISED	MONE	CLOSED IS MORMAL FOR SECONDARY BECIEC CONTAINMENT ISOLATION
			AW JANES	CONTINUOUSLY VENTED TO PW PUMP SIDE. NO EPPECT ON HV-8514 OR EV-8544 SI REALIGNMENT, BUT		PARE ENGLISH	# PART	PUNCTION EVALUATED IN ESP SPA. MOV-850A/B/C ARE REDUNDANT CONTAINMENT ISOLATION VALUES
				DISABLES CONTAINMENT ISOLATION PUNCTION OF BY-851A			-	TO BY 851A/B AND SY 2900/3900, BUT PRIBETRATIONS AND VALVES MOT TYPE C LEAK TESTED PER LOCFRSO APPRIBLE J
1.2.05.G4.1 HV-	8514	ZSO-3854A2 ZSO-3854A4	CONTACTS OPEN (OFF)	REDUCED REDUNDANCY FOR HV-854A CLOSED ENTERLOCE TO HV-851A CIRCUIT (ONE SWITCH). ERNAINING SWITCH PROVIDES	PERIODIC TESTING	(SAME AS 1.2.5.3.1)	RELIABILITY REQUEED FOR TRAIN B SI PUMPING, NOME FOR SECONDARY RECIR	NORMAL POSITION. VALVE

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## SMERGENCY CORE COULING SYSTEM SINGLE FAILURE ANALYSIS SAN OMOFER UNIT ! TABLE 1-1: SAFETT INJECTION / MAIN PM ISOLATION FMSA

ITBH A	DRVICE ID	COMPONENT ID	FAILURE HODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON ECCS	BENABES
01.2.05.04.2	HY-8514	ZSO-185442 ZSO-385444	CONTACTS CLOSED	SY-8544 CLOSED INTERLOCE TO EV-8514 DEPRATED. BY-8514 WILL BEGIN OPENING CONCURRENTLY WITH IV-854 CLOSING	CONTROL ROOM INDICATION PERIODIC TESTING	NOME REQUIRED (MSLB ANALYSIS BOUNDS POTENTIAL CONDENSATE INJECTION)	INJECTION OF CONDENSATE FROM ONE TRAIN DURING PW PUMP BRALIGNERMY	
01.2.05.05.1	RV-854A	SEQ 2 (18-10, 12)	CONTACTS OPEN (OFF)	AV-8544 PAILS TO CLOSE (REHAINS OPEN) ON SIS/SISLOP. MO REFECT IF AFTER SIS/SISLOP DUE TO SIGNAL SEAL-IN IN VALVE	PRELODIC TESTING	(SABE AS 1.2.5.1.1)	(\$AWR AS 1.2.5.1.1)	NORMAL POSITION
01.2.05.05.2	8V.4841	SEQ 2	CONTACTS CLOSED	CIRCUIT	PERIODIC TESTING	(SAHE AS 1.2.5.1.2)	(SAME AS 1.2.5.1.2)	
01.2.05.06.1		(18-10, 12) 125 VDC BUS 82 (72-211)	AOTAS FOA	(SAME AS 1.2.5.1.2)  BV-8544 PAILS TO CLOSE (REMAINS OPEN) ON SIS/SISLOP	CONTROL ROOM INDICATION	REDUNDANT TRAIN FOR FLOW. COMDENSATE, MEATER DRAIN PUMP TRIPS AND DISCHARGE VALUE INTERLOCE PREVENT CONDENSATE INJECTION	INOPERABILITY OF TRAIN B	
01.2.05.07.1	BV-9544	[31	PRESSURE LOW	ISA UNAVAILABLE TO REPOSITION VALVE OPEN FOR STSTEM RESET APTER INJECTION TERMINATED	CONTROL BOOM ANNUNCIATION	MONB REQUIRED		AIR OPERATED BYDRAULIC PUMP IN ACTUATOR ISOLATED BY 3V-527. VALVE REQUIRED TO CLOSE POR SI AND SECONDARY RECIEC
<b>01.2.06.01.1</b>	G- JA	PUMP/MOTOR	FOR LFOR	REDUCED TRAIN B PM PUMP PLOM	CONTROL BOOM INDICATION PERIODIC TESTING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B PUMPING FOR SI AND SECONDARY BECIEC	INCLUDES LUBE OIL FAN COOLER B-ITA. PUMP REUGIRED FOR SECONDARY RECIRC UNTIL SI PUMP CAN DELIVER REQUIRED PLOW VIA
01.2.06.02.1	G-3A	8U8 \$2C (152-12C94)	OPRN	TRAIN B PN PUMP FAILS TO RESTART FOR SI (OM SIS/SISLOP) OR FOR SECONDARY RECIEC	PRREODIC TRETING	RROUNDING TRITA	SECIEC  STANDARYRICITA OR ABSCONDUSA  TROBSUSALICITA OR ABSCONDUSA	IDLE/WINDHILLING PW PURP
01.2.06.02.2	G-3A	BUS \$2C (152-12CO4)	CLOSBO	(MANUALLE) OR TRIPS APTRE STARTING TRAIN B PW PUMP PAILS TO TRIP DURING SIS/SISLOP STARTING SQUENCE OR ON LO-LO RVST LEVEL. MAINTAINS DIPPERENTIAL PRESSURE ON MV-8514 VALVE DISC AND DECRADES TRAIN B BUS VOLTACES DURING LOAD SEQUENCE		BASI FRARF MOA-8204/B/C CTORNER LOS TO-TO BECONDUM LETTIN LOS 21 THO	RECIRC, INCREASED RESPONSE THE FOR TRAIN B HOTOR-OPERATED VALVES (ROV-8504, MOV-21), REDUCED RELIABILITY FOR AUTO-TERMINATION OF SI ON LO-LO	SIS/SISLOP. PUMP UNAVAILABLE POR SECONDARY RECIPC DUE TO CAVITATION PAILURE APPER SI
01.2.06.03.1	G·3A	LSL1-3088 LSL/LSL1-3089 LSL/LSL1-3090	OPP (BIGH)	1/3 LOW RWST LEVEL TRIP INPUTS DISABLED TO TRAIN B PW PURP. TRAIN B PW PUMP TRIP LOGIC BECOMES 2/2 ON REMAINING	PRRIODIC TRATING	NOME EÉGNIEED	HONE BRAST (BAST)	NORMAL POSITION. INTERLOCE FROM G-50A CONTROL CIRCUIT
01.2.05.03.2	G-14	F3F\F3F1-3080 F3F\F3F1-3089	ON (LOW)	1/3 LOW RWST LBVBL IMPUTS TRIPPED, TRAIN B PW PUMP TRIP LOGIC BECOMES 1/2 ON REMAINING IMPUTS	PERIODIC TRATING	REDUNDANT TRAIN FOR SI, NOMB REQUIRED FOR SECONDART RECIEC	REDUCED RELIABILITY OF TRAIN B PUNPING FOR 31, NOMB FOR SECONDARY BECIEC	

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### BMBBGBNCY CORE COOLING STATEM SINGLE FAILURE AWALTSIS SAM ONOFRE UNIT 1 \_\_\_\_\_\_\_ TABLE I-I: SAFETY INJECTION / MAIN FN ISOLATION FMBA

•••••	DBAICE ID	COMPONENT ID	PAILURE MODE	LOCAL RPPRCTS AND DRPRNDENT PAILURES	DETECTION METHOD OF	INTERENT COMPRISATING PROVISIONS	BPPECT ON BCCS	EBBARES
01.2.06.94.1 G-	14	RII_(FV)		PERFORM  INDIA 10 MOA-820V/B/C CFORRE  BRAL FEARF VAD LEVEN B EN ENTE  TRYIN 8 ER ENTE LES ON TOR	PRRIODIC TESTING.	NOWE REQUIRED FOR SI,  REDUNDANT IMPUT PROM SI PUMP FOR MOV CLOSURE ON LO-LO ENST LEVEL.	RELIABILITY OF AUTO-TERMINATION	MOITIROS JAMBON
01.2.06.04.2 G-	34	STI (PW)	ON	TRAIN B PW PUMP TRIPS, CANNOT BR RESTARTED. TRAIN B LOW RWST LRVRL SIGNAL TO MOW-850A/B/C WIA BELATE RTRAZ, RTIBZ, RTICZ	PSRIODIC TRATING			v
01.2.06.05.1 G-	3 A	89-3091	CONTACTS CLOSES	SIS/SISLOP SIGNAL SEAL-IN TO	PRRIODIC TRSTING		NONE POR SI OR AUTO-TERMINATION	NORMAL POSITION, ROTH SWITCHRS
		BS-3091A	(OFF)	TRAIN & SI/PW PUMPS CANNOT &B RESET AFTER SEQ SLOCE/RESET		RWST LRYRL TRIP, REDUNDANT TRAIN FOR SECONDARY RECIRC	OP SI ON LO-LO RUST LEVEL, INOPERABILITY OF TRAIN B PUMPING FOR SECONDARY RECIEC	MUST OPEN FOR RESET. RESET REQUIRED TO PREMIT PUMP RESTART FOR SECONDARY RECIRC
01.2.06.05.2 G-	34	82-30914 83-30914	CONTACTS OPEN	TRAIN & SIS/SISLOP SIGNAL SEAL-IN REDUNDANCY FOR LOW RWST LEVEL TRIP REDUCED TO 1/1	PERIODIC TESTING	REDUNDANT INPUTS PROM AT PUMP FOR MOY CLOSURE ON LO-LO EYST LEVEL, NOME REQUIRED FOR ST	REDUCED BELIABILITY FOR AUTO-TERMINATION OF SI ON LO-LO	AFTER LO-LO RWST LEVEL TRIP
	•.			ON REMAINING RESET SWITCH		AND SECONDARY RECIRC	SECONDARY RECIRC	
01.2.06.06.1 <u>C</u> -	J <u>A</u>	"b" CONTACT	OPEN	TRAIN B BRATER DRAIN PUMP DORS NOT AUTOMATICALLY TRIP ON FW PUMP TRIP. 818/818LOP TRIP UNAPPECTED	PERIODIC TESTING	··		HORMAL POSITION. HEATER DRAIN PUMP TRIPS ON SEPARATE SEQ IMPUT FOR SI, CAN ALSO BE TRIPPED MANUALLY FOR SECONDARY
01.2.06.06.2 G-	11	152-12CO4 "b" CONTACT	CLOSED	TRAIN B MBATER DRAIN PUMP	CONTROL BOOM INDICATION	(\$4HB AS 1.2.6.6.1)	(SAME AS 1.2.6.6.1)	RECIRC
01.2.06.01.1 G-	34	83-2 (RBLAT)	CONTACTS OPEN (OFF)	TRAIN & PW PUMP PROTECTIVE TRIP ON SUCTION VALVE BY-853A CLOSED DISABLED	PERIODIC TESTING	(SAME AS 1.2.6.6.1)	(SAME AS 1.2.6.6.1)	MOIFIEOG JAMBON
01.2.06.07.2 G-	34	81-2 (BBLAT)	CONTACTS CLOSED	SUCTION VALUE HV-851A CLOSED SIGNAL WILL TRIP TRAIN B PW PUMP 30 SEC APTER 813/81810P	PERIODIC TESTING	REDUNDANT TRAIN FOR SI, NOME REQUIRED FOR SECONDARY RECIRC	PUMPING FOR SI, MONE FOR	SIS/SISLOP BLOCE/RESET WOULD OCCUR BEPORE PUMP RESTART FOR SECONDARY RECIRC
01.2.06.08.1 G-	)4	83-5 (RELAT)	OFF	SIS/SISLOP SEAL-IN DISABLED TO TRAIN B PN PUMP SUCTION VALVE PROTECTIVE TRIP, OVERLOAD TRIP		REDUNDANT TRAIN FOR SI PLOW, Baceup Manual Miniplow Isolation Valves (PVS-472,	AIN NINIBION ANTAR CA-30 TO SI BYON VALUE REG BYOCE/BRARA STREET OF ABRICA OF LEVIN B	ONORMAL POSITION. RUST INVENTORY CALCULATION INCLUDES CV-36/37 FAILURE, LOCAL MANUAL
				DEPRAY AND RUST MINIFLOW VALVE CV-875A. PW PUMP MINIFLOW VALVES WILL REALIGN TO		476) POR BUST INVENTORY AND SECONDARY RECIRC		BACEUP ISOLATION APTER 33 HINUTES: LOCATION NOT ACCESSIBLE WITH THI SOURCE
A1 2 66 A8 2 C :	14	83-5 (RBLAT)	ON	COMPRISE AFTER SEQ BLOCE/RESET SIS/SISLOP SEAL-IN SIGNAL TO	CONTROL ROOM INDICATION	ADMINISTRATIVE CONTROLS ON	*REDUCTION IN BUST BURON	TRUMS TRUMICAL SPECIFICATIONS 3 3 3
#1.6.UB.UB.6 LT			<b></b>	TRAIN B PM PUMP MINIPLOW VALVE CV-875A AND OVERLOAD TRIP DBFRATS, CAUSING BEALIGHENT OP TRAIN B PM PUMP MINIPLOW TO RWST. NO BPPRCT APTER	PBRIODIC TESTING	RUST BORON CONCENTRATION		AND 4.1.1 GOVERN THE BYST

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## EMERCENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OMOPRE UNIT 1 TABLE 1-1: SAFETY INJECTION / HAIN PW 130LATION PHEA

ITSH &	DRVICE ID	COMPONENT ID	FAILURE HODE	LOCAL BEFECTS AND DEPENDENT FAILURES	METHOD OF	LUMBRRUT COMPRUSATING PROVISIONS	RPPRCT ON RCCS	REMARES
01.2.06.09.1 G:	JA	_CY-8754		CONDRIGATE PLOW PROM TRAIN B PM PUMP TO RWST LP PRIOR TO RIS/ALSLAP NO REPECT LP		(SABR_A3_1.2.5.4.2)	F(SANR_AS_1.7.6.8.21	[NCLUDES SY-8354, LS-2 (25C-18754)
01.2.06.09.2 G-		CV-8154	CLOSED	TOSS OF TRAIN S PW PUMP  NINIFLOW PROTECTION FOLLOWING	PERIODIC TESTING	REDUMDANT TRAIN		NORMAL POSITION. MINIPLON REQUIRED TO PREVENT PUMP
01.2.06.10.1 G-	34	CY-36	OP8#	RINIFICOR SO CONDENSES PLANSISTOR OS ABVIR S EN DAND SINVESTOR	PRRIODIC TRSTING			
<b></b>								HINUTES LOCATION NOT ACCESSIBLE WITE THE SOURCE TERMS
01.2.06.10.2.G-	<u> </u>	CV-36	<u> Črōsiro</u>	LOSS OF TRAIN B PW PUMP MINIPLOW PROTECTION BURING MORMAL OPERATION	PORTODIC TRATING	BEDUKDANT TRACK	REDUCED RELIABILITY OF TRAIN B PUMPING FOR SI AND SECONDARY RECIRC	
01.2.06.11.1 G-	)A	81Q 2 (19-9, 11)	CONTACTS OPEN (OPP)	TRAIN & PW PUMP FAILS TO TRIP ON SIS/SISLOP, MAINTAINING DIPPRENTIAL PRESSURE ON BY-85IA VALVE DISC AND DECRADING TRAIN & BUS VOLTAGES DURING LOAD SEQUENCE		REDUNDANT TRAIN FOR SI AND SECONDART RECIEC, REDUNDANT INPUTS FROM SI PUMP FOR MOV CLOSURE ON LO-LO RWST LEVEL	INOPERABILITY OF TRAIN B PURPING FOR 31 AND SECONDARY RECIRC, INCREASED RESPONSE TIME OF TRAIN B MOTOR OPERATED VALVES (MOV-850A, MOV-21), REDUCED RELIABILITY FOR AUTO-TERRIMATION OF \$1 ON LO-LO	MORNAL POSITION. PW PUMP TRIP REQUIRED FOR BY-851A/B BRALIGMMENT. PUMP COULD BR UNAVAILABLE FOR SECONDARY RECIRC DUE TO CAVITATION PAILURE AFTER SI FUMP TRIP ON
01.2.06.11.2 C-	31	SBQ Z	CONTACTS CLOSED	TRAIN 8 PM PUMP TRIPS,	CONTROL ROOM INDICATION	REDUNDANT TRAIN FOR SI AND	RUST LEVEL INOPERABILITY OF TRAIN B	PAILURE OCCURING PRIOR TO
		(19-9, 11)	(ON)	RESTARTS IN SEC LATER. CANNOT BE RESTARTED AFTER LOW RUST LEVEL TRIP	PRRIODIC TRSTING	REQUIRED FOR LO-LO EMST LEVEL	AUTO-TERMINATION OF SI ON LO-LO	EFFECT ON SI FUNCTION AS
01.2.06.12.1 G-	34	8EQ 2 (42-1, 3)	CONTACTS CLOSED	TRAIN & FW PUMP OVERLOAD TRIP	PERIODIC TESTING	REDUNDANT TRAIN	ENST LEVEL PROUCED ERLIABILITY OF TRAIN B SI PUMPING	MORMAL POSITION
01.2.96.12.2 G-	34	SBQ 2 (42-1, 3)	CONTACTS OPEN	BEGINS TO OPEN TRAIN B FW PUMP OVERLOAD TRIP DEFRATED	PRRIODIC TESTING	(SAMB AS 1.2.6.12.1)	(SANE AS 1.2.6.12.1)	
01.2.06.13.1 G-	34	98Q 2 (53-1, 3)	CONTACTS OPEN (OPP)	TRAIN B PW PUMP MINIPLOW DORS NOT ISOLATE TO CONDENSEE ON 313/313LOP, PW PUMP PROTECTIVE		(1.01.3.1 EA BHAE)	\$(2ABB 49 1.8.6.10.1)	MORNAL POSITION
01.2.0a.1J.2 G-	34	989 2 (53-1, 3)	(OM) CONTACTA CTOZBO	SEC AND PROVIDES CLOSE PERMISSIVE TO TRAIN B PW PUMP	CONTROL BOOM IMPICATION	NORE BEGUIEED	NOMB	TRAIN 8 VALVES WILL BESPOND NORMALLY AND PW PUMP WILL BRSTART AS BRQUIRED
				MINIPLOW VALVE CV-36 IF PRIOR TO 313/313LOP, AFTER 313/313LOP, HV-853A OPENING WILL CLEAR FW PUMP PROTECTIVE	<del>-</del> ·			

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### EMERCENCY CORE COOLING SYSTEM SINGLE FAILURE AMALTSIS SAM OMOPRE UNIT 1. TABLE 1-1: SAPETT INJECTION / MAIN PM ISOLATION PREA

ITEM A	DEALCH ID	COMPONENT ID	FAILURE HODE	LOCAL BPPECTS AND DRPSMDENT PAILURES	METHOD OF DETECTION	IMBERRAT COMPRESSITING PROVISIONS	APPROT ON BOUS	REMARES
<u>01</u> .2.06.14.1 G	<u></u>	. \$89 2 (30-9, 11)	CONTACTS OPEN	OSEN AND THE STATE OF THE STATE	PBRIODIC TESTING	AND REDUNDANT TRAIN FOR SI,	REDUCED RELIABILITY OF TRAIN B. PUMPING FOR SI, NOME FOR SECONDARY RECIRC	MORNAL POSITION
01.2.06.14.2 G	-11	38Q 2 (38-9, 11)	CONTACTS CLOSED (OH)	TRAIN & PW PURP NIMIPLOW	CONTROL ROOM INDICATION, PERIODIC TESTING	ADBINISTRATIVE CONTROLS ON RUST BORON CONCENTRATION	*REDUCTION IN RUST BORON CONCENTRATION IF PRIOR TO SIS/SISLOP. NO REPECT IF AFTER	TECHNICAL SPECIFICATIONS 3.3.3 AND 4.1.1 COVERN THE BUST
01.2.06.15.1 G	-14	AUS AZC 125VDC CONTROL POWER	AOT 43 TOA	TRAIN E PU PUNP CANNOT BE TRIPPED OR RESTARTED, AND 173 MINIPLOW REMAINS ALIGNED TO CONDRISTE	CONTROL BOOM INDICATION, PREIODIC TESTING	REDUNDANT TRAIN FOR SI AND SECONDART RECIRC PURPING, DACEUP MANUAL MINIFLOW [SOLATION VALVES [FUS-172], 176) FOR RWST INVENTORY	HINOPERABILITY OF TRAIN B	
01.2.06.16.1 0	-14	MCC-2 (42-1282)	VOLTS LOW	LOSS OF TRAIN & PW PUMP LUBE	CONTROL BOOM ENDICATION	SECUNDANT YEARN	INOPERABILITY OF TRAIN B PUMPING FOR 31 AND SECONDARY BECIEC	TREMS LUBB OIL FAN COOLER B-17A REQUIRED FOR BITENDED FW PUMP OPERATION DURING SBLOCA OR
01.2.06.17.1 0	-34	184	PRESSURE LOW	ISA UNAVAILABLE TO REPOSITION PN PUMP MINIPLON VALVES CV-36 AND CV-875A	CONTROL ROOM ANNUNCIATION	DACEUP MITROGRA	NONS. TRAIN B FY PUMP MINIPLOW VALVES BEPOSITION AS REQUIRED USING SAPRYY RECATED BICK-UP	MSLB INSIDE CONTAINMENT ISA IS A NON-SAFETY RELATED, NON-SBISHIC SYSTEM
01.2.06.18.1 G	- <u>14</u>	CNI	PRESSURE LOW	AVERAN MILBOREN ANAVATIVER LO	PRRIODIC SURVEILLANCE	REDUNDANT TRAIN FOR SI AND SECONDARY RECIEC PUMPING, MANUAL BACRUP WINIPLOW [SOLATION VALVES (PNS-472,	MITROGRM SINOPERABILITY OF TRAIN 8 PUMPING FOR 31 AND SECONDARY RECIRC, OR PARTIAL DIVERSION OF TRAIN 8 SI FLOW TO CONDENSER	STRAIN B PW PUMP MAY PAIL DURING SBLOCA OR HSLB IP CV-875A CLOSED. RWST INVENTORY CALCULATION INCLUDES CV-36/37
						1167 POB BUST THVENTORY		PATEURE OPEN, COCAL HABUAL BACEUP 1901ATION APTER 30 BINUTES: LOCATION INACCESSIBLE WITH THI SOURCE TRANS
01.2.07.01.1 @	V-851A	VALVE/ACTUATOR	OPEN	TRAIN B PW PLOW ALIGNED TO SI HEADER (IF PARTIALLY OPEN) OR SUCTION VALVE BY-854A CLOSES (VIA INTERLOCE IP BY-851A PULLY OPEN) IF PRIOR TO		REDUNDANT TRAIN FOR SI PLOW, REDUNDANT HOV-850A/B/C CLOSURE FOR RECONDIRY RECIRC BOUNDARY. Malb analysis bounds possible Condensate injection	PUMPING FOR SI AND SECONDARY	TRAIN B FN PUMP FAILURE MAY OCCUR DUE TO CAVITATION IP INTERLOCE CLOSES NV-8514 PRIOR
01.2.07.01.2 @	V-051A	VALVE/ACTUATOR	CLOSED	313/313LOP. NO BPPECT APTER 313/313LOP, BUT CANNOT BE BECLOSED BOR SECONDARY BECIEC TRAIN B PN PUMP 31 PLOW PATH BLOCKED	PRRIODIC TRITING	REQUIRED FOR SECONDARY RECIEC		WORMAL POSITION. PATLURE CAN BESULT PROM IMADEQUATE ACTUATOR THRUST TO OVERCOME
								DRIC POECES IF SV-Z900/3900 PAILS TO VENT INTER-DISC CAVITT OR PM PUMP PAILS TO TRIP
01.2.07.02.1 #	V-851A	230-1854A2 230-1854A4	CONTACTS OPEN (OFP)	REDUCED REDUNDANCY FOR OPEN PERMISSIVE TO HV-854A (ONE SWITCH). REMAINING SWITCH PROVIDES SIGNAL AS REQUIRED	PBBLODIC TBSTING	REDUNDANT TRAIN FOR SI, MUNE REQUIRED FOR SECONDARY RECIRC	RELIABILITY BEDUCED FOR TRAIN B SI PUMPING, NOWE FOR SECONDARY BECISC	MORNAL POSITION. INTERLOCE

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BREBJACY CORR COOLING ATSTEM SINCLE PAILURE AMALTSTS
SAM OMOREE UNIT. 1
TABLE 1-1: SAFETT (MJECTION / MAIN FW ISOLATION FINE.

ACTUATOR ISOLATED BY SV-524 MONE REQUIRES FOR SI.

REDUNDANT HOW-650A/B/C CLOSUER AGAINST CONDENSITE INJECTION TO ISOLATION
FOR SECONDANT RECIEC GOUNDANT RCS FOR SECONDANT RECIEC SEISMIC CATEGORY A. VALVE OPEN HORMAL FOR SECONDARY RECIEC METSTE ASI CSTAIRS YTSTER NOW TSAIN B PM PUMP PAILURE MAT RESULT PROM CAVITATION PRIOR TO \$15/515LOP CAM BE CREDITED FOR MSLB IN CONTAINERT PRE SEP SECTION 15.1.5 SV-1, SV-2, SV-525. BACKUP SI MORMAL POSITION. INCLUDES WALVES ASE SAFETY RELATED. HORMAL POSITION MURNAL POSÍTION NORMAL POSITION COMDENSATE INJECTION FROM TRAIN MOMB. VALVE MILL REPOSITION AS REQUIRED USING SAPETT-BELATED BACKUP MITROGEN HOMS POR SI, INOPERABILITY OF TRAIN B PUNPING FOR SECCEDARY ENTRITION OF CONDENSATE PROMI TRAIN & DURING PM PUMP REDUCED REDUKDANCT ACAINST PURPLING FOR SI AND SECONDARY RECIBE IF FW PUMP PAILS LEDUMDART PER ISOLATION VALVES 621 DELIVERY TIRE INCREASED. BREITABILLITY REDUCED (VIA RELIABILITY FOR SECONDARY NOPERABILITY OF TRAIN B PUMPING POR SI, MOME POR SECONDARY BECIEC INOPERABILITY OF TRAIN B RPPRCT ON SCUS 1 SAME AS 1.2.8.1.11 MOMB FUR SI, REDUCED (SARS AS 1.2.7.1.2) 15ARE AS 1.2.3.1.2) RECIEC ALIGNERS REALIGNMENT 480 M MBADBR). 143, 144, BOY-20, 21, 22 ASSUMBD IN LOCA/MSLB ANALYSES. MOME POR MOM-SEISMIC MEADER REQUIRED FOR SECONDARY RECIRC HOME REQUIRED FOR ST, ISA AND NOME BEQUIRED FOR ST. REDUKDLINT TRAIN FOR SECONDARY REDUNDANT TRAIN FOR SI, NOME NOVE REQUIRED (ASLE ANALYSIS BOUNDS POTENTIAL CONDENSATE CONDENSATE AND BEATSE DRAIN PCV-156, 457, 458, CV-142, REDUNDANT NOV-850A/B/C FOR INBERNT CORPRASATING SECONDARY SECIEC BOUNDARY REDUNDANT LIMIT SWITCH PROVISIONS (3.1.7.1.1.2) (SAME AS 1.2.0.1.2) SAM 49 1.2.0.1.1) REDUNDANT TRAIN BACEUP MITROGEN INJECTION) UMP TRIPS COMTROL ROOM AMMUNCIATION CONTROL ROCK INDICATION PRRIODIC TRSTING CONTROL ROOM INDICATION PERIODIC TESTING CONTROL ROOM INDICATION CONTROL BOOM INDICATION PRRIODIC TRETING BACKUP MITROGRA UMAVAILABLE TO PERIODIC SURVEILLANCE KETHOD OF PRRIODIC TRSTING NY-851A MILL OPRY AS REQUIRED PREIODIC TESTING ON NY-851A CLOSED INTRELOCE PRRIODIC TRYTING PRETODIC TRSTING PRRIODIC TRATING PRRIODIC TRATING ISA UMAVAILABLE TO REPOSITION CONDENSATE PLOS TO TEATH B FW PURP PRIOR TO SEATH B FW REDUCIO REDUEDANCE POR CLOSE RECESCULATION AFTER INJECTION SECONDARY DECIRCULATION APTRE DEFEATIO, BY-051A WILL BEGIN TRAIN B PW PUMP SI PLOW PATH BECIRCULATION APTER INJECTION VALVE CLOSED FOR CONTAINMENT BEPOSITION VALVE CLOSED FOR APTER 189 BLOCK/BESET (ONE UNTIL BACEUP VALVES CLOSED VALVE CAMANT BE OPENED FOR OPENIEC CONCURRENTLY MITH SIGNAL SEAL-IN TO HY-BSEA CLOSE INTERLOCE SIGNAL TO DIVERTED INTO NOM-SRISHIC SYSTEM RESET OR SECONDARY PORTION OF MAIN PY MEADER LOCAL RPERCTS AND DEPRNORM PAILURES SI PLOW PROM BOTH TRAINS CONTAINMENT [SOLATION OS PRCLOSED FOR CONTACHES SIGNAL, VALVE CANNOT BE ISOLATION OR SECONDARY SECONDARY RECIRCULATION INTERLOCE PROBERY: 054A ISOLATION OR SECONDARY REQUIRED POSITION FOR INJECTION TRAINATED (918 18 1.2.7.1.2) (SAMS AS 1.2.8.1.2) RICIRCULATION LINIT INITCAL PREMINATED TREMINATED 10018 CONTACTS CLOSED (OB) CONTACTS CLOSED PAILURE BUDS (OPP) COMTACTS CLOSED (OM) CONTACTS CLOSED CONTACTS OPEN COMPACTS OPEN CONTACTS OPBN PRESSURE LOW PERSSURE LOW WOLTS LOW CLOSED (086) 66 OPRI 3 COMPONENT IN VALVE/ACTUATOR VALVE/ACTUATOR 2 280-385142 25C-3851A1 25C-3851A1 (16-9, 11) 384 2 [16-9, E) 135-315113 125 VOC 8 US 280-385141 (18-2, 4) 534-2, (14-2, 4) 112-211 3 849 2 18 3 DRVICE 10 01.2.07.01.1 BV-851A 01.2.09.02.1 EV-8524 ... 01.2.02.02.2 EV: 8514 01.2.07.03.2 BV-051A 01.2.07.04.1 BV-651A 01.2.07.07.1 BV-051A 01.2.07.04.2 HV-BSIA 01.2.07.06.1 NV-851A 01.2.08.01.1 BY-6524 01.2.04.01.2 HV-8524 01.2.07.05.1 BV-851A 01.2.08.02.2 BY-852A 1189 1

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EMBROBNET CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAM ONOFRE UBIT I TABLE I-1: SAFETY IMJECTION / MAIN FW INDLATION FREA

		<del>,</del>		7		,		
ESPREES	SECONDARY RECISC	NOM-SAPRIT EBLATED ISA STSTEM CAN DE CREDITED FOR MSLA IN CONTAINMENT PER SEP SECTION 15.1.5. AIR-OPERATED MYDRAULIC	FURP IN VALVE ACTUATOR 1501,4120 BY SV-525	MORMAL POSITION, MUV-850C ASSUMED COMMON-CAUSE PAILURE DUBLIS MSLB OUTSIDE CONTINUENT DU TO UNQUALIÈRE			POLIURE MAT RESULT IN TACELERATION THE DUBLING ACCELERATION THE DUBLING LELOCA BUT BOTH THE DUBLING THE	
RPPECT ON BCCS	SELLYER TIRE HACERASED, SI BELLYER BELLYER BELLYER BELLYER SELLYER STATES (WILL BENDER SELLYER STATES (MACERASE) SI BELLYER SELLYER SE	NOME FOR MON-SEISMIC MEADER DURING SI NOME REQUIRED FOR SI RECONDANT TRAIN FOR SECONDARY TRAIN & PUMPING FOR SECONDARY RECIRC	MOME ERQUIRED FOR 31, MOME FOR 51, REDUCED REDUMDANCY REQUIREM FRIFS FOR LO-LO FOR AUTO-TREMEMATION OF 31 OF PREST LEVEL, AND FOR PRESENTATION OF SECONDARY RECIPE.		:	ESCIEC.  BOUR POR SI OR SECONDARY  RECIEC, REDUCED REDUNDANCY FUE  AUTO-TREMMATION OF SI ON LO-LO  BUST LEVEL	12. 1. 6. 2. 1. ST BERGS	FARECTION REDUCED TO 1/2 LODPS FOR LOCA (DAR LUNP SPILLING), 1/1 LODPS FOR MYLB (LUNP C BLOCKED DUZ TO COMMON-CAUSE FAILURE), MOMB FOR AUTO-TREMIMATION OF 31 ON LO-LO RAST LEVEL ON FOR SECONDARY BESTING
SROVES OF PRESENT COMPRESS TO US PROVIDED STATEMENT OF THE PROPERTY OF THE PRO	- 680 UNDANT EN ISOLATION VALVAS ECV-456, 451, 458, CV-142, 143, 144, BOY-20, 21, 22 ASSUMBD IN COLVESTE AMALTANS	HOME FOR MON-SEISMIC MEADER DURING SI NOME REQUIRED FOR SI, RECONDANT TRAIM FOR SECONDARY TRAIM B BECIRC	BOME ERQUISED FOR 51, SEDUNDARY PURP TRIPS FOR LO-LO REST LEVEL, REDUNDARY VALVES FOR SECONDARY RECTED GOURNARY	BEDUNDANT FLCW PATHS TO BCS LOOPS B AND C FOR S1, NORE BROUTED FOR SECONDARY RECIRC OR LO-LO RUST LAWEL	REDUNDANT FLOW PATHS TO LOOPS BECUIED FOR LO-LO BAST LEVEL OR FOR SILVED PATHS TO LOOPS FOR THE PATHS TO LOOPS FOR THE PATHS TO LOOPS BECOME AND THE PATHS TO LOOPS BE AND THE PATHS	MOME REQUIRED FOR SI OR SECONDARY RECIRC, REQUINDANT PURP TRIPS FOR LO-LO RUST	NOW BROUTED	REDUNDANT FLOW PATES TO RUS LOOPS B AND C FOR 31, MONE REQUIRED FOR LO-LO RWY LEVEL OR FOR SECONDARY RECIEC
METHOD OF DETECTION	CONTROL ROOM IMPICATION Preiodic trating	CONTROL BOOM ANNUNCIATION	COMTROL ROOM INDICATION	PRRIODIC TRATING	CONTROL BOOM ANNUMCIATION, INDICATION	PERIODIC TESTING	CONTROL BOOM INDICATION	CCATROL ROOM INDICATION
LOCAL BPFECTS AND DEPENDENT FAILUESS	21 FLOW PROM SOTE IRALES. DIVERTED LATO MON-SEISHIC PORTION OF MAIN TW BALABEE UNTIL BACEUP WALVES CLOSED.	REQUIRED POSITION FOR SECONDARY RECIRCULATION 13. UNAVAILABLE TO REPOSITION VALUE OPEN POR SECONDARY RECIRCULATION APTER INJECTION TRESILECTION	NO RESECT ON INJECTION: VALVE CANNOT BE RECLOSED ON LOW REST LEVEL TO TREMINATE INJECTION FLOW OR REMOTE HANDLELY FOR	SECONDARY SECIES BOUNDARY IMJECTION PATH BLOCESD TO BCS LOOP A	REDUCED REDUNDANCY ACAIMST AUTO-CLOSURE OF MOV-656A OM LOW BUST LEVEL (OME BELAT)	AUTO-CLOSURE OF HOV-850A OM 10-10 888T LEVEL DEPRATED	LOAMS AND	INJECTION PATH NOT AUTOMATICALLY ALIGHED TO B.3 LEOP A ON SIS/SISLOP
FAILURE NODE	WOLTS 10W	NO 1 8 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	## ## ## ## ## ## ## ## ## ## ## ## ##	62.6073	CONTACTS CLOSED	CONTACTS OPEN	CONTACTS OF EACH	WOLTS LOW
COBPONENT 19	(12-211)	181	VALVE/ACTUATOR	WALVE/ACTUATOR	G 20 10 11 11 11 11 11 11 11 11 11 11 11 11	8718 87162	(1.51) 830 2 830 2 (6-1,3)	125 VDC 8US 82 (17. 211)
ITEM & DEVICE ID	91.2.98.03.1.BY-8524	01.2.08.01.1 W-852A	01.2.69.91.1 #09-5504	01.2.09.01.2 BUV-550A	01.2.03.02.1 NOV-8504	01.2.09.02.2 HOV-850A	01.2.09.01.2 MOV-8504	01.2.09.04.1 MSV-850A

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### ENERGRACY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT L TABLE 1-1: SAFETY INJECTION / NAIN FW ISOLATION FREA

TEH #	DEVICE ID	COMPONENT ED	PAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INUBERNT COMPENSATING - PROVISIONS	EPPECT ON BOOS	REMARES
. <u> </u>	/-ASQA	BCC-2 (42-1274)	. VQLTS LOW	ANTA RAILT NOT OURN ON TON SIBASISTOM ON BECTORE ON TON	CONTROL BOOM INDICATION	LOOPS & AND C FOR SI, REDUNDANT PUMP TRIPS FOR LO-LO		
						REST LEVEL, REDUNDANT VALVES (BV-851A/B) FOR SECONDET RECIEC BOUNDART	PATLUREJ. REDUCED REDUNDANCY POR AUTO-TRREMATION OF SI ON LO-LO RUST LEVEL AND FOR 38CONDARY RRCIEC	
01.2.10.01.1 (80								
01.2.11.01.1 G-1	IA, G-18	809 82C (152-12C06)	OPEN	1 OF 2 CONDANSATE PUMPS TRIPPED TO TRAIN & PW PUMP	CONTROL ROOM INDICATION	NONE REQUIRED	MONB	TRAIN B POWERED CONDENSATE PUMP WOULD BE TRIPPED ON
		(152-12COB)			**************************************	NOUR RECILIERS FOR AS PLOW	MAND DOD INTRODUCE DIAM	SIS/SISLOP IF BUNNING
91.2.11.91.2 <u>G-</u> 1	14, 6-11	809 82C (152-12C06) (152-12C08)	CLOSED	I OP 2 CONDENSATE PUMPS CANNOT BE TRIPPED TO TRAIN B PM PUMP SUCTION	PRINTED TESTING	NONE BEQUIRED FOR SI FLOW, CLOSURE OF SUCTION VALVE HV-8544 PREVENTS CONDENSATE INJECTION	NONE FOR ENJECTION PLOW.  REDUCED ERDUNDANCY AGAINST INJECTION OF CONDENSATE BY TRAIN D	NORMAL POSITION
01.2.11.02.1 G-1	14, G-18	194-5 (RBLAY9)	CONTACTS OPEN (OFF)	PUMPS WILL NOT TRIP ON BUS UNDERVOLTAGE, SIS/SISLOP TRIP	PERIODIC TESTING	(SAMR AS 1.2.11.1.2)	(\$AM\$ AS 1.2.11.1.2)	MORMAL POSITION
01.2.11.02.2 G-1	14, G-18	194-5 (BBLATS)	CONTACTS CLOSED	PROM 18Q UMAPPECTRO  1 OF 2 TRAIN B CONDENSATE PUMPS TRIPPED	CONTROL ROOM INDICATION	NOME SECUTESO	NOMB	
01.2.11.03.1 G-1	IA, G-18	939 2 (20-5.7) (20-9,11)	CONTACTS OPEN (OPP)	TRAIN & CONDENSATE PUMPS WILL NOT TRIP ON SEQ SIGNAL. BUS UNDERVOLTAGE TRIP UNAPPECTED	PRRIODIC TRATING	(SAME AS 1.2.11.1.2)	(SAME AS 1.2.11.1.2)	HORMAL POSITION
01.2.11.03.2 G-1	14, G-18	\$89 2 (20-5,7) (20-9,11)	CONTACTS CLOSED (ON)	PUMPS TRIPPED	CONTROL ROOM LUDICATION	NONE REQUIRED	NORB	
01.2.11.04.1 G-	1A, G-18		VOLTS LOW	TRAIN B CONDRINSATE PUMPS WILL NOT TRIP ON SEQ OR BUS UNDERVOLTAGE SIGNALS	CONTROL BOOM INDICATION	NONE REQUIRED FOR ST FLOW, CLOSURE OF SUCTION VALVE BY-854A PREVENTS CONDENSATE	NOME FOR INJECTION FLOW.  BRDUCED BELIABILITY AGAINST INJECTION OF CONDENSATE BY	
01.2.12.01.1 G-	364	BUS #2C (152-12C09)	OPEN	MEATER DRAIN PUMP TRIPPRD TO TRAIN B PW PUMP SUCTION	CONTROL ROOM INDICATION	NONE ESCATESO INTECTION	TRAIN B NOMB	BRATER DRAIN PUMP TRIPPED ON SIS/SISLOP
01.2.12.01.2 G-		BUS AZC (152-12C09)	CLOSED		PERIODIC TESTING	NOME REQUIRED FOR ST PLCM. CLOSURE OF SUCTION VALVE EV-854A PREVENTS CONDRISATE	NOME FOR INJECTION PLOW.  REDUCED REDUNDANCY AGAINST INJECTION OF CONDENSATE BY	BORNAL POSITION
01.2.12.02.1 G-	364	152-12CO4 "b" CONTACT	OPEN	TREP ON TRAIN B PW PUMP TREP.	PBRIODIC TRATING	(SANE AS 1.2.12.1.2)	TRAIN B. (SAME A9 1.2.12.1.2)	MORMAL POSITION DURING POWER OPERATION
01.2.12.02.2 G-	164	152-12004	CLOSED		CONTROL BOOM INDECATION	NONE REQUIRED	MONB	
01.1.12.03.1 G-	161	194-4 (RPLAT)	CONTACTS OPEN (OFF)	TRIPPED TRAIN & MEATER ORAIN PUMP WILL NOT TRIP ON BUS UNDERVOLTAGE, SEQ AND PW PUMP TRIPS	PRRIODIC TESTING	(9AMS AS 1.2.12.1.2)	(SAMB AS 1.2.12.1.2)	NORMAL POSITION



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### EMBRUSHOF CORE COOLING STATEM SINGLE FAILURE ANALYSIS SAM OMOFRE UNIT 1 TABLE 1-1: SAFETT INJECTION / MAIN FM ISOLATION PREA

	DEVICE ID	COMPONENT ID	PAILURE HODE	LOCAL REFECTS AND DRPRMDRNT PAILURES	MBTHOD OF DBTECTION	INHERBUT COMPENSATING PROVISIONS	RYPECT ON RCCS	BANARES
01.2.12.03.2 G:364	·	_124:4	CONTACTS CLOSED	TRAIN B BRATER DRAIN PUMP TRIPPED	CONTROL ROOM INDICATION	MONE REQUIRED	ERON	
01.2.12.04.1 G-16A	· · · · · · · · · · · · · · · · · · ·	389 2 	CONTACTS OPEN (OPE)	TRAIN & BRATER DRAIN PUMP WILL MOT TRIP ON BRO BIGNAL, TRIP		(SAME AS 1.2.12.1.2)	(SAME AS 1.2.12.1.2)	NORMAL POSITION
01.2.12.04.2 G-36A		8EQ 2 [19-1, 3]	CONTACTS CLOSED	ON PH PUMP TRIP UMAPPECTED TRAIN & MRATER DRAIN PUMP TRIPPED	CONTROL BOOM INDICATION	NOME SECULESD	NONB	
01.2.12.05.1 G-36A		BUS \$2C 125VDC CONTROL POWER	VOLTS LOW	ABIS SICAPTS  NOT JEIL ON 285 OB SA SAND  ABITA B REVLES DEVIA SAND AITT		NOWE REQUIRED FOR SI PLOW.  CLOSURE OF SUCTION VALVE BY-6544 PREVENTS COMBRISATE [WIRCTION]	NOME FOR INJECTION PLOY. REDUCED REDUMDANCY AGAINST [NJECTION OF COMPRISATE BY TRAIN B	
	C PLON					187801108		THERE ARE NO VALVES IN THIS CATEGORY
	C PLON		NOME (PASSIVE)		PERIODIC TESTING			INCLUDES SIS-OC4
01.3.02.01.1 MANUA	L VALVES, C BOUNDARY							THERE ARE NO VALVES IN THIS
01.3.02.02.1 CHRCE	OR RELIEP S, TRAIN C							CATEGORY THEER ARE NO VALVES IN THIS CATEGORY
01.3.03.01.1 HOV-8:		VALVB/ACTUATOR	OPBN	NO BEFECT ON INJECTION. VALUE CAMOOT BE RECLOSED ON LOW RUST LEVEL TO TERRIBATE INJECTION FLOW OR REMOTE-NAMUALLY FOR SECONDARY RECIPC BOUNDARY		MOME REQUIRED FOR SI,  REDUNDANT PUMP TRIPS FOR LO-LO RWST LEWEL, REDUNDANT VALVES FOR SECONDARY RECIRC BOUNDARY	LO-LO RWST LEVEL, AND FOR SECONDARY RECIEC	POTENTIAL COMMON-CAUSE FAILURE  DURING MSLE OUTSIDE  CONTAINMENT BAS NO BFFECT,  BECAUSE LO-LO BWST LEVEL WILL  NOT OCCUP (SINCE NO
			. '					CONTAINMENT SPRAY ACTUATION OCCURS) AND SECONDARY RECIEC IS ONLY USED FOR MSLB [MSIDE
01.3.03.01.2 HOV-8	50C	VALVE/ACTUATOR	CLOSED	INJECTION PATH BLOCKED TO BCS	PERIODIC TESTING	A AND B FOR SI PLOW, MONE BEQUIRED FOR SECONDARY RECIRC	INJECTION REDUCED TO 1/2 LOOPS FOR LOCA (ONE LOOP SPILLING) AND 2/2 LOOPS FOR HSLB, NONE	DURING MALO DUE TO MON-QUALIFIED POWER SUPPLY IN
		<del></del>	<b></b>		· · · · · · · · · · · · · · · · · · ·	OR LO-LO RNST LEVEL	AUTO-TERMINATION OF SI ON LO-LO	TURBING BUILDING
		RTICI RTICZ	CONTACTS CLUSED		CONTROL ROOM ANNUNCIATION, INDICATION	A AND B FOR SI PLOW, MOMB	RWST LEVEL  REDUCED RELIABILITY OF LOOP C  INJECTION PATH FOR SI FLOW,  NOBE FOR AUTO-TERMINATION OF SI	VALVE AUTO-CLOSE LOGIC BECOMES 1/1 ON REMAINING RELAY INPUT
						OR FOR SECONDARY RECIRC	ON LO-LO BUST LEVEL OR FOR SECONDARY RECIEC	
01.3.03.02.2 MOV-8	50C	RTIC1 RTIC2	CONTACTS OPEN (ON)	AUTO-CLOSUBB OF MOV-850C ON LO-LO BW3T LBVBL DRFBATRD	PRRIODIC TESTING	NONE REQUIRED FOR SI OR SECONDARY RECIEC, REDUNDANT PUMP TRIPS FOR LO-LO RYST	MOME FOR SI OR SECONDARY RECIEC, REDUCED REDUMDANCY FOR AUTO-TREMIMATION OP SI ON LO-LO	MORMAL POSITION
01.3.03.03.1 NOV-85		SBQ 1 (21-5, 7)	CONTACTS OPBN (OFP)	LOSS OF TRAIN A SIS/SISLOP ACTUATION OF LOOP C INJECTION FLOW PATH	PBRIODIC TESTING	LEVEL  REDUMDANT INPUT FROM TRAIN B  (3EQ 2), REDUMDANT FLOW PATHS  TO RCS LOOPS A AND B	RWST LEVEL REDUCED REDUNDANCT FOR SI PLOW THROUGH LOOP (MIECTION PATH	NORMAL POSITION

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#### EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALTSIS SAN GNOPER UNIT 1 TABLE 1-1: SAFETY INJECTION / MAIN PW ISOLATION FMBA

item i	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	· PROVISIONS	RPPRCT ON ECCS	BENARES
01.3.03.03.2	M3A-820C	<u>889 1</u> (21-5, 1)	CONTACTS CLOSED	MOV-850C OPENS DURING NORMAL OPERATION. NO SPPECT OR INJECTION OR AUTO-CLOSURE ON LOW REST LEVEL	CONTROL BOOM INDICATION	NONS SECULESD		FAILURE MAY RESULT IN LUCREASED MAIN FO PUMP ACCELBRATION TIME DURING LBLOCA, BUT BOTE TRAINS OF SI
01.3.03.04.1	MOA-920C	SBQ 2 (18-6,8)	CONTACTS OPEN	LOSS OF TRAIN B SIS/SISLOP ACTUATION OF LOOP C INJECTION	BBBIODIC BESTING	REDUNDANT [NPUT FROM TRAIN A (380 1), REDUNDANT PLOW PATRS	BRDUCED REDUNDANCY FOR SI PLON	FLOW WOULD BE AVAILABLE WITE THIS PAILURE MORNAL POSITION
01.3.03.64.2	HOV-850C	110 1	CONTACTS CLOSED		CONTROL ROOM INDICATION	TO RCS LOOPS A AND B	[SAMB AS 1.3.3.3.2]	· · · · · · · · · · · · · · · · · · ·
01.3.03.05.1	MOV-850C	(18-6,8) UPS	VOLTS LOW	IF PRIOR TO SIS/SISLOP, MOV-850C CANNOT BR OPENED, IF AFFER, MOV-850C CANNOT BR RECLOSED	CONTROL BOOM INDICATION	B FOR SI FLOW, REQUIDANT PUMP TRIPS FOR LO-LO RWST LRVEL,	REDUNDANCE FOR AUTO-TERMINATION	10-1
01.3.03.06.1	MOV-850C	MCC-3 (8-1391)	VOLTS LOW	CAUSES LOSS OF UPS AFTER >30 HINUTES	CONTROL BOOM INDICATION	REDUNDANT PATHS TO LOOPS A AND B FOR SI FLOW, REDUNDANT PUMP	POR SECONDARY RECIEC BOUNDARY INJECTION REDUCED TO 1/2 LOOPS POR LOCA (ONE LOOP SPILLING)	PAILURE MAY OCCUE > 30 MINUTES PRIOR TO SIS/SISLOP
				· - ·	a care o como material antico de se		FOR SECONDARY RECIEC BOUNDARY	
	CARCE VALVES,			<u></u>				THERE ARE NO VALVES IN THIS
01.4.02.01.1	COMMON PLOW BANUAL VALVES, COMMON BOUNDARY		OPBM	PARTIAL DIVERSION OF SI FLOW PROM BOTH TRAINS TO OTHER	PRRIODIC SURVEILLANCE	REDUNDANT TRAIN FOR COMBINED SI FLOW RATE, NORMALLY CLOSED	*PARTIAL DIVERSION OF 2 TRAIN	CATEGORY SEE TABLE 1-2 FOR DETAILED BOUNDARY VALVE ANALYSIS
				STATERS OR ATMOSPHERE		BACEUP VALVES AND/OR ADMINISTRATIVELT CONTROLLED VALVE LOCEING FOR RWST	TRAIN INJECTION FOR PLOW, CV-36/37 PAILURE FOR RWST INVENTORY	
01.4.02.01.2	MANUAL VALVES,		Crosso	NO REPERCES ON RCCS FUNCTIONS	PERIODIC SURVEILLANCE	NONE BEGRISSO [NASM1084	MONE	
01.4.02.02.1	COMMON BOUNDARY CHRCE AND RELIE VALVES, COMMON		MORMAL (PASSIVE)	PARTIAL DIVERSION OF BOTH TRAINS OF SI FLOW FROM LOOPS	MOMB	BEDUNDANT TRAINS (COMBINED PLOW) FOR PLOW RATE, MONE FOR INVENTORY	HOWEVER, LOSS OF INVENTORY NOT	SBB TABLE 1-2 FOR OBTAILED BOUNDARY VALVE ANALYSIS. INCLUDES 319-365 AND RV-868.
	BOUNDART			A, B, C TO BOLD-UP TANK		THARMIORE		SIS-385 IS A SPRING CHRCE VALVE
	HOV-20	VALVB/ACTUATÓB	OPEN	PN BLOCE VALUE TO S/C B CANNOT BB CLOSED	PBRIODIC TRSTING	REDUNDANT (SOLATION VALVES (PCV-457 OR HV-852A/B)	ISOLATION TO S/G B FOR SI AND SECONDARY RECIRC	NORMAL POSITION DURING POWER OPERATION. MOV-20 OR PCV-457 CLOSED FOR SECONDARY RECIEC TO PERMIT PLOW CONTROL VIA STPASS VALUE CV-144
01.4.03.01.2	MOA-SÕ	VALVE/ACTUATOR	CLOSED	MAIN FW BLOCKED TO S/G B. BYPASY PATH UNAPPRICTED	CONTROL BOOM INDICATION	MONE BEGUIEED		VALVE CLOSED ON SIS/SISLOP

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## RMBRGSNCY CORE COOLING SYSTEM SINGLE FAILURE AMALTSIS SAN OMOPRE UNIT ! TABLE 1-1: SAFETY INJECTION / MAIN FW ISOLATION PREA

1758 8	DEVICE ID	. COMPONENT ID	PAILURE MODE	LOCAL BEFECTS AND DEPENDENT PAILURES	MBTHOD OF DBTRCTION	· PROVISIONS	APPECT ON ACCS	REMARES
91.6.02.02.1 E0			CONTACTS OPEN (OPP)	NOT CLOSS ON SIS/SISTOD	PBRIODIC TESTING	(SAME AS 1.4.3.1.1)	[SAMB AS 1.4.3.1.1]	VALVE CAN BE MANUALLY CLOSED FOR SECONDARY RECIEC
i 01.4.01.02.2 MO		389 1 112-5, 1)	CONTACTS CLOSED	(SANS AS   .4.3.3.2)	CONTROL BOOM INDICATION	(SAME AS 1.4.3.1.2)	(SANR AS 1.4.3.1.2)	108 980089881 980[80
01.1.03.03.1 MO		MCC-1 (42-1197)	AOLIS FOR	PW BLOCK VALVE TO S/G B CANNOT BE CLOSED BECEPT LOCAL-MANUALLY	CONTROL BOOM INDICATION	REDUNDANT ISOLATION VALVES (PCV-457 OR NV-852A/B)	BROUGED REDUNDANCY FOR MAIN FW ISOLATION TO S/G B FOR SI AND SECONDARY RECIEC	SECONDARY RECIEC TO PERMIT FLOW CONTROL VIA BYPASS VALVE
								CV-144. VALVE LOCATED IN TURBINE BUILDING AND ACCESSIBLE FOR LOCAL-MANUAL
01.4.04.01.1 MQ	IV-21	VALVE/ACTUATOR	OPEN	PM BLOCK VALVE TO S/G A CANNOT	PRRIODIC TRSTING	REDUNDANT ISOLATION VALVES	89011580 8801100105 8VD WITH SM	CONTROL IP MEEDED DURING HILB INGIDE CONTAINMENT
			-178 L	SE CLOSED		(PCV-456 OB BV-852A/B)	REDUCED REDUXDANCY FOR MAIN FU ISOLATION TO S/G A FOR SI AND SECONDARY RECIRC	OPERATION. MOV-21 OR PCV-456 CLOSED FOR SECONDARY RECIEC TO PERMIT PLOW CONTROL VIA BYPASS
01.4.04.01.2 HO	V-21	VALVE/ACTUATOR	CLOSED	HAIN PW BLOCKED TO S/G A, BYPASS PATH UNAPPROTED	CONTROL ROOM ENDICATION	MONE SECUISED	NOMB	ANTAR CROSED ON SIR/SIRFOD
01.4.04.02.1 HO		98Q 2 (42-5, 7)	CONTACTS OPEN (OPP)	PW BLOCK VALVE TO \$/G A WILL NOT CLOSE ON \$13/818LOP	PRRIODIC TRATING	(1.1.1.1 EA BHAE)	(SAME AS 1.4.4.1.1)	VALUE CAN BE MANUALLY CLOSED FOR SECONDARY RECIRC
81.4.04.02.2 HO	A-51	18Q 2 (42-5, 7)	CONTACTS CLOSED	(8AMR AS 1.4.4.1.2)	CONTROL ROOM INDICATION	(SANB AS 1.4.4.1.2)	(SAMB AS 1.4.4.1.2)	
01.4.01.03.1 80	V-21	MCC-2 (4Z-1242)	VOLTS LOW	FY BLOCK VALVE TO S/G A CANNOT BE CLOSED BECEPT	CONTROL ROOM INDICATION	REDUNDANT ESOLATION VALVES (PCV-456 OR NV-852A/B)	REDUCED REDUNDANCY FOR MAIN FM ISOLATION TO S/G A FOR SI AND	MOV-21 OR FCV-455 CLOSED POR SECONDARY RECIEC TO PERMIT
				LÒCAL-MANUACÉT		•	SECONDARY RECIEC	PLON CONTROL VIA BYPASS VALVE CV-142. VALVE LOCATED IN TURBINE BUILDING AND
								ACCESSIBLE FOR LOCAL-MANUAL CONTROL DURING MSLB INSIDE CONTAINMENT
01.4.05.01.1 MO1	V-22	VALVE/ACTUATOR	ÖPBN	PM BLOCK VALUE TO B/G C CANNOT BR CLOSED	PERIODIC TESTING	REDUNDANT ISOLATION VALVES (PCV-458 OR BV-852A/B)	REDUCED REDUNDANCY POR MAIN PW ISOLATION TO S/G C FOR SI AND SECONDARY RECIEC	MORMAL POSITION DUSING POWER OPERATION. NOV-22 OR PCV-458 CLOSED FOR SECONDARY RECIEC TO
01.4.05.01.2 MO	V-22	VALVE/ACTUATOR	CLOSED	HAIN PW BLOCERD TO S/G C,	CONTROL BOOM INDICATION	NOME REQUIRED	RONS	PRRMIT PLOW CONTROL VIA STPASS VALVE CV-143 VALVE CLOSED ON SIS/SISLOP
01.4.05.02.1 MOV	V-22	88Q 1 (58-1, 3)	CONTACTS OPEN	BYPASS PATH UNAPPROTED PW BLOCK VALVE TO S/G C WILL NOT CLOSE ON SIS/SISLOP		(SAHR AS 1.4.5.1.1)	(SAMB AS 1.4.5.1.1)	VALVE CAN BE MANUALLY CLOSED FOR SECONDARY RECIEC
01.4.05.02.2 MOV	V-22	9BQ ( (50-1,1)	CONTACTS CLOSED (ON)	(SAHE AS 1.4.5.1.2)	CONTROL BOOM INDICATION	(SAME AS 1.4.5.1.2)	(SABB AS 1.4.5.1.2)	TOR JECOMPARI ESCISC
01.4.05.03.1 HO	V-22	HCC-1 (42-1183)	VOLTS LOW	FW BLOCK VALVE TO S/G C CANNOT BE CLOSED BICEPT LOCAL-MANUALLY	CONTROL BOOM INDICATION	REDUNDANT ISOLATION VALVES [PCV-158 OR EV-4521/B]	REDUCED REDUNDANCY FOR MAIN PM ISOLATION TO S/G C FOR SI AND SECONDARY RECIRC	
		-					:	CO-143. WALVE LOCATED IN TURBINE BUILDING AND ACCESSIBLE FOR LOCAL MADUAL CONTAGO DURING MSLB INSIDE CONTAGONALIMENT

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EMBRIGACY CORR COOLING SYSTEM SINGLE FAILURE AMALYSIS SAM OMOFRE UNIT 1 TABLE 1-1: SAFETY IMPRICAL / MAIM FW ISOLATION FREA

PAILURE MODE
CAMBOT DE CONTROL VALVE TO S/C A PERIODIC TESTING
MAIN FM BLOCKED TO 2/G A. MTPARS PATE UNAFFECTED
CANNOT BE CLOSED OR TEROTTLED
MAIN PM BIPASS ISOLATED TO 8/G CONTROL BOOM INDICATION, A. MAIN PLON PATH UNAPPROTED PRESONS INSTINC
MAIN PM BTPASS VALVE TO 8/G A WILL WOT CLOSE ON TRAIN A
S187/35LOP (S181 43 1.4.6.2.2)
MAIN PU BTPASS VALVATO S/G A PREIODIC TESTING MILL NOT CLOSE ON TRAIN B
(SAME AS 1.4.6.2.2) CONTROL ROOM INDICATION PRELIABILIES
8/G & OVERFILL PROTECTION PRESONC TESTING SIGAL DISABLE TO MAIN PU PLOY CONTROL VALVE (PCV-456)
89-2456) 3/G A OVERFILL PROTECTION PRRIODIC TESTING 3/GML CLOSES PCV-155 AND CV-112
S/G A GVERFILL PROTECTION CONTROL BUGN INDICATION SIGNAL CLOSES PCV-456 AND ANNUNCIATION CV-142

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## BNBBGBNCF COMB COOLING SYSTSM SINGLE FAILURE AMALTSIS SAM ONOFRE UMIT 1 TABLE 1-1: SAFETE INJECTION / MAIN FW ISOLATION FM3A

	4 H271	DBVICE ID	COMPONENT ID	FAILURE MODE	EDCAL BPPECTS AND DEPENDENT PAILURES	METHOD OF Detection	INURRENT COMPRESATING . PROVISIONS	BPPSCT ON BCC3	REMARSS
	01.1.96.05.4	ECV-456	-VITAL BUS BI (8-1105V)	VOLTS LOW	4/G A OVERPILL PROTECTION SIGNAL DISABLED TO PCV-456 AND CV-142	CONTROL BOOM INDICATION,	NOME ERGUTERO	, MORR	WRLAT IS RHERGIZE TO ACTUATE AND PAILS OPP ON LOSS OF VITAL AUS POWER, ROWEVER CIRCUIT TO RE DISCONNECTED PRODUCTION 12 OVERFILL PROTECTION HODIPICATIONS. ANNUNCIATION
1	01.4.06.05.5	PCV-456 CV-142	LT-453 LOOP	89	S/G A OVERFILL PROTECTION SIGNAL CLOSES PCV-456 AND CV-112	PRRIODIC TESTING	MONE REQUIRED FOR SI, MOME FOR SECONDARY RECIEC WITH CONCURRENT COMMON-CAUSE	NOME FOR SI, LOSS OF SECONDARY RECIRC TO SIG A/B/C WITE COMCURRENT COMMON-CAUSE FAILURE	ASSUMBD COMMON-CAUSE PAILURES
		<del></del>		<del></del>					CONTAINMENT. UPSCALE PAILURE MOULD ENERGIZE RELAYS LC-4538-82, LC-4548-22G AND
	A1 4 A2 A1 A	9.5u 464							LC-455B-82G, HOWEVER CIRCUIT TO BE DISCONNECTED PENDING CYCLE 12 OVERPILL PROTECTION HODIFICATIONS
1	01.4.07.01.1	FCY-431	VALVB/ACTUATOR	_ <u>Obah</u>	MAIN FO CONTROL VALVE TO SIGE CANNOT BE CLOSED	PERIODIC TESTING	REDUNDANT ISOLATION VALVES (MOV-20 OR MV-852A/B)	REDUCED REDUNDANCY FOR MAIN FN ISOLATION TO S/G B FOR SI AND SECONDARY RECIRC	MORNAL POSITION DURING POWER OPERATION. INCLUDES SY-457, SY-3457 AND BACEUP WITROGEN (GMI) SUPPLY. MOY-20 OR
	01.4.01.01.2	BCV_AS2	VALVE/ACTUATOR	LIVEBU	MAIN PW BLOCKED TO S/G B.	CONTROL ROOM INDICATION	MAND DEALLINES	NAME .	PCV-457 CLOSED FOR SECONDARY RECIRC TO PERMIT PLOW CONTROL VIA BYPASS VALVE CV-144
	01.4.07.02.1		VALVE/ACTUATOR		BYPASS PATH UNAPPECTED  MAIN PH BYPASS VALVE TO S/G B  CANNOT BE CLOSED OF THROTTLED	CONTROL ROOM INDICATION	NOME REQUIRED  REDUMDANT ISOLATION VALUES (NV-852A/B) FOR SI. REDUMDANT	NOME  REDUCED REDUNDANCY FOR MAIN PW ISOLATION TO S/G B FOR SI, LOSS	VALVE CLOSED ON SIS/SISLOP  NORMAL POSITION DURING STARTUP/SBUTDOWN
							HANUAL BLOCK VALVE AND	OF SECONDARY BECIEC PLOW CONTROL TO S/G B	
i F	01.4.07.02.2	CV-144	VALVE/ACTUATOR	CLOSED	MAIN PW BYPASS ISOLATED TO 9/G B, MAIN PLOW PATE UNAPPRITED		MONE REQUIRED FOR SI, REDUNDANT S/G. FOR SECONDARY RECIEC	NOWE FOR SI, LOSS OF SECONDARY BECIEC TO S/G B	·
-	01.4.01.03.1	CV-144	SV-151	OFF (OPEN)	MAIN PW BYPASS VALVE TO 8/6 B WILL NOT CLOSE ON TRAIN B SIS/SISLOP	PRRIODIC TESTING	BEDUNDANT SOLENOID (SV-2114)	REDUCED REDUNDANCY FOR ESOLATION OF MAIN FW BYPASS PATH TO S/G B	MORNAL POSITION
	01.4.07.03.2	CA-144	3V-151	ON (CLOSED)	(SAHS AS 1.4.7.2.2)	CONTROL BOOM INDICATION PERIODIC TESTING	(SAME AS 1.4.7.2.2)	(SAME AS 1.4.7.2.2)	
1	01.4.07.04.1		SV-2144	OPP (OPBN)	MAIN PW BTPASS VALVE TO S/G B WILL NOT CLOSE ON TRAIN A SIS/YISLOP		BROUNDANT BOLENOID (34-151)	REDUCED REDUNDANCY FOR HAIN FW BYPASS ISOLATION TO S/G B	NORMAL POSITION
	01.4.07.04.2	CY-111	SV-2144	ON (CLOSED)	(SARE AS 1.4.7.2.2)	CONTROL ROOM INDICATION PERIODIC TESTING	(S.1.1.1 EA BHAR)	(SAHE AS 1.4.1.2.2)	
	01.4.07.05.1	PCV-457 CV-144	LC-454B-12G (BBLAY)	CONTACTS OPEN (OFF)	9/G 8 OVERFILL PROTECTION SIGNAL DISABLED TO MAIN PH FLOW CONTROL VALVE (FOV-457) AND PYPASS (CV-144, VIA 5/-151)	PRRIODIC TESTING	NOME REQUIRED FOR 31 AND SECONDARY RECIRC	NONE FOR 31 OR SECONDARY RECIPE	MORNAL POSITION, CIRCUIT TO 89 DISCOMMECTED PSNDERG CYÉES 12 CYSRYLLL PROTECTION MODIFICATIONS, 9.0003 ET-454 LOOP FRITCES 100

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## EMBRIGENCY CORE COOLING SYSTEM RINGLE FAILURE ANALTSIS RAM ONOFRE UNIT 1 TABLE 1-1: RAFRTY INJECTION / MAIN FW ISOLATION FMEA

	# MRTI	DRAFCE ID	COMPONENT ID	PAILURE HODS	LOCAL BEFRECTS AND DEPRINDENT PAILURES	MSTHOD OF	INBERENT COMPENSATING PROVISIONS	SPFSCT ON BCCS	REMARES
	91.4.97.95.8	PCV-451 CV-114	LC-4548-22G (RBLAY)	CONTACTS CLOSED (OB)	9/G B OVERPILL PROTECTION SIGNAL CLOSES FCV-457 AND CV-144	PRRIODIC TRSTING	NOME REQUIRED FOR 31, REDUNDANT 3/G: FOR SECONDARY RECIRC	NONE FOR SI, LOSS OF SECUNDARY BECIEC TO S/G B	INDICATED LEVEL BY 3/G MR CONTROL CHANNEL, MONEYER CIRCUIT TO BE DISCONNECTED PRODING CTCLE 12 OVERFILL PROTECTION MODIFICATIONS.
1-1-1	01.4.07.05.3	PCV-457 CV-144	BBG BUS #2 (8-1281)	VOLTS LOW	8/G B OVERPILL PROTECTION SIGNAL CLOSES SCV-457 AND CV-144	CONTROL BOOM INDICATION, ANNUNCIATION	MOME REQUIRED FOR SI, REDUNDANT S/Gs FOR SECONDARY BECIEC	NOME FOR SI, LOSS OF SECONDARY RECIEC TO S/G &	BOUNDS LT-854 LOOP PAILURE HIGH RELAT ACTUATED ON HIGH INDICATED LEVEL BY S/G MR CONTROL CHANNEL, HOWEVER CERCUIT TO BE DISCOMMETED PANDING CTCER 12 OVERFILL
	01.4.97.05.4	PCV-451 CV-144	VITAL BUJ \$2 (8-1205V)	VOLTS LOV	S/G B OVERFILL PROTECTION SIGNAL DISABLED TO PCV-157 AND CV-144	CONTROL ROOM INDICATION, ANNUNCIATION	NONE SEGUISED	HOWE	PROTECTION MODIFICATIONS. LT-454 LOOP PAILS BIGB ON LOSS OP POWER BELAT IS BURBEGIZE TO ACTUATE AND PAILS OFP ON LOSS OF VITAL BUS POWER, HOWEVER CIRCUIT TO BE DISCONNECTED PRODUNG CYCLE 12 OWERFILL PROTECTION
! ! ! ! ! !	01.4.07.65.5	9CV-451 CV-144	LT-454 LOOP	<u>. 19</u>	S/G B OVERFILL PROTECTION Signal Closes PCV-457 And CV-144	PRRIDUIC TRATING	MONE ERQUIRED FOR SI, NONE FOI SECONDARY RECIRC WITH CONCURRENT COMMON-CAUSE PAILURE OF LT-453 AND LT-455 LOOPS	AMONB FOR SI, LOSS OF SECONDARY BECIEC TO S/G A/B/C WITH CONCURRENT COMMON-CAUSE FAILURE OF LT-453 AND LT-455	ASSUMED COMMON-CAUSE PAILURES DURING MSLB INSIDE CONTAINMENT. UPSCALE PAILURE WOULD BHERGIZE RELATS
	0: .4.38.0; .1 /	PCV-454	VALVB/ACTUATOR	OPSM	MAIN PW CONTROL VALVE TO S/G C	PBB(ODIC TBSTING	REDUNDANT ISOLATION VALVES (MOV-22 OR NV-852A/B)		OPERATION. INCLUDES SV-458,
·! r				al cond	MILL BY BLOOMER TO C.C. C	CONTROL DANK LIPLOSTON	MOUR DROILIGER		SV-3458 AND BACEUP MITROGEN (GMI) SUPPLY. NOV-22 OR FCV-458 CLOSED FOR SECONDARY RECIEC TO PREMIT FLOW CONTROL VIA STPASS VALUE CV-143 VALUE CLOSED ON SIS/9[31:0P
.1	01.4.05.01.2 (		VALVE/ACTUATOR VALVE/ACTUATOR		MAIN FW BLOCKED TO S/G C. BYPASS PATH UNAFFECTED MAIN FW BYPASS VALVE TO S/G C CANNOT BE CLOSED OR THROTTLED		REDUNDANT ISOLATION VALVES (BY-852A/B) FOR SI, REDUNDANT MANUAL BLOCE VALVE AND REDUNDANT S/GE FOR SECENDARY RECIEC	MOME  REDUCED REDUMBANCT FOR MAIN PM ISOLATION TO S/G C FOR SI, LOSS OF SECONDARY RECIEC FLOW CONTROL TO S/G C	HORMAL POSITION DURING

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178H 4	DBVICE TO	COMPONENT ID	PAILURE HODE	LOCAL REFECTS AND DRPHNDRNT FAILURES	MBTHOD OF DBTBCT(CM	INHERBUT COMPRESATING PROVISIONS	BPPBCT ON BCCS	BSMAGES
01-4-08-02.2.CV	:161	_ VALVE/ACTUATOR	CLOSED	MILIN PN BIPASS 130LATED TO S/G C, MILIN PLON PATH UNAPPRICTED	CONTROL ROOM INDICATION.	NOME REQUIRED FOR SI, REDUNDANT 9/G4 FOR SECONDARY	NUMB FOR SI. LOSS OF SPCOMDARY	
	-141	_9V:150	OPP. (OPPN)	MAIN ON BYPASS VALVE TO S/G C. WILL NOT CLOSE ON TRAIN B #15/915LOP	. PBRIODIC .TBSTING	RECIEC BEDUNDANT_SOLENOID (SY-2143)	RROUCED REDUNDANCE FOR ISOLATION OF MAIN FW BYPASS PATH TO S/C C	NORMAL POSTTION
01.1.04.03.2 CV	111	8V-150	ON (Crosso)		CONTROL ROOM INDICATION PRESONE TESTING	_15AHE_AS_1.4.U.2.21	13ABS AS 1.4.8.3.21	
01.4.08.04.1 CV-	-143	SV-2143	OFF (OFEN)	MAIN PU DIPASS VALUE TO SIG C		REDUNDANT SOLENOID (SV-150;	REDUCED REDUNDANCE FOR MAIN FW	
01.4.08.04.2 CV	-143	SV-2143	ON (CLOSED)	#19/919LOP (9ABE AS 1.4.8.2.2)	CONTROL ROOM INDICATION	(SANB AS 1.4.8.2.2)	(3.8.8.1.4.8.2.2)	-
01.4.00.05.1 FCV CV-	141	LC-0558-12G (RBLAT)	CONTACTS OPEN (OFF)	S/G C OVERPILL PROTECTION SIGNAL DISABLED TO MAIN PU PLON CONTROL VALVE (PCV-458)	PRRIODIC TRATING PRRIODIC TRATING	NOME REQUIRED FOR SI AND SECONDARY RECIEC	NONE FOR 31 OR SECONDARY RECIEC	DISCOMMECTED PENDING CYCLE 12
0j.g.0å.05.2 F2V CV-		LC-4558-820 (RBLAT)	CONTACTS CLOSED (ON)	AND STRASS (CV-143, VIA SV-150) S/G C OVERPILL PROTECTION SIGNAL CLOSES FCV-458 AND CV-143	PBBIODIC TESTING	MONE REQUIRED FOR SECONDARY RECIRC	MOME FOR S., LOSS OF SECONDARY RECERC TO S/G C	OVERPILL PROTECTION  MODIFICATIONS. BOUNDS LT-455 LOOP FAILURE LOV BRIAY ASTUATED ON HIGH ENDICATED LEVEL BY S/G MR CONTROL CHANNEL, BOWEVER CIRCUIT TO BE DISCONNECTED
1.4.08.05.3 PCV		ARG BUS \$3	AOFLE FOR	S/G C OVERFILL PROTECTION	CONTROL ROOM INDICATION.	MOMB REQUIRED FOR SI,	NOME FOR SI, LOSS OF SECONDARY	PRODUCTION MODIFICATIONS.  BOUNDS LT-455 LOOP FAILURE BIGH
	10	(8-1381)	<del>.</del> .	CA-141	ANNUNCIATION	BROUNDANT S/Gs FOR SECONDARY BROIRC		INDICATED LEVEL BY S/G MR CONTROL CHANNEL, HOWEVER CIRCUIT TO BE DISCONNECTED PRINTING CYCLE 12 OVERFILL PROTECTION HODIFICATIONS.
								LT-455 LOOP PAILS NICE ON LOSS OF POWER
21.4.08.05.4 PCV CV-		VITAL BUS \$3 (8-1305V)	VOLTS LOW	S/G C OVERPILL PROTECTION SIGNAL DISABLED TO PCV-458 AND CV-143		-	NONZ	RELAY 13 EMBEGIZE TO ACTUATE AMD PAILS OFP ON LOSS OF VITAL BUS POWER, BOYEVER CIRCUIT TO BE DISCOMMECTED PRODING CTCLE 12 OVERPILL PROTECTION HODIFICATIONS. ASSUMELATION
		** ***		· · · · ·	·····			OCCURS ON MISMATCH CHANNEL TRIP
L.1.08.05.5 PCV CV-	- <u>158</u> 143	LT-455 LOOP	<b>BQ</b> .	3/G C OVERFILL PROTECTION SIGNAL CLOSES PCV-458 AND CV-141	PBBLIODIC TESTING	NOME REQUIRED FOR SI, MOME FOR SECONDARY RECIRC WITH CONCURRENT COMMON-CAUSE FAILURE OF LT-453 AND LT-454 LOOPS	NONE FOR SI, LOSS OF SECONDARY RECIEC TO 9/G A/B/C WITH CONCURRENT COMMON-CAUSE PAILURE OF LT 453 AND LT 454	INON-BQ S/G MR LBVBL INTRS ASSUMBD COMMON-CAUSE FAILURBS DURING MBLB INGIDE CONTAINBENT, UPSCALE FAILURB WOULD BMBRG122 RBLAYS
								EC-4538-12, EC-4548-12G AND EC-4558-12G, BOMEMER CIRCUIT TO BE DISCOMMENTED PENDING CYTER 12 A GERELLO ENTENTE N MODERN ATTOMA



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## BREGJENCY CORE COCLING STATEM SINGLE FAILURE ANALTSIS SAN OMOFRE UNIT 1 TABLE 1-1: SAFETY INJECTION / HAIN FW ISOLATION PREA

iten a	PRAICE ID	COMPONENT ID	FAILURE HODE	LOCAL EPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION -	INHERENT COMPENSATING PROVISIONS	EPPECT ON BCCS	REMARES
01.4.01.01.1	PCV:416	SBQ 1	CONTACTS OPEN	RATH DA CORESOT ANTAB TO 218 V DES	LODIC TESTING	REDUNDANT ISOLATION VALVE FOR	EBDUCED REDUNDANCY FOR MAIN PA	NORMAL POSITION INCLUDES
	CV-142,143,144	(16-9, 11)	(077)	AND STPASS VALUES TO S/G A, B, C WILL MOT CLOSE ON TRAIN A 		PCV (MOV-21), REDUNDANT BOLENOIDS POR BYPASS VALVES (SY-3142, SY-150, SY-151)	ISOLATION	RELAT SQIT IN SOLENOID VALVE CONTROL CIRCUITS. VALVES CAN BE MANUALLY CONTROLLED FOR
01.4.09.01.8	FCV-456 CV-142,143,144	SBQ 1 - (16-9, 11)	CONTACTS CLOSED	MAIN PW BLOCERD TO 3/G A AND COM BIPASS PATH BLOCERD TO 8/G A, B. C	TROL BOOM INDICATION		NONE FOR SI, LOSS OF SECONDARY	INDICATED. BVALUATION OF
			·		- · ·			MANUAL BIPASS PATH OR LEAD LIFTING REQUIRED TO MITIGATE EPPECTS ON SECONDARY
01.4.09.02.1	PCV-457,458 CV-142,143,144	880 2 (11-1, 3)	CONTACTS OPEN (OPE)	HAIN PW CONTROL VALVES TO S/G PER B, C AND STPASS VALVES TO S/G A, B, C WILL NOT CLOSE ON	IODIC TESTING	REDUNDANT ISOLATION VALVES FOR FCVS (MOV-20, MOV-22), REDUNDANT SOLENOIDS FOR BYPASS	ISOLATION	ABCIRCULATION NORMAL POSITION. INCLUDES RELAT SQLZ IN SOLENOID VALVE CONTROL CIRCUITS. VALVES CAN
01.4.09.02.2	PCV-451,458	310 2	CONTACTS CLOSED	TRAIN B SIS/SISLOP  MAIN PW BLOCERD TO S/G B, C CON	TROL ROOM EMPICATION	VALVES (8V-149, SV-2143, 8V-2144)	NOME FOR SI, LOSS OF SECONDARY	BE CONTROLLED MANUALLY FOR SECONDARY RECIRC
	CV-112,143,144		(OM)	AMS BYPASS PATH BLOCKED TO S/G			RECIRC TO S/G A/B/C	INDICATED. EVALUATION OF HANDAL BYPASS PATH OR LBAD LIPTING REQUIRED TO BITICATE
01.4.09.03.1	PCV-156	125VDC BUS AL	VOLTS LOW	HAIN PW CONTROL VALUE TO S/G A CON-	PROL ROOM INDICATION	REDIMINANT EQUESTION VALUE COR	REDUCED REDUNDANCY FOR MAIN FW	EPPECTS ON SECONDARY RECIRCULATION
	CV-142,143,144			AMD BYPASS VALVES TO S/G A, B. C WILL NOT CLOSE ON TRAIN A \$15/5/SLOP		PCV (MOV-21), REDUNDANT SOLENOIDS FOR BYPASS VALVES (SV-3142, SV-150, SV-151)	ISOLATION	CONTROLLED FOR SECONDARY RECIEC
	PCV-457,458 CV-142,143,144	125VDC BUS #2 [72-211]	VOLTS LOW	MAIN PW CONTROL VALVES TO S/G COM B. C AND BYPASS VALVES TO S/G A. B. C WILL NOT CLOSE ON	PROL BOOM INDICATION	REDUNDANT ISOLATION VALVES FOR	BRDUCED REDUNDANCE FOR MAIN FW ISOLATION	VALVES CAN BE MANUALLY CONTROLLED FOR SECUNDARY RECIEC
01.4.09.05.1	PCV-456, 451, 458	APWAS-A	TRIPPRO	TRAIN & SIS/SISLOP  HPW CURCE VALUE BACKUP HODE IS FER	IANIC TESTING	VALVES (37-145, 3V-214), SV-2144)	NONE FOR SI, LOSS OF SECONDARY	
	CV-142, 143, 144		(CONTACTS CLOSED)	ARHED FOR S/G A/B/C. PCVs AND CVs WILL CLOSE VIA RESPECTIVE SOLEHOLDS IF TURBINE IS		SECONDARY RECIEC	RECIRC TO S/G A/B/C APTER MPW PUMPS TRIPPED	
				TRIPPED (TTIZ CONTACTS CLOSED) AND BOTH HPW PUMPS ARE TRIPPED ("5" CONTACTS CLOSED)				THIS FAILURE FOR SECONDARY RECIEC
	PCV-456,451,458 CV-142,143,144	APVAS-A	UNTRIPPED (CONTACTS OPEN)	•	ODIC TRSTING	• • • • • • •	RECIRC	OUTPUT/ISOLATION RELATS ARE DR-EMBRGIZE TO ACTUATE. UNTRIPFED STATE IS WITH RELATS
	PCV-456,451,458 CV-142,143,144	AFWA3-B	TRIPPED (CONTACTS CLOSSO)	MEW CHECK VALVE BACKUP HOLE IS PERI	ODIC TESTING		NONE FOR SI, LOSS OF SECONDARY RECIEC TO S/G A/B/C AFTER NEW	IN BERGIZED POSITION STALUATION REQUIRED FOR LEAD LIFTING, USE OF MANUAL BIPASS
				CVS MILL CLOSE VIA RESPECTIVE SOLEMOIDS IP TURBINE IS TRIPPED (TTIZ CONTACTS CLOSED) AND BOTH MPW PUMPS ARE TRIPPED				VALVES OR MPW PUMP BREATER RACEOUT/RECLOSE TO MITIGATE THIS FAILURE POR SECONDARY RECIRC
	٠.,			("b" CONTACTS CLOSED)		•		

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#### EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 1-1: SAFETY INJECTION / MAIN FW ISOLATION FMEA

ITEM 6	DEVICE ID	COMPONENT ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	INSERRY COMPRESATING PROVISIONS	BPFBCT ON BCCS	REMARES
Q1.4.92.96.Z	<u>PCY-456,457,450</u> CV-142,143,144	AFWAS-B	UNTRIPPED (CONTACTS OPEN)	MEN CHRCE VALUE BACEUP MODE DESIGNED FOR B/G A/B/C	PRRIODIC TRATING	SECONDARA SECIEC	MONE FOR SI AND SECUNDARY BECIEC	OUTPUT/ISOLATION RELATS ARE DE-RHEEGIZE TO ACTUATE. UNTELPPED STATE IS MITE RELATS IN ENERGIZED POSITION
01.4.09.07.1	PCV-456,457,458 CV-142,143,144		CONTACT CLOSED	MPW CHRCE VALVE BACEUP MODE WILL BE ARRED FOR 3/G A/B/C AND FCVS/CVS WILL CLOSE VIA RESPECTIVE SOLENGISS TO TURBINE IS TRIPPED (TTIZ	PRRIODIC YESTING	NOME REQUIRED FOR SI OR	NOMB FOR SI AND SECONDARY  BECLEC	PARCOLLER POSITION PARCONDIRY BREIRC UNIPPRETED BRECAUSE S/G LEVEL RESTORED TO TOS BY APP PLOW PRE ROI, PRIOR TO INITIATING BROWDIRY RECIEC PLOW. RESET OF APPLS (WITH
01.4.09.01.2	PCV-456, 457, 458	152-11004	CONTACT OPEN	CONTACTS CLOSED), RITERS TRAIN OF APMAS ACTUATES (CONTACTS CLOSED) AND REMAINING NEW PUMP TRIPS ("b" CONTACT CLOSES)	·	god atgulata twok	NOME FOR ST AND SECONDARY	LEVEL ) 51) DISARMS CHECK VALUE BACKUP WODE FOR FCVS AND CV6. BOI VERIFICATION BEQUIRED
	CV-142,143,144			DISABLED FOR S/G A/B/C		SECONDARY RECIEC	RECIRC	· · · · · · · · · · · · · · · · · · ·
01.4.09.08.1	PCV-456,457,458 CV-142,143,144	1112, 1112-ISO	CONTACTS OPEN (OPP)	MFW CRECE VALVE BACEUP HODE DISABLED FOR RESPECTIVE FCV/CV SOLENOID VALVE CIECUITS (TTIZ: FCV-456, CV-142/143/144 TRAIN A 3Vs., TTIZ-150: FCV-451/458,	PBRIODIC TESTING	MOME REQUIRED FOR SI OR	NOME FOR SEAMD SACONDARY BECIEC	CUTPUT/ISOLATION RELATS ARE ENERGIZE TO ACTUATE
01.4.09.08.2	PCV-456, 457, 458 CV-142, 143, 144		CONTACTS CLOSED	CV-143/144 TBAIN B SVs, TTI3-ISO: CV-142 TBAIN B SV) HPW CRECE VALVE BACEUP HODE ARRED FOR S/G A/B/C. FCVS-AND CVs WILL CLOSE VIA RESPECTIVE SOLENOID VALVES 17 BITRER	PRRIODIC TESTING	MOME EEGVIEED FOR SI CE	MONR FOR SI AND SECONDARY RECIRC	#SECONDARY RESCIRC UNAPPROTED BECAUSE S/G LEVEL RESTORED TO TOL BY APM FLOW PER ROI, PRIOR TO INITIATING SECONDARY RECIRC
				TRAIN OF APWAY IS ACTUATED (RELAT CONTACTS CLOSED) AND BOTH MPW PUMPS ARE TRIPPED ("b" CONTACTS CLOSED)				PLON. RESET OF APMS (MITH LBVBL > 5%) DISARMS CHECK VALVE BACKUP MODE FOR FCV3 AND CV4. BOI VERIFICATION REQUIRED
01.4.09.09.1	PCV-456,457,458 CV-162,163,144		VOLTS LOW	HPW CBRCE VALVE BACEUP HODE DISABLED FOR RESPECTIVE PCV/CV SOLENOID VALVE CIRCUITS (TT12: PCV-456, CV-142/141/144 TRAIN A SV6, TT12-130: PCV-457/458, CV-143/144 TRAIN B SV6,	PBRIODIC TRSTING	NORE REQUIRED FOR SECONDARY RECIRC	NOME FOR SI AND SECONDARY RECIEC	OUTPUT/ISOLATION RELATS ARE EMERGIZE TO ACTUATE
01.4.09.10.1	PCV-456,451,458 CV-142,143,144		VOLTS LOW	TTI3-ISO: CV-142 TRAIN B SV) MFW CHECE VALVE BACEUP HODE IS ARRED FOR S/G A/B/C. FCVs AND CVs WILL CLOSE VIA RESPECTIVE SOLEMOIDS IP TURBIER IS TRIPPED (TTI2 CONTACTS CLOSED)		NOME REQUIRED FOR SI, NOME P SECONDARY RECIEC	DR INOUB FOR SI, LOSS OF SECONDARI RECTEC TO \$7G A/B/C AFTER MPB PUMPS TRIPPED	LIPTING, USB OF HANDAL BIPASS VALVES OR HPW PUMP BERALER RACEOUT/RECLOSE TO MITIGATE THIS PAILURE FOR SECONDERS
				AND BOTH HPW PUMPS ARE TRIPPED				RECIRC. ANNUNCTATION OCCURS PROM AFMAS-A ACTUATION OR TROUBLE

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## EMPROSMEY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN CHOFRE UNIT 1 TABLE 1-1: SAFETY (HJECTION / MAIN FM (SOLATION FMEA

1188	DRAICE ID	COMPONENT ID	PALLURE MODE	LOCAL BEFRCTS AND DRFRNDRNT FAILURES	METHOD OF Detection	INMERBUT COMPRESSIONS PROVISIONS	BPFECT ON BCCS	REMARES
01.4.03.	11.1 PCV-456,452,458 CV-142,143,144	. WITAL BUS. 85 (8-2901V)	VOLT3 LOW	ARMED FOR S/G A/B/C. FCVs AND CVs Will CLOSE VIA RESPECTIVE SOLENOIDS IF TURBINE IS	ANNUNCIATION	NOVE REQUIRED FOR SI, NOWE FOR SECONDARY RECIEC		PRVALUATION REQUIRED FOR LEAD LIPTING, USE OF NAMUAL STPASS VALVES OR MFW PUMP SERATER RACEOUT/RECLOSE TO MITIGATE
01.4.03.	12.1 PCV-456,457,458	184	PRESSURE LOW	TRIPPED (TTRE CONTACTS CLOSED) AND BOTH MPW PUMPS ARE TRIPPED  ("A" CONTACTS CLOSED)  TRIPPED (TTRE CONTACTS FAIL		NOWE REQUIRED FOR STRAIGH	*MONS FOR SI (ISA MOT CREDITED	THIS PAILURE FOR SECONDARY  RECIRC. ANNUNCIATION OCCURS ON AFWAS-B ACTUATION OR TROUBLE  REACH FOY MAS REPARATE BACKUP
· ·	CV-142,143,144	CONTRACTOR OF THE PARTY OF THE		OPBN, BTPASS VALVES PAILCLOSED TO S/G A. D. C		VALVES, BACEUP WITROGEN FOR CONTROL VALVES FOR SI. NOWB FOR SECONDARY RECIRC	POR PCV CLOSURB), LOSS OF	NZ (GMI) SUPPLY FOR CLOSURE. COMMON-CAUSE PAILURE NOT POSTULATED DURING SECONDARY
ļ <u>—</u>		- <del></del>	<u>-</u>	·				RECIRC, BUT SINGLE FAILURE OF  15A-250 COULD 130LATE 12A TO  CVS. RVALM OF MANUAL BYPASS PATHS ARRO FOR MITIGATING
01.4.10.	01.1 MOV-1204	VALVE/ACTUATOR	Nado	POTENTIAL PARTIAL DIVERSION OF BOTH TRAINS OF SI FLOW TO APW STSTEM (G-108_OFF) OR		HV-852A/B PREVENT [NJBCTION OF	PLOW DIVERSION AND INJECTION OF	ACCEPTABILITY BEQUIRES: 1) AFY
. 	<del> </del>		- -	INJECTION OF APP INTO MAIN PW		CONDENSATE TO ECS		LOGIC TO PREVENT TRAIN A START UNLESS TRAIN B FAILED, 2) DUAL PAILURE OF MOY-1204 OPEN PLUS APM TRAIN B IS OUTSIDE DESIGN
01.4.10.	01.2 HOV-1204	VALVE/ACTUATOR	CLOSED	NO IPPECT	PRRIODIC TRSTING	NOME SEGULESD	NOME	BASIS. APW CHE VALVE NOT SEAT LBAE TESTED NORMAL POSITION DURING POWER OPERATION. MAY BE OPEN DURING
			- · · · · · · · · · · ·					STARTUP UNDER ADMINISTRATIVE CONTROL. VALVE CLOSES AUTOMATICALLT ON SIS/SISLOP AND APWAS-A
1	02.1 BOV-1204	38Q 1 (49-1,3) 38Q 1	CONTACTS OPEN (OPP) CONTACTS CLOSED	MOV-1204 WILL NOT CLOSE ON 813/313LOP MOY-1204 CLOSES, CANNOT BE	PERIODIC TESTING PERIODIC TESTING	(SAME AS 1.4.10.1.1)	(SAMB AS 1.4.10.1.1) (SAMB AS 1.4.10.1.2)	*{SAME AS 1.4.10.1.1}. MORMAL POSITION
	04.1 MOV-1204	(49-1,3) BCC-1 	(ON) VOLTS LOW	BROPENBO POTENTIAL PARTIAL DIVERISON OF BCTH TRAINS OF SI PLOW TO APW STSTEM (G-103 OPP) OR	CONTROL BOOM ENDICATION,	APW LOGEC, VALVES APW-304 AND	REDUCED REDUMBANCY AGAINST SI	CCROSS-TIE PROM APW PUMP G-10S TO MAIN FW HEADER. ACCEPTABILITY REQUIRES: 11 AFW
<u> </u>				INJECTION OF APP INTO HAIN FW HBADER (G-103 QH)	· · · · · · · · · · · · · · · · · · ·	CONDENSATE TO BCS		LOGIC TO PREVENT TRAIN A START UMLESS TRAIN B PAILED AND 21 DUAL PAILURE OF MOV-1204 OPEN
j 	 01.1 SV-702A	SOLRNOID VALVES	ОРЕМ	SI LOOP B OR C VRMT WILL NOT	CONTROL ROOM INDICATION,	REDUNDANT VALVES (SV-TUZE).	REDUCED REDUKEANCY FOR SI LOOP	PLUS APW TRAIN B IS OUTSIDE DESIGN BASIS. AFW CHE VALVE NOT SEAT LEAE TESTED NAV BR OPENED FOR PREIODIC
· · · · · · · · · · · · · · · · · · ·	SY-102C		o, Ln		PRRESOUR TESTING	SA-10501	B, C BOUNDARY ISOLATION	SUBVELLANCE. CIS ACTUATED ON RESPECTIVE SEQUENCER AS WELL AS ON HISH CONTAINMENT PRESSURE



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## EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OMOPRE UNIT 1 TABLE 1-1: SAFETY INJECTION / MAIN FW ISCLATION FREA

ITEM #	DRVICE ID	COMPONENT ID	FAILURE MODE	LOCAL RPPRCTS AND DRPENDENT PAILURES	DETECTION METHOD OF	INHERBAT COMPRASATING PROVISIONS	BPP2CT ON BCCS	REMARES
	8V-102C		CLOSED	NO BEERCT	PRRIODIC TRSTING	NONE REQUIRED	MQNB	HORMAL POSITION
01.4.11.02.1	9V-102C	DIO, DIO-I (RRLAYS)	CONTACTS CLOSED	SI LOOP B AND C VENTS WILL NOT		(1.1.1.1.1 EA SHAE)	(SAMB AS 1.4.11.1.1)	NORMAL POSITION FOR DIO. BELAT
01.4.11.02.2	SV-102C	DIO, DIO-1 (RELATS)	CONTACTS OPEN (OFF)	TRAIN B SI LOOP B AND C VENT	PERIODIC TESTING	NORS SECRIBED	MOMB	CONTACTS WIRED IN PARALLEL MORMAL POSITION FOR DID-1. RELAT CONTACTS WIRED IN PARALLEL. DIO IS CIS RELAT,
	8V-102C	C18-8 [PC-1121-1]	ON (NO C18)	(SAME AS 1.4.11.2.1)	PRRIODIC TESTING	(SAME AS 1.4.11.1.1)	(SAME AS 1.4.11.1.1)	DIG-1 19 CIS OVERBIDE RELAT MORNAL POSITION. OUTPUT IS
	9V-102C	C19-8 (PC-1121-1)	OFF (Cla)	(SABE AS 1.4.11.2.2)	CONTROL ROOM ANNUNCIATION	(SAME AS 1.4.11.1.2)	(SAMB AS 1.4.11.1.2)	DR-BARRGIZS TO ACTUATE
414,1144,1	8V-102A 8V-102C	38Q 2 (20-1, 2, 3, 4)	CONTACTS CLOSED	CLS TRAIN B ACTUATED TO SI LOOP B, C VENT ISOLATION VALVES	PREIODIC TRATING	(SAME AS 1.4.11.1.2)	(SAME AS 1.4.11.1.2)	
01.4.11.01.2	94-105V 94-105C	989 2 (20-1, 2, 3, 4)	CONTACTS OPEN (OPP)	CLS TRAIN & WILL NOT ACTUATE ON LOW PRESSURIZER PRESSURE	PERIODIC TESTING	19AMB 49 1.4.11.1.1)	(\$AMR AS 1.4.11.1.1)	MORNAL POSITION
01.4.11.05.1	SV-7024 SV-102C	VITAL BUS 46 (4-3002V)	VOLTS LOW	(BG. HILB OUTSIDE CONTAINMENT) TRAIN B SI LOOP B AND C VENT	CONTROL ROOM INDICATION	NOME BEGUIDED	MONB	
)1.4.11.06.1		1254DC BR3 15	WALTE LAW	I SOLATION VALVES CLOSE IRRESPECTIVE OF CIS	COMBRA! BOOM THE CO. T. C.			
	SV-102C	(12-221)		CISTRAIN A ACTUATED TO SI LOOP B AND C VENT ISOLATION VALVES	CONTROL BOOM INDICATION	NOME SEGULESO	NONE	
01.4.12.01.1	SV-702B SV-702D	SOLENOID AVEAS	OPBN	SI LOOP B OR C VENT WILL NOT	CONTROL ROOM INDICATION, Periodic resting	BEDUNDANT VALVES (SV-10ZA)	BEDUCEC BEDUNDANCT FOR SI LOOP B, C BOUNDARY ISOLATION	MAT BE OPENED FOR PERIODIC SURVELLANCE. CIS ACTUATED ON RESPECTIVE SEQUENCES AS WELL AS ON HIGH CONTAINBENT
	IV-102D	SOLEMOID VALVES	CLOSED	NO EFFECT	PERIODIC TESTING	NONE BEGUIESD	NONB	PRESSURE MORMAL POSITION
	IV-102D	(BELATS)	CONTACTS CLOSED (ON)	SI LOOP B AND C VENTS WILL NOT ISOLATE ON TRAIN A CIS		(SAMS AS 1.4.12.1.1)	(9AMB AS 1.4.12.1.1)	MORNAL POSITION FOR DIO. BELAY CONTACTS WIRED IN PARALLEL
	V-1020 .		CONTACTS OPEN (OPP)	TRAIN A SI LOOP D AND C VRUT ISOLATION VALVES WILL CLOSE	PRRIODIC TRATING	NONE REQUIRED	NORR	MORMAL PUSITION FOR DIG-1. RSLAY CONTACTS WIRRD IN PARALLEL. DIG 18 CIS RELAY. DIG-1 IS CIS OVERFIDE RELAY
	V-102D	(PC-1120-1)	ON (NO CIS)	(SAME AS 1.4.12.2.1)	PRRIODIC TRATING	(SAMB AS 1.4.12.1.1)	(SAMB AS 1.4.12.1.1)	MORHAL POSITION. OUTPUT IS DB-BM8RGIZE TO ACTUATE
	V-7020	(PC-1120-1)	obb (cia)		CONTROL ROOM ANNUNCIATION	(SANB AS 1.4.12.1.2)	(SAMB AS 1.4.12.1.2)	The state of the s
1.4.12.04.1 S		98Q 1 (20-1, 2, 3, 4)	CONTACTS CLOSES (ON)	CIS TRAIN A ACTUATED TO SI LOOP B. C VENT ISOLATION VALVES	PBBIODIC TESTING	(SAMB A3 1.4.12.1.2)	(SAMB AS 1.4.12.1.2)	-• • ne ne ne
1.4.12.04.2 9 S	V-7028 V-702D	\$80 1 (20-1, 2, 3, 4)	CONTACTS OPBN (OPP)		PBRIODIC TESTING	(SAME AS 1.4.12.1.1)	{SAMS AS 1.4.12.1.1}	NORMAL POSITION



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## BHBRGBNCY CORR COOLING SYSTRM SINGLE FAILUBE ANALYSIS SAN ONOPRE UNIT ! TABLE 1-1: SAFETY INJECTION / HAIN FW ISOLATION FHEA

	ITEM #	DEVICE ID	COMPONENT ID	FAILURE MODE	LOCAL BPPBCTS AND DBPBNDBNT FAILURBS	MRTHOD OF DRTBCTION	INHERENT COMPENSATING PROVISIONS	657BCT ON ECCS	REMARES
-	01.1-12.05.1	SV-102A	YETAL BUS &1 (0-11124)	AOTIA FOA	TRAIN & SI LOOP & AND C YENT ISOLATION VALVES CLOSE IRRISPRCTIVE OF CIS	CONTROL ROOM ENDICATION	MONE BEGUIESD	NONE	
-	01.1.12.06.1_	47-102 <u>8</u> 97-1020	125VDC BUS A1 (72-123)	WOLLETTOK.	CES TRAIN A ACTUATED TO SE LOOP B AND C VENT ESOLATION	CONTROL ROOM INDICATION	NONE BECATEED	MON3	
	01.4.11.01.1	MOV-356	VALVE/ACTUATOR	OPRI	PARTIAL DIVERSION OF LOOP A 3: FLOW TO OTHER LOOPS VIA SEAL INJECTION/COLD LEG RECIRCULATION DISCHARGE PIPING		MONU BEGULESE BROW	ST DELIVERY TO CORE (MEROVES	PLOW DISTRIBUTION BOUNDED BY THERE WEADER WALVE OPEN CASE (2/3 LOOPS FOR LOCA, 3/3 LOOPS FOR MSLB) VS. DESIGN BASIS
	01,4,11.01,2	HoA-326	VALVB/ACTUATOR	CLOSED	NO TABLET ON ENTRELION	PBRIODIC TESTING	NONS ESSOLEED	BACH	CASE (172 LOOPS POR LOCA, 2/2 LOOPS FOR MSLB) WORMAL POSITION. IMPACT ON COLD LBG BECREVULATION
	01.4.11.02.1	HOV-156	MCC-1	VOLTS LOW	NO EFFECT ON ENJECTION	CONTROL ROOM INDICATION	ROME SEGNISED	MONE	ADDRESSED IN SECTION 2 IMPACT ON COLD LEG RECIRC
	01.4.14.01.1	MOV-357	(42-1158) Valve/actuator	OPRM	PARTIAL DIVERSION OF LOOP B SI FLOW TO OTHER LOOPS WIA SEAL	CONTROL BOOM INDICATION	NOMB BEGUIRED	SI DELIVERY TO CORE IMPROVED	ADDRESSED IN SECTION 2 PLOW DISTRIBUTION BOUNDED BY THREE HEADER VALVE OPEN CASE
ļ				- ·- ·· ·	INJECTION/COCO LEG RECIRCULATION DISCHARGE PIPING				[2/3 LOOPS FOR LOCA, 3/3 LOOPS FOR MSLB) VS. DESIGN BASIS CASE (1/2 LOOPS FOR LOCA, 2/2
	01.4.14.01.2	MOV-357	VALVE/ACTUATOR	CLOSED	NO SEESCE ON ENTECTION	PERIODIC TESTING	MONB BEÖNIBED	MOMB	LOOPS FOR MSLB) NOWHAL POSITION. IMPACT ON COLD LBC RECIRCULATION
	01.6.14.02.1	MOV-357	MCC-2 (42-1243)	VOLTS LOW	NO BPPECT ON INJECTION	CONTROL ROOM INDICATION	NONE BEGUIEED	MONB	ADDRESSED IN SECTION 2 INPACT ON COLD LEG RECIECULATION ADDRESSED IN
	01.4.15.01.1	MOV-358	VALVE/ACTUATOR	OPEM	PARTIAL DIVERSION OF LOOP C SE PLOW TO OTHER LOOPS WEA SEAL	CONTROL ROOM INDICATION	HOME SEGUISED	SI DELIVERY TO CORE IMPROVED	SECTION 2 PLOW DISTRIBUTION BOUNDED BY THREE HRADRE VALVE OPEN CASE
				•	INJECTION/COLD LEG RECIRCULATION DISCHARGE PIPING				[2/3 LOOPS FOR TOTA, 3/3 LOOPS FOR MSLB) VS. DESIGN BASIS CASE (1/2 LOOPS FOR LOCA, 2/2
	01.4.15.01.2	MOV-358	VALVE/ACTUATOR	CLOSED	NO REPERCT ON INJECTION	PBRIODIC TESTING	NONE REQUIRED	NOMB	LOOPS FOR HSLB)  NORMAL POSITION. (HPACT ON COLD LBG BECIECULATION
L	01.4.15.02.1	HOV-358	UPS	VOLTS LOW	MOITOBLMI NO TORRANS CM	PERIODIC TESTING	NONE REQUIRED	MOME	ADDRESSED IN SECTION 2  UPS COMMON TO HOV-650C. [HPACT ON COLD LBG BECIRCULATION  ADDRESSED IN 682-644-4
	01.4.15.03.1	HGA-328	HCC-3 (42-1385)	VOLTS LOW	CAUSES LOSS OF UPS AFTER >30 MINUTES	CONTROL ROOM INDICATION	NOME SEGUISED	MOM.2	ADDRESSED IN SECTION 2 IMPACT ON COLD LEG RECIRCULATION ADDRESSED IN SECTION 2
1	61.4.16.01.1	EV-202	VALVB/ACTUATOR	OPRM	LBIDOWN NOT AUTOMATICALLY ISOLATED ON SIS/MISLOP. DIVERSION FLOW FROM BCS LOOP A LIMITED TO BC GEM BY FLOW CRIPICES. FLOW TO PRESSURIZER METER TANK FOLLOWING BENOTE MANIAL LBTULWN ISOLATION VIA	PB910DIC T8STING	REDUNDANT TRAIN FOR COMBINED SI PLOW BATB, LETDOWN CONTAINMENT ISOLATION VALVES AND LIMITED RELIEF TANK CAPACITY FOR REST INVENTIORY	OPARTIAL DIVERSION OF Z TRAFN SI FLOW, BOUNDED BY SINGLE TRAIN INJECTION FOR FLOW, CV/35/37 PARIORS FIR RAST INVENTORY	REQUIRED TO SPECIFY CLUSING CV-525 AND CV-526 IMMEDIATELY UPON SIS/SISLUP, SWST INVENTORY CALC SEV REQUIRED TO ADTHESS ONISHABLE FLOW FROM ETS TO PRE VICE SEV LE

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#### PARROCRYCY CORR COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN OMORRE UNIT 1 TABLE 1-1: SAFETY INJECTION / NAIM FW ISOLATION FMEA

LTEN A	DBVICE ID	OI TREMOPUOS	FAILURE MODE	LOCAL REPECTS AND DEPENDENT FAILURES	METHOD OF Detection	INHBRENT COMPRUSATING PROVISIONS	RPPRCT ON SCCS	BENABES
01.4.16.01.2		YALYR/ACTUATOS VALVR/ACTUATOS	_CLOSED	MO_BPPRCT	PRRIODIC TRSTING	MOMB REQUIRED	P(SAMB AS 1.4.16.1.1)	THORNAL POSITION. INCLUDES
•								HT-1203. ROI REV BEQUIRED TO SPECIET CLOSING CY-525 AND CY-526 INNEDIATELE UPON S13/313LOP. RWST INVENTORE CALC REV REQUIRED TO ADDRESS
91.4.16.92.2	CV-201	YALYB/ACTUATOB.		NO BPPECT	PRRIODIC TRATING	NOME BECNIESD	MONR	UNISOLABLE FLOW FROM RCS TO PRT VIA RV-206
01.4.16.03.1	CV-204	VALVE/ACTUATOR	OPEN			(SAME AS 1.4.16.1.1)		#INCLUDES HT-1204. BOT REV REQUIRED TO SPECIFY CLOSING CV-525 AND CV-526 IMMEDIATELY UPON \$13/51910P. RVST
	<del></del>							INVENTORY CALC RRY REQUIRED TO ADDRESS UNISQUABLE FLOW PROM RCS TO PRY VIA RY-206
01.4.16.03.2	CA-581	VALVE/ACTUATOR VALVE/ACTUATOR		RICESS LETDOWN MOT AUTOMATICALLY ISOLATED ON	PERIODIC TESTING CONTROL BOOM INDICATION	SI FLOW RATE, BACKUP	SPARTIAL DIVERSION OF 2 TRAIN SI FLOW BOUNDED BY SINGLE TRAIN	DURING STARTUP. BOI REV
: 		<u></u>		SIS/SISLOP. DIVERSION PLOW FROM BCS LOOP A TO LETPOWN. BCS DEAIN TANE OR SEAL WATER BETURN. (PLOW LIMITED TO LESS		REHOTE-HANDAL PAIL-CLOSED  13014710H VALVE (BCY-1117) FOR RWST INVENTORY	CV-36/31 PALLURE FOR RUST	BEQUIRED TO SPECIFY CLOSING NCY-1111 UPON SIS/SISLOP IF BICESS LETDOWN IS IN SSRVICE
01.4.15.04.2	CV-287	VALVE/ACTUATOR	CLOSED	THAN 90 GPH BY LINE LOSSES)	PERIODIC TESTING	NORE BEGULEED		NORMAL POSITION DURING POWER
	CV-202, <u>203.</u> 204, 287	(50-1, 1)	CONTACTS OPPN (OPP)	LETPOWN, RICESS LETPOWN WILL NOT ISOLATE ON TRAIN A SIS/SISLOP	PRRIODIC TESTING	REDUNDANT LAPUT 780M TRALM R 989	REDUCED REDUMPANCY ASSIST SE DIVERSION FROM LOOP A	
01.4.16.05.2	204, 287	38 <u>0</u> 1 (50-1, 3) 380 2	CONTACTS CLOSSO (ON) CONTACTS OPEN	LETDOWN, BICESS LETDOWN ISOLATED LETDOWN, RICESS LETDOWN WILL	CONTROL BOOM INDICATION PRRIODIC TESTING	MONE REQUIRED  REDUNDANT INPUT FROM TRAIN A	NONE  REDUCED REDUNDANCE AGAINST SI	
•	204, 267	150-1, 3) 880 2	CONTACTS CLOSED	NOT ISOLATE ON TRAIN B SIS/SISLOP LRIDOWN, RICESS LETDOWN	CONTROL ROOM INDICATION	NONE BEGGIEED	ACMS  SEON DIABBEION BBOH 1005 V	
•	204, 2 <u>87</u> CV-202, 203, 20	(50-1, 3)	ON {ON}	ISCLATED AUTO-CLOSE SIGNAL TO CV-202/203, DB-BNSRGIZING	CONTROL ROOM ENDICATION	NOME BEGUIRED FOR ECC3		MORNAL POSITION FOLLOWING SEQ 12 SIS/SIBLOP. PAILURE
	<u>.</u>	, ·		BESPECTIVE SOLRHOID PILOTS FT1202/1203 AND CLOSING VALVES				PREVENTS BE-OPEING CY-202/203  TO RE-ESTABLISH LETDOWN. PARALLEL VALVE CY-204 UNAPPROTED
01.4.16.07.2	c¥-202, 20 <del>1</del> , 20	4 83-10 (EBLAY)	990	SBQ #2 AUTO-CLOSE SIGNAL DISABLED TO CV-202/203. BEDUNDANT SIGNAL FROM SBQ #1	PRRIODIC TRSTING	REDUNDANT SIGNAL PROM SEQ \$1	BROUGED BELIABILITY FOR SIS/SISLOP ISOLATION OF LETDOWN	POSITION OF RBLAY DUBING HORMAL OPERATION. PARALLEL VALVE CV-204 AUTO-CLOSE
				VIA BELAT 83-12 UNAPERCTED				SIGNALS FROM SRC AT AND AZ VIA RBLAYS 83-11 AND 83-13 PNAFFF TSD

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### SIEGER BRUCY CORE COOLING STSTEM SINGLE FAILURE ANALYSIS TABLE 1-1: SAFETY (MUSCION / NAIN FW ISOLATION FREA

<u></u>						ENUDDE COMPONDATION		
ITBH A	DEALCE ID	COMPONENT 1D	FAILURB HODE	LOCAL RPPECTS AND DEPRYDENT PAILURES	MRTHOD OF Drtaction	INHERENT COMPRESATING PROVISIONS	REFECT ON BUCS	REMARES
 	·							
01.4.16.04.1.	.CX:202,.201,.201	Al:11	ON	_CONTACTS CLOSE TO PROVIDE SEC	CONTROL ROOM INDICATION.	MONE REQUIRED FOR BCCS		HORMAL POSITION FOLLOWING 939 AZ SIS/SISLOP. PAILUSB
.1		(RELAT)		\$2 BEAL-IN SIGNAL TO BELATS 83-10 AND 83-11, RESULTING IN				PREVENTS RE-OPEING VALVES TO
!				AUTO-CLOSE SIGNAL TO				BR-BSTABLIRB LETPONN 18
				CV-202/203/204 WHICH				DESTRED
1				DB-BNERGIZES RESPECTIVE				
·				PT1202/1203/1204 AND CLOSES				
1				AVEARS				
01.4.16.01.2	CV-202, 203, 204	1 03-11	OFF	SEQ 42 SEAL-IN FOR	PRRIODIC TRATING	REDUNDANT SIGNALS AND SEAL-IN		POSITION OF RELAY DURING
		(BELAT)		CV-202/203/204 AND AUTO-CLOSE		PROM SEQ \$1	SIS/SISLOP ISOLATION OF LETDOWN	NORMAL OPERATION
]				SIGNAL TO CV-204 DISABLED.				
·{		<del></del>		PRON SEQ AL VIA RELATE 83-12				
j ,				VND 83-13 ANVELECTED				
01.4.14.09.1	CV-202, 203, 20	1 43-12	OM	AUTO-CLOSE BIGNAL TO CV-202	CONTROL ROOM INDICATION	NOME REQUIRED FOR ECCS	NOME FOR ECCS	NORMAL POSITION POLLOWING SEQ
·	<u> </u>	(RBLAT)		AND CV-201 WHICH DB-RNBRGIZES				AL SIS/SISLOP. PAILURE
,				SOLENOID PILOTS PT1202 AND				PREVENTS RE-OPEING CV-202 AND
<u>'</u>				PT-1203, CLOSING VALVES				CV-201 TO R8-BSTABLISH LRTDOWN. PARALLEL VALVE CV-204
•								UNAPPRETED
01 4 15 04 2	CV-202, 203, 20	1 43-12	OFF	SEQ #1 AUTO-CLOSE SIGNAL	PERIODIC TESTING	REDUNDANT SIGNAL FROM SEQ #2	REDUCED RELIABILITY FOR	POSITION OF RELAY DURING
	21. 1211 1211 12	(BBLAT)	111	DISABLED TO CV-202/203.			SIS/SISLOP ISOLATION OF LETDOWN	
i		•		REDUNDANT SIGNAL PROM SEQ 82				VALVE CV-204 AUTO-CLOSE
<u> </u>				VIA BRLAY #3-10 UNAPPROTED				SIGNALS PROM SEQ 81 AND 82 VIA RELATS 83-11 AND 83-13
ļ								UNAPPRICTED
	CV-202, 203, 20	1 41-11	OM	CONTACTS CLOSE TO PROVIDE SEQ	CONTROL ROOM INDICATION	NOME REQUIRED FOR BCCS	HONE FOR ECCS	NORMAL POSITION POLLOWING SEQ
<u> </u>	C4-141 1431 10	(RELAT)	¥	SI SEAL-IN SIGNAL TO RELATS				#1 SIS/SISLOP. FAILURE
		,		83-12 AND 83-13, RESULTING IN				PREVENTS BE-OPEING VALVES TO ME-ESTABLISH LETDOWN IF
<u> </u>				AUTO-CLOSE SIGNAL TO				DESIRED
<b>"</b>				CY-202/203/204 WHICH DR-BURRGIZES RESPECTIVE				
<u>.</u>	•			SOLENOID PILOTS				
.i				PT1202/1203/1204, CLOSING				
				VALVES			ORDINARA BRIFARALLENI RAB	POSITION OF RELAY DURING
01.4.16.10.2	CV-202, 201, 20		OPP	SEQ \$1 SEAL-IN POR	PBBIGDIC TESTING	REDUNDANT SIGNALS AND SEAL-IN	SIS/SISLOP ISOLATION OF LETDOWN	
		(BELAT)		CV-202/203/204 AND AUTO-CLOSE SIGNAL TO CV-204 DISABLED.		Seon and St	313/314Fot 120FELLOW DE FRIDAM	BORGED STREET, CO.
·i				REDUNDANT SIGNALS AND SEAL-IN				
				AND 83-11 UNAPPROTED				
01.4.16.11.1	CV-292, 203,	FNB STITIL	AOTAS FOR	SOLBHOLD VALVES POR CV-202.	CONTROL BOOM INDECATION	NORE BEGAIRED	₩∩ <b>₽</b> ₹	
•	204, 287	(8-1518)		•				
				FREDCAN		A 2012 1 100 11 100 11 100 11 1		
01,4.16,11.1			AOTAS TOM	PRON SEQ 12 VIA RELATS 83-10 AND 83-11 UNAPPECTED SOLENOID VALVES POR CY-202, 103, 204, 287 AND SEQ RELATS 83-10, 83-12 DR-BHBRGIZE, 130LATING LETDOWN AND BICB35	CONTROL BOOM INDICATION	MONE BEGNIBED	MOMR	

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## BHERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM ONOFRE UNIT 1 TABLE 1-1: SAFETY INJECTION / MAIN FW ISOLATION FMEA

1 H2T1	DBVICE 10	COMPONENT ID	FAILURE HODE	LOCAL EPPECTS AND DEPENDENT PAILURES	METHOD OF Detection	INBERRNT COMPRISATING PROVISIONS	APPRET ON ACCS	BBMADES
91.4-17-91.1 1	134-111	VALVE/ACTUATOR	OPSN	J OF 2 SERIES VALVES OPENED	CONTROL ROOM INDICATION,	PEBUUNDANT VALVE MOV-834	REDUCED REDUNDANCY AGAINST SI	
01.4.17.01.2 a 01.4.17.02.1 a		VALVE/ACTUATOR ECC-1	CLOSED Volts Low	PROM LOOP A COLD LEG BOUNDARY NO REPECT	ANNUNCIATION PERIODIC TESTING CONTROL ROOM INDICATION	NONE SEGNISED NONE SEGNISED	PLOW DIVERSION PROM LOOP A MONE	NORMAL POSITION
01.4.18.01.4		(42-1170) VALVB/ACTUATOR		1 OF 2 SERIES VALVES OPENED FROM LOOP A COLD LEG BOUNDARY	CONTROL BOOM INDICATION,	BEDUNDANL AYTAB WOA-833	BEQUEED REDUNDANCY AGAINST SI	
01.4.14.01.2 E 01.4.18.02.1 B		VALVE/ACTUATOR PC-425E	CLOSED OPEN	NO BALECA NOA-934 OBBRING BFOCERD	PARIODIC TRATING PARIODIC TRATING	HOME REQUIRED (SAME AS 1.4.18.1.2)	RONE (SAME AS 1.4.18.1.2)	NORMAL POSITION NORMAL POSITION. PRESSURIZER
01.4.10.02.2 #		PC-4251	CLOSED	MOA-834 OBBNERS MOS BFOCESD	CONTROL ROOM INDICATION	REDUNDANT VALVE (NOV-813)	REDUCED BROUNDANCY AGAINST SI PLOW DIVERSION FROM LOOP A	PRESSURE INTERLOCE
01.4.18.03.1 H		HCC-2 (42-1272) VALVE/ACTUATOR	OPEN	LOOP & BCS SAMPLE FLOW NOT	CONTROL ROOM INDICATION	MONE SEGUISED (34-3305)	NOME  REDUCED REDUMDANCE AGAINST SI	MORMAL POSITION. INCLUDES
				ISOLATED INSIDE CONTAINMENT. OUTSIDE CONTAINMENT VALVE SV-3102 UNAPPECTED			PLOW DIVERSION PROM LOOP B	SV-955
01.4.19.01.2 0	v-955	VALVE/ACTUATOR	Crosto	LOOP B BCS SAMPLE FLOW	PERIODIC TRATING	NOME BESOISED	NOAR	
01.4.19.02.1 C	V-956	VALVE/ACTUATOR	OPEN	LOOP C RCS SAMPLE PLOY NOT ISOLATED INSIDE CONTAINMENT.	CONTROL BOOM INDICATION	- REDUNDANT VALVE (SV-3302)	REDUCED REDUNDANCY AGAINST SI FLOW DIVERSION FROM LOOP C	NORMAL POSITION. INCLUDES SV-956
01.4.19.02.2 C	v-355	VALVE/ACTUATOR	CLOSED	OUTSIDE CONTAINMENT VALVE SV-3302 UNAPPECTED LOOP C RCS SAMPLE FLOW	PBRIODIC TESTING	MONE REQUIRED	NONB	
01.4.19.03.1 C	V-955 V-956	V[TAL BUS #34 (8-3314V)	AOTA TOA	ISOLATED LOOP 8, C ECS SAMPLE PLOW ISOLATED	CONTROL BOOM INDICATION	NONE BEGNIESD	MONE	VALUE SAFETY FUNCTION IS TO FAIL CLOSED
01.4.20.01.1 9	V-1102	VALVE	OPEN	LOOP B, C RCS SAMPLE PLOW NOT ISOLATED ON TRAIN B CIS	PERIODIC TESTING	REMOTE-MANUAL, FAIL CLOSED Baceup Isolation Valves (SV-955, SV-956)	PARTIAL DIVERSION OF 2-TRAIN SI FLOW, BOUNDED BY SINGLE TRAIN INJECTION FOR FLOW, CV-36/37	
01.4.20.01.2 8	V-1102	VALVE	CLOSED	LOOP B, C BCS SAMPLE PLOW	CONTROL BOOM INDICATION	NOME BEGNIESD	NONE NOR EAST IRABITORS	
01.4.20.02.1 9	V-1102	D13, D13-1 (RBLAYS)	ON (NO CIS)	(SIMB IS 1. (. 20.1.1)	PRRIODIC TRATING	(SAND AS 1.4.20.7.1)	(SAMB AS ITATEOTET)	NORMAL POSTTION FOR DIS. RELAY CONTACTS WIRED IN PARALLEL
01.4.20.02.2.8	V - 3302	D13, D13-1 [BECA98]	OPP (CIS)	LOOP B, C BCS SAMPLE PLOW ISOLATED (SV-3302 OB-BMSBG(280)	PERIODIC TESTING	NORE BEGUIRED	момв	NORMAL POSITION FOR DIJ-1. RELAY CORTACTS WIRED IN PARALLEL. DIJ IS CIS RELAT,
- O[.4.20.03.] \$	V-3302	CIS-B (PC-1121-1)	CN (NO CIS)	(SAMB AS 1.4.20.1.1)	PERIODIC TESTING	(9AME AS 1.4.20.1.1)	(SAMB AS 1.4.20.1.1)	DIJ-1 IS CIS OVERRIDE RELAT RORMAL POSITION. OUTPUT IS DE-EMERGIZE TO ACTUATE
01.4.20.03.2.8	7-1102	CIS-B	OPP (CIS)	(SAMS AS 1.4.20.2.2)	PERIODIC TESTING	(SAHE AS 1.4.20.2.2)	(SAME AS 1.4.20.2.2)	The second secon
01.4.20.04.1 S	V-3302	TPČ-1121-1) 889 2 (20-1, 2, 3, 4)	CONTACTS CLOSED (ON)	CIS TRAIN B ACTUATED TO SV-3302	CONTROL BOOM INDICATION, PBBIODIC TESTING	(SANE AS 1.4.20.1.2)	(SAME AS 1.4.20.1.2)	•

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#### EMERGENCY CORE COOLING STATEM SINGLE FAILURE ANALYSIS SAN ONORRE UNIT 1 TABLE 1-1: SAPETY INJECTION / MAIN FN 1301ATION FMSA

ITEM #	DBAIGB 10	COMPONENT ID	PAILURS MODE	LOCAL SPPECTS AND DEPENDENT FAILURES	METHOD OF Detection	INHBERNT COMPRESSITING PROVISIONS	RPPBCT ON BCCS	BENARES	
; '		{20-1, 2, 3, 4}	(OFF)	OR LOW PRESSURIZER PRESSURE (EG. MSLB OUTSIDE CONTAINMENT)		ISANG AS 1.4.20.1.11	•		
						•			
			· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·					
							;		
; ; ; ;					· · · · · · · · · · · · · · · · · · ·				

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TABLE 1-2: SAFETY INJECTION BOUNDARY VALVE ANALYSIS

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BRESSENCY CORE COOLING SYSTEM SINGLE PAILURE AMALTSIS SAN QNORER UNIT I BOUNDARY VALVE AMALTSIS CDM "M" No. M-Revision No. 1
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		(SAP81	Y RELATED	BOUNDARY-	> (SAPRTY RELATED BACKUP	)	(NON-SAPETY RELATED BACEUP		
<u>:</u>	\$ M871	TAG #	MC/AUTO?	LOCESD?	TAG 1	MC/AUTO?	TAG A	MC/AUTO?	
						·			
<u> </u>		SIS: 105					NONE :		P. G-SUB SUCTION DRAIN TO AUX BLDG SUMP
		\$19-101	CLOSED						
1		819-309	CLOSED	MO	NOMB		NONE		# G-SOB DISCHARGE BEADER DRAIN
<u>-</u> -	01.1.01	. 112-111	CLOSED	_100	_ KOTI		MOM	. <u></u>	G-50B CASING VENT G-50B DISCRARGE BRADER DRAIN G-50B DISCRARGE BRADER PRESSURE (NSTRUMENT IRST
1		212 414							COMMBCTION
i		315-317	CLOSED	NO	NOME		8LS-329	CLOSED	# G-SOB DISCHARGE HEADER DRAIN
-		815-315	CLCSED	MO	HOUSE		NONS		
ı		\$19-321	CLOSED CLOSED	10 10	HONE		NONE		# BV-853B INTER-DISC DEAIN
ļ		819-325			NOR		HOME		* NV-8538 INTER-DISC ORALN
	01.1.10	17:1511	AUTO CLOSED	 No	MONE		CONDENSATE AND MEATER DRAIN STREET		G-38 CONDENSATE SUCTION ISOLATION
			CLOSED	NO NO	NOME		NONE		# G-38 CASING VENT
l	01.1.11						NONE		G-38 MINIPLOW HEADER VENT
<del> </del>		145-569	CLOSED CLOSED		NONE		_ MONE		G-18 BUNIFLOW BRADER WENT
1	01.1.14		AUTO	NO.	PMS-473	ARDU	NONE		# G-38 MINIPLOY BEADER DRAIN
:	01.1.14	61.11	2010		503-411	OPER	PW9-417, 537		G-38 CONDRIGAR MINIPLOW ISOLATION. DOWNSTREAM
-	01.1.15	PW2-115	CLOSED	785					DRAIN PNS-537 NORMALLY CLOSED
1	01.1.15		CLOSED		MOMB		840%		CV-37 BTPASS
ļ	01.1.17		AUTO	MU .	CV-142/3/4, PCV-456/7/8, MOV-20/21/22, MOV-1204,	A HPA			* G-38 DISCHARGE WEADER VENT
<u></u>	91.1.17	84.0340	AVIV		APN-143, 346, 388, PNS-373, 412	AUIU	PWS-449, 453, 347, 411, 457, 467, 581, 536, 546, 486, 488, 192, 390, 444, 518, 540, 542, 572,	CFOZAN	C-18 ARRANAER DISCURRER FACTOR
•					TER. 213' 340' 300' 503-513' 419		N-41, 46		
	01.1.18	010.116	CLOSED	MO	MONR		NORE		4 HU ACIB EMBOD BIOG BOLIU
	01.1.19		CLOSED	- <u> </u>	NORE		NONE		NY-851B INTER-DISC DRAIN     NY-851B INTER-DISC DRAIN
:	01.2.01		CLOSED	NO	NONE		NOME		G-50A SUCTION DRAIN TO AUX BLDG SUMP
i	01.2.02		CLOSED	HO			NOME		G-SOA CASING VENT
	01.2.03				NOME		NOME		G-SOA DESCRARGE MEADER DRAIN
1	01.2.04		CLOSED	NO	MOME		NONE		G-SOA DISCHARGE WRADER PRESSURE [WSTRUMENT TEST
1		•.• •	000000						COMMINECTION
	01.2.05	\$18-318	CLOSED	NO .	MONE		313-316	CLOSRO	# G-SOA DISCHARGE BRADER DRAIN
! .	01.2.06			NO	1012		NOMB		4 G-SOA DISCHARGE HEADER DRAIN
	01.2.07		CLOSED	MO	NONE		NOWR		B HV-8534 INTER-DISC DRAIN
	01.2.08			MO	VOII		KONR		NV-853A INTER-DISC DRAIN
ļ	01.2.09		AUTO		NOME		CONDENSATE AND MEATER DRAIN STREM		* G-3A CONDRUGATE SUCTION ISOLATION
!	01.2.10		CLOSED	MO	NOWE		NONR		* G-1A CASING WENT
	01.2.11		CLOSED	NO -	NOVE		NONE		C-14 MINIPLOW HRADER VENT
	01.2.12		CLOSED	NO	NONE		MONE		• G-JA BINIPLON BRADER VENT
	01.2.13		CLOSED	NO	NONS		MUMB		* G-34 MINIFLOW BRADER DRAIN
<u> </u>	01.2.14		AUTO			OPEN	PW9-476, 506		. C-34 CONDRISER MINIPLOW ISOLATION. DOWNSTREAM
!						-	• ***		DRAIN PWS-506 NORMALLY CLOSED
!	01.2.15	PVS-474	CLOSED	TES	MONE		NOMB		CV-36 BTPASS
	01.2.16			NO	NOME	••	NONB	•	. G-JA SUCTION HRADER DRAIN
	01.2.17	BV-8524	AUTO		CV-142/3/4, PCV-456/7/8, MOV-20/21/22, MOV-1204,	AUTG	PMS-449, 453, 347, 411, 457, 467, 583, 536, 546,		G-3A FREDWATER DISCHARGE ISOLATION
Į					APW-343, 346, 388, FMS-373, 412		496, 488, 192, 190, 444, 518, 540, 542, 572,		
r -				*			RV-47, 46		
•	01.2.18	\$13-336	CLOSED	NO	MONB		MONR		· HV-851A INTER-DISC DRAIN
	01.2.19	S15-338	CLOSSO	NO	NONE		NONE		· HV-B51A INTER-DISC DBAIN
-									





## EMERGENTY CORE COOLIN; STATEM SINCLE PAILURE ANALYSIS SAN ONOPRE UNIT L BOUNDARY VALVE ANALYSIS

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and the extra distribution.				MC/AUTO?	TAG #	NC/AUTO?	REMARES
1.1.01(MOT_USBD	L						THERE ARE NO BOUNDARY VALVES UNIQUE OF THE TRAIN
							"C" INJECTION PATH VIA HOV-850C. HOV-358 IS
							ADDRESSED AS PAST OF THE COMMON BOUNDARY IN SECTION 1.4 OF THIS TABLE
1.4.01 BCS-019	CLOSED	MO	NONE		C3-021	CLOSED	LOOP A COLD LEG (DISCHARGE) DRAIN TO RODT
1.4.02 RCS-014	CLOSED	MO I	NONE	9	CS-028	CLOSED	I LJOP B COLD LEG (DISCHARGE) DRAIN TO RCDT
1.4.03 RCS-048	CLOSED	MO	NONE		CS-050	CLOSED	LOOP C COLD ERG (DISCHARGE) DRAIN TO RCDT
1.4.04 RCS-065	CLOSED	NO	HONE	1	C8-064	CLOSED	LETDOWN LINE DRAIN TO REDT PUMP SUCTION
1.4.05 3[8-319	CLOSED	NO .	DOME	H	ONE		G-38 STPASS. THROTTLED OPEN FOR TECH SPEC
							SURVEILLANCE OF SI HEADER BORON CONCENTRATION.
							PAILURE OPEN WOULD DIVERT SI PLOY PRON BOTH TRAINS
				·.			AND DISABLE OUTSIDE CONTAINMENT ISOLATION FOR SI
							HEADER
1.4.06 BIS-320	CLOSED	No i	NONE	<u> </u>	ONE		G-JA BYPASS. THROTTLED OPEN FOR TECH SPEC
							SURVEILLANCE OF SI BEADER BORON CONCENTRATION.
							PAILURE OPEN MOULD DIVERT SI PLON PROM BOTH TRAINS
				· · · · · · · · · · · · · · · · · · ·			AND DISABLE OUTSIDE CONTAINMENT ISOLATION FOR SI
							MBADSR
1.4.01 9[8-340	CLOSED	MO I	MONE	<u>.</u>	AP		SIS MEADER DRAIM DOWNSTREAM OF HV-851A
1.4.08 815-342	CLOSED	MO	NONE	· · · · · <del>- ·</del> · · · · · · · · · · · · · · · · · ·	OMB		SIS HEADER SAMPLE DOWNSTREAM OF AV-851A
1.4.09 918-344	CLOSED	MO I	NOME	· ·	OME		SIS READER VENT DOWNSTREAM OF MV-8514
1.4.10 \$18-341	CLOSED	MO I	NONE	N .	ONE		SIS WEADER SAMPLE DOWNSTREAM OF MV-8518
1.4.11 \$13-343	CLOSED	10	NONE	3	18-345, 347	CLOSEO	915 BRADER VENT DOWNSTREAM OF BV-8518
1.4.12 815-363	CLOSED	NO I	MCMB		ONB		SEGARE IS MIAM TREVERS SEGARE EIG
1.4.13 818-361	CLOSED	<b>#</b> 0 :	MONR	L. C.	OMB	;	SIS HEADER VENT, LOOP A SI PATH
1.4.14 BY-868	BELIEF		NONE		ONE		913 BEADER RELIEP TO BUL BOLDUP TANE. NORMAL
							SETTING RANGE RESULTS IN SI DIVERSION DURING
	•						SBLOCA OR MSLB. SETPOINT VERIFIED AS PART OF ASME
			· · · · · · · · · · · · · · · · · · ·		·		SECTION TO IST PROGRAM
1.4.15 SIS-390	CLOSED	T85					SIS HEADER PURGE TO RWL HOLDUP TAME
1.4.16 313-386	CHRCE		NONE	S	13-387	OPRN	SPRING-LOADED CHROS VALVE RELIEVES SIS HEADER TO
			· · <del></del>				BUL BOLDUP TANE. NORMAL SETTING RANGE RESULTS IN
							SI DIVERSION DURING SELOCA OR HSLE. VALVE IS NOT
							INCLUDED IN ASHE SECTION BY IST PROGRAM
1.4.17 513-385	CLOSED	183	=				SIS HEADER PURCE TO BUST. TECH SPEC ACTION
		-					STATEMENT BUTERED WHEN VALVE THROTTLED OPEN FOR
						1	SURVELLLANCE OF SI HEADER BORON CONCENTRATION
1.4.14 819-189	CLOSED	NO 1	NONE		NEHOWN HERDLE (SAMPLE VALVE)	CLOSED	SIS BEADER PURCE LINE PRESSURE INSTRUMENT
				_	· · · · · · · · · · · · · · · · · · ·		MOITALORI
1.4.19 SIS-408	CLOSED	NO 1	NOME	G	HE-1115	CLOSBO"	LOOP C SI HEADER NITSOGEN TEST CONNECTION
1.1.20 SIS-110			NÓNB		W1-1116		LOOP B ST BEADER MITROGEN TEST CONNECTION
1.4.21 SV-702D	AUTO		SV-102C, SIS-405	AUTU			LOCP B SI BEADER SAMPLE LINE CONTAINMENT ISOLATION
1.1.22 87-7028	AUTO		SV-702A, 915-406	. AUTO			LOOP C SI BEADER SAMPLE LINE CONTAINMENT ISOLATION
1.4.23 NOV-356			VCC-305, 306	CHBCK	A 1 of the section of the last and the section of t		LOOP A CLE ISOLATION. VALVE NOT OPENED UNTIL
	204488						CHARGING PUMP(S) RUNHING
1.4.24 HOV-357	CLOSED	MO 1	VCC-305, 306	CHRCK			LOOP B CLR ISQLATION. VALVE NOT OPENED UNTIL



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## EMERGENCY CORE COOLING STSTEM SINGLE PAILURE ANALYSIS SAM ONOPRE UNIT 1 BOUNDARY VALVE ANALYSIS

ITBN #	TAG A	MC/AUTO?	LOCEBO?	TAG &	MC/AUTO?		NC/AUTO?	REMASES
01.4.24	FOA - 129 '	CL0380	- ₩2	ACC:302' 108	CHECK.	····		LOOP C CLB ISOLATION, VALVE NOT OPENED UNTIL
A1 4 26	CB2 160	OPEN :		MONE				CHARGING PUMP(S) RUNNING
01.4.20	CB3-366				•	134, 169	I), CLOSED	REST PILTER PUMP SUCTION. VALUE IS SE/MSR SEISHIC
						411. 111		AQUNDARY AND MUST BE CLOSED DURING NORMAL OPERATION TO MERT SEP TOPIC III-6 COMMITMENTS.
								TROM SPEC ACTION ENTRY FOR INOPREABLE RUST
_ *								REQUIRED WITH VALVE OPEN. CRS-338 IS BOUNDARY PROM
						** *** **** **** **** **** **** ***		NSE BACE TO SE PIPING
01.4.27	CRS-118	CLOSED	789					REPUBLING WATER PUMP BYPASS TO RWST.
								OPENSO/THEOTTLED FOR SECONDARY SECIECULATION
01.4.28		CLOSED	NO	SPP-328	CLOSED	RVL-540	CLOSED	RWL ION BECHANGER CONNECTION TO RUST
01.4.29 (		CT07BD	NO.	NONE		NONE	1	G-8A DBD[CATED SAPE SHUTDOWN MINIPLOW DRAIN
91.4.30		Croard	MO	NONE		CRS-314, VCC-384, 196, 398, 400, 402, 404	CFOSED I	G-84 DEDICATED SAFE SHUTDOWN MINIPLON TO RWST
01.4.31		CLOSED	NO	CAP				RWST LAVAL INSTRUMENT NOZZLA DRAIN
81.4.32		CTOJED	NO	NONS		NOMB		RWST LEVSE ENSTRUMENT (LS-69) DRAIN
41.4.21		_Crossb	<u>NO</u>	HONE		NORE		RUST LEVEL INSTRUMENT (LT-950) DRAIN
01.4.34 ( 01.4.35 (		CLOSED	NO.	NONE		NOMB		RYST LEVEL INSTRUMENT (LT-3020) DRAIN
		CLOSED	MO	NOMB NOMB		NOMB		RWST LAVEL INSTRUMENT (LS-30) DRAIN
01.4.36 I 01.4.31 I		CLOSED	<u>NO</u>	NONE		LDS-006		LETDOWN LINE DRAIN UPSTRANN OF RECEMBRATIVE HE
01.4.38 (		AUTO	BU	CV-525 OR CV-526/LDS-312	OPEN	SLIND PLANCE		LETDOUN LINE DRAIN DOWNSTRAM OF RECENERATIVE HE
	C4-147	2010		C4-953 OB C4-356/E03-915	Vrsa			RCS LETOONN ISOLATION. VALVE FAILURE OR LEAGUE
- · ·								ABBULTS IN SI DIVERSION, AND BACEUP VALVES NOT ADDRESSED IN BOI. BOWEVER, BYEN IF INCLUDED IN
								801, DIVERSION WOULD STILL OCCUR FOR SELOCA AND
								M3LB VIA RV-206 TO PRT
01.4.19 (	CV-203	AUTO		CV-525 OR CV-526/LDS-312	OPEN			RCS LETDOWN ISOLATION. VALVE PAILURE OR LEAKAGE
								RESULTS IN SI DIVERSION, AND BACEUP VALVES NOT
								ADDRESSED IN BOL. HOWEVER, BYEN IF INCLUDED IN
						TO THE WORLD SEE AND SEE ASSESSMENT AND ADMINISTRATION OF THE PARTY OF		BOI, DEVERSION WOULD STILL OCCUR POR SBLOCA AND
								HISLO VIA RV-206 TO PRT
01.4.40	CV-204	AUTO		CV-525 OR CV-526/LDS-312	OPBN			RCS LETDOWN ISOLATION. VALVE PAILURE OR LEARAGE
								RESULTS IN SI DIVERSION, AND BACKUP VALVES NOT
						•		ADDRESSED IN BOI. HOWEVER, RVEN IF INCLUDED IN
	· - ·					·		BOL, DIVERSION WOULD STILL OCCUR FOR SBLOCA AND
								MSLB VIA RV-206 TO PRT
01.4.41 0		AUTO		LDS-010, HCV-1117	CLOSED			BCS BICESS LBTDOWN ISOLATION
01.4.42 F			NO .	MONB		MONB		MEN PUR? RWST MINIFLON DRAIN DOWNSTRBAM OF CV-8758
01.4.43 P				MONE		NOMB		MEN PUMP RUST MINIFLOW DRAIN DOWNSTRRAM OF CV-875A
01.4.44 P	. 112 - 244	CLOSED	NO	NONE		MONB		HEA PUMP RAST MINIFLOW DRAIN IN COMMON BRIURN TO

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SECTION 2: COLD LEG RECIRCULATION

#### COLD LEG RECIRCULATION NOTES

- 1. Item numbers in this section have been assigned as follows:
  - O2.1: Train A CLR pumping and filter bypass, CLR flow path to RCS Loop A and boundary devices
  - 02.2: Train B CLR pumping and filter bypass, CLR flow path to RCS Loop B and boundary devices
  - 02.3: CLR flow path to RCS Loop C and boundary devices
  - 02.4: Common flow path and boundary devices.
- 2. Table 2-1 is the Failure Modes and Effects Analysis (FMEA) for the CLR function. Table 2-2 is the associated boundary valve analysis.
- 3. The boundary valve analysis for those portions of the Containment Recirculation and Spray system associated only containment spray is contained in Table 5-2.
- 4. Potential single failure susceptibilities in the FMEA table are flagged with "\*" as the first character of the associated ECCS EFFECTS field. Other open items (eg. required procedure or calculation changes) are flagged with "\*" as the first character of the REMARKS field.
- 5. Potential single failure susceptibilities in the Boundary Valve Analysis table are flagged with "\*" in the unlabelled field adjacent to REMARKS. Items flagged with "#" in the unlabelled field adjacent to REMARKS are acceptable from a single failure standpoint subject to credit for SEP Topic III-6 seismic boundary criteria.

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#### COLD LEG RECIRCULATION REFERENCES

Piping and Inst	rumentation Diagrams
5178100	Reactor Coolant System
5178110	RCP Seal Water System (Sh 1)
5178111	RCP Seal Water System (Sh 2)
5178115	Safety Injection System
5178120	Containment Spray and Recirculation System (Sh 1)
5178121	
5178135	Containment Spray and Recirculation System (Sh 2)
	Volume Control and Charging System (Sh 1)
5178136	Volume Control and Charging System (Sh 2)
5178140	Letdown Demineralizer System
5178145	Boric Acid System
5178150	Reactor Cycle Sampling System
5178403	Gaseous Nitrogen System (Sh 4)
5178404	Gaseous Nitrogen System (Sh 5)
5178443	Instrument and Service Air System (Sh 4)
5178447	Instrument and Service Air System (Sh 8)
5178449	Instrument and Service Air System (Sh 10)
5178950	Post-Accident Sampling System (Sh 1)
Elementary Diag	rame
N1542 Sh 1	Recirculation Pumps
N1546 Sh 13	Station Loss of Voltage Auto-Transfer
63719	
	FY-1112, FY-1115A/B/C/D/E/F (Sh 6)
64374	MOV-883
455369	MOV-1100B
455371	MOV-866A/B, MOV-18/19, MOV-356/357/358
455432	HCV-427A/B/C
455437	CV-410/411
455448	CV-304/305
455510	MG-8AF/BF (Charging Pump Lube Oil Cooler Fans)
455875	CV-406A/B
456246	FCV-1115D/E/F (Train B)
5150626	Charging Pumps
5150885	480 V Bus #1/2/3 Undervoltage
5151028	MOV-1100C
5167841	CV-2145
5202909	MOV-1100D
Other Drawings	• • •
63714 Sh 1	Loop: PT-425
64383	One-Line: CSAS Inverter (Train B)
451410	Loop: Recirculation/SI Flow
457257	Loop: LT-1100
5112418	Schematic: Auxiliary Relay Rack R12 (Rear)
Procedures	
S01-1.0-10	Donaton Main on Cofoba Indiantian
	Reactor Trip or Safety Injection
SO1-1.0-12	SI Termination
S01-1.0-20	Loss of Reactor Coolant
SO1-1.0-23	Transfer to Cold Leg Injection and Recirculation
S01-4-39	Safety Injection Alignment
SO1-12.3-7	Monthly Sequencer Testing

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SO1-14-40

Control of Locked Valves

Other Documents

System Description: Safety Injection, Recirculation and Containment Spray Systems SD-S01-580

SD-S01-590 System Description: Safeguard Load Sequencing

System

Response to Generic Letter 88-14, "Instrument Air M89048

Supply System Problems Affecting Safety Related

Systems", dated July 5, 1989

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TABLE 2-1: COLD LEG RECIRCULATION FMEA



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#### ENERGENCE COEE COLEMA SYSTEM SENGLE PARLURS ANALYSES SAN CHOPES UNIT ! FABLE CHEC COEE LEE RECESTOLATERN ANEA

ITEN A	DEVICE ID	COMPONENT ED	PAILURR MODE	LOCAL EFFECTS AND DEPSADENT FAILURES	PO CENTER RESTORTED	INSBERNT COMPENSATING PROVESTORS	BEFECT ON BOOS	BEMARES
93,1,61,21,	I MANUAL VALVES. TRAIN A PLOW		CPEN	<u>P</u> àng	PRRIDDIC SURVEILLANCE	NONE REQUIRED	NON3	[MCLUORS: VCC-202, -303, -329
·[	I HANDAL VALVES,		CLOSED	TRAIN A CHARGING PUNP SUCTION, DISCRARGE OR MINIPLON 1801ATED	PERIODIC SURVEILLANCE	REDUNDANT TRAIN	LOSS OF TRAIN A CHARGING PUMP	AND -337
	train a ploy		NORE (SYSSIAS)		PRRIODIC TESTING		CAPABILITY FOR CLR. BLR	INCLUDES: CRS-008, VCC-305,
07.1.02.01.	TRAIN A BOUNDARY		OPEN	BIVERSION OF TRAIN A PUMP PLON AND, FOR OUTSIDE CONTAINMENT VALUES WHICH ARE NOT LOCKED CLOSED OR PROVIDED WITH SR BACTUPS, LOSE OF BRCIRC/RWST INVENTORY	PRRIODIC SUBVEILLANCE	388 TABLE 2-2 FOR DETAILED BOUNDARY VALVE ANALYSIS	*POTENTIAL LOSS OF BOTH TRAINS OF CLE, BLE AND SPEAT BUE TO UNISOLABLE LOSS OF INVENTORY THROUGH OUTSIDE CONTAINMENT VALVES WHICH ARE NOT LOCKED CLOSED OR PROVIDED WITH SE	SER TABLE 2-2 POR DRTAILED BOUNDARY VALVE ANALYSIS
02.1.02.01.	Z MANUAL VALVES, TRAIN A BOUNDARY		CLOSED	HONS	PERIODIC SURVEILLANCE	NOME BEGNIESD	BACEUPS NOWE	
02.1.02.02.	CHRCE OR RELEAP  VALVES, TRAIN A  BOUNDARY		MOBRIT (57331AB)				· · · · · · · · · · · · · · · · · · ·	THREE ARE NO VALVES IN TRIS
02.1.03.01.		PUMP/NOTOR	LOW PLOW	BROUGED RECTEC PUMP OUTPUT TO REPUBLING WATER AND CRARGING PUMPS. NO REPECT ON INJECTION	PRITERT SICOIRE	REDUNDANT TRAID	INOPERABLETT OF TRAIN A RECIRC PUMPING	SPUMP IST DRY BUMP AND REFURLING INTERVAL WINIFLOW TRSTS IMADROUATE TO VERIFT
								PREFORMANCE RELATIVE TO HINIBAL SYSTEM MARGINS. TECH SPEC MUST ALSO BE REVISED TO REQUIRE OPERBILITY OF BOTH
02.1.03.02.1		8WGR #1 {52-1107}	OPEN	TRAIN A RECIRC PUMP FAILS TO START OR TRIPS APTER STARTING	PERIODIC TESTING	(SAME AS 2.1.3.1.1)	(SAMS AS 2.1.1.1.1)	EBCIEC PUMPS NORMAL POSITION
02.1.01.02.1	G-45A	8WGR #1 (52-1107)	CLOSED	TRAIN A RECIRC FUMP STARTS OF PAILS TO TRIP, RESULTING IN OUT OF SEQUENCE BUS LOADING OS (IF PRIOR TO SUMMERGENCE) PUMP	CONTROL ROOM INDICATION	ERGUNDANT TRAIN	POTENTIAL LOSS OF TRAIN A RECIRC PUMP OR BLECTRICAL POWER	PUMP MOSMACLY DSY
02.1.03.03.1	G-45A	21-112	TRIPPBD	DANAGE BUS UV TRIP SEAL-IN TO TRAIN A	CONTROL BOOM INCICATION	REDUNDANT TRAIN	THE DOG AND LIFE OF TOATS A BOALOW	
		(UV RELAY)		RECIRC PUMP. TRIPS PUMP IP RUNNING, BLOCKS START IF NOT	CONTROL BOOK INDICATION	83008DARI 18ATE	INOPERABILITY OF TRAIN A RECIRC	
02.1.01.01.1		27-112 (UV RRLAY)	UMT819PBD	BUS UV TRIP DEPRATED TO TRAIN A RECIRC PUMP, CAUSING OUT OF SEQUENCE BUS LOADING IF PUMP ON AT TIME OF 219/31310P	PBRIODIC TESTING	REDUNDANT TRAIN	POTENTIAL LOSS OF TRAIN A BLBCTRICAL POWER	NORMAL POSITION
02.1.03.01.1		LSI (SUMP LVL BBLAT)	CONTACTS OPEN	SERVICE MATER COOLING DISABLED TO TRAIN A RECIEC PUMP FOR NORMAL TESTING. NOT REQUIRED	PBRIODIC TESTING	REDUNDANT TRAIN	REDUCED BELIABILITY OF TRAIN A RECIRC PUMPING	
02.1.03.04.2		EST (SUMP LVL RBLAT)	CONTACTS CLOSED	WHEN SUBHERGED POST-ECCIDENT SERVICE WATER COOLING AND UNQUALIFIED SV (PV-2077) ISOLATED APTER PUMP START	PBB1091C TBST1MG	ISOLATION PUBBS PREVENT (B)(2) INTERACTION WITH PUMP CONTROLS	REDUCED RELIABILITY OF THAIN A RECIBE PURPING	NORMAL POSITION



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#### BHBRGENCY CORB COOLING SYSTEM SINGLE FAILURE AWALYSIS SAN ONOFRE UNIT 1 TABLE 2-1: COLD LEG RECIRCULATION FMEA

1169	H \$	DEVICE ID	COMPONENT (D	FAILURB MODR	LOCAL EPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	•	ENURSENT COMPRESSATING PROVISIONS	BPFECT ON BOOS	REMARES
i <b>92.1</b> .83	3.05.1 G-45	<b>A</b>	EY-2011	_1Q	LOSS OF SERVICE MATER COOLING	PRRECORLS TRATING		TROUTITION EASES 1556ABML (61(5)	BBQUCRQBBLIA9LLLTYQF. TBALW	
					TO TRAIN A BECIEC PUMP, FUSES BLOW TO PROTECT PUMP CONTROLS			INTERACTION WITH PUMP CONTROLS		
02.1.03 ;	1.06.1 G-45	<b>A</b>	CONTROL POWER	TOTIS FOR	_ TRAIN A RECIRC PUMP CANNOT BE STARTED IF OFF OR TRIPPED IF RUNNING	CONTROL ROOM INDICATION.		REQUIREMENT TRAIN	POTENTIAL LOSS OF TEALN A	
102.1.0	4.01.1 MQV.	1664	VALVE/ACTUATOR	OPEN	CHARGING AND REPUBLING WATER TORRING AND REPUBLING WATER	CONTROL BOOM INDICATION		NOME FOR INJECTION, CHRIS	*LOS3 OF INJECTION MEDE CONTAINMENT SPRAY AND CHARGING	FINES LOCE OUT OF MOV-866A AND
					PUNP SUCTION DUE TO GAS BINDING OF COMMON PIPING BY			AND	AND POTENTIAL LOSS OF RECIRC HOSE CHARGING DUE TO GAS	BRANCH TECHNICAL POSITION
					CONTAINMENT PRESSURE		••		SINDING OF COMMON SUCTION PIPING	1992 1
	1.01.2 HOV-		VALVE/ACTUATOR		TRALM A REC <u>irc Pump Cambot</u> Br Alighed			REDUNDANT TRAIN	INOPERABILITY OF TRAIN A RETURN PUMPING CAPABILITY	NORMAL POSITION
	1.02.1 HOV-		MCC-1 143-11421	VOLTS LOW	TRAIN A RECIEC PUMP CANNOT BE			REDUNDANT TRAIN	INOPERABILITY OF TRAIN A RECIRC	·
02.1.9;	5.01.1 HOV-	11008	VALVE/ACTUATGE	OPEN	BUST ALIGHED TO CHARGING PUMP SUCTION. MORNAL FOR INJECTION. CLR AND BLR. SEAL RETURN TO	CONTROL BOOM INDICATION		BACEPLON DURING HORMAL OPS.	MOMB FOR INJECTION, CLB OR MLE. LOSS OF REMOTE-MANUAL CHARGING SUCTION ISOLATION FOR SECONDARY	
					VCT (SOLATED VIA INTERLOCE TO CV-410 AND CV-411		<u></u>	FOR SECONDARY RECIEC, NONE REQUIRED FOR CLE AND BLE	BRCIEC	- In a second date of the second
07.1.09 	7.01. <b>2 H</b> OA-	11008	VALVE/ACTUATOR	CLOSBD	1 OF 2 SUCTION VALVES PAILS TO OPEN FOR INJECTION, CLE AND MLE. MORNAL FOR SECONDARY	PSRIODIC TESTING		REDUNDANT VALVE FOR INJECTION, CLB AND BLB. MONE REQUEED FOR SECONDARY RECISE	REDUCED REDUNDANCY FOR CHARGING PUMP SUCTION REALIGNMENT	MORAL POSITION
02.1.05	5.02.1 HOV-	1100B	LC-1100BI	EIGH LRVEL	MOV-1160B WILE NOT AUTO-OPEN ON LOW YCT LEVEL DURING MORHAL			REDUNDANT VALVE FOR MORMAL OPS. NORE REQUIRED FOR	REDUCED REDUNDANCY FOR CHARGING PUMP SUCTION REALEGNMENT DURING	
·					OPS. NO RPFECT ON SEQ ACTUATION OR (IP IN MANUAL)	·		INJECTION OF RECIRC	NORMAL OPS. NOME FOR INJECTION OR FOR RECIRCULATION (IF VALVE	
!					P03T-313/313LOP				IN MANUAL MODE FRIDE TO SER I BLOCE/RESETI	
02.1.0	5.02.2 HOV-	11008	LC-110081	TOA TEAST	MOV-1100B WILL AUTO-OPBM (AND NOT AUTO-CLOSE ON BIGH VCT LEVEL) DURING NORMAL OPS. NO	CONTROL BOOM INDICATION, PERIODIC TESTING		BECIEC None Bedrieed bos Intection of	NOME EP VALVE PLACED IN MANUAL PRIOR TO SEQ I BLOCK/RESET	
01 1 05			LS-9	CONTACTS OPEN	BFFRCT ON SRQ ACTUATION OR (IF IN MANUAL) POST-313/313LOP MOV-1100B WILL NOT AUTO-CLOSE			NONE REQUIRED FOR ENJECTION OF	MUR	
W. 1. U.	#44-	11008	(HOA-1100C)	CONTACTS OF SH	ON HIGH VCT LEVEL DURING HORMAL OPS. NO SPERCT ON SEQ ACTUATION OR (IF IN MANUAL)	PORTOUTE 18311NG		BRCIRC	. <b>Bump</b>	
			LS-9	CONTACTS CLOSED	POST-SIS/SISLOP  MOV-1100B WILL AUTO-CLOSE ON	BROLONIO TESTINO		REDUNDANT CONTACTS PRON	ARDUCED RELIABILITY FOR SOTH	
U.,.I.U.	1.01.2 M.V-		(#0A-1100C)	COMINCIS CEOSED	HIGH VCT LEVEL BEFORE MOV-1100C TO FULLY OPEN,			LC-1100BE	CHARGING PUMPS FURING MORNAL	
					INCREASING POTENTIAL FOR LOSS OF SUCTION TO CHARGING PUMPS. NO BPERCT ON SEQ ACTUATION OR (IF IN MANUAL) POST-SIS/SISLOF					



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## EMBECANCY CORR COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OWOPRE UNIT 1 TABLE 2-1: COLD LZG ERCIBCULATION FMEA

·   -	# #271 	DBAICE TO	COMPONENT ID	FAILURE MODE	LOCAL REFECTS AND DRPENDENT FAILURES	METHOD OF Detection	INHERRNT COMPENSATING PROVISIONS	RPFECT ON BCCS	BEMARES
 	92,1.0\$,04.1.8	₽V-1190 <b>8</b>	. \$89.1 (39-1, 3)	_OPE_(OPEN)	BIS/SISLOP. AUTO-LEVEL AND	PRRECODES TRRETING	REQUIDANT VALVES FOR	_BEDUCED_REDUNDANCY_FOR_CHARGING PUNP_SUCTION_REALIGNHENT	PRR PROCEDURE LF AUTO-OPEN
	<u> </u>	04-11 <u>608</u>	380   (39-1, 3)	ON (CTOSED)	BRALIGH POR RWST SUCTION TO Charging Pumps, CV-410 And	CONTROL ROOM INDICATION	RECIRC  MONE REQUIRED FOR INJECTION,  CLR OR BLR. REDUNDANT HANUAL  VALVES FOR SECONDARY RECIRC	NOME FOR INJECTION, CLR OR BLB. LOSS OF RENOTE-HANDAL CHARGING SUCTION REALIZABLE FOR	PAILS
	02.1.05.05.1	GA-1100P	SII (BBLAY)	OPP	CV-111 CLOSE MOV-1100C WILL NOT CLOSE ON BEQ 1 SIS/SISLOP. NO REPECT ON MOV-1100E OR D ACTUATION	PERIODIC TESTING	MOV-1100D (38Q 2/311) FOR INJECTION, NOW REQUIRED FOR	SECONDARY RECIEC  REDUCED BEDUNDANCY FOR CHARISING PUMP SUCTION REALIGNMENT (VCT ISOLATION)	NORMAL POSITION
	02.1.05.05.2 8	OV-1100B	SII (RBLAY)	ON	SEQ AUTO-CLOSE SIGNAL TO HOV-1100C, CAUSING VALVE TO	PERIODIC TESTING	NOME BEGRIESED SECIEC	NONE. VALVES RESPOND NORMALLY TO SEE INITIATION AND RESET	
	92.1.05.06.1 8	B0011-VC	 L9-5	CONTACTS OPEN	CLOSE AS SOON AS LINIT SWITCH INTERLOCE SATISFIED BY MOY-1100B OR D OPEN. NO REFECT ON HOW-1100B NOT-CLOSED SIGNAL	CONTROL BOOM INDICATION	MONE BEGNIESO	NUMB, DUB TO MORMAL PATH TO	
-	02.1.05.0 <u>6.2</u> H	0 <b>V-1100B</b>		CONTACTS CLOSED	ISOLATES SEAL MATER BETURN TO VCT VIA CV-610. NO REPECT ON MOV-1100B OPERATION LOSS OF MOV-1100B INTERLOCE TO	PRRIODIC TESTING	BEDANDARI AVTAB	SUCTION RETURN  REDUCED REDUNDANCE FOR SEAL	
	02.1.05.01.1	07-1100 <b>8</b>	LS-6	CONTACTS OPEN	CV-110 MOV-1100B NOT CLOSED SIGNAL 130LATES SEAL WATER RETURN TO VCT VIA CV-411. NO RPFECT ON	(SAMB AS 2.1.5.6.1)	(SAME AS 2.1.5.6.1)	WATER RETURN ISOLATION TO VCT (SANS AS 2.1.5.6.1)	·
_	02.1.05.07.2 H	OA-1100B	L9-6	CONTYCES CYOSED	HOV-11000 OPERATION LOSS OF HOV-11008 INTERLOCE TO CV-411	(SAME AS 2.1.5.6.2)	(SAUB AS 2.1.5.6.2)	(SAMS AS 2.1.5.6.2)	· · · · · · · · · · · · · · · · · · ·
	02.1.05.08.1 8	OA-11008	LS-9	CONTACTS CLOSED	WALVE OPEN SIGNAL TO HOV-1100C MILL PERMIT MOV-1100C TO AUTO-CLOSE ON LOW VCT LEVEL OR	PERIODIC TESTING	REDUNDANT CONTACTS FROM LC-1100BE AND SEE RELAYS	REDUCED RELIABILITY FOR BOTH CHARGING PUMPS DURING MORMAL OPERATION	
					SEC SIGNAL (VIA SIE BELAT) BEFORE MOV-11008 OR D FULL OPIN, INCERSING POTENTIAL FOR LOSS OF SUCTION TO CHARGING PUMPS, NO EFFECT ON MOV-11008 OPERATION				
<u> </u>	02.1.05.08.2 H	OV-1100B	L9-9 	CONTACTS OPEN	LOSS OF 1 OF 2 VALVE OPEN SIGNALS TO MOV-1100C SEQ AND VCT LEVEL AUTO-CLOSE CETS	PERIODIC TESTING	REDUNDANT CONTACTS FROM MOV-1100D	REDUCED REDUNDANCE FOR CHARGING PUMP SUCTION REALIGNMENT	
	02.1.05.0 <del>3</del> .1 <b>н</b>	0V-1100B	ES-10	CONTACTS CLOSED	VALVE OPEN SIGNAL TO MOV-1100C WILL PERMIT MOV-1100C TO AUTO-OPEN ON BIGH VCT LEVEL	PRREIODIC TESTING	MONE BEGUIESD	NOME FOR INJECTION OR 119 MENTIOUS PLASSE IN MANUAL PRIOR TO SER BLOCK/HESET) CLR. MER	
	02.1.05.09.2 M	)V-11008	T 8 - 10	CONTACTY OPEN	MITH NO SEQ SIGNAL LOSS OF 1 OF 2 VALVE OPEN SIGNALS TO MOV-1100C AUTO-OPEN ON YOT LEVEL	PRRIODIC TESTING	MONE BEGUIERD	MONE	:

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#### SHERGENCY CORS COCLING SYSTEM SINGLE FAILURE AMALTSIS SAN ONORRE UNIT 1 TABLE 2-1: COLD LEG RECIRCULATION FMSA

ETBN &	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL EPPRCTS AND CEPRUDENT PAILURES	MRTHOD OF DBTBCTION	BEOALSTONS INHEBERAL COMBENS 71 INC	BFFSCT ON RCCS	BEMARES
02.1.05.10.1 <u>#</u>		MCC-1		REMOTE-MANUALLY OR VIA SIS/SISLOP FOR INJECTION, CLE AND MLB. OR CANNOT BE	CONTROL BOOK IMPLICATION	REDUNDANT VALVE/TRAIN	ANNS ARCTION BENTIONERL BEDACED ESONADAMIA LOS CHUBCIAC	
<u>02.1.06.01.1 G</u>	-18	PUMP/MOTOR		RE-CLOSED REMOTE-HAMUALLY FOR SECONDARY RECIRC REDUCED TRAIN A CHARGING PUMP PLOW. RESULTS IN AUTO-START SIGNAL TO REDUNDANT PUMP G-SA ON LOW DISCRARGE PRESSURE	CONTROL BOOM INDICATION, ANNUNCIATION, PRRIODIC TESTING	MIAST/9MU9 THACHUGES	INCPERABLETTY OF TRAIN A FUMPING FOR CLA AND BLE PRIMARY PATM	INCLUDES AUT L.G. PUMP AND FAN COOLER. CHARGING PLOW NOT CREDITED POR INJECTION
02.1.06.02.1 G	- 8 8	BUS 81C (152-11co))	OPBN	OR PAILS TO START ON	CONTROL BOOM INDICATION, PRRIODIC TRATING	REDUNDANT PUMP/TRAIN	INOPERABILITY OF TRAIN A PUNPING FOR CLR AND BUR PRIMARY	
02.1.06.02.2 G		008 01C (152-11507)	CLOSSO	SIS/SISLOP IF SELECTED TRAIN A PUMP STARTS OR FAILS TO TRIP ON SIS/SISLOP IF SELECTED. HOW-1100C UNAPPECTED	CONTROL ROOM INDICATION, PERIODIC TESTING	MOV-1100C CLOSES AS REQUIRED	PATH POTENTIAL OPERATION OF 2 CHARGING PUMPS DURING INJECTION	ADMINISTRATIVELY CONTROLLED SELECTOR SWITCHES ALIGN HOV-11-DOC POWER TO SAME TRAIN
	A profession and administration of the second			Salatina Ros-1140C UNIFFECIAL			: 	AS CHARGING PUNP SSLECTED TO START, WITH OTHER TRAIN CHARGING PUNP TRIPPRD AND LOCKED OUT ON 313/31SLOP
02.1.06.01.1 G		162 TDC (152-12COT)	ON (CONTYCIS Crósed)	TRAIN A CHARGING PURP AUTO-START ENABLED ON LOW DISCHARGE HARRE PERSOURE WITH GRA OPP. NO REPROT ON SEQ ACTUATION BUT PURP HAY START ON SEQ BLOCE/RESET WITH	PBRIORIC TESTING	[SAHR AS 2.1.6.2.2]	(SAMB A3 2.1.6.2.2)	
02.1.06.01.2 G	- 98	162 TDC (152-12007)	OFF (CONTACTS OPEN)	PIC-1111 BQ PAILURB TRAIM A CHARGING PUMP AUTO-START ON LOW DISCHARGE WRADER PRESSURE DISABLED. NO	PERIODIC TESTING	NOME BEGUISED	MONB	
02.1.06.04.1 G	- 8B	186 (152-12C07)	ON (CONTACTS CLOSED)	RPPECT ON SEQ ACTUATION TRAIN A CRARGING PUMP AUTO-STARTS, CANNOT BE NAMUALLY TRIPPED APTER PUMP	CONTROL BOOM INDICATION, . PERIODIC TRATING	DAR SEGUIDES		BELAT 14-1 SBALS IN TR BBLAY IN DB-SBLECTBD PUMP AFTBR MBQ BLOCK/BBSBT
02.1.06.04.2 G	-18	186 (152-12007)		LOCKOUT RESET. NO RPPRCT ON SEQ ACTUATION TRAIN A CHARGING PUMP AUTO-START ON TRAIN B PUMP BLECTRICAL FAULT DISABLED. NO RPPRCT ON SEQ ACTUATION	(SAME AS 2.1.6.3.2)	(SAMB AS 2.11.6.3.2)	(SAHS AS 2.1.6.3.2)	
02.1.06.95.1 9 02.1.06.06.1 G		LAST USED   194-1   RELATI		TSAIN A CHARGING PUMP (AND OTHER TSAIN A 4 by LOADS) TRIP APTRE 11.5 SEC, CAMBOT BE RESTARTED (RBLAY DOES NOT RESET), OR RESTAST DELAYED BY 35 SEC (RBLAY RBSETS)	CONTROL BOOM INDICATION, ANNUNCIATION	N:AST THACKUOSS		UV BELAY TRIP DOSS MOT OCCUB DURING SISLOP TP DG RB-BMBRGIZBS BUS MITHIN 10 SEC SAFBTY AMALYSIS LINITS



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## RHBS 13NCY CORS COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM OMOFRE UNIT 1 TABLE 2-1: COLD LEG RECIPCULATION FMSA

FAILURE MODE	LOCAL BFFECTS AND DBPSWDBYT PAILURBS	MBTHOD OP MBTBCTION	INHERBNT COMPRISATING - PROVISIONS	REFECT ON BUCS	FEMTES?
OPP.(CONTACTS_OPBN).	TRAIN A CHARGING PUNE (AND	Pariodic trating	NOME BEGUIERO	NCMB	
·	NOT TRIP ON BUS UNDERVOLTAGE DURING MORMAL OPERATION. NO	· · · · · · · · · · · · · · · · · · ·			
	LOAD SEQUENCING DUE TO SEPARATE SISLOP TRIP SIGNAL TO		······		
BUS BIC (CONTACTS OPBN)	TRAIN A CHARGING PUNP WILL NOT TRIP ON SIR/RISLOP, NORMAL FOR	PRRIODIC SURVEILLANCE AND TESTING	MOA-1100C CFORES V2 BEGINEED	CHYBGING SAMES DABING INTRCLION	
	PUMP/MOV-11000 SELECTION. NO				
CFOSEDI	TRAIN A CHARGING PUMP WILL	PRRIODIC SURVEILLANCE AND TESTING	MONE REQUIRED FOR INJECTION,  MANUAL CONTROL AFTER SEQ.  RECORDERS FOR CIR AND NER	HODE CHARGING CAPABILITY IF I	HARGING NOT CREDITED DURING INJECTION, SELECTOR SWITCH POSITION: ADMINISTRATIVELY
	PUNP/MOV-1109C SELECTION. NO SPECT ON TRAIN & PUNP OR MOV-1108C SEQ ACTUATION			-	CONTROCTED  CONTROCTED
OPP (CONTACTS OPEN)	TRAIN A CHARGING PUMP WILL NOT	PBRIODIC TRATING	NONE REQUIRED FOR INJECTION,  MANUAL CONTROL AFTER SEQ  BLCCE/RESET FOR CLE AND HER		HARGING NOT CREDITED DURING MJBCTLON
	SIGNAL. MAY CAUSE	CONTROL BOOM INDICATION, PRRIODIC TESTING	REDUNDANT TRAIN FOR SISLOP WITH TRAIN A SSLECTED, NOME	(MOV-1100C) AND SS-2 (G-MA) IMOPERABLLITY OF TRAIN A FGE SISLOP. NO EFFECT IF SIS OR	
·	ON SISLOP IF TRAIN A BREECTED. TRIP ON SIS/SISLOP VIA		REQUISED FOR SIS OR TRAIN B	TRAIN B SELECTED	
	(LP TRAIN & SELECTED) NOT APPROTED				
<u></u>	TRIP ON 818/813LOP, NORMAL POR TRAIN A CHARGING			POTENTIAL OPBRATION OF 2 CHARGING PUMPS DURING INJECTION	
	RPPRET ON TRAIN B PUMP OR MOVILOUS SEQ ACTUATION	COMPONE POOR STORY	NAME OF COLUMN ASSESSMENT OF THE COLUMN ASSESS		
	TRIP EP TRAIN B SREBCTRD ON 1 SS-1. NO RPPRET ON TRAIN B	•	NOME REQUIRED FOR INJECTION, REDUNDANT PUMP FOR CLR AND BLR	[SAME AS 2.1.6.T.2]	
N	ACTUATION TRAIN B CHARGING PUMP	PBRIODIC TESTING	-		
,	DISCHARGE HEADSE PRESSURE WITH G-88 OFF. NO EFFECT ON SEQ			casping tours tourn INTECTION	
	G-8a MAY START ON SBG BLOCK/BESBT WITH FIC-1111 By				 
	DEP (CONTACTS OPEN)  BUS BIC (CONTACTS OPEN)  DEP (CONTACTS OPEN)  IN (CONTACTS CLOSED)  IN (CONTACTS CLOSED)	PAILURE HODE  DEPSADENT PAILURES  OPP (CONTACTS OPEN) TRAIN A CHARGING PUMP (AND OTRES TRAIN A 4 NO LOADS) MILL NOT TRIP ON BUS UNDERVOLTAGE DURING MORMAL OPERATION. NO EPPECT ON SEQ ACTUATION OR LOAD SEQUENCING DUB TO SEPARE SISLOP TRIP SIGNAL TO TRAIN A CHARGING PUMP WILL NOT SIGNAL. HAT CAUSE OUT-OP-SEQUENCE PUMP WILL NOT SIGNAL. HAT CAUSE OUT-OP-SEQUENCE PUMP WILL NOT SIGNAL. HAT CAUSE OUT-OP-SEQUENCE PUMP WILL NOT SIGNAL SELECTED. NOT TRAIN A SELECTED. NOT TRAIN A SELECTED. NOT TRAIN A CHARGING PUMP WILL NOT SEPRET ON TRAIN A SELECTED. NOT TRAIN A CHARGING PUMP WILL NOT SEPRET ON TRAIN A CHARGING PUMP WILL NOT TRIP ON SIS/SISLOP. NORMAL POR PUMP/NOV-1100C SELECTION. NO SEPRET ON TRAIN A PRIBOR PUMP VILL NOT TRIP ON SIS/SISLOP. NORMAL POR PUMP/NOV-1100C SELECTION. NO SEPRET ON TRAIN A PRIBOR ACTUATION. NO REPRICT ON TRAIN B PUMP OR NOV-1100C SEQ ACTUATION. SISLECTED ON TRAIN B SELECTED ON ACTUATION.	PAILURE HODE  DEPENDENT PAILURES  DEFECTION  OTHER TRAIN A CHARGING PURP LAND  DEFECTION  DEFECT ON SEQUENCING DUE TO  DEPARTE SIZEOP TREE SIGNAL TO  LOAD SEQUENCING DUE TO  DEPARTE SIZEOP TREE SIGNAL TO  LOAD SEQUENCING DUE TO  DEPARTE SIZEOP TREE SIGNAL TO  LOAD SEQUENCING DUE TO  DEPARTE SIZEOP TREE SIGNAL TO  LOAD SEQUENCING DUE TO  DEPARTE SIZEOP RUPP WILL NOT PREIODIC SURVEILLANCE AND  TREE OF SIZESTON, NO  LEFFECT OF TRAIN A CHARGING PURP WILL PREIODIC SURVEILLANCE AND  TREE OF SIZESTON, NO  LEFFECT OF TRAIN A CHARGING PURP WILL PREIODIC SURVEILLANCE AND  TREE OF SIZESTON, NO  LEFFECT OF TRAIN A CHARGING PURP WILL NOT PREIODIC TRETING  TREE OF SIZESTON, NO  LEFFECT OF TRAIN A CHARGING PURP WILL NOT PREIODIC TRETING  TREE OF SIZESTON WILL STATEM  DEFECT OF TRAIN A CHARGING PURP WILL NOT PREIODIC TRETING  TREE OF SIZESTON WILL  SIGNAL HAT CAUSE  OUT-OF-SEQUENCE PURP LOADING  OUT-OF-SEQUENCE PURP WILL NOT PREIODIC TRETING  TREE OF SIZESTON WILL  SEPARTE SIZE CONTACTS AND SS-1  (IP TRAIN A SELECTED) NOT  APPECTED  FOR CONTACTS OFEN) TRAIN A CHARGING PURP WILL NOT PREIODIC SURVEILLANCE AND  TREE OF SIZESTON WILL CONTROL SURVEILLANCE AND  TREE OF SIZESTON WILL CONTROL SURVEILLANCE AND  TREE OF SIZESTON WILL CONTROL SURVEILLANCE AND  DISCARCE SIZESTON WILL CONTROL SURVEILLANCE AND  TREE OF SIZESTON WITH CONTROL SOON INDICATION,  TREE OF TRAIN A CHARGING PURP WILL CONTROL BOON INDICATION,  TREE OF TRAIN A CHARGING PURP  ACTUATION  IN TRAIN A CHARGING PURP  ACTUATION  TRAIN A CHARGING PURP  AUTO-START BRABELED ON LOW  DISCARCE HEADES PRESSURE WITH  C-80 OFF. NO SEPECT ON SEQ  ACTUATION OF SITHER PURP, BUT  G-84 MAY START ON SEQ  BOULD SECURITY WITH SECURITY SECURITY  ACTUATION OF SITHER PURP, BUT  G-84 MAY START ON SEQ  BOULD SECURITY SECURITY SECURITY  ATTUITION OF SITHER PURP, BUT  G-84 MAY START ON SEQ  BOULD SECURITY SECURITY  BOULD SECURITY SECURITY  ATTUITION OF SITHER PURP, BUT  G-84 MAY START ON SEQ  BOULD SECURITY  BOULD SECURITY  BOULD SECURATION  ATTUIL SON SECURITY  ATTUIL SON SECURITY  ATTUIL SON SEC	PAILURE MODE  DEPSHORST PAILURS  DEPSHORST PAILURS  DETECTION  PROVISIONS  PROVISIONS  PROVISIONS  PROVISIONS  DEPSHORST PAILURS  DETECTION  PROVISIONS  DEPSHORST PAILURS  DETECTION  OTHER TRAIN A CHARGING PURP LAND  DURING MORRAL OPRATION, NO  REPPECT ON SEQ MUDERVOLTAGE  DURING MORRAL OPRATION, NO  REPPECT ON SEQ ACTUATION OF  LOAD SEQUENCIES DUTO  SPRARE SISLOP TRIP SIGNAL TO  100 SIC (CONTACTS  TRAIN A CHARGING PURP VILL NOT PRRIDDIC SURVELLANCE AND  REPPECT OF TRAIN A PURP OR  DOWNING MORRAL OPRATION  DEPSECT OF TRAIN A PURP OR  DOWNING MORRAL OPRATION  TRAIN A CHARGING PURP VILL PRRIDDIC SURVELLANCE AND  DOWNING SEQ ACTUATION  PRECED TRAIN A PURP OR  DOWNING SEQ ACTUATION  DOWNING SEQ ACTUATION  PROVIDED SEQ ACTUATION  ATALL ON SIS/SISLOP  TRAIN A CHARGING PURP VILL NOT PRRIDDIC TESTING  DOWNING SEQ ACTUATION  ATALL ON SIS/SISLOP  TRAIN A CHARGING PURP VILL NOT PRRIDDIC TESTING  DOWNING SEQ ACTUATION  ATALL ON SIS/SISLOP  TRAIN A CHARGING PURP START  CONTROL SEQ ACTUATION  TRIP OF SIS/SISLOP  TRAIN A CHARGING PURP PILL NOT PRRIDDIC TESTING  DOWNING SEQUENCE PURP PURP LOADING  ON SISLOP IT TRAIN A SELECTED  TRAIN A CHARGING PURP WILL NOT PRRIDDIC TESTING  TRIP OF SIS/SISLOP TO THE PLANT OF	DEFECT AND DEFECT AND DEFECTOR OF LEARNING CONTROL OF PROVISIONS REFECT ON BCCS  PAILURE HOOD DEPONDED FAILURES DEFECT ON BCCS  PROVISIONS RESIDENCE FOR CONTROL OF PROPERTY OF PROVISIONS REFECT ON BCCS  PROVISIONS THE OR DAS UNDERVOITAGE  DURING CONTACTS OPEN THE FAILURES PROPERTY OF PROVIDED CONTROL OF PROPERTY OF PROVIDED CONTROL OF PROVIDED

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## EMPRISHING COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 2-1: COLD LBG HBC(RIULATION FMEA

LTSH # 0	EAICE ID COMBONERT I	D FAILURE MODE	LOCAL RFFECTS AND DRPENDENT FAILURES	METHOD OF DETECTION	DENTAL PROPERTY OF THE SERVICE OF TH	BPFECT OF BCC3	E384K28
02.1.06.10.2 G-83	162 TDC (152-11CDT)		AUTO-START BISABLED ON LOW BISCHARGE MEADER PRESSURE. NO			NORB	······································
02.1.06.11.1 G-88	186 (192-11007)	. N	BPPSCT ON SEQ ACTUATION OF BITSER PURP. TRAIN A CRARGING PUMP LOCERD OUT, TRAIN & PUMP AUTO-STARTS AND CAMBOT ER TRIPED AFFER	CONTROL ROOM INDICATION	BEDUNDANT TRAIN	LOSS OF TRAIN A CHARGING PUMP CAPABILITY FOR INJECTION, CLR AND BIR	
02.1.06.11.2.G:08	(152-11COT)		ERG BLOCK BESET TRAIN & PROTECTION DISABLED FOR G-BB FAULTS			RRDUCED RELIABILITY FOR TRAIN A BLECTRICAL SYSTEM NOME	
02.1.06.12.1 G-88	MCC-1 (92-1129)		BONNING BRUSH BESSORS MILE SOME SOME STORE SOME BOLDS OF START OF TORE BOLDS OF START OF THE SOLF		MONE BEGAIEED		BOUNDS EQ FAILURS OF LUBB OIL PUMP MOTOR MOTOR DRIVEN LUBB OIL PUMP MOT CREDITED IN LIEU OF SHAPT-DRIVEN PUMP
02.1.06.11.1 G-8B	#CC-1 (42-1135)	VOLTS LOW	TRAIN A <u>LUBE OIL FAN COOLBE</u> Will mot start on siglop with Pump Running	PRRIQUIC TRATING	NONE BURNIERO		TOWNS AND SAILUES OF PAM
02.1.06.14.1 G-88	CONTROL POWE	C WOLTS LOW	TRAIN A CHARGING PUMP CANNOT BE STARTED IF OFF OR TRIPPED IF RUNNING	CONTROL BOOM INDICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A CHARGING PUMP FOR INJECTION, CLR AND HLR	
02.1.06.15.1 G-8B 02.1.07.01.1 MOV-1	INOT USED) 9 VALVE/ACTUATO	B OPBN	1 OF 2 FILTER BYPA3S PATHS	CONTROL BOOM INDICATION, PERIODIC TESTING	NONE BEGALISED	NONS	
02.1.07.01.2 MOV-1			DISIBLED FOR CLE	CONTROL BOOM INDICATION, PERIODIC TESTING	BEDINDING AVEAE (NOA-18)	REDUCED REDUNDANCY FOR CLR DISCHARGE PLOW PATH REDUCED REDUNDANCY FOR CLR	
02.1.01.02.1 MOV-1	9 <u>mcc-1</u> (42-1146)	AOFĖŽ FOM	HON-18 BYTTS 73-17	CONTROL ROOM INDICATION	REBUNDANT VALVE (MOV-18)	DISCHARCE PLOW PATH IP FAILURE PRIOR TO BRALIGHMENT	
02.1.03.01.1 HOV-3	56 VALVB/ACTUATO	B Chan	OF 3 CLE PATHS ALIGNED TO BCS, CANNOT BE BECLOSED TO ISOLATE PCV-1115A/D IP BEQUIRED	CONTROL ROOM INDICATION	NOME REQUIRED FOR CLE ALIGNMENT	NOME FOR CLE ALIGNMENT	*NOT ACCEPTABLE FOR INJECTION WITH CONCURRENT PAILURE OF CHARGING (RG. DUS TO MOV-1100C). TRCH SPRC ACTION
92.1.08.91.2 MOV-3	56 VALVB/ACTUATO	R CLOSED	1 OF 3 CLR PATHS TO BCS LOOPS	CONTROL ROOM INDICATION,	REDUNDANT PLOW PATHS TO BCS	LOSS OF RCS LOOP A CLR FLOW	ENTRY REQUIRED WITH VALVE OPEN DURING NORMAL OPERATION FLOW VIA SEAL INJECTION TO ECP IN APPECTED LOOP NOT CREDITED
02.1.08.02.1 HOV-3	56 NCC-1 (42-1158)	VOLTS LOW	DISABLED BOY-356 CANNOT BE REPOSITIONED, RESULTING IN POTENTIAL LOSS OF 1 OF 3 CLR PATHS (IF CLOSED) OR IMABILITY TO ISOLATE FCY-1115A/D (IF	CONTROL ROOM INDICATION	REDUNDANT PLOW PATHS TO RCS LOOPS B AND C FOR CLR	POTENTIAL LOSS OF CLE FLOW PATH TO BCS LOOP A	
	L VALVES,	OFRM	OPBN) NONS	PERIODIC BURNETLE STORY	NOME BENNIERD	N : N B	INCLUDES: CR3-009, VCC-308,

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## EMBRURNCY CORR COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONORRE UNIT | TABLE Z-1: COLD LEG RECIRCULATION FREA

, ,! 		DBAICE ID	COMPONENT ID	FAILURE MODE	LOCAL BPPECTS AND DEPENDENT FAILURES	METHOD OF	INHBERNT COMPENSATING PROVISIONS	BPFECT ON ECCS	REMARES
<u> </u>		MANUAL VALVES, TRAIN B PLON CHECE VALVES,		CLOSED	TRAIN B CHARGING PUMP SUCTION, Discharge or miniplow isolated	PERIODIC SURVEILLANCE PERIODIC TESTING	REDUNDANT TRAIN	LOSS OF TRAIN & CHARGING PUNK CAPABILITY FOR CLR AND BLR	INCLUD35: CR3-U09, VCC-308,
	02.8.02.01.1	TRAIN B PLON		OPBM	DIVERSION OF TRAIN B PUMP PLOW AND, FOR VALVES OUTSIDS CONTAINMENT WHICE ARE NOT LOCKED CLOSED OR PROVIDED WITH TRE BACEUPS, LOSS OF RECIRC/RWST INVENTORY	PBRIODIC SURVRILLANCE	SER TABLE Z-Z FOR DETAILED BOUNDARY VALVE ANALYSIS	PPOTENTIAL LOSS OF BOTH TRAINS OF CLE, BLE AND SPEAT DUE TO UNISOLABLE LOSS OF INVESTORY THROUGH OUTSIDE CONTAINERS VALVES WHICH ARE NOT LOCEED CLOSED OR PROVIDED WITH SE	-312 SSE TABLE 2-2 FOR BSTALLBD SOUNDARY VALVE ANALYSIS
	02.2.02.01.2	MANUAL BOUNDART VALVES, TRAIN B	- de - de description de la constant	CLOSED	NONS	PERIODIC SURVEILLANCE	DBS BROW	BACRUPS W/MB	
}	02.2.02.02.1	CRECE OR RELIEF VALVES, TRAIN B BOUNDARY		NORMAL (PASSIVE)			· · · · · · · · · · · · · · · · · ·		THERR ARE NO VALVES EN THES CATEGORY
	02.2.03.01.1		PUMP/MCTOR	LOA BLOM	REDUCED RECIEC PUMP OUTPUT TO REPUBLING WATER AND CHARMING PUMPS. NO REPECT ON INJECTION	PRRIODIC TRATING	REDUNDANT TRAIN		PUNP IST DRY BUNP AND REFUELING INTRRVAL MINIFLOW TESTS INADEQUATE TO VERIFY PREPORMANCE RELATIVE TO MINIMAL SYSTEM MARGINS. TROS
-									SPEC HUST ALSO BE REVISED TO REQUIRE OPERABILITY OF BOTH PUMPS
-	02.2.03.02.1		SUGR #2 (52-1207)	098#	START OR TRIPS AFTER STARTING	PRRIODIC TESTING	RIDART TRACK	INOPERABLLITY OF TRAIN B RECIEC	NORMAL PUSITION PUMP MORMALLY DRY
	02.2.03.02.2	G-458 <sub>,</sub> 	SMCR 82 (52-1807)	CLOSED	TRAIN & RECIEC PUMP STARTS OR FAILS TO TEIP, RESULTING IN OUT OF SEQUENCE BUS LOADING OR (IF PRIOR TO SUBMERGENCE; PUMP DAMAGE	CONTROL MOOR INDICATION	REDUNDANT TRAIN	POTRATIAL LOSS OF TRAIN B BRCIBC PUMP OR BLECTRICAL POURR	FOR BURNALLY DAY
-	02.2.03.01.1	G-45B	27-112 (UV RELAT)	TRIPPED	BUS UV TRIP SRAL-IN TO TRAIN B RECIEC PUMP. TRIPS PUMP IF RUNNING, BLOCKS START IF NOT	CONTROL ROOM INDICATION	BEDUNDANT TRAIN	INOPERABLLITY OF TRAIN B RECIRC PUMPING	
	02.2.01.01.2	G-158	27-112 (UV RBLAT)	UNTRLPPBD	BUS UV TRIP DREBATED TO TRAIN B RECIRC PUMP, CAUSING OUT OF SEQUENCE BUS LOADING IF PUMP	PERIODIC TESTING	REDUNDANT TRAÍN	POTENTIAL LOSS OF TRAIN B BLECTRICAL POWER	M-MARL POSITION
·	02.2.03.04.1	G-458	LSI (SUMP LVL BBLAT)	CONTACTS OPEN	ON AT TIME OF SIS/SISLOP SERVICE WATER COOLING DISABLED TO TRAIN B RECIRC PUMP FOR NORMAL TESTING. NOT REQUIRED	PBRIODIC TESTING	RECUMDANT TRAIN	REDUCED RELIABILITY OF TRAIN B RECIEC PUMPING	
- -	02.2.01.64.2	G-158	LSI (SUMP LVL RBLAT)	CONTACTS CLOSED	WHEN SUBMERGED POST-ACCIDENT SERVICE WATES COOLING AND UNQUALIFIED SV (FV-3077) [SOLATED AFTER PUMP START	PRATODIC TRATING	INTERACTION WITH PUMP CONTROLS		N. MMAL POSITION
	02.2.03.05.1	Ç-1 <u>5B</u>	PV-3077	<b>9</b> Q	LOSS OF SERVICE WATER COOLING TO TRAIN BEREIRC PUMP, FUSES BLOW TO PEOTECT PUMP CONTROLS	PBRIODIC TBSTING	ISOLATION PURBS PREVENT (B)(2) INTREACTION WITH PURP CONTROLS		

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#### RMERGRACY CORE COOLING SYSTEM SINGLE FAILURE AMALYSIS SAM OMOFRE UNIT: 1 TABLE 2-1: COLD LEG RECIRCULATION PMEA

. ITBH # .	DEVICE ID	COMPONENT ID	PAILURE MODE	LOCAL EFFECTS AND DEPENDENT PAILURES	METHOD OF Detection	INUBURNT COMPRUSATIN; Provisions	BEFRET ON BOYS	PENARES
22.2.03.96.1	G:159	SUGR #2 125VOC CONTROL POWER	VOLTS LOV	TRAIN B RECIRC PUMP CANNOT BE STARTED IF OFF OR TRIPPED IF RUMBING	CONTROL ROOM: INDICATION, _ ANNUNCIATION	BROUNDANT IRALN	POTENTIAL LOSS OF TRAIN B RECIEC PUMPING	
92.2.01.01.1.	NOV-4668	YALYB/ACTUATOR		LOSS OF INJECTION MODE CHARGING AND REPUBLING WATER PUMP SUCTION DUE TO GAS SINDING OF COMMON PIPING BY CONTAINMENT PRESSURE	CONTROL SOON INDICATION	NOME FOR INJECTION, CHECK VALUE PREVENTS SACEPLON	PLOSS OF INJECTION MODE CONTAINMENT SPEAT AND CHARGINS AND POTENTIAL LOSS OF RECIST MODE CHARGING DUB TO GAS BINDING OF COMMON SUCTION	POWER LOCK OUT OF MOY-866A AND HOV-8668 REQUIRED PER MRC ICSB-18
02.3.01.01.4	104-1689		_CLOSED	TRAIN B. BBCIBC PUMP CANNOT BB	PRRIODIC TRATING	REDUNDANT TRAIN	PIPING INOPPRABILITY OF TRAIN B RECIRC	MORMAL POSITION
02.2.04.02.1	MOV-866B	MCC-2 (42-1210)	AOTIS FOR	ALIGNED TRAIN B RECIRC PUMP CANNOT BE ALIGNED	CONTROL BOOM ENDICATION	RECUNDANT TRAIN	PUMPING CAPABILITY INOPERABILITY OF TRAIN B RECIRC PUMPING CAPABILITY	
02.2.05.01.1	ROA-1190D	VALVE/ACTUATOR	OPBM .	BUST ALIGNED TO CHARGING PUMP SUCTION. MORNAL FOR INJECTION, CLR AND BLR. SEAL RETURN TO VCT ISOLATED VIA INTERLOCE TO		BACEFLOW DURING MORNAL OPS,	MOME FOR INJECTION, CLR OR MLR. LOSS OF GENOTE-HANVAL CHARGING SUCTION ISOLATION FOR SECONDARY RECIRC	
02.2.05.01.2	10A-1100D	VALVE/ACTUATOR	CLOSEC	CY-410 AND CY-411 1 OF 2 SUCTION VALVES FAILS TO OPEN POR INJECTION, CLE AND NLE. NORMAL FOR SECONDARY	PRRIODIC TESTING	REQUIRED FOR CLR AND HER	REDUCED REDUNDANCY FOR CHARGING	HORMAL POSITION
02.2.05.02.1	10V-1100D	LC-1100BT	AEGN LRVRL	bost-sis/airrob  vcantion of (16 im mumnt) obs no beect on 886 on fom act frabt drring mornut mor-11000 miff not valo-obsm secisc	PERIODIC TRATING	ESDUNDANT VALVE FOR MOSMAL OPS. MOMS REQUIRED FOR INJECTION OR RECIRC	BEDUCED REPUNDANCY FOR CHARGING PUMP SUCTION REALIGNMENT DURING NORMAL OPS. NOWE FOR INJECTION OR FOR RECIRCULATION (IP VALUE IN MANUAL MODE PRIOR TO SEQ 2	
02.1.05.02.2	10V-1100D	LC-1100B1	LOW LEVEL	MOV-1100D WILL AUTO-OPEN (AND NOT AUTO-CLOSE ON RIGH VCT LEVEL) DURING MORNAL OPS. NO	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE BEGIECO POR IMJECTION OR	BEOGRARSEL) BEOGRARSEL BEOGRARSEL BEOGRARSEL	· -
02.2.05.03.1 1	10V-1100D	L9-10 (NOV-1100C)	CONTACTS OPEN	SPECT ON SEQ ACTUATION OR (IF IN MANUAL) POST-SIS/SISLOP MOW-1100D MILL NOT AUTO-CLOSE ON HIGH VCT LEVEL DURING MORHAL OPS. NO SPERCT ON SEQ ACTUATION OR (IF IN MANUAL)		NOWE REQUIRED FOR INJECTION OR	MONE	
02.2.05.01.2 1		(#0A-1196C) F3-10	CONTACTS CLOSED	POST-SIS/SISLOP MOW-1100D WILL AUTO-CLOSE ON BIGH WCT LEWEL BEFORE MOW-1100C IS FULLY OPEN, LUCERASING POTENTIAL FOR LOSS OF SUCTION TO CHARGING PURPS.	PRRIODIC TRATING	BEDUMDANT CONTACTS FROM LC-1100BE	BEBUCED BELIABILITY FOR BOTH CHARGING PUBLIC MORNAL OPERATION	
02.2.05.04.1 M	P) <b>A-†Í00</b> Ô	SBQ 2 (39-1, 3)	OFF (OPBN)	NO BEPECT ON SEQ ACTUATION OR (IF IN MANUAL) POST-SIS/SISLOP MOV-1100D WILL NOT OPEN ON SIS/SISLOP. AUTO-LEVEL AND MANUAL OPERATION UNASFRUTED	PBB19Dic TBSTING	BROUNDANT VALVES FOR INJECTION, MONE REQUIRED FOR RECIRC		VALVE BYMUTE-MANUALLY OPENED PRE PROCEDURE EF AUTO-OFEN FAILS



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#### PMSSSENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONCPRE UNIT 1 TABLE 2-1: COLD LEG RECIRCULATION PREA

itin 1	DEVICE 10	COMPONENT ED	PAILURE MODE	LOCAL RPPECTS AND DRPRNDRMT FAILURES	HETHOD OF	INHERENT COMPENSATING	BOOKS AN ANN	
					DETECTION	PROVISIONS	BAFFECT ON BOOS	BEMARES
02.2.05.01.2 May-		SBQ 2 (39-1, 3)	.ON.(CLOSED)	HOY-1100D AND HOY-1100C  REALICM FOR EWST SUCTION TO  CHARGING PUMPS, CV-410 AND  CY-511 CLOSE		CLE OF BLE. REDUNDANT MANUAL	NOUS FOR INJECTION, CLR OR HLB. LOSS OF REMOTE-HANUAL CHARGING SUCTION REALIGNMENT FOR SECONDARY RECIEC	
02.2.05.05.1 MOV-	11000	SIT (RELAT)	OFF	MOV-1100C WILL NOT CLOSE ON SEQ 2 SIS/SISLOP. NO EFFECT ON MOV-1100B OR D ACTUATION		MOV-11009 (SEQ 1) FOR INJECTION, NOWS REQUIRED FOR	REDUCED REDUNDANCY FOR CHARGING M PURP SUCTION REALIGNMENT (VCT	PRMAL POSITION
02.2.05.05.2 HOV-	11000	SII (RELAT)	08	SEQ AUTO-CLOSE SIGNAL TO MOV-1100C, CAUSING VALVE TO CLOSE AS SOOM AS LIMIT-SWITCH	PERIODIC TESTING		NOMB. VALVES RESPOND NORMALLY TO SEQ INITIATION AND RESET	· <u>— · · </u>
	· · · · · · · · · · · · · · · · · · ·			INTERLOCE SATISFIED BY HOY-11000 OR D. NO BFFECT ON HOY-11000 OR D			<u>.</u>	
02.2.05.06.1 MOV-	11000	LS-5	CONTACTS OPEN	MOV-11000 NOT CLOSED SIGNAL [SOLATES SEAL MATER RETURN TO VCT VIA CV-410. NO REPECT ON	CONTROL ROOM INDICATION	NONE SEGNISED	NOME, DUE TO MORNAL PATH TO SUCTION RETURN	
G2.2.05.05.2 MUV-		<u>L8-5</u>	CONTACTS CLOSED	MOV-1100D OPERATION LOSS OF MOV-1100D INTERLOCE TO CV-410			REDUCED REDUNDANCY FOR SEAL WATER RETURN ISOLATION TO VCT	· · · · · · · · · · · · · · · · · · ·
02.2.05.07.1 MOV-	11000	L\$-6	CONTACTS OPEN	MOV-1100D NOT CLOSED SIGNAL ISOLATES SEAL WATER RETURN TO VCT VIA CV-411. NO EPPECT ON	(SAHS AS 2.2.5.6.1)	(SAMB AS 8.2.5.6.1)	(SAHB AS 2.2.5.6.1)	
-VOM 5.10.20.5.50	11000	F3-6	CONTACTS CLOSED	LOSS OF HOV-1100D INTERLOCE TO	(SAHB AS 2.2.5.6.2)	(SAMB AS 2.2.5.6.2)	(SAME AS 2.2.5.5.2)	
02.2.05.08.1 MOV-	1100D 	L\$-9	CONTACTS CLOSED	VALVE OPEN SIGNAL TO MOV-1100C WILL PREMIT MOV-1100C TO AUTO-CLOSE ON LOW VCT LEVEL OR	PRRIODIC TESTING	LC-1100BE AND SIE BELATS	BEDUCED RELIABILITY FOR BOTH CHARGING PUMPS DURING MORMAL OPERATION	
				SEG SIGNAL (VIA SIE RELAT) BEFORE MOV-1100B OR D FULL OPEN, INCREASING POTENTIAL FOR				
	· · ··	· · · · · · · · · · · · · · · · · · ·		LOSS OF SUCTION TO CHARGING PUMPS. NO SPPECT ON MOV-1100D OPERATION	·			
02.2.05.08.2 MOV-	11000	L3-9	CONTACTS OPEN	FOR OF 1 OF 2 VALVE OPEN	PRRIODIC TESTING		REDUCED REDUNDANCY FOR CHARGING PUMP SUCTION REALIGNMENT	· · · · · · · · · · · · · · · · · · ·
02.2.05.09.1 HOV-	1100D	LS-10	CONTACTS CLUSED	VCT LEVEL AUTO-CLOSE CETS VALVE OPEN SIGNAL TO MOV-1100C WILL PERMIT MOV-1100C TO	PERIODIC TESTING	-	NOME FOR INJECTION OR (IF MOV-1100C PLACED IN MANUAL	
02.2.0£.09.2 MUV		LS-10	CONTACTS OPEN	AUTO-OPBN ON HIGH VCT LEVBL With NO 989 Signal LOSS OP 1 OF 2 VALVE OPBN	PBRIODIC TESTING		PRIOR TO SER BLOCE/RESET) CLR, BLR NOVE	
			•	SIGNALS TO MOV-1100C AUTO-OPEN ON VCT LEVEL				•
02.2.05.10.1 H <sub>2</sub> V-		HCC-2 (42-1299)	VOLTS LOW	MOV-1100D CANNOT BE OPENED SENOTE-MANUALLY OR VIA SIS/SISICP FOR INJECTION, CLR AND HLB, OR CANNOT BE BE-CLOSED REMOTE-MANUALLY F.R.	CONTROL BOOM INDICATION		ESDUCED REDUNDANCY FOR CHARGING FURP SECTION REALIGNMENT	
			• .	SECONDARY RECIRC				

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## EMBAGBNCY CORP COOLING STATEM SINGLE FAILURE AMALTAIS SAN OMOPRE UMIT 1 TABLE 2-1: COLD LEG RECIBEULATION PMEA

ETSH 4	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL BFFECTS AND DEPENDENT PAILURES	MRTHUD OF DRTECTION .	INUSERNT COMPRESATING PROVISIONS	EFFECT ON ECCS	BRAIRES
02.2.06.01.1 G-8	<b>.</b>	PUNP/NOTOR	. LON PLOY	PLOW. RESULTS IN AUTO-START RIGHAL TO REDUNDANT PUMP G-88 ON LOW MEADER PRESSURE	CONTROL ROOM INDICATION, AMMUNICATION, PRRIODIC TESTING	REDUNDANT PUMP/TRAIN	PUMPING FOR CLR AND BLE PRIMART	INCLUDES AUT L.O. PUMP AND FAN COOLER. CHARGING PLOW NOT CREDITED FOR INJECTION
02.2.06.02.1 G-8	A	BUS #2C [152-12C01]	OPRN	OR PAILS TO START ON	CONTROL BOOK INDICATION, PERIODIC TESTING	REDUMBANT PUMP/TRAIN	INOPERABILITY OF TRAIN B PUNPING FOR CLR AND BLR PRIMARY	
02.2.06.02.2 G-8		BUB #2C [152-12C01]	CLOSED	SIS/SISLOP IF SELECTED TRAIN B PUMP STARTS OR FAILS TO TRIP ON SIS/SISLOP IF SELECTED. HOV-1100C UNAPPECTED	CONTROL BOOM INDICATION, PRRIODIC TESTING	MOV-1100C CLOSES AS REQUIRED	PATH POTENTIAL OPERATION OF 2 CHARGING PUMPS BURING INJECTION	
	· · · · · · · · · · · · · · · · · · ·				··· · · · · · · · · · · · · · · · · ·	- · · · · · · · · · · · · · · · · · · ·		MOV-1100C POWER TO SAME TRAIN AS CHARGING PUMP SELECTED TO START, WITH OTHER TRAIN CHARGING PUMP TRIPPED AND LOCKED OUT ON SIS/SISLOP
	4			TRAIN B CHARGING PUBP AUTO-START BHABLED ON LOW DISCHARGE BRADER PRESSURE WITH GAB OFF. NO REPRICT ON SEQ ACTUATION BUT PURP HAT START ON SEQ BLOCK/RESET WITH	PERIODIC TESTING	(SAHB A9 2.2.6.2.2)	(SAHB AS 2.2.6.2.2)	
02.2.06.01.2 G-8	A	162 TDC (152-11C07)		PIC-1111 BQ PAILURE TRAIN B CHARGING PUMP AUTO-START ON LOW DISCHARGE NRADRE PRESSURE DISABLED. NO	FSREODIC TRAFING	NOME ENSOIDED	NONE	
02.2.06.04.1 G-8		186 [152-11001]:		RPPECT ON SEQ ACTUATION TRAIN B CRARGING PUMP AUTO-STARTS, CANNOT BE MANUALLY TRIPPED APTER PUMP LOCE-OUT BESST. NO EFFECT ON	CONTROL ROOM INDICATION, PERIODIC TESTING	CERTUPES SHOW		RBLAY 74-1 SBALS IN TR SIGNAL TO DR-SBLBCTED PUMP APTER SBQ BLOCE/RBSRT
02.2.06.04.2 G-8	· · · · · · · · · · · · · · · · · · ·	186 (152-11007)		SEQ ACTUATION TRAIN B CRARGING PUMP AUTO-START ON TRAIN A PUMP BLECTRICAL FAULT DISABLED. NO	(9AME AS 2.2.6.3.2)	(SAND AS 2.2.6.3.2)	(SAME AS 2.2.6.3.2)	
02.2.06.05.1 G-8		LC-110081	BIGB	REPECT ON SEQ ACTUATION LO-LO-LO VCT LEVEL TRIP OF TRAIN & CHARGING PUMP DISABLED		NOME REQUIRED FOR INJECTION, CLE OR MLR	<del></del>	LO-LO-LO TRIP CREDITED FOR APPENDIE & FIRE SCRNARIOS
02.2.06.05.2 G-8		LC-1100BI	FOR	LO-LO-LO VCT LEVEL TRIP OF TRAIN B CHARGING PUMP	CONTROL BOOM INDICATION	REDUNDANT TRAIN POR INJECTION, OVERBEIDS SWITCH FOR RECIEC		
02,2,06.05.3 G-8		LC-110031		LO-LO-LO VCT LEVEL TRIP OP TRAIM B CHARGING PUMP	CONTROL BOOM INDICATION	OVERRIDE SWITCH	MANUAL OPERATION OF OVERRIDE SWITCE	

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#### EMBRICENTY CORE COOLING BYSIGH SINCLE FAILURE ANALYSIS SAN CHOFRE UNIT 1 TABLE Z-1: COLD LEG RECIRCULATION FMEA

	ITBS (	DRAICR ID	COMPONENT ID	PAILURE MODE	DEPENDENT FAILURES	METHOD OF DRIBECTION	INSERRAT COMPENSATING PROVISIONS	BPERCT ON BUCS	BENARES
	02.2.06.06.1 G	11	_ 194:5		TRAIN B CHARGING PUMP (AND. OTHER TRAIN B 4 by LOADS) TRIP APTER 11.5 SEC, CANNOT BS _BESTARTED (RELET DORS NOT RESET), OR RESTART DELATED BY	ANNUNCIATION	RRDUNGANT TRAIN	PUMPING FOR CLR AND BLB PRIMARY	UV RELAY TRIP DORS MOT OCCUR.  DURING SISLOP IF DC  RB-RHSRGIZES BUS WITHIN 10 SEC  SAPETY ANALYSIS LINITS
	02.2.06.06.2 G		194-5 (RSLAT)		35 SEC (RELAY RESETS) TRAIN & CHARGING PUMP (AND OTHER TRAIN B 4 by LOADS) WILL NOT TRIP ON BUS UNDERVOLTAGE BURING NORMAL OPPRATION. NO		NONE BEGNIESD	NCNS	· · · · · · · · · · · · · · · · · · ·
					APPACT ON SAG ACTUATION OR LOAD SEQUENCING DUB TO SPRABATA SISLOP TRIP SIGNAL TO	-			
	02.2.06.07.1 G-		89-1 	BUS 82C (CONTACTS OPEN)	TRAIN B CHARGING PUMP/MOV-1100C SELECTION. NO		MAA-1100C CTORES TO 85601EBD	CHARGING PURPS DURING INSECTION  CHARGING PURPS DURING INSECTION	•
	02.2.06.07.2 G-				REFECT ON TRAIN A PUMP OR MOV-1100C REQ ACTUATION TRAIN B CHARGING PUMP WILL TRIP ON RESTAURTED. MORBAL FOR TRAIN A CHARGING	SESTING SUBABILITANCE AND		MODE CHARGING CAPABILITY IF TRAIN B PRESELECTED ON 83	CHARGING NOT CREDITED DUBING INJECTION: SELECTOR SWITCH POSITIONS ADMINISTRATIVELY
	02.2.06.00.1 G-		88Q 2 (28-1, 3)	OFF (CONTACTS OPEN)	PUMP/NOV-1100C SBLBCTION. NO BPPECT ON TRAIN A PUMP OR MOV-1100C SBQ ACTUATION TRAIN B CHARGING PUMP WILL NOT START ON SIS/SISLOP	PRRIODIC TESTING	MONE REQUIRED FOR INJECTION, MANUAL CONTROL AFTER SEQ	LOSS OF AUTOMATIC INJECTION	CONTROLLED CHARGING NOT CREDITED DURING INJECTION
	02.2.06.08.2 G-	84		ON [CONTACTS CLOSED]	TRAIN & CHARGING PUMP START SIGNAL. MAT CAUSE OUT-09-SEQUENCE PUMP LOADING	CONTROL ROOM INDICATION, PERIODIC TESTING	BLOCE/RESET FOR CLR AND HLR  REDUNDANT TRAIN FOR SISLOP WITH TRAIN B SELECTED, NONE REQUIRED FOR SIS OR TRAIN A	TRAIN B SELECTED ON 33 (MOV-1100C) AND 35-1 (G-88) INOPERABILITY OF TRAIN B FOR SISLOP. NO BEFECT IF SIS OR TRAIN A SELECTED	
					ON SISLOP IF TRAIN B SELECTED. TRIP ON SIS/SISLOP VIA SEPARATE SEQ CONTACTS AND SS-2 (IF TRAIN A SELECTED) NOT		SELECTION .		
	02.2.06.09.1 G-		SEQ 2 (29-1, 3)	OFF (CONTACTS OPEN)	AFFECTED TRAIN & CHARGING PUMP WILL NOT TRIP ON SIS/SISLOP, NORMA FOR TRAIN & CHARGING		HOV-1100C CLOSES AS REQUIRED	PUTRNTIAL OPERATION OF 2 CHARGING PUMPS BURING INJECTION	
. <u>-</u> .	02.2.06.09.2 G-		SHQ 2 (29-1, 1)	ON (CONTACTS CLOSED)	PURP/HOV-1100C SELECTION. NO BFFECT ON TRAIN A PUMP OR MOV-1100C SEQ ACTUATION TRAIN B CHARGING PUMP WILL TRIP IF TRAIN A SELECTED ON SS-2. NO BFFECT ON TRAIN A	CONTROL ROCH INDICATION, PRRIODIC TESTING	NOME BEQUIEED FOR INJECTION,		
i į					PUNP OR MOV-1100C SEQ			(B)7-1100C) AND Si-1 (G-88)	



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ITEM &	DRAICE ID	COMPONENT ID	FAILURE HODE	LOCAL EFFECTS AND DEPENDENT FAILURES	DETECTION METHOD OF	IMABRENT COMPENSATING PROVISIONS	RPFECT ON BCCS	REMARES
02.2.06.10.1 <u>G</u> -	· · · · · · · · · · · · · · · · · · ·			TRAIN A CHARGING PUMP AUTO-START RMARLED ON LOW DISCRARGE BRADES PRESSURE WITH G-SA OFF. NO. SFFECT. ON \$89	PRECODIC TESTING	MOA-1100C CF0383 V3 B5801880	POTENTIAL OPERATION OF 2 CHARGING PUMPS DURING INJECTION	
02.2.06.10.2 G-		162 TDC	077	ACTUATION OF EITERS PUMP, BUT G-88 MAY START ON SEQ BLOCK/RESET WITH PIC-LIII EQ PAILURS TRAIN A CRARGING PUMP	PRRIODIC TRATING	NONS BEGNIEED	NONE	
02.2.06.11.1 G-1		(152-12C01) 186	ON	AUTO-START BISABLED ON LOW BISCHARGE MEADER PRESSURE. NO EPPECT ON SEQ ACTUATION OF EITHER PUMP. TRAIN B CRARGING PUMP LOCERD	CONTROL ROOM INDICATION	ESDUMDANT TRAIN	LOSS OF TRAIN B CHARGING PUMP	
02.2.06.11.2 G-I	<del></del>	(152-12C07)	OFF	OUT, TRAIN A PUMP AUTO-STARTS AND CANNOT BE TRIPPED AFTER SEQ BLOCK RESET	PERIODIC TRATING	SEDUMDANT TRAIN	CAPABILITY FOR IMJECTION, CLE AND MLE  REDUCED RELIABILITY FOR TRAIN 8	· · · · · · · · · · · · · · · · ·
02.2.06.12.1 G-		(152-12C07) HCC-2A (42-12A16)	VÕLTS LOV	POR C-SA PAULTS TRAIN & MOTOR-DRIVEN LURE OIL PUMP WILL NOT START ON LOW BRARING PRESSURE WITH PUMP		NONE SEGUISED	BLECTRICAL STSTEM BONE	BOUNDS EQ FAILURE OF LUBE OIL PUMP MOTOR. MOTOR-DRIVEN LUBE OIL PUMP NOT CERDITED IN LIBU
02.2.06.13.1 G-4	A	MCC-ZA (42-12A14)	NOTES FOR	RUMNING TRAIN B LUBB OIL PAN COOLER WILL NOT START ON SIGLOP WITH PUMP BUNNING	PRRIODIC TRATING	NONE EEGNIESD	NONE	OF SHAFT-DRIVEN PUMP BOUNDS BQ PAILURE OF FAN MOTOR. LURE OIL FAN COOLES NOT CREDITED IN LIEU OF
02.2.06.14.1 G-4		BUS \$2C 125VDC CONTROL POWER	<u> </u>	BE STARTED IF OFF OR TRIPPED IF RUNKING	CONTROL BOOM INDICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B CHARGING PUMP FOR INJECTION, CLB AND HLS	SHAPT-DRIVEW PUMP
02.2.06.15.1 G-4		(A491) VALVE/ACTUATOR		TRAIN B CHARGING PUMP WILL NOT START ON SIS/SISLOP I OF 2 FILTER BIPASS PATHS ALIGNED FOR CLR	PERIODIC SURVELLANCE CONTROL BOOM INDICATION, PERIODIC TESTING	NOME REQUIRED	(SAME AS 2.1.6.1.4.1) NOWE	
02.2.01.01.2 HOV		WALVE/ACTUATOR  MCC-2  [42-1294]	CLOSED VOLTS LOW	I OP 2 PILTER BYPASS PATHS DISABLED FOR CLR MOV-18 PAILS AS-15	CONTROL ROOM INDICATION, PERIODIC TESTING CONTROL ROOM INDICATION	BEDUNDAN ANTAB (NOA-13) BEDUNDAN ANTAB (NOA-13)	REDUCED REDUNDANCY FOR CLR DISCHARGE FLOW PATH REDUCED REDUNDANCY FOR COLD LEG REDUCED REDUNDANCY FOR COLD LEG RECIRCULATION DISCHARGE FLOW	
52.2.98.01.1 N9V	· <b>i</b> si <u>-</u>	VALVE/ACTUATOR	OPRN	1 OF 3 CLR PATHS ALIGNED TO BCS, CAMMOT BE RECLOSED TO ISOLATE PCV-11158/E IP	CONTROL BOOM INDICATION	NOME SEQUIRED FOR CLE	PATS IF FAILURE PRIOR TO REALIGNMENT WOME FOR CLR ALIGNMENT	*MOT ACCEPTABLE FOR (MIRCTION MITH CONCURRENT FAILURE OF CHARGING (RG. DUE TO
•			·	REQUIRED				HOV-1100C). TECH SPEC ACTION BYTET REQUIREM QUIENCE SPEC HOLD SECURITY OF THE



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## BHRRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALTHIS SAN ONOPRE UNIT 1 TABLE 2-1: COLD LEG RECIRCULATION PREA

1 KST1	DBAICB ID	COMPONENT ED	FAILURE MODE	LOCAL BFFBCTS AND DRPBNDBNT FAILURBS	MATHOD OF Datection	INSERBUT COMPRESSITING PROVISIONS	REFERENT ON RECES	RBHARES
	•		CLOSED	1 OF 1 CLB PATHS TO BCS LOOPS DISABLED	PERIODIC TESTING	REDUNDANT FLOW PATHS TO BCS LOOPS A AND C	LOSS OF BCS LOOP B CLB FLOW	FLOW VIA SHAL INJECTION TO RCP IN APPROTED LOOP NOT CREDITED
02.2.08.02.1	HOV-357	#CC-2 112-1213)	VOLTS LOW	BOY-357 CANNOT BE BEPOSITIONED, RESULTING IN POTENTIAL LOSS OF 1 OF 3 CLR PATHS (IF CLOSED) OR INABILITY TO ISOLATE FCY-1115B/E (IF	CONTROL ROOM INDICATION	REDUNDANT PLOW PATHS TO RCS LOOPS A AND C FOR CLR	POTENTIAL LOSS OF CLB PLOW PATE TO BCS LOOP B	
02.3.01.01.1	MQV-358	VALVE/ACTUATOR	OP\$N	OPEN) 1 OF 1 CLE PATHS ALIGHED TO BCS, CANNOT BE RECLOSED TO	CONTROL ROOM INDICATION	VICENSEMANT VOMB BESTATERED LOS CUE	NOME FOR CLE ALIGNMENT	INOT ACCEPTABLE FOR INJECTION WITH CONCURRENT PAILURE OF
<del>.</del>				ISOLATE PCV-1115C/F 19 BEQUIRED	<del></del>			CHARGING (EC. DUE TO MOV-1100C). TRCH SPRC ACTION ENTRY BRQUIRRO WITH VALVE OPEN
02.3.01.01.2	HOA-328	VALVE/ACTUATOR	CLOSED	I OF 3 CLE PATES TO BCS LOOPS DISABLED	CONTROL BOOM INDICATION, PRRIODIC TRATING	REDUNDANT FLOW PATHS TO RCS	LOSS OF RCS LOOP C CLR PLON	DURING MORMAL OPERATION PLOW VIA SHAL IMJECTION TO RCP IM APPROTED LOOP NOT CREDITED
02.3.01.02.1	MOV-358	UPS	VOLTS LOW	HOV-358 CLANOT BE REPOSITIONED, RESULTING IN POTENTIAL LOSS OF 1 OF 3 CLE PATES (IF CLOSED) OR INSELLET TO ISOLATE PCV-1115C/F (IF	CONTROL BOOM INDICATION	BEDUNDANT FLOW PATHS TO RCS LOOPS A AND B FOR CLB	POTENTIAL LOSS OF CLE PLOW PATH TO BCS LOOP C	
Gz.3.01.53.1	HOV - 358	HCC-3 (8-1391)	VOLTS LOW	OPEN) CAUSES LOSS OF UPS APTER 130 HIN. HOV-158 CANNOT BE REPOSITIONED, RESULTING IN POTENTIAL LOSS OF 1 OF 3 CLE PATES (IF CLOSED) OR INABILITY TO ISOLATE FCY-1115C/F (IF	CONTROL BOOM INDICATION	REDUNDANT FLOW PATHS TO BES LOOPS A AND B FOR CLR	POTENTIAL LOSS OF CLR PLOW PATH TO BCS LOOP C	
	MANUAL VALVES, COMMON FLOW		KB90	NONB Oben)	PRRIODIC SURVEILLANCE	MORE RESOURED	NONE	INGLUDES: CRS-316, -425, VCC-343, -344, RCP-315, -316,
	MANUAL VALVES, CONHON PLON		CLOSED	ISOLATION OF MINIPLOW FOR BOTH CHARGING PUMPS, OR LOW PLOW CLE CONTROL (PCV-1)(\$4, B OR C)	PERIODIC SUBVEILLANCE	NONE	LOSS OF CHARGING PUMP CAPABILITY FOR CLR AND BLR	-317, -318, -360, -362 VCC-343 AND -344 MUST BB LOCEED OPBN
02.4.01.02.1	CHRCE VALVES,		NOME (PASSIVE)	-	PERIODIC SURVEILLANCE			INCLUBES: VCC-188
02.4.01.03.1	MANUAL VALVES, COMMON BOUNDARY		OPEN	DIVERSION OF BOTH TRAINS OF PUMP FLOW AND, FOR OUTSIDE CONTAINMENT VALUES WHICH ARE NOT LOCEED CLOSED OR PROVIDED WITH SE BACEUPS, LOSS OF RECIRC/RUST INVENTOR!	PRRIODIC SURVEILLANCE	SEE TABLE 2-2 FOW DETAILED BOUNDARY VALVE AMALTSIS	POTSMTIAL LOSS OF BOTH TRAINS OF CLE, HLE AND SPRAT DUE TO UNISOLABLE LÖSS ÖF INVENTÖRY THROUGH OUTSIDE CONTAINMENT VALVES WHICH ARE NOT LOCEBD CLÖSED OR PROVÍDED WITH 39 BACEUPS	ISBB TABLE 2-2 POB DETAILED BOUNDARY VALVE ANALYSIS. BECIEC BOUNDARY VALVES NOT SBAT LEAR TESTED AS PART OF BECIEC SYSTEM LEARAGE HONITORING PROGREE
	MANUAL VALVBS. Commun Boundary		CLOSSD	EMON	PRRIODIC SURVEILLANCE	MOME REQUERED	NONB	•



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NECTRODICATION FOR LIBERTAL MEDB.

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#### EMBRGBNCY CORB COOLING SYSTEM SINGLE PAILURE ANALTHIS SAM OMOFER UNIT 1 TABLE 2-1: COLD LEG RECIRCULATION FMRA

LOCAL BPPECTS AND NETHOD OF INHERBET COMPRESATING ONENT ID PAILURE MODE DEPENDENT PAILURES DETECTION PROVISIONS REFECT ON SCCS REMARES itin t DRVICE ID COMPONENT ID ORAL CERCE AND RELIEF MORNAL (PASSIVE) PARTIAL DIVERSION OF CHARGING PREIODIC SURVEILLANCE REDUNDANT TRAINS FOR FLOW PLOSS OF INVENTORY NOT INCLUDED 1888 TABLE 2-2 FOR DETAILED VALVES, COMMON PUMP AND CLR PLOW TO VCT AND RATE, MONE FOR ENVENTORY IN RUST CALCULATION BOUNDARY VALVE ANALYSIS. ROUNDARY BCDT VIA RV-289 AND RV-2004 RECIEC SOUNDARY VALVES NOT SEAT LEAR TESTED AS PART OF RECIRC SYSTEM LEAGAGE MCMITORING PROGRAM 92.4.02.01.1 HOV-883 VALVE/ACTUATOR OPEN HORBAL FOR INJECTION, LOSS OF PERIODIC TESTING REDUNDANT CHECK VALVE REQUIRED REPUMPANCY FOR IREPUMPANT CHECK VALVE NOT BEHOTE-MANUAL BOUNDARY (CR3-301) ISOLATION OF RUST FROM LEAR TESTED AS PART OF RECIEC ISOLATION FOR RECIRCULATION RECIRCULATED SUMP WATER SYSTEM LEAGAGE MUNITORING PROGRAB ..... 02.4.02.01.2 HOV-883 VALVE/ACTUATOR CLOSED NORMAL FOR RECIRC. LOSS OF CONTROL ROOM INDICATION POWER LOCE OUT BY REDUNDANT NOT APPLICABLE, PAILURE INJECTION MODE SUCTION TO BOTH CONTROL SWITCHES AND PRECLUDED BY POWER LOCK-OUT CONTACTORS PRO MRC BRANCH ABPUBLING NATER PUMPS AND CHARGING PUMPS TECHNICAL POSITION ICSB-18 RMS-2054 CONTACTS OPEN 02.4.02.02.1 MOV-883 PRRIODIC TESTING (SANR AS 2.4.2.1.1) HOV-883 CONTROL CIRCUIT (SAHE AS 2.4.2.1.1) DISABLED, CAUSING LOSS OF REMOTE-MANUAL BOUNDARY ISOLATION CAPABILITY FOR RECIRCULATION CONTROL ROOM INDICATION REDUNDANT SWITCH RMS-2047 REDUNDANCY AGAINST RMS-2054 02.4.02.02.2 MOV-883 CONTACTS CLOSED HOV-833 CONTROL CIRCUIT. INCLUDING RMS-2041. RMABLED SPURIOUS VALVE CLOSURE VALVE ACTUATOR SCRIVES OPEN PSRIODIC TESTING (SARR AS 2.4.2.1.1) (SARR AS 2.4.2.1.1) (SARR AS 2.4.2.1.1) 42.4.02.01.1 HOV:483 \_\_\_\_\_ RHS-2241 OPEN (CONTACTS B/C SIGNAL AS SOON AS CONTROL CLOSEDI CIRCUIT BHABLED BY RMS-2054. CANNOT BE CLOSED REMOTE-NAMUALLY FOR RECIEC BOUNDARY ISOLATION VALVE ACTUATOR RECEIVED CLOSE PERIODIC TESTING REDUNDANT SWITCH RMS-2054 REDUNDANCY ACAIMST 82.4.02.03.2 HOV-883 RMS-2047 CLOSE ICONTACTS R/P SIGNAL AS SOON AS CONTROL REPUBLIOUS VALVE CLOSURE CLOSEDI CIRCUIT RHABLED BY RMS-2054. AND CANNOT BE REOPENED BENOTE-HANUALLY 02.4.02.04.1 MOV-883 AZCC OR AZCCA OFF (CONTACTOR OPEN) VALVE CANNOT BE CONTROL ROOM INDICATION REDUNDANT CHRCE VALVE REDUCED REDUNDANCY FOR SCHECK VALVE NOT LEAK TRATED (CRS-301) · (CONTACTORS) REMOTE-MANUALLY CLOSED FOR ISOLATION OF RUST FROM AS PART OF RECIRC SYSTEM LEARAGE BINITORING PROGRAM RECIRCULATION RECIRCULATED SUMP WATER C2.4.02.04.2 MOV-883 1 OF 2 REDUNDANT CONTACTORS PREIODIC TESTING 12CC OR 42CCA ON (CONTACTOR REDUNDANT CLOSE CONTACTOR REDUCED REDUNDANCY AGAINST \*VERIFICATION MERDED THAT SPURIOUS VALVE CLOSURE (CONTACTORS) CLOSED CLOSE IN VALVE CLOSE CET. BRISTING SURVEILLANCES WOULD REDUCING CLOSE LOGIC TO 1/1 ON DETECT THIS FAILURE RENAINING CONTACTOR 02.4.02.05.1 MOV-883 WOLTS LOW VALVE CANNOT BE CONTROL ROCH INDICATION REDUNDANT CHECK VALVE REDUCED REDUNDANCY FOR \*CHECK VALVE NOT LEAK TESTED (CRS-301) ISOLATION OF RAST FROM AS PART OF RECIRC SYSTEM 142-13961 REMOTE-HANUALLY CLOSED FOR LBAKAGE MONITORING PROGRAM RECIRCULATION RECIRCULATED SUMP WATER NONS FOR SBLOCA. REDUNDANT 02.4.03.01.1 HJV-1100C VCT CANNOT BE ISOLATED ON PRRIODIC TRETING POTRNTIAL LOSS OF BOTH \*BPFRCT OF GAS BINCING IN VALVE/ACTUATOR OPEN CHECK VALVE AND CHARGING PUMP CHARGING PUMPS FOR PORTION OF COMMON SUCTION LINE LOW-LOW LEVEL OR POR FOR CLR AND MLR IN LBLOCA. RECIRCULATION IN SBLOCA IP TO REDUNDANT CHARGING PUMP HAS INJECTION, RESULTING IN GAS CHARGING NOT CREDITED FOR BINDING/LOSS OF PRS-SELECTED SECOND CHARGING PUMP NOT BEEN VERIFIEC FOR INJECTION IN LBLOCA, HILE OR AUT)-STARTS BEFORE SIS/SISLOP. SUBSEQUENT RECISE BY TEST OR CHARGING PUMP AND PORTION OF COMMON SUCTION PIPING LOSS OF CHARGING CAPABILITY ANALYSIS DONERG ENJECTION AND ONE CHARGEST PUMP DOWLING

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1T2H #	DEVICE ID	COMPONENT ID	FAILURE HODE	LOCAL REPRECTS AND DREPRIGENT PAILURES	SO DENTAN	· PROVISIONS - PROVISIONS	EFFSCT ON BCCS	REMARES
_02:4:43:01:2:	MOX-1100C .	<u>Nalyszactuato</u> s	CLOSEC	YCT 13QLATED DURING NORMAL OPERATION REQUIRED POSITION POST-813/413LOP	CONTROL ROOM INDICATION	MOV-11008 AND D BIPASS PCV-5051 PREVENTS SUCTION LOSS	LOSS OF SEISHIC CATEGORY A SUCTION TO BOTH CHARGING PUMPS PRIOR TO SISYSISLOP	FFCY-5051 CONTROL SYSTEM AND MITROGRM SUPPLY ARE MSRFP
<u>02.4.</u> 93.92. <u>1.</u>	HQV-1100C	(RELAT)	TIEN FUARF	MOV-1100C WILL NOT AUTO-CLOSE ON LOW WCT LEVEL DURING NORMAL OPS. NO RPPECT ON SEQ ACTUATION OR (IP IM MANUAL)	. EBBIQDIC. TBSTLUG	LO-LO-LO TRIP OF TRAIN B CRARGING PUMP (G-RA) PREVENTS LOSS OF ROTH PUMPS DUB TO CAVITATION / GAS BINDING		. NOL BOLD TO-FO-FO LBIL IS
02.4.03.02.2	MOA-1100C	LC-1100BE	FOA FRASE	POST-SIS/SISLOP  ON SIGN VCT LEVEL AND MAT  CLOSE SPURIOUSLY DURING MORMAL		REDUNDANT CONTACTS PROM MOV-1100D AND MOV-1100D DURING MORNAL OPS, NONE REQUIRED FOR		···
				OPS. NO REPECT ON SEQ ACTUATION OR (IF IN MANUAL) POST-SIS/SISLOP		INTECTION OF BECIEC	INJECTION OF RECIRCULATION IP PLACED IN MANUAL MODE PRIOR TO SEQ BLOCK/RESET	
02.4.01.03.1	<del></del>	(#0A-1100B) Ta-8	CONTACTS OPEN	ACL FOR FRARF VALO-CFORE CELA  FOR FARE VALO-CFORE CELA	PRRIODIC TESTING	REDUNDANT CONTACTS FROM	REDUCED RELIABILITY FOR MOV-1100C AUTO-CLOSURE DURING DURING TO STREET OF AND FOR STREET OF THE PROPERTY OF T	
02.4.03.03.2 (		(80A-11009) T3-8	CONTACTS CLOSSD	INTERLOCE DEPEATED. HOV-1100C WILL AUTO-CLOSE CONCURRENTLY WITE MOV-1100S AND MOV-1100D OPENING ON LOW YCT LEVEL OR	PBRIODIC TESTING	BROUNDANT CONTACTS FROM SIR BREAT AND LC-1100BI	RBBUCED RELIABILITY FOR BOTH CHASGING PUMPS DUBING NORMAL OPS	
02.4.03.04.1	MOV-1100C	L3-9	CONTACTS OPEN	\$13/8[8LOP	(SAME AS 2.4.3.3.1)	REDUNDANT CONTACTS FROM	(SAMS AS 2.4.3.3.1)	
02.4.01.04.2 1		(MON-1100D)	CONTACTS CLOSED	(SAHE AS 2.4.3.3.2)		80011-VOH (2.1.2.4.3 ZA BMAE)		•
02.4.03.05.1		(HOA-1100B)	CONTACTS OPEN	1 OF 2 INTERLOCE CONTACTS DISABLED TO MOV-1100C	PERIODIC TESTING	MONE REQUIRED	(SAME AS 2.4.3.3.21 NOWB	
		_1	— · — · · · · · · · · · · · · · · · · ·	AUTO-OPEN VCT BIGN LEVEL CET. NO EPPECT ON SEQ OR AUTO-CLOSE CETS			· · · · · · · · · · · · · · · · · · ·	
02.4.03.05.2	MOA-1100C	(NOA-1100B) F2-10	CONTACTS CLOSED	INTERLOCE DEPEATED. MOV-1100C WILL AUTO-OPEN ON RIGH VCT LEVEL CONCURRENTLY WITH	PERIODIC TESTING	LS-9 AND LS-10 INTERLOCES TO MOV-1100B AND MOV-1100D PREVENT CONCURRENT CLOSURE	REDUCED REDUNDANCE AGAINST LOSS OF CHARGING PUMP SUCTION DURING NORMAL OPERATIONS	
	•			MOV-1100B/D CLOSE SIGNAL DURING MORMAL OPS. NO SPEECT ON SEQ ACTUATION				
02.4.03.06.1 1	HOA - 1100C	LS-10 (MOV-1100D)	CONTACTS OPEN	(SANE AS 2.4.3.5.1)	(SANE AS 2.4.3.5.1)	(SAME AS 2.4.3.5.1)	(SAME AS 2.4.3.5.1)	
2.4.01.06.2	MOA-1100C	LS-10	CONTACTS CLOSED .	(SANR AS 2.4.3.5.2)	(SAME AS 2.4.3.5.2)	[S.E.S.E. BRAE]	(SAME AS 2.4.3.5.2)	
	HOA-1100G	3(1 (MON-1100B)	OM	MOV-1100B AUTO-OPRNS THEN MOV-1100C AUTO-CLOSES, REALIGNING CHARGING PUMP	CONTROL ROOM EMBECATION	CLE OR BLR. BEDUNDANT MANUAL	REMOTS MANUAL CHANGING SECTION REALIGNMENT DISASED FOR SECONDARY RECERC	
02.4.01.07.2 #	H9A-1100C	S(X (MOV-1100B)	OPF	SUCTION TO BUST  HOW-11008 AUTO-OPEN AND  HOW-1100C AUTO-CLOSB ON SEQ 1 513/513LOP DISABLED. 3EQ 2  AUTO-OPEN OF HOW-1100D AND  AUTO-CLOSB OF HOW-1100D?	PBB10DIC TESTING	REDUNDANT VALVE (MOV-1100D)	BSSUCED REDUNDANCY FOR CHARGING FUND SUCTION REALLIGHMENT	

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## EMBLIBNCY CORB COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM ONOFFE UNIT 1 TABLE 2-1: COLD LBG RECIRCULATION FMEA

. LIBB 4	DEVICE 10	COMPONENT ED	PAILURE MODE	LOCAL RPPRCTS AND DRPENDENT PAILURES	METHOD OF DETECTION	PROVISIONS  THERENT COMPRESATING	EFFECT ON BCCS	REMARKS
02.4.03.03.1	HÁA-1100C	(MOA-1160D) 811	<u> 01 </u>	HOV-1100D AUTO-OPENS THEN HOV-1100C AUTO-CLOSES, BEALIGHING CHARGING PUMP	(SAHB AS 2.4.3.7.1)	(SAME AS 2.4.3.7.1)	ISAMB AS 2.4.2.7.1)	
02.4.03.08.2	HOV-1100C	(HOA-1160D)	019	SUCTION TO BUST NOV-1100D AUTO-OPEN AND NOV-1100C AUTO-CLOSE ON SEQ 2 STS/SISLOP DISABLED. NO SPEECT	(SAHE AS 2.4.3.7.2)	(SABB AS 2.4.3.7.2)	(SAMB AS 2.4.3.1.2)	
02.4.01.09.1	NOV-1100C		MCC-1 CONTACTS	STATE A PORTE SPINCTED FOR ON SEC 1	CONTROL ROOM INDICATION	NOME ERQUIERD FOR QUE AIC	NOME IP DUS ATC CHARGING PUNP	MULTIPLE FAILURE SCRWARTO
		(POWER SEL. SW.)		HOW-1180C. NORMAL FOR BUS BIC (TRAIN A) CHARGING PUMP PRE-SELECTION		CHARGING PUMP PRE-SELECTION. ADMINISTRATIVE CONTROL PRECLUDES CEOSS-TRAIN	PRE-SELECTION. POTENTIAL LOSS OF BOTH TRAINS OF CHARJING FOR CLE AND BLE IF CROSS TRAIN ALIGNED AND LOSS OF ONE TRAIN	(ADMIN CONTROL PLUS POWER
02.4.03.09.2	HOA-1300C	SS (POWER SEL. SW.)	BCC-24 CONTACTS	TRAIN B POWER BREECTED FOR MON-1100C. NORMAL FOR BUS 82C	CONTROL BOOM INDICATION	ALIGHMENT  MONE BEQUIEED FOR BUS 420  CBARGING PUMP PRE-SELECTION.	OP POWER OCCURS  NONE (P BUS 12C CHARGING PUMP  PRS-SELECTION. POTENTIAL LOSS	(ADMIN CONTROL PLUS POWER
				(TRAIN B) CHARGING PUMP PRÉ-IRLECTION	<u> </u>	ADMINISTRATIVE CONTROL PRECLUDES CROSS-TRAIN ALIGNMENT	OF BOTH TRAINS OF CHARGING FOR CLR AND BER TF CROSS TRAIN ALIGNED AND LOSS OF ONE TRAIN OF POWER OCCURS	PAILURES) IS OUTSIDE DESIGN BASIS
02.4.03.09.3	MOA-1100C	SS (POWER SEL. SW.)	CONTACTS OPEN (OR OPP)	CONTROL POWER, RESULTING IN GAS SINDING OF PRE-SELECTED	CONTROL BOOM INDICATION	NONE FOR INJECTION, REDUNDANT CHECK VALVE AND CHARGIN'S PUMP FOR CLR AND BLR		DEFFECT OF GAS-BINDING IN PORTION OF COMMON SUCTION PIPING ON RECIRC OPERATION OF
02.4.01.03.4	MOV-1100C	85 (POURR SEL. SW.	CONTACTS SHORTED	Charging Pump and Portion of Common Suction Piping How-1100c Power Selection Carnot be Charged bur to relat	CONTROL BOOM INDICATION, PREIODIC TESTING	(SAMB AS 8.4.3.9.1 AND 2.4.3.9.1	(SAME AS 2.4.3.9.1 AND	REDUNDANT CRARGING PUMP 449 NOT BERN VERIFIED
02.4.03.09.5	MOV-1100C	39 (PÕNER SEL. SW.	CONTACTS GROUNDED	LOSS OF BOTH TRAINS OF POWER TO NOV-1108C VIA OVERCURRENT	CONTROL ROCH INDICATION,	(SAME AS 2.4.3.9.3)	(SAME AS 2.4.3.9.3)	*(SAMB AS 2.4.3.9.3) BOUNDS SBORT IN RELATS 83-1 OR 83-2
02.4.01.10.1	HOV-1100C	4)-) (RELAT)	ON (CONTACTS OPEN)	TRIP OF BREES 8-1198 AND 42-12476 (\$446 AS 2.473.9.2)	(SAME AS 2.4.3.5.2)	[SANE A3 2.4.3.5.2]	(SANR AS 2.3.3.5.2)	•
02.4.03.10.2		\$3-1 (\$\$LAY) \$3-2	OPP (CONTACTS CLOSED) ON	TRAIN B POWER CANNOT BE SELECTED FOR MOV-1100C (SAME AS 2.4.3.5.1)	(SAME AS 2.4.3.9.2) (SAME AS 2.4.3.9.1)	(SANR AS 2.4.3.9.2) (SANR AS 2.4.3.9.1)	(SAME AS 2.4.3.9.2)	
02.4.03.11.2		(RBLAT) 03-2 (RBLAT) MCC-1	(CONTACTS OPEN) OPP (CONTACTS CLOSED) VOLTS LOW	TRAIN A POWER CANNOT BE SELECTED FOR MOV-1100C LOSS OF TRAIN A POWER TO	(SANE AS 2.4.3.9.1) CONTROL ROOM INDICATION	(SAME AS E.4.3.9.1) NOME FOR INJECTION. REDUNDANT		PRESENT OF GAS BENDING IN
<u> </u>	H. F. LIAA.	78-1198) ·	- Volta bod	HOV-1100C, BRSÜLTING IN PAILURE TO CLOSE AND LOSS OF TRAIN A CHARGING PUMP IP PRESELECTED		CREET VALVE AND CHARGING PUMP FOR CLR AND BLB		PORTION OF COMMON SUCTION LINE TO BEDUNDANT CHARGING PUMP BAS NOT BEEN VERIFIED FOR SUBSEQUENT RECISC BY TEST OR ANALYSIS

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#### BMBROGMET CORE COOLING SYSTEM SINGLE FAILURE AMALTSIS SAM OMOFRE UNIT I TABLE 2-1: COLD LBG RECIPCULATION FMEA

	DEVICE ID	COMPONENT ID	PAILURE MODE	LOCAL EPPECTS AND DEPENDENT PAILURES	METHOD OF Detection	INBERBUT COMPRISATING PROVISIONS	BPFBCT OH BCCS	BRHARES
82.4.03.13.L.	MOV:1100C	MCC-2A (42-12A76)	VOLTS LOW	LOSS OF TRAIN B POWER TO MOY-1100C, RESULTING IN PAILURE TO CLOSE AND LOSS OF TRAIN B CHARGING PUMP IF	CONTROL BOOM INDICATION	NONE FOR INJECTION. RESUMBLEST CHECK VALVE AND CHARGING PUMP FOR CLE AND BLE	DURING INJECTION AND ONE	PORTION OF COMMON SUCTION LINE TO BEDUNDANT CHARGING PUMP BAS NOT BERM YERIFIED FOR
				PRESELECTED				SUBSEQUENT RECIEC BY TEST OR ANALTSIS
02,4 <u>.04</u> .01.1	rë-1100 <b>g</b> roop	(88794) FG-110581	BICH FRARF	MIGS VCT LEVEL SIGNAL TO MOV-1100B/C/D, CAUSING MOV-1100C OPENING AND	PBRLODIC TRSTING	POR LBLOCA, MSLB OR AGTR EF MOV-1100B/C/D PLACED IN MANUAL	CHARGING PUMPS FOR SELOCA IF SECOND CHARGING PUMP	FINCLUDES LT-1100, POWER SUPPLT. MORMAL POSITION OF CONTROLLER OUTPUT. PRA
	+-			MOV-1100B/D CLOSING IP IN AUTO. DISABLES LO-LO-LO TRIP OF G-8A. NO RPPRCT ON SEQ ACTUATION OR POST-SIS/SISLOP		beios to and proce/grant	SIS/SISLOP. NOWE FOR LBLOCA,	REQUIRED TO JUSTIFY TRIS CONDITION UNTIL CYCLE 12 ECCS UPGRADES
02.4.04.01.2	LC-11008 LOOP	LC-1100B1 (RELAT)	LOW LEVEL	(IP IM MAMUAL) LOW WCT LEVEL SIGNAL TO MOV-1100B/C/Q_CAUSING MOV-1100B/D OPENING AND	PERIODIC TESTING	MONE REQUIRED	BLOCE/RESET TRAIN B CEARGING PUNP WILL NOT AUTO-START SURING [N]ECTION, BUT AVAILABLE FOR RECIEC WITH	CHARGING PUMPS NOT CREDITED POR INJECTION
02.4.04.02.1	FC-11008 F03b	(9-1412A) - ĀĪĀVĒ BAG \$4	AOFIZ FOR	ALSO CAUSES LO-LO-LO TRIP OF C-88. NO SPRECT ON SEQ ACTUATION OF POST-SIS/SISLOP LOW VCT LEVEL SICHAL TO HOV-1100B/C/D, CAUSTING NOV-1100B/D OPENING AND NOV-1100C CLOSING IF IN AUTO.	CONTROL BOOM TABLESTION	MOME BEGATEED	TRAIN B CHARGING PUMP WILL NOT AUTO-START DURING INJECTION, BUT AVAILABLE FOR SECIEC WITH LEVEL TRIP OVERRIDE	
02.4.05.01.1	CV-410	VALVB/ACTUATO3	OPBN	ALSO CAUSES LO-LO-LO TRIP OF G-8A. NO EFFECT ON SEQ ACTUATION OR POST-SIS/SISLOP VALVE WILL NOT CLOSE ON MOV-1100B/D INTERLOCES POST-SIS/RISLOP TO ISOLATE	PBRIODIC TEST	REDUNDANT VALVE (CV-411)	EBDUCED REDUNDANCY FOR ISOLATION OF SEAL WATER RETURN TO VCT	INCLUDES SV-410. LWJECTION/CLE/MLE BOUNDARY PUNCTION
02.4.05.01.2	CV-410	VALVE/ACTUATOR	CLOSED	SEAL WATER RETURN TO VCT SEAL WATER RETURN TO VCT ISOLATED. NO EFFECT ON	CONTROL BOOM INDICATION, ANNUNCIATION	NONE BEQUIEED	NONE	
				CHARGING PUMPS DUB TO DIRECT SHAT WATER HE PAIN TO PUMP SUCTION LINES				
02.4.05.02.1	CV-410	LS-5 (80V-11009)	CONTACTS OPEN	(9AMB AS 2.4.5.1.2)	(SAME AS 2.4.5.1.2)	(SAMB AS 2.4.5.1.2)	(SANB AS 2.4.5.1.2)	
02.4.05.02.2	CA-410	LS-5	CONTACTS CLOSED	NOA-1100B OBBN RICHVF NOA-1100B OBBN RICHVF	PBRIODIC TRATING	13AMB AS 2.4.5.1.11	(SAHE AS 2.4.5.1.1)	
02.4.05.03.1	CV-410	(MOV-1100B) LS-5	CONTACTS OPEN	(SAMB AS 2.4.5.1.2)	(SAMS AS 2.4.5.1.2)	(SANE A3 2.4.5.1.2)	(SAMB AS 2.4.5.1.2)	
02.1.05.03.2	CA-410	- F2-2 - (#6A-1100D)	CONTACTS CLOSED	VALVE WILL NOT CLOSE ON	(SAMB AS 2.4.5.1.1)	(SAHB A9 2.4.5.1.1)	(SAHE AS 2.4.5.1.1)	,
02.4.06.01.1	CV-411	(MOV-11000) VALVB/ACTUATER	CPSN	MOY-1100D OPBN SIGNAL VALUS WILL NOT CLOSE ON MOY-1100B/D INTSELOCES POST-SIS/SIS/CP TO ISOLATE SSAL WATER RETURN TO WIT	PB940DEC TEST	BBDANDYNÍ AVÍAB (CA-410)	REDUCED REDUNDANCT FOR ISOLATION OF SHAL MATER BETURN TO YET	INSCRIPTION OF BRIDGE STATES OF THE PROPERTY O



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#### EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM ONOFRE UNIT 1 ... TABLE 2-1: COLD LEG RECIRCULATION FMBA

					•			
ITSN &	DRVICS 10	COMPONENT 10	PAILURE MODE	LOCAL BFFBCTS AND DSPBNDENT FAILURES	MBTHOD OF DBTECTION	INHERBNT COMPRESATING PROVISIONS	BPFBCT ON BCCS	REMARES
						(		
02.4.06.01.2	CV-411	_YALVE ACTUATOR	CLOSED	(SAMB AS 2.4.5.1.2)	(SAMB AS 2.4.5.1.2)	(SANR AS 2.4.5.1.7)	(SAHS AS 2.4.5.1.2)	
02.4.06.02.1	CV-411	L9-6	CONTACTS OPEN	(SANR AS 2.4.5.1.2)	(SAME AS 2.4.5.[.2]	(SAME AS 2.4.5.1.2)	(SANE AS 2.4.5.1.2)	
		(MOV-1100B)		•		(0	(5000 00 00000)	
<u> </u>	CY-411	18-6	CONTACTS CLOSED	. (SANB AS 2.4.5.2.2)	[SAME AS 2.4.5.1.1]	(8AUB_AS_Z.4.5.1.1)	_(SAME:AS, 2.4.5.1.11	
	<b></b>	(MOA-1100B)						
02.4.06.03.1	CA-411	L9-6	CONTACTS OPEN	(SAME AS 2.4.5.1.2)	(SAME AS 2.4.5.1.2)	(SAMB AS 2.4.5.1.2)	(SAMB AS 2.4.5.1.2)	
02.4.06.03.2		TROA-1100b)	MANA	10.00 .0 6				
P2.4.08.03.2	C1-411	L8-6	CONTACTS CLOSED	(SAHE AS 2.4.5.3.2)	(SAMB AS 2.4.5.1.1)	(SAMB AS 2.4.5.1.1)	(SAMB AS 2.4.5.1.1)	
2.4.07.01.1	CV 418	(MOV-1100D) VITAL BUS 84	VOLTS LOW	CM 444 AMB CM 411 GEOGG				
	CV-411	(8-1402V)	AUT IN TOR	CA-410 WAD CA-411 CTOSE'	CONTROL BOOM INDICATION	MONS BEQUIESD	MONB	
	A - 411	[8.14414]		ISOLATING SEAL WATER RETURN TO VCT	1			
2.4.08.01.1	P[C-1111 LOOP_	PIC-1131	OUTPUT BIGB		PERIODIC TESTING	NAME DEGITORS	MONB	
ara (melepel 1. )	TTT 1114 8441		antiai átái	AUTO-START DISABLED TO BOTH	LEBIOACC IBSILIA	NONE BEGUIEED	MONE	
				CHARGING PURPS. NO REPRET ON		·		
				SIS/SISLOP ACTUATION OR AFTER				
				SEQ BLOCE/RESET				
2.4.08.01.2	PIC-1111 LOOP	P[C-1111	OUTPUT LOW	LOW DISCRARGE PRESSURE	CONTROL BOOM INDICATION,	MOV-1100C CLOSES AS BEQUIRED	POTRETIAL OPERATION OF 2	
				AUTO-START SIGNAL TO BOTH	ANNUNCIATION		CHARGING PUMPS DURING INJECTION	
				CHARGING PUNPS, CAUSING START		PRIOR TO SEQ BLOCK/RESET OR		
				OF IDLE PUMP DURING MORMAL		DURING CLR/NLR		
		·····		Obabatton and ables and				
	••• • • • • • • • • • • • • • • • • •			BLOCE/RESET				
2.4.08.01.3	PIC-1111 LCOP	PIC-1111	99	LOW DISCHARGE PRESSURE	CONTROL ROOM INDICATION,	PCV-1115A/B/C/D/B/F AND	POTENTIAL OPERATION OF 2	CHARGING PUMPS AND PIC-1111
				AUTO-START SIGNAL HAT OCCUR TO	ANNUNCIATION			BNATBORNBUL NOT HYB3R CHLIF
				BOTH CHARGING PUMPS, CAUSING		CHARGING PLOW TO WITHIN	#LE	POST-LOCA RECIRCULATION IS
1-				START OF DE-SELECTED PUMP		CAPABILITY OF OPBRATING		INITIATED
A 08 02 1 1	PIC-IIII LOOP	DIC TILLY	CONTACTS CLOSED	AFTER SEQ BLOCE/RESET	CONTRAL COOK THE CONTRACT	RECIRCULATION PUMP(S)		
	ric-iiii Loor	(BBLAT)	(OPF)	LOW CHARGING PUMP DISCHARGE		NONE REQUIRED DURING	NOME. START OF ONE CHARGING	PIC IS BLECTRO-MECHANICAL
		( BBLK11	faiti	PRESSURE SIGNAL TO AUTO-START CET OF BOTH CHARGING PUMPS.	LEGIODIC (\$211M)	SIS/SISLOP. MOV-1100C CLOSES	PUMP AND TRIP/LOCKOUT OF OTHER	
				CAUSING START OF IDLE PURP		AS REQUIRED TO PREVENT CAS BINDING OF DE-SELECTED PUMP	ON SIS/SISLOP IS UNAPPROTED, AND RESTART OF DE-SELECTED PUMP	CURRENT LOOP
				DURING MORMAL OPS AND		FOLLOWING SEQ BLOCK/RESET	FOLLOWING SEQ BLOCE/RESET IS	
				FOLLOWING SEQ BLOCE/RESET.		FATTABLE SM BPACE (#89#]	ACCEPTABLE AS LONG AS HOV-11000	
			* *	DORS NOT APPRET SIS/SISLOP	· · · · · · · · · · · · · · · · · · ·		WAS CLOSED	
				TRIP OF DR-SELECTED PUMP		•		
2.4.08.02.2 F	PIC-1111 LOOP	PIC-11111	CONTACTS OPEN (OB)	CHARGING PUNP AUTO-START ON	PBRIODIC TRSTING	NONE REQUIRED FOR INJECTION OR	NONE FOR INJECTION OR	
		(RELAY)		LOW DISCHARGE PRESSURE		BECIRCULATION	RECIRCULATION	
				DISABLED DURING MORMAL OPS. NO				
				REPECT ON 813/913LOP OR				
				POLLOWING SEQ BLOCK/RESET				
2.4.98.02.3 F	PIC-1111 L00P	PIC-1111Z	CONTACTS CROUNDED	(SAMB AS 2.4.8.2.2)	(SANB AS 2.4.8.2.2)	(SAME AS 2.4.8.2.2)	(SAMB AS 2.4.8.2.2)	DC SYSTEMS ARE UNGROUNDED.
	· · · ·	(BBLAY)						FAILURE OF ONE TRAIN MAY OCCUR
								WITH A PRE-BRISTING GROUND,
								HOWEVER SUCH A DOUBLE FAILURE
					• •			SCRNARIO IS OUTSIDE THE DESIGN
								BASIS



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## BHBRGBRCT CORB COOLING SYSTEM SINGLE FAILURE ANALTSIS SAN ONOFRE UNIT 1 TABLE 2-1: COLD LSG RSCIRCULATION FMBA

•	(TEM )	DBVICS ID	COMPONENT ID	FAILURB HODB	LOCAL BEFRETS AND DRPRHORMY PAILURES	MBTHOD OF Drtection	IMBRERNT COMPENSATING PROVISIONS	EFFECT ON BCCS	BRNABES
	02.4.98.02.4	PIC-ILII LOOP	PIC-1114 <b>1</b> (RBLAY)	INPUT OPEN	(SAMB AS 2.4.0.2.1)	[SAMB AS 2.4.8.2.1]	[SAMS AS 2.4.8.2.1]	[\$4NB 49 2.4.6.2.1]	······································
_	02.4.08.02.5	1C-1111 LOOP	PIC-11111 (RBLAT)	EMPUT SHORT	VITAL BUS #4 SUPPLY TO PIC-11112 BAT TRIP. AUTO-STAR	(SAMB AS 2.4.8.2.1)	(SAMB AS 2.4.8.2.1)	(SAMB AS 2.4.8.2.1)	
	02.4.04.03.1 F	1C-1111 LOOP	VITAL 8US 81 (8-1109V)	VOLTS LOW	SPPRCTS SAME AS 2.4.6.2.1) LOW DISCHARGE PRESSURE AUTO-START SIGNAL TO BOTH CRARGING PUMPS, CAUSING START OF EDLE PUMP DURING MORNAL OPERATION AND AFTER SEQ	CONTROL ROOM INDICATION, ANNUNCIATION	MOV-1100C CLOSES AS REQUIRED FOR INJECTION. NOWE REQUIRED PATOR TO SEQ ELOCE/RESET OR DURING CLR/BLR	POTENTIAL OPERATION OF 2 CHARGING PUMPS DURING INJECTION (APTER SEQ BLOCE/RESET)	
	02.4.08.03.2 F	1C-1111 LOOP	VITAL BUS 84 (8-1416V)	VOLTS LOW	BLOCE/RESET LOW CHARGING PUMP DISCEARGE PRESSURE SIGNAL TO AUTO-START CET OF BOTH CHARGING PUMPS, CAUSING START OF IDLE PUMP	CONTROL ROOM INDICATION, PERIODIC TESTING	NOME REQUISED DURING SIS/SISLOP. BOY-1100C CLOSES AS REQUIRED TO PREVENT GAS	MONR. START OF ONE CHARGING PUMP AND TRIP/LOCADUT OF OTHER ON \$13/313LOP IS UNAPPROTED.	
			<del></del> . <u>-</u>	·	DUBLING NORMAL OPS AND FOLLOWING BEG BLOCK/BESET. DORS NOT APPECT SIS/SISLOP TRIP OF DE-SELECTED PUMP		BINDING OF DE-SELECTED PUMP POLLOWING SEQ BLOCE/RESET	AND RESTART OF DR-SELECTED PUMP FOLLOWING SER BLOCK/RESET IS ACCEPTABLE AS LONG AS NOV-1100C HAS CLOSED	
	02.4.09.01.1 P	CV-1112	VALVE/ACTUATOR	OPEN	FCV-1112 CAMNOT BE CLOSED FOR CLR BOUNDARY OR MODULATED FOR BLR PRIMARY PATH FLOW CONTROL		REBUMBANT VALVES (CV-104, CV-105) FOR CLE BOUNDARY,	REDUCED REDUNDANCE FOR CLE SOUNDARY ISOLATION, LOSS OF BLE	<del></del>
	02.4.09.01.2 P	CV-11112	VALVB/ACTUATOR	CLOSSD	PCV-1112 DOES NOT OPEN FOR INJECTION AND CANNOT BE HODULATED FOR BLE PRIMARY PATH	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT PATE FOR BLR HOME FOR INJECTION, NOME REQUIRED FOR CLR, REDUNDANT PATE FOR BLR	PRIMARY PATH LOSS OF CRAEGING PUMP INJECTION PATH TO BCS LOOP A, AND BLE PRIMARY PATH	CHARGING NOT CREDITED FOR INJECTION
	02.4.09.02.1 P	CV-1112	PC-1112 LOOP	SEGNAL SEGS	PLOW CONTROL. NORMAL FOR CLE FCV-1112 CANNOT 8B CLOSED FOR CLR SOUNDARY FUNCTION OR		(SAHS AS 2.4.9.1.1)	(SAMB AS 2.4.9.1.1)	PC-1112 MANUAL MODE, USED FOR PCV-1112 MODULATION/CLOSURE,
					HODULATED FOR BLE PRIMARY PATH PLOW CONTROL				UNAFFECTED BY AUTOMATIC INPUTS FROM LC-130P AND PIT-1112. [8](2] INTERACTION FROM NON-BQ PIT-1112 PERCLUDED BY FOWER
	02.4.09.02.2 P	CV-1112	PC-1112 LOOP	SEGNAL LOW	PCV-1112 CANNOT BE MODULATED POR BLE PRIMARY PATH PLOW	CONTROL ROOM INDICATION	REDUNDANT PATS FOR MLR	LOSS OF MLR PRIMARY PATE	SUPPLY TE-1112
	02.4.09.03.1 P	CV-1112	SV-1112	ON (OPBN)	COMTROL. MORMAL FOR CLR (SAMB AS 2.4.9.1.1)	(SAME AS 2.4.9.1.1)	(SAME AS 2.4.9.1.1)	(SAHE AS 2.4.9.1.1)	*SV-5112 POWER MUST BE LOCEED OUT AT C-38 PANEL AND DSD SWCH
	02.4.03.05.2 P	:v:TTT2	\$V-1112	OFP [MODULATE]	FCV-1112 DOBS NOT FULLY OPEN FOR INJECTION. NO RPPRET ON MODULATION OR CLOSURE OF PCV FOR CLE AND BLE	PRRIODIC TRSTING	NONE FOR INJECTION	LOSS OF CHARGING PUNF INJECTION PATH TO BCS LOOP A	TO PERCLUDE SIMILAR FAILURE DUE TO EQ CHARGING NOT CREDITED FOR INJECTION
	02.4.09.04.1 F	SV-141 <b>2</b>	35Q 1 (51-1,3)	OFF (CONTACTS OPEN)		PBB:ODIC TESTING	REDUNDANT SEQ	REDUCED REDUNDANCE FOR CHARGING PUMP INJECTION ALIGNMENT	CHARGING NOT CREDITED FOR





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# EMZEGENCY CORE COOLING SYSTEM SINGLE FAILURE AMALYSIS SAN OMOFEE UNIT 1 TABLE Z-1: COLD LEG RECIPCULATION FREA

:	ITSH #	OBVICE ID	COMPONENT [9	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	MATHOD OF DBTBCTION	INHERENT COMPRESATING PROVISIONS	BFFECT ON ECVS	854185
-	. 02.4.09.04.2	₽CV:1112	SBQ 1 (51-1,3)		FCY-1112 FULLY OPENS FOR INJECTION ON SEQ I SIS/SISLOP. NO REPRICT ON MODULATION OR CLOSURE OF FCY FOR CLR AND BLR DUE TO OVERFIOR IN SV CET	CONTROL ROOM INDICATION, PERIODIC TESTING	NONB_B3QUIRED.		
	02.4.09.05.1 (		380 2 _(5)-1,3)	OFF (CONTACTS OPEN)		PBB1091C TBSTING	PSE INADHUDAR	REDUCED RESUMBANCE FOR CHASGING C FUMP INJECTION ALIGNMENT I	HARVING NOT CREDITED FOR MIRCTION
	02.4.09.05.2	FCV-1112	SBQ 2 (51-1.3)		FCV-1112 PULLY OPENS FOR IMBECTION ON SEQ 2 SIS/SISLOP. NO EFFECT ON MODULATION OR CLOSURE OF FCV FOR CLR AND BLE DUE TO OVERFIOR IN SV CET	CONTROL ROOM INDICATION, PRRICEDIC TESTING	MONE BEGNIEED	MONB	
i I i	02.4.09.06.1 1	PCV-1112,	REG 8US 61 (3-1197)	VOLTS LOW		CONTROL BOOM INDICATION	MTA9 AUB BTAKBBTUA	LOSS OF BLE PRIMARY PATH	·
'   	<u> </u>	707-1112	125V9C 399 41 (72-110)	AUTIS FOA	SY-1112 CANNOT BE EMBRGIZED TO FULLY OPEN FOW-1112 AUTOMATICALLY FOR INJECTION. HODULATION UNAPPROTED FOR COLD LEG BEGIEC BOUNDARY AND HOT LEG RECIEC PRIMARY PATH	CONTROL BOOM INDICATION	NONE FOR INJECTION	INDERSABILITY OF CHARGING PUNP C	HARGING FLOW NOT CORDITED FOR HIBECTION
	02.4.09.08.1 F	CV-1112	[SA		FUNCTIONS 13A UNAVAILABLE FOR PCV-1112 OPENING (INJECTION) OR HODULATION (BLR)	CONTROL ROOM INDICATION, ANNUNCIATION	BACEUP MITROGRM	PCV-1112 OPENS AND MODULATES AS REQUIRED ON BACEUP MITROGEN	
	92.4.09.93.1	PCV-1112	(PCZVs)	PRESSURA LOW	GMI UNAVAILABLE FOR PCV-1112	CONTROL BOOM ENDICATION, ANNUNCIATION	PATH FOR HLR	PRIMARY PATH, WITH CONCURSENT	BARGING FLOW NOT CRED: TBD 708 NJBCTION
	02.4.10.01.1 0		VALVE/ACTUATOR			CONTROL BOOM INDICATION, PBRIODIC TRATING	REDUNDANT VALVE (PCV-1112) POR	PAILURE OF 184 LOSS OF ELE PRIMARY PATH, REDUCED REDUMDANCY FOR CLR BOUNDARY	· · · · · · · · · · · · · · · · · · ·
<u> -</u>	U2.6.10.01.2 C	W-104	AVĒĀBĀV (LAVALOR	CLUSED		CONTROL BOOM INDICATION	NOME FOR INJECTION, NOME REQUIRED FOR CLE OR HER	LOSS OF CHARGING PUMP INJECTION C PATH TO LOOP A. MONE FOR CLR OR I	
   .   .	02.4.]].01,] C	¥- <u>105</u>	ACTAUTOA/AVIAN	OPEN	CY-105 OPENS FOR PZE AUI SPRAT AND CANNOT BE RECLOSED FOR CL3 BOUNDARY FUNCTION. NORMAL FOR BLR PRIMARY PATH	CONTROL BOOM ENDICATION	BEDUNDANT VALVE (FCV-1112) FOR CLR BOUNDARY, NOWE REQUIRED FOR BLR		ICTNDBZ BÁ-1302
,	02.4.11.01.2 0	V-305	VALVE/ACTUATOR	CLOSBO		CONTROL ROOM ENDICATION, PBB:ODIC TRSTING	•	LOSS OF HER PRIMARY PATE, NOWE FOR CLR	



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## BHBRGSNCY CORB COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OHOPER UNIT 1 TABLE Z-1: COLD LBG RECIPCULATION FHEA

٠.	LTBN #	DBAICB ID	COMPONENT ID	FAILURE MODE	LOCAL RPPRCTS AND DEPRHDENT FAILURES	METHOD OF DETECTION	PROVISIONS  INTERPRET COMPENSATING	BPFBCT ON BCCS	REMARES
Ç	2.4.12.01.1	CA-302	UTILITY BUS (8-1508)	VOLTS LOW	CV-304 AND CV-305 CLOSE, CANNOT BE OPENED, ISOLATING CRARGING PURP INJECTION PATH	CONTROL ROOM INDICATION,	MONE FOR INJECTION, BEDUNDANT PATH FOR BLE, MONE REQUIRED FOR CLE		
. 0	<u>2,</u> 4.12.02.1	CV-304	<u>ISA</u>	PRESSURE LOV	TO BCS LOOP A AND BLE PRIMARY PATE. VALVES PAIL TO CLE POSITION 13A UNAVAILABLE TO CV-304 AND CV-305. CV-304 CLOSES, 130LATING CRAEGING PURP		NOME FOR INJECTION, BACKUP MZ FOR BLB	LOSS OF CHARGING PUMP INJECTION PATH TO BCS LOOP A. CV-305 BEPOSITIONS AS REQUIRED POR CLE	INJECTION
	2.4.12.01.1	CV-305	GNI (PORVs)	PRESSURE LOW	CA-302 OBBRING (NTB)	PERIODIC SURVEILLANCE	REDUMDANT PATH FOR MLR	AND BLE USING DACTUP M2 LOSS OF BLE PRIMARY PATH WITH CONCURRENT ISA FAILURE	
. 0	<u>2,9,12,0).</u> 2	CA-302		Cr038D	ISOLATES BACEUP M2 TO CV-305	CONTROL ROOM INDICATION	FOCAL MANUAL OPERATION OF SACEUP ME SUPPLY	CV-305	INCLUDES SY-532A. MANUAL  STRASS VALUE LOCATED ON SAFE SIDE OF SHIELD WALL. ACCESS AND USE SOUNDED BY RICSTING
	2.4.12.03. <b>3</b>		125VDC BUS #2 {72-220}	VOLTS LOW	ISOLATES BACRUP B2 TO CV-305 INSIDE CONTAINMENT (RLB) BY CLOSING CV-532	CONTROL BOOM INDICATION	LOCAL MANUAL OPERATION OF REGUNDANT STPASS VALVE IN BACEUP MZ SUPPLY	LOSS OF AUTOMATIC M: BACEUP TO CV-305	DOSE CALCULATIONS MANUAL BYPASS VALVE LOCATED ON SAPE SIDE OF BRIELD WALL. ACCESS AND USE BOUNDED BY
Ç	2,4.13.01.1	PCA-1112V	V <u>alvb</u> /actuator	OÈBM	CLR PLOY TO BCS LOOP A CANNOT BE THROTTLED BELOW ABOUT 80 CPM	CONTROL BOOM INDICATION		INABILITY TO TREOTILE CLE FLOW TO BCS LOOP A BELOW ABOUT BO GPM FOR COMBINSD CLE/HLE	BRISTING DOSE CALCULATIONS  YALVE IN SERVICE DURING MORNAL OPS FOR SEAL INJECTION TO LOSS A RCP
0:	2.4.13.01.2	PCV-1115A	VALVB/ACTUATOR	CLOSED	LOW RANGE CLE FLOW CONTROL LOST FOR ECS LOOP A, CAUSING DROP IN LOOP A CLE FLOW UNTIL FCV-1115D OPENED TO COMPENSARE	CONTROL ROOM INDICATION	PARALLEL VALVE (PCV-1115D). REDUNDANT PLOW PATHS TO RCS LOOPS B AND C	REDUCED CLE FLOW TO BCS LOOP A UNTIL FCV-1115D OPENBO TO COMPENSATE	VALUE IN SERVICE DURING MORNAL OPS FOR SEAL INJECTION TO LOOP A ECP
	.4.13.02.1 	FCV-1115A .	PT-11154	SIGNAL HIGH	(SANS AS 2.4.13.1.1)	(SAMB AS 2.4.13.1.1)	(SAME AS 2.4.[3.1.])	(SANE AS 2.4.[3.1.1)	POSITION DEMAND SIGNAL. ACTUAL CONTROLLER OUTPUT IS REVERSE
	. 4 . 11 . 02 <u>. 2</u>		PT-1115A	SIGNAL LOW	(SAMR AS 2.4.13.1.2)	(SAMB AS 2.4.13.1.2)	(SABS AS 2.4.13.1.2)	(SAMB AS 2.4.13.1.2)	ACTING DUB TO PAIL OPEN DESIGN OF VALVE
0	(.4.14.01.t	FCY-11150	VALVE/ACTUATOR	OPBN	INCREASE IN CLR PLOW TO RCS LOOP A, PREVENTING CLR FLOW BALANCE AND DIVERTING PLOW	CONTROL BOOM INDICATION	REQUIRED TO PREVENT INADEQUATE CHARGING PUMP MPSH DURING	LOSS OF CLR PLOW BALANCE AND	PBOTH BRCIRC PUMPS MUST BE BUN DURING BRCIRC IP AVAILABLE, AS COMBROURNCES OF THIS SINGLE
					PROM RCS LOOPS B, C AND MER Primart path		TRANSIENT UNTIL NOV-356 CAN BE CLOSED TO ISOLATE FAILED PCV		PAILURE ARE UNACCEPTABLE WITH LESS THAN 2 RECIRC PUMPS RUNNING
0;	. i . i i . o i . ž	FCV-11150	VALVE/ACTUATOR	CLOS2D	HIGH RANGE CLR FLOW LOST TO BCS LOOP A	CONTROL BOOM INDICATION	REDUNDANT PATHS TO BCS LOSES B AND C	INOPBRABILITY OF INITIAL CLR TO BCS LOOF A	
0;	. 4 . 14 . 02 . 1	FCV-11150	PY-1115D	SIGNAL HIGH	INCREASE IN CLE PLON TO RCS LOOP A IF TRAIN A CONTROLLER ALIGNED	CONTROL ROOM INDICATION	BEDUNDANT CONTROLLER	LOSS OF TRAIN A PLOW CONTROLLER FOR CLB TO RCS LOOP A	



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# EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE AMALTSIS SAM ONDERS UNIT 1 TABLE Z-1: COLD LEG RECIRCULATION PREA

ITBN #	OBAICE ID	COMPONENT ID	FAILURB MODS	LOCAL EFFECTS AND DEPENDENT FAILURES	HETHOD OF DETECTION .	IMBBERNT COMPENSATING PROVISIONS	BPFBCT ON BCCS	BEMARES
02.4,14.02.2	PCV-1115D		SIGNAL LOW	DECREASE IN CLE PLOW TO BCS LOOP A IF TRAIN A CONTROLLER ALIGNED	CONTROL BOOM INDICATION	BEDNADART CONTROLLER	LOSS OF TRAIN A PLOW CONTROLLER FOR CLR TO BCS LOOP A	
02.6.14.03.1	ECV-1115D	SV-1115AD . SV-1115DA SV-1115DB	. 088 _		CONTROL ROOM INDICATION. PREIODIC TEST	PATUS		ALIGNED. MISALIGNMENT OF INDIVIDUAL SVS BOUNDED BY PAILURE OF ASSOCIATED FCV
02.4.14.03.2	PCV-1115D	8V-1115AD SV-1115DA SV-1115DB	OR	PCV-1115D TRAIN A CONTROLLER CANNOT BR ALIGHRO, CONTROL ALIGNS TO TRAIN B CONTROLLER	CONTROL ROOM INDICATION, PERIODIC TEST	REDUNDANT CONTROLLER AND PLOW PATES	****	MISALIGNMENT OF INDIVIDUAL SV= Bounded by Failure of Associated PCV
02.4.14.04.1	PCV-11150	TH-11150	SIGNAL BIGS	INCREASE IN CLE PLOW TO RCS LOP A LP TRAIN B CONTROLLER ALIGNED	CONTROL BOOM INDICATION, PERIODIC TESTING	REDUNDANT CONTROLLER	(BANB AS 2.4.14.3.1)	
02.4.14.04.2	PCV-11150	7M-1115D	SIGNAL LOW	DECREASE IN CLE PLON TO ECS LOP A LP TRAIN & CONTROLLER ALIGNED	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CONTROLLER	(SAME AS 2.4.[4.3.])	
02.4.14.05.1	FCV-1115B	CWL	PRESSURE LOW	(9AME AS 2.4.14.1.2)	(SAME AS 2.4.14.1.2)	(S.1.1.1.2 EA BHAE)	(SAME AS 2.4.14.1.2)	SEPARATE BACEUP NZ SUPPLY FOR BACH OF FDV-1115D/B/F
02.4.15.01.1	PCV-1115A FCV-11150	PT-1115A FT-1115D LOOP	SIGNAL HIGH	INCREASE IN CLE PLOY TO LOOP A VIA PCY-L115A/D OPENING, CLE PLOY TO RCE LOOP A CANNOT BE TROTTLED BELOY SO GPH EVEN	CONTROL BOOM INDICATION	(SAME AS 2.4.14.1.1)	•	*(SAME AS 2.4.14.1.1) COMMON  SPETT-RANGE CONTROL LOOP FOR PCV-1115A AND PCV-1115D (TRAIN A)
			•	WITH FCV-ILISO TRAIN B CONTROLLER ALIGNED				
02.4.15.01.2	PCV-1115A PCV-1115D	FT-1115A FT-1115D LOOP	SIGNAL LOW	LOSS OF TRAIN A CLR FLOW CONTROL FOR RCS LOOP A	CONTROL ROOM INDICATION	REDUNDANT CONTROLLER AND PLOW	LOSS OF TRAIN A PLOW CONTROLLER	
02.4.16.01.1		VALVE/ACTUATOR	OPEN	CLR PLOW TO BCS LOOP B CANNOT BR THROTTLED BELOW ABOUT 60	CONTROL ROOM ENDICATION	CLE/HLE FLOW REMAINS WITHIN	TO BCS LOOP B BRLOW ABOUT SO	VALVE IN SERVICE DURING MORNAL OPS FOR SEAL ENJECTION TO LOOP 8 SCP
	_			GPM		INITIAL CLB LIMIT OF ABOUT 350 GPM	·	
03.4.16.01.1	R PCV-11158	VALVB/ACTUATOR	Croaso	LOW BANGE CLE PLOW CONTROL LOST POR RCS LOOP B. CAUSING DROP IN LOOP B CLE PLOW UNTIL PCV-1115E OPENED TO COMPRISATE	CONTROL ROOM INDICATION	PARALLEL VALVE (PCV-1115B),  BEDURDINT FLOW PARMS TO BCS  LOOPS A AND C	REDUCED CLE PLON TO BCS LOOP B UNTIL POV-TITES OFBURD TO COMPRESATE	OPS POR SRIL INJECTION TO LOOP  8 RCP
02.4.16.02.1	PCV-11158	P7-1115B	SIGNAL BIGB	(SAME AS 2.4.16.1.1)	[SAMB AS 2.4.16.1.1]	(SAMB AS 2.4.16.1.1)	(SAME AS 2.3.18.1.1)	POSITION DEWAND SIGNAL. ACTUAL CONTROLLER OUTPUT IS REVERSE ACTING DUB TO PAIL OPEN DESIGN OF VALVE
02.4.16.02.7		PT-1115B VALVB/ACTUATOR	SICHAL LOW OPRN	(SAME AS 2.4.16.1.2) INCREASE IN CLE PLOW TO BCS LOOP B, PREVENTING CLE PLOW ESLANCE AND DIVSETIN; FLOW	(SAME AS 2.4.16.1.2) CONTROL BOOM INDICATION	(SAME AS 2.4.16.1.2) BOTH RECIEC PUMPS OPERATE AS REQUIERD TO PREVENT IMADEQUATI CHARGING PUMP MESH DURING	(SAME AS 2.4.16.1.2) LOSS OF CLE PLOY BALANCE AND TORROCED PRIMARY PAYFIELE UNTIL PAILED FOY ISOLATED	*BOTH RECIRC PUMPS MUST BE RUN
		andre and a second		PROM RCS LOOPS A. C AND BUR PRIMARY PATH		TRANSIBUT UNTIL MOV-357 CAN BI	<u> </u>	FAILURS ARS UNACCEPTABLE WITE LRSS TRAN & RRCIRC PURPS RUNNING
	2 FCV-1115B	VALVB/ACTUATOB	CLCSBD	HIGH RANGE CLR PLOW LOST TO RCS LOOP B	CONTROL BOOM INDICATION	BROUNDANT PATHS TO BCS LOOPS (	A INOPERABLLITY OF INITIAL CLR TO RES LOOP B	





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## ENBAGENCY CORE CODEING SYSTEM SINGLE FAILURE ANALYSIS SAM ONOFRE UNIT 1 TABLE Z-1: COLD LEG RECIRCULATION PASA

} - :	LTBN #	DAVICE 19	COMPONENT LD	FAILUSS MODS	LOCAL BPFECTS AND DRPSWDENT FAILURES	METHOD OF Detection	INBERBUT COMPRUSATING PROVISIONS	BPFBCT ON BCCS	SEMARES
i i —		ECV-1115R	£Y-111\$B	SIGNAL HIGH	INCREASE IN CLE PLON TO BCS LOOP B IF TRAIN A CONTROLLER ALIGNED	CONTROL BOOM INDICATION	S3JJVOTAT_CONTSOLLBR	LOSS OF TRAIN A FLOW CONTROLLER. FOR CLB TO BCS LOOP B	
Ĺ	02.4.11.02.2	PCY-1115E		SIGNAL LOW	DECREASE IN CLE PLOY TO ECS LOOP B IF TRAIN A CONTROLLER ALIGNED	CONTROL BOOM INDICATION	BEDUNDANT CONTROLLER	LOSS OF TRAIN A PLOW CONTROLLER. POR CLR TO BCS LOOP B	
   	02.4.17.03.1	PCV-1115E	8V-1115BE 9V-1115BA 8V-1115BB	OFF	FCY-11158 TRACK B CONTROLLER CANNOT BE ALIGNED, CONTROL REMAINS ALIGNED TO TRAIN A CONTROLLER	CONTROL ROCK ENDICATION, PREIODIC TEST	REDUNDANT CONTROLLER AND FLOW PATHS		TRAIN A CONTROLLER NORMALLY ALIGNED. HISALICMENT OF INDIVIDUAL SW. BOUNDED BY PAILURE OF ASSOCIATED FCV
	02.4.17.01.2	FCV-11151	SV-111598 SV-11158A SV-11158B	OM		CONTROL BOOM ENDICATION, PERIODIC TEST	BEDUNDANT CONTROLLER AND PLOW PATHS	LOSS OF TRAIN A PLOW CONTROLLER FOR CLR TO BCS LOOP B	
}	02.4.11.04.1	PCV-1115B	7H-11158	SICNAL HIGH	INCREASE IN CLR PLON TO BCS	CONTROL BOOM (UDICATION, PERIODIC TESTING	BEDUNDANT CONTROLLER	(SAMB AS 8.4.17.3.1)	
 	02.4.17.04.2	FCV-11158	7H-11158	SIGNAL LOW	DECREASE IN CLR FLOW TO BCS	CONTROL BOOM INDICATION, PERIODIC TESTING	BEDUNDANT CONTROLLER	(SAME AS 2.4.17.3.1)	
	02.4.17.05.1	PCV-11158	CMI	PRESSURE LOW	(SAMB AS 2.4.17.1.2)	(SAME AS 2.4.17.1.2)	(SAMS AS 2.4.17.1.2)	•============	SEPARATE BACKUP MZ SUPPLY FOR BACK OF PDV-1115D/B/F
    	02.4.19.01.1	PCV-11158 FCV-11158	PT-11158 PT-11158 LOOP	SIGNAL NICH	INCREASE IN CLE FLOW TO LOOP B VIA FCY-11158/B OPENING, CLE FLOW TO RCS LOOP B CAMNOT BE TREOTTLED BELOW SO GPM EVEN WITH FCY-11158 TRAIN S CONTROLLER ALIGNED	CONTROL BOOM INDICATION	(SAMP 48 2.4.17.1.1)		SPLIT-BANGE CONTROL LOOP FOR PCV-1115B AND PCV-1115B (TRAIN A)
-	02.4.18.01.2	FCV-11159	PT-11158 PT-11158 LOOP	SIGNAL LON	LOSS OF TRAIN A CLR FLOW CONTROL FOR RCS LOOP B	CONTROL BOOM INDICATION	REDUNDANT CONTROLLER AND FLOW PATHS	LOSS OF TRAIN A PLOW CONTROLLER FOR RCS LOOP B	. ,, ,
_	02.4.19.01.1		VALVE/ACTUATOR	OPEN	CLE FLOW TO BCS LOOP C CANNOT BE JEBOTTESD BELOW ABOUT SO GPH	CONTROL BOOM INDICATION		INABILITY TO THROTTLE CLE FLOW TO BCS LOOP C BELOW ABOUT SO	VALVE IN SERVICE DURING MORMAL C RCP
}	02.4.19.01.2	PCV-1115C	VALVB/ACTUATOR	CF03BD _	LOW RANGE CLE PLOW CONTROL LOST FOR BCS LOOP C, CAUSING DROP IN LOOP C CLE PLOW UNTIL FCV-1115F OPENSO TO COMPRNSATE	CONTROL BOOM INDICATION	PARALLEL VALVE (PCV-1115F), ESDUMDANT PLOW PATHS TO ECS LOOPS A AND B		VALUE IN SERVICE DURING MOSMAL OPS FOR SEAL INJECTION TO LOCP
   	02.(.19.02.1	PCV-1115C	PŸ-11150	SIGNAL BIGB	(SAMB AS 2.4.1.1)	(SAMB AS 2.4.19.1.1)	(SAHR AS 2.4.19.1.1)	(SAME AS 2.4.19.1.1)	POSITION DEHAND SIGNAL. ACTUAL CONTROLLER OUTPUT IS REVERSE ACTING DUB TO FAIL OPEN DESIGN OF VALUE
	C2.4.19.02.2 02.4.20.01.1		PY-1115V Valve/actuator	SIGNAL LOW Open	(SAME AS 2.4.19.1.2) INCREASE IN CLE FLOW TO BCS LOOP C, PREVENTING CLE FLOW BALANCE AND DIVERTING PLOW FROM BCS LOOPS A, B AND HLE PHINARY FATH	CENTROL BOOM INDICATION		FAILED FCV ISOLATED	180TH BSCIRC PUMPS HUST BE RUN DURING RECIRC IF AVAILABLE, AS COMSEQUENCES OF THIS SINGLE FAILURE ARE UMANCEPTABLE WITH LESS THAN 2 RECIRC PUMPS RUNNISC



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## BMB9GBNCY COR9 COOLING STSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 2-1: COLD LEG RECIRCULATION FMBA

LTEN A	DRAICE ID	COMPONENT ID	FAILURS HOOR	LOCAL EPPECTS AND DEPENDENT FAILURES	MBTHOD OF DBTBCTION	INHERBUT COMPENSATING PROVISIONS	BFFECT ON BCCS	
	···	<del></del>	*					
02.4.29.01.2	PCV:1115P	VALVB/ACTUATOR	CLOSED	BCS FOOD C BICH BYNGE CIB STON FOST ID	CONTROL ROOM ENDICATION	REDUNDANT PATHS TO RCS LOOPS A	INOPRRABILITY OF INITIAL CLR TO	CLR PLOW BROUGHD BY PROCEDURE 5 BRS POST-LOCA TO WITHIN CAPABILITY OF FCV-1115A/B/C
02.4.24.02.3 	PCA-TTT8b	_RI-1115R	. SIGNAL NIGH	INCREASE IN CLE PLOW TO RCS LOOP C IP TRAIN A CONTROLLER ALIGNED	CONTROL ROOM ENDICATION	REDUNDANT CONTROLLER	LOSS OF TRAID A PLOY CONTROLLER FOR CLE TO BCS L'OOP C	
02,4.20,02,2	PCV-1115P	_FJ-1115F	SIGNAL LON	DECERTISE IN CLE PLOY TO BCS LOOP C IF TRAIN A CONTROLLER ALIGNED	COMPROL BOOM (MOTCATION	ARDUNDANT CONTROLLER	LOSS OF TRAIN A PLON CONTROLLER	
1	.PCV-3315P	8Y-1115CP 9V-1115PA SV-1115PB	OFF	FCV-1115F TRAIN & CONTROLLER CANNOT BE ALIGNED, CONTROL BEHAINS ALIGNED TO TRAIN A	CONTROL ROOM INDICATION. PERIODIC TEST		FOR CUR TO BCS LOOP CONTROLLER	TRAIN A CONTROLLER MORMALLY ALIGNED. MISALIGNMENT OF INDIVIDUAL SVS BOUNDED BY
02.4.20.03.2	PCV-1115F	SV-1115CF SV-1115PA SV-1115PB		CONTROLLER PCV-1115F TRAIN A CONTROLLER CANNOT BE ALIGHED, CONTROL ALIGNS TO TRAIN B CONTROLLER	CONTROL BOOM INDICATION, PRRIODIC TEST	REDUNDANT CONTROLLER AND FLOW	LOSS OF TRAIN A PLOW CONTROLLER FOR CLR TO BCS LOOP C	BOUNDED BY PAILURE OF
02.4.20.04.1	PCV-1115F	TH-1115F	SIGNAL HIGH	INCREASE IN CLE PLOW TO RCS LOOP C IF TRAIN & CONTROLLER ALIGNED	CONTROL ROOM INDICATION, PRRIODIC TESTING	REDUNDANT CONTROLLER	(1.C.03.1.5 EA BEAR)	ASSOCIATED FCY
02.4.20.04.2	PCV-1115P	TH-1115P	SIGNAL LOW	DECREASE IN CLR PLOW TO RCS LOOP C IP TRAIN & CONTROLLER ALIGNED	CONTROL BOOM INDICATION, PRRIODIC TRATING	REDUNDANT CONTROLLER	(SAME AS 2.4.20.3.1)	
02.4.20.05.1	PCV-1115P	GNI	PRESSURS LOW	(SAME AS 2.4.20.1.2)	(9AMB AS 2.4.20.1.2)	(SAME AS 2.4.20.1.2)	(9AHS AS 2.4.20.1.2)	SEPARATE BACEUP M2 SUPPLY FOR BACH OF FDV-1115D/B/F
02.4.21.91.1	PCV-1115C PCV-1115P	PT-1115C PT-1115F LOOP	SIGNAL HIGH	INCREASE IN CLE PLOW TO LOOP OF A PCV-1115C/P OPENING, CLE PLOW TO RCS LOOP C CANNOT BE THROTTLED BELOW SO GPH BVRM WITH PCV-1115P TRAIN S CONTROLLER ALIGNED	C CONTROL ROOM INDICATION	(SANB AS 2.4.20.1.1)	[SANB AS 2.4.20.1.1]	I(SAME 43 2.4.20.1.1) COMMON SPLIT-RANGE CONTROL LOOP FOR FCV-1115C AND FCV-1115F (TRAIN A)
02.4.21.01.2	FCV-1115C FCV-1115P	FF-1115C	" RICHAF FOA	LOSS OF TRAIN A CLR FLOW	CONTROL BOOM INDICATION		LOSS OF TRAIN A FLOW CONTROLLER	
02.4.22.01.1	PCV-1115A/D PCV-1115B/B	PT-1115F LOOP VITAL BUS 84 (8-1416V)	VOLTS LOW	CONTROL FOR BCS LOOP C PCV-1115A/B/C FAIL OPEN AND PCV-1115D/B/F FAIL CLOSED LP	CONTROL ROOM INDICATION	PATES BEDUNDANT CONTROLLERS		PAIDEWALIC CUTC BEGILESO TO
! <del> </del>	PCV-1115C/P			TRAIN A CONTROLLERS ALIGNED. CLB PLON CANNOT BE THROTTLED BBLON ABOUT BO GPM PER ECS LOOP			C, AND IMABILITY TO THROTTLE CLE PLOW SELOW ABOUT SO GPM PRE LOOP FOR COMBINED CLE/HLR	FCV-1115A/B/C AND UPPER LIMIT FOR PRIMARY PATH HLR FLOW TO REMAIN WITHIN RECIRC PUMP FLOW CAPABILITIES
02.4.22.02.1	PCV-1115A/D PCV-1115B/B PCV-1115C/F	18A 	PRESSURE LOW	PCV-1115A/B/C PAIL OPEN AND CLR PLOW CANNOT BE THEOTTLED BELOW ABOUT BO GPM PER ECS LOOP. PCV-1115D/B/P MODULATE ON BACEUP NZ AS REQUIRED	CONTROL BOOM INDICATION, ANNUNCIATION	BACEUP M2 FOR PCY-11150/B/P PLOW CONTROL	ON ISA OR THROTTLE CLR PLOW	ABTORAULIC CALC REQUIRED TO VERIFT FLOW THROUGH WIDS OPEN FOV-1115A/B/C, AND UPPER LIMIT FOR PRIMARY PATH BLR FLOW TO REMAIN WITHIN THE CAPASILITIES
								OF A SINGLE RECIRC PUMP FOR THIS POTENTIAL COMMON-CAUSS FAILURE



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## EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN CHOPRE UNIT I TABLE 2-1: COLD LEG RECIRCULATION FMSA

,		DBAICE ID	COMPONENT 16	BOOM SEULING	LOCAL BEFRECTS AND DEPRHDENT PAILURES	METHOD OF DETECTION .	INHERENT COMPENSATING PROVISIONS	RPPRCT ON ACCS	REMARES
	92.4.23.01.1	PCY-1115D PCY-1115B PCY-1115P	_ CSAS	WOLTS LOW	TRAIN & CONTROLLERS DISABLED FOR FCV-1115D/B/F	CONTROL ROOM INDICATION,	REDUNDANT TRAIN A CONTROLLERS	LOSS OF 1 OF 2 REDUMDANT CONTROLLERS FOR BACK OF PCW-1115D/8/F FOR CLR PLOW CONTROL	
	02.4.21.02.1	FCV-1115D FCV-1115R FCV-1115P	125VDC BUS 82 (72-223)	VOLTS LOW	LOSS OF POWER TO TRAIN B CSAS INVERTERS. TRAIN B CONTROLLERS DISABLED FOR FCY-1115D/8/F		REDUNDANT TRAIN A CONTROLLERS	LOSS OF 1 OF 2 REDUNDANT CONTROLLERS FOR BACE OF FCV-11150/B/F FOR CLR PLON	
i 	02.4.21.01.1	PCV-11150 PCV-11158 PCV-1115P	SWGR #2 125VDC CONTROL POWER (052-1226)	VOLTS LOW	CONTROLLER SELECTOR VALVES FOR PDV-1115D/R/F FAIL IN TRAIN A POSITIONS, TRAIN & CONTROLLERS		REDUNDANT TRAIN A CONTROLLERS	CONTROL LOSS OF 1 OF 2 REDUNDANT CONTROLLERS FOR BACH OF FCV-1115D/B/F FOR CLR FLOW	
-	02.4.24.01.1	FT-1114A LOOP	<u> </u>	SIGNAL HIGH	CANNOT BE ALIGNED BIGH CLE PLOW INDICATION FOR BCS LOOP A	CONTROL BOOM INDICATION	REDUNDANT LOOPS	CONTROL CLE PLOW TO LOOP A MUST BE ISOLATED PER PROCEDURE AT CLOSING MOV-356TO PREVENT BICERDING RECIRC PUMP AND	*VBRIFT PROCEDURE REQUIRES NOV-356 CLOSURE. CLOSURE REQUIRED SINCE PCV-1115D FAILURE AND FI-3114A FAILURES
	02.4.24.01.2	PT-3114A E00F	P1-31144	SIGNAL LOW	LOW CLR PLOW INDICATION FOR BCS LOOP A	CONTROL BOOM ENDICATION	NORB VATITUES	CHARGING PUHP FLOW LIMITS  CLE PLOW TO BCS LOOP A WOULD  BE INCREASED PER PROCEDURE, RESULTING IN CLE AND CLEFARE	CANNOT BE DISTINGUISHED DURING CONSINED CLE/BLR WITHOUT BQ FIT-1112 LOOP SPCV-1115D FAILURE AND FL-3114A FAILURE CANNOT BE DISTINGUISHED DURING CONBINED
					· · · · · · · · · · · · · · · · · · ·			PLOW IMBALANCE, AND POTENTIALLY EXCERDING RECIRC PUMP LIMITATIONS	CLEVILE WITHOUT BY PIT-1112 LOOP. CHARGING PUMP AMMETER USED TO DETERMINE TOTAL
.!	02.4.24.02.1	PT-3114A LOOP	CTO MEST 4 15VDC SUPPLE	OUTPUT VOLTS LOW	(SAMB AS 2.4.24.1.2)	(SABB AS 2.4.24.1.2)	(SAME AS 2.4.24.1.2)	*(SAME AS 2.4.24.1.2)	CHARGING PUMP PLOW *{SAMB AS 2.4.24.1.2}
	02.4.24.03.1	PT-3114A LOOP	VITAL BUS \$5 (8-2903V)	VOLTS LOW	LOW CLR FLOW INDICATION FOR RCS LOOP A	CONTROL BOOM INDICATION	NONS AVAILABLE	OCLE PLOW TO BCS LOOP A WOULD BE INCREASED PER PROCEDURE, RESULTING IN CLE AND CLE/MLE	OPCY-1115D PAILURB AND F1-3114A PAILURB CANNOT BE D1971NGU1948D DURING COMBINED
								PLOW IMBALIANCE, AND POTENTIALLY BECERDING RECIRC PUMP LIMITATIONS	LOOP. CHARGING PUMP ANHETER USED TO DETERMINE TOTAL
	02.4.25.01.1	PT-2114B LOOP	P1-21149 	SIGNAL BIGH	HIGH CLR FLOW INDICATION FOR BCS LOOP B	CONTROL BOOM INDICATION	REDUNDANT LOOPS	CLR PLOW TO LOOP B MUST BE " ISOLATED PER PROCEDURE BY CLOSING BOW-35770 PREVENT	CHARGING PUMP PLOW *VERIFY PROCEDURE REQUIRES HOV-357 CLOSURE. CLOSURE REQUIRED 8/RCB PCV-11/158
			:				······································	BICERDING RECIRC PUMP AND CHARGING PUMP FLOW LIBITS	PAILURB AND PI-2114B PAILURB CANNOT BE DISTINGUISHED DURING CORBURD CLE/BLE WITHOUT BQ FIT-1112 LOOP. CHARGING PUMP AMMETER USED TO DETERMINE
· · · · · · · · · · · · · · · · · · ·	02.4.25.01.2	PT-21149 L00P	F1-2111B	SIGNAL LOW	LOW CLE PLOW INDICATION FOR RCS LOOP B	CONTROL BOOM INDICATION	HONE TATIFUSES	ECLE FLOW TO BCS LOOP 8 WOULD BE INCREASED PER PROCEDURS, RESULTING IN CLE AND CLEVER FLOW INBELANCE, AND POTENTIALLY SICESSOING BEGING PUMP	TOTAL CRARGING FUMP PLOW PECY-11158 PAILURE AND F1-21148 PAILURE CANNOT BE DISTINGUISHED DURING COMBINED





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## EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE AWALTSIS SAN OMOFRE UNIT I TABLE Z-1: COLD LBG RECIRCULATION FHEA

178N 8 DEVICE ID CUMPON⊇NT ID FAILURE MODE	LOCAL BPPECTS AND DEPENDENT FAILURES	MBTHOD OF	INSERNT COMPRESATING PROVISIONS	BPFSCT ON BCCS	BEHARKS
	HIGH CLR FLOW INDICATION POS	CONTROL BOOM LUDICATION	BROUNDANT LOQES	ISOLATED PER PROCEDURE ST CLOSING MOV-358TO PREVENT	*YBRIFT PROCEDURE REQUIRES* NOV-158 CLOSURE CLOSURE REQUIRED SINCE PCV-1115F FAILURE AND PI-2114C PAILURE
<u> </u>				CHARGING PUMP PLOW LIMITS	CANNOT BE DISTINGUISEED DURING COMBINED CLE/NLE WITHOUT EQ PIT-1112 LOOP. CHARGING PUMP
<u> 92.4.25.92.3 PT-21146 LOOP PT-21146 81GNAL LOW _ </u>	LOW CLE FLOW ENDICATION FOR	CONTROL BOOM INDICATION	MONE WATER	*CLB BFOA 10 BCB FOOD C MONTO	AMBRER USED TO DETERMINE TOTAL CHARGING PUMP PLON SPCY-1115P PAILURE AND PI-2114C PAILURE CANNOT BE
				RESULTING IN CLE AND CLE/HLE PLOW IMPALANCE, AND POTENTIALLY RICERDING RECIRC PUMP	DISTINGUISEED DURING COMBINED CLEARLE MITEOUT EQ PIT-1112 LOOP. CEARCING PUMP ANNETER
02.4.25.03.1 PT-2114B LOOP C69 MBST 4 OUTPUT VOLTS LOW PT-2114C LOOP 15VDC SUPPLY	LOW CLR PLOW INDICATION FOR RCS LOOPS B AND C	PERIODIC TESTING	NONS AVAILABLE	CLE FLOW TO ECS LOOPS & AND C WOULD BE INCREASED PER	USBD TO DETERMINE TOTAL CRARGING PUMP PLON *FCV-1115B/P PAILURB AND F1-2114B/C PAILURBS CANNOT BB
				PROCEDURE, RESULTING IN CLE AND CLE/BLE PLOW IMBALANCE, AND POTENTIALLY RECEDENCE RECIBO	DISTINGUISHED DURING COMBINED  CLEFALE WITHOUT EQ PIT-1112  LOOP. CRARGING PUMP ARMETER USED TO DETERMINE TOTAL
02.4.25.04.1 PT-21149 LOOP VITAL 8/3 43A VOLTS LOW PT-2114C LOOP (8-3313V)	LOW CLR FLOW INDICATION FOR RCS LOOPS B AND C	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE VAVITABLE	FIGURE FLOW TO BOS LOOPS B AND C	CHARGING PUMP PLOW *FCV-1115B/F PAILURE AND FI-2114B/C PAILURES CANNOT BE
<del> </del>				PROCEDURE, RESULTING IN CLE AND CLE/BLE FLOW INSALANCE, AND POTENTIALLY BICERDING RECIEC PUMP LIMITATIONS	CLB/BLE WITHOUT BQ PIT-1112 LOOP. CHASCING PUMP ANNEER USBD TO DETRUNINE TOTAL
02.4.26.01.1 CV-2145 VALVE/ACTUATOR OPEN (OR NORMAL)	LOSS OF CHARGING PUMP DISCHARGE SAMPLE LINE	LOCAL INDICATION	NOME REQUIRED FOR CLE OF BLE FLOW RATE. BACKUP MANUAL VALVE		CHARGING PUMP FLOW BACKUP ISOLATION VALVE NOT ACCESSIBLE DURING
02.4.26.01.2 CV-2145 VALVE/ACTUATOR CLOSED	130LATION FOR CLE AND BLE PRIMART PATH BOUNDARY PUNCTION CHARGING PUMP DISCHARGE SAMPLE LINE ISOLATED. MORNAL POR CLE		(RSS-323) FOR INVENTORY	NOME	RECERCULATION WITH THE SOURCE TREM ALSO ISOLATES SAMPLE LINE TO MON-SAPETY RELATED PASS SYSTEM
02.4.21.01.1 CV-4064 VALVB/ACTUATOR OPEN	AND BLR MOV-1100C BYPASSED VIA CV-406A/B, POTENTIALLY	CONTROL BOOM INDICATION	NOWS FOR SELOCA, REDUMBANT CHECE VALVE AND CHARGING PUMP	CAPABILITY FOR SBLOCA,	FINCLUDES SV-406A. REDUNDANT VALVE CV-406B NORMALLY OPEN,
	GAS-BINDING BOTH CHARGING PUMPS DURING VCT LBVBL TRANSISMT PRRCEDING SIS/SISLOP IN SBLOCA, OR PRE-SBLECTED		FOR BECIEC IN OTHER BYENTS	PRE-SELECTED CHARGING PUMP FOR OTHER EVENTS	DOBS NOT AUTO-CLOSE ON SIS/SISLOP OR LOW VCT LEVEL. PFF2CT OF GAS BINDING IN COMMON PART OF SUCTION LINS TO
	CHARGING PUMP DURING LBLOCA, MSLB OR SGTR INJECTION. NO BFFBCT IF DURING BBCIRC				ABDUNDANT PUMP HAS NOT BEEN VERLPIED FOR SUBSEQUENT RECIRC BY TEST OR ANALYSIS





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#### BMSRUBNCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OMOFRE UNIT 1 TABLE 2-1: COLD LEG RECIRCULATION FMSA

	179M #	DBV(CB (D	COMPONENT ID	FAILURB MODB	LOCAL SPPECTS AND DEPRODUCT PAILURES	MRTHOD OF Drtbction	INBERBUT COMPRUSATING PROVISIONS	EPPECT ON ECCS	BENARES
		CY-1964	YALŸB/AÇTUATOR	CTOABD	MARRUP PATH PROM BLENDING TER TO VCT ISOLATED	contror Bood INDICATION	TOWE BEQUIESD	NONB	MORMAL POSITION
	02.4.21.01.3	CV-406A 	VALVE/ACTUATOR		VALUE PAILS OPEN. NO REPECT ON CLE OR BLE RINCE BARBU ENVIRONRENT IN VALUE AREA DORS NOT OCCUR UNTIL RECIEC IS INITIATED, WHICE SEATS VCT		NORS SEGUISED	MONE	(b){2) FUSE PROTECTS OTHER UTILITY BUS LOADS
	02.4.27.02.1	CV-1068	VALVE/ACTUATOR	OPEN	CRECE VALUE TO PREVENT GAS AIMDING HARRUP PATE FROM BLENDING TRE TO CHARGING PUMP SUCTION CANNOT BE ISOLATED DURING INJECTION. CRARGING PUMP	CONTROL ROOM INDICATION, PSRIODIC TRATING	BEDUNDANT VALVE CV-406A PREVENTS GAS BINDING OP CHARGING PUMPS VIA CV-405B	REDUCED REDUMPANCE FOR VCT ESOLATION POST-SES/SESLOP	NORMAL POSITION. INCLUDES SV-406B. DORS NOT AUTO-CLOSE ON SIS/SISLOP OR LOW VCT LEVEL. UPGRADE TO SR AND ADD
		ON 4000			SUCTION PIPING SBISHIC BOUNDARY (VCT CBBCE VALVB VCC-301) UNAPPECTED		100B 650H586		TO 19T PROM REQUIPE FOR WCT 1901 PUNCTION. BOI: MUST BE REVISED TO REQUIRE WALVE CLOSED AND PRECLUDE START OF LOCKED-OUT PURP SIMILAR TO MOV-1100C
·	02.4.27.02.2		VALVE/ACTUATOR VALVE/ACTUATOR		MARKUP PATH PROM BLENDING TRE TO CHARGING PUMP SUCTION ISOLATED VALVE PAILS OPEN. NO EFFECT ON		NONS ERGAIRED NONS ERGAIRED	NOME	BORIC ACID SYSTEM NOT CREDITED POST-ACCIDENT. RWST CREDITED FOR SAFE SHUTDOWN [b][2] PUSE PROTECTS OTHER
					CLE OR BLE SINCE BARSH BNAIRONNENT DORS NOT OCCUR UNTIL RECIRC IS INITIATED, WHICH SEATS YCT CERCE VALVE TO PREVENT GAS BINDING				UTILITY BUS LOADS
	02.4.27.03.1	CV - 406B	- CONTROL SWITCH	VCT	CV-406A OPENS, CV-406B CLOSES, ALIGNING HAIBUP FROM BLENDING TRE TO VCT. CLOSED VALVE PREVENTS GAS BINDING BY THIS PATE	CONTROL BOOM ENDICATION	NONE BEQUIRED	WORK	
	02.4.21.03.2	CA-4068	CONTROL SWITCH	DIRECT	CV-406B OPENS, CV-406A CLOSES, ALIGNING HARBUP FROM BLENDING THE TO WCT. CLOSED VALUE PREVENTS GAS BINDING BY THIS PATH	CONTROL ROOM INDICATION	ROME SEGUISED	NONE	MORMAL POSITION
. r =	02.4.21.03.3	CV-406A CV-406B	CONTROL SWITCE	CONTACTS OPBN	CV-406A AND CV-406B OPEN, BYPASSING MOV-1100C AND POTBNTIALLY GAS-BINDING BOTH CHARGING PUNPS DURING WCT LEVEL TRANSIBNT PRECEDING	CONTROL BOOM INDICATION	(SAMB AS 2.4.27.1.1)	*(SAMB AS 2.4.27.1.1)	*(SAMB AS 2.4.27.1.1)
					S13/S1SLOP IN SELOCA, OR PRESELECTED CHARGING PUMP DURING LBLOCA, MSLB OR SGTR INJECTION. NO EFFECT IF DURING RECIEC				





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## BMBRUBNCY CORE COOLING SYSTEM SINGLE FAILURE AMALTSIS SAN ONOFRE UNIT 1 TABLE 2-1: COLD LEG RECIRCULATION PMSA

	9n	DRAICE ID	GI TKEWOOMOD	FAILURE MODE	LOCAL BFFBCTS AND DBFBNDRNT FAILURSS	METHOD OF Detection	INFREBRIT COMPENSATING PROVISIONS	BFPECT ON ECCS	REMARES
22.4.	27.03.4	CY-4964 CY-406B	CONTROL SALICA	CONTACTS CLOSE	CY-4064 AND CY-4068 CLOSE	CONTROL ROOM INDICATION	NOME BEGNISSD	NOME	BORIC ACID SISTEM NOT CRBDITED POST-ACCIDENT, RUST AVAILABLE POR SAPE BRUTDOWN
02.4.	27.03.5	CV-106A CV-106B	CONTROL SWITCH	CONTACTS GROUNDED	CRABGING PURP SUCTION (b)(2) PUSE BLOWS, OB-ENSEGIZING AND OPENING CV-4064/B, WRICE BYPASSES	CONTROL ROOM INDICATION	(1.1.75.4.2 EA BBAC)	*(SAMB A3 2.4.27.1.1)	0(SAMB AS 2.4.27.1.1)
				**	HOV-1100C, POTRUTIALLY GAS-BINDING BOTH CHG PPS DURING VCT LEVEL TRANSIBHT PRECEDING #13/515LOP IN				
			III TO BIIQ	VOLTS LOW	SBLOCA, OR PER-SELECTED PUMP IN LBLOCA/MSLB/SGTE INJECTION. NO EPPECT ON RECIRC CV-406A AND CV-4068 OPEN.	CONTROL ROOM INDICATION	NOME FOR SELOCA, REDUNDANT	*POTENTIAL LSS OF CLR PUMPING	PAT LEAST ONE OF CV-406A/8
		CA-106B CA-106Y	UTILITY BUS 	-	BYPASSING MOV-1100C. POTRYTIALLY GAS-BINDING BOTH CHARGING PUMPS DURING VCT		CHECK VALVE AND CHARGING PUMP FOR RECIRC IN OTHER RVSMTS	CAPABILITY FOR SBLOCA,	MUST BE FAIL CLOSED AND/OR LOCEED CLOSED. EGI: MUST BS REVISED TO REQUIRE VALVE CLOSED AND PRECLUDE START OF
!					LAVEL TRANSIENT PRECEDING SIS/SISLOP IN SELOCA, AND PRESELECTED PUMP DURING LBLOCA, MSLB, SGTR INJECTION.				LOCEED-OUT PUMP SINICAR TO MOV-1100C PAILURE TO CLOSE
02.4.	27.05.1	CA-4068	ISA	BBB33ABB FOM	NO RPPROT IP DURING RRCIRC CV-406A AND CV-406B OPRN, BTPASSING MOV-1100C, POTRNTIALLY GAS-BINDING BOTH	CONTROL ROOM INDICATION	MOME FOR SELOCA, REDUNDANT CHECE VALVE AND CHARGING PUMP FOR SECTEC IN OTHER EVENTS	CAPABILITY FOR SHLOCA, PRE-SELECTED CHARGING PUMP FOR	
					CHARGING PUMPS DURING VCT LEVEL TRANSIENT PRECEDING SISYSISLOP IN SELOCA, AND PRESELECTED PUMP DURING			OTHER BYENTS	REVISED TO REQUIRE VALVE CLOSED AND PRECLUDE START OF LOCAED-OUT PURP SINICAE TO MOV-1100C FAILURE TO CLOSS
02.4.	. 28.01.1	BCV-4274	VALVB/ACTUATOR	OPSN	LBLOCA, MSLB, SGTR INJECTION. NO REPECT LE DUBLING RECIRC RCP BEAL RETURN DIVERTED TO	CONTROL BOOM INDICATION	MONE FOR SE ENVENTORY, MONE	*UNISOLABLE DIVERSION OF \$1/RCS	BRAST (RASENTORS AND SI/FA LO-FO BAST FRANK TRIB SELDOIRE
ļ		·			LOOP A VAPOR SEAL BEAD TAME, WEICH OVERPLONS TO ECOT		BEQUIRED FOR PLOW	OR CLE PLOW DUE TO CONTINUED  RCP SEAL FUNCTIONING	CALCS BUST BE REVISED TO INCLUDE POTENTIAL INVENTORY DIVERSIONS TO BODT
02.4.	. 20 . 01 . 2	RCV-427A	WALVE/ACTUATOR	CLOSED	LOOP A VAPOR SEAL MEAD TAME CANNOT BE REPILLED MITEOUT LOCAL MANUAL OPBRATION OF	CONTROL BOOM INDICATION	NORE EEGLIEED	1091	BORRAL POSITION
	2á ói i	BCV-427A	VALVE/ACTUATOS	RG	BYPASS VALUE, NO EPPECT ON INJECTION OR RECIEC PLOW OR INVENTORY VALUE PAILS CLOSED DUR TO	CONTROL BOOM INDICATION	NONE BEQUIEED	NONE	(6)72) PUSB PROTECTS OTHER 125
		ECV-4273	VALVB/ACTUATOB		POWER ISOLATION BY (b)(2) PUSI BCP SBAL RETURN DIVERTED TO LCOP B VAPOR SPAL HEAD TANE,		NOMB POR SI INVENTORI, NOMB REĢULĒŠO FOR FLOW	*UNISOLABLE DIVERSION OF SIZECT AWARDORY TO ROOT. MORE ON SICE CLE FLOW DUE TO CONTINUES	VDC BUS AT LOADS  *BWST INVENTORY AND ST/FW  LO-LÓ BWST LÍVÍST TRIP SSTPOINT  CALCS NUST S8 REVISED TO
•					MATCH ONERSTOMS TO BUDI			RUB 284F ENDILLINGAR OR OFF FROM DOR TO CONTINUES	INCLUDE POTENTIAL INVENTIBY DIVERSIONS TO BID!

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#### EMBRGENCY COBB COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONDERS UNIT 1 TABLE 2-1: COLO LEG RECIRCULATION FMEA

í 	[TBH	DEVICE ID		FAILURE MODE	LOCAL EFFECTS AND DEPENDENT PAILURES	MSTHOD OF Drybction	INHERENT COMPENSATING PROVISIONS	BFFECT ON BCCS	REMARES
1	. 02.4.28.02.	2 HCY-427B		CLOSED .	LOOP 8 VAPOR SEAL HEAD_TANE CANNOT 88 REFILLED WITHOUT LOCAL MANUAL OPERATION OP REPASS VALVE. NO REPECT ON	CONTROL ROOM INDICATION		•	NORMAL POSITION
	02.4.20.02.1	<u>  BCA-</u> 4518	VALVS/ACTUATOR	ið	INJECTION OR RECIEC PLOW OR INVENTORY VALVE FAILS CLOSED DUE TO POUR ISOLATION OF (6)(2) FUSE	CONTROL BOOM INDICATION	None Bedaibad	HONB	(b)(2) PUSB PROTECTS OTHER 125
	02.4.28.03.1	BCV-427C	VALVB/ACTUATOR	OPBN	BCP SEAL RETURN DIVERTED TO LOOP C VAPOR SEAL READ TANE, WHICH OVERPLOWS TO ECDT	CONTROL BOOM INDICATION	BESOISED LOS LTON HORE LOS ELON	**************************************	RWST ENVENTORY AND SI/FW
	02.4.28.01.1	. HCV-427C	VALVE/ACTUATOR	CLOSED	LOOP C VAPOR SEAL READ TAME CANNOT BE REFILLED WITHOUT LOCAL MANUAL OPERATION OF STPASS VALVE. NO REFECT ON INJECTION OR RECIRC PLOW OR	CONTROL BOOM INDICATION	NORE ERGUIRED		DIVERSIONS TO REDT
L	02.4.28.03.1	BCV-427C	VALVE/ACTUATOR	EQ	INVENTORY VALVE PAILS CLOSED DUE TO POWER ISOLATION BY (b)(2) PUSE	CONTROL ROOM INDICATION	NONE SEGULESD		(b)(2) PUSE PROTECTS OTHER 125
	02.4.28.01.1	#CV-4274 #CV-4276	<u>utility bus</u> (8-1502)	VOLTS LOW	VALVES PAIL AS-IS, CONTROL BELAT OPERATE AND RESET COILS CANNOT BE EMERGIZED TO CHANCE STATE OF CONTACTS IN SOLENOID	CONTROL ROOM [ADICATION -	CUS PLON  NOWS BEQUIESD FOR INTECTION OR  NOWS FOR SIVERS INVENTORS.	POTENTIAL UNISQUABLE DIVERSION OF SI/ECS INVENTORY TO ECOT, NOME FOR INJECTION OR CLE PLOW DUE TO CONTINUED PUNCTIONING OF	LO-LO RYST LEVEL TRIP SETPOINT CALCS HUST BE REVISED TO
<u> </u>	02.4.28.05.1	BCV-427A BCV-427B BCV-427C	1254DC BUS 11 [72-130]	VOLTS LOW	VALVE POWER CIRCUITS VALVES FAIL CLOSED	CONTROL ROOM INDICATION	GREIDBER ENOK		DIVERSIONS TO RCDT
1			· · · · ·		<u></u>			·	
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			· ··						

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TABLE 2-2: COLD LEG RECIRCULATION BOUNDARY VALVE ANALYSIS



EMSEGENCY CORE COOLING SYSTEM SINGLE FAILURS ANALYSIS
SAN ONOFRS UNIT I
BOUNDARY VALVE ANALYSIS

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2.1.01 CRS-01 2.1.02 CRS-0 12.1.03 UNE M 12.2.01 CRS-0 12.2.02 CRS-0 12.2.04 VCC-3 12.3.01 CRS-0 12.3.02 CRS-0 12.3.04 CRS-0 12.3.04 CRS-0 12.3.05 CRS-0 12.3.05 CRS-0 12.3.05 CRS-0 12.3.05 CRS-0 12.3.05 CRS-0 12.3.05 CRS-0										
2.1.02 CRS-0  12.1.03 UNE M  12.2.01 CRS-0  2.2.02 CRS-0  2.2.03 UNE M  2.2.04 VCC-3  2.3.01 CRS-0  2.3.02 CRS-0  2.3.04 CRS-0  2.3.04 CRS-0			NO	NONB			CAP			§ G-45A MINIPLOW VENT/DRAIN
2.2.01 CBS-0 12.2.02 CBS-0 2.2.03 UME MI 2.2.04 VCC-3' 2.3.01 CBS-0 2.3.02 CRS-0 2.3.03 CBS-0 2.3.04 CBS-0		CHRCE		NONE REQUIRED	. –		CAP		OPBN	RECIRC PUMP G-45A BEARING SERVICE WATER SUPPLY.
2.2.01 CBS-0 12.2.02 CBS-0 2.2.03 UME MI 2.2.04 VCC-3' 2.3.01 CBS-0 2.3.02 CRS-0 2.3.03 CBS-0 2.3.04 CBS-0										NON-EQ BACEUP VALVE OPENS AS PART OF PUMP START,
2.2.01 CBS-0 12.2.02 CBS-0 2.2.03 UME MI 2.2.04 VCC-3' 2.3.01 CBS-0 2.3.02 CRS-0 2.3.03 CBS-0 2.3.04 CBS-0										ROWEVER, AUTOMATIC CONTAINMENT ISOLATION VALVES
2.2.01 CBS-0 12.2.02 CBS-0 2.2.03 UME MI 2.2.04 VCC-3' 2.3.01 CBS-0 2.3.02 CRS-0 2.3.03 CBS-0 2.3.04 CBS-0										CV-517 AND CV-115 PREVENT DILUTION OF SUMP BY
2.2.01 CBS-0 12.2.02 CBS-0 2.2.03 UME MI 2.2.04 VCC-3' 2.3.01 CBS-0 2.3.02 CRS-0 2.3.03 CBS-0 2.3.04 CBS-0	455515	a		H2118			MAND			CONTINUED SERVICE WATER PLOW
2.2.02 CBS-0  2.2.03 UNE MI  2.2.04 VCC-3' 2.3.01 CBS-0 2.3.02 CRS-0 2.3.03 CBS-0 2.3.04 CBS-0	MARDLE	CLOSED	MO	NONB			NONE			GRAIN GRAIN
2.2.02 CBS-0  2.2.03 UNE MI  2.2.04 VCC-3' 2.3.01 CBS-0 2.3.02 CRS-0 2.3.03 CBS-0 2.3.04 CBS-0	.005	CLOSED	MO	NONE			CAP			# G-45B MINIFLOW VENT/DRAIN
2.2.03 UNE MI 2.2.04 VCC-3' 2.3.01 CBS-0' 2.3.02 CRS-0' 2.3.03 CRS-0' 2.3.04 CRS-0'		CHECE	■V	NORE REGAIRED			EV-3011		OPRW	RECIEC PUMP G-458 BEARING SERVICE WATER SUPPLY.
2.2.04 VCC-3' 2.3.01 CBS-01 2.3.02 CRS-01 2.3.03 CR3-02 2.3.04 CRS-01	· · · · · · ·	COBVE		hone position					<u> </u>	NON-EQ BACKUP VALVE OPENS AS PART OF PUMP START.
2.2.04 VCC-3' 2.3.01 CBS-01 2.3.02 CRS-01 2.3.03 CR3-02 2.3.04 CRS-01										HOWEVER, AUTOMATIC CONTAINMENT ISOLATION VALVES
2.2.04 VCC-3' 2.3.01 CBS-01 2.3.02 CRS-01 2.3.03 CR3-02 2.3.04 CRS-01										CV-537 AND CV-115 PREVENT DILUTION OF SUMP BY
2.2.04 VCC-3' 2.3.01 CBS-01 2.3.02 CRS-01 2.3.03 CR3-02 2.3.04 CRS-01				···	• • • •					CONTINUED SERVICE WATER PLON
2.3.01 CBS-0 2.3.02 CBS-0 2.3.03 CB3-0 2.3.04 CBS-0	MESDLE	CLOSED	NO	MOME			HONE			# G-SA DISCHARGE PRESSURE INSTRUMENT (PT-1119A)
2.3.01 CBS-0 2.3.02 CBS-0 2.3.03 CB3-0 2.3.04 CBS-0										N
2.3.02 CRS-0 2.3.03 CR3-0 2.3.04 CRS-0		CLOSED	MO	NONB	•		VCC-348, 384		CLOSED	4 G-8A DSD MINIPLOW LINE TO RWST
2.3.03 CR3-0 2.3.04 CRS-0		CLOSED	NO	NONB			CAP ,			# G-45A/PT-500 TEST CONNECTION
2.3.04 CRS-0		CLOSED	NO.	NONB			CAP			# G-45A/FT-500 TBST CONNECTION
		CLOSED	NO	NONE			CAP			# G-45B/FT-SO1 TBST CONNECTION
7.1.03 CH2-0		CLOSBD CLOSBD	NO No	MONE			CAP			# G-45B/FT-501 TBST CONNECTION # REACTOR CAVITY DBWATERING PUMP DISCHARGE ISOLATION
2.1.06 CBS-0		CLOSED	183	MONE			CR9-029, 030 CRS-026.028		CLOSED	REPUBLING CAVITY DRWATBRING ISOLATION
2.3.07 CRS-0		CLOSED	NO 133	NON3			CAP			# SPRAT MOZZLE BYPASS VENT/DRAIN
2.3.08 CBS-0		CLOSED	185	NONS			NONS			SPRAT MOZZLB BYPASS
2.1.09 CBS-1		CLOSED	NO	NONE			CAP			# BECIRC LINE VENT BETWEEN PENETRATION AND RECIRC BI
2.3.10 CBS-3		CLOSED	NO	NONE			NONE			* RECIRC LINE DRAIN BRIWERN PENETRATION AND RECIRC
										<u> </u>
2.3.11 CBS-3		CLOSED	NO	NONE			NONS			BECIRC LINE DRAIN DOWNSTRBAN OF RECIRC HI
2.3.12 CBS-3	-319	OPEN	NO	NONE			CRS-320		CLOSED	BECIRC LINE DRAIN BETWEEN HE AND CHARGING SUCTION.
				T1.771.215					· ·	VALVE OPEN VIOLATES LTS SEISMIC BOUNDARY CRITERIA
2.3.13 CBS-3	111	CFOSED	NO	NONB			HONB			BRCIRC LINE VENT BETWEEN HE AND CHARGING CONNECTION
1 1 14 606 1	116	CLAGDA	NO.	NOND			NONE			3 RECIRC LINE VENT BETWEEN HI AND CHARGING
2.3.14 CRS-3	340	CLOSED	<u>NO</u>	NONB						CONNECTION
2.3.15 CBS-3	125	CLOSED	NO	NONS			MONB			* RECIRC LINE DRAIN BETWEEN HI AND CHARGING
L. J. 13 CB3 J.	•••	010380		W0.73			HOND			COMMRCTION
2.3.16 CRS-3	321	CLOSED	YBS	CBS-322		CHRCA				REPUBLING WATER PUMP DISCHARGE BYPASS TO SUCTION
2.3.17 CRS-3		CLOSED	NO	NONE		*****	CBS-312, 313, 315		CLOSED	# RWST SUCTION CONNECTION TO FILTER PUMP
2.3.18 CRS-3		CLOSED	NO	NONB			NONE			RWST SUCTION DRAIN
2.3.19 CBS-3	301	CHECE		MOV-883	ra e	OPBN			'	BUST OUTLET CHECK VALVE NOT SEAT LEAGAGE TESTED.
										BEDUNDANT VALVE MOV-883 CLOSED FOR RECIRC BY
										PROCEDURE BUT MAY BE SINGLE PAILURE
2.3.20 CRS-4								_ ,		The state of the s
2.3.21 VCC-3/ 2.3.22 VCC-3/		CLOSED CLOSED		NONE PROM		** ****	SHON 2 KON		# 14 MATE 1	SPENT PUBL PIT SUCTION CONNECTION  NOV-1100B/D UPSTREAM SAMPLE





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## BREAGBACT CURE COOLING SYSTEM SINGLE FAILURS ANALYSIS SAN ONOFRS UNIT 1 BOUNDARY VALVE AMALYSIS

!	ETBN #	TAG (			) (	AFBTY BRUATED BACKUP	NC/AUTO!	(NON-SASETT RELATED BACKUP	NC/A970?	BENASES
:				-						
	02.3.23	ACC-353	_ CLOSED	_ NQ _	NONB			CAP		# FLASH TAME PATH VENT
!		VCC-324	CLOSED		VCC-405		CLOSED			PLASE TAME PATH ISOLATION
•		BA9-345	CLOSED	MO	NOMB			NONE		BLENDING THE STPASS
	02.3.26.	VCC:101	CORCI		"WON-1100C' CA-100B'	ycc-111	OTUA	NON8		VCT OUTLET CHECE. REDUNDANT VALVES REQUIRED TO
										ISOLATE RIDROGEN COVER GAS PLON TO CHARGING PUNP
i										SUCTION. VCC-311 IS CHECK VALVE. CV-4058 AND
										SBRIES VALVE CV-406A PAIL OPEN AND ARE
i	02.1.27	CV-410	AUTO		CV-411		OTUA			SBAL WATER RETURN TO WCT
:		RV-249	RELIEF		NONE REGULEED		2010			PASSIVE. SEAL WATER HE RELIEF TO VCT. SET PT 140
		. •			PANO SPECIFICA	<del></del>				PSIG
	02.1.10	VCC-354	CLOSED	NO	MONB			RONG		* SEAL WATER RETURN DRAIN
1		VCC-317	CLOSED	MO	NONE			NONB		* SBAL WATER RETURN DRAIN
,		VCC-316	CLOSED	NO	NONE			NOME		* SEAL WATER RETURN VENT
'	02.3.33	VCC-383	CLOSED	NO	NONE			SPENT RESIN TANK		· SEAL WATER RETURN PILTER DRAIN
		VCC-152	CLOSED	MO	NONE			MONE		SEAL WATER RETURN FILTER VENT
	02.3.35	ACC-355	CLOSED	NO	NONE	, , , , , , , , , , , , , , , , , , , ,		NONE		DIRECT BORIC ACID INJECTION PATH TO CHARGING PUMP
i										SUCTION. BORIC ACID STSTEM DOBS NOT HART LTS
										SBISHIC CRITBRIA
	02.3.36	CV-528	OPSH	NO	CV-527		OPBN	NONE		SEAL WATER RETURN CONTAINMENT ISOLATION. VALVES
										ARE REMOTE-MANUAL. BOL REV REGO TO SPECIFY CLOSURE
										ON SIS/SISLOP
:		PM!!-352	CHECE		PMU-351		CHECK			DIRECT DILUTION PATH TO CHARGING PUMP SUCTION
l i	02.3.35	543-319	CHBCE		NOME BEGALESD					• PASSIVE. BORIC ACID TRANSPER PUMP DISCHARGE.
<b>L</b>										SBRIBS VALVE CV-334 FAILS OPEN. VALVE IS NOT IN
.:	02 2 13	VCC-321	CLOSED	MO	PHON			MONB		IST PROGRAM
•	02.3.33	401-151	CEOSED	#9	MAN TO THE PART OF			MUBE		DIRECT BORIC ACID INJECTION PATH TO CHARGING PUMP SUCTION. BORIC ACID STSTEM BORS NOT MEET LTS
										SEISHIC CRITERIA
!	C2.3.40	RV-259	RELIEF		VCC-314		OP3N	NCN3		PASSIVE. TEST PUMP DISCHARGE BELIEF TO VCT.
p. I					****		0.54	WORD		LEARAGE IN RECIEC HODE WITH FAILED VCT REQUEES
,										VCC-314 CLOSURE
<u>.</u> '	02.3.41	UNE MREEL	B CLOSBO	NO	NONE			NONE		* TEST PUMP PRESSURE INSTRUMENT (PI-1120) DRAIN
	02.3.42	CV-2145	OPBN		MONB			RSS-325, RSS-337, CV-2022		* CHARGING PUMP DISCHARGE SAMPLE ESOLATION. BOI DOES
• [										NOT REQUIRE CLOSURE OF CV-2145
·	02.3.43		CH3CE		MOV-880		CLOSED			ALTERNATE CLE PATH FROM BSF WTR PUMP
· <u>ˈ</u>		BCP-313	CLOSED	NO	NONS			BLIND FLANGE		SBAL WATER FILTER C-429 VENT
	92.3.45			NO	NONB			RCP-307		# SEAL WATER PILTER C-423 DRAIN
	02.3.46		CLOSED	NO.	NONS			BCP-307		8 SBAL WATER PILTRE C-423 DRAIN
*****	02.3.47		CLOSED	. NO _	NONB			BLIND PLANGE		SBAL WATER PILTER C-42 VENT
i		BCP-304	CLOSED	NO NO	NCNE			RCP-108		SBAL WATER FILTER C-42 DRAIN
	62.3.49 62.1.50	ETP-105 CBS-327	CLOSED	NO NO	NONE			RCP-308	-	# SBAL WATER FILTER C-42 DRAIN
<b>1</b>	02.3.51		CLOSED		NONB NAWR			NONE		8 RO-521 TAP 80-521 TAP
	02.3.31		CLOSED	NO NO	HONE			RCP-045		* BO-321 TAP & BPC A SEAL RETURN VENT
		RCP-057	CLOSED	NO NO	NONE			HONB		* BCP A SEAL BRIURN DRAIN
	*******	mot va:			3702			11/11/20	•	- BUT IN CORD BUILDED DERLE





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#### BMSBGBNIY CORS COOLING SYSTEM SINGLE FAILURE AMALYSIS SAM OMGFRE UNIT I BYUNDARY VALVE AMALYSIS

ITEM #	(SAFBTY	RBLATED NC/AUTO?	BOUNDARY-) LOCKED?	SAFSTY RE	LATED BACKUP NC/	) ( AUTO?	NON-SAFETY RELATED BACKU TAG #	)P) MC/AUTO?	REMARES
** 2	:=======	. Antaile		·					## '
02.1.54						BUONB			RCP A VAPOR SBAL BRAD TANK MAREUP DRAIN
02.3.55		CLOSED	NO	NONS		NONE		•	VAPOR SEAL BEAD TANE MARSUP BYPASS. OPEN RESULTS IN PLOW TO RCDT
02.3.56				TNORB		_MONE			RCP A VAPOR SHAL HEAD TANK MARRUP, OPEN BESULTS IN
	RCP-062		NO NO	ENON ENCH		RCP-046	•		) RCP B SRAL RBTURN VENT : RCP B SSAL RBTURN DRA[N
02.3.59 02.3.60		CLOSBD CLOSBD	NO No	BUNB		NONB NONB	,	1	BCP B VAPOR SHAL HEAD TANK MARBUP DRAIN BCP B VAPOR SHAL HEAD TANK MARBUP BYPASS. OPEN
02.3.61	HCV-4278	CLOSED	NO	NOM8		NONB			RESULTS IN FLOW TO BEDT REP B VAPOR SEAL HEAD TANK HARBUP. OPEN RESULTS IN
02.3.62				<b>MCM8</b>		BCP-144			FLOW TO RCDT BCP C SRAL RRTURN VENT
02.3.63 02.3.64	BCP-020	CLOSED CLOSED	NO NO	NOME		MOMB			CCP C SEAL RETURN DEAIN  RCP C VAPOR SEAL BEAD TANK MARRUP DEAIN
02.3.65			NO	- Mon B		NOMB		!	RCP C VAPOR SEAL HEAD TAME MARRUP STPASS. OPEN RESULTS IN PLOW TO RCDT
U2.3.55				NONB.		NONE			RCP C VAPOR SEAL SEAD TANK MAREUP. CPRM RESULTS IN PLOW TO RCDT
02.3.67 E	RCP-003	CLOSED	MO C#	NOMB		BLIND PLANGE RCP-013			LOOP A SEAL INJECTION PILTER VENT LOOP A SEAL INJECTION PILTER DRAIN
02.3.69 ( 02.3.70 (	ECP-029	CLOSED	NO NO	NONE NONE		RCP-013 RCP-031			LOOP A SEAL INJECTION PILTRE DRAIN  RCP A SEAL INJECTION DRAIN
02.3.71 E	RCP-010	CLOSED	NO NO	ŘĆ W B Now B		BLIND PLANGE RCP-014		CLOSED #	LOOP B SBAL INJECTION FILTER VENT LOOP B SBAL INJECTION FILTES DRAIN
02.3.73 E	RCP-010	CLOSED CLOSED	NO No	NOM E		RCP-014 RCP-032		CLOSED #	LOOP B SEAL INJECTION PILITER DRAIM BCP B SEAL INJECTION DRAIM
02.3.75 E	ICP-108		NO NO	RONE .		BLIND PLANGE RCP-112		CLOSED	LOOP C SBAL INJECTION FILTER VENT LOOP C SBAL INJECTION FILTER VENT
02.3.77 E	ICP-128	CLOSED	NO NO	HONE NONE	• • • • • • • • • • • • • • • • • • • •	RCP-112 RCP-130		-	LOOP C SEAL INJECTION FILTER DRAIN BCP C SEAL INJECTION DRAIN
02.3.79 5		CHECE		MOA-820Y	AUTO				LOOP SE BRADER CHECK VALVE. ALLOWED THEM SPEC LRAKAGE 5 GPM AT ANT PRESSURE
02.3.80 9		CHBCE	***	HOA-820B		· <u></u>			LOOP 8 SI BRADER CHECK VALVE. ALLOWED TECH SPEC LBARAGE 5 GPM AT ANY PRESSURE
02.3.81 S		CHBCE		NOV-850C	AUTO			## ###################################	LOOP C SI HRADBE CHECK VALVE. ALLOWED TECH SPEC LEARAGE 5 GPM AT ANY PRESSURE
V2.3.82 P	U4-1112	OPEN	NO.	CV-304, CV-305	OPEN				CV-304 IS MORMALLY OPEN, CV-305 MORMALLY CLOSED. CV-304 PAILS CLOSED ON LOSS OF AIR. OTHERS HAVE BACEUP HZ FOR HLR PRIMARY PATH PUNCTION

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SECTION 3: HOT LEG RECIRCULATION

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#### HOT LEG RECIRCULATION NOTES

1. Item numbers in this section have been assigned as follows:

03.1: Primary Hot Leg Recirculation (HLR) path and boundary devices

03.2: Alternate HLR path and boundary devices.

- 2. Table 3-1 is the Failure Modes and Effects Analysis (FMEA) for the HLR function. Table 3-2 is the associated boundary valve analysis.
- 3. The HLR function uses portions of the Cold Leg Recirc (CLR) and Containment Spray (CSS) systems, as well as RCS boundary devices for the Safety Injection (SIS) function. The HLR FMEA and boundary valve analysis tables include only those items unique to HLR or which are part of CLR/CSS/SIS but have different functions (eg. safe state) for HLR service. To limit the ECCS\_SFA database to a reasonable size, items with the same function for HLR as for CLR/CSS/SIS have not been duplicated to this Section.
- 4. Potential single failure susceptibilities in the FMEA table are flagged with "\*" as the first character of the associated ECCS EFFECTS field. Other open items (eg. required procedure or calculation changes) are flagged with "\*" as the first character of the REMARKS field.
- Potential single failure susceptibilities in the Boundary Valve Analysis table are flagged with "\*" in the unlabelled field adjacent to REMARKS. Items flagged with "#" in the unlabelled field adjacent to REMARKS are acceptable from a single failure standpoint subject to credit for SEP Topic III-6 seismic boundary criteria.

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## HOT LEG RECIRCULATION REFERENCES

Piping and Inst	rumentation Diagrams
5178100	Reactor Coolant System
5178105	Pressurizer System
5178110	RCP Seal Water System (Sh 1)
5178111	RCP Seal Water System (Sh 2)
5178120	Containment Spray and Recirculation System (Sh 1)
5178121	Containment Spray and Recirculation System (Sh 2)
5178130	Letdown and Residual Heat Removal System
5178135	Volume Control and Charging System (Sh 1)
5178136	Volume Control and Charging System (Sh 2)
5178140	Letdown Demineralizer System
5178145	Boric Acid System
5178150	Reactor Cycle Sampling System
5178403	Gaseous Nitrogen System (Sh 4)
5178404	Gaseous Nitrogen System (Sh 5)
5178443	Instrument and Service Air System (Sh 4)
5178447	Instrument and Service Air System (Sh 8)
5178449	Instrument and Service Air System (Sh 10)
	2
Elementary Diag	rans
63719	FY-1112
64362	CV-525/527
64371	CV-526/528
455437	CV-410/411
455438	CV-412
455448	CV-276, CV-202/203/204, CV-287/288, CV-304/305,
	CV-413/414
5151796	MOV-813/814, MOV-822A/822B, MOV-833/834
5151907	Vertical Board Instrument Power Supply
5159553	Train B CIS Relays
5159756	CV-957
5180605	CV-962
Other Drawings	
63714	Loop: PY-1430C/H
	-
<u>Procedures</u>	
SO1-1.0-10	Reactor Trip or Safety Injection
SO1-1.0-12	SI Termination
SO1-1.0-20	Loss of Reactor Coolant
SO1-1.0-22	Post-LOCA Cooldown and Depressurization
SO1-1.0-23	Transfer to Cold Leg Injection and Recirculation
SO1-1.0-24	Transfer to Hot Leg Recirculation
SO1-4-39	Safety Injection Alignment
S01-4-41	Containment Spray and Recirculation System
·	Alignment
SO1-12.3-7	Monthly Sequencer Testing
SO1-12.3-35	Containment Spray and Recirculation System Safety
	Related Alignment
SO1-14-40	Control of Locked Valves

Other Documents

System Description: Safety Injection, Recircula-SD-S01-580

tion and Containment Spray Systems

SD-S01-590

System Description: Safeguard Load Sequencing

System

M89048

Response to Generic Letter 88-14, "Instrument Air

Supply System Problems Affecting Safety Related

Systems", dated July 5, 1989

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TABLE 3-1: HOT LEG RECIRCULATION FMEA

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## EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 3-1: BUT LEG RECIRCULATION FHEA

ITEM #	DBAICB ID	COMPONENT ID	PAILURE MODE	LOCAL BPPECTS AND DBPENDENT FAILURES	DETECTION WELDOD OF	- BEOATATORE INRESENT COMBENSATING	EPPECT ON ECCS	BEMARES
		***************************************						F
1.1.01.01.1	L MANUAL VALVES.	<del></del>						THERE ARE NO VALVES IN THIS
	PRIMARY PATH PLON							CATEGORY
3.1.01.02.1	CORCE VALVES.		NONE (PASSIVE)					
	PRIMARY PATH				*			INCLUDES ACC-003
1 1 49 61 1	PLOU MANUAL VALVES.		0001		•			
3.1.46.01.1	PRIMARY PATE		OPEN	PLOW TO LOOP A OR A COLD LEG	PRRIODIC SURVEILLANCE	ALTERNATE PATE	BLE PRIMARY PATH DISABLED	1988 TABLE 3-2. NORMAL
	BOUNDARY			FLOW TO LOUP & UK & CULD LEG				THROTTLED POSITION OF PZR-020, -021 CONSIDERED IN ANALYSIS OF
	<del></del>							ALR PLOW BROWIERBRENTS.
								ADMINISTRATIVE CONTROLS OR
								ANTAR FOCEING BESTIERD' SINCE
								MISPOSITIONING IS NOT
								DETECTABLE DURING NORMAL OPERATION
<u> </u>	MANUAL VALVES.		Crosso	REDUCED WARN-UP PLOW THROUGH	PERIODIC SURVEILLANCE	NONE REQUIRED	HOME	
	BTAG TRABISG			PZR SPRAY LIMB. NO SPPRCT ON RCC9				
3.1.02.02.1	CHE OR RELIEF			ECC3				SHEET AND MA HACKING AN BOTA
	VLV, PRIMART							THERE ARE NO VALVES IN THIS
	PATH BOOMDARY					•		
4-1-84-81-1	111-1111 100P	11-1112	SIGNAL BIGB	PRIMARY PATH BLE PLOW MAY BE	CONTROL ROOM INDICATION	ALTERNATE PATE		SUBTROD OF DETECTION
				SRT LOW BY REMOTE-MANUAL CONTROL (MODULATION) OF			PATH	(COMPARISION OF FCV-1112
				PCV-1112				POSITION DEMAND, PIT-1112 PLOW INDICATION, CHARGING PUMP
								MOTOR AMPS,
								FI-3114A/2114B/2114C PLOW
								INDICATION AND PCV-1115D/B/P
								POSITION DENAND) CANNOT Distinguish between PCV and
	B/A 1114 1445							INDICATION FAILURES
3.1.03.01.2	P17-1112 LOOP	PT-1112	SIGNAL LOW	PRIMARY PATH BLR PLOW HAY BE SET BEGR BY REMOTE-MANUAL	CONTROL BOOM INDICATION	ALTERNATE PATE	POTENTIAL INDALANCE IN CLE/BLE	*(SAME AS 3.1.3.1.1)
				CONTROL (MODULATION) OF			PLON	
				PCV-1112				
3.1.03.01.3	FIT-1112 LOOP	PT-1112	BQ	PRIMARY PATH BLR PLOW CANNOT	CONTROL ROOM INDICATION	ALTERNATE PATE	POTENTIAL INDALANCE IN CLE/BLE	*(SANE AS 3.1.3.1.1)
				BE MBASURED	· · · · · · · · · · · · · · · · · · ·		PLOW OR LOSS OF BLR PRIMARY	
3.1.03.02.1	PIT-1112 LOOP	REG BUS #4	VOLTS LOW	DOWNSCALE PAILURE OF HER	CONTROL ROOM INDICATION	ALTERNATE BLR PATE	PATE LOSS OF BLR PRIMARY PATE	POLUCE ENIDENILE DOD HIS
		[8-1489]		PRIMARY PATH PLOW INDICATION	AANTAN BAAN TENTANITAN	uniografia app 1910	MAS OF BUE LEIGHER LEIS	*RANGE INADEQUATE FOR HLR PRIMARY PATE FUNCTION, BACKUP
								PLOW DETERMINATION METHOD
								REQUIRED IN BOLE IRRESPECTIVE
.1.04.01.1	PCV-1112	VALVE/ACTUATOR	OPRN	PCV-1112 CANNOT BE CLOSED FOR	CONTROL POOM INDICATION	BEDUNDANT VALVES (CV-104.		OF PIT-1112 FAILURB
	<del></del>			CLE BOUNDARY OR MODULATED FOR		CV-305) FOR CLR BOUNDARY.	REDUCED REDUNDANCY FOR CLR BOUNDARY ISOLATION, LOSS OF BLR	
				HLR PRIMARY PATH PLOW CONTROL	•	REDUNDANT PATH FOR BLB	PRIMARY PATO	

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## BARRGENCY CORE COOLING SYSTEM SINGLE FAILURE AWALTSIS SAN ONOPRE UNIT 1 TABLE 3-1: HOT USG RECIRCULATION FREA

ITEM #	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL BPPBCTS AND DBPRHDRHT PAILURBS	DBTRCTION	IMBRRENT COMPRISATING PROVISIONS	EPPECT ON ECCS	REMARES
91.1.91.91.2.	PCY-1112	YALYB/ACTUATOR_	CLOSED	FCV-1112 DORS NOT OPEN FOR LWJECTION AND CANNOT BE RODULATED FOR ELE PRIMARY PATA	CONTROL BOOM INDICATION. PREIODIC TESTING	MONE FOR INJECTION, NOME REQUIRED FOR CLE, REDUNDANT PATE FOR MILE	LOSS OF CHARGING PUMP INJECTION PATH TO ECS LOOP A, AND BLE PRIMART PATE	CHARGING MOT CREDITED FOR
03.1.04.02.1	PCV-1112	PC-1112 LOOP	SIGNAL BIGB	PLOW CONTROL. MORMAL FOR CLR PCV-1112 CANNOT BE CLOSED FOR CLR BOUNDARY PUNCTION OR	CONTROL BOOM INDICATION	(SAMB AS 3.1.4.1.1)	(SANE AS 3.1.4.1.1)	PC-1112 MANUAL MODE, USED FOR FCV-1112 MODULATION/CLOSURE.
				MODULATED FOR BLE PRIMARY PATE FLOW CONTROL				UNAPPROTED BY AUTOMATIC INPUTS PROM LC-430P AND PIT-1112. (B)(2) INTERACTION PROM NON-EQ PIT-1112 PRECLUDED BY POWER
03.1.04.02.2	PCV-1112	PC-1112 LOOP	SIGNAL LOW	FOR BLE PRIMARY PATH PLOW	CONTROL ROOM INDICATION	REDUNDANT PATH FOR ALR	LOSS OF BLE PRIMARY PATH	SUPPLY TE-1112
03.1.04.03.1	PCV-1112	8V-1112	ON (OPRN)	CONTROL. NORMAL POR CLR (SAME AS 3.1.4.1.1)	(SAMB AB 3.1.4.1.1)	(SAMB AS 3.1.4.1.1)	(SAHR AS 3.1.4.1.1)	*SY-5112 POWER MUST BE LOCKED OUT AT C-38 PAREL AND BSD SYGR
•							•	TO PERCLUDE SINILAR PAILURE DUE TO BQ
13.1.04.03.2	PCV-1112	84-1112	OPP (HODULATE)	FCV-1112 DOBS NOT FULLY OPEN FOR INJECTION. NO EFFECT ON	PRRIODIC TRSTING	NOME FOR INJECTION	LOSS OF CHARGING PUMP INJECTION PARE TO BOS LOOP A	
D3.1.04.04.1	PCV-1112	SBQ 1 (51-1,3)	OFF (CONTACTS OPEN)	MODULATION OR CLOSURE OF FCV FOR CLE AND BLR FCV-1112 DORS NOT FULLY OPEN FOR INJECTION ON SEQ I S13/313LOP. NO EFFECT ON	PERIODIC TESTING	REDUNDANT SEQ	BEDUCED REDUNDANCY FOR CHARGING PUMP INJECTION ALIGNMENT	CHARGING NOT CREDITED FOR
)3.1.04.04.2	PCV-1112	38Q 1	ON (CONTACTS CLOSED)	PODULATION OR CLOSURE OF PCV POR CLR AND BLR PCV-1112 PULLY OPENS POR	CONTROL ROOM INDICATION,	NOME REQUIRED	KONB	
		(51-1,3)		INJECTION ON SEQ 1 313/313LOP. NO EPPECT ON MODULATION OR CLOSURE OF PCV FOR CLE AND HLE	PBRIODIC TESTING			
3.1.04.05.1	PCV-1112	38Q 2 (51-1,3)	OFF (CONTACTS OPEN)	LOS INTECTION ON REG 5 DOS TOTAL DOS NOT BOILT OBEN DAS TO CARBIDE IN RACES	PRRIODIC TRATING	REDUNDANT SEQ	REDUCED REDUNDANCY FOR CHARGING PURP INJECTION ALIGNMENT	CHARGING NOT CREDITED FOR
				SIS/SISLOP. NO RPPRCT ON HODULATION OR CLOSURS OF FCV FOR CLR AND BLR				
3.1.04.05.2	PCV-1112	3BQ 2 (51-1,3)	ON (CONTACTS CLOSED)	INJECTION ON SEQ 2 SIS/SISLOP. NO BPPECT ON MODULATION OR	CONTROL BOOM INDICATION, Pariodic trating	NOME BECALESO	MONE	
3.1.04.06.1	PCV-1112	REG 8US #1	VOLTS LOW .	CLOSURB OF FCV FOR CLR AND HLR DUB TO OVERBIDE IN SV CET FCV-1112 FAILS CLOSED AFTER SV-1112 DE-EMBRG(ZED (BY	CONTROL BOOM ENDICATION	ALTERMATE BLR PATH	LOSS OF BLE PRIMARY PATE	,
3.1.04.07.1	FCV-1112	, ,	VOLTS LOW	OVERRIDE OR SEQ BLOCK/RESET) SV-1112 CANNOT BE EMERGIZED TO PULLY OPEN FCV-1[12	CONTROL ROOM INDICATION	NONE FOR INJECTION, MONE	INOPERABILITY OF CHARGING PUMP THIRCTION PATH TO LOOP A. WONE	

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## EMBEGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS

SAN ONOFRE UNIT 1
TABLE 3-1: BOT LEG RECIRCULATION FREA

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ITRN 1	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL BPPBCTS AND DBPBNDANT PAILURBS	DEFECTION METROD OF	INEBRENT COMPRESATING PROVISIONS	BFFRCT ON BCCS	REMARCS
Q1.1.Q1.Q8.1_P	CY-1112		PRESSURE LOW	ISA UNAVAILABLE POR PCY-1112	CONTROL ROOM INDICATION.	BACKUP MITROGRM	PCV-1112 OPENS AND MODULATES AS	
				OPENING (INJECTION) OR	ANNUNCIATION		REQUIRED ON BACKUP MITROGEN	
03.1.04.09.1.2	CY-1112	(PORVa)	PRESSURE LOW	GNI UNATAILABLE FOR FCY-1112 OPBWING (INJECTION) OR NODULATION (BLR)	CONTROL ROOM INDICATION, ANNUNCIATION	NOME FOR INJECTION, REDUNDANT PATE FOR BLB	LOSS OF CRARGING PURP INJECTION PATE TO RCS LOOP A AND BLE PRIMARY PATE, WITH CONCURRENT PAILURE OF ISA	CHARGING FLOW NOT CREDITED FOR INJECTION
03.1.05.01.1 C	V-304	VALVE/ACTUATOR	OPSW	CV-304 OPENS (NORMAL) BUT CANNOT BE CLOSED FOR BLE PRIMARY PATE OR BACEUP CLR	CONTROL ROOM INDICATION, PREIODIC TESTING	NOWE REQUIRED FOR INJECTION, REDUNDANT VALUE (PCV-1112) FOR CLE, REDUNDANT PATH FOR ELE	LOSS OF BLE PRIMARY PATE,	
03.1.05.01.2 C	A-304	VALVE/ACTUATOR	CLOSED	BOUNDARY PUNCTIONS CV-304 [SOLATES CHARGING PUMP INJECTION PATH TO LOOP A.	CONTROL BOOM INDICATION	NONE FOR INJECTION, NONE REQUIRED FOR CLR OR BLR	LOSS OF CHARGING PUMP INJECTION PATH TO LOOP A. NOWE FOR CLR OR	
03.1.06.01.1 C	V-305	VALVE/ACTUATOR	OPBN	NORMAL POR CLE AND BLR CV-305 OPENS FOR P2R AUX SPRAY AND CANNOT BE RECLOSED FOR CLE BOUNDARY PUNCTION. NORMAL FOR		REDUNDANT VALVE (PCV-1112) POR CLE BOUNDARY, MONE REQUIRED FOR BLE		INCLUDES RT-1305
03.1.06.01.2 C	V-305	VALUE/ACTUATOR	CLOSED	BLE PRIMARY PATO  CV-305 CANNOT BE OPENED FOR	CONTROL ROOM INDICATION.		LOSS OF MLE PRIMARY PATH, NOME	
				PRIMARY PATH BLR. NORMAL POR CLR BOUNDARY	PREIODIC TESTING	REQUIRED FOR CLE	FOR CLR	
03.1.07.01.1 C	V-304 V-305	(8-1508)	VOLTS LOW	CV-304 AND CV-305 CLOSE, CANNOT BE OPENBO, ISOLATING CHARGING PUMP INJECTION PATH TO BCS LOOP A AND BLE PRIMARY	CONTROL ROOM INDICATION, ANNUNCIATION	NONE FOR INJECTION, REDUNDANT PATH FOR BLR, MONE REQUIRED FOR CLR	LOSS OF CHARGING PUMP INJECTION PATH TO RCS LOOP A AND BLR PRIMARY PATH, NOWB FOR CLR	*CHARGING NOT CREDITED POR INJECTION. BRALIGHMENT OF UTILITY BUS VIA TRANSPRE SW \$7 REQUIRED TO PRECLUDE
				PATH. VALVES PAIL TO CLE POSITION				COMMON-MODE PAILURE OF BLR (DUB TO LOSS OF TRAIN B POWER) BY RESTORING SAPETY-RELATED
03.1.07.02.1 CV	/-304 /-305	134	PRESSURE LOW	ISA UNAVAILABLE TO CV-JO4 AND CV-JO5. CV-JO4 CLOSES, ISOLATING CHARGING PUMP	CONTROL BOOM ANNUNCIATION	NONE FOR INJECTION, BACKUP NZ	LOSS OF CHARGING PUMP INJECTION PATH TO RCS LOOP A. CV-305 AMPOSITIONS AS REQUIRED FOR CLR	INJECTION
01.1.07.03.1 CV		CNI	PRESSURE LOW	INJECTION TO RCS LOOP A BACKUP M2 UNAVAILABLE FOR	PERIODIC SURVEILLANCE	REDUNDANT PATE FOR ELE	AND BLE USING BACEUP M2 LOSS OF BLE PRIMARY PATH WITH	
03.1.07.03.2 CV	- 305  - 304  - 305	(PORVe) CV-512	CLOSED	CV-305 OPBNING (BLR) ISOLATES BACEUP N2 TO CV-305 INSIDE CONTAINNENT (BLR)	CONTROL ROOM INDICATION	LOCAL MANUAL OPERATION OF REDUNDANT SYPASS VALVE IN	CONCURRENT 19A PAILURE LOSS OF AUTOMATIC M2 BACKUP TO CV-305	INCLUDES SV-532A. MANUAL BYPASS VALVE LOCATED ON SAPE
						BACKUP NZ SUPPLY		SIDE OF SHIELD WALL. ACCESS AND USE BOUNDED BY BRISTING DOSE CALCULATIONS
03.1.07.03.3 CV CV	-304 -305	125VDC BUS \$2 (72-220)	VOLTS LOW	ISOLATES BACEUP NZ TO CV-305 INSIDE CONTAINMENT (BLE) BY CLOSING CV-532	CONTROL ROOM INDICATION	FOCAL MANUAL OPERATION OP	LOSS OF AUTOMATIC M2 BACEUP TO CV-305	MANUAL BYPASS VALVE LOCATED ON SAPE BIOB OF SHIRLD WALL. ACCESS AND USB BOUNDED BY
03.1.08.01.1 PC	V-430C	VALVE/ACTUATOR	OPBN	PARTIAL OR COMPLETE DIVERSION OF BLE PRIMART PATH PLOW TO RCS LOOP B COLD LEG	CONTROL ROOM INDICATION	ALTERNATE PATE	LOSS OF HLE PRIMARY PATH	BIISTING DOSE CALCULATIONS *INCLUDES BY-1430C. FCV-1112 *SETTING BUST INCLUDE MARGIN
				and store a comp pag				POR UNDETECTABLE PARTIAL OPENING OF VALVE WITHIN LIMIT SWITCH HYSTERISIS

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#### EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS

TABLE 3-1: BOT LEG RECIRCULATION FMBA

1788 #	DRAICR ID	COMPONENT ID	FAILURE MODE	LOCAL BFFBCTS AND DEPENDENT PAILURES	METHOD OF DETECTION	INBRERNY COMPENSATING PROVISIONS	RPPRCT ON BCCS	REMARES
21.1.04.01.1	PCY-410C	VALVE/ACTUATOR	CLOSED	NONE, NORMAL FOR BLE	CONTROL ROOM INDICATION	MONE REQUIRED	ROM	
03.1.09.01.1	PCV-430B	VALVE/ACTUATOR	OPBN	PARTIAL OR COMPLETE DIVERSION OF BLR PRIMARY PATE PLOW TO BCS LOOP A COLD LEG		ALTERNATE PATE	LOSS OF BLR PRIMARY PATE	FINCLUDES BY-1430B. PCV-1112 SETTING HUST INCLUDE MARGIN FOR UNDETECTABLE PARTIAL
3.1.09.01.1	DCW_430B	VALVE/ACTUATOR	CLOCRO	MANG MARKIT BAR ALD	COMPAND BOOM EMPLOYEE			OPENING OF VALVE WITHIN LIMIT. SWITCH HYSTERISIS
3.1.10.01.1		PC-430C/B LOOP		NOME. MORNAL POR BLR	CONTROL ROOM INDICATION	NONE BEQUIRED	MONS	
	PCA-1308	FC-430C/# 100F	STORAL BIGG	DIVERSION OF PRIMARY PATH HER FLOW TO LOOP A AND B COLD LEGS		ALTERNATE PATE	LOSS OF BLE PRIMARY FLOW PATH	PC-430C AND PC-430H SIGNAL PROVIDED FROM PT-430, -431, OR -432 VIA SW. P/430
3.1.10.01.2	PCV-430E	PC-410C/H LOOP	SIGNAL LOW	NOME. MORNAL FOR BLR	CONTROL BOOM INDICATION	NOME BEGNIESD	NONT	112 112 21: 1(112
1.1.10.01.1		PC-430C/B LOOP		DIVERSION OF PRIMARY PATH BLR		NOME IF ALTERATE PATH EQ OR	LOSS OF BLE PRIMARY PLOW PATE	BQ UPGRADE OF BOTH HLR FLOW
3.1.10.02.1	PCV-430H PCV-430C PCV-430H	REG BUS \$1 (8-1187)	VOLTS LOW	PLOW TO LOOP A AND 8 COLD LEGS DIVERSION OF PRIMARY PATE BLR PLOW TO LOOP A AND 8 COLD LEGS	CONTROL BOOM INDICATION	SINGLE PAILURE OCCURS ALTERNATE BLE PATE	LOSS OF BLR PRIMARY PATH	PATHS REQUERED
1.1.10.03.1		ISA	PRESSURB LOW	NOME. MORNAL FOR BLR	CONTROL ROOM INDICATION	NOME BEGUIRED	вомв	
1.1.11.01.1	PT-31144 LOOP	PE-3114A	SIGNAL BIGH	BIGH CLR PLOW INDICATION FOR	CONTROL BOOM INDICATION	REDUNDANT LOOPS	CLR FLOW TO LOOP A MUST BE	*ARBILLA DEOCEDIES BEGNISS
				ECS LOOP A			ISOLATED PER PROCEDURE ST	MOV-356 CLOSURE. CLOSURE
							CLOSING HOV-356TO PREVENT BICKEDING RECIRC PUMP AND	REQUIRED SINCE PCV-1115D PATEURE AND PI-3114A PAILURES
							CHARGING PUMP PLOW LINETS	CANNOT BE DISTINGUISHED DURING COMBINED CLE/BLE WITHOUT BQ PIT-1112 LOOP
3.1.11.01.2	PT-31144 LOOP	PI-31144	SIGNAL FOR	ECS LOOP A	CONTROL ROOM INDICATION	NOME TATIFABLE	CLE PLOW TO RCS LOOP A WOULD BE INCREASED PER PROCEDURE, RESULTING IN CLE AND CLE/FILE	PPCV-1115D PAILURE AND PI-3114A PAILURE CANNOT BE DISTINGUISABO DURING COMBINED
							PLOW INBALANCE, AND POTENTIALLY BECEBOING RECIRC PUMP	CLR/BLR WITHOUT BQ FIT-1112 LOOP. CHARGING PUMP ANNETER
							LIMITATIONS	USED TO DETERMINE TOTAL CHARGING PUMP PLOW
	PT-31144 LOOP	CTO NEST 4 15VDC BUPPLY	OUTPUT VOLTS LOS	(SAMB AS 2.4.24.1.2)	(SAME AS 2.4.24.1.2)	(SANE AS 2.4.24.1.2)	*(BAHR AS 2.4.24.1.2)	1(SARE AS 2.4.24.1.2)
1.1.11.01.1	PT-3114A LOOP	VITAL BUS 15 (8-2903V)	VOLTS LOW	LOW CLR PLOW INDICATION FOR RCS LOOP A	CONTROL ROOM INDICATION	NOME VATITABLE	CCLR PLOW TO BCS LOOP A WOULD BR INCREASED PER PROCEDURE, RESULTING IN CLR AND CLR/RLR	OPCY-1115D FAILURE AND PI-3114A PAILURE CANNOT BE DISTINGUISHED DURING COMBINED
							PLOW IMBALANCE, AND POTENTIALLY BICEBOING RECIRC PUMP PLOW	CLR/BLR WITHOUT BQ F[7-1112 LOOP. CHARGING PUMP ANNETER
1.1.12.01.1	FT-2114B LOOP	PI-2114B	SIGNAL BIGH	BIGH CLR PLOW INDICATION FOR	CONTROL ROOM INDICATION	REDUNDANT LOOPS	CLE PLOW TO LOOP B MUST BE	USED TO DEFERMINE TOTAL CHARGING PUMP PLOW *VERIFY PROCEDURE REQUIRES
				RCS LOOP B			ISOLATED PER PROCEDURE BY CLOSING NOV-357TO PREVENT	HOV-357 CLOSUBB. CLOSURB
							BICBBDING RECIRC PUMP AND	BBQUIRBD SINCE PCV-11158 PAILURB AND PI-21148 PAILURB
			·····				CHARGING PUMP PLOW LIMITS	CANNOT BE DISTINGUISED DURING COMBINED CLR/HLR WITHOUT BQ
								FIT-1112 LOOP. CHARGING PUMP AMBIER USED TO DETERMINE

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## BHERGENCY CORE COOLING STATEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 3-1: BOT LEG RECIRCULATION FREA

ITRE & DRAICE ID	COMPONENT ID	FAILURB MODB	LOCAL RPPECTS AND DEPENDENT FAILURES	MBTHOD OF DBTBCTION	BEOALSTONS INHESENT CONDENSVING	BPFRCT ON BCC9	BRANSS
01.1.12.01.2 FT-2114B LOOP	EL-21148	SIGNAL LOW	LOV CLR PLOW INDICATION FOR	CONTROL ROOM INDICATION	NONB AVAILABLE	CLR PLOW TO RCS LOOP 8 WOULD	*PCV-1115B PAILURE AND
						BE INCREASED PER PROCEDURE, RESULTING IN CLE AND CLE/BLE FLOW IMBALANCE, AND POTENTIALL	PI-21148 PAILURE CANNOT BE DISTINGUISEED DURING COMBINED
						BICBBDING RECIRC PUMP LIMITATIONS	LOOP. CHARGING PUMP ANNETER USED TO DETERMINE TOTAL
3.1.12.02.1 PT-2114C LOOP	PI-2114C	SIGNAL BIGH	MIGH CLR PLOW INDICATION FOR RCS LOOP C	CONTROL ROOM INDICATION	REDUNDANT LOOPS	CLB PLOW TO LOOP C MUST BB	SABELLA BROCEDUSE SECULERS
			ECS LOOP C			ISOLATED PER PROCEDURE BY CLOSING HOV-158TO PREVENT	NOV-158 CLOSURE. CLOSURE BEQUIERD SINCE FCV-1115F
						CHARGING RUMP PLOY LIMITS	PAILURE AND PI-2114C PAILURE CANNOT BE DISTINGUISHED DURING
							COMBINED CLR/BLR WITHOUT BQ FIT-1112 LOOP. CHARGING PUMP AMERICA USED TO DETERMINE
3.1.12.02.2 PT-2114C LOOP	PI-2114C	SIGNAL LOW	LOW CLR PLOW INDICATION FOR	CONTROL ROOM INDICATION	NOME VATITABLE	*CLR PLOW TO BCS LOOP C WOULD	TOTAL CHARGING PUMP PLOW SPCV-1115P PAILURE AND
			RCS LOOP C			BE INCREASED PER PROCEDURE, RESULTING IN CLR AND CLR/BLR	PI-2114C PAILURE CANNOT BE BISTINGUISMED DURING COMBINED
						PLOW IMBALANCE, AND POTENTIALLY RICERDING RECIRC PUMP LIBITATIONS	LOOP. CHARGING PUMP AMMETER
3.1.12.03.1 PT-2114B LOOP	C69 ME37 4	OUTPUT VOLTS LOW	LOW CLR PLOW INDICATION FOR	PBRIODIC TESTING	NOME AVAILABLE	*CLR PLOW TO RCS LOOPS & AND C	USED TO DETERMINE TOTAL CHARGING PUMP PLOW
FT-2114C LOOP	15VDC SUPPLY		RCS LOOPS B AND C			WOULD BE INCREASED PER PROCEDURE, RESULTING IN CLR AND	PI-21148/C PAILURBS CANNOT BE
						CLB/BLR PLOW IMBALANCE, AND POTENTIALLY DECERDING RECIRC	CLE/RUR WITHOUT BQ PIT-1112 LOOP. CHARGING PUMP ANNETER
.1.12.04.1 PT-21148 LOOP	VITAL BUS #3A	WALTS LAW	LOW CLR PLOW INDICATION FOR	CONSTOL DOOM THREE STOR		PUNP LINITATIONS	USED TO DETERMINE TOTAL CHARGING PUMP PLOW
PT-2114C LOOP	(8-3313V)	TODIS DV	BCS LOOPS B AND C	CONTROL BOOM INDICATION, PERIODIC TESTING	NOME AVAILABLE	FLOW TO RCS LOOPS B AND C WOULD BE INCREASED FER PROCEDURE, RESULTING IN CLR AND	PI-2114B/C PAILURES CANNOT BE
						CLR/BLR FLOW IMBALANCE, AND	CLE/SLE WITSOUT BQ FIT-1112 LOOP. CHARGING PUMP ANNETER
4 AL AL & MAUDIN WILLIAM						PUMP LIMITATIONS	USED TO DETERMINE TOTAL CHARGING PUMP PLOW
.2.01.01.1 MANUAL VALVES, ALTERNATE PATE PLOW		OPBN	NOR	PRETODIC SURVEILLANCE	NONE ERGNIERD		TRCLUDES CRS-340, 341, LDS-020, RER-002, 004, 016,
.2.01.01.2 MANUAL VALVES, ALTERNATE PATE		CLOSED	ALTERNATE HLE PATH TO LOOP C HOT LEG ISOLATED FROM		BROUNDANT PRIMARY BLR PATH	LOSS OF ALTERNATE BLR PATE	025, 026 ALTRONATE PATH NOT USED UNLESS PRIMARY BLR PATH DETECTABLY
PLOW 2.01.02.1 CHECE VALVES, ALTERNATE PATE		NONE (PASSIVE)	CONTAINMENT SPRAY BRADER	PERIODIC TESTING			PAILS INCLUDES CRS-020

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## EMBEGENCY CORE COOLING STSTEM SINGLE FAILURE AMALTSIS

SAN ONOFRE UNIT 1
TABLE 3-1: BOT LEG RECIRCULATION FMBA

ITEM #	DRVICE ID	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION .	(MBERRAY COMPRASATING PROVISIONS	BPPBCT ON BCCB	REMARES
	MANUAL VALVES,		_OPBM	DIVERSION OF ALTERNATE PATE	PRRIODIC SURVRILLANCE	RRDUNDANT PRIMART PATH	LOSS OF ALTREMATE BLE FLOW PATH	SRE TABLE 1-2. ALTRONATE PATE
	ACTERNATE PATE BOUNDARY			BLE FLOW TO CONTAINMENT				MOT USED UNLESS PRIMARY PATE DRINGTABLEY PAILS
	MARUAL VALVES. ALTERNATE PATE BOUNDARY		018077	MOME	PERIODIC SURVEILLANCE	NONE REQUIRED	NOVE	***************************************
.2.02.02.1	CHECK OR BELIEF	· .	MORMAL (PASSIVE)	NONB	PERIODIC TESTING	NONE REGULERO	NONB	SBB TABLE 3-2. ALTERNATE BLR
	VLVS, ALT PATE BOUNDART		ABON	HAMS	doubles book substantial			PRESSURE INSUPPLICENT TO LIFT RV-206
	BU9-9644	VALVE/ACTUATOR	_9788	HOMB	CONTROL BOOK INDICATION	NONE REQUIRED		ONE OF HOV-8224 AND B IS
1. <b>2</b> .01.01.2	HOV-822A	VALVE/ACTUATOR	CLOSED	LOSS OF ALTBRHATE BLR PATH VIA	CONTROL ROOM IMPLICATION	BEDUNDANT VALVE HOV-8328 AND		NON-REGENERATIVE COOLING
	1812		-251385	HOA-8557	PERIODIC TESTING	BROUNDARY PRIMARY BLR PAYR	ALTERNATE BLE PATE	NOTE POWER-LOCKOUT BURING WORMAL OPERATION DUE TO POST-LOCA FLOODING OF
.2.03.01.3	HOV-8224	VALVE/ACTUATOR	TQ.	VALVE PAILS AS-IS, WITE LOSS	CONTROL ROOM EMBICATION	MUME IS DEINIDA STAR IG GINUIS		ACTUATOR, WHICH IS NOT QUALIFIED FOR SUBMERGENCE
				OP POSITION INDICATION, CAUSING LOSS OP ALTREMATE BLB PATH IP ONE OP MOV-822A/B IS	TOTAL BYYN ARMAURITUM	PAILURE	ALTERNATE BLE PATE	PROVIDE (b)(2) PROTECTION OF MCC
1.2.03.02.1	HOV-822A	HCC-1 (42-1164)	VOLTS LOW	NOT INITIALLY OPEN VALVE FAILS AS-IS. IF CLOSED, CANNOT BE ALIGNED FOR	CONTROL ROOM INDICATION		REDUCED RELIABILITY OF ALTERNATE BLE PATE	
				ALTERNATE BLE PATE TO LOOP C BOT LEG				
3.2.04.01.1	HOY-1228	VALVE/ACTUATOR	OPBN	NOMB	CONTROL ROOM INDICATION	NONE BEQUIRED		ONB OF HOA-8557 THD B 18
3.2.04.01.2	HOV-8238	VALVE/ACTUATOR	CLOSED	LOSS OF ALTERNATE BLR PATH VIA	CONTROL ROOM INDICATION.	REDUNDANT VALUE MOV-822A AND		MORMALLY OPEN FOR LETDOWN MON-REGENERATIVE COOLING *MOV-8224 OR B MUST BE OPEN
					PRRIODIC TRSTING		ALTERNATE BLE PATE	WITH POWER-LOCKOUT DURING WORMAL OPERATION DUE TO POST-LOCA PLOODING OF
1.2.04.01.3	NOA-8558	VALVE/ACTUATOR	RQ	VALVE PAILS AS-IS, WITH LOSS	CONTROL ROOM INDICATION	NOUR IF PRIMARY PAYS IS SINGLE		ACTUATOR, WEICH IS NOT QUALIFIED POR SUBMERGENCE
				OP POSITION INDICATION, CAUSING LOSS OF ALTREMATE BLR PATE IF ONE OF MOV-822A/B IS			ALTERNATE BLE PATS	PROVIDE (b)(2) PROTECTION OF HCC
1.2.04.02.1		MCC-2 (42-1266)	VOLTS LOW	NOT INITIALLY OPEN VALVE PAILS AS-IS. IP CLOSED, CANNOT BE ALIGNED POR	CONTROL BOOM INDICATION	•	REDUCED RELIABILITY OF ALTERNATE BLE PATE	
9 05 A1 7 *	1011 A13	Wat HO LA CENTEROR		ALTERNATE HER PATH TO LOOP C HOT LEG	,			
.2.05.01.1 1	IOA-911	VALVB/ACTUATOR	OLRN	1 OP 2 SERIES VALVES OPEN FOR ALTERNATE HER PATH TO LOOP C	CONTROL BOOM INDICATION	NONE REQUIRED FOR ALTERNATE		REDUNDANT VALVE MOV-814 BNSURBS BCS INTEGRITY

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#### BHERGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS

SAN QNOPRE UNIT 1
TABLE 3-1: BOY LEG RECIECULATION FHEA

ITEM #	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL REFECTS AND DEPENDENT FAILURES	DETECTION	EMBERBUT COMPRESSATING PROVISIONS	EPPECT ON ECCS	REMARES
01.2.05.01.2	MOA-813	YALYE/ACTUATOR	CLOSED	ALTERNATA BLE PATH CANNOT BE		REDUNDANT PRIMARY HER PATH	LOSS OF ALTERNATE BLB PATH	NORMAL POSITION
03.2.05.01.3	HOV-813	VALVE/ACTUATOR	EQ	ALIGNED TO LOOP C BOT LEG VALVE PAILS AS-IS, WITE LOSS	PBRIODIC TRSTING CONTROL BOOM INDICATION	NONE IF PRIMARY PATH IS SINGLE	*POTENTIAL CONMON-CAUSE LOSS OF	BREAKER AND CONTROL POWER PUSE
				OF POSITION INDICATION, IF CLOSED, PREVENTS ALIGNMENT OF		PAILURR	ALTERNATE ALR PATE	PROVIDE (BILL) PROTECTION OF
** * ** * * * * * * * * * * * * * * * *		•		ALTREMATE BLE PATH				MCC. ACTUATOR WILL BE REPLACED WITH BE MODEL BY DCP 3548.00
03.2.05.02.1	HOA-813	PC-4251	CONTACTS OPEN	(BAHR AS 3.2.5.1.2)	PRRIODIC TRATING	(SAME AS 3.2.5.1.2)	(SAME AS 3.2.5.1.2)	MORNAL POSITION. BCS PRESSURE
03.1.05.02.2	MOA-813	PC-4251	CONTACTS CLOSED	RCS PRESSURE INTERLOCE	PARIODIC TRUTING	HOME REQUIRED FOR ALTERNATE	MONE FOR ALTERNATE BLE	INTERLOCE REDUNDANT VALVE MOV-814
				DRFEATED, PERMITTING REMOTE-MANUAL OPERATION OF		<u>ALR</u>		PROVIDES BCS INTEGRITY
				VALVE AT ANT TIME				
03.2.05.03.1	NOA-813	MCC-1 (42-1169)	VOLTS LOV	VALVE PAILS AS-IS. IF CLOSED,	CONTROL ROOM INDICATION	RECUNDANT PRIMARY ALE PATH	LOSS OF ALTERNATE BLE PATE	
		(49-1105)		ALTERNATE BLE PATE CANNOT BE ALIGNED TO LOOP C BOT LEG				
03.2.06.01.1	ROA-814	VALVE/ACTUATOR	OPBN	1 OF 2 SERIES VALVES OPEN FOR	CONTROL BOOM INDICATION	NONE REQUIRED FOR ALTERNATE	NOME FOR ALTERNATE BLE	BEDUNDANT VALVE MOV-813
				ALTERNATE BLE PATH TO LOOP C		BUE		BNSUBBS BCS INTEGRITY
03.2.06.01.2	BOV-814	VALVB/ACTUATOR	CLOSED	ALTERNATE BLE PATE CANNOT BE	CONTROL ROOM INDICATION.	REDUNDANT PRIMARY HER PATH	LOSS OF ALTERNATE HER PATH	MORMAL POSITION
A3 4 A4 A1 3	MOV 014			ALIGNED TO LOOP C NOT LEG	PRRIODIC TESTING			
03.2.06.01.3	B0A-814	VALVE/ACTUATOR	19	VALUE PAILS AS-IS, WITH LOSS OF POSITION INDICATION. IF	CONTROL BOOM INDICATION		POTENTIAL COMMON-CAUSE LOSS OF	
				CLOSED, PREVENTS ALIGNMENT OF		PALLURE	ALTERNATE BLE PATE	PROVIDE (b)(2) PROTECTION OF HCC. ACTUATOR WILL BE REPLACED
	MAU ALA	W00 8		ALTERNATE BLE PATE				WITH BQ HODEL BY DCP 3548.00
03.2.06.02.1	BUV-814	MCC-2 (42-1211)	VOLTS LOW	VALVE PAILS AS-IS. IP CLOSED, ALTERNATE BLE PATH CANNOT BE	CONTROL ROOM INDICATION	BEDUNDANT PRIMARY BLE PATH	LOSS OF ALTERNATE BLR PATE	
				ALIGNED TO LOOP C BOT LEG				
03.2.07.01.1	HOA-833	VALVE/ACTUATOR	OPEN	1 OF 2 BRRIES VALVES OPENS	CONTROL ROOM INDICATION	REDUNDANT VALVE HOV-834,	BROUCED BELIABILITY OF	
				BRIVERN ALTERNATE BLE PATE AND LOOP A COLD LEG		REDUNDANT PRIMARY ELE PATH	ALTERNATE BLE PATE	
03.2.01.01.2	HOV-833	VALVE/ACTUATOR	CLOSED	VALVE REMAINS IN ALTERNATE BLE		NOME BEGNIESD	MONB	NORMAL DURING MODES 1, 2 AND 1
03.2.01.01.3	MOV-811	VALVE/ACTUATOR	<b>P</b> O	PATA BOUNDARY ALIGNMENT	PERIODIC TESTING			
		******	**	VALVES PAILS AS-IS, WITH LOSS OF POSITION INDICATION	CONTROL ROOM INDICATION	NOME REQUIRED	NONE	BREAKER AND CONTROL POWER PUSE PROVIDE (b)(2) PROTECTION
03.2.07.02.1	MOV-833	MCC-1	VOLTS LOW	VALVE PAILS AS-19	CONTROL BOOM INDICATION	NONE ERGUIRED	NOME	-marine failet Lenisching
03.2.00.01.1	MOA-834	(42-1170) Valve/actuator	OPRN	I OF 2 SERIES VALVES OPENS	CONTROL ROOM INDICATION	DEV(INU'IN& N') No mun was	DERNORD DRITABLITUS AS	
				BRIMBBN ALIBENATE BLE PATH AND			REDUCED RELIABILITY OF	
03.2.08.01.2	MAY 414	941 VB /4000 LEAD	OLOGED.	LOOP A COLD LEG				
44.8.44.VI.E	DA 4 . 014	VALVE/ACTUATOR	CLUSED	VALVE REMAINS IN ALTERNATE HAR PATH BOUNDARY ALIGNMENT	PERIODIC TESTING	NONE BEGUIRED	NORE	MORNAL DURING MODES 1, 2 AND 3
03.2.08.01.3	MOV-834	VALVE/ACTUATOR	89	VALVES PAILS AS-IS, WITH LOSS		HOME BEONISED	NONB	BREAKER AND CONTROL POWER FUSE
03.2.08.02.1	MOV-834	PC-4251	CONTACTS OPEN	OF POSITION INDICATION (SAME AS 3.2.8.1.2)	PRRIODIC TESTING	(SAME AS 3.2.8.1.2)	(SAME AS 3.2.8.1.2)	PROVIDE (b)(2) PROTECTION MORMAL POSITION. BCS PRESSURE
03 5 66 65 6	MAN 434			•		•		INTERLOCE .
03.2.08.02.2	BU 4 - 814	PC-4251	CONTACTS CLOSED	RCS PRESSURE INTERLOCE DEPRATED, PERMITTING	PERIODIC TESTING	NONE REQUIRED	NONB	
				BENOTE-MANUAL MOV-834 OPENING				
				AT ANY TIMB				

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BHERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT 1

TABLE	1-1:	HOT	LEG	RECIRCULATION FREA

ITBH #	DBVICE ID	COMPONENT ID	PAILURE MODE	LOCAL REPRECTS AND DEPENDENT FAILURES	METHOD OF DRIECTION	INBERBAT COMPENSATING PROVISIONS	BPPECT ON ECCS	REMARES
01.2.08.01.1	MOX-834	MCC-2 (42-1212)	AOTIS FOA	VALVE PAILS AS-IS	CONTROL BOOM INDICATION	NONE BEÖNTEED	RONE	
03.2.09.01.1	MOA-811	PT-125 LOOP	RIGH PRESSURE (RELAT OFF)	PRESSURIZER PRESSURE INTERLOCE WILL NOT CLEAR, PREVENTING	CONTROL ROOM INDICATION, PRRIODIC TRATING	PRIMARY ELR PATE	INOPERABILITY OF ALTERNATE BLE	ANTAB MOA-813 BESOTERD TO OBER
81.2.09.01.2	NOA-834 NOA-813	PT-425 LOOP	LOW PRESSURE (RBLAT ON)	OPENING OF RITARE VALVE PRESSURIZER PRESSURE INTERLOCE CLEARS, PREMITTING	CONTROL BOOM INDICATION, PERIODIC TESTING	NOME REQUIRED FOR ALTERNATE	NOME FOR ALTERNATE BLE	REDUNDANT VALVES MOV-814 AND
43.2.09.02.1		REG BUS 14	VOLTS LOY	REMOTE-NAMUAL OPENING OF MOV-813 AND MOV-834 Pressurizer pressure interloce	CONTROL ROOM INDICATION,	BONE REQUIRED FOR ALTERNATE	NOME FOR ALTERNATE SUR	REDUNDANT VALVES NOV-814 AND
·	HOA-834	(8-1486)		MOA-813 VAD MOA-834 Cravas Rynnyr Obbild Ob	PERIODIC TESTING	ELE		MOV-833 PROVIDE BCS INTECRITY. LOSS OF POWER TO PT-425 LOOP CAUSES PC-425 TO ENERGIZE
03.2.09.03.1	MAN DIA	VITAL BUS \$4	VOLTS LOW					OUTPUT RELAY PC-4251, CLOSING PERMISSIVE CONTACTS IN MOV-813/834 OPENING CIRCUITS
	MOV-834	(8-1406V)	AODIS DOS	PRESSURIZER PRESSURE INTERLOCE WILL NOT CLEAR, PREVENTING OPENING OF HOV-813 AND HOV-834	PERIODIC TESTING	PRIMARY BLR PATH	INOPERABILITY OF ALTERNATE BLE	VALVE HOW-BIJ REQUIRED TO OPE FOR ALTERNATE BLR FLOW PATH. PC-4251 RELAT IS
								ENERGIZE-TO-ACTUATE FOR CONTACT CLOSURE IN VALVE OPENING CIRCUIT
03.2.10.01.1	CV-525	VALVB/ACTUATOR	OPBN	I OP 2 SERIES (CONTAINMENT) ISOLATION VALVES CANNOT BE CLOSED FOR ALTERNATE BLE	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT VALVE CV-526, REDUNDANT PRIMARY BLR PATH	REDUCED RELIABILITY OF ALTERNATE BLE PATH	NORMAL POR LETDOWN. INCLUDES AIR ISOLATION BY-2525
03.2.10.01.2	CV-525	VALVE/ACTUATOR	CLOSED	BOUNDARY LETDOWN [SOLATED, VALVE REMAINS IN ALTERNATE HLR PATH	CONTROL ROOM INDICATION	NOME SEGRISSO	RONR	
03.2.10.02.1		VITAL BUS #1 (8-1111V)	NOTES FOR	BOUNDARY ALIGHMENT VALUE PAILS CLOSED	CONTROL ROOM INDICATION	NONE BEGNISSD	RORE	INTERNAL DUMP VALVE IS DE-EMBRGIZE TO ACTUATE
<b>63.2</b> .10.03.1	CV-525	184	PRESSURE LOW	VALVE BRIFTS CLOSED IF INTERNAL EYDRAULIC LEAKAGE PRESENT	CONTROL ROOM INDICATION	NORE BEGGIESED	NORE	
03.2.11.01.1	CV-526	VALVE/ACTUATOR	OPEN	1 OF 1 SERIES (CONTAINMENT) ISOLATION VALVES CANNOT BE CLOSED FOR ALTERNATE BLE	CONTROL BOOM INDICATION, PERIODIC TESTING	REDUNDANT VALVE CV-525, REDUNDANT PREMARY BLR PATH	REDUCED BRITABILITY OF ALTERMATE BLE PATE	NORMAL FOR LETDOWN. INCLUDES AIR ISOLATION BY-3526
03.2.11.01.2	CV-526	VALVE/ACTUATOR	CLOSED	BOUNDARY LBTOONN ISOLATED, VALVE REMAINS IN ALTERNATE BLR PATH	CONTROL BOOM INDICATION	KONE BEQUIRED	MONE	
03.2.11.02.1		VITAL BUS #5 (8-2909V)	VOLTS LOW	BOUNDARY ALIGNMENT VALVE PAILS CLOSED	CONTROL ROOM INDICATION	NORE BEGNIEED	NOMB	INTERNAL DUMP VALVE IS DB-BNBRGIZE TO ACTUATE
93.2.11.03.1	CV-526	ÎSA	PRESSURE LOW	VALVE DRIPTS CLOSED IP INTERNAL BEDRAULIC LEARAGE PRESENT	CONTROL ROOM INDICATION	NOME BEGILBED	NOME	

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## RMBRCBNCT CORE COOLING SYSTEM SINGLE FAILURE AWALTSIS SAW OHOFRE UNIT 1 TABLE 3-1: HOT LEG RECIRCULATION FMBA

				LOCAL BPPRCTS AND	MARINU VO	IMBORNA COMPRISATOR		<del></del>
ITEM #	DBAICE ID	COMPONENT ID	PAILURE MODE	DEPENDENT FAILURES	METHOD OF DETECTION	PROFISIONS  INHERENT COMPROSATING	RPPRCT ON RCCS	RIMARES
03.2,12.01.1	CV-202	VALYR/ACTUATOR	QPBN	LETOONN FROM RCS LOOP A NOT	CONTROL ROOM INDICATION. PRESCOCE TESTING	REDUNDANT PRIMARY BLR PATH	LOSS OF ALTREMATE BLE PLOW PATE BOUNDARY INTEGRITY	NORMAL POSTTION, INCLUDES PT-1202
01.2.12.01.2	CV.161	VALVE/ACTUATOR	CIAGON	BLR PATE FLOW				11-1404
63.2.12.02.1		VALVE/ACTUATOR		NO REFECT (SAME AS 3.2.12.1.1)	PRRIODIC TRATING PRRIODIC TRATING	MORE REQUIRED	MONE .	Manual Bassassas Bussassas
				•		(SAME AS 3.2.12.1.1)	(SAME AS 3.2.12.1.1)	NORMAL POSITION. INCLUDES PT-1203
03.2.12.02.2 01.2.12.03.1		VALVE/ACTUATOR		NO BPPBCT	PBRIODIC TESTING	NONE REQUIRED	hong	
		VALVE/ACTUATOR	OPSE	(SAMB AS 3.2.12.1.1)	PERIODIC TESTING	(SAME AS 3.2.12.1.1)	•	NORMAL POSITION. INCLUDES PT-1204
01.2.12.01.2	CV-204	VALVE/ACTUATOR	CLOSED	NO BPPECT	PERIODIC TESTING	NOME REQUIRED	· NONE	
03.2.12.04.1								
	CV-102, 201, 2	(50-1, 3)	OFF (OPEN)	LETDOWN FROM RCS LOOP A COLD LEG WILL NOT ISOLATE ON TRAIN A \$13/818LOP	PERIODIC TESTING	REDUNDANT INPUT PROM TRAIN B	REDUCED RELIABILITY FOR ALTERNATE BLE PATE SOUNDARY ISOLATION	INCLUDES RELAY \$3-12
01.2.12.05.2	CV-202, 203, 2	104 SEQ 1 (50-1, 3)	ON (CLOSED)	LETDOWN ISOLATED FROM RCS LOOP A COLD LEG	CONTROL ROOM INDICATION	NOME REQUIRED	NONE	
03.2.12.06.1	CV-202, 203, 2		OFF (OPBN)	LETDOWN PROM RCS LOOP A COLD	PERIODIC TESTING	REDUNDANT INPUT FROM TRAIN A	REDUCED RELIABILITY FOR	INCLUDES 83-10. VALVES CAN
		(50-1, 3)		LEG WILL NOT ISOLATE ON TRAIN B SIS/SISLOP	10010010 1001100	SEQUENCER	ALTERNATE ELE PATE BOUNDARY ISOLATION	ALBO BE REMOTE-MANUALLY CLOSED FOR ALTERNATE BLE PATE BOUNDARY
	CV-202, 201, 2	(50-1, 3)	ON (CLOSED)	LETDOWN ISOLATED FROM LOOP A COLD LEG	CONTROL ROOM INDICATION	NONE BEGILBED	NOM8	AAAAA
03.2.12.07.1	CV-202, 203, 2		ON	AUTO-CLOSE SIGNAL TO	CONTROL ROOM INDICATION	NONE REQUIRED FOR ECCS	MONE POR BCCS	MORNAL POSITION FOLLOWING SEQ
	4	(RELAT)		CV-202/203, DB-ENERGIZING RESPECTIVE SOLENOID PILOTS PT1202/1203 AND CLOSING VALES				\$1 SIS/SISCOP. FAILURE PREVENTS RE-OPENNING CY-202/203 TO RE-ESTABLISE
								LETDOWN. PARALLEL VALVE CV-204 UNAPPROTED
03.2.12.07.2	CV-202, 203, 2		OPP	SEG AL AUTO-CLOSE SIGNAL	PRRIODIC TESTING	REDUNDANT SEGNAL PROM SEQ \$2		POSITION OF RELAT DURING
·	<del></del>	(RBLAT)		DISABLED TO CV-202/203. REDUNDANT BIGNAL FROM SEQ \$2 VIA RELAT \$3-12 UNAPPECTED			SIS/SISLOP ISOLATION OF LETDOWN	
								RBLAYS 83-11 AND 83-13 UNAPPROTED
03.2.12.08.1	CV-202, 203, 2		ON	CONTACTS CLOSE TO PROVIDE SEQ	CONTROL BOOM INDICATION	NONE BEQUIRED FOR SCCS		DEE SHINOTION BOLLONING BED
		(RELAY)		\$1 SEAL-IN BIGNAL TO RELAYS 83-10 AND 83-11, RESULTING IN				\$1 SIS/SISLOP. FAILURE PREVENTS RE-OPENNING VALVES TO
				AUTO-CLOSE SIGNAL TO CV-202/203/204 WHICH D8-BNBEGIZES RESPECTIVE SOLENOID PILOTS				RE-BSTABLISH CETDOWN IF DESIRED
				PT1202/1203/1204 AND CLOSES VALVES				***************************************
3.2.12.08.2 (	CV-202, 203, 20	01 83-11	opp	SEQ 11 SEAL-IN POR	PBBIODIC TESTING	REDUNDANT SIGNALS AND SEAL-IN		POSITION OF RELAY DURING
		(RBLAY)		CV-202/203/204 AND AUTO-CLOSE SIGNAL TO CV-204 DISABLED. REDUNDANT SIGNALS AND SBAL-IN		FROM SBQ #2	SIS/SISLOP ISOLATION OF LETDOWN	

AND 83-13 UNAFFECTED

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# SHERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1. TABLE 3-1: BOY LEG RECIRCULATION FHEA

ITEM A	DRVICE ID	COMPONENT ID	FAILURE MODE	LOCAL SPERCTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPRESSATING PROVISIONS	RPPRCT ON BCCS	REMARES
1.2.12.09.1	CV-202, 201, 20	4 83-12 (BBLAT)	ON	AUTO-CLOSE SIGNAL TO CY-204 WHICH DE-BURBGIZES SOLENOID PILOT PTIZO4 AND CLOSES VALVE	CONTROL ROOM INDICATION	MONE REQUIRED FOR ECCS	NONE FOR ECCS	NORMAL POSITION FOLLOWING SEQ \$2 SIS/SISLOP. PAILURE PREVENTS RE-OPERMING CV-204 TO RE-ESTABLISE LETDOWN, PARALLEL
3.2.12.09.2	CV-202, 203, 20	4 83-12 (RBLAY)	OFF	SRQ \$2 AUTO-CLOSE SIGNAL DISABLED TO CY-202/203. REDUNDANT SIGNAL FROM SEQ \$1	PERIODIC TESTING	BSDUNDANT SIGNAL FROM SSQ \$1	REDUCED RELIABILITY FOR SIS/SISLOP ISOLATION OF LETDOWN	VALUES CV-202/203 UNAPPECTED POSITION OF RELAY DURING
3.2.12.10.1 (	CV-202, 201, 20	4 83-13	O#	VIA BELAY 83-16 UNAPPECTED  CONTACTS CLOSE TO PROVIDE SEQ	CONTROL SOON INDICATION	NOME REQUIRED FOR ECCS		SIGNALS FROM SEQ \$1 AND \$2 VIA RELATS 83-11 AND 83-13 UNAPPROTED NORMAL POSITION FOLLOWING SEQ
		(RELAT)		\$2 SEAL-IN SIGNAL TO RELATS 83-12 AND 83-13, RESULTING IN	CONTROL SOUR INDICATION	MANS TRADESTA LAR BCCS	~~.	#2 SIS/SISLOP. FAILURS PREVENTS RE-OPENNING VALVES TO
				AUTO-CLOSE SIGNAL TO CV-202/203/204 NEICE DB-ENERGIZES RESPECTIVE SOLENGID PILOTS				RE-RETABLISH LETDOWN IF Desired
1.2.12.10.2 (	CY-202, 203, 204	83-13   (RBLAY)	OPF	P71202/1203/1204 AND CLOSES VALVES SEQ #2 SEAL-IN FOR CV-202/203/204 AND AUTO-CLOSE	PRRIODIC TESTING	BEDUNDANT SIGNALS AND SEAL-IN	REDUCED RELIABILITY FOR 818/818LOP ISOLATION OF LETDOWN	POSITION OF RELAT DURING NORMAL OPERATION
				SIGNAL TO CY-204 DISABLED. REDUNDANT BIGNALS AND SPAL-IN PROM SRQ 41 VIA RELAYS 83-10				
).2.12.11.1 C	Y-202, 203, 204	UTILITY BUS (8-1518)	VOLTS LOW	203, 204 AND SEQ RELATS 83-10,	CONTROL ROOM INDICATION	NONE ESCULES	NONE	
3.2.13.01.1 C	W-413	VALVE/ACTUATOR	OPEN	83-12 DB-BMBRGIZE, ISOLATING LETDOWN FROM LOOP A COLD LEG DIVBRSION OF ALTERNATE BLR	CONTROL ROOM INDICATION	REDUNDANT PRIMARY BLR PATE	LOSS OF ALTERNATE HER PATH	INCLUDES SV-413, 280/C-1413
.2.13.01.2 0	V-413	WALVE/ACTUATOR	CLOSED	PLOW TO BCP SEAL WATER RETURN NORMAL FOR ALTERNATE BLE PATH SOUNDARY	CONTROL ROOM INDICATION	NOME BEGUIEED	NORB	MORMAL POSITION
3.2.13.01.1 C	V-413	VALVB/ACTUATOR	BQ	DIVERSION OF ALTERNATE BLE PATH PLOW TO BCP SEAL WATER RETURN OR RCDT	MOMB			PROTECTION OF OTHER VITAL BUS LOADS. CHECK VALVE TO BE
<del></del>				·				INSTALLED BY DCP 3548 WILL PRRYENT PLOW DIVERSION WITH TRIS FAILURR
3.2.13.02.1 C		V[TAL BUS ]4 (8-1402V)	VOLTS LOW	VALVE PAILS CLOSED	CONTROL ROOM INDICATION	NONE REGULARD	NONB	
3.2.13.03.1 C 1.2.14.01.1 C		VALVB/ACTUATOR	PRESSURE LOW	VALVE PAILS CLOSED  1 OF 2 SERIES VALVES OPEN FROM ALTERMATE BLR PATH TO SEAL WATER RETURN	CONTROL ROOM INDICATION CONTROL ROOM INDICATION			INCLUDES SV-412, 290/C-1412. Normal Position



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## BHERGENCY CORE COOLING SYSTEM SINGLE PAILURE AMALYSIS

SAN ONOFRE UNIT 1
TABLE 3-1: BUT LEG RECIRCULATION PHBA

ITSH #	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL SPERCTS AND DEPENDENT FAILURES	DRIBCTION .	PROVISIONS  PROVISIONS	REFECT ON BCCS	BRMARES
11.2.14.01.2 <u>.</u> C	1-412	VALVE/ACTUATOR	CLOSED	NORMAL POR ALTERNATE BLR PATH	CONTROL ROOM INDICATION	NOME SECULESD	MONB	· · · · · · · · · · · · · · · · · · ·
)3.2.14.01.3 C	7-412	VALVE/ACTUATOR	19	BOUNDARY DIVERSION OF ALTERNATE BLE PLON TO RCP SEAL WATER RETURN	NONE	HOMB IF BUR PRIMARY PATH IS SINGLE PALLURE	SPOTENTIAL COMMON-CAUSE LOSS OF ALTERNATE BLE FLOW TO BCP SBAL	* ** *
								LOADS. DCP 3548 WILL INSTALL CHECE VALVE TO PERVENT PLOW DIVERSION VIA TRIS PATH
3.2.14.02.1 C	/-412 	4101 (RELAY)	CONTACTS CLOSED (OM)	VALUE WILL NOT CLOSE ON CV-410 CLOSURE, MAY DIVERT BECESS LETDOWN TO RCDT VIA BY-2004	PERIODIC TESTING	BEDUNDTHA INDIA LEGR CA-411		INTERLOCE FROM CV-418. NORMAL POSITION FOR SEAL WATER RETURN
3.2.14.02.2 C		4101 (RELAT)	CONTACTS OPEN (OPF)	DURING WORMAL OPERATION VALVE CLOSES, CANNOT BE REOPENED	CONTROL ROOM INDICATION, PERIODIC TRATING	NOME BESONERED	NONB	
3.2.14.03.1 C	/-412 	4111 (RELAT)	CONTACTS CLOSED (ON)	VALVE WILL NOT CLOSE ON CV-411 CLOSURE, HAY DIVERT EECESS LETDOWN TO ECDT VIA RV-2004	PERIODIC TESTING	ERDUNDANT INPUT FROM CV-410	REDUCED RELIABILITY FOR ALTERNATE BLE PATO BOUNDARY	INTERLOCK PROM CV-411. NORMAL POSITION FOR SHAL WATER RETURN
3.2.14.03.2 C	/-112	4112 (RBLAT)	CONTACTS OPEN (OFF)	DUBING NORMAL OPERATION VALVE CLOSES, CANNOT BE EBOPENED	PRRIODIC TRATING	NOME BEGUIEBD	MOMB	
3.2.14.04.1 C		V[TAL BUS #4 (#-1402V)	VOLTS LOW	VALVE PAILS CLOSED	CONTROL BOOM INDICATION	NOMB BEQUIRED	NONE	
13.2.14.05.1 C		VALVE/ACTUATOR	PRESSURE LOW	VALVE FAILS CLOSED VALVE ALIGNED TO BICESS LETDOWN BI	CONTROL ROOM INDICATION	NOWS REQUIRED  BEDUNDANT VALVES CV-287,  BCV-1117 PREVENT DIVERSION OF ALTERNATE BLR FLOW TO LOOP B		THESE-WAY AIR-OP VALVE. INCLUDES 87-1288, 250/C-1288
3.2.15.01.2 C	/-288	VALUE/ACTUATOR	DIVERT	VALVE ALIGNED TO BODT	CONTROL ROOM INDICATION	COLD LEG BEDUNDANT PRIMARY BLR PATE	BROUCED RELIABILITY OF ALTERNATE ELE PATE BOUNDARY	
)3.2.15.01.3 C	7-288	VALVE/ACTUATOR		DIVERSION OF ALTERNATE BLR PLOW TO BCP SEAL WATER RETURN OR BCDT	NONB	NONE IF PRIMARY BLE PATE IS SINGLE PAILURE		PUSE PROVIDES (b)(2) PROTECTION OF OTHER UTILITY BUS LOADS. CRECE VALVE TO BE
								INSTALLED BY DCP 3548 WILL PREVENT PLOW DIVERSION WITH THIS PAILURE
3.2.15.02.1 C	/-208	UTILITY BUS (8-1508)	ACTA FOR	VALVE PAILS TO NORMAL POSITION	CONTROL BOOM INDICATION	HCY-1117 PRBURNT DIVERSION OF ALTERNATE BLE PLON TO LOOP B	NONB	
3.2.15.03.1 C	-208	19A	PRESSURB LOW	VALUE PAILS TO MORMAL POSITION	CONTROL ROOM INDICATION	MCV-1117 PREVENT DIVERSION OF	NOMB	
3.2.16.01.1 CI	-962	VALVE/ACTUATOR		L OF 2 SERIES VALVES OPEN IN ALTERNATE BLE PATH (RHS)	CONTROL ROOM INDICATION	ALTERNATE BLE PLOW TO LOOP B COLD LEG REDUNDANT VALVE CV-957, REDUNDANT PRIMARY BLE PATE	REDUCED RELIABILITY OF ALTERNATE SLE PATO BOUNDARY	INCLUDBS SV-962, 280/C-2962
3.2.16.01.2 C	-962	VALVE/ACTUATOR		SAMPLE LINE TO CHEM LAB ALTERNATE BLE PATH (BHE)	CONTROL ROOM INDICATION	NOME BEGNIESD		NORMAL



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### BHERGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS

SAN ONOFRE UNIT 1
TABLE 3-1: BOT LEG RECIRCULATION PHEA

ITRU A	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL RPPRCTS AND DEPRHDENT PAILURES	METHOD OF DETECTION	INBERENT COMPENSATING PROVISIONS	EFFECT ON ECCS	RRHARES
3.2.16.02.1	CY-962	<u>VITAL BUS 834</u> (8-3311V)	NOTES FOR	VALVE PAILS CLOSED	CONTROL ROOM ENDICATION	MONE REQUIRED	NONE	
3.2.16.03.1		ISA	PRESSURE LOW	VALVE PAILS CLOSED	CONTROL BOOM INDICATION	HOME REQUIRED	NONE REDUCED RALIABILITY OF	INCLUDES 84-951. 250/G-3951
1.2.11.01.1	F1-331	WALNE/ACTUATOR		ALTERNATE BLE PATE (REE)	CONTROL MINE INDICATION	REDUNDANT VALVE CV-962. REDUNDANT PRIMART BLR PATH	ALTERNATE BLE PATE BOUNDARY	18LLD013 81-321, 13U/L-3331
1.1.11.01.1	CV-951	VALVE/ACTUATOR	CLOSED	SAMPLE LINE TO CHEM LAB ALTREMATE BLE PATH (RME)	CONTROL BOOM INDICATION	NOME REQUIRED	NGH8	MORNAL
				SAMPLE LINE ISOLATED TO CHEM LAB				
3.2.17.02.1	CY-951	D12, D12-1 (BBLAYS)	CONTACTS OPEN (OPE)	VALVE WILL CLOSE WEEN	PRRIODIC TRATING	MONE BEQUIESD	NOME	TRAIN B CONTAINMENT ISOLATION SIGNAL RELATS
1.1.11.02.1	CY-951	012. D12-1	CONTACTS CLOSED	DE-ENERGIZED ON TRAIN B CIS VALVE WILL NOT CLOSE ON TRAIN	PARIODIC TASTING	BEDUNDANT VALVE CV-962.	REDUCED RELIABILITY OF	MORMAL POSITION
3.2.17.03.1	CV-957	(RELAYS) VITAL BUS 46	VOLTS LOW	AVAR AVITA CTORED	CONTROL ROOM INDICATION	MONE BEGNIERD BEONNOTHE SELUTER UTS STATE	ALTERNATE BLE PATE BOUNDARY BORE	
3.2.11.04.1	CV-951	(1-3001V) 19A	PRESSURE LOW	VALVE FAILS CLOSED	CONTROL ROOM INDICATION	NONE BEGUIRED	MONE	· · · · · · · · · · · · · · · · · · ·
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						<del></del>		
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TABLE 3-2: HOT LEG RECIRCULATION BOUNDARY VALVE ANALYSIS



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### BHERGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS \_\_\_\_\_\_SAN ONOFRE UNIT L BOUNDARY VALVE ANALTSIS

[80w 4					D BACEUP (			
ITEM #	TAG #	NC/AUTO?	LOCERD?	TAG #	MC/AUTO?	TAG #	MC/AUTO?	BINARES
01.1.01	VCC-001	CLOSED	NO	MOMR	BLIND P	.ANGR		REGENERATIVE BY CHARGING-SIDE VENT
01.1.02	CV-304	OPBM	NO	NONB	MOMR			MORHAL CHARGING PATH ISOLATION VALVE
03.1.03	PCV-430C	OPBN	NO	NOME	HONE			PRESSURIZER SPRAY VALVE. MON-RQ CONTROLLER, MITE PARTIAL OPEN FAILURE NOT DRIECTABLE BY RQ LIMIT
								SWITCHES. BOI PRIMARY PATH BLR PLOW MUST INCLUDE
03.1.04	PVC-4308	OPRN	MO	MOME	EMON		•	ALLOWANCE FOR THIS UNDSTRUCTABLE BIPASS PLOY
		. XI.II.			- GVFE			PRESSURIZER SPRAY VALVE. NON-EQ CONTROLLER, WITE PARTIAL OPEN PAILURE NOT DETECTABLE BY EQ LIMIT SWITCHES. BOI PRIMARY PATE BLE PLOW BUST INCLUDE
			· · · · · · · · · · · · · · · · · · ·					ALLOWANCE FOR THIS UNDETECTABLE BYPASS PLOY
93.1.03	P2R-020	OPBN	NO	NOME	MOME		1	PRESSURIZER SPRAY EBSP-WARM STPASS. MORNALLY TEROTILED BUT POSITION NOT ADMINISTRATIVELY
03.1.06	PZR-021	OPEN	<b>N</b> O	NOME	ROMB		1	CONTROLLED PRESSURIZER SPRAY HERP-WARM DYPASS. MORMALLY THROTTLED BUT POSITION NOT ADMINISTRATIVELY
		·						CONTROLLED BOY POSITION NOT ADMINISTRATIVELY
	CR3-342		MO	NONB	NORB		. 1	ALTERNATE BLE CONTAINMENT PENETRATION NO TEST
	LDS-022 CV-525	CLOSED	NO ·	NONE	MONE			ALTERNATE BLR/LETDOWN VENT
	LDS-021		NO NO	CV-526	OPEN MOME			LETDOWN INSIDE CONTAINMENT ISOLATION VALVE. BOI BEV REQUIRED TO REQUIRE CLOSURE ON SIS/SISLOP
	200 111	00000			1085	······································	<u></u>	LETDOWN/ALTERNATE BLE INSIDE CONTAINMENT PENETRATION M2 TEST VALVE
3.2.06	286-018	CLOSED	NO	NOMB	MONE			RUR PLON CONTROL VALVE DRAIN
3.2.07	833-014	CLOSED	NO	NOMB	MONR -		1.	RHR SAMPLE CONTAINMENT PRINCIPATION N2 TEST VALVE
3.2.08		AUTO	NO	CV-959, B99-310	CLOARD			RBR SAMPLE INSIDE CONTAINMENT ISOLATION. VALUE MORNALLY CLOSED
11.1.09	-HOA-111	CLOSED	10	-NOV-814	CLOSED	<del></del>		HOW-812 AND NOW-814 ARE BUR DISCURDED ISOLATIONS TO LOOP A COLD LEG. BOTH ACTUATORS NOW-EQ
1.2.10	RER-024	CLOSED	MO	NOMB	BLIND PI	ANGR	1	TO LOOP A COLD LEG. BOTH ACTUATORS HON-EQ RER HI R21A VENT
	RBR-020		NO	NOAB	CAP	*****	•	REG HI RETA DRAIN
	BBR-021		MO	NONE	CAP			RER DE 1218 DEATH
	RER-023		NO.	NOME	CAP			BBR BI BRIS VENT
	RER-OIS		NO NO	NONE	BLIND PI	ANGE		BRE NI COMMON TATEL TING ABAL
11.2. [5	RA-509	RRLIEF	MO	NORE BEGNISED				REB BELIEF TO P2E BELIEF TAME. VALVE PROTECTS RER MIC/PIPING AGAINST CY-202/203/204 LEMEAGE POST-318/918LOP, AND AUGMENTS OVERPRESSURE
3.2.16	CV-413	CLOSED	MO	CY-412	AUTO			HITIGATION STATEM (OMS) FOR NORMAL SEUTDOWN BICESS LETDOWN ISOLATION TO RBB. CV-412 AND CV-413
·	<del></del>					· · · · · · · · · · · · · · · · · · ·		ARR NON-RQ. NEW CHECK VALVE TO BE INSTALLED PER
3.2.17	888-012	CLOSED	NO .	MONB	BLIND PL	AMCR	•	DCP 3548.0
	RBR-006		NO.	ROM	BLIND PL	<del>-</del>	•	RHR PUMP G-14A DISCHARGE LIMB DRAIN RHR PUMP G-14A CASING VENT
3.2.19	888-008	CLOSED	NO	NONB	NOMB			RER PUMP G-14A CASING DRAIN
		CLOSED	NO .	HONB	BLIND PL	ANGB		RHR PUMP G-14B DISCHARGE LINE DRAIN
3.2.21	RHR-005	CLOSED	NO	NONB	BLIND PL	-		BHB PUMP G-14B CASING VBNT

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SECTION 4: SECONDARY RECIRCULATION

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#### SECONDARY RECIRCULATION NOTES

- 1. Secondary Recirculation is used for long-term decay heat removal following a secondary system rupture (MSLB, FWLB-D) in containment. Consistent with Standard Review Plan Section 15.1.5, non-safety related systems and equipment may be credited for such events following a single failure. For purposes of this criterion at SONGS 1, the assumed failure is a common-cause loss of the Residual Heat Removal (RHR) system. Since loss of RHR is a common-cause failure, secondary recirculation is evaluated assuming an additional random single failure.
- 2. Consistent with the above, secondary recirculation credits non-safety related portions of the Containment Spray and Recirculation system (between the refueling water pump discharge and RWST) and Main Feedwater system (between the HV-852A/B valves and the FW isolation valves in the mezzanine). The non-safety related Instrument and Service Air (ISA) system is also credited for operation of HV-852A/B and CV-142, 143, 144. The redundant air compressors are powered from safety related busses, and so would be available after a loss of offsite power. As such, ISA single failures are bounded by isolation of the branch connections to the above valves as indicated in the FMEA table, and the ISA system is not explicitly evaluated. For HV-852A/B, redundant connections from the service air and instrument air headers prevent loss of air to these components due to single active failure of a branch isolation valve.
- 3. Item numbers in this section have been assigned as follows:
  - 04.1: Train A pumping and boundary devices
  - 04.2: Train B pumping and boundary devices
  - 04.3: Common flow path and boundary devices.
- 4. Table 4-1 is the Failure Modes and Effects Analysis (FMEA) for the Secondary Recirculation function. Table 4-2 is the associated boundary valve analysis.
- 5. The secondary recirculation functions of the recirculation pumps, refueling water pumps, SI/FW pumps and realignment valves, SI header valves, and FW isolation valves are addressed in Sections 1 (Safety Injection), 2 (Cold Leg Recirculation), and 5 (Containment Spray) of this analysis. This section addresses the additional train-common systems/equipment or functions (such as FW bypass valve modulation) required for secondary recirculation.
- 6. Potential single failure susceptibilities in the FMEA table are flagged with "\*" as the first character of the

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associated ECCS EFFECTS field. Other open items (eg. required procedure or calculation changes) are flagged with "\*" as the first character of the REMARKS field.

7. Potential single failure susceptibilities in the Boundary Valve Analysis table are flagged with "\*" in the unlabelled field adjacent to REMARKS. Items flagged with "#" in the unlabelled field adjacent to REMARKS are acceptable from a single failure standpoint subject to credit for SEP Topic III-6 seismic boundary criteria.

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## SECONDARY RECIRCULATION REFERENCES

Piping and Inst	rumentation Diagrams
5178115	Safety Injection System (Sh 1)
5178120	Containment Spray and Recirculation System (Sh 1)
5178121	Containment Spray and Recirculation System (Sh 2)
5178145	Boric Acid System
5178167	Radwaste Liquid Processing (Sh 3)
5178205	Feedwater System (Sh 1)
5178206	Feedwater System (Sh 2)
5178220	Auxiliary Feedwater System (Sh 1)
5178225	Main Steam System (Sh 1)
5178227	Main Steam System (Sh 3)
5178228	Main Steam System (Sh 4)
5178270	Secondary Chemical Feed System
5178300	Spent Fuel Pit Cooling System
	Instrument and Service Air System (Sh 2)
5178442	Instrument and Service Air System (Sh 2)  Instrument and Service Air System (Sh 3)
5178442	
	Instrument and Service Air System (Sh 4)
5178444	
5178446	
5178448	Instrument and Service Air System (Sh 9)
71	
Elementary Diag	
•	FCV-456 and CV-142
5150407	Steam Generator Blowdown CV-100 and CV-100B
5159842	Auxiliary Feedwater Actuation (AFWAS), Train A
5159843	Auxiliary Feedwater Actuation (AFWAS), Train B
Table Biomesia	
Loop Diagrams	THE TANK THE STATE OF THE STATE
451775	AFWS Actuation Train A (LT-2400A/B/C)
451776	AFWS Actuation Train B (LT-3400A/B/C)
Other Bearing	
Other Drawings	
5112416	Schematic: Auxiliary Relay Rack R12 (Front)
Dana	
Procedures	
501-1.0-10	Reactor Trip or Safety Injection
SO1-1.0-12	SI Termination
SO1-1.0-30	Loss of Secondary Coolant
SO1-1.0-32	Loss of RHR Following Loss of Secondary Coolant
	in Containment
SO1-14-40	Control of Locked Valves
Other Documents	
SD-S01-210	System Description: Condensate and Feedwater
	Systems
SD-S01-260	System Description: Feedwater Control System
SD-S01-420	System Description: Compressed Air Systems
SD-S01-580	System Description: Safety Injection, Recircula-
	tion and Containment Spray Systems
SD-S01-590	System Description: Safeguard Load Sequencing
	System
	<del>-</del>

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M89048

Response to Generic Letter 88-14, "Instrument Air Supply System Problems Affecting Safety Related Systems", dated July 5, 1989

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TABLE 4-1: SECONDARY RECIRCULATION FMEA





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## EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS

I HAT I	DBAICB ID	COMPONENT 10	PAILURB HODB	LOCAL RPPECTS AND DEPENDENT FAILURES	NETBOD OF Noithean	INBRRBNT COMPRUSATING PROVISIONS	REFERCT ON BCCS	REMARKS
	<del>****************</del>		- * daulie europeane.	ANY METUTAL PARTIES OF THE SECOND AND AND AND AND AND AND AND AND AND A	<del></del>		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
.1.01.01.1	.(Buons)						•	TRAIN A AND B PUMPING/PATH
					•			COMPONENTS FOR SECONDARY
								RECIRC ARE COVERED IN SECTIONS
		<del></del>						1 (81/MPM), 2 (CLR) AND 5
		·						(CONTAINMENT SPRAY)
_1.1.02.01.1	(NONE)				•			TRAIN A AND B BOUNDARY
							~~~~	COMPONENTS FOR SECONDARY
								RECIRC ARE COVERED IN SECTIONS
	<del></del>							1 (SI/MPN), 2 (CLR) AND 5
								(CONTAINMENT SPRAT)
1.101.01.1	LT-2400A	_LT-2400A	OUTPUT HIGH	TRAIN A PARRON BANGE LRYBL	CONTROL ROOM INDICATION.	REDUNDANT APW TRAIN PROVIDES	TRAIN A MARRON RANGE LEVEL	LNCLUDES LT-2400A/B/C.
	LT-2400B	LT-2400B		INDICATION AND APM CHANNEL	PBBIODIC TESTING	NR LEVEL INDICATION AND	INDICATION AND APP ACTUATION	ASSOCIATED LOOP DEVICES AND
	LT-2400C LOOPS	LT-2400C		DISABLED FOR ONE OR MORE S/Gs		AUTOMATIC BLONDONN 180LATION	DISABLED FOR ONE OR HORE 8/Gs	MEST POWER SUPPLY
1.1.03.01.2	1.T-24004	LT-2400A	OUTPUT LOW	TRAIN A NARROW RANGE LEVEL	CONTROL ROOM INDICATION.	REDUNDANT APM TRAIN TO PROVIDE	ADTIN T MIDDOM DINUS LBADI	· · · · · · · · · · · · · · · · · · ·
	LT-2400B	LT-24009	COTTO: EOS	INDICATION DISABLED AND AFW	PERIODIC TRATING	RE LEVEL INDICATION, NOWE	INDICATION DISABLED FOR ONE OR	•
	LT-2100C_L00P9_			CHANNEL TRIPPED FOR ONE OR		REQUIRED FOR AUTOMATIC	MORE SIG. SLOWDOWN ISOLATED IR	
•				MORE S/G		BLONDOMN INCLATION		
						Prosposs (Sorvios	TWO OR MORE	
17.5 <del>07.02</del> 71	FF:51384	AEL4718A2-037	TOLTS LOW	INVIEW INVESTOR BYACK CHARE	CONTROL ROOM INDICATION,	PROGRAFIA PRICIATOR INDERESTOR	TRAIN.A.WARROW RARGE, LEVEL	
	LT-2400C LOOPS	(4)		AUTO-ACTUATION DISABLED.	RANDACIATION	NONE REQUIRED FOR AUTOMATIC		
				BLONDOWN ISOLATED ON TRAIN A		BLOWDOWN ISOLATION	DISABLED, BLOSDOER ESCLAIGO	
	•			APW RELAY DE-BHERGIZING				
.1.03.03.1 1	PT - 127		OUTPUT BIGH	LOCAL INDICATION FOR TRAIN A	CONTROL DOOM EMPERATION	REDUNDANT TRAIN, RESUNDANT	10011 INDICATION DIGABLED BOD	LACIS MECHANICAL ENGREUMENS
	L-1-1-1:			BBFUBLING WATER PUMP G-27M	- AND HALF BANK BANK BIND		LOCAL INDICATION DISABLED FOR CONTAINMENT SPRAY/SECONDARY	LOCAL MECHANICAL INSTRUMENT.  REDUNDANT CONTROL ROOM
				DISCHARGE PRESSURE DISABLED		POR REPUBLING WATER PUMP	RECIRCULATION FLOW SPLIT FROM	INSTRUMENT PT-18/PI-165 ALSO
						DISCHARGE BRADER PRESSURE	TRAIN A REPUBLING WATER PUMP	MECHANICAL
.1.03.03.2			OUTPUT LOW	(SAMB AS 4.1.3.3.1)	(SAME AS 4.1.3.3.1)	(SAMB AS 4.1.3.3.1)	(BANK AS 4.1.3.3.1)	
.2.01.01.1 (	( avas)							TRAIN A AND B PUMPING/PATH
								COMPONENTS FOR SECONDARY RECIRC ARE COVERED IN SECTIONS
								I (SI/MPW), 2 (CLR) AND 5
								(CONTAINMENT SPRAT)
4 44 41	1110121					·		
.2.02.01.1 (	(MUME)							TRAIN A AND B BOUNDARY
					···			COMPONENTS FOR SECONDARY
								RBCIRC ARB COVERED IN SECTIONS 1 (SI/MFW), 2 (CLR) AND 5
	- w							(CONTAINMENT SPRAY)
		1.0.0400:						
.2.03.01.1 <u>1</u> <u></u>		LT-3400A LT-3400B	OUTPUT HIGH	TRAIN 8 NARROW BANGS EBYBL INDICATION AND AFW CHANNEL	CONTROL BOOM INDICATION, PERIODIC TESTING	REDUNDANT APW TRAIN PROVIDES  NR LEVEL INDICATION AND		INCLUDES LT-3400A/B/C, ASSOCIATED LOOP DEVICES AND





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## BHERGENCY CORE COULING SYSTEM SINGLE FAILURE ANALYSIS SAM CHOFRE UNIT 1 TABLE 4-1: SECONDARY RECIRCULATION FREA

ITEN A	DBVICE ID	COMPONENT ID	FAILURS MODE	LOCAL BPPECTS AND DEPENDENT FAILURES	MRTHOD OF DRTBCTION	INHERBNI COMPRESATING PROVISIONS	BPFBCT ON BCCS	BENARES
1,2.01.01.2	17-14004	17.14004	OUTPUT LOW .	TRAIN B MARRON RANGE LBYRL	CONTROL BOOM INDICATION	REDUNDANT APM TRAIN TO PROVIDE	TRAIN A MARROW RANGE LEVEL	
	LT-14008	LT-3400B	_9v1191_644	INDICATION DISABLED AND AFW			INDICATION DISABLED FOR ONE OR	
	LT-3400C LOOPS			CHANNEL TRIPPED FOR ONE OR			MORE S/Gs. BLOWDOWN [SOLATED [F	
		<del></del>		MORR_8/Ga			TWO OR MORE	
.2.03.02.1	LT-3400A	VETAL BUS 15	VOLTS LOW	TRAIN & NARROW RANGE LEVEL	CONTROL ROOM INDICATION,	REDUNDANT APM TRAIN TO PROVIDE	TRAIN B MARROW BANGE LEVEL	
·	LT-3400B	(8-2901V)	·	INDICATION AND AFW	ANNUNCIATION	MR LEVEL INDICATION, NONE	INDICATION DISABLED, BLOWDOWN	
	LT-3400C LOOPS			AUTO-ACTUATION DISABLED.		REQUIRED FOR AUTOMATIC	ESOLATED	
				BLOWDOWN ISOLATED ON TRAIN B		BLOADOAN ESOUSSION		
				APW RELAT DE-EMBRGIZING				
.2.03.03.1	PI - 206		OUTPUT BIGH	LOCAL INDICATION FOR TRAIN B	CONTROL ROOM INDICATION	REDUNDANT TRAIN, REDUNDANT		LOCAL MECHANICAL INSTRUMENT.
				BEFUBLING WATER PUMP G-278				REDUNDANT CONTROL ROOM
				DISCHARGE PRESSURE DISABLED		FOR ERPUBLING WATER PUMP		INSTRUMENT PT-18/PI-165 ALSO
			ANDRUM 1011	40.45 40 4 5 5 11		DISCHARGE MEADER PRESSURE		HECHAPICAL
1.2.03.03.2	P1-206		OUTPUT LOW	(SAME AS 4.2.3.3.1) NOWE FOR PWS VALVES (NORMALLY	(SAME AS 4.2.3.3.1)	ADMINISTRATIVELY CONTROLLED	(SAME AS 4.2.3.3.1) *POTRMT[AL DIVERSION OF	*[MCLUDES CRS-338, FWS-455 OR
	MANUAL VALVES, COMMON PLOW PATH		OPEN	OPEN). FOR CRS-338, LOSS OF	ARRIODIC ZARARIPPUNCE	LOCKING TO PERVENT OPENING	CONTAINMENT SPRAT PLOW AND LOSS	- ·
	COMMON PLON PAIR			FLOW CONTROL FOR SECONDARY				PWS-372 AND 376 (8/G B).
				RECIRC TO RUST		NONE DURING SECONDARY RECIRC		PMS-415 AND 419 (S/G C). BOL
				ABOURD TO BUST		AVA DUBIRU BEVORDABI BEVIEV		DOBS NOT INCLUDE ALIGNMENT
		·						VERIFICATION FOR APPLICABLE
	•							VALVES. REDUNDANT ISOLATION
	M. U.S. 1 N. 1 1100		CLACED		BEDIANIC CHOURTLEANCE	NAME PAR COG 334 DERINALNS		VALVE AND PLOW PATH REQUIRED  *BOI DOES NOT INCLUDE
1.3.01.01.2	MANUAL VALVES, COMMON PLOW PATE			SECONDARY RECIRC PATH ISOLATED FROM REPURLING WATER PURPS TO	PREIODIC SUBVELLLANCE	NONE FOR CRS-338, REDUNDANT PATHS TO OTHER S/G FOR PWS	CRS-338 CLOSURE, LOSS OF	ALIGNMENT VERIFICATION FOR ALL
	CORNUM PLOW PAID			RWST OR PROM MAIN PW PUMPS TO		VALVES	SECONDARY RECIRC PATH TO ONE OR	
,				OME OR HORE S/G		********	MORE S/G FOR FWS VALVE CLOSURE	
					······································			BYDRAULIC CALCULATION TO
								VERIFT ADEQUACT OF EXISTING 2
								INCO REPUBLING WATER PILTER
								PUMP LIMBS
	CBBCE VALVES,		MONE (PASSIVE)		PERIODIC TRETING			INCLUDES PRS-379 AND 007 (S/G
<del></del>	COMMON PLOW PATE							A), PVS-378 AND 006 (S/G B).
								PWS-417 AND 012 (S/G C)
	MANUAL VALVES,		OPBM	DIVERSION OF SECONDARY RECIRC	PERIODIC SURVEILLANCE		*LOSS OF SECONDARY RECIEC	INCHES AND ALLCHES THE PROPERTY OF THE PROPERT
	COMMON BOUNDARY			PLOW/INVENTORY TO CHARGING		ADMINISTRATIVELY CONTROLLED LOCKING		INCLUDE ALIGNMENT VERIFICATION OF ALL APPLICABLE VALVES. MUST
				PUMPS, CONDENSER, BORIC ACID SYSTEM, BADWASTE, SPENT FUEL		EU CE I MU		SPECIFY LOCAL CLOSURE OF
				PIT, SPRAY PUMP SUCTION OR				VCC-326 (TO PROTECT AGAINST
				ATMOSPHERE				PCV-SC51 ACTION) AND PROVIDE
				water Hubb				RESPONSE-NOT-OBTAINED OPTIONS
								IF MOV-1100B/D DOBS NOT CLOSE
					· · · · · · · · · · · · · · · · · · ·			(RG. CLOSE CRS-425)
1.3.02.01.2	MANUAL VALVES,		CLOSED	NONB	PBRIODIC SURVBILLANCE	NOMB BEQUIRED	ROOM	VALVE LOCEING PROGRAM DOBS
	COMMON BOUNDARY							NOT COVER SECONDARY RECIEC
								FUNCTION





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#### BHERGENCY CORE COCLING SYSTEM SINGLE FAILURE ANALYSIS

SAN ONOFER UNIT 1
TABLE 4-1: SECONDARY RECIRCULATION FREA

ITBN #	OBVICE ID	COMPONENT ED	FAILURB MODB	LOCAL EFFECTS AND DEPENDENT PAILURES	METHOD OF Defection	INHBRBNT COMPENSATING PROVISIONS	EPFECT ON ECCS	REMARES
04.3.02.02.1	CHR_OR_ABLIRF		MOBANT (SVZ) TVERON			PBRIODIC TRSTING		*SBB TABLE 4-2 FOR DETAILED
	VLV, COMMON BOUNDARY							BOUNDARY VALUE ANALYSIS. IST PROGRAM DORS NOT INCLUDE SCF-158, 359, 398
04.3.03.01.1	CV-142	VALVB/ACTUATOR	OPBN	MAIN PW BYPASS VALVE TO 9/G A CANNOT BE CLOSED OR THROTTLED		MANUAL BLOCK VALVE AND	REDUCED REDUNDANCY FOR MAIN FU ISOLATION TO S/G A FOR SI, LOSS OF SECONDARY RECIEC FLOW	
A4 1 A3 A1 1	OH 149	W+1 UB /+C+II++OB	CLOGDD	MAIN PW BYPASS ISOLATED TO 3/0	COMPROL BOOM INDICATION	REDUNDANT S/GS FOR SECONDARY RECIRC NOWE REQUIRED FOR SI,	CONTROL TO S/G A  MONE FOR SI, LOSS OF SECCEDARY	SINGLE PAILURES APPRITING THE
04.3.03.01.2	rv-146	VALVE/ACTUATOR	CLUSBN	A STATE OF BIFASS ISOLATED TO STA	PERIODIC TESTING	REDUNDANT B/G+ FOR SECONDARY BBCIEC	ABCIRC TO S/G A	ASSOCIATED SOLENOID VALVES ARE ADDRESSED IN SECTION 1 OF THIS ANALYSIS
04.3.04.01.1	CV-144	VALVE/ACTUATOR	OPBN	MAIN FW BYPASS VALVE TO 8/G B CANNOT BE CLOSED OR TEROTTLED		MANUAL BLOCK VALVE AND	REDUCED REDUNDANCY FOR MAIN FU ISOLATION TO S/G B FOR SI, LOSS OF SECONDARY RECIPC PLOW	
04.3.04.01.2	CV-144	VALVB/ACTUATOR	CLOSED	HAIN FW BYPASS ISOLATED TO S/G		REDUNDANT S/G4 FOR SECONDARY RECIEC NONE REQUIRED FOR \$1,	CONTROL TO S/G B  NONE FOR SI, LOSS OF SECONDARY	
<del></del>				B	PROTODIC TRETING	REDUNDANT S/G. FOR SECONDARY RECIRC	RECIRC TO S/G B	ASSOCIATED SOLEMOID VALUES ARE ADDRESSED IN SECTION 1 OF THIS ANALYSIS
04.3.05.01.1	CV-143	VALVB/ACTUATOR	OPBN	MAIN PW BYPASS VALVE TO S/G C CANNOT BE CLOSED OR THROTTLED		HANUAL BLOCK VALVE AND	REDUCED REDUNDANCY FOR MAIN PY ISOLATION TO S/G C FOR SI, LOSS OF SECONDARY RECIRC FLOW	NORMAL POSITION DURING
04.3.05.01.2	AU 141	VALVE/ACTUATOR	CLOSED	MAIN PW BYPASS ISOLATED TO 8/0	CONTROL BOOM INDICATION	BEDUNDANT S/G. FOR SECONDARY RECIEC NOME REQUIRED FOR SI.	CONTROL TO 8/G C  MOME FOR SI. LOSS OF SECONDARY	SINGLE PAILURES APPROTING THE
04.3.03.01.2	r4-143	TALIB/ACIDATOR	C1043h	C	PRRIODIC TRESTING			ASSOCIATED SOLEMOID VALVES ARE ADDRESSED IN SECTION 1 OF THIS ANALYSIS
	CA-143 CA-143 CA-145	(BBLAY)	OPP	APWAS-A AND APWAS-B SIGNALS Disabled to crece valve baceu Hode for hain pu bypass valve:	?	APW YAME FOR SHORT TREM INVENTORY, REDUNDANT MANUAL CONTROLS OR LOCAL VALVES FOR	LOSS OF AUTOMATIC BLOVDOWN ISOLATION, POTENTIAL DIVERSION OF SECONDARY RECIRC INVENTORY	NORMAL POSITION
				(TRAIN A SOLBHOID VALVES FOR CV-142, 143, 144) AND TO BLOWDOWN ISOLATION VALVES (SOLBHOID VALVE SV-84 FOR		LONG 189M	PROM SYSTEM UNTIL REGUNDANT VALVES CLOSED	
04.3.06.01.2	CV-142	APV1	ON	CV-100, 100A, 100B) BLOWDOWN ISOLATION VALVES	CONTROL ROOM INDICATION,	NONE SEGUISED	NONB	
	CA-141 CA-141	(BELAY)		(CV-100, 100A, 100B) CLOSB, MAIN PW BYPASS VALVES (CV-142, 143, 144) CLOSE VIA ASSOCIATE SOLENOID VALVES ON TURBINE	<u>.</u> '			
	=			TRIP COINCIDENT WITE MAIN PW PUMP TRIP. SIS/SISLOP CLOSE OF CV-142, 143, 144 FOR SI	P			

12/25/90



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## BM39GBNCY CORE COOLING SYSTEM SINGLE FAILURE ANALTSIS

TABLE 4-1: SECONDARY RECIRCULATION PHEA

1188	DEALCE ID	COMPONENT LD	FAILURE MODE	LOCAL BPPECTS AND DBPENDENT FAILURES	METHOD OF Detection	INHBRENT COMPENSATING PROVISIONS	BPPECT ON BCCS	REMARES
,	.CV-142 CV-143 CV-144	MCC-2A	_VOLTS LOW	MAIN FW BTPASS VALVES RENOTE MANUAL CONTROL DISABLED FOR 8/G A/B/C	CONTROL ROOM INDICATION	LOCAL NAMIJAL CONTROL AT VALUE POSITIONERS	REDUCED RELIABILITY OF MAIN FW STPASS VALVES FOR SECONDARY RECIEC PLOW CONTROL	BROL DORS NOT ADDRESS REQUIREMENTS FOR LOCAL CONTROL
	CV-141 CV-141			MAIN FW BYPASS VALVES TO S/G A/B/C WILL NOT CLOSE ON TRAIN A SIS/SISLOP, VALVE HODULATION UNAPPECTED. AUTOMATIC S/G BLOWDOWN ISOLATION ON APWAS-A AND APWAS-B DISABLED BY		SOLBHOID VALVES TO CLOSE BYPASS VALVES FOR SI, CONTROL BOOM SANDSWITCE FOR RENOTE	REDUCED RELIABILITY OF MAIN FW AFFASS VALVES FOR SI BOUNDARY, POTBUTIAL DIVERSION OF SECOMPARY RECIEC INVENTORY FROM SYSTEM UNTIL BLOWDOWN ISOLATION VALVES CLOSED REMOTE-MANUALLY	EBLONDOWN ISOLATION NOT ADDRESSED IN BOI
4.1.06.04.1	CY-142	ISA .	PRESSURE LOW	OR-BUBBCIZING OF BRLAT AFMI. HANUAL COMTROL UNAFFECTED HAIN FREDMATER BIPASS VALVES FALL CLOSED TO S/G A/B/C		NONE REQUIRED FOR SE. NONE FOR	NONB FOR SI, LOSS OF SECONDARY	*COMMON-CAUSE FAILURE NOT POSTULATED DURING SECONDARY
	CV-144		- ··- · · <del>- ·</del>	THE PROPERTY OF THE PROPERTY O		PETALEURI REARY		RECIRC, BUT SINGLE FAILURE OF ISA-960 COULD ISOLATE ISA TO CYS. RYALUATION OF MANUAL BYPASS PATES REQUIRED FOR MITIGATING EPPECTS ON
4.3.07.01.1	CV-100	VALVE/ACTUATOR	OPBN	S/G BLOWDOWN ALIGHED TO PLASH TAME, CANNOT BE ISOLATED FROM CONTROL BOOM	PERIODIC TESTING	•	POTENTIAL DIVERSON OF SECONDARY RECIRC INVENTORY FROM SYSTEM UNTIL REDUNDANT VALVE(S)	MORNALLY CLOSED, BLOWDOWN
4.3.07.01.2	CV-100	VALVB/ACTUATOB	Crosed	S/G BLOWDOWN 190LATED TO FLASH	CONTROL ROOM INDICATION	NOMB BBÖNIBBD		ISOLATION NOT ADDRESSED IN BOI OR VALVE LOCKING PROGRAM NORMAL POSITION
4.3.07.02.1	CV-100A	VALVE/ACTUATOR	OPEN		CONTROL BOOM INDICATION, PRRIODIC TRATING	BBDUNDANT VALVE CA-100B		NON-SAPRTY RELATED BACKUP TO
4.3.07.02.2	CV-100A	VALVE/ACTUATOR	CLOSED		PBRIODIC TESTING	NOME BEGUIRED		CV-100B. BLOWDOWN ISOLATION NOT ADDRESSED IN BOI
1.3.07.03.1	CV-100B	VALVB/ACTUATOB	OPBN		CONTROL ROOM ENDICATION, PERIODIC TESTING			PMS-381 AND 230/C-2183.
4.3.07.03.2	CV-100B	VALVE/ACTUATOR	CLOS3D	(SAMB AS 4.3.7.2.2)	(SAME AS 4.3.7.2.2)	(SAME AS 4.1.7.2.2)		PPORBER IN BOT
	CV-100 CV-100A CV-100B	37-81	ON (OPBN)		PRRIODIC TESTING	APW TAME POR SHORT-TERM [HVENTORY, BEDUNDANT MANUAL VALVES (PWS-524 OR PWS-518,	POTENTIAL DIVERSION OF SECONDARY RECIEC INVENTORY FROM STRTEM UNTIL REDUNDANT VALVE(S)	NORMAL POSITION. BLOWDOWN ISOLATION NOT ADDRESSED IN BOI
	CV-100A	SV-81	OFP (CLCSBD)	ISOLATING S/G BLOWDOWN TO	CONTROL BOOM INDICATION	522, 523) FOR LONG TREM NOME REQUIRED	CLOSED LOCALLY NONS	
1.3.07.05.1	CV-100B CV-100	APWI	CONTACTS OPBN	PLASH TAME AND OUTPALL (Same as 4.3.7.4.2)	(SAMB AS 4.3.7.4.2)	(SAMB AS 4.3.1.4.2)	(SAMB AS 4.3.7.4.2)	

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#### BHERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS

SAN ONOFRE UNIT ! TABLE 4-1: SECONDARY BECIRCULATION FHBA

ITBH #	DBVICE ID	COMPONENT ID	PAILURE MODE	LOCAL RPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION -	INSERNAT COMPRISATING PROVISIONS	BPPBUT ON BCCS	REMARES
01.1.07.05.2	CA-1008 CA-100V CA-100	APNI (RBLAT)	CONTACTS CLOSED (OFF)	3/G BLOWDOWN HILL NOT ISOLATS AUTOMATICALLY ON APWAS-A OR APWAS-B, HANUAL CONTROL UMAPPROTED	P8810DIC IBSTING	CONTROL ROOM HANDSWITCH FOR		*MORBAL POSÍTION, BLONDGUN 1 ISOLATION NOT ADDRESSED IN BOI
04.3.07.06.1	CA-1008 CA-100V CA-100	125YDC BUS #1 (72-121)	VOLTS LOW	SV-84 DB-EMBEGIZES, CLOSING CV-100, 100A, 100B, THEREBY ISOLATING S/G BLOWDOWN TO		NOME REQUIRED	MORE	
04.3.07.07.1	CV-100A	[34	PRESSURE LOW	CV-100, 100A, 100B PAIL CLOSED, 130LATING B/G BLOWDOWN	CONTROL ROOM ENDICATION	NONE BEGNISED	NOME	
04.3.08.01.1	CY-100B LT-1950		OUTPUT BIGH	TO PLASE TANK AND OUTPALL LOCAL INDICATION DISABLED FOR RWST LEVEL (USED FOR MANUAL HODULATION OF CRS-338)	CONTROL ROOM INDICATION	REDUNDANT CONTROL ROOM INSTRUMENTS FOR RUST LEVEL	LOCAL INDICATION DISABLED FOR RWST LEVEL	LOCAL MECHANICAL INSTRUMENT FOR RWST LEVEL. CONTROL ROOM INSTRUMENTATION INCLUDES PNEUMATIC INSTRUMENT LT-950
01.3.08.01.2			OUTPUT LOW	(SAMB AS 4.3.8.1.1)	(SANE AS 4.3.8.1.1)	(SAME AS 4.3.8.1.1)	(SAME AS 4.3.8.1.1)	AND TRAIN B POWERED INSTRUMENT LT-3020
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TABLE 4-2: SECONDARY RECIRCULATION BOUNDARY VALVE ANALYSIS



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# BMPRGENCY CORE COOLING STSTEM SINGLE FAILURE ANALYSIS \_\_\_\_\_SAN\_ONOPER\_UNIT\_1 \_\_\_\_\_\_BOUNDARY VALVE ANALYSIS

				) ( SAPRTY RELATED BACKUP						
ITEM #	TAG #	BC/AUTO?	LOCEBD?	TAG #	NC/AUTO!	!	TAG #	NC/AUTO?		REMARKS
4.1.01	(BNONB)								SER TABLES 1-2	(SI), 2-2 (CLR), 5-2 (CONTAINMENT
22 1 1 2 7 2 .										M A AND B BOUNDARY VALVES
1.2.01	(NOWE)								* SER TABLES 1-2	(SI), 2-2 (CLR), 5-2 (CONTAINMENT
										N A AND 8 BOUNDARY VALVES
4.3.01	CBS-425	OPEN	TES	CRS-426 AND: CRS-316 OR MOV-1100B/D + VCC-326	OPEN	NONB			* RWST/RECIRC SUG	TION PATE ISOLATION TO CHARGING
									PURPS. BOI DORS	NOT REQUIRE CLOSURE OF VCC-326 OR
									PROVIDE RESPONS	IB-NOT-OBTAINED OPTIONS FOR
1.3.02	CBS-389	CLOSED	NO	PMU-356, BAS-360 (CHBCE VALVES), CRS-384	CLOSED	NONE			MARRUP ISOLATIC	N TO RUST AND SPENT PUBL POOL
1.1.03	CBS-181	CLOSED	MO	NONE		CAP/FLANGE				IP DESCHARGE VENT. VALVE AND PEPING
				MANUE					ARR NON-SAPRTY	
1.3.01	CR3-380	CLOSED	NO	MONB		CAP/FLANGE			ARR NON-SAPETY	IP DISCHARGE VENT. VALVE AND PIPING
1 1 05	CBS-315	CLOSED	NO	CRS-311, 312	CLOSED	MONR				LP STPASS ISOLATION. VALVE AND
	083.414	CEOSED		VBG - 011, 415	000385	POR .				SAPETY RELATED. VALVE CRS-313 WOULD
										INST VIA G-60 SUCTION (IF OPEN) AS
									REQUIRED FOR SE	CONDARY RECIRC PUNCTION
.3.06	CBS-376	CLOSED	ŇO	MOMB		MONS				IN TO AUX BLDG BUMP VIA BUST
1 07	CBS-371	CLOSED	NO	NOME .		CRS-372		CLOGER	OVERFLOW	IP VENT. VALVE AND PIPING ARE
	(31-311	CECTED	av	NORS.		083-316		CLUSED	NON-SAFRTY RELA	
1.3.08	C2S-364	CHRCE	NO	NOME REQUIRED						IP DISCHARGE CHECK VALVE. VALVE
									WOULD ALIGN PLO	W TO RWST VIA G-60 SUCTION (IF
									•	RD FOR SECONDARY RECIEC PUNCTION
1.3.09	CB3-373	CLOSED	NO	NONE .		BWL-508		CLOSED		IP DISCHARGE TO RADVASTE LOW
									RELATED RELATED	M. VALVE AND PIPING ARE MON-SAPETY
1.3.10	CBS-374	CLOSED	¥0	8FP-325	CLOSED	NOMB				IP DISCHARGE TO RADWASTE ION
									BICHANGER STOTE	H
	8CP-359	CBBCE	NO.	NOMB BEGILBED					B/G A CBRMICAL	
	SCF-398	CHRCE	KO KO	NORE REQUIRED		•			S/G B CHRMICAL	
	SCP-358 APW-321	CHECE	NO NO	MONE SEGNISED					8/G C CORMICAL 8/G A AUT PV LI	
	APV-447	CLOSED	NO.	NONE SEAGLES		CAP			S S/G A APW PW LT	· <del>-</del>
.1.16	AFW-322	CHRCE	NO	NONE BEGNIESD					S/G B AUL PV LI	
	APV-398	CLOSED	NO	NOVE		CAP			J S/C B APP PO CI	
	APW-324	CHRCK	NO	NONE BEGUIRED					8/G C AUI PV LI	
	APV-310 FVS-009	CLOSED	NO NO	MONB		CAP			S/G C APN PN LI	
	PWS-009	CLOSED	NO NO	NONE		CAP			8 S/G A MAIN FW E 8 S/G B HAIN FW E	•
	FWS-014	CLOSED	NO NO	NONB		CAP			8 3/G C HAIN FW I	
	MSS-003	CLOSED	NO	NORE		100-82H		CLOSED	1 S/C A SECONDARY	
	M35-012	CLOSED	<b>M</b> 0	NONE		MSS-010	•	CLOSED	I S/G B SECONDARY	SIDE DRAIN
1.3.25	MS3-004	CLOSED	NG	BNON		MS3-002		CLOSED	# S/G C SECONDARY	SIDE ORALM





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ITBN #	TAG #	MC/AUTO?	LOCKED?	- (	•	NC/AUTO	?	TAG #	NC/AUTO?		REMARES
04.1.28_	CV-100B	_CLOSED AUTO	NO	. FWS-526 PWS-524		CLOSED	MONR CV-100A		AUTO	* !	S/G RLOYDOWN ISOLATION TO PLASE TANK BLOWDOWN ISOLATION TO OUTFALL. CV-100A/B CLOSE AUTOMATICALLY ON LOW S/G WATER LEVEL (APWAS-A OR APWAS-R)
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SECTION 5: CONTAINMENT SPRAY

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#### CONTAINMENT SPRAY AND HYDRAZINE INJECTION NOTES

- 1. Item numbers in this section have been assigned as follows:
  - 05.1: Train A pumping, flow path and boundary devices
  - 05.2: Train B pumping, flow path and boundary devices
  - 05.3: Common flow path and boundary devices.
- 2. Table 5-1 is the Failure Modes and Effects Analysis (FMEA) for the Containment Spray and Hydrazine Injection functions. Table 5-2 is the associated boundary valve analysis.
- 3. The boundary valve analysis for those portions of the Containment Recirculation and Spray system common to Cold Leg Recirculation is contained in Table 2-2.
- 4. Potential single failure susceptibilities in the FMEA table are flagged with "\*" as the first character of the associated ECCS EFFECTS field. Other open items (eg. required procedure or calculation changes) are flagged with "\*" as the first character of the REMARKS field.
- Potential single failure susceptibilities in the Boundary Valve Analysis table are flagged with "\*" in the unlabelled field adjacent to REMARKS. Items flagged with "#" in the unlabelled field adjacent to REMARKS are acceptable from a single failure standpoint subject to credit for SEP Topic III-6 seismic boundary criteria.

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### CONTAINMENT SPRAY AND HYDRAZINE INJECTION REFERENCES

	rumentation Diagrams
5178110	RCP Seal Water System (Sh 1)
5178120	Containment Spray and Recirculation System (Sh 1)
5178121	Containment Spray and Recirculation System (Sh 2)
5178125	Containment Spray Hydrazine Addition System
5178400	Gaseous Nitrogen System (Sh 1)
5178443	Instrument and Service Air System (Sh 4)
5178449	Instrument and Service Air System (Sh 10)
Elementary Diag	rams
64346	Hydrazine Additive Pumps
64354	Containment Spray Actuation System Train A (Sh 1)
64355	Containment Spray Actuation System Train A (Sh 1)
64356	CV-82 and CV-114
64357	Refueling Water Pumps
64359	SV-600
	SV-601
	CV-517
64365	CSAS Train B
64369	CV-518
64374	MOV-883
64383	CSAS Inverter System
455693	CV-92
5130826	Containment Spray and Hydrazine Addition Control
	System Train A (Sh 1)
5130827	Containment Spray and Hydrazine Addition Control
	System Train A (Sh 2)
5130876	
3130876	4.16 kV Buses Undervoltage and Generator
5150700	Underfrequency Relays
5159793	Containment Spray and Hydrazine Addition Control
	System Train B (Sh 1)
5180775	Containment Spray and Hydrazine Addition Control
	System Train B (Sh 2)
<u>Procedures</u>	
SO1-1.0-20	Loss of Reactor Coolant
SO1-1.0-23	Transfer to Cold Leg Injection and Recirculation
SO1-1.0-24	Transfer to Hot Leg Recirculation
SO1-1.0-30	Loss of Secondary Coolant
SO1-4-41	Containment Spray and Recirculation System
	Alignment
SO1-14-40	Control of Locked Valves
SO1-12.3-35	Containment Spray and Recirculation System Safety
501 12.3 33	
Other Documents	Related Alignment
SD-S01-580	
2n-201-200	System Description: Safety Injection, Recircula-
an an an	tion and Containment Spray Systems
SD-S01-590	System Description: Safeguard Load Sequencing
	System
M89048	Response to Generic Letter 88-14, "Instrument Air
	Supply System Problems Affecting Safety Related
	Systems", dated July 5, 1989
	- · · · · · · · · · · · · · · · · · · ·

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TABLE 5-1: CONTAINMENT SPRAY FMEA





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### EMBEGBNCY CORE COOLING SYSTEM SINGLE PAILURE AMALTSIS SAN OMOFRE UNIT 1 TABLE 5-1: CONTAINMENT SPRAY AND ETDRAZINE INJECTION PHBA

ITBN \$	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL REFECTS AND DEPENDENT FAILURES	METROD OF DRIBCTION	PROATRIONS IMBREMA COMPENSATING	APPRET ON BECCA	RIMARES
05,1.01.01.1	BARDAL VACARS	<u> </u>	QPBN	NOME	PERIODIC SURVRILLANCE	NONE BEQUIRED	NOMB	INCLUDES CR8-302, 306, 330
	TRAIN A FLON	•						(MINIPLON), BNA-302, 304, 308 (MYDRAZINE)
05.1.91.91.3	BANUAL VALVBS,		_Cró8Bb	TRAIN A CONTAINMENT SPRAY OR BYDRAZINE PUMPING SUCTION, DISCRARGE OR MINIFLOW ISOLATED	SEBTODIC BARABITTANCE	BEDUNDANT TRAIN	LOSS OF TRAIN A CONTAINMENT SPRAY AND MYDRAZING ADDITION PUMPING	
05.1.01.02.1	CRECE VALVES,		NOME (SYSSIAE)	PISCESSED OF BUSINESS ISOLATED	PERIODIC TESTING		rvariau	INCLUDES CES-304, SNA-306
<b>65.1.02.01.1</b>	MANUAL VALVES, TRAIN A BOUNDARY		OPEN	DIVERSION OF TRAIN A STUBAZINE PLOW TO STUBAZINE TANK OR LOSS	PERIODIC SURVEILLANCE	BEDUNDANT TRAIN FOR FLOW RATE, BONE FOR INVENTORY	*LOSE OF TRAIN A MYDRAZINE PLOU OR REDUCTION IN DURATION OF	SEE TABLE 5-2 FOR DETAILED BOUNDARY VALVE ANALYSIS
				OF MYDRAZINE INVENTORY TO ATMOSPHERE			STORAZINE PLOW FOR BOTH TRAINS DUB TO INVENTORY LOSS TREOUGH UNLOCERD VALVES	
45.1.02.01.2	MANUAL VALVES, TRAIN A BOUNDARY		CLOSED	NORE	PRETODIC SURVETLLANCE	NONE ENGLISED	PORT	
<u> </u>	CARCE OR RELIEP VALVES, TRAIN A BOUNDARY		MORNAL (PASSIVE)	NOME. VALVE OPENS TO RECIRC G-2004 PLOW TO RYDRAZINE TANK ONLY IF SV-600 REMAINS CLOSED	PREIODIC TESTING	NONE REQUIRED	NORE	INCLUDES RV-2003A. VALVE SETPOINT VERIFIED AS PART OF ASHS II IST
05.1.03.01.1		PUNP/HOTOR	FOA LFOA	BRDUCED TRAIN A PLOW FOR CONTAINMENT SPRAY AND	PRRIODIC TRATING	BEDUNDANT TRAIN	INOPERABILITY OF TRAIN A PUNPING FOR CONTAINMENT SPRAY	
05.1.03.02.1	G-27N	8NGR #1 (52-1119)	OPEN	ALTERNATE NOT LEG RECIRC TRAIN A SPRAT PUMP FAILS TO START OR TRIPS IP RUNNING	PREIODIC TESTING	REDUNDANT TRAIN	AND ALTERNATE HOT LEG RECIRC INOPERABILITY OF TRAIN A PUMPING FOR CONTAINMENT SPRAY	
<b>05.1.03.02.2</b>	G-21N	SWGR #1 (52-1119)	CLOSED	TRAIN A SPRAT PUMP STARTS OR PAILS TO TRIP, RESULTING IN OUT OF SEQUENCE BUS LOADING	CONTROL ROOM INDICATION	REDUNDANT TRAIN (RUNS IF APPROTED TRAIN PAILS OFF, CAN BE TRIPPED FOR RECIRC IF	AND ALTERNATE BOY LEG RECIRC POTENTIAL LOSS OF TRAIN A BLECTRICAL POWER FOR SISLOP OR INABILITY TO TRIP FOR	BOIS SPECIFY AT MOST I SPRAY FOMP RUBNING IN EXCISE, BUS TO RECIRC PUMP PLOW LIMITATIONS
05.1.03.03.1	G-118	APSS (RELAT)	ON		CONTROL BOOM INDICATION, PARIODIC TESTING	APPECTED TRAIN PAILS ON) REDUNDANT TRAIN FOR SISLOP, OVERRIDE FOR PUMP TRIP FOR	RECIRCULATION  POTENTIAL LOSS OF TRAIN A BLECTRICAL POWER FOR SISLOP	OVERTIDE FUNCTION MORNALLY REQUIRED POST-CEAS
		<u> </u>		OVERLOAD DEFEATED, AUTO START SIGNAL SEALED-IN, RESULTING IN OUT OF SEQUENCE BUS LOADING FOR SISLOP		RECIRCULATION APTER SIS		asquiss rout-van
05.1.03.03.2	G-218	APSS (RBLAY)	ÓPP	TRAIN A SPRAT PUMP AUTO-START AND UNDERVOLTACE/OVERLOAD TRIP DEPEAT DISABLED. MANUAL START UNAPPECTED	PARTODIC TRATING	REDUNDANT TRAIN FOR INJECTION, HANDAL START OR REDUNDANT TRAIN FOR RECIRCULATION	INOPERABILITY OF TRAIN A FOR INJECTION MODE CONTAINMENT SPRAY, MOME FOR RECIRCULATION (DUE TO RANUAL STARY	
05.1.03.04.1	G-27#	APS6 (RBLAT)	ON (CONTACTS OPEN)	TRAIN A SPRAT PUMP MANUAL TRIP DRPKATED, PUMP CANNOT BE TRIPPED BICEPT VIA OVERRIDE APTER APSS BRLAT EMBRGIZED ON	PRRIODIC TESTING	NOME REQUIRED FOR INJECTION,  OVERFIDE FOR PUMP TRIP DURING  RECIEC	CAPABILITY) HOMB	OVERRIDE FUNCTION NORMALLY REQUIRED POST-CSIS
05.1.03.04.2	G-27#	APS6 (RELAT)	OFF (CONTACTS CLOSED)	CSAS TRAIN A SPRAY PUMP MANUAL TRIP NOT DRPBATED ON CSAS	PBRIODIC TESTING	AUTO-START BIGNAL, REDUNDANT TRAIN	REDUCED RELIABILITY OF TRAIN A CONTAINMENT SPRAY PUMPING	MORNAL POSITION DURING OPERATION



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# SHERGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN OMOPRE UNIT 1 TABLE 5-1: CONTAINMENT SPRAY AND BYDRAZINE INJECTION PARA

	DBVICE ID	COMPONENT ID	FAILURE MODE	LOCAL REFECTS AND DEPENDENT FAILURES	METROD OF DETECTION	FROATSTORS  [NUBBBRAL COMBRANTING	RPPRCY ON RCCS	BRIARES
05,1,03,05,1_0	3-27W	127-511 (UV BRLAY)	CONTACTS OPEN	TRAIN A SPRAY PUMP UNDREVOLTAGE TRIP DEFRATED, RESULTING IN OUT OF SEQUENCE BUS LOADING FOR MINIOP IF PUNE	PRBETODIC IBALIAC		POTRATIAL LOSS OF TRAIN A BLECTRICAL POWER FOR SISLOP, NOME FOR SIS	
<u> </u>	3-211	127-511 (UV BBLAT)	CONTACTS CLOSED	ALREADY RUMMING. NO SPPECT ON AUTO-START IF INITIALLY OFF TRAIN A SPEAT PUMP UV TRIP SIGNAL, PREVENTING MANUAL START. AUTO-START AND OVERRIBS FUNCTIONS UNAPPECTED	CONTROL BOOM INDICATION, PREIODIC TESTING	REDUNDANT TRAIN	REDUCED RELIABILITY OF TRAIN A CONTAINMENT SPRAY AND ALT BOT LEG RECIEC PURPING	
05.1.03.06.1	)-21H	SWGR \$1 125VDC CONTROL POWER	AOL13 FOA	PUMP CANNOT BE STARTED IF OFF OR TRIPPED IF BUNNING	CONTROL BOOM INDICATION, ANNUNCIATION	REDUNDANT TRAIN (RUNS IF APPROTED TRAIN FAILS OFF, CAN BE TRIPPED FOR RECIRC IF	POTENTIAL LOSS OF TRAIN A CONTAINMENT SPRAY AND STORAZINE PUMPING OR INABILITY TO TRIP	
05.1.04.01.1	CV-517	VALVE/ACTUATOR	OPEN	VALUE OPENS FOR INJECTION BUT CANNOT BE ERCLÓSED FOR BECIRCULATION	CONTROL BOOM INDICATION, PERIODIC TRETING	APPECTED TRAIN FAILS ON) NORE REQUIRED FOR INJECTION, REDUNDANT RECIEC PUMPS FOR RECIRCULATION CAPACITY	TO REDUCE SPEAT PLOW TO WITHIN	*INCLUDES PY-8517. NORMAL POSITION. BOI DORS NOT CURRENTLY REQUIRE RUNNING BOTE RECIRC PUMPS AS ASSUMED BY
05.1.04.01.2 (	CV-517	VALVE/ACTUATOR	CLOSED	******************************	CONTROL ROOM INDICATION, PREIODIC TESTING	CV-518 FOR INJECTION HODE.	1 OF 2 REDUMBLET BI-FLOW SPRAY PATES INOPERABLE FOR [BJECTION,	BYDRAULIC CALC MC734-012 SUPPL
	CV-517	AVST (RELAT)	CONTACTS CLOSED (ON)	REMAINS IN RECIRC ALIGNMENT CRAS OPEN SIGNAL TO VALVE, NO RPPECT ON MANUAL CLOSE DEPEAT	PERIODIC TESTING	NOME REQUIRED FOR ENJECTION, OVERRIDE FOR RECIEC	NONE	OVERRIDE FUNCTION MORNALLY REQUIRED POST-CRAS
05.1.04.02.2 (	CV-517	AVST (RBLAT)	CONTACTS OPEN (OPF)	OR OVERFIDE PUNCTIONS CSAS SIGNAL DEPEATED TO CV-517 AUTO-OPEN AND OVERFIDE. MANUAL OPEN AND CLOSE DEPEAT UNAPPECTED, SO THAT VALVE		REDUNDANT VALVE FOR INJECTION, REDUNDANT RECIRC PUMPS AND PRIMARY PATS FOR BOY LEG RECIRC	OF 2 REDUNDANT RI-PLOW SPRAY PATES POTENTIALLY INOPERABLE POR INJECTION, POTENTIAL INABILITY TO REDUCE SPRAY PLOW	CURRENTLY REQUIRE RUNNING BOTE  BECIEC PUMPS AS ASSUMED BY
				CANNOT BE RECLOSED IF MANUALLY OPENED	·		TO WITHIN CAPACITY OF ONE ESCIRC PUMP, APPECTING PUMP HEAD FOR ALTERNATE BLE PATE	
05.1.01.03.1	CV-5]1	TAND (BBCTAL)	CONTACTS OPEN (ON)	HANUAL CLOSE DEPRATED, OVERRIDE AND AUTO/HANUAL OPEN UNAPPROTED	PERIODIC TESTING	NOME REQUIRED FOR INJECTION, OVERRIDE FOR RECIRCULATION	HONE	OVERBIDE PUNCTION NORMALLY BEQUIEED POST-CSAS
05.1.04.03.2	CV-\$11	TANGO (BELTA)	(OPP)	HANUAL CLOSE DEFEAT DISABLED. OVERRIDE AND AUTO/MANUAL OPEN UNAPPECTED	PRRIODIC TRATING	REDUNDANT TRAIN	BEDUCED RELIABILITY OF TRAIN A	NORMAL POSITION
05.1.04.04.1	CY-\$17	848-505 <b>9</b>	CONTACTS CLOSED	CV-517 AND CV-518 CLOSE, CANNOT BE REOPENED IF PES-520, PES-521 LOOPS SEE BICE/LOW RECIRC PUMP PLOW COMBINATION	CONTROL ROOM INDICATION,	NONE BEGNEEED	NONE	SPRAY PLOW LIMITER CIRCUIT INCLUDES PIS-520/521 LOOPS, AND ISOL RELAY 113VE4 TO CV-518. FAILURE WAS NO COMSEQUENCE SINCE BOTH LOOPS SEE LO BECIEC PP PLO DURING
!						<u></u>		INJECTION (IE, RECIRC PUMPS OFF), AND CV-517/518 ARE CLOSED FOR RECIRC. LOOP FT# ARE ALSO EQ



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# EMBEGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONOPRE UNIT 1 TABLE 5-1: CONTAINMENT SPRAY AND ETDRAZINE INJECTION FREA

<del></del>	MPONBAT ID	PAILURE MODE	DEPENDENT PAILURES	METROD OF DETECTION	PROVISIONS	REFERENCE ON LCCA	EBHARES
-511	2059	CONTACTS OPEN	SPRAT FLOW LIMITER DISABLED	-	NONE BEQUIRED SKON	1048	NOBULL ROS LT LOU
				CONTROL INDICATION	CV-518_FOR_INJECTION, NOWE	PATHS_INOPERABLE_POR_INJECTION,.	
				CONTROL ROOM INDICATION, ANNUNCIATION	HOME FOR INJECTION, NOWE REQUIRED FOR BECIECULATION	SPOTENTIAL COMMON-CAUSE LOSS OF BOTH HI-PLOW SPRAT PATES DURING	
						RECIRCULATION	BURING MORMAL OPS OR DECLARED INOP IF CLOSED, BUT TECH SPEC
							CHANGE REQD. VALVES HUST BEHAIN FULLY OPEN FOR AT LEAST 5 HOURS (RMALLEST SELOCA) TO
-82 VALV	/E/ACTUATOR			CONTROL ROOM INDICATION	SPRAY OR INJECTION BODE.	NORE FOR CONTAINMENT SPRAY, LOSS OF CONTAINMENT ISOLATION	BEHAIN BOUNDED BY ANALYSIS SINCLUDES SV-128, ZSO/C-1082. BOIS PERMIT SPEAT PUMPS TO BE
			POR CONTAINMENT [SOLATION		RECIRC PUMP HEAD TO HAINTAIN LOOP SEAL IN SPRAY RISER FOR CONTAINMENT ISOLATION		TRIPPED AFTER PRESSURE REDUCTION POST-LOCA. VALVE FAILURE ON LOSS OF AIR NOT
							COMPISTENT WITH BASIS FOR ACCEPTANCE OF PENETRATION COMPIGURATION UNDER SEP TOPIC
-81 AVEA	B/ACTUATOR			•		I OF 2 REDUNDANT CONTAINMENT	VI-4. NORMAL POSITION
-82 AV85	(RELAT)	CONTACTS CLOSED (ON)	CONTAINMENT SPRAY CSAS OPEN SIGNAL TO VALVE	CONTROL BOOM INDICATION,	(SAME AS 5.1.5.1.1)	(SAME AS 5.1.5.1.1)	
-12 AV95	(RELAT)	CONTACTS OPEN (OFF)	DEPRATED. NO EPPECT ON MANUAL		MANUAL OPEN OR REDUNDANT VALUE	• •• • • • • • • • • • • • • • • • • • •	MORMAL POSITION
-82 AV36	(RELAT)	CONTACTS OPEN (ON)	CV-82 MANUAL CLOSE DEFEATED. NO EPPECT ON MANUAL OR	CONTROL ROOM INDICATION, PERIODIC TESTING	(SAUB AS 5.1.5.1.1)	(SAME AS \$.1.5.1.1)	
-82 AV96	(RELAT)	CONTACTS CLOSED	CY-82 MANUAL CLOSE DEFEAT DEFEATED	PERIODIC TESTING	REDUNDANT VALVE	REDUCED RELIABILITY OF TRAIN A CONTAINMENT SPRAY PAYS	, , , , , , , , , , , , , , , , , , , ,
		AOF13 FOA	CY-82 PAILS OPEN, CANNOT BE	CONTROL BOOM ENDICATION	NONE REQUIRED FOR CONTAINMENT SPRAY, RECIRC PUMP BEAD TO HAINTAIN LOOP SEAL FOR CONTAINMENT ISOLATION	LOSS OF CONTAINMENT ISOLATION VALVING FOR SPRAT PRINTTRATION	SEC PERSONS SPEAT PUMP TRIP AFTER PRESSURE REDUCTION POST-LOCA. MOT CONSISTENT WITH SEP TOPIC VI-4 BASIS FOR
					HAVE STATISTICS AND JAMES THE PARTY		ACCEPTIBILITY OF CONTAINMENT ISOLATION CONFIGURATION FOR THE SPEAT PENETRATION
-82 [84		PRESSURE LOW	CV-82 PAILS OPEN, CANNOT BE BRCLOSED	CONTROL ROOM INDICATION	NOBE REQUIRED FOR CONTAINMENT SPRAT, RECIRC PUMP BRAD TO MAINTAIN LOOP SRAL FOR CONTAINMENT ISOLATION	LOSS OF CONTAINMENT ISOLATION	ABOI PERMITS SPRAT PUMP TRIP AFTER PERSSUER REDUCTION. NOT CONSISTENT WITH SEP TOPIC VI-4 BASIS FOR ACCEPTABILITY OF THE ISOLATION CONFIGURATION FOR
	517 VITI (8-1 517 ISA  517 ISA  62 VALV  62 VALV  62 AVS  63 AVS  64 AVS  65 AVS  66 AVS  67 AVS  68 AVS  68 AVS  69 AVS  60 AVS  60 AVS  61 AVS  62 AVS  63 AVS  64 AVS  65 AVS  66 AVS  66 AVS  67 AVS  68 AVS  68 AVS  69 AVS  60 AVS  60 AVS  61 AVS  61 AVS  62 AVS  63 AVS  64 AVS  65 AVS  66 AVS  67 AVS  68 AVS  68 AVS  69 AVS  60 AVS  60 AVS  61 AVS  61 AVS  62 AVS  63 AVS  64 AVS  65 AVS  66 AVS  67 AVS  68 A	\$2	S17 VITAL BUS \$1 VOLTS LOW  (8-1113V)  517 ISA PRESSURE LOW  82 VALVE/ACTUATOR OPEN  82 AVSS (RELAT) CONTACTS CLOSED (ON)  82 AVSS (RELAT) CONTACTS OPEN (ON)  82 AVSS (RELAT) CONTACTS OPEN (ON)  82 AVSS (RELAT) CONTACTS CLOSED (OPP)  83 AVSS (RELAT) CONTACTS CLOSED (OPP)  84 AVSS (RELAT) CONTACTS CLOSED (OPP)  85 AVSS (RELAT) CONTACTS CLOSED (OPP)  86 AVSS (RELAT) VOLTS LOW	SIT VITAL BUS \$1 VOLTS LOW CY-517 PAILS CLOSED, CANNOT BE (8-1113Y) RESPEND CY-517 DEIPTS CLOSED IF INTERNAL STORMULE LERRAGE, CANNOT BE REOPEND CANNOT BE RECLOSED	SIT VITAL BUS \$1 VOLTS LOW CT-SIT PAILS CLOSED, CARNOT BE CONTROL ENDICATION  (8-11139) REOPERAD  517 13A PRESSURE LOW C-SIT DELFTS CLOSED IF CONTROL ROOM INDICATION  LINTERNAL STORAULIC LERALAGE, AMBUNCIATION  22 VALVE/ACTUATOR OPEN VALVE OPEN FOR CONTAINMENT PRAIT BUT CAMEDY BE RECORDED FOR CONTAINMENT INDICATION  22 VALVE/ACTUATOR CLOSED VALVE WILL NOT OPEN HAMUALLY CONTROL ROOM INDICATION  23 AVIS (RELAT) CONTACTS CLOSED CONTAINMENT SPEAT CONTROL ROOM INDICATION, PRICODIC TESTING CONTROL ROOM INDICATION RECCORDS	PRICOGE TESTED  (4:-1117)	PRIODIC TRITION   PRIODIC TRIBUTE   PRIODIC TRITION   PRIODIC TRIBUTE   PRIODIC TR





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## RMERGENCY CORE COOLING SYSTEM SINGLE PAILURE AMALYSIS SAN OWOPRE UNIT 1 TABLE 5-1: CONTAINMENT SPRAY AND ETDRAZINE INJECTION PREA

`F'	iten e	DEVICE ID	COMPONENT ID	PAILURE MODE	LOCAL EFFECTS AND DRPENDENT FAILURES	MBTHOD OF DRIECTION	INBRENT COMPENSATING PROVISIONS	BPFECT ON ECCS	REMARES
_	Q\$.1.06.01.1 G	-2004	_ EUMP/MOTOR	TON BYON	BROUCED TRAIN_A BIDRAZINE PLON TO SPRAY PUMP DISCRARGE BRADER		REDUNDANT PUMP	INOPERABILITY OF TRAIN A	
-	05.1.06.01.2 G	-1004	PUMP/MOTOR	19	TRAIN A RYDRAZINE PUMP MOTOR PAILS (OPEN, SHORT OF GROUND)	CONTROL BOOM ANNUNCIATION	HOME BEGUIESD	RYDRAZINE PURPING POTRHYTAL COMMON-CAUSE LOSS OF STDRAZINE PURPING APTER & BOURS	FOLLOWING CRAS BREURES
					2 RES AFTER RECIRCULATION INITIATED	•	•		ADEQUATE STORAZINE DELIVERY. MOTOR CONTROLLES BREAKER PRECLUDES (b)(2) IMPACT ON
	05.1.06.02.1 G	-2004	MCC-1 (42-1153)	OPBM	TRAIN A STORAZINE PUMP PAILS TO START OR TRIPS IS SUMMING	CONTROL BOOM INDICATION, PRRIODIC TRATING	ERDUNDANT PUMP	INOPERABILITY OF TRAIN A STORAZINE PUMPING	offer acc Loids
	05.1.06.02.2 G	-2004	MCC-1 (48-1153)	CLOSED	TRAIN A STORAZINE PUMP STARTS OR PAILS TO TRIP, RESULITING IN OUT OF SEQUENCE BUS LOADING	CONTROL ROOM INDICATION	REDUNDANT VALVE CONTROLS TO PREVENT PLON UNTIL REQUIRED, REDUNDANT TRAIN TO PROVIDE	REDUCED RELIABILITY OF TRAIN A ELECTRICAL POWER FOR SISLOP, STORAZINE STATEM ISOLATION FOR	TO RESULT IN ACTUAL LOSS OF
:	05.1.06.01.1 G	-2001	APS1 (RELAT)	CONTACTS OPEN (OPF)	TRAIN A MIDRAZINE PUMP AUTO-START DEPEATED, MANUAL	PERIODIC TESTING	BIDDADTHA SOMS STOR BOR BIBTOS	SIS AND SISLOP INOPERABILITY OF TRAIN A STORAZINE PUMPING	NORMAL POSITION
	95.1.06.03.2 G	-200A	APSI (RELAT)	CONTACTS CLOSED (ON)	START UNAPPRICTED TRAIN A STORAZINE PURP AUTO-START SIGNAL SRALED-IN.		BEDUNDART PUMP	(SANE AS 5.1.4.2.2)	
;	05.1.06.04.1 G	-200A	APSE (RELAT)	CONTACTS CLOSED	OVERRIDE, LOW LEVEL AND MANUAL TRIPS UNAPPROTED TRAIN A STORAZINE PUMP MANUAL		REDUNDANT PUNP	BEDUCED RELIABILITY OF TRAIN A	MORMAL POSITION
	05.1.06.04.2 G	-200A	APSI (RBLAT)	(OPP) CONTACTS OPEN (ON)	TRIP DEFRAT DEFRATED TRAIN A RIDRAZINE PUMP MANUAL TRIP DEFRATED, PUMP CANNOT BE	PRRIODIC TRATING	NONE BEQUIESD	STORALINE PUMPING MONE	
!					TRIPPED MANUALLY BYCEPT VIA OVERBIDE APTER APEL BELAT ENERGIZED ON CRAS. LOW LEVEL				
	05.1.06.05.1 G	-2004	L[8-500A LOOP	OUTPUT OPEN (OFF)	TRIP UNAPPRITED TRAIN A STORAZINE PUMP LON LEVEL TRIP DEPRATED, MANUAL	PERIODIC TESTING	NORE SEGUISSE	MONE	NORMAL POSITION. EQUIPMENT PROTECTION PUNCTION ONLY
!  -	05.1.06.05.2 G	-2004	L18-5004 LOOP	OUTPUT CLOSED (ON)	TRIP UNAPPROTED TRAIN A STORAZINE PUMP LON LEVEL TRIP SIGNAL SEALED-IN,	CONTROL ROOM ANNUNCIATION	REDUMBANT PUMP	INOPERABILITY OF TRAIN A BYDRAZIME PUMPING	
	05.1.06.05.3 G	-2004	LI9-5001 LOOP	IMPUT OPEN	PUMP WILL TRIP IP RUNNING AND CANNOT BE RESTARTED (SAME AS \$.1.6.5.1)	(BANK AS 5.1.6.5.1)	(SAHE AS 5.1.6.5.1)	(SAHE AS 5.1.6.5.1)	
	05.1.06.05.4 G		LIS-500A LOOP	INPUT SHORT	BLOWS SUPPLY PUSE, CAUSING LOSS OF POWER TO PT-501, FIS-500, LIS-500A, PIS-510 AND	CONTROL ROOM ANNUNCIATION, PERIODIC TESTING	REDUNDANT INPUTS FOR CRAS LOGIC, REDUNDANT HYDRAZINE PUMP	LOSS OF 1 OF 3 CONTAINMENT BI-BI PRESSURE INPUTS TO TRAIN	PIS-526 AND PIS-521 BOTH WAIL LOW, RUSURING THAT APRAT PLOW LIMITER CANNOT DISABLE CV-517
					PIS-520, -521, -522 LOOPS. RESULTS IN LOSS OF CE A IMPUT TO TRAIN A/B CSAS LOGIC,			ERLIABILITY OF TRAIN A STORAZINE PUMP	AND CV-518 BURN IF ARRED
,	· · · · · · · · · · · · · · · · ·	- · · -··			DEPEAT OF LOW LEVEL TRIP FOR G-200A, AND LOW PLOW BIGNALS TO PLOW LINITER				
ļ			<b>.</b>		to the Plution		ne remark a service		





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# EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OMOFRE UNIT 1 TABLE 5-1: CONTAINMENT SPRAY AND HYDRAZINE IMJECTION PHBA

ITEM #	DRVICE ID	COMPONENT 1D	FAILURE MODE	LOCAL RPPECTS AND DEPENDENT PAILURES	MBTHOD OP DRTBCTION	INBRENT COMPENSATING PROVISIONS	RPPRCY ON BCCS	REMARES
. 05.1.06.05.5	G-2004	.LIS-500A LOOP		HAT CAUSE SPURIOUS LOW LEVEL SIGNAL TO TRAIN A STDEAZINE PUMP 2 SES AFTER SECIECULATION INITIATED	ANHUNCIATION	NORE BEGNIESD	BYDRAZINE PUMPING APTER 2 HOURS	POLLOWING CRAR ENSURES ADROUATE ETDRAZING DELIVERY. LIS-500A DRVICE PROVIDES
					·			ISOLATION OF NON-EQ INTE FROM OTHER LOADS ON SAME POWER SUPPLY
<b>85.1.06.06.1</b>	G-200A	VITAL BUS \$1 (8-1116V)	AOTIS FOR	LOSS OF POWER TO PT-501, PIS-511, PIS-500, LIS-500A, PIS-510 AND PIS-520 AND -521 LOOPS, CAUSING LOW CH. A	CONTROL ROOM ENDICATION, ANNUNCIATION	REDUNDANT CHANNELS FOR CEAS, REDUNDANT STORAZINE PURP	LOSS OF 1 OF 3 REDUNDANT CONTAINMENT BI-BI PRESSURE INPUTS TO CSAS TRAIN A/B LOGIC AND REDUCED BELIABILITY OF	
				CONTAINMENT PRESSURE SIGNAL TO CSAS A/B LOGIC, AND DEPENTING LOW LEVEL TRIP OF TRAIN A			TRAIN A STORAZINE PUMP	
95, 1.01.01.1	9V-600		<b>OPBN</b>	BYDRAZINE PUMP VALUE ALIGNE FOR TRAIN A RYDRAZINE PLOW, CANNOT BE RECLOSED	CONTROL BOOM INDICATION	SEBURAL STOR MALIT SEGNISED SEBURATAL SAME CONTROLS TO	REDUCED RELIABILITY AGAINST SPURIOUS BYDRAZINS SYSTEM ACTUATION	SPURIOUS STATEM ACTUATION WOULD DEPLETE HYDRAXINE INVENTORY SUCH THAT BOSE CALC ASSUMPTIONS COULD NOT BE HET
05.1.07.01.2	84-600	VALVE/ACTUATOR	CLOSED	VALVE DOES NOT OPEN FOR TRAIN A NIDRAZINE FLOW	PBBIODIC TESTING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A	POR A SUBSEQUENT LOCA NORMAL POSITION
05.1.07.01.3	97-600	VALVB/ACTUATOR	<b>10</b>	TRAIN A STORAZINE ISOLATION VALUE FAILS (OPEN, SRORT OR GROUND) 2 BRS APTER RECIRCULATION INITIATED		NONE REQUIRED		MINIBUM 2 RES OPERATION  POLLOWING CSAS ENSURES  ADEQUATE SYDERACINE DELIVERY.  PUST PROVIDES (5)(2)  PROTECTION OF OTHER DC BUS  LOADS
05.1.07.02.1	8V-600	AVSZ (RELAT)	CONTACTS OPEN (OFF)	TRAIN A MIDRAZINE ISOLATION VALUE AUTO-OPEN AND OVEREIDE DEPRATED, MANUAL OPEN	PERIODIC TESTING	(SAMB AS 5.1.7.1.2)	(SAME AS 5.1.7.1.2)	NORMAL POSITION
05.1.07.02.2	8V-600 	AVSZ (RELAT)	CONTACTS CLOSED (ON)	UMAPPECTED TRAIN A SYDRAZINE ISOLATION VALVE AUTO-OPEN SIGNAL AND	CONTROL GOOR INDICATION	(SAHE AS 5.1.7.1.1)	(SAME AS 5.1.7.1.1)	
05.1.07.03.1	3V-600	AVS1 (RELAT)	CONTACTS CLOSED	OVERRIDE PERMISSIVE SEALED-IN TRAIN A STORAZINE ISOLATION VALVE MANUAL CLOSE DEPRAT DEPRATED	PRRIODIC TESTING	REDUNDANT TRAIN	REDUCED RELIABILITY OF TRAIN A STORAZINE ADDITION	NORMAL POSITION
05.1.07.03.2	8V-600 	AVS1 (RELAT)	CONTACTS OPEN (ON)		PREIODIC TESTING	(SAMB 45 5.1.1.1.1)	(SAME AS 5.1.7.1.1)	OVERRIDE PUNCTION MORBALLY REQUIRED POST-CSAS
05.1.07.04.1	8V-600	125VDC BUS \$1 (72-122)	VOLTS LOW		CONTROL BOOM INDICATION	RECOMPANT TRAIN	INOPERABILITY OF TRAIN A EVOLUTION SELECTION	



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# EMERGENCY CORE COOLING SYSTEM SINGLE PAILURS ANALYSIS SAN ONOPRE UNIT 1 TABLE 5-1: CONTAINERNT SPRAY AND SYDRAZINE INJECTION PREA

ITEM #	DBV[CB [D	COMPONENT ID	FAILURE MODE	LOCAL BFFBCTS AND DBFBNDBNT FAILURES	BETECTION	SEGATETONS [MERBERAL CORSERNAVAING	RPPRCT ON BCCS	BEHARES
05.2.01.01.1	BANUAL VALVES,		OPEN	NONE	PRRIODIC SURVEILLANCE	MOME BESONESS	NOM3	INCLUDES CRS-141, 101, 129
	TRAIN & PLOY							(MINIPLOW), SMA-301, 303, 307 (RTDRAZINZ)
18.2.01.01.2	TRAIN B PLON		CLOSID	TRAIN 8 CONTAINMENT SPEAT OR	PARTODIC BANABITYPHES	BROUNDANT TRAIN	LOSS OF TRAIN B CONTAINMENT SPRAY AND BYDRAZING ADDITION PUMPING	
	CHRCE VALVES,		NONE (SYSSIAB)	PISCENTION OF STRILL ON PROPERTY	PRRIODIC TESTING			INCLUDES CR8-305, 88A-305
5.2.02.01.1	NAMUAL VALVES, TRAIN B BOUNDARY		OPEN	DIVERSION OF TRAIN B STREETING	1 - 1 - 2 - 1	REDUNDANT TRAIN FOR PLOY BATS, NOME FOR INVENTORY	CLOSS OF TRAIN B STORAZINE FLOW OR REDUCTION IN DURATION OF	SEE TABLE 5-2 FOR DETAILED BOUNDARY VALVE ANALYSIS
				OF STORAZINE INVENTORY TO ATMOSPEREE		,	AFDRAZINE PLOW FOR BOTH TRAINS DUE TO INVENTORY LOSS TEROUGH UNLOCERD VALVES	
5.2.02.01.2	MANUAL VALVES, TRAIN B BOUNDART		CLOSED	NOME	PRRIODIC BURYRILLANCE	NONE BEGUIEED	NOME	
	CARCE OR RELIEF VALVES, TRAIN B BOUNDARY	<u> </u>	MÖBRYT (byářiab)	NOME. VALVE OPENS TO RECIRC G-2008 FLOW TO MYDRAZINE TAME ONLY IF SV-501 REMAINS CLOSED	PERIODIC TENTING	NOME SEGULESS	HOSE	INCLUDES RV-2003B. VALVE SETPOINT VERIFIED AS PART OF ASSE II 187
<u>5.2.03.01.1</u>		PUMP/MOTOR	róa břoa	REDUCED TRAIN B PLOW FOR CONTAINMENT SPEAT AND ALTERNATE NOT LEG RECIEC	PERIODIC TESTING	REDUNDANT TRAIN	INOPERABLLITY OF TRAIN 8 PUMPING FOR CONTAINMENT SPRAY AND ALTERNATE BOT LEG RECIRC	
<u>5.2.03.</u> 02 <u>.1</u>	G-218	8VGR (2 (52-1219)	OPBN		PERIODIC TRATING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B PUMPING FOR CONTAINMENT SPRAY AND ALTERNATE NOT LEG RECIEC	
5.2.03.02.2	G-218	SWGR #2 (52-1219)	Čroabd	TRAIN B SPRAY PUMP STARTS OR PAILS TO TRIP, RESULTING IN OUT OF SEQUENCE BUS LOADING FOR SISLOP	CONTROL BOOM INDICATION	REDUNDANT TRAIN (RUMS IF APPECTED TRAIN PAILS OFF, CAN BE TRIPPED FOR RECIEC IF APPECTED TRAIN FAILS ON)	POTENTIAL LOSS OF TRAIN B BLECTRICAL POWER FOR SISLAP OR INABILITY TO TRIP FOR BRCIRCULATION	BOIS SPECIFY AT MOST 1 SPRAY PURP BUNNING IN BECIEC, DUE TO RECIBC PURP PLOY LIMITATIONS
5.2.03.03.1	0-218	BPSS (RELAY)	ON		CONTROL ROOM INDICATION, PRRIODIC TESTING	REDUNDANT TRAIN FOR SISLOF, OVERRIDE FOR PUMP TRIP FOR RECIRCULATION APTER SIS	POTRUTTAL LOSS OF TRAIN B BLECTRICAL POWER FOR SISLOP	DESCRIBED POST-CRYS
				OUT OF SEQUENCE BUS LOADING FOR SISLOP				
5.2.01.03.2	G-219	8995 (RBLAT)	OFF	TRAIN & SPRAT PUMP AUTO-START AND UNDERVOLTAGE/OVERLOAD TRIP DEPRAT DISABLED. MANUAL START UNAPPECTED		REDUNDANT TRAIN FOR INJECTION, MANUAL START OR REDUNDANT TRAIN FOR RECIRCULATION	INJECTION MODE CONTAINMENT SPRAY, MONE FOR RECIRCULATION (BUE TO MANUAL START	
5.2.03.04.1	G-213	BPSE (BBCVA)	ON (CONTACTS OPEN)	TRAIN B SPRAT PUMP MANUAL TRIP DEFBATED, PUMP CANNOT BE TRIPPED BICEPT VIA OVERFIDE APTER BPS5 RELAT EMBEGIZED ON	PRRIODIC TRATING	NOME REQUIRED FOR IMPRICTION, OVERRIDE FOR PUMP TRIP DURING RECIRC	CAPABILITY) BONE	OVERRIDE PUNCTION NORMALLY REQUIRED POST-CRAS
5.2.03.04.2	G-218	BPS6 (RBLAY)	OFF (CONTACTS CLOSED)	CSAS TRAIN B SPRAY PUMP MANUAL TRIP NOT DEPRATED ON CSAS	PERIODIC TESTING	AUTO-START SIGNAL, REDUNDANT TRAIN	BEDUCED BELIABILITY OF TRAIN B	NORMAL POSITION DURING OPERATION



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### EMPROBECT CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM OMOFRE UNIT 1 TABLE 5-1: CONTAINMENT SPRAY AND STORAZINE INJECTION FMEA

ITER & DRV	ICE ID . COMPONENT ID	FAILURE MODE	LOCAL BPPBCTS AND DEPENDENT FAILURES	BRIBOD OF BRIBCTION	(MARRANT COMPRUSATING PROVISIONS	BPPRCT ON BCCS	PRMARES
95,2.91.05,1 G-278 _	12[-611	·	TRAIN B SPRAY PUMP	Sheroofic leating	REDUNDANT TRAIN FOR SISLOP, SOME REQUIRED FOR SIS	POTENTIAL LOSS OF TRAIN 8 RESCURICAL POWER FOR SISLOP, NOWE FOR SIS	
05.2.03.05.2_G-278	[UV BBLAT]	CONTACTS CLOSED	ALBRADT RUNNING. NO EPPECT ON AUTO-START IF INITIALLY OPP TRAIN B SPRAY PUMP UV TRIP SIGNAL, PREVENTING MANDAL START. AUTO-START AND OVERFIDE PUNCTIONS UNAPPECTED	CONTROL ROOM INDICATION, PRELODIC TRETING	BEBUNDANT TRAIN	REDUCED RELIABILITY OF TRAIN B CONTAINMENT SPEAT AND ALT BOT LBG RECIRC PUMPING	
05.1.03.06.1 G-218	SWGR #2 125VDC CONTROL POWER	AOT48 FOA	PUMP CANNOT BE STARTED IF OFF OR TRIPPED IF RUNNING	CONTROL BOOM INDICATION, ANNUNCIATION	DE TRIPPED FOR RECIRC IP	POTENTIAL LOSS OF TRAIN B CONTAINMENT SPRAT AND SIDEAZINE PUMPING OR INABILITY TO TRIP	
05.2.04.01.1 CV-518	VALVB/ACTUATOR	OPEN	SECISCULATION  ANTAE OLSMS LOS INTECTION OR  AUTHORITIES  AUTHORITIES	CONTROL ROOM INDICATION, PERIODIC TRATING	APPECTED TRAIN PAILS ON; NORE REQUIRES FOR INJECTION, REDUNDANT RECIRC PUMPS FOR RECIRCULATION CAPACITY	SPRAY PUMP FOR RECIRCULATION HONE FOR INJECTION, INABILITY TO REDUCE SPRAY FLOW TO WITHIN CAPACITY OF SINGLE RECIRC PUMP PER ROI	POSITION. BOI BORS NOT
05.2.04.01.2 CV-518	VALVE/ACTUATOR	CLÒSBÒ	VALUE DORS NOT OPEN FOR INJECTION HODE SPRAT PLOW, REMAINS IN BECIEC ALIGNERAT	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT BI-PLOW PATH THROUGH CV-517 FOR INJECTION MODE, NOWE REQUIRED FOR RECIRC MODE	PATES INOPERABLE FOR INJECTION,	BIOGRAPHIC BUIST-918 SUFFE D
05.2.04.02.1 CV-518	BVST (RELAT)	CONTACTS CLOSED (ON)	CSAS OPEN SIGNAL TO VALVE, NO EPPECT ON MANUAL CLOSE DEPEAT- OR OVERRIDE PUNCTIONS	PRECODIC TRATING	NORE REQUIRED FOR INJECTION, OVERRIDE FOR RECIRC	MONB .	OVERFICE FUNCTION MORMALLY REQUIRED POST-CSAS
05.2.04.02.2 CV-518	BVS7 (RELAY)	CONTACTS OPEN (OFF)	CRAS SIGNAL DEPEATED TO CV-518 AUTO-OPEN AND OVERREDS. MANUAL OPEN AND CLOSE DEFEAT		REDUNDANT VALVE FOR INJECTION, REDUNDANT RECIEC PUMPS AND NOT LEG RECIEC PATE FOR RECIEC	FOR INJECTION, POTENTIAL	CURRENTLY REQUIRE RUNNING SOTH RECIEC PUMPS AS ASSUMED IN
			UNAPPECTED, SO THAT VALVE CANNOT BE RECLOSED IF HABUALLY OPENED			INABILITY TO REDUCE SPRAY PLOW TO WITEHN CAPACITY OF ONE RECIEC PUMP, APPECTING PUMP READ FOR ALTERNATE ELE PATE	D STORAULIC CALC MC734-012 SUPPL
05.2.04.03.1.CV-518	BYSE (RELAT)	CONTACTS OPEN (ON)	MANUAL CLOSE DEFEATED, OVERBIDE AND AUTO/MANUAL OPEN	PRRIODIC TRATING	NONE REQUIRED FOR INJECTION, OVERRIDE FOR RECIECULATION	HORE	OVERRIDE FUNCTION MORHALLY REQUIRED POST-CSAS
05.2.04.03.2 CV-518	BV98 (RBLAT)	CONTACTS CLOSED (OPP)	UNAPPECTED MANUAL CLOSE DEPEAT DISABLED. OVERFIDE AND AUTO/MANUAL OPEN	PRECODIC TRATING	REDUNDANT TRAIS	REDUCED RELIABILITY OF TRAIN B	NORMAL POSITION
05.2.06.04.1 CV-518	113VR4 (RBLAT)	CONTACTS CLOSED	UNAPPRETED CV-518 CLOSES, CANNOT BE BEOPENED	CONTROL ROOM INDICATION, ANNUNCIATION	ROME BEGNIESD LOS	1 OF 2 REDUNDANT BI-PLOW SPRAT PATHS DISABLED DURING INJECTION, NO REPECT ON	ISOLATION RELAT PRON NON-EQ SPRAY PLOW LIMITER CIRCUIT IN CV-517 CONTROLS
05.2.04.04.2 CV-518	IIJYR4 (RBLAT)	CONTACTS OPEN	SPRAT PLOW LIMITER SIGNAL DISABLED TO CV-518	PERIODIC TESTING	RECIECULATION NOME REQUIRED	RECISCULATION NO.	NORMAL POSITION
05.2.04.05.1 CY-\$18	CSAS INVERTER (102-4)	VOLTS LOW	CV-518 PAILS CLOSED, CANNOT BE REOPENED	CONTROL INDICATION	REDUNDANT HI-PLON PATH THROUGH CV-517 FOR INJECTION, NOWE REQUIRED FOR RECIECULATION	1 OF 2 REDUNDANT BI-PLOW SPRAY PATES INOPERABLE FOR INJECTION, NO REPECT ON ESCIENCULATION	





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### EMBRGSMCY CORB COOLING STOTEM SINGLE PAILURE ANALYSIS SAN OMOFRE UNIT 1 TABLE 5-1: CONTAINMENT SPRAY AND ETDRAZINE INJECTION FMBA

-	i ITBU #	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL BEFRECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	SEGATIONS INSERRAL CONSERSTAING	REPRET ON RCCB	RENARIS
	05.2.04.06.1	Y-510	194	PRESSURE LOW _	CV-510 DRIFTS CLOSED IF	CONTROL ROOM INDICATION,	BONE FOR IMPROTION, MONE REQUIRED FOR RECIRCULATION	SPOTENTIAL COMMON-CAUSE LOSS OF SOTE SI-PLOW SPRAY PATES SURING	
					CANNOT BE RESPENSE			INJECTION, NO REPECT ON	BEQUIRE VALVES TO BE OPEN
									DURING MORNAL OPS OR DECLARED
									INOP IF CLOSED. VALVES MUST BEHAIN FULLY OPEN FOR AT LEAST
,									5 HOURS (SHALLEST MBLOCA) TO
	•								REMAIN BOUNDED BY AMALTERS.
١.	AS 2 65 61 1 6	W-11A .	VALVE/ACTUATOR	ADPM	VALVE OPEN FOR CONTAINMENT	COMPROL MOON THREE PLANS	MOND SPONIESS POR CONCATHANNA		TROUBLE CHANGE REQUIRED
ļ		······································	"ABRABLECIONION		SPRAY BUY CANNOT BE RECTORED	continue nois tantestica	NORE REQUIRED FOR CONTAINMENT		PINCLUDES SV-118, \$80/G-1114. BOLO PERMIT SPRAT PUMPS TO BE
				•	FOR CONTAINMENT ISOLATION				TRIPPED AFTER PRESSURE
!				-		<del>*</del>	LOOP SEAL IN SPEAT BISSE FOR		REDUCTION POST-LOCA. VALVE
į							CONTAINMENT ISOLATION		FAILURE ON LOSS OF AIR NOT
i									CONSISTENT WITH BASIS FOR
 									ACCRPTANCE OF PRINTINATION CONFIGURATION UNDER SEP TOPIC
									VI-4.
	05,2.05.01.2 C	Y-114	VALVE/ACTUATOR	CLOSED		CONTROL BOOM INDICATION,			NORMAL POSITION
					OR AUTOMATICALLY ON CRAS FOR CONTAINMENT SPRAY	PREIODIC TRATING		SPRAY PATES EMOPERABLE	
	05.2.05.02.1 C	V-114	BVSS (RELAT)	CONTACTS CLOSED (ON)		CONTROL ROOM INDICATION,	(SANE AS 5.2.5.1.1)	(SAHE AS 5.2.5.1.1)	
:		•••••••••••••••••••••••••••••••••••••••				PERIODIC TRATING			
:	05.2.05.02.2 C	V-114	BVS5 (RELAT)	CONTACTS OPEN (OFF)		PERIODIC TRATING	BROUNDANT VALVE FOR INJECTION,		MORNAL POSITION
					AUTO-OPEN DEPRATED. NO RPPECT ON HANDAL CLOSE DEFRAT OR		HANUAL OPEN OR REDUNDANT VALVE		
٠.					MANUAL OPEN		FOR RECIRCULATION	INJECTION MODE	
	05.2.05.03.1 C	V-114	SVS6 (RELAT)	CONTACTS OPEN (ON)	CV-114 MANUAL CLOSE DEFEATED.	CONTROL BOOM INDICATION.	(SAME AS 5.2.5.1.1)	(SAME AS 5.2.5.1.1)	
ĺ						PERIODIC TRATING			
	46 4 46 44 4 4		BUAG 1881.W1		AUTO-OPEN				
	05.2.05.01.2 C	7-114	BV86 (RELAY)		CV-114 NAMUAL CLOSE DEFEAT	PERIODIC TESTING	BEDUNDANT TALVE	REDUCED RELIABILITY OF TRAIN B	
	65.2.05.04.1 C	V-114	VITAL BUS #2	• • • •	CV-114 PAILS OPEN, CANNOT BE	CONTROL ROOM INDICATION	HOME REQUIRED FOR CONTAINMENT		SEOI PERMITS SPRAT PUMP TRIP
. !			[8-12149]		RECLOSED		SPRAT, RECIRC PUMP READ TO	•	AFTER PRESSURE REDUCTION
							MAINTAIN LOOP BRAL POR		POST-LOCA. NOT CONSISTENT WITE
i.							CONTAINMENT ISOLATION		SEP TOPIC VI-4 BASIS FOR
-1  -	<del></del>								ACCEPTIBILITY OF CONTAINMENT IBOLATION COMPIGURATION FOR
;				•					TRE SPRAY PRINTRATION
1	05.2.05.05.1 C	1-114	194		CV-114 PAILS OPEN, CANNOT BE	CONTROL BOOM INDICATION	HOME REQUIRED FOR CONTAINMENT		BOL PERMITS SPRAT PUMP TRIP
1					RECLOSED		SPRAY, RECIEC PUMP MEAD TO MAINTAIN LOOP SEAL FOR		APTER PRESSURE REDUCTION. NOT
							CONTAINMENT ISOLATION		CONSISTENT NITH SEP TOPIC VI-4 BASIS FOR ACCEPTABILITY OF THE
•							AALINIAMI 18ANNITAM		ISOLATION CONFIGURATION FOR
									THIS PRINCIPATION
	65.5.06.01.1 G	-2008	PUMP/MOTOR		REDUCED TRAIN B HYDRAZINE FLOW TO SPRAY PUMP DISCHARGE HEADER			INOPERABILITY OF TRAIN B SYDRAZINE PUMPING	





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# EMERGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 5-1: CONTAINMENT SPRAY AND SYDRAZINE INJECTION PMEA

ITEM #	DRAICE TO	COMPONENT ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	NETECTION  DETECTION	INSERBUT COMPENSATING PROVISIONS	RPPECT ON ECCS	EBNVELA
05.2.06.01.2 (	G-200B	PUMP/MOTOR	19	TRAIN B STDRAZINS PUMP MOTOR PAILS (OPEN, SECRETULATION INITIATED	CONTROL BOOM VANAMICIATION	NONE BEGATERED	POTRUTIAL COMMON-CAUSE LOSS OF SYDRAZINE PUMPING AFTER 2 ROURS	POLLOWING CRAS EMBURES ADEQUATE STORAZINE DELIVERY. MOTOR CONTROLLER BREAKER
							•	PRECLUDES (b)(2) IMPACT ON OTHER MCC LOADS
05.2.06.02.1	G-100B	MCC-SV	OPBM	TRAIN B BYDRAZING PUMP PAILS	CONTROL BOOM INDICATION,	REDUNDANT PUMP	INOPERABILITY OF TRAIN B	
		(42-12A79)		TO START OR TRIPS IS RUNNING			BTDBAZING PUMPING	
45.2.06.02.2	C-200B	MCC-2A	CLOSED	TRAIN & STORAZINE PUMP STARTS		REDUNDANT VALVE CONTROLS TO	BEDUCES BELIABILITY OF TRAIN &	
		(42-13419)		OR FAILS TO TRIP, RESULTING IN		PREATURE FROM CALIFF BEGGISTO.	BURCTRICAL POWER FOR SISLOP.  BYDRAZINE SYSTEM ISOLATION FOR	TO RESULT IN ACTUAL LOSS OF
				OUT OF REQUERCE BUS LOADING		REDUNDANT TRAIN TO PROVIDE	SIS AND SISTEM TOUGHTON FOR	SETTE & BOS DORING STATUT
46 9 66 63 1 4	C 1000	BPS1 (RELAT)	CONTACTS OPEN (OFF)	TRAIN B BTDRAZING PUNP	PREIODIC TESTING	REDUNDANT PUNP	INOPERABILITY OF TRAIN B	NORMAL POSITION
0\$8.0£.03.1.0	e-tāós	" oKsf"(kères) "	CONTACTS OF SE [OFF]	AUTO-START DEFRATED, MANUAL START UNAPPRICTED	Instraction that the	PERCANANT LOUI	BYDRAZINB PUMPING	24201A 144111A
05.2.06.01.2	G-200B	BPSI (RELAY)	CONTACTS CLOSED (ON)	TRAIN B STORAZINE PUMP	CONTROL BOOK INDICATION.	REDUNDANT PUMP	(\$.\$. <u>\$. \$. 3. 5. 2. 8</u> ANAR)	
				AUTO-START SIGNAL SRALED-IN. OVERRIOR, LOW LEVEL AND MANUAL TRIPS UNAPPROTED				
05.2.06.01.1	G-200B	BPS2 (RBLAT)	CONTACTS CLOSED	TRAIN B BYDRAZINE PUMP MANUAL	PERIODIC TESTING	BEDUNDANT PUMP	REDUCED RELIABILITY OF TRAIN B	MORNAL POSITION
			(OPP)	TRIP DEPEAT DEFEATED			STORAZINE PUMPING	
05.2.06.04.3 (	G-2008	BP92 (BBLAT)	CONTACTS OPEN (ON)	TRAIN B BYDRAZINE PURP MANUAL TRIP DEPRATED, PURP CANNOT BE TRIPPED MANUALLY EXCEPT VIA OVERRIDE AFTER BPS1 ESLAT ENERGISED ON COAS. LOW LEVEL	PARTODIC TESTING	NOME SEGNISED	BONS	
				TRIP UNAFFECTED				
05.2.06.05.1	G-2008	LIS-SOOB LOOP	OUTPUT OPEN (OPP)	TRAIN B BYDRAZINE PUMP LOU LEVEL TRIP DEPEATED, MANUAL TRIP UNAPPECTED	PRRIODIC TRATING	NORE EEGNIEED	NORE	PROTECTION PUNCTION ONLY
05.2.06.05.2	G-2008	L19-500B LOOP	OUTPUT CLOSED (ON)	TRAIN B BYDRAZINE PUMP LOW	CONTROL ROOM ANNUNCIATION	REDUNDANT PUMP	INOPERABILITY OF TRAIN B	
				LEVEL TRIP SIGNAL STALED-IN, PUMP WILL TRIP IF RUNNING AND CANNOT SE RESTARTED			ATDRAZINB PUMPING	
05.2.06.05.3 ( 05.2.06.05.4 (		L18-5008 LOOP L18-5008 LOOP	INPUT OPBN INPUT SBORT	(SAME AS 5.2.6.5.1) BLOWS SUPPLY PURB, CAUBING	(SAME AS 5.2.6.5.1) CONTROL ROOM ANNUNCIATION,	(SANE AS 5.2.6.5.1) REDUNDANT EMPUTS FOR CRAS	(SAME AS 5.2.6.5.1) LOSS OF 1 OF 3 CONTAINMENT	
				LOSS OF POWER TO PT-502,	PERIODIC TESTING	LOGIC, REDUNDANT STORAZINE PUMP	AI-II PRESSURE IMPUTS TO TRAIN	
				PIS-501, LIS-500B AND PIS-512 LOOPS. RESULTS IN LOSS OF CH E INPUT-TO TRAIN A/B CRAS LOCIC,		ruar	A AND B CSAS LOGIC, REDUCED RELIABILITY OF TRAIN B SYDRAZING PUMP	
				DEPEAT OF LOW LEVEL TRIP FOR G-2008, AND LOW PLOW SIGNALS TO PLOW LIMITER				
05.2.06.05.5	G-200B	L18-5008 LOOP	BQ	MAY CAUSE SPURIOUS LOW LEVEL SIGNAL TO TRAIN B BYDRAZINE PUMP 2 BRS AFTER RECIRCULATION	ANNUNCIATION	NOME EEGLIEED	POTENTIAL COMMON-CAUSE LOSS OF BYDRAZINE PUNPING AFTER 2 HOURS	
				INITIATED				LIS-5005 DEVICE PROVIDES ISOLATION OF NON-EQ INTE FROM OTHER LOADS ON SAME POWER SUPPLY





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## EMERGENCY CORE COOLING SYSTEM SINGLE PAILURE AMALTSIS SAN ONOPRE UNIT L TABLE 5-1: CONTAINMENT SPRAT AND STORAZINE INJECTION PHEA

:	1788 \$	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL REPRECTS AND DRESNORMY FAILURES	METROD OF Detection	IMERRENT COMPRESATING PROVISIONS	BPFECT ON ECCS	REMARES
	Q\$.2,06,06,1	G-2008	C9A9_ENVERTER	ÄÖLLA FOA	LOSS OF POWER TO PT-502, PIS-512, PIS-501 AND LIS-500A LOOPS, CAUSING LOW CE. 8 CONTAINMENT PRESSURE SIGNAL TO	ANNUNCIATION	REDUNDANT CHANNELS FOR CSAS, BEDUNDANT STORAZINE PUMP	LOSS OF 1 OF 3 REDUNDANT CONTAINMENT BI-BI PRESSURE IMPUTS TO CSAS TRAIN A/B LOGIC AND REDUCED RELIABILITY OF	
	05.2.01.01.1	3V-601	VALVE/ACTUATOR	OPED	CRAS A/B LOGIC, AND DREATING LOW LEVEL TRIP OF TRAIN B STDRAZINE PUMP VALVE ALIGNS FOR TRAIN B STDRAZINE PLOW, CANNOT BE RECLOSED	CONTROL ROOM INDICATION	REDUNDANT PUMP CONTROLS TO	REDUCED RECTABLLITY AGAINST SPURIOUS STORAZINE STOREM ACTUATION	SPURIOUS SYSTEM ACTUATION WOULD DEPLETE STORAZION
	05.3.07.01.2		AVEAR V V V V V V V V V V V V V V V V V V V		VALLYS DOES NOT OPEN POR TRAIN		REDUNDANT TRAIN	INOPERABILITY OF TRAIN B BYDRAZING INJECTION	ASSUMPTIONS COULD NOT BE MET FOR A SUBSEQUENT LOCA MORNAL POSITION
	05.8.01.01.3		VALVB/ACTUATOR		TRAIN B BYDRAZINE ISOLATION VALVE FAILS (OPEN, SHORT OR GROUND) 2 BES AFTER RECIRCULATION INITIATED	CONTROL ROOM INDICATION, AMEUNCIATION	NORE SEQUESED	POTENTIAL COMMON-CAUSE LOSS OF STORAZINE PLOW APTER 2 BRS	POLLOWING CSAS ENSURES ADEQUATE STORACINE DELIVERT. PUST PROVIDES (6)(2) PROTECTION OF OTREE BC BUS
; 	05.2.07.02.1	SV-601	BV92 (RBLAT)	CONTACTS OPEN (OPF)	TRAIN B BYDRAZINE ISOLATION VALVE AUTO-OPEN AND OVERRIDE DEPRATED, NANUAL OPEN UNAPPECTED	PERIODIC TRETING	(SAME 48 5.2.7.1.2)	(SAME AS 5.2.7.1.2)	LOADS NORMAL POSITION
.    	05.2.07.02.2	94-601	BVS2 (RBLAT)	CONLYCLS CFORED (6#)	TRAIN B STORAZINE ISOLATION VALUE AUTO-OPEN SIGNAL AND OVERRIDE PERHISSIVE SEALED-IN	CONTROL BOOM INDICATION	(SAME AS 5.2.7.1.1)	(BAMB AS 5.2.7.).1)	
-	05.2.07.03.1		BASI (BELTA)	CONTACTS CLOSED (OPP)	TRAIN B MYDRAZING ISOLATION VALVE NAMUAL CLOSE DEFRAY DEFRAYED	PERIODIC TESTING	REDUNDANT TRAIN	REDUCED RELIABILITY OF TRAIN B MYDRAZINE ADDITION	NORMAL POSITION
   	05.2.01.03.2	8Y- <u>601</u>	BVS1 (RBLAT)	CONTACTS OPRN (ON)	TRAIN & BYDRAZINE (SOLATION VALUE MANUAL CLOSE DEPRATED, VALUE CANNOT BE CLOSED EICEPT VIA OVERBIDE APTER BUSZ ENERGIZED ON CSAS	PRRIODIC TRATING	(SAHE AS 5.2.7.1.1)	(SAMB AS 5.2.7.1.1)	OVERRIDE PUNCTION MORHALLT REQUIRED POST-CSAS
	05.2.07.04.1 8	BV-601	125VDC BUS #2 [72-220]	VOLTS LOW	TRAIN B BYDRAZING ISOLATION VALVE FAILS CLOSED, CANNOT BE	CONTROL BOOM [NDICATION	REDUNDANT TRAIN	INOPREASILITY OF TRAIN B BYDRAZING ADDITION	
<u> </u>		CORROR STOR		OPBN	REOPENED	PREIODIC SURVEILLANCE	MONE BEGRIERD	DONE	INCLUDES: CRS-041
		CORMON FLOW		CLOSBD	CONTAINMENT SPRAY HEADER ISOLATED INSIDE CONTAINMENT	PERIODIC SURVELLLANCE	ADMINISTRATIVE CONTROLLED VALVE LOCKING PRECLUDES FAILURE	LOSS OF BOTH TRAINS OF CONTAINMENT SPRAT AND RIDRAZINE INJECTION	
	05.3.01.02.1 (	CHRCE VALVES, COMMON PLON		NOME (PASSIVE)					SINCLUDES CRS-101, SEA-315. CRS-301 NOT LEAR TESTED FOR RECIEC BOUNDARY PUNCTION IN 1ST PROGRAM





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### BHBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALTSIS SAN ONOPER UNIT 1 \_\_\_\_\_\_\_ TABLE 5-1: CONTAINERT SPRAY AND STORAZINE INJECTION PHBA

	=	*		LOCAL BPFECTS AND	HETROD OF	INHERRNY COMPENSATING	The second secon	
ITBN #	DEVICE ID	COMPONENT ID	FAILURE MODE	DEPENDENT FAILURES	DETECTION	PROVISIONS	EFFECT ON ECCS	REMARES
05.3.02.01.1	MANUAL VALVES, _ COMMON BOUNDARY		OPEN	DIVERSION OF BOTH TRAINS OF CONTAINMENT SPRAY AND RYDRAZINE INJECTION TO ATBOSFARRE, RUST, SYDRAZINE		SES_TABLE_5_2_FOR_DETAILED BOUNDARY VALVE ANALYSIS	CONTAINMENT SPEAT DUE TO UNISOLABLE LOSS OF INVENTORY TREQUES OUTSIDE CONTAINMENT	SEE TABLE 5-2 FOR DETAILED SOUNDARY VALVE AMALTSIS
				TABL OR OTHER STATEMS			VALVES WEICH ARE NOT LOCEED SUITABLE BACEUP DEVICES	
	MANUAL VALVES, COMMON BOUNDARY		CLOSED	MONE	PERIODIC SURVEILLANCE	HONE REQUIRED	MONE	
i	CHECK OR RELIEF VALVES, COMMON BOUNDARY		HORMAL (PASSIVE)	1013	PRRIGOTE ANDARICTVANCE	MONE EBQUI PED		[#CLUD85 RV-2000, -2001, -2002
45.1.01.01.1	MOA-181	VALVE/ACTUATOR	OPEN .	NORMAL FOR INJECTION, LOSS OF BEHOTE-HANNAL BOUNDARY ISOLATION FOR RECIRCULATION	PARTONIC TRATING	REDUNDANT CHRCE VALVE (CRS-301)	BEDUCED REDUNDANCY FOR ISOLATION OF RWST FROM RECIRCULATED SUMP WATER	AS PART OF RECIRC SYSTEM LEARAGE MONITORING PROGRAM
<u>65,3,03.01.2</u>	_HOV-883	_VALVE/ACTUATOR	CLOSED .	MORNAL FOR RECIEC, LOSS OF INJECTION HODE SUCTION TO BOTE REPUBLING WATER PUMPS AND CHARGING PUMPS		POWER LOCK ONT BY REQUIDANT CONTROL SWITCHES AND CONTACTORS PER MRC BRANCE TROMICAL POSITION 1038-10	NOT APPLICABLE, FAILURE PRECLUDED BY POWER LOCE-OUT	BREUBLING WATER PUMPS PROVIDE CONTAINMENT SPRAT PUMPING CAPABILITY FOR SONGS 1
05.3.03.02.1	HOY-883	BMS-2054	CONTACTS OPEN	MOV-883 CONTROL CIRCUIT DISABLED, CAUSING LOSS OF REMOTE-HABUAL BOUNDARY ISOLATION CAPABILITY FOR	PERIODIC TESTING	(SAME AS 6.2.3.1.1)	(SAME AS 5.3.3.1.1)	*(SAMB 49 \$.1.3.1.1)
05.3.03.02.2	HOV-883	RHS-2054	CONTACTS CLOSED	RECIRCULATION NOV-883 CONTROL CIRCUIT, INCLUDING RMS-2047, ENABLED	CONTROL BOOM INDICATION	BEDUNDANT SWITCH BHS-2047	REDUCED REDUNDANCY AGAINST	
95.1.03.03.1	HOV-683	BHS-2067	OPEN POSITION (CONTACTS D/C CLOSED)	VALVE ACTUATOR RECEIVES OPEN SIGNAL AS 100M AS CONTROL CIRCUIT ENABLED BY RMS-2054.	PERIODIC TESTING	(SAND AS 5.3.3.1.1)	(SAME AS 5.3.3.1.1)	*(SAME AS 5.3.3.1.1). RANDSWITCH IS SPRING RETURN TO NEUTRAL POSITION
42				CANNOT BE CLOSED  REMOTE-MANUALLY FOR RECIEC  BOUNDARY ISOLATION				PROTEST FORTIUM
05.3.03.03.2	HOA-883	RMS-2041	CLOSE POSITION (CONTACTS B/F	VALUE ACTUATOR RECRIVES CLOSE SIGNAL AS SOON AS CONTROL	PARIODIC TRATING	REDUNDANT SDETCE REA-2054	SANGIONS AVEAR CPOURE SEDUCED ESPANDANCA TEVINSA	NEUTRAL POSITION NEUTRAL POSITION
			CLOSED}	CERCUIT EMABLED BY EMS-2054, AND CANNOT BE REOPENED BEMOTE-MANUACLY				
05.3.03.04.1	HOA-193	42-CC OR 42A-CC (CONTACTORS)	(CONTACTOR OPEN)	VALVE CANNOT BE BENOTE-HANUALLY CLOSED FOR RECIRCULATION	CONTROL ROOM INDICATION	(CES-301)	BEDUCED EROUNDANCE FOR ISOLATION OF BYST FROM RECIRCULATED SUMP WATER	*CHECK VALVE MOT LEAK TESTED AS PART OF BECIRC SYSTEM LEAKAGE MONITORING PROGRAM
05.3.03.04.2		42-CC OR 42A-CC (CONTACTORS)	ON (CONTACTOR CLOSED)	VALVE CLOSE CET, REDUCING	PBBLODIC TBSTING	SECOND CLOSE CONTACTOR	REDUCED REDUNDANCY ACAIMSY SPURIOUS VALUE CLOSURE	VERIFICATION NEEDED TEAT BIISTING SURVEILLANCES WOULD DETECT THIS FAILURE
05.3.03.05.1	BQV-883	MCC-3 (42-1390)	AOFLS FOR	CLOSE LOGIC TO 1/1 OM BEHAINING CONTACTOR VALVE CANNOT BE REMOTE-MANUALLY CLOSED FOR RECIRCULATION	CONTROL BOOM INDICATION	REDUNDANT CHECK YALVE (CRS-301)	REDUCED REDUNDANCY FOR ISOLATION OF BYST PROMERCIECULATED SUMP WATER	ICERCE VALVE NOT LEAK TRETED AS PART OF RECIRC STETEM LEARAGE MONITORING PROGRAM





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# EMBRGENCY CORE COOLING SYSTEM SINGLE PAILURE AMALYSIS SAN OMOFRE UNIT 1 TABLE 5-1: CONTAINMENT SPRAY AND SYDRAZINE EMJECTION PHRA

	(fan þ	DRAICE ID	COMPONENT ID	PAILURB HODR	LOCAL EFFECTS AND DEPENDENT PAILURES	METROD OF DETECTION	INSERENT COMPRESATING PROVISIONS	EFFECT ON ECCS	REMARES
1 1	98.1.04.01.1	ROA-110	VALVE/ACTUATOR	_OP8U	CONTAINMENT SPRAY PUMPS ALIGNED TO SEAL WATER/COLD LEG RECIRCULATION SYSTEM	CONTROL ROOM_INDICATION	CRECK VALVE ECP-233 BEHAINS SEATED DURING INJECTION AND ERCIECULATION BY CHARGING PUR DISCHARGE READ	CONTAINMENT SPRAY SOUNDARY	PRY-882 MAY BIYERT FLOW TO  WOT. ALTERBATE COLD LEG RECIRC  WOT CRESITED BECAUSE  UNAMALIZED FOR FLOW/READ
	65.3.04.01.2	NOA-880	VALVE/ACTUATOR	CLOSED	NONE	CONTROL ROOM INDICATION, PRRIODIC TRATING	NONE ESCATES	ROMB	MORNAL POSITION
-	85.3.84.82.1		NCC-2 (42-1262)	AOTAS COA	VALVE PAILS AS-IS	CONTROL ROOM INDICATION	NOME BEGRIESO	BONE	
	<b>85.3.85.8</b> 1.1	CV- <u>12</u>		QPAN	DIVERSION OF BOTH TRAINS OF CONTAINMENT SPEAT AND STORAZINE INJECTION TO FIRE SUPPRESSION BEADER IN	CONTROL BOOM INDICATION	PAILURE 18 PRECLUDED BY ICES-18 POWER LOCKOUT VIA REDUNDANT CONTROL SWITCESS BS-1892 AND BS-1892A	CONTAINENT SPRAY	INCLUDES NON-EQ SY-116 AND 280/C-1892. EQ PAILURE OPEN OR (b)(2) IMPACT PRECLUDED BY ICSS-18 POWER LOCK OUT
	05.3.05.01.2 05.3.05.02.1		VALVE/ACTUATOR	CONTACTS OPEN	CONTAINMENT NOME VALVE FAILS EN CLOSED	PERIODIC TESTING PERIODIC TESTING	BONE EEQUIEED	NONE None	NORMAL POSITION NORMAL POSITION, VALVE ONLY
i	05.1.05.02.2	CV-92	AS-1092	CONTACTS CLOSED	POSITION, CANNOT BE OPENED VALUE WILL OPEN AS SOON AS	CONTROL BOOM INDICATION,	REDUNDANT CONTROL SWITCH	REDUCED REDUNDANCY AGAINST	OPENED FOR PIRE SUPPRESSION IN
	05.3.05.03.1 05.3.05.03.2		ES-1092A ES-1092A	CONTACTS OPEN CONTACTS CLOSED	BS-1892A ACTUATED (SAME AS \$.3.5.2.1) VALVE WILL OPEN AS 200M AS	PRRIODIC TESTING (SAME AS 5.3.5.2.1) CONTROL BOOM INDICATION.	BS-1092A (SAMB AS 5.3.5.2.1) REDUNDANT CONTROL SWITCH	SPURIOUS VALVE OPENING (SAME AS 5.3.5.2.1) REDUCED REDUNDANCE AGAINST	(SAME AS 5.3.5.2.1)
	<b>65.3.65.04.1</b> (	CV-92	VITAL BUS \$1 (8-1102Y)	AOTAS FOA	89-1092 ACTUATED VALVE PAILS IN CLOSED POSITION. CANNOT BE OPENED	PERIODIC TESTING CONTROL ROOM INDICATION	HOME REQUIRED	SUBJOIN AVEAS OBSHIRE	
	05.3.05.05.1	SV-91	ISA	PERSURE LOW	VALUE PAILS IN CLOSED POSITION, CANNOT BE OPENED	CONTROL ROOM INDICATION, ANNUNCIATION	NORE SEGUIDED	BOHS	
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. TABLE 5-2: CONTAINMENT SPRAY BOUNDARY VALVE ANALYSIS





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# BHERGENCT CORE COOLING STSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT 1 BOUNDARY VALVE ANALYSIS

ITEM #	TAG #	MC/AUTO?	LOCKED!	( SAPETT RELATED BACK	MC/AUTO?	TAG A	MC/AUTO?	REMARES
	· <del></del>	<del></del>			#0/#010:	140 J	#U/AUIU:	######################################
15.1.01	_CRS-112	CIASED	<b>*</b> 0	NONE	MAND			
	CHERONN		BO	TONE	ANON			G-27M CASING DRAIN TO AUX BLDG SUMP
5.1.01	BY-2001A			NOME REQUIRED	avas		'	G-200A PRESSURE INSTRUMENT BRAIN (TO ATMOSPHERE)
·								G-200A BISCHARGE BELIEF TO STORAZINE TAME. SETPOINT VERIFIED AS PART OF ASME SECTION II IST
								PROGRAM
	884-324		NO	NORE	CAP		1	G-200A DISCHARGE VENT
	CE3-331		No	NORT	NONE			G-218 CASING DRAIN TO AUX BLOG BUND
	UNENOVA		MO	MONE	MONE			G-2008 PRESSURE INSTRUMENT DRAIN (TO ATMOSPHERE)
2.2.83	BA-5003B	BELIEF		NONE BEGNIESD				G-2008 DISCRARGE BRLIEF TO BYDRAZINE TAME.
								SETPOINT VERIFIED AS PART OF ASHE SECTION IL 1ST
C 9 A4	88A-325	CLASSA	NA	MANE				PROGRAM
			NO Tra	NORE	CAP			G-200B DISCHARGE VENT
3 · C · T L	~AB4:10f	_CLOSED	194					BREUBLING NATER PURP 6-27N, 6-213 BRCIRCULATION TO
5.1.02	80A-310 .	CLOSED	725					AUCTION
		CLOSED	100					G-200A RECIRCULATION TO BYDRAZINE TANK
			10	NONE	SEA-313		anter i	G-200B RECIRCULATION TO HTDRAZINE TANE
	***	*******			985-413		CHECK 1	STORATINE TAME RECIRCULATION PUMP DISCHARGE
5.1.05	38A-317	CLOSED	KO .	NONE	INCHANA ABAL		A depois	ISOLATION. PUMP AND PIPING ARE NOR
					- VIEW TANK			STORACION TANK REGIECULATION PEMP SUCTION ISOLATION. PUMP AND PIPING ARR MER
		CLOSED		NONE	CAP			STORAZINE TAME FILL CONNECTION
5.3.01	EV-2000	BRLIRE		NONE EBOUIEED	<b>~</b>		•	STORALINE TAME PRESSURE RECIEF, SEPPOINT VERIFIED
					A company of the second			AS PART OF ASHE SECTION II IST PROGRAM
5.3.08	BV-2001	RELIEF		NONE BEGNISED				NYDRAZINE TANE VACUUM RELIEF. SETPOINT VERIFIED AS
				10 magray 1 1 10 magray 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				PART OF ASHE SECTION II IST PROGRAM
3.3.09	BA-5005	BELIEF		RONE BEGDIEED				RIDRAZINE TAME VACUUM RELIEF. SETPOINT VERIFIED AS
	HUENAM			n-n-				PART OF ASME SECTION II 19T PROGRAM
		CLOSED		NONE	MONB			RADDYSTING LANG SUBSENDS INSTRUMENT ARKA
		CLOSED I	10	NONE PROUTORS	MONE		t	BIDBATING TAME ABUT
	487-316	CEBUL		NONE BEGNIESD				BIDRAZING TANK NITROGEN COVER GAS SUPPLY. SR/NSR
.1.11	UNENOVA	CLOSED	 10	MONR	MOMR			SOUNDARY BITENDS PAST CHRCE VALUE TO PCV-500
		~~~~ I	••	246	#UWS		•	ETDRAZINE TAME CRYSL INSTRUMENT (LT-600A) SEAC POT
.1.14	UNENOVE	CLOSED I	10	RORE	. NORE			ASUSTALING ATMA TERMS! EMBADIMENT (TO COVER BOYL DOG
	· · · · · · · · · · · · · · · · · · ·	· ····································	<del></del>					STORARINE TANK LAVEL [HETPUMENT (LT-500B) BRAL POT VEHT
.3.15	SEA-318	CLOSED 1	10	MONE	MOME		1	NYDRAZINE TANK SAMPLE LINE. DRAIN VALVE SEA-323
							•	DOES NOT ISOLATE SAMPLE COMMECTION
		CLOSED I	0	MONB	NONE			BYDRAZINE TANE DRAIN
1.3.17	CB3-338	CLOSED 1	13					REPUBLING WATER PUMPS RECIRCULATION TO RWST.
								OPENBO/THROTTLED FOR SECONDARY RECIRCULATION
.1.18			0	NONE	CAP			REPUBLING WATER PUMP DISCHARGE BRADER VENT/DRAIN
1.3.15	CR9-361	CLOSED 1	ES					REPUBLING WATER PUMP DISCHARGE CONNECTION TO RUST
1 10	CDG 144	010000	-					PILTER PUMP SUCTION
1.3.20	CR9-182	Crossd N	U	NONB	CRS-352, 356,	368, 378	CHBCE #	PIRE SUPPRESSION BOSE CONNECTION TO CONTAINMENT
								SPRAY (REPUBLING WATER PUMP DISCHARGE BRADER).



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# BHERGENCY CORE COOLING STSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT 1 BOUNDARY VALVE ANALYSIS

				•				
ITSH #	CSAPETT TAG #			SAPETY RELATED BACEUP	MC/AUTO?	(NOW-SAPETY RELATED BACEUP TAG #	MC/AUTO?	REMARES
	~							
05.3.21	CRS-319	CLOSED	MO	MONE		Nons	1	PRPURLING WATER PUMP OLECHARGE MEADER YENT
05.3.11		CLOSED		CRS-142 (M2)	AUTO			ALTERNATE NOT LEG ESCIECULATION LINE. CHECK VALVE
				MOV-813, 814, 833, 834 (RMR)			-	CRS-626 PREVENTS SACEPLON PROM LETDONN/RMS INTO
65.3.23	ROA-110	CLOSED	MO	_CV-202, 203, 204 (LD3)	CHICE			APPRAT STATEM ALTERNATE COLD LEG RECIRCULATION LINE, CRECK VALVI
								PREVENTS BACEPLON PROM SEAL INJECTION/CLE INTO
								SPRAT ATSTEM. CHARGING PUMP BRAD EASPS CHECK VALVI
						•		SEUT TO PREVENT FORWARD PLON FROM SPRAY SYSTEM INTO SEAL INJECTION/CLE READER
35.1.24		CLOSED	110	CAP				SPRAY PLOY LIMITED ORIFICE BO-526 TAP ISOLATION
)5.3.25 )5.3.26		CLOSED	MO MO	CAP CAP				SPRAY PLOW LIMITER ORIPICE RO-526 TAP ISOLATION
5.3.21		CLOSED	NO	CAP				SPRAT PLOW LIMITER ORIPICE BO-525 TAP ISOLATION SPRAT PLOW LIMITER ORIPICE RO-525 TAP ISOLATION
5.3.18		CLOSED	100	NONE		CIP		SPRAT BRADER VENT
85.3.29 85.3.30		CLOSED	NO NO	NOME NOME		NOMB NOMB		SPRAT STADER PLOT INSTRUMENT VENT
95.3.31		CLOSED	789		***	TORE		FIRE SUPPRESSION SEADER ISOLATION. VALVE LOCKING
				<del>.</del>				VIA REDUNDANT POWER ISOLATION DEVICES PER ICSS-18
05.3.32 05.3.33		CLOSED	MO	NONE		CAP CAP		REPUBLING CAVITY FILL/DRAIN  SPRAY BRADER TEST CONNECTION
05.1.14		CLOSED	789			VAF	•	SPEAT MOZELE STRASS TO REPUBLING WATER PUMP SUCTION
05.1.35	CR9-045	OPEN	NO	NOVE		BONE		SPRAY RISER BRAIN. PLOW LIMITED BY ORIFICE FO-2015 AND SPRCIFICALLY ADDRESSED BY SISTEM BYDRAULIC CALCULATIONS
5.3.36	CR3-011	CLOSED	No	NORB		CAP		SPRAY BRADER TEST CONNECTION
				•				
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SECTION 6: COMPONENT COOLING WATER

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#### COMPONENT COOLING WATER (CCW) NOTES

- 1. Item numbers in this section have been assigned as follows:
  - 06.1: Train A CCW pumping, valves and boundary devices
  - 06.2: Train B CCW pumping, valves and boundary devices
  - 06.3: Train C CCW pumping, valves and boundary devices
  - 06.4: Common flow path and boundary devices.
- 2. Table 6-1 is the Failure Modes and Effects Analysis (FMEA) for the CCW function. Table 6-2 is the associated boundary valve analysis.
- 3. Potential single failure susceptibilities in the FMEA table are flagged with "\*" as the first character of the associated ECCS EFFECTS field. Other open items (eg. required procedure or calculation changes) are flagged with "\*" as the first character of the REMARKS field.
- 4. Potential single failure susceptibilities in the Boundary Valve Analysis table are flagged with "\*" in the unlabelled field adjacent to REMARKS. Items flagged with "#" in the unlabelled field adjacent to REMARKS are acceptable from a single failure standpoint subject to credit for SEP Topic III-6 seismic boundary criteria.

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#### COMPONENT COOLING WATER SYSTEM REFERENCES

Piping and Inst	rumentation Diagrams
5178310	Component Cooling Water System (Sh 1)
5178311 ·	Component Cooling Water System (Sh 2)
5178312	Component Cooling Water System (Sh 3)
5178443	Instrument and Service Air System (Sh 4)
5178449	Instrument and Service Air System (Sh 10)
Elementary Diag	rans
63718	Auxiliary Coolant System (TC-601A/B, PC-605)
64364	CV-737A
64369	CV-737B
450516	Emergency Thermal Barrier Cooling Pump G-964
455378	MOV-720A, MOV-720B
455449	CV-722A, CV-722B, CV-722C
5149971	Component Cooling Water Pumps G-15A, G-15B, G-15C
5150876	4160 V Buses Undervoltage, Underfrequency Relays
5150885	480V Bus Undervoltage Relays
<u>Procedures</u>	
SO1-1.0-23	Transfer to Cold Leg Injection and Recirculation
SO1-2.1-10	CCW System Malfunction
SO1-4-19	CCW System Operation
SO1-4-38	CCW System Alignment
SO1-7-11	Saltwater Cooling System
SO1-12.3-31	CCW System Safety Related Alignment
SO1-14-40	Control of Locked Valves
SO1-V-2.15	Inservice Testing of Valves Program
Other Documents	
SD-S01-330	System Description: Component Cooling Water
32 332 333	System
SD-S01-580	System Description: Safety Injection,
	Recirculation and Containment Spray Systems
M89048	Response to Generic Letter 88-14, "Instrument Air
	Supply System Problems Affecting Safety Related
	Systems", dated July 5, 1989
	<u> </u>

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TABLE 6-1: COMPONENT COOLING WATER FMEA



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### EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 6-1: COMPONENT COOLING WATER PHEA

ITRN 4	DEVICE ID	COMPONENT ID	PAILURS MODE	LOCAL BPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	SSOATSIORS STATEMENT COMPERSTAING	BPFECT ON BCC8	EDRANES
	MANUAL VALVES, . TRAIN A PLON		OPBN	NOM8	PERCODIC SURVELLLANCE	NONE BEGNIEED	NOME	NORMAL POSITION: INCLUDES CCV-302, 326, 346, 310, 370,
06.1.01.02.1	HANUAL VALVES, TRAIN A PLON CHRCE VALVES, TRAIN A PLON		CLOSED NONE (PASSIVE)	TRAIN A CCU PUNP SUCTION, DISCHARGE OR MINIFLOW ISOLATES	PERIODIC SURVEILLANCE	REQUIRED LOADS	LOSS OF TRAIN A CCW PURPLING CAPABILITY	INCUMES CCA-355
66.1.02.01.1	MANUAL VALVES, TRAIN A BOUNDARY		OPR#	PLON AND LOSS OF STRICK FLOW AND LOSS OF STRICK INVENTORY	PERIODIC SURVEILLANCE	REDUNDANT TRAIN FOR FLOW, HOUR FOR INVENTORY	SPOTENTIAL LOSS OF BOTE TRAINS OF CCU FOR INJECTION AND RECIRCULATION AUS TO UNISOLABLE LOSS OF INVENTORY TREOUGH	BOUNDARY VALVE ANALYSIS.
							VALVES WHICH ARE NOT LOCKED CLOSED OR PROVIDED BITH SE BACRUPS	TRAT IT CANNOT BE CREDITED POST-ACCIDENT
	MANUAL VALVES, TRAIN A BOONDARY		CTORED	NONE	PERIODIC SURVEILLANCE	HOME BEGILEED	RONE	HORMAL POSITION
	CRECE OR RELIEP VALVES, TRAIN A BOUNDARY		MORMAL (PASSIVE)	<u> </u>				TREES ARE NO VALVES IN THIS CATEGORY
06.1.03.01.1	G-15A	PUMP/HOTOR	FOR BEON	REDUCED TRAIN A CCW PURP OUTPUT TO REQUIRED LOADS	PERIODIC TESTING	BROUNDANT TRAIS	INOPERABILITY OF TRAIN A CCW Pumping	THE THERE CCU PUMPS CONNECT TO A COMMON SUPPLY AND RETURN SEADER SYSTEM SERVING ALL
06.1.03.02.1	G-15A	SWGR #1 {52-1121}	OPEN	TRAIN A CON PUMP FAILS TO START OR TRIPS APTER STARTING	PBRIODIC TRATING	(SANE AS 6.1.3.1.1)	(SAME AS 6.1.3.1.1)	LOADS HORMAL POSITION FOR STANDBY SERVICE
06.1.03.02.2	G-15A	84GR #1 (52-1121)	CLOSED	TRAIN A CON PUMP STARTS OR FAILS TO TRIP, RESULTING IN OUT OF SEQUENCE BUS LOADING	CONTROL BOOM INDICATION	ESOMBANT TRAIN FOR SISCOP, NONE REQUIRED FOR SIS	POTENTIAL LOSS OF TRAIN A BLECTRICAL POWER DUE TO OUT OF SEQUENCE BUS LOADING DURING	NORMAL POSITION WITH PUMP
06.1.03.03.1	G-15A	CS: 52-1121 (CONTROL SWITCH)	START	POR SISLOP TRAIN A CCW PUMP STARTS AS SOOM AS OWERLOAD OR	CONTROL ROOM INDICATION, PRRIODIC TRATING	REDUNDANT TRAIN FOR SISLOP, NONE REQUIRED FOR SIS	SISLOP, NORE FOR SIS POTENTIAL LOSS OF TRAIN A SLECTRICAL POWER DUE TO OUT OF	G-15A CONTROL SYITCE
				UNDERVOLTAGE TREP CLEARS, CANNOT BE TREPPED MANUALLY. START CONDITION ARMS AUTO-START CIRCUITS OF G-ISB/C FOR G-ISA OVERLOAD OR UNDERVOLTAGE CONDITION			SEQUENCE BUS LALDING DURING SESLOP, MONE POR SES	
06.1.03.03.2	Q-15A	Confeor diren	STOP	CRAINTASCCRESUMETES ENABLLY OR AUTOMATICALLY DUE TO BREE	SONTERIC PROPERTING CATION.	BEDUNDART TRAIN	PUBBBBBILITY OF TRAIN V CCA	
06.1.03.03.3 (		CS: 52-1121 (CONTROL SWITCH)	MANUAL (OUT OF AUTO)	ANTI-PUNPING ANTI-PUNPING	CONTROL BOOM INDICATION, PRRIODIC TESTING		INOPRRABILITY OF TRAIN A CCM PUMP FOR INJECTION, INITIAL	STECH SPEC 3.3.1 ACTION ENTRY REQUIRED IF PUMP IS NOT IN
06.1.03.03.4 (		CS: 52-1121 (CONTROL SWITCH)	OPBN (ALL CONTACTS)	OTHER SIGNALS, MANUAL START/STOP UNAFFECTED TRAIN A CCW PUMP CANNOT BE STARTED OR TEIPPED, AND AUTOSTART DISARHED FOR G-15B/C ON G-15A OVERLOAD OR UNDERVOLTAGE FAILURE	PERIODIC TESTING	BEDUNDANT TRAIN	RECIRC  INOPERABILITY OF TRAIN A CCU PUNP, POTENTIAL LOSS OF TEAIN A BLECTRICAL POWER DUE TO OUT OF SEQUENCE BUS LOADING FOR SISLOP	AUTO HODS





EMERGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS

SAM OMOFRE UNIT I

TABLE 6-1: COMPONENT COOLING WATER PREA

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\$ HEF]	DBAICR ID	COMPONENT ID	FAILURE HODE	LOCAL BPPRCTS AND DRPRWDRWT FAILURES	METEOD OF Detection	INBERRAT COMPRASATING PROVISIONS	REFECT ON ECCS	RIBIRES
06.1.03.03.5 G	-154	(CONTROL SWITCE)		BE RESTARTED DUE TO BREE ANTI-PUMPING, AUTOSTART	PERIODIC TESTING			UNCROUNDED. TECH SPEC ACTION ENTER REQUIRED IF BITHER
06.1.03.04.1 G	I-15A	PC-605I (RELAT)	CONTACTS OPEN (ON)	TRAIN A CCW PUMP AUTO-START DISABLED ON LOW DISCEARGE PRESSURE, NO SPEECT ON	CONTROL BOOM ANNUNCIATION, PERIODIC TESTING	*******	BRDUCED RELIABILITY OF TRAIN A CCW PUMPING FOR MON-SIS/SISLOP SYENTS, NONE FOR SIS/SISLOP	
06.1.03.04.2 0	-154	PC-605E	CONTACTS CLOSED (OFF)	SIS/SISLOP STARY FROM SEQ 1 TRAIN A CCW PUMP AUTO-STARTS AS SOON AS 480 BUS VOLTAGE PRESENT	CONTROL ROOM INDICATION,	NONE SEGULATE FOR SISTOP,	SPECIALCY BAS FOYDING SABING BURING BURING BURING BURING BURING SABER BAR 10 OAL OL	NORMAL POSITION UNTIL AT LEAST
	i-15a	8EQ	CONTACTS OPEN (OPF)	TRAIN A CCW PUMP AUTQ-START ON SIS/SISLOP DISABLED, OTHER AUTO-START SIGNALS AND MANUAL	PRRIQUIC_TRATING		SISLOP, NORE FOR SIS INOPERABLITY OF TRAIN A CCM PUMP FOR INJECTION, INITIAL RECIRCULATION	NOITI POOLITION
06.1.03.05.2 0	-154	88Q 1 (20-5,7)	CONTACTS CLOSED (ON)	START/STOP UNAFFECTED TRAIN A CCW PUMP AUTO-STARTM, HANUAL TRIP UNAFFECTED	CONTROL BOOM INDICATION, PERIODIC TESTING	REDUNDANT TRAIN FOR SISLOP, NOME REQUIRED FOR SIS	POTENTIAL INOPERABILITY OF TRAIN A BLECTRICAL POWER BUE TO OUT OF ARQUENCE RUB LOADING FOR	
06.1.03.06.1 6	3-154	(contror anitch) cs: 25-1551	CONTACTS OPEN (STOP/APTER STOP)	TRAIN A CCW PUNP WILL MOT AUTO-START ON G-158 OVERLOAD OR BUS UNDERVOLTAGE, SIS/SISLOP AUTO-START	PRRIODIC TESTING	REDUMBANT TRAIN FOR NON-SIS/SIS/OP SYRMIR, NONE REQUIRED FOR SIS/SIS/OP	STATES, NORE FOR SIS STATESTOP FOR HOR-SIS/SISLOP	G-158 CONTROL SWITCH
06.1.03.06.2	i-15a	CS: 52-1221 (CONTROL SWITCH)	CONTACTS CLOSED (START/APTER START)	UNAPPECTED TRAIN A CCW PUMP WILL AUTO-START ON G-158 OVERLOAD OR BUS UNDERVOLTAGE AS 800M AS TRAIN A BUS VOLTAGE PRESENT	PRRIODIC TESTING	POR 815	SPOTENTIAL COMMON-MODE LOSS OF TRAIN A BLECTRICAL POWER, BUR TO OUT OF SEQUENCE BUS LOADING AND TRAIN S CCU PURP OVERLOD OR BUR UNDERVOLTAGE DURING SIGNOP, MONE FOR SIS	NORMAL POSITION.
06.1.03.07.1	I-15A	27-2 (SWGR2 UV BBLAT) B6 (52-1221 OYLD BBLAT)	(UV ON, OVLD OPP)	(SAME AS 6.1.3.6.1)	(SABE AS 6.1.3.6.1)		(SAMB 48 6.1.3.6.1)	NORMAL POSITION. SWGR #2 BUS UMBREVOLTAGE AMD G-15B OVERLOAD RELATE. 86 RELAY ALSO ACTUATED BY 27-111 UV RELAY
06.1.03.07.2.0	9-1 <b>54</b>	27-2 (SWGR2 UV RBLAY) 86 (52-1221 OVLD	CONTACTS CLOSED	(SAUE AS 6.1.3,6.2)	(SAUB_AS_6, 3, 3, 6, 2)	(SANK AS 6.1.3.5.2)	9(2AHB_AB_6.1.3.6.2)	FOR SWCR \$2
06.1.03.08.1 (	5-15A	BRLAY) CS: 52-1305 (CONTROL BWITCH)	CONTACTS OPEN (STOP/APTER STOP)	TRAIN A CCW PUMP WILL NOT AUTO-START ON G-15C OVERLOAD OR BUS UNDERFOLTAGE, SIS/SISLOP AUTO-START UNAPPECTED	PERIODIC TRATING	REDUNDANT TRAIN FOR NON-SIS/SISLOP EVENTS, NOMB REQUIRED FOR SIS/SISLOP	REDUCED RELIABILITY OF TRAIN A CCW PUMP FOR HOM-SIS/SISLOP EVENTS, NOWE FOR SIS/SISLOP	G-15C CONTROL SWITCH





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INJECTION OR RECIRCULATION

### EMBRGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN OMOPRE UNIT 1 TABLE 6-1: COMPONENT COOLING WATER PHBA

ITEM \$ DEVICE I	D COMPONENT ID	PAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METROD OF Detection	INBERRNY COMPENSATING PRODUSTING	REFERCT ON ECCS	BROARES
06.1.03.08.2 G-154			TRAIN A CCW PUNP WILL AUTO-START ON G-15C OVERLOAD OR BUS UNDREVOLTAGE AS SOOM AS TRAIN A 803 FOLTAGE PRESENT			TRAIN A BLECTRICAL POWER, DUE TO OUT OF BEQUENCE BUS LOADING AND SWING BUS LUBBERVOLTAGE	
06.1.03.09.1 G-154	27-2 (SUGR) UV RELAT) 86 (52-1305 OVLD BELAT)	(UV ON, OVED OFF)	(SAND AS 6,1,2,8,1)	(SAME AS 6-1-3-8-1)			MORMAL POSITION. SWGR #3 BUS UNDERVOLTAGE AND G-18C OVERLOAD RELATS. 86 RELAT ALSO ACTUATED BI 21-111 UY 88LAT
06.1.03.09.2 G-15A		(UV OFF, OVLD ON)	(SAME AS 6.1.3.8.2)	(SAME AS 6.1.3.8.2)	(SAME AS 6.1.3.8.2)	*(SAME AS 6.1.3.8.2)	POR SWGE #1
06.1 <u>.01</u> .10.1 G-154	86 (52-1305 GVLB RBLAY) 	CONTACTS OPEN (OFF)	TRAIN A CCW PUMP WILL NOT TRIP ON SWGR \$1 UNDERVOLTAGE	PRRIODIC TRATING	REDUNDANT TRAIN FOR SISLOP, NOME REQUIRED FOR SIS	POTENTIAL LOSS OF TRAIN A RECTRICAL POWER DUB TO OUT OF REQUENCE BUS LOADING DURING SISLOP, NOWE FOR SIS	MORNAL POSITION, SWGR 81
06.1.03.10.2 G-15A	27-111 (UV BRLAY)	CONTACTS CLOSED (ON)	TRAIN A CCW PUMP TRIPS, CANNOT BR RESTARTED	PERIODIC TESTING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A CCM	
06.1.01.11.1.G-15A	SWGR #1 125VDC CONTROL POWER	AOTIS TOM	TRAIN A CCV PUMP CANNOT BE STARTED OR TRIPPED	CONTROL ROOM INDICATION	REDUNDANT TRAIN	LMOPERABILITY OF TRAIN A CCM PUMP	SER MIRING DIAGRAM 112790 AND ONB LINE DIAGRAM 5102169 FOR POWER SUPPLY
06.1.01.01.1 MOY-720B	VALVE/ACTUATOR	OPBW	CCM FLOW ALIGNED TO TRAIN A SMC/CCM RI	CONTROL BOOM INDICATION	TRAIN A SUC PP TO RESTORE COOLING FOR NON-SIS/SISLOP RVENTS W/ TRAIN B SUC PP IN SERVICE. NONE REQD FOR		
06.1.04.01.2 MOV-120B	VALVE/ACTUATOR	CLOSED	CCM PLOW CANNOT BE ALIGNED TO		SIS/SISLOP OR W/ TRAIN A SWC PP IN SERVICE REDUNDANT TRAIN	NITH TRAIN A SUC PUMP IN SERVICE. INOPERABILITY OF TRAIN A	
06.1.04.02.1 HOV-7208	521/AI (RBLAY)	CONTACTS OPEN (OFF)	TRAIN A SUC/CCW MI HOY-720B WILL NOT AUTOMATICALLY ALIGH TRAIN A	PERIODIC TESTING PERIODIC TESTING	REDUNDANT TRAIN FOR INJECTION, INITIAL RECIRC	SUC/CCV BI FOR INJECTION AND	
			SUCCCU BY ON TRAIN A SUC PUMP START (NG. SUC PUMP START ON SIS/SISLOP), HANUAL ACTUATION UNAPPROTED			INITIAL RECIRCULATION	
06.1.04.02.2 HOV-120B .	521/AI (RBLAY)	CONTACTS ELOSED	(SAME AS 6.1.4.1.1)	(SAMB AS 6.1.4.1.1)	(SAME AS 6.1.4.1.1)	(SAMB AS 6.1.4.1.1)	
06.1.04.03.1 HOV-720B	BCC-1 (42-1187)	VOLTS LOW	VALVE PAILS AS-IS, WILL NOT ALIGN TRAIN A SUC/CCM BY IP CLOSED, CANNOT BE CLOSED BY COCALLY IP OPEN (BG.	CONTROL ROOM INDICATION	BRDUNDANT TRAIN	INOPERABILITY OF TRAIN A SVC/CCU B1	
06.1.05.01.1 CV-717A	VALVB/ACTUATOR	OPBM	POR SWC PUMP PAILURE; CCW FLOW ALIGNED TO RECIRC HE	CONTROL ROOM INDICATION	NONE BEGRIESD	NOMB (MORNAL FOR SECIECULATION)	INCLUDES ST-2737A, 250/C-2737A. SINGLE TRAIN PLOW WITH VALVE OPEN ADEQUATE FOR ALL REQUIRED LOADS IN





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### EMERGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN OMOPRE UNIT 1 TABLE 6-1: COMPONENT COOLING WATER PREA

[TRN #	DEVICE ED	COMPONENT ID	PAILURE MODE	LOCAL EPPECTS AND DEPENDENT FAILURES	METHOD OF DETECTION .	INBERENT COMPRESATING PROVISIONS	BPFBCT ON BCCS	BRMARES
06.1,05.01.2 (	CV-131 <u>A</u>	VALVB/ACTUATOR	CLOSED	TRAIN A VALUE CANNOT BE OPENED FOR CCM FLOW TO RECIRC BY	PRBLODIC TRSTING	BEDUNDANT AVEAS	INOPERABILITY OF TRAIN A VALVE	
06.1.05.02.1	CV-131A	VITAL BUS \$1 (8-1114V)	VOLTS LOW	VALVE PAILS OPEN, ALIGNING CON PLON TO RECIRC HI	CONTROL ROOM INDICATION	NONE BEGUIRED	ROMS	
06.1.05.03.1	CV-131A	ISA	PRESSURE LOW	VALVE DRIFTS OPEN IF INTERNAL STORAULIC LEARAGE PRESENT, ALIGNING CCW FLOW TO RECIEC NI	CONTROL ROOM INDICATION	NONE BEQUIRED	NONE	VALVE ACTUATOR USES AIR-OPERATED STDRAULIC PUMP TO MAINTAIN ACCUMULATOR PRESSURS
04.2.01.01.1 8	MANUAL VALVES, PRAIN & PLON	•	OPBM	KONS	PERIODIC BUBYBICLANCE	NONE BEGGEBB		HOERAL FORTSTON. TROUDER CCW-303, 327, 347, 311, 371, 330
	BAIN B PLON		CLOSED	TRAIN B CCM PUMP SUCTION, DISCRARGE OR MINIPLOW ISOLATED		SECURED FOUDS  BEDONDYNA ABYIN AO SEBAB YFF	LOSS OF TRAIN & CCW PUMPING CAPABILITY	
	BAIN & PLOY	******* /#11#*11 * /	MONE (PASSIVE)		PRRIODIC TRATING			INCLUDES CCM-323
06.2.02.01.1 B	IANUAL VALVBS, IRAIN B BOUNDARY	··	OPEN	DIVERSION OF TRAIN & CCW PUMP FLOW AND LOSS OF STETEM	PRRIODIC SURVEILLANCE	BEDUNDANT TRAIN FOR FLOW, MONE	OP CCW FOR INJECTION AND	BOUNDARY VALVE ANALYSIS.
<b>.</b>				I MASHLOST			RECIRCULATION DUE TO UNISOLABLE LOSS OF INVENTORY TEROUGE VALVES WHICH ARE NOT LOCKED CLOSED OF PROVIDED VITA BE	BREATED AND MON-SEISHIC, SO THAT IT CANNOT BE CREDITED POST-ACCIDENT
06.2.02.01.2 H	IANUAL VALVRS.		CLOSED	MOMB	PERIODIC SURVRILLANCE		BACEUPS WORK	NORMAL POSITION
06.2.02.02.1 C	PRAIN B BOUNDARY		NORMAL (PASSIVE)					THERE WEE NO AVEARS IN ANIS
	ALVES, TRAIN B OUNDART	***		-				CATEGORT
06.2.03.01.1 G	i-158 ·	PUMP/MOTOR	FOR BYON	OUTPUT TO ENGUIEED FOYDS  BEDUCED TEVIN B CCA DAND	PBRIODIC TESTING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B CCW PUMPING	THE THREE CCW PUMPS CONNECT TO A COMMON SUPPLY AND RETURN HEADER SYSTEM SERVING ALL
AC 4 A1 A1 1 A		GHOD 14	00.04	Analy & gov pline balls no	DDD (ab 10. enget va	(0) 40 40 4 4 4 4 4	/a.wa .a / a a	LOADS
06.2.01.02.1 0		SUGR #2 (52-1221)	OPEN	START ÖR TRIPS APTER STARTING	PRRIODIC TRSTING	(SAME AS 6.2.3.1.1)	(SAME AS 6.2.3.1.1)	NORMAL POSITION FOR STANDST
06.2.03.02.2 G	i-158 	8WGR #2 (52-1221)	CLOSED	TRAIN B CCW PUMP STARTS OR PAILS TO TRIP, RESULTING IN OUT OF SEQUENCE BUS LOADING	CONTROL BOOM INDICATION	NOME REQUIRED FOR SIS	POTENTIAL LOSS OF TRAIN B BLECTRICAL POWER DUE TO OUT OF SEQUENCE BUS LOADING DURING	NORMAL POSITION WITE PUMP RUNNING
06.2.03.03.1 G	-150	CS: 52-1221	START	FOR SISLOP TRAIN S CCW PUMP STARTS AS	CONTROL ROOM INDICATION,	REDUNDANT TRAIN FOR SISLOP,	SISLOP, NOME FOR SIS POTENTIAL LOSS OF TRAIN B	G-158 CONTROL SWITCH
• ••••		(CONTROL SWITCH)		UNDERVOLTAGE TRIP CLEARS, CANNOT BE TRIPPED MANUALLY.	PRREGOTC TRATING		BLACTRICAL PORRE BUE TO OUT OF " SEQUENCE BUS LOADING DURING SISLOP, NOWE FOR SIS	
		-		START CONDITION ARMS AUTO-START CIRCUITS OF G-15A/C FOR G-15B OVERLOAD OR				
06.2.03.03.2 G	-158	CS: 52-1221 (CONTROL SWITCH)	STOP	UNDERVOLTAGE CONDITION TRAIN B CCW PUMP TRIPS AND CANNOT BE RESTARTED MANUALLY	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN 8 CCW	





### EMERCENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT [ TABLE 6-1: COMPONENT COOLING WATER PREA

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118R )	DRVICE ID	COMPONENT ID	FAILURE MODE	LOCAL RPPECTS AND DEPENDENT PAILURES	MBTHOD OP	INBERBNY COMPRISATING PROVISIONS	BPPBCT ON BCCS	REMARES
06.2.03.03.3.0	G-158	CS: 52-1221 (CONTROL SWITCH)		TRAIN B CCW PUMP WILL NOT AUTO-START ON SIS/SISLOP OR OTHER SIGNALS, HANDAL START/STOP UNAPPROTED	CONTROL ROOM INDICATION, PRRIODIC TESTING			*TECH SPBC 3.2.1 ACTION ENTRY REQUIRED IF PUMP IS NOT IN AUTO HODE
06.2.03.03.4 0	1-158	CS: 52-1221 (CONTROL SWITCE)	OPEN (ALL CONTACTS)	TRAIN & CCW PUMP CANNOT BE STARTED OR TRIPPED, AND	PRECODIC TESTING	REDUNDANT TRAIN	INOPREABILITY OF TRAIN B CCU PUMP, POTRHTIAL LOSS OF TRAIN B BLECTRICAL POURE DUE TO OUT OF SEQUENCE BUS LOADING FOR SISLAP	
46,2,41,01.5 (	G-154	CO: \$2-1221(CONTROL SYLTCE)			PRRIODIC TRATING	BEDUNDANT TRAIN	INOPERABILITY OF TRAIN B CCY PURP, POTENTIAL LOSS OF TRAIN B ELECTRICAL POWER BUR TO OUT OF SEQUENCE BUS LOADING FOR SISLOP	UNGROUNDED. TECH SPEC ACTION ENTER REQUIRED IP BITEER
06.2.03.04.1 0	)-1\$B	PC-605E (RBLAT)	CONTACTS OPEN (ON)	TRAIN B CCW PUMP AUTO-START DISABLED ON LOW DISCEARCE PRESSURE, NO EFFECT ON	CONTROL BOOM ANNUNCIATION, PERIODIC TESTING	REDUMDANT TRAIN FOR NON-SIS/SISLOP EVENTS, MONE REQUIRED FOR SIS/SISLOP	REDUCED RELIABILITY OF TRAIN B CCW PUMPING FOR NON-RIS/RISLOP EVENTS, NOWE FOR RIS/RISLOP	
06.2.03.04.2 G	G-15B	PC-6051 (BRLAT)	CONTACTS CLOSED (OPF)	SIS/SISLOP START FROM SEQ 2 TRAIN & CCW PUMP AUTO-STARTS AS 800M AS 480 BUS VOLTAGE PRESENT	CONTROL BOOM INDICATION, PRRIGOLO TRAFLING	REDUNDANT TRAIN FOR SISLOP, NONE ERQUISED FOR SIS	POTENTIAL LOSS OF TRAIN B BLECTRICAL POWER DUE TO QUI OF SEQUENCE BUS LOADING DUBING	ONE CCA brub Shaning Normay Sosition andir at repat
06.2.03.05.1 0	i-1 <b>58</b>	889 2 (28-5,1)	CONTACTS OPEN (OPF)	TRAIN B CCW PUMP AUTO-START ON SIS/SISLOP DISABLED, OTBER AUTO-START SIGNALS AND MANUAL START/STOP WWAFFECTED	PERIODIC TRATING	BEOUNDART TRAIN	SISLOP, NOME FOR SIS INOPERABLLITY OF TRAIN B CCV PUMP FOR INJECTION, INITIAL RECIRCULATION	NORMAL POSITION
06.2.03.05.2 G	i-158	SBQ 2 (28-5,7)	CONTACTS CLOSED (ON)	TRAIN B CCW PUMP AUTO-STARTS, NAMUAL TRIP UMAPPECTED	CONTROL BOOM INDICATION, PERIODIC TESTING	REDUNDANT TRAIN FOR SISLOP, NONE REQUIRED FOR SIS	POTENTIAL INOPERABILITY OF TRAIN B BLECTRICAL POWER BUR TO OUT OF SEQUENCE BUS LOADING FOR	
86.2.03.06.1 G	i-15B	CS: 52-1121 (CONTROL SWITCS)	CONTACTS OPEN (STOP/APTER STOP)	TRAIN B CCW PUMP WILL MOT AUTO-START ON G-15A OVERLOAD OR BUS UNDERVOLTACE, 313/313LOP AUTO-START	PBRIODIC TRATING	REDUNDANT TRAIN FOR NON-213/213LOP RVENTS, NONE REQUIRED FOR SIS/313LOP	SISLOP, NOME FOR SIS BEDUCED BELIABILITY OF TRAIN B CCW PURP FOR BOX-518/318LOP BYENTS, NOME FOR SIS/SISLOP	G-15A CONTROL SWITCE
06.2.03.06.2 G	)-15B	CS: 52-1121 (CONTROL SWITCH)	CONTACTS CLOSED (START/APTER START)	UNAPPECTED TRAIN 8 CCV PURP WILL AUTO-START ON G-15A OVERLOAD OR BUS UNDREVOLTAGE AS \$00M AS TRAIN 8 BUS VOLTAGE PRESENT	PRECODIC TESTING	NOME FOR SISLOP, MOME REQUIRED FOR AIS	SPOTENTIAL COMMON-MODE LOSS OF TRAIN B ELECTRICAL POWER, DUR TO OUT OF SEQUENCE BUS LOADING AND TRAIN A CCW PUMP OVERLOAD OR BUS UNDERVOLTAGE DURING SISLOP. NOWE FOR SIS	NORMAL POSITION.
06.2.03.07.1 G	3-150	27-2 (SWGR) UV RRLAT) 86 (52-112) OVLD RRLAT)	(UV ON, OVED OPP)	(SAHE AS 6.2.3.6.1)	(SAMB AS 6.2.3.6.1)	(SAME AS 6.2.3.6.1)	(SAMB AS 6.2.3.6.1)	MORNAL POSITION. SWCR #1 BUS UNDERVOLTACE AND G-15A OVERLOAD RELATS. #6 RELAT ALSO ACTUATED BT 27-111 UV RELAT POR SWGR #1





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### EMBECENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAM OMOFRE UNIT 1 TABLE 6-1: COMPONENT COOLING WATER PHEA

1				••				
1788 #	DBAICS ID	COMPONENT ID	PAILURE HODE	LOCAL BPPECTS AND DEPENDENT FAILURES	DETECTION CE	INUBRANT COMPANSATING PROVISIONS	SPERCY ON BCCS	RIMARES
06 • 03 03	9 C 160	44 4 JAMAN IN	CONDICER CLOCED	(0.00 .0 6 0 0 6 0)	19.00		./	
	2 G-15B	RBLAY)  86 (52-1121 OVLD  RRLAY)	(UV OPP, OVLD ON)	(SAME AS. B. Z. J. B. Z)	. [YAMB. AX 6.Z.J.6.Z]	(8AHR AS_6.2.3.6.2)	*(SAME AS 6.2.3.6.2)	
96.2.03.08.	1 G-15B	C9: 52-1305	CONTACTS OPEN (STOP/APTER STOP)	TRAIN B CCW PUMP WILL NOT AUTO-START ON G-15C OVERLOAD	PERIODIC TRATING	REDUNDANT TRAIN FOR NON-818/818LOP EVENTS, NONE	REDUCED RELIABILITY OF TRAIN B CCW PUMP FOR NON-819/819LOP	G-15C CONTROL SWITCH
<del>                                   </del>				OR BUS UNDERVOLTAGE, SIS/SISLOP AUTO-START UNAPPROTED		BEGUIRED FOR SIS/BISTOP	EVENTS, MONE FOR \$15/813LOP	
06.2.03.08.	1 G-15B	C8: 52-1305	CONTACTS CLOSED	TRAIN B CCM PUMP WILL	PRRIODIC TRSTING	NOME FOR SISLOP, MOME REQUIRED	*POTENTIAL COMMON-MODE LOSS OF	
		(CONTROL SWITCH)	(START/APTER START)	AUTO-START ON G-15C OVERLOAD		FOR SIS	TRAIN B BLECTRICAL POWER, DUE	
				OR BUS UNDERVOLTAGE AS SOON AS TRAIN B BUS VOLTAGE PRESENT		=	TO OUT OF SEQUENCE BUS FOYDING	
							POLLOWING SIS/SISLOP TRIP OF	•
46.2.03.03.	1 G <u>-158</u>			(SAME AS 6.2.3.1.1)	(SYRE V2 6'5'3'6'1)	[SAME AS 6.2.3.0.1]	(\$4BR A8 6.2.3.9.1)	NORMAL POSITION. SUGB \$3 BUS
;   !		RELAT) 86 (52-1305 OVLD	(UV ON, OVED OPP)	•				UNDERVOLTAGE AND G-15C OVERLOAD RELAYS. SE RELAY ALSO
		RELATI						ACTUATED BY 27-111 UV RELAY
06.2.03.09.	2 G-158	27-2 (SWGR) UV BRLAT)	CONTACTS CLOSED (UV OFF, OVLD ON)	(SAME AS 6.2.3.8.2)	(SANE AS 6.2.3.8.2)	(SAME AS 6.2.3.8.2)	*(SAHE AS 6.2.3.8.2)	FOR SACE \$3
		86 (52-1305 OVLD						
06.2.03.10.	1 C 158	RELAT) 27-111	CONTACTS OPEN	TRAIN B CCM PUMP WILL NOT TRIP	0414014 <b>0</b> 140140	SOUNDAME ADDIT DOD STOLOS	BORDUREAL 4000 OR BOATH 9	MADMAL PORCETON GUAD AN
		(UV RELAT)	(OPP)	ON SUGR #2 UNDERVOLTAGE	Lagrante ingiline	REDUNDANT TRAIN FOR SISLOP,	POTENTIAL LOSS OF TRAIN B	NORMAL POSITION. SMGR #2
•		(11 22200)	1				SEQUENCE BUS LOADING DURING SISLOP, MONE FOR SIS	Anna-Antida Panti
06.2.03.10.	2 G-158	21-111 (UV RELAT)	CONTACTS CLOSED	TRAIN B CCW PUMP TRIPS, CANNOT BE RESTARTED	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT TRACK	INOPERABILITY OF TRAIN & CCW	· · · · · · · · · · · · · · · · ·
06.2.03.11.	1 G-158	SWGR #2 125VDC CONTROL POWER	VOLTS LOW	TRAIN B CCW PUMP CANNOT BE STARTED OR TRIPPED	CONTROL ROOM INDICATION	REDUNDANT TRAIN	IMOPERABLLITY OF TRAIN & CCU	
06.2.04.01.	1 MOA-1507	VALVE/ACTUATOR	OPEN		CONTROL ROOM INDICATION		RESUCTION OF CCW MEAT REMOVAL CAPACITY FOR MON-SIS/SISLOP	BORNAL POSITION WITH TRAIN B SWC PUMP IN SERVICE, SWC PUMP
•			• •				EVENTS OR WITH TRAIN A SMC PUMP	
•					•	SERVICE. NOME REED FOR	IN SERVICE, NOME FOR SIS/SISLOP	
··					y a serve one control quages and again		OR WITH TRAIN B SWC PURP IN	
06.2.04.01.1	1 HOV-720A	VALVE/ACTUATOR	CLOSEO	CCW PLOW CANNOT BE ALIGNED TO	CONTROL ROOM INDICATION, PERIODIC TRSTING	PP IN SERVICE REDUNDANT TRAIN	SERVICE. INOPERABILITY OF TRAIN B SWC/CCV BI	
06.2.04.02.	MOV-120A	521/A1	CONTACTS OPBN	HOV-720A WILL NOT	PERIODIC TESTING	REDUNDANT TRAIN FOR INJECTION.		· · · · · · · · · · · · · · · · · · ·
		(RBLAY)	(OPF)	AUTONATICALLY ALIGN TRAIN B		•	SACACCA BE LOS INTECTION THO	
· · · · · · · · · · · · · · · · · · ·				SWC/CCW BI ON TRAIN 8 SWC PUMP	e e e e e e e e e e e e e e e e e e		INITIAL BECIRCULATION	
				START (EG. SWC PUMP START ON SIS/SISLOP), MANUAL ACTUATION				
				UNAPPRETED				





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-	ETRM \$	DBVICB ID	COMPONENT ID	FAILURS MODE	LOCAL RPPECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INDERENT COMPENSATING PROVISIONS	RFFRCT ON BCCS	PENARES
	86.2.04.02.2	MOV-720A	521/41	CONTACTS CLOSED	[SAME AS_6,2.4,1,1]	(SANR 48 6.2.4.1.1)	(1.1.1.1) EA THAR)	(SAME AS 6.2.4.1.1)	
	66.2.04.03.1	MOV-720A	(RBLAY) BCC-2 142=1200}	AOTIS FOR	VALUE PAILS AS-IS, WILL NOT ALIGH TRAID & SUC/CCV DI IT	CONTROL BOOM INDICATION	REDUNDANT TRAIN	INOPERABLLITY OF TRAIN B	
					CLOSED, CANNOT BE CLOSED BICEPT LOCALLY IF OPEN (BG. FOR SWC PUMP FAILURE) CCW FLOW ALIGNED TO RECIRC BE	MANADAL DADIN FINICATION	MONE REQUIRED	HOME (HORBAL FOR RECIRCULATION)	incumie at 1777a
	06.2.05.01.1	CV-137B	VALVE/ACTUATOR	OPRI	CCW PLOW ALIGNED TO RECIEC BY	CONTROL BOOM INDICATION	BOBS SEASISER		ZEO/C-3731B. SINGLE TRAIN PLOW WITH VALVE OPEN ADEQUATE FOR
		,							INJECTION OF SECIECULATION
	06.2.05.01.2	CV-1318	ATTABATCE ATTACK	CLOSED	TRAIN B VALVE CANNOT BE OPENED	PERIODIC TESTING	REDUNDANT VALVE	INOPERABILITY OF TRAIN & VALVE	
	46.2.05.02.1	CV-1318	V[TAL BUS \$2 (8-1214V)	VOLTS LOW	POR CCM PLOW TO BECIEC MX VALUE FAILS OPEN, ALIGNING CCM PLOW TO RECIEC BY	CONTROL ROOM INDICATION	NONE REQUIRED	NONE LOS BECIECULATION BY CCA STOR	
	96.2.05.03.1	CV-1378	184	PRESSURE LOW	VALVE DRIFTS OPEN IF INTERNAL ETDRAULIC LEARAGE PRESENT, ALIGNING CCW PLOW TO RECIBE AN		NONE BEGULEED	NORE	VALVE ACTUATOR USES AIR-OPERATED STORAULIC PUMP TO MAINTAIN ACCUMULATOR PRESSURE
		MANUAL VALVES, SOUTH PUMP PLON		OPEN	MONE	PERIODIC SURVEILLANCE	NONE ERGNIERO	NONE	NORMAL POSITION. INCLUDES CCW-305, 319, 349, 313, 373
	46.3.01.01.2	MANUAL VALVES,		CLOSED	SOUTE COM PUMP SUCTION,	BEBEODEC BREAFIFFYNCE	TRAIN A OR B TO SERVE ALL	LOSS OF SOUTH CCW PUMPING	
	06.3.01.02.1	•		NOME (PASSIVE)	DISCHARGE OR MINIPLOW ISOLATED	PERIODIC TESTING	ERQUIRED LOADS	CAPABILITY	INCLUDES CON-325
	86.3.02.01.1	SOUTH PUMP PLON MANUAL VALVES, SOUTH PUMP BOUNDARY	2.000	OPEN	DIVERSION OF SOUTH CCW PUMP PLOW AND LOSS OF STATEM INVENTORY	PRECODIC SURVEILLANCE	TRAIN A OR B POR PLOU, NOWE POR INVENTORY	SPOTENTIAL LOSS OF TRAIN A AND B CCW FOR INJECTION AND BECIECULATION DUB TO UNISOLABLE	BOUNDARY VALVE ANALYSIS.
								CLOSED OF PROVIDED WITH SE CLOSED OF PROVIDED WITH SE	RELATED AND MON-SEISMIC, SO THAT IT CANNOT BE CREDITED POST-ACCIDENT
		MANUAL VALVES, SOUTE PUMP		CLOSED	NONE	PRRIODIC BURABILITANCE	NOME BEGUIEED	NONE .	NORMAL POSITION
	06.3.02.02.1	BOUNDARY CHI OR RELIEF VALVES, SOUTH PP		MORRAL (PASSIAE)					TERRE ARE NO VALVES IN THIS CATEGORY
	66.3.03.01.1	BOUNDARY G-15C	PUMP/HOTOR	FOR BFOR	REDUCED SOUTE COM PUMP OUTPUT TO REQUIRED LOADS	PERIODIC TESTING	TRAIN A OR B TO SERVE ALL REQUIRED LOADS	INOPERABILITY OF SOUTH CCW PUMP	TAB TERES CCW PUMPS CONNECT TO A COMMON SUPPLY AND RETURN
					and the second s				BRADBE SYSTEM SERVING ALL
	06.3.03.02.1	G-15C	SVGR #3	OPEN	SOUTH CCW PUNP PAILS TO START	PERIODIC TESTING	(1.1.C.C. & SA SHAR)	(SAME AS 6.3.3.1.1)	LOADS NORMAL POSITION FOR STANDST SERVICE
1	06.3.03.02.2	G-15C	(\$2-1305) SWGR #3 (52-1305)	CLOSED	OR TRIPS AFTER STARTING SOUTE COM PUMP STARTS OR FAILS TO TRIP	CONTROL ROOM INDICATION	MONB BEGUIRED	NOME. TRAIN A/B BUS LOADING EMPACT PRECLUDED BY AUTOMATIC ISOLATION OF SWGR \$3	MORMAL POSITION WITH PUMP RUNNING





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#### EMBRGENCT CORE COOLING STSTEM SINGLE FAILURE ANALYSIS SAN OMOFRE UNIT 1 TABLE 6-1: COMPONENT COOLING WATER PREA

ITBE	DBVICB ID	COMPONENT 10	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT FAILURES	MBTMOD OF DRIBCTION	PROATSIONS IMPREMAL COMBENSVAING	BPFECT ON BCCS	ESMIETS
06.3.03.03.1	G-15C	_C3: 52-130\$ (CONTROL SWITCE)	START	SOUTE CCM PUMP STARTS AS SOON AS OVERLOAD OR UNDERVOLTAGE TRIP CLEARS, CANNOT SET TRIPPED MANUALLY. START CONDITION ARMS AUTO-START CIRCUITS OF G-15A/B	PBRIODIC TESTING	NONE BEGIEFF	NORS, TRAIN A/S RUS LOADING REPART PERCUIDES FOR SIS/SISLOP EVENTS SY AUTOMATIC ISOLATION OF SEGR 23	_G-15C_CONTROL_BULTCH
06.3.03.03.2	G-1\$C	CS: 52-1305 (CONTROL SWITCE)	STOP .	FOR G-15C OVERLOAD OR UNDERVOLTAGE CONDITION SOUTH CCW PUMP TRIPS AND CANNOT BE RESTARTED MANUALLY OR AUTOMATICALLY DUE TO BERR	CONTROL BOOM INDICATION, PRESODIC TESTING	TRAIN A OR B TO SERVE ALL. REQUIRED LOADS	INOPERABILITY OF SOUTH CCW PUMP	
06.3.63.03.3	G-15C	CB: 52-1305 (CONTROL ANITCH)	HANUAL (OUT OF AUTO)	ANTI-PURPING SOUTE CCW PUMP WILL NOT AUTO-START ON LOW BRADER PRESSURE OR OTHER SIGNALS, MANUAL START/STOP UNAFFECTED	CONTROL BOOM INDICATION, PERIODIC TESTING	TRAIN A/B TO SERVE ALL REQUIRED LOADS	REDUCED RELIABILITY OF SWING CCW PUMP FOR MON-SIG/SIGLOP EVENTS	
06.3,03,83,6	G-15C	C8: \$2-1305 (CONTROL SWITCH)	OPEN (ALL CONTACTS)	BOUTH CCW PUMP CAMMOT BE STARTED OR TRIPPED, AND AUTOSTART DISARRED FOR G-15A/B ON G-15C OVERLOAD OR	PRRIODIC TRATING	TRAIN A OR 8 TO STRYR ALL	INOPERABILITY OF SQUTE CON PUMP IF NOT INITIALLY RUNNING	TRAIN A/S BUS LOADING INPACT PRECLUDED FOR SIS/SISLOP EVENTS BY AUTOMATIC ISOLATION OF SYGR §3
06.3.03.03.5	G-15C 	C8: \$2-1305	SHORT/GROUND [ALL CONTACTS]	UNDERVOLTAGE FAILURE SOUTS CCW PUMP TRIPS, CANNOT BE RESTARTED DUB TO BREE ANTI-PUMPING, AUTOSTART DISARMED FOR G-154/B OW G-15C	CONTROL ROOM INDICATION, PRRIQUIC TRETING	TRAIN A/B TO SERVE ALL BEQUIRED LOADS	INOPERABILITY OF SOUTE CCV PURP	UNGROUNDED. TECH SPEC ACTION ENTRY REQUIRED IP SITEER SYSTEM NEGATIVE POLE GROUNDED
06.1.03.04.1	G-15C	PC-6051	CONTACTS OPEN	OVERLOAD OR UNDERVOLTAGE SOUTS CCU PUBP AUTO-START	CONTROL ROOM ANNUNCIATION,	TRATU A/D TO BERVE ALL	REDUCED RELIABILITY OF SOUTH	TO PRECLIDE COMMON-MODE LOSS OF CONTROL POWER TO TRAIN A/B DUE TO THIS SINGLE PAILURE NORMAL POSITION WITH AT LEAST
06.3.03.04.2	G-15C	PC-6051 (RBLAT)	CONTACTS CLOSED	DISABLED ON LOW DISCHARGE PRESSURE SOUTH CCY PURP AUTO-STARTS AS SOOM AS SWING BUS VOLTAGE	PERIODIC TESTING  CONTROL BOOM INDICATION, PERIODIC TESTING	NORE SEGULEED  SEGULEED FOURS	CCW PUMP FOR MON-SIS/SISLOP SVENTS MONE. TRAIN A/B BUS LOADING IMPACT PRECLUDED FOR SIS/SISLOP	ONE CCW PUMP RUMNING  MORNAL POSITION UNTIL AT LEAST ONE CCW PUMP RUMNING
06.3.03.05.1	G-15C	8EQ	(NOT USED)	PRESENT			OF SECT \$3 OF SECT \$3	SEQ 2 CONTACTS REMOVED FROM PUMP CONTROL CIRCUIT
06.3.03.06.1	1-15C	CS: 52-1121 (CONTROL SWITCH)	CONTACTS OPEN (STOP/APTER STOP)	SOUTE CCW PUMP WILL NOT AUTO-START ON G-15A OVERLOAD OR BUS UNDERVOLTAGE, LOW BEADER PRESSURE AUTO-START UNAFFECTED	PBRIODIC TESTING	TRAIN D TO BREVE ALL REQUIRED	REDUCED RELIABILITY OF SOUTH CCY PUMP FOR NON-SIS/SISLOP EVENTS	G-15A CONTROL SWITCE
06.3.03.06.2	G-1 <b>5</b> C	(CONIBOL SALLCE) C3: 25-1151	CORTACTS CLOSED	OMETACIAN SOUTH CCW PUMP WILL AUTO-START ON G-15A OVERLOAD OR BUS UNDERFOLTAGE AS BOOM AS SWING BUS VOLTAGE PRESENT	PBRIODIC TRSTING	MOME ERQUIERD	NOME. TRAIN A/B BUS LOADING IMPACT FOR SIS/SISLOP BYRNTS PRECLUDED BY AUTOMATIC ISOLATION OF SWCS \$3	NORMAL POSITION.
06.3.03.07.1	3-1 <b>5</b> C	27-2 (SWGR1 UV RELAT) 86 (52-1121 OVLD RELAT)	CONTACTS OPEN (UV ON, OVED OPP)	(BAHR AS 6.3.3.6.1)	(SAMB AS 6.3.3.6. <u>i</u> )	(9ANR 49 6-3.3-6-1)	(SANR 45 6.3.3.6.1)	NORMAL POSITION, STOR ALBUS UNDERVOLTAGE AND G-15A OVERLOAD RELATS. 86 RELAT ALSO ACTUATED BY 27-111 UV RELAT FOR SWGR #1





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### EMBEGGNOT CORE COOLING STOTEM SINGLE PAILURE ANALTSIS SAN ONOPRE UNIT 1 TABLE 6-1: COMPONENT COOLING MATER PREA

ITEM # DEVICE IS	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION -	BSOATATONS THEREBAL COMBENSATING	BPFBCT ON BCCS	BENARES
06.1.01.07.2 G-15C	21-2 (SWGR) UV RBLAY) 86 (52-112) OVLI	(UV OFF, OVLD ON)	(SAME AS 6.1.1.6.2)	[8488 AS (6.3.3.6.2)		_{84B A9_6,3,1,6,2}	
06.3.03.08.1 G-15C	CS: 52-1221	CONTACTS OPEN (STOP/APTER STOP)	SOUTH CCM PUMP WILL NOT AUTO-START ON G-15B OVERLOAD OR BUS UNDERVOLTAGE, LOY	PRRIODIC TRATING	TRAIR A TO SERVE ALL REQUIRED LOADS	REDUCED RELIABILITY OF SOUTH CCW PUMP FOR MON-SIS/SISLOP RYBHTS	G-15B CONTROL SWITCH
96,1,03,08.2 0-15C			ON G-158 OVERLOAD OR BUS UNDERVOLTAGE AS SOON AS SWING	Stridofc arating	MONE BEGNIBED	_1018	MOBRATE BORISION
04.3.03.09.1 G-15C	BELAT)  85 (85-122) OVL  88LAT)  27-8 (94GB2 UV	(UV ON, OVLD OFF)	BUS TOLTAGE PRESENT (SAME AS 6.3.3.8.1)	(SAIB AS 6.3.3.0.1)	(SAME AS 6.3.3.8.1)	(SAME AS 6.3.1.6.1)	NORBAL POSITION. SWER \$2 BUS UNDERVOLTAGE AND G-15B OVERLOAD RELATS. \$6 RELAT ALSO ACTUATED BY 27-111 UV BELAT
06.1.03.09.2 G-15C	86 (52-1221 OATI BELAT) BELAT)	CONTACTS CLOSED (UV OPP, OVED ON)	(SAME AS 6.3.3.8.2)	(848B A8 6.3.3.8.2)	(SAME AS 6.3.3.8.2)	(\$488 43 6.3.3.8.2)	POR SUGR #2
06.3.03.10.1 G-15C	21-121 (UV RELAT)	CONTACTS OPEN (OPP)	SOUTH CCM PUMP WILL NOT TRIP ON SUCE \$3 UNDERVOLTAGE	PERIODIC TESTING	NORE BEGULEED	NOME. TRAIN A/S BUS LOADING IMPACT FOR SIS/SISLOP EVENTS PRECLUDED BY AUTOMATIC	MORMAL POSITION. EWGR #3 UNDERVOLTAGE RELAT
06.3.03.10.2 G-15C	27-131 (UV RBLAT)	CONTACTS CLOSED	SOUTH CCW PUMP TRIPS, CANNOT BR RESTARTED	PERIODIC TESTING	TRAIN A OR B TO SERVE ALL REQUIRED LOADS	ISOLATION OF SUGR \$3 INOPERABLEITY OF SOUTH CCW PUMP	
06.3.03.11.1 G-15C 06.4.01.01.1 MANUAL VALVES		OBM OCTS FOR	SOUTE CON PUMP CANNOT BE STABTED OR TRIPPED BICESS CON FLOW TO SPRNT PURL			INOPERABILITY OF SOUTH CCM PUMP IF NOT INITIALLY RUNNING POTENTIAL REDUCTION OF CCM PLON	SPENT PUBL PIT MI. CCV-398
COMMON PLON P		CLOSED	PIT BY, DIVERTING FLOW FROM CTHER REQUIRED CCW LOADS CCW FLOW INCLATED TO APRIL	PRRIODIC SURVEILLANCE, LOCAL	ADMINISTRATIVELY CONTROLLED VALVE LOCEING PROGRAM PAILURE PRECLUDED BY	TO ECCE LOADS  NOWE FOR ECCE LOADS, LOSS OF	PRESET TO THEOTTLE FLOW
COMMON PLOW P		OPBM	FORL PIT BI, INCREASING PLOW TO OTHER REQUIRED CCW LOADS BICESS PLOW TO RECIRC SI,	INDICATION  PREIODIC SURVEILLANCE, LOCAL	ADMINISTRATIVELY CONTROLLED VALVE LOCKING PROGRAM PAILURE PRECLUDED BY	COOLING FOR SPENT FUEL PIT POTENTIAL REDUCTION OF CCU FLOW	RECIRC BE, INCLUDING REPUBLING
CONHON PLOY P			BEQUIESD CCM FOYDS	INDICATION	ADMINISTRATIVELY CONTROLLED	TO OTHER ECCS LOADS	WATER PUMP MINIFLOW COOLING. CCM-390 PRESET TO THROTTLE PLOW
06.4.01.02.2 MANUAL VALVES COMMON PLOW P		CLOSED		PERIODIC SURVEILLANCE, LOCAL INDICATION	PAILURE PRECLUDED BY ADMINISTRATIVELY CONTROLLED VALVE LOCKING PROGRAM	LOSS OF COOLING FOR RECIRC BY AND REPUBLING WATER PUMP HIMIPLOW	
06.4.01.03.1 MANUAL VALVES COMMON PLOW P	, CCW-301, 350, ATH 351, 352, 353	OPBN -	BICESS CCW PLOW TO BAD MONITOR AND SURGE TANE, DIVERTING PLOW PROM OTHER REQUIRED CCW LOADS	•		POTENTIAL REDUCTION OF CCW PLOW TO ECCS LOADS	SSURGE TAME/RAD MONITOR LIBE. CCH-350, 352, 353 NOT IN LOCKING PROGRAM





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ITEE A	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL REFERCTS AND DEPENDENT PAILURES	METHOD OF DETECTION	INBRERAL COMBERNATING	BPFECT ON BCCS	BEMARES
06 4 01 03 1	L MANUAL VALVES.	CCH-1A1 15A	CLOSED	CCM PLOW ISOLATED TO RAD	PERIODIC SURVEILLANCE, LOCAL	PAFI IIDP DOPILITADA BU	LASS AS ALL COM DIMINO BUD TA	DDOLLDU I THE MATHE GOW SAL TH
	COMMON PLOY PATE			HOWITOR AND PROM SURGE TAME BACE TO PUMP SUCTION, CAUSING LOSS OF PUMP SUCTION PRESSURS CONTROL	INDICATION	ADMINISTRATIVELY CONTROLLED VALVE LOCKING PROGRAM	CONTROL  CON	FREIGH PROGRAM
06.4.01.04.	COMBON PLOW PATE	406, 407, 408,	OPEN	BICESS CCW FLOW TO BRACTOR CYCLE SAMPLE BIO, DIVERTING	PERIODIC SURVEILLANCE	MONE	SPOTENTIAL REDUCTION OF CCW	PREACTOR CYCLE SAMPLE SIS. CCW-407, 408, 409, 410
		409, 410, 411		PLOY PROM REQUIRED CCW LOADS				THROTTLE PLOW BUT NOT IN LOCKING PROGRAM. NO PLOW INDICATION PROVIDED.
mer i seat deben e minerom ne como o como o com				,			· .	THRESPOSE, STATEM BYDRAULIC BALANCE REQUIRED WITH VALVES PULLY OPEN
	CORNON PLOW PATE	1 406, 407, 408, 409, 410, 411	CLOSED	CCU FLOW ISOLATED TO REACTOR CYCLE SAMPLE MIA, INCREASING PLOW TO REQUIRED CCU LOADS	PERIODIC SURVEILLANCE	NONE REQUIRED FOR ECCS, PASS STATEM FOR POST-ACCIDENT SAMPLING	LOSS OF COOLING TO REACTOR CICLE SAMPLE MIS, MOME FOR RCCS	
06.4.01.05.1	MANUAL VALVES, COMMON PLOY PATE		OPEN	RICERS CCW PLOW TO CHARGING PUMP LUBE OIL COOLERS, DIVERTING PLOW PROM OTHER	PERIODIC SURVEILLANCE	MOMB .	PLOW TO OTHER ECCS LOADS	SCHARGING PUMP LUBE OIL COOLERS. FLOW INDICATION NOT PROVIDED AND VALVES NOT IN
06.4.01.05.1	COMMON PLOW PATE		CLOSED	CCW PLOW ISOLATED TO CHARGING PUMP LUBB OIL COOLERS,	PERIODIC SURVEILLANCE	NOME FOR SIS, REDUNDANT G-SA PAN COOLER FOR SISLOP	*LOSS OF BOTH CHARGING PUMPS FOR SIS, LOSS OF CHARGING PUMP	
			-	BESONERS CCA FOYDS			G-88 FOR SISLAP	BECAUSE COOLING DUTY FOR NORMAL OPERATION (VERIFIED BY LUBE OIL TEMPERATURE ALARMS)
AC 4 A1 AC 1	MANUAL NATURO	00H 414 416	0.D.D.H					DOBS NOT BOUND POST-ACCIDENT CRARGING PUMP MEAT LOADS
00.4.01.06.1	CORNON PLOW PATE		OPBN	RECESS CCW PLOW TO SEAL WATER MI, DIVERTING PLOW FROM OTHER REQUIRED CCW LOADS		NONE	AFOA 40 OLENE SCCS FOURS	*SBAL WATER BI. VALVE CCW-415 PRESET TO THROTTLE FLOW. VALVES NOT IN LOCKING PROGRAM
06.4.01.06.2	HANUAL VALVES,		CLOSED	CCW PLOW ISOLATED TO SEAL	LOCAL INDICATION, PERIODIC	BORE	POTENTIAL LOSS OF CHARGING	SEAL WATER RETURN LIME
	COMMON PLOW PATH	416		WATER BEQUIERD CCW LOADS	SURVRILLANCS.		PURP SUCTION SUBCOOLING PRIOR TO REMOTE-MARUAL ISOLATION OF STAL WATER RETURN LINE	ISOLATION VALUES NOT AUTOMATICALLY ISOLATED ON SIS/SISLOP OR CIS
06.4.01.01.1	MANUAL VALVES, COMMON PLOW PATE	429-434, 436-440, 442,	OPRI	CCA FOODS SECONDS CCA FOODS & SECONDS CCA LOYDS	PRRIODIC SURVBILLANCE	MOAB	*POTRNTIAL BROUCTION OF CCM PLOW TO BCCS LOADS	REV. LOADS (VASTE GAS COMPRESSORS, APTERCOOLERS, SAMPLE COOLERS, ETC). PLOW
		495, 497						INDICATION NOT PROVIDED AND VALVES NOT IN LOCKING PROGRAM. TERREPORE, STSTEM ETDRAULIC
06 4 81 07 9	MAMUAL VALVES.	CCM 425-422	CLOSED	CLA BIUM ISUITABU AV DRI	PEDIUVIC CHDASHITANS	MUNB BEUNIDEN	INST OF CONTRO SO BUT INDO	BALANCE REQUIRED WITH VALVES
ND . 1. U I . U f . Z	COMMON PLOW PATE		C10381	CCM PLOW ISOLATED TO RML LOADS, INCRESSING PLOW TO REQUIRED CCW LOADS	PBRIODIC SURVEILLANCE	NONE BEGATERD	LOSS OF COOLING TO BYL LOADS	





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### EMBEGENCY CORE COOLING STOTEM SINGLE FAILURE AMALTSIS SAM OMOPRE UNIT 1 TABLE 6-1: COMPONENT COOLING WATER FREA

ITBN #	DRAICE ID	COMPONENT ID	FAILURE HODE	LOCAL EPPECTS AND DEPENDENT FAILURES	METEOD OF DRTECTION	INTERENT COMPENSATING PROVISIONS	BPFECT ON BCCS	BEKARES
06.1.01.08.1	MARUAL VALVES, CORNOR FLOW PATE		OPBN	RICESS CCW FLOW TO RCP-A		MOMB.	SPOTENTIAL REDUCTION OF CCH	FRCP-A HOTOR AND THREMAL  BARRIBE COOLING. VALVES NOT IN LOCKING PROGRAM
	NAMUAL VALVES, COMMON FLOW PATE	017, 019, 453,	CLOSED	BRABINGS AND TRREMAL BARRIER COLL, INCREASING FLOW TO OTHER	CONTROL ROOM ANNUNCIATION, LOCAL INDICATION, PERIODIC	INTEGRITY SORT-ACCIDENT BCP SEAT SORT-ACCIDENT BCD ROW LOS	LOSS OF CCW COOLING TO BCP-A TRERNAL BARRIER, SEAL INJECTION UNAFFECTED	
	CORNON FLOW PATE		OPBN -	COIL, DIVERTING FLOW FROM BEARINGS AND THERMAL BARRIER BECKEN CON FLOW FROM BEARING FLOW FROM	LOCAL INDICATION, PRRIODIC SURVEILLANCE		SPOA 40 GINDS BCCS TOVOS	RECP-B HOTOR AND THERMAL BARRIER COOLING, VALVER HOT IN LOCKING PROGRAM
06,1,01,09.2	NAPUAL VALVES.		CLOSED	COIL, INCREASING PLOW TO OTHER COIL, INCREASING PLOW TO OTHER	LOCAL INDICATION, PERIODIC	INTEGRITY SORT-ACCIDENT SCP SEAT ACCIDENT SCP SEAT	LOSS OF CEN COOLING TO RCP-B THERMAL BARRIER, SEAL INJECTION UNAFFECTED	
	MANUAL VALVES, COMMON PLOW PATE	016, 018, 455,	OPEN	COIL, DIVERTING FLOW FROM BERRINGS AND THERMAL BARRIER REQUIRED.	LOCAL INDICATION, PERIODIC SURVEILLANCE	NORE	SPOTENTIAL REDUCTION OF CCA	*RCP-C HOTOR AND THERMAL BARRIER COOLING. VALVES NOT IN LOCKING PROGRAM
	HANDAL VALVES, CONNON PLOY PATE		CLOSED	BRARINGS AND TERRNAL BARRIER COIL, INCREASING PLOW TO OTHER		SEAL INJECTION FLOW FOR INTEGRITY	LOSS OF CCM COOLING TO RCP-C TREEMAL BARRIER, SEAL INTECTION UNAPPRICABL	
	MANUAL VALVES, COMMON PLOW PATE		OPEN	REQUIRED CCW LOADS  BHERGENCY THERMAL BARRIER PUMP ALIGNED TO ECP-A, B AND C. NO BPPECT ON CCW PLOW UNLESS BHERGENCY THERMAL BARRIER PUMP	PRRIODIC SURVEILLANCE	BEDUNDART CCM PUMPS TO ENSURE REQUIRED PLOWS IF G-964 OFF.	NORE UNLESS G-964 ON, IN WRICE CASE POTENTIAL REDUCTION IN CCW PLOW TO OTHER REQUIRED CCW LOADS	
	MANUAL VALVES, COMMON PLOW PATE		CLOSED	G-964 STARTS BHBBGBHCT THERMAL BARRIER COOLING PATH ISOLATED TO	PRRIODIC SURVEILLANCE	MONE BEQUIESD	NONE FOR ECCS	EMERGENCY TREBEAL BARRIER PUMP NOT CREDITED FOR RCCS EVENTS
	NAMUAL VALVES, CORNON PLOW PATE		OPBN	PROP.A, B OR C BICESS CCW PLOW TO BICESS LBIDOWN RI, DIVERTING PLOW PROM BCCS LOADS	LOCAL INDICATION, PRRIODIC SURVEILLANCE	BOMB	POTENTIAL REDUCTION IN CCU PLOW TO ECCS LOADS	SEICESS LETDOWN HI, NOT NORMALLY IN SERVICE. CCV-465 PRESET TO THROTTLE PLOY.
	MANUAL VALVES, COMMON PLOW PATH		CLOSED	CCW PLOW ISOLATED TO EICESS LETDOWN BI, INCREASING PLOW TO ECCS LOADS	SURVEILLANCE	NONE SEGUISED	LOSS OF COOLING TO SECRES LETDOWN BI, MONS FOR ECCS LOADS	VALVES NOT IN LOCEING PROGRAM
	MANUAL VALVES, COMMON PLOW PATE		OPEN	DIVERTING PLOW FROM BCCS LOADS		NOR	PLOW TO BCCS LOADS	PRES BIS AND BER PUMP COOLING.  BBR BI CCW PLOW CONTROLLED BY TCW-6014/B. VALVES NOT IN LOCKING PROGRAM
	MANUAL VALVES, COMMON PLOW PATE	CCW 011-016,	CLOSED	CCW FLOW ISOLATED TO BBE PURPS AND/OR HI, INCREASING FLOW TO BCCS LOADS	PERIODIC SUBVELLLANCE	MOMB REQUIRED	NONB FOR ECCS	RBR STYTEM NOT CREDITED POST-ACCIDENT, SINCE DORS NOT MERT SINGLE FAILURE FOR VALVE ALIGNMENT AND IS NOT EQ





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### EMBRGENCY CORE COOLING STOTEM SINGLE PAILURE ANALYSIS SAN OMOFRE UNIT 1 TABLE 6-1: COMPONENT COOLING WATER FREA

	itta /	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METROD OF DETECTION	PROAISIONS INHERENT CONDENSATING	BPFECT ON BCCS	ERMARES
	06.4.01.14,	1 HANUAL YALVES, COHHOM PLOW PATH			BICESS CCW FLOW TO BRACTOR	PRRIODIC SURVEILLANCE		STOM TO ECCS FOYDS	PREACTOR SHIELD COOLING COILS. PLOW INDICATION NOT PROVIDED AND VALVES NOT IN LOCKING PROGRAM, THERROOR STSTEM
	06.4.01.14.	2 NAMUAL VALVES, COMMON PLOW PATE	050, 063,065,067,069,		CCM PLOW ISOLATED TO REACTOR	CONTROL BOOM ANNUNCIATION,		NORB FOR ECCS	STORAULIC SALANCE REQUIRED WITH VALVES FULLY OPEN REACTOR SEIELD COOLING REQUIRED TO PREVENT LONG-TERM DEGREATION OF SHIRLD CONCRETE
j -	06.4.01.15.	I CHECE VALVES, COMMON PLOY PATH		NONE (PASSIVE)		PERIODIC TRATING			BURING MORNAL OPERATION  *RCP-A TRENHAL BARRIER  COOLING/SHERGENCY TERRNAL  BARRIER PATE. CCW-001 AND 025
	06.4.01.16.	I CHECE VALVES, CONBOR FLOW PATH		BONE (PASSIVE)		PRRIODIC TRATING			NOT IN 13T PROGRAM SECP-B TERRHAL BARRIER COOLING/EMERGENCY TERRHAL
	06.4.01.11.	1 CRECE VALVES, COMMON PLOW PATE		NOMB (byzalab)		PERIODIC TRATING	· · · · · · · · · · · · · · · · · · ·		BARRIBR PATH. CCW-024 AND 082 NOT IN 187 PROGRAM 18CP-C TREMAL BARRIBR COOLING/BRERGEMOT TREMAL BARRIBR PATH. CCW-002 AND 026 NOT IN 187 PROCRAM
	06.4.02.01.	t MANUAL VALVES, COMMON BOUNDARY		OPRN	DIVERSION OF BOTH TRAINS OF CCM PUMP PLOW AND LOSS OF CCM [NYENTORY	•	SEE TABLE 6-2 FOR DETAILED BOUNDARY VALVE ANALYSIS	*POTENTIAL LOSS OF BOTH TRAINS OF CCW PUMPING BUR TO UNISOLABLE LOSS OF INVENTORY	
					·			THROUGH VALVES WHICE ARE NOT LOCEED CLOSED ON PROVIDED WITH SAFETY RELATED BACKUPS	
İ	06.4.02.01.	2 MANUAL VALVES, COMMON BOUNDARY		CLOSED	NOME	PERIODIC SURVEILLANCE	NOME BEGUIERD	NONE	
	06.4.02.02.	1 CRECE OR RELIEF VALVES, COMMON BOUNDARY		MOSHÝľ (byzálas)		PERIODIC SURVEILLANCE (SURCE TAME MARBUP REQUIREMENTS)		NORE	INCLUDES: PSV-1483, RV-787 (SURCE TAME VAPOR SPACE), RV-721A, 7216, 721C. VACUUM BREAKER AND RELIEF VALVES PREVENT LOSS SOF SURGE TAME IF
-	06.1.03.01.	1 TCV-601A	<u>Valyb</u> /actuatob	OPBN	ECCS LOADS  E-21A, DIVERTING CCW FLOW PROB	CONTROL ROOM INDICATION, PRRIODIC SURVEILLANCE	FLOW PATH ISOLATED BY BLOCK VALVE OR LIMITED BY STEM COLLAR	CCM FLOM BYER  BIRHAM VCCBLIFFE ALLS ONE CCA  LOM LO ECCE FOVDE BEDRIED LO	RCV-605 CLOSES #[INCLUDES PCV-1601A. ONE OF TCV-601A/B ISOLATED BY BLOCE
			•					TYLE VILLEN	COMPIGURATION NOT ACCEPTABLE APTER CTCLE 11 REPUBLING, BUR TO INCREASED SPRMT PURL PIT
:	06.4.03.01.	Z TCV-601A	VALVB/ACTUATOR	CLOSBO	CCM PLOM ISOLATED TO REB MI 8-21A, INCREASING PLOM TO BCCS LOADS		NONE BEGUIEED	NOWE FOR ECCS	BEAT LOAD RHE NOT CERDITED POST-ACCIDENT DUE TO ALIGNMENT VALVE SINGLE PAILURE AND SISTEM EQ
ì									SUSCEPTIBILITIES

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# EMBEGENCY CORE COOLING SYSTEM SINGLE FAILURS AWALTSIS SAN ONOFRE UNIT 1 TABLE 6-1: COMPONENT COOLING WATER PHEA

	TABR 1	DRVICE ID	COMPONENT ID	FAILURE HODE	LOCAL EPPECTS AND DEPENDENT PAILURES	HRTBOD OF Drtrction	SBOATSTONS INBESENT CORESPATING	BPFECT ON BCCS	REMARES
	_06.4.03.02.1	TCV-6014	TC-6014 LOOP	OUTPUT BIGG (VALVE CLOSED)	(\$AHE AS 6,4,3,1.2)	(SARE AS 6.4.1,1,2)	(SAME AS 6.4.3.1.2)	(SANE AS 5.4.3.1.2)	INCLUDES TR-601A, TC-601A,
 	06.4.03.02.2	TCV-601A	TC-601A LOOP	- (AVEAR OSSM)	(SAMB AS 6.4.3.1.1)	(SAME AS 6.4.3.1.1)	(SAME AS 6.4.3.1.1)	(SAMR AS 6.4.3.1.1)	TH-601A, TI-601A AND TH-601A SORE OF TCY-601A/B ISOLATED BY BLOCE VALVE, OTHER FLOW
									LIMITED OF STEM TRAVEL COLLAR. COMPIGURATION NOT ACCEPTABLE APTER CYCLE 11 REPUBLING DUR
	06.4.03.02.3	TCV-6014	TC-601A LOOP	10	TCV-6014 OPENS, CAUSING BICES	S COMBOOL DOOM ENDIONS			TO INCREASED SPENT FUEL PIT
. <del></del>		··· ·/···		<b>-*</b>	CCM PLOM TO MAR HI E-21A AND DIVERTING PLOM POR ECCS LOADS	PERIODIC SURVEILLANCE	OR PLOW LIMITED BY STAN COLLAR	PLOW TO RECURE LOADS BROUGHD TO MINIMUM ACCEPTABLE WITH ONE CCI PUMP AND REDUCED SPRNT FUEL PIT	BLOCE VALVE, OTHER PLOW LIMITED BY STEM TRAVEL COLLAR.
-			··· · ·		· · · · · · · · · · · · · · · · · · ·			BRAT LOAD	CONFIGURATION NOT ACCEPTABLE TO INCREASED SPENT FUEL PIT
	06.4.03.03.1 1	TCV-601A	184	PRESSURE LOW	TCV-601A FAILS OPEN, CAUSING BICESS CCW PLOW TO REE BI B-21A AND DIVERTING PLOW PROM	CONTROL ROOM INDICATION, PERIODIC SURVEILLANCE	OB STOM FINITED BY STEM COFFEE ANTAR INOTATED BY STEM COFFEE	PLOW TO RCCS LOADS REDUCED TO MINIMUM ACCEPTABLE MITM ONE COM PUMP AND REDUCED SPENT PUBL PIT	OF TCV-6014/B ISOLATED BY
_					ECCS LOADS			BEAT LOAD	LINITED BY STEN TRAVEL COLLAR. CONFIGURATION NOT ACCEPTABLE AFTER CYCLE 11 REPUBLING DUE
	06.4.04.01.1.1	TCV-601B	ANTABACTON TOB	OPRW	EICESS CCW PLOW TO RER AI B-218, DIVERTING CCW PLOW PROM BCCS LOADS	CONTROL BOOM INDICATION, PRESONCE SURVEILLANCE	COLLAR OR LIMITED BY STEE	PLOW TO ECCS LOADS REDUCED TO STRINGS ACCEPTABLE WITE ONE COM PURP AND REDUCED SPRET FUEL PIT	TO INCREASED SPENT PUBL PIT BEAT LOAD FINCLUDES PCV-1601B. ONE OF TCV-501A/B ISOLATED BY BLOCK VALVE, OTHER PLOY LIMITED BY
						ting the control of t		CCW PLOW BATE	STRM TRAVEL COLLAR. COMPICURATION NOT ACCEPTABLE AFTER CYCLE 11 REPUBLING, DUE TO INCREASED SPENT PUBL PLT
	06.4.04.01.2 T	CV-6018	VALVB/ACTUATOR	CLOSED	CCW PLOW ISOLATED TO REE BI R-21B, INCREASING PLOW TO BCCS	CONTROL ROOM INDICATION, PERIODIC SURVEILLANCE	NORE BEQUIRED	BOME FOR ECCS	MBAT LOAD RHR MOT CREDITED POST-ACCIDENT DUE TO ALIGNMENT VALVE SINGLE
	06.4.04.02.1 T	CV-601B	TC-601B LOOP	OUTPUT BIGE	LOADS (SAMB AS 6.4.4.1.2)	(SAMB AS 6.4.4.1.2)	(SAME AS 6.4.4.1.2)	(BARR AS 6.4.4.1.2)	PAILURE AND SYSTEM EQ SUSCEPTIBILITIES INCLUDES TE-6018, TC-6018,
*******	06.4.04.02.2 T	CA-6018	TC-601B LOOP	(VALVE OPEN)	(SAME AS 6.4.4.1.1)	(SANR AS 6.4.4.1.1)	(SAHE AS 6.4.4.1.1)	(SANE AS 6.4.4.1.1)	TH-601B, TI-601B AND TH-601B *ONE OF TCV-601A/B ISOLATED BY BLOCK VALVE, OTHER FLOW
* .									LIMITED BY STEM TRAVEL COLLAR. COMPIGURATION MOT ACCEPTABLE APTER CICLE 11 REPUBLING DUB TO INCREASED SPENT PUEL PIT
	06.4.04.02.3 7	ĊA- <b>201</b> 8	TC-601B LOOP	BQ	TCV-5018 OPENS, CAUSING BICESS CCW FLOW TO RER BI E-218 AND DIVERTING FLOW FOM ECCS LOADS			NIKÍNUM ACCÉPTABER WITH ONE CCW PUMP AND REDUCED SPENT PUBL PIT	HBAT LOAD TOMB OF TCY-601A/B ISOLATED BY BLOCK VALVE, OTHER PLOW





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### EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE AWALTSIS SAN OMOPRE UNIT 1 TABLE 6-1: COMPONENT COOLING WATER PHEA

LTRM #	DBAICE ID	COMPONENT ID	PAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METROD OF Detection	PROVISIONS  PROVISIONS	EPPECT ON ECCS	BERTEE
06.4.04.03.1	TC4-6018		PRESSURE LOW	TCY-601B FAILS OPEN, CAUSING BICESS CCW FLOW TO ROR BI B-21B AND DIVERTING PLOW FROM BCCS LOADS	CONTROL BOOM_INDICATION,PREIODIC SURVEILLANCE	OR PLOW LIMITED BY STRM COLLAR	PLOW TO RCCR LOADS REDUCED TO MESIGUM ACCEPTABLE WITH ONE CCW PUMP AND REDUCED SPENT PUBL PIT REAT LOAD	OF TCV-6014/8 ISOLATED BT BLOCE VALVE, OTHER FLOW LIMITED BY STEM TRAVEL COLLAR.
								COMPIGURATION NOT ACCEPTABLE APTER CYCLE 11 REPUBLING DUB TO INCREASED SPENT PUBL PIT BEAT LOAD
06.4.05.01.1		VITAL BUS \$4 (\$-1402Y)	VOLTS LOW			OR PLON LINITED BY STEN COLLAR	PLOW TO ECCS LOADS BEDUCED TO	FORE OF TCY-SOLA/B ISOLATED BY BLOCK YALVE, OTHER FLOW
			_	PROM BCCS LOADS			PUMP AND REDUCED SPENT FUEL PET BEAT LOAD	COMPIGURATION NOT ACCEPTABLE APTER CYCLE 11 REPUBLING DUE
								TO INCREASED SPENT FUEL PIT
06.4.06.01.1.	PC-605 LOOP.	PC-{Q\$	(LO BDB PR838)	AUTO-START SIGNAL TO CCM AND EMBEGENCY TERRNAL BARBIER PUMPS, CAUSING PUMPS TO START AS SOOM AS EXERCITYE BUS	PERIODIC TESTING	POR SIS	POTENTIAL LORS OF TRAIN A AND B BLECTRICAL POWER DUR TO OUT OF SEQUENCE BUS LOADING DURING SISLOP, MONE FOR SIS	UNDERVOLTAGE TRIPS FOR SISLOP
06.4.06.01.2	PC-605 LOOP	PC-605	CONTACTS CLOSED (MORMAL HOR PRESS)	VOLTAGE AVAILABLE AUTO-START SIGNAL ON LOW EDR PRESSURE DISABLED TO CCW AND ENERGENCY THERNAL BARRIER PUMPS, SIS/SISLOP AUTO-START OP G-15A/B UNAPPECTED			REDUCED RELIABILITY OF CCW SYSTEM FOR MON-SIS/SISLOP EVENTS, NONE FOR SIS/SISLOP	NORMAL POSITION. SOUTS CCN PUMP G-15C BOT CREDITED FOR SIS/SISLOP BYRNTS
06.4.06.01.3	PC-605 LOOP	PC-605	19	AUTO-START SIGNAL TO CCW AND BHERGENCY THERMAL BARBIER PUMPS, CAUSING PUMPS TO START	CONTROL BOOK ANNUNCIATION, PERIODIC TESTING	POR SIS	POTENTIAL LOSS OF TRAIN A AND B BLECTRICAL POWER DUS TO OUT OF BROUBNCE BUS LOADING DURING	SHORT OR GROUND) COULD MINIC
				AS BOOM AS RESPECTIVE BUS VOLTAGE AVAILABLE			BISLOP, NORE FOR BIS	UNDSEVOLTAGE TRIPS FOR SISLOP
06.4.06.02.1		PC-605I (RBLAT)	(NORMAL BOR PRESS)	(9AHE AS 6.4.6.1.2)	(SAME AS 6.4.6.1.2)	(SANE AS 6.4.6.1.2)	(9ABB AS 6.4.6.1.2)	
6.4.06.02.2		PC-605I (RELAT)	(LO EDR PRESS)	(SAME AS 6.4.6.1.1)	(SAHE AS 6.4.6.1.1)	(SAHE AS 6.4.6.1.1)	(SANE AS 6.4.6.1.1)	
06.4.06.02.3	PC-605 LOOP	PC-6051 (RBLAT)	IMPUT OPEN OR SHORT	(1.1.3.6.8 BA BHAR)	(SAHE AS 6.4.6.1.1)	(SAMB AS 6.4.6.1.1)	(1.1.3.5.6 BA SHAR)	
06.4.06.02.4	PC-605 LOOP	PC-605I (RBLAY)	GROUND GROUND	AUTOSTART SIGNAL TO CCW AND SHERGENCY THERMAL BARBIER PUMPS, CAUSING PUMPS TO START AS SOOM AS RESPECTIVE BUS	CONTROL ROOM INDICATION, PERIODIC PESTING	POR SIS		ELECTRICAL TRAINS COULD OCCUR MITS PRE-EXISTING GROUND ON BEGATIVE POLE OF DC SYSTEM.
; ; ; ;				VOLTAGE AVAILABLE. PAILURE PARALLELS POSITIVE POLE OF 125VDC CONTROL POWER POR ALL 3 480 V BUSES				TROE SPEC ACTION BUTET REQUIRED WITH DC STSTEM GROUNDED
06.4.06.03.1	PC-605 LOOP	VITAL BUS 84 (8-1415V)	AOTIA FOR	AUTOSTART SIGNAL TO CCW AND EMBEGRACT TERRHAL BARRIER PUMPS, CAUSING PUMPS TO START AS SOOM AS RESPECTIVE BUS VOLTAGE AVAILABLE	CONTROL ROOM INDICATION, PERIODIC TESTING	NORE FOR SISLOP, NOME ERQUIRED FOR SIS	*POTRUTIAL LOSS OF TRAIN A AND B ELECTRICAL POWER DUE TO OUT OF SEQUENCE BUS LOADING DURING SISLOP, NOWE FOR SIS	





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### EMBRGENCY CORE COOLING SYSTEM SINGLE PAILURE AWALTSIS SAN ONOPRE UNIT 1 TABLE 6-1: COMPONENT COOLING WATER PMBA

	DRAICE ID	COMPONENT ID	PAILURS MODE	LOCAL REPRETS AND DRPBNDENT FAILURES	METHOD OF Detection	BECATATORS  LHABBBRAL COMBRANTING	BPFRCT ON BCCS	REMARES
	CV-122A CV-722B CV-722C	VALVB/ACTUATOR	OPRN	CCW FLOW ALIGNED TREOUGR TREEMAL BARRIER COILS FOR RCF-A, B OR C	CONTROL BOOM INDICATION	NOME SEGUTORD	NONE	MORMAL POSITION. INCLUDES SOLEMOID VALVES SY-1722A, 1722B, 1722C AND BAND SWITCHES SS-1722A, 1722B, 1722C. ERMOTE-MANUAL ISOLATION REQUIRED FOR TREMAIL SARRISE
1	CV-722A CV-122B CV-122C	VALVE/ACTUATOR	CLOSED)	CCW FLOW ISOLATED TO TRERMAL BARRIER COIL FOR ECP-A, B OR C		SEAL INJECTION FOR POST-ACCIDENT ECP SEAL INTEGRITY	CCW COOLING LOST FOR BCP-A, B OR C SEAL, SEAL IMJECTION UNAPPECTED	COIL PAILURE ONLY
	CV-122A CV-122B CV-122C	VALVE/ACTUATOR	IQ	CCU FLOW ALIGNED THROUGH THERMAL BARRIER COILS FOR RCP-A, B OR C	CONTROL BOOM INDICATION	NONE BEQUIEED	NONE	SOLEMOID VALUES BT-1722A, 1722B, 1722C NOT EQ. PUSES PROVIDED FOR (b)(2) PROTECTION
	CV-722A CV-722B CV-722C	#17AL BUS #2	VOLTS LOW	CV-722A, B AND C PAIL OPEN, ALIGNING CW PLOW THROUGH THERNAL BARRIER COILS FOR	CONTROL ROOM INDICATION	NONE SECUESED	NORE	OF OTHER CIRCUITS VALVES MORMALLY OPEN, REMOTE-MANUALLY CLOSED FOR THERMAL DARRIER COIL FAILURE
	CV-722A CV-722A CV-722C	<u> 184</u>	bessanbe för	RCP-A, B AND C CV-722A, B AND C FAIL OPEN, ALIGHING CV PLOW THROUGH THREMAL BARRIER COILS FOR RCP-A, B AND C	CONTROL BOOM INDICATION	NOMB BEGNERED	MONE	ONLY 19ALVES MORBALLY OPEN. THIS PAILURE MOULD PREVENT REBOTE-HAMUALLY CLOSING FOR THERMAL BARRIER COIL FAILURE.
			· · · ·					VERIFICATION REQUIRED TEAT PLOW RATE INTO CCW SYSTEM FOR TRIS EVENT IS LESS TEAN LOCA THRESPROLD
06.1.08.01.1	G-961	PUMP/HOTOR	STOM TON	REDUCED EMERGENCY THERMAL BARRIER COOLING PLOW	PERIODIC TESTING	MONE BEQUIRED	HOME FOR ECCS	PUMP NOT CREDITED FOR ECCS
06.4.08.01.8	G-981	PUNP/MOTOR		BOTOR MAY PAULT, RESULTING IN UP TO SOA DRAIM ON 125VDC BUS \$1 BEFORE OVERCURERNY TRIP OF BREAKER		NONS	EPOTENTIAL COMMON-CAUSE LOSS OF TRAIN A 125VDC CONTROL POWER FOR LOCA, NSLS OR FULS. WITS CONCURRENT SINGLE PAILURE OF TRAIN B, RESULTS IN LOSS OF ALL AC POWER	QUALIFIED FOR IN-CONTAINMENT ENVIRONMENT, CIRCUIT NOT ISOLATED ON SIS/SISLOP, EPPECT
06.4.08.02.1	G-964	PC-6051 (RBLAT)	CONTACTS CLOSED (LO BOR PRESS)	EMBRGENCY TEBRNAL BARIER PUMP STARTS APTER 10 BEC DELAY IP C/9 IS IN AUTO	CONTROL ROOM INDICATION	NOME BEGNIESD	NONB	DATION CONTINUES CARACTERIST IN DESIGN BASIS BATTERY CALCULATION
06.4.08.02.2	G-964 	PC-605E (RELAT)	CONTACTS OPEN (NORMAL HDR PRESS)	EMBRGENCY TREEMAL BARRIER PUMP AUTO-START ON LOW BRADER PRESSURE DIRABLED, AUTO-START OM BUS \$10/20 UNDERVOLTAGE (LOP) UNAPPECTED IF C/S IN AUTO	PBBIODIC TESTING	NONE BEGNIEED	NONE POR ECCA	PUMP MOT CREDITED FOR ECCS EVENTS
06.4.08.03.1	G-964	127-51 (UV RBLAT)	CONTACTS CLOSED (ON)	BUS #1C UNDERVOLTAGE SIGNAL TO EMERGENCY TERRHAL BARRIER PUMP AUTO-START CIRCUIT. LOP AUTO-START LOGIC BECOMES 1/1 ON BUS #2C [MPUT		NONE ESCRISSO	MONE	MOTOR OPERATION IS ANALYZED IN DESIGN BASIS BATTERY LOADING CALCULATIONS





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## EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OMOFRE UNIT 1 TABLE 6-1: COMPONENT COOLING WATER FMEA

	ITEM \$	D81	ICR ID	COMPONENT ID	FAILURE MODE	LOCAL BPPBCTS AND DRPBNDENT FAILURES	MRTHOD OF	INSERBNT COMPRESSIONS PROVISIONS	BFFECT ON ECCS	RIMARES
	06.1.08.03.2		•	(UN BELAY)	CONTACTS OPEN (OPP)	BUS SIC UNDERVOLTAGE SIGNAL DISABLED TO BERECENCY TERRHAL BARRIER POWP LOP AUTO-START CIRCUIT, AUTO-START ON LOW	SABLODIC IBSILAC	NOME ESCRISSO	WOME FOR RCCS	NORMAL CONDITION
	06.4.08.04.1			121-61 (UV RBLAT)	CONTACTS CLOSED (ON)	BRADER PRESSURE UNAPPECTED BUS SEC UNDERVOLTAGE SIGNAL TO EMBRGSHCT THERMAL BARRIER PUMP AUTO-START CIRCUIT. LOP AUTO-START LOGIC BROOMS 1/1	CONTROL ROOM ANNUNCIATION	NONE REQUIRED	BORE	MOTOR OPBRATION IS ANALYZED IN DESIGN BASIS BATTERY LOADING CALCULATIONS
	06.4.08.04.2	G-964		121-61 (UV RBLAT)	CONTACTS OPEN {OPP}	DISABLED TO EMBRGENCY THERMAL BARRIER PUMP LOP AUTO-START	PERIODIC TESTING	ROAR BEGNIESD	NOMB FOR ECCS	NORMAL CONDITION
<u> </u>	96 <u>.1.</u> 01.95.1	Ģ-964			VOLTS LOW	CIRCUIT, AUTO-START ON LOW Brader Pressure Unappected Exergency Terrnal Barrier Pump Disabled	CONTROL BOOM INDICATION	NONS BEGILEED	NOBE FOR ECCS	EMBRGENCY TERRNAL BARRIER PUMP NOT CREDITED FOR ECCS EVENTS
·				······································						
	<b></b>			·- · ·		·				
		<del>.</del> .—		· ·					•	
<u> </u>										
				· · · · · · · · · · · · · · · · · · ·						
	···		<u></u>							
										7 70 70 10 1 417 1 1 11 11 11 11 11 11 11 11 11 11 11

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TABLE 6-2: COMPONENT COOLING WATER BOUNDARY VALVE ANALYSIS



## BHREGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN OMOFRE UNIT 1 SOUNDARY VALVE ANALYSIS

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		(SAPRTI	RELATED	ROUNDARY-)	(BAPRTT RELATED BACEUP		(NOW-BAPRTY RELATED MACHIN		
· '	1188 /		NC/AUTO?		TAG #	NC/AUTO		NC/AUTO?	REMARES
							,		
	06.1.01_	CCN-106	CLOSED	MO	NONE		NOTE		DRAIN VALVE ON THE TRAIN A CCU PURP SUCTION LINE.
:									PAID SHOWS NO CAP OR BACKUP.
!	06.1.02	- CCY-336 - CCY-314	CLOSED	MO MO	NONE	#1 00 PB	CAP		DRAIN VALVE ON TRAIN A CCN PUMP DISCHARGE LINE.
	96.1.04		CLOSED	NO	CCN-318	CLOSED	CAP		TRAIN A CCU PUMP CASING UNIT MALVE.
	06.1.05		CLOSED	10	HOME		CAP		DRAIN VALVE FOR TRAIN A CCW MRAT BICHANGER.
,[	06.1.06	CCW-182	CLOSED	MO	NONE		CAP	i	VENT VALUE ON OUTLET LIKE FROM TRAIN A CCW MEAT
i									BICHANGER.
:	06.1.07	CCV-145	CLOSED	NO	NONE		NONE	1	DRAIN VALVE ON SUPPLY LINE TO TRAIN A CCW HEAT
ļ							<u> </u>		BICHANGER. PAID ANOMA NO CAR OR BACKUP.
İ	06.1.08	CC#-181	CLOSED	NO	MOMB		CAP	ı	DRAIN VALVE ON DISCHARGE LINE PRON TRAIN A CCV
j	06.2.01	CCW. 169	CLOSED	MO	MONE		CAB		BEAT BICHANGER
j	06.2.01		CLOSED	. <u>MV</u>	NONE		CAP		DRAIN VALVE ON TRAIN & CCN PUNP.  DRAIN VALVE FOR TRAIN & CCN PUNP DISCHARGE LINE.
;	86.2.83		CLOSED	RO	NONE		CAP	i	VENT VALUE ON SUPPLY LINE TO TRAIN & CCU BEAT
							,	•	BICRANGER.
1	06.2.04	CCT-360	CLOSED	NO	NONE		CAP		VENT VALVE FOR TRAIN & CCU BEAT EICHANGER.
	06.2.05	CCW-35#	CLOSED	NO	NONE		CAP	i	DRAIN VALVE ON TRAIN B CCV BRAT BICHANGER.
:	06.2.06	CCA-380	CLOSED	NO.	NONE		MONE		DRAIN VALVE ON OUTLET CON LINE FROM TRAIN & CON
•									HEAT BICHANGER. PAID SHOWS NO CAP OR BACKUP.
	46.2.07	CCA-344	CLOSED	MO	MONE		MONE	ı	DRAIN VALVE ON SUPPLY LINE TO TRAIN & CCW BEAT
,	06.2.08	CCH 316	OPBN		00H 31A				BICHANGER. PAID SHOWS NO CAP OF BACKUP.
1	06.3.01		CLOSED	NO NO	RONE CCA-313	CLOSED	CAP		TRAIN 8 CCW PUMP CASING VENT DRAIN VALUE ON TRAIN C CCW PUMP SUCTION LINE.
	06.3.02		CLOSED	NO	NONE	4	CAP	;	DRAIN VALVE ON TRAIN C CCW PUMP DISCRARGE.
	06.1.01		CLOSED	10	CCV-317	OPEN	UAI .		CASING VENT VALVE FOR TRAIN C CCW PUMP CASING
	06.4.01		CLOSED	NO	NOME	****	BCV-605, CCW-355 AND CCW-356		SURGE TAME FILL MANIFOLD INCLATION. BCV-605
! :								•	AUTO-CLOSES ON MIGH RADIATION SIGNAL PROM RE-1217.
İ									REMAINING BACEUP VALVES ARE NORMALLY CLOSED
	06.4.02	CCN-378	CFOSED	<b>M</b> O	NOME		CAP	1	SAMPLE VALVE ON LINE BETWEEN SURGE TAME AND CCW
} <b>-</b>					There are the second se				PUMP SUCTION READER
.]	06.4.03	CC8-373	CLOSED	RO	NONE		PMU-325	CHICK	CONNECTION DETWEEN CCW AND PRIMARY MARRUP WATER
	06.1.01	CCW. 181	CLOSED	NO	NONB		CAP		STSTEM.
<u> </u>			CLUBBD				CAF		RECIRCULATION WEAT NICHANGER
1	04.4.05	CCV-394	CLOSED	MO	MORE		MONE	1	DRAIN VALUE ON RETURN LINE PROM RECIRCULATION HEAT
		••••						·	BICHANGER. PAID SHOWS NO CAP OR BACEUP.
	06.1.06	CCN-504	CLOSED	NO	RONS		MONE		DRAIN TO MOLDUP TANK RLC-C-20A VAULT. PAID SHOWS
1									NO CAP OR BACRUP.
ļ	06.4.07	CCU-391	Crosto	¥0	NONE .		MONE		VENT LINE ON STPASS ABOUND CV-731A AND B. PAID
									SHOWE NO CAP OR BACKUP.
Ţ	06.4.08	CCA-202	CLOSED	NO	NONB		MONE		DRAIN VALVE ON RECIRCULATION REAT RICHANGER. PAID
` <b></b> -	06.4.09	CCW 100	CLOSED	NO	MAND		NAMB		SHOWS NO CAP OR BACKUP.
F	tv.F.ev	CC#-100	CINGBB	μU	NONB		MOME	•	VENT VALVE ON RETURN LINE PROM SPENT PUBL POOL. PAID SHOWS NO CAP OR BACKUP.
t	06.4.10	CCY-3AA	CLOSED	NO	MONB		MONR		DRAIN VALVE ON CCV SUPPLY LINE TO SPENT FUEL POOL
								- ·	HEAT BICHANGER. PAID SHOWN NO CAP OR BACEUP.



## EMERGENCY CORE COOLING STOTEM SINGLE FAILURE ANALYSIS SAN ONOPER UNIT 1 BOUNDARY VALVE ANALYSIS

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ITEM #		MC/AUTO?		CSAPITT BELATED BACEUP-	NC/AUTO?	. TAG 1	MC/AUTO?	REMARKS
				•,		. The f		
.06-1-11	CCN-101	CLOSED	NO	NONE				DRAIN VALVE ON RETURN CCU LINE FROM SPENT FUEL
								BEAT EXCHANGES. PAID SHOWS NO CAP OR BACKUP.
VD.1.14	UNE MARDLE	CLORED	MO	CCM-340, DWE MEEDLE	OPS# NOME			NEEDLE VALVE AT PI-605D. NO TAG NUMBER SHOWN ON PAID, BACEUP IS COMMON ROOT VALVE FOR PC-605
06.4.13	UNE GLOBES	CLOSED	NO	NOME	MONE			DRAIN VALVES AT LC-610A, LC-610B, LG-610. NO TAG
06.4.14	CCW-494	CLOSED	NO	NORE	NONE			NUMBERS SHOWN ON PAID SEAL WATER HI SUPPLY LIME VENT VALVE. PAID SHOWS
	····					er - 141 til de fillet dille i i tille de miner til de filletente overheidellige dille terdene		NO CAP OR BACKUP
06.4.15	CCA- 113	CLOSED	NO	NOME .	EMOR			SEAL WATER HE SUPPLY LINE DRAIN VALVE. PAID SHOWS NO CAP OR BACKUP
06.4.16	CCV-414	CLOSED	NO	NONE	MONE	· · - · · · · · · · · · · · · · · · · ·		SEAL WATER AT SUPPLY LINE WENT VALUE. PAID SHOWS
AC 4 19	CCW 113	et oeen	No.	MAMP	MONA			NO CAP OR BACEUP
16.4.11	voi-1!!	Crossp	NO	inoin	MONS			SRAL MATER BY SUPPLY LINE VENT VALVE. PAID SHOWS NO CAP OR BACKUP
6.4.18	CCW-420	CLOSED	NO	NONE	RONS		1	SEAL WATER HE SUPPLY LIBE DRAIN VALVE. PAID SHOWS
6.4.19	CCV-496	CLOSED	NO	MONE	NOME			NO CAP OR BACKUP STAL WATER SI SUPPLY LINE WENT VALVE. PAID SHOWS
			77		<u>-</u>			NO CAP OR BACKUP
6.4.20	CCN-111	CLOSED	NO	MONE	NONS			RML SUPPLY LINE VEHT VALVE. PAID SHOWS NO CAP OR BACRUP
6.4.21			MO	CAP				RWL SUPPLY CONNECTION, SPARS
6.4.22 6.4.23		CLOSED	NO	CAP NONE				RUL RETURN CONNECTION, SPARE
6.4.24		CLOSED	BO	NONE	CAP CAP		i	RCP-A SUPPLY LINE VENT VALVE
6.4.25	CCN-005	CLOSED	<b>NO</b>	NONE	NOMB	v		ECP-A SUPPLY LINE VENT VALVE. PAID SHOWS NO CAP OR
6.4.26	CCW-013	CLOSED	NO	NOME	CCW-015		CLOSEO #	BACEUP RCP-A RETURN LINE WENT VALVE
6.4.21		BELLEP		NOME SEGUISED				RCP-A TREEMAL BARRIER COIL RELIEF VALVE
6.4.28 6.4.29			NO NO	NORE	NOME CAP			RCP-A RETURN LINE DRAIN VALVE
6.4.30			NO	NORE	CAP		-	SCL-S SELICH FINE ASML AVER
1.1.31			NO	NONE	CAP		•	ECP-B RETURN CINE DRAIN VALVE
6.4.32	CCA-618	CLOSED	NO	NONB	NONE		ı	RCP-B RETURN LINE VENT VALVE. PAID SHOWS NO CAP OR BACKUP
6.1.33	CC#-094	CLOSED	NO	NONB	NONB			RCP-B RETURN LINE VENT VALVE. PAID SHOWS NO CAP OR
6.4.34	2V-721A	RELIEP		NONE REQUIRED				BACKUP RCP-B THERMAL BARRIER COIL RELIEF VALVE
6.4.35			ĬO	NORS	MOME		t	BCP-B ERTURN LINE DRAIM VALVE. PAID SHOWS NO CAP
6.4.36	CCW-190	CLOSED	MO	NOMB .	010			OR BACEUP
6.4.31			NO	NONE	CAP			RCP-B RETURN LINE VENT VALVE RCP-C SUPPLY LINE VENT VALVE
6.4.38	CC#-001	CLOSED .	NO	NOME	CAP		i	RCP-C SUPPLY LINE DRAIN VALVE
6.4.35	CCA-008	CLOSED	NO	NORB	NONB			RCP-C SUPPLE LIME VENT VALVE. PAID SHOWS NO CAP OR BACKUP
	CCW-014	CLOSED	NO	NONE	NOMB			RCP-C RETURN LINE VENT VALVE. PAID SHOWS NO CAP OR





## EMBEGBNOT CORE COOLING STATEM SINGLE FAILURE ANALTHIS SAM ONOFRE UNIT 1 BOUNDARY VALVE ANALTHIS

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		(SAPETE	RELATED	BOUNDARY-	) (				)	e e e e e e e e e e e e e e e e e e e
	ITRM #	TAG #	MC/AUTO?	LOCEBD?		TAG #	NC/AUTO?	TAG \$	NC/AUTO?	RBMARES
1			·						·	•
İ										
1400-4		.BY-1210			NONE BEGAISED		<u></u>			RCP-C THERMAL BARRIER COIL RELIEP VALVE
	06.4.42	CCT-020	CLOSED	NO	MONE		ROAB			RCP-C RETURN LINE DRAIN VALVE. PAID SEOWS NO CAP
;	06.4.43_	CCH. 445	CLOSED	MO	MVMB				_	OR BACRUP
ļ	06.4.44		CLOSED		NONE		CAP NOWE			BCP-C RETURN LINE VANT VALVE
	06.4.45	-	CLOSED	NO .	HOME		MONE			BICASS LETDOWN BI SUPPLY LINE DRAIN VALVE
.!	06.4.46		CLOSED	NO	HOME		HONE			BICESS LETDOWN BE SUPPLY LINE DEALE VALUE
	06.4.47	· · · · · · · · · · · · · · · · · · ·	CLOSED	NO	NONE	****	ROM			BICRSS LETDOWN BI RETURN LINE VENT VALVE
!	06.4.48	CCN-013	CLOSED	NO	NONE		NOME			SICESS LETDOWN HE RETURN -LINE DRAIN VALUE
	06.4.49	CCV-451	CLOSED	MO	MONE		CAP			BICESS LETDOWN BE RETURN LINE DRAIN VALVE
	06.4.50	CCT-452	CLOSED	NO	MONB		CAP		i-	BICESS CELDOAN ES BESABA FINE ASMA AVEA
1	06.4.51	CCW-471	CLOSED	MO			HOME			BICROS LETDOWN BE RETURN LINE VENT VALVE. PAID
·L									·	SHOWS NO CAP OR BACEUP
į	06.4.52	CCV-412	CLOSED	NO			MONE			RICESS LETDOWN BY RETURN LINE DRAIN VALVE. PAID
.'										SHOWS NO CAP OR BACKUP
<u></u>	06.4.53	CCV-175	CLOSED	MO			RORE		1	RICESS LETDOWN EI RETURN LINE VENT VALVE. PAID
1										SECHS NO CAP OR BACKUP
Ì	06.4.54		CLOSED	MO			CAP			RER BY 8-218 SUPPLY LINE VENT VALVE
`	06.4.55	CCW-019	CLOSED	NO	_		HOME			RER BY B-218 SUPPLY LINE DRAIN VALVE. PAID SHOWS
i										NO CAP OR BACKUP
i	06.4.56	CC#-007	CLOSED	MO	NONB		HOMB			RER MI E-218 RETURN LINE DRAIN VALVE. PAID SHOWS
<del></del>										NO CAP OR BACRUP
1	06.4.57		CLOSED	MO	MONE		CAP			REE AS 8-518 BELOEN TIME ABUL AVEAS
1	06.4.58		CLOSED	NO	NONE		CAP			BAB HS 8-51V ENABLY FINE ARMA AVTAR
`ļ	06.4.59	CCU-048	CLOSED	NO	NONE	er e e e	NONE			RHR HI 8-214 SUPPLY LINE DRAIN VALVE. PAID SHOWS
ار				***						NO CAP OR BACEUP
Ì	06.4.60	CCM-012	CTOSED	<b>#</b> 0	NONE		HONE			RER BY 8-214 RETURN LINE WENT WALVE. PAID SHOWS NO
	06.4.61	CCH 153	CLOSED	NO	MOVE					CAP OR BACRUP
	06.4.62		CLOSED		NONE		CAP			BUR MI B-21A RETURN LINE VENT VALVE
1	06.4.63		CLOSED	NO No	NOME		CAP			BRACTOR SRIELD COOLING COIL SUPPLY LINE VENT VALVE
		CC8-110	CEOSER	BU	NONE		CAP		!	REACTOR SHIELD COOLING COIL SUPPLY LINE DRAIN
.	06.4.64	CCW-874	CLOSED	MC	NONE		MOME			VALVE
!	*******	008-413	000100		NVP3		PURE		•	REACTOR SHIELD COOLING COIL SUPPLY LINE DRAIN
.	06.4.65	CCW-080	CLOSED	MO	NONE		HOME		<del></del>	VALVE. PAID SHOWS NO CAP OR BACKUP
	•••••	••••	000000		2012		PURE	•	•	REACTOR SHIELD COOLING COIL SUPPLY LINE DRAIN
.[	06.4.66	CCM-081	CLOSED	MO	MONE		MONR			VALVE. PAID SHOWS NO CAR OR BACKUP REACTOR SHIELD COOLING COIL RETURN LINE DRAIN
·										VALVE. PAID SHOWS NO CAP OR BACKUP
1	06.4.67	CCW-078	CLOSED	110	MONE		MOMB			REACTOR SHIELD COOLING COIL RETURN LINE DRAIN
1					<del>-</del>		242		•	VALVE. PAID SHOWS NO CAP OR BACKUP
1	06.4.68	CCV-498	CLOSED	NO	MONB		NONE			REACTOR SHIELD COOLING COIL RETURN LINE VENT
1					-				•	VALVE. PAID SHOWS NO CAP OR BACKUP
1	06.4.69	CCW-499	CLOSED	NO	NONE		MONE		1	REACTOR SHIELD COOLING COIL RETURN LINE DRAIN
					• •					VALVE. PAID SHOWS HO CAP OR BACKUP
	06.4.70	CCV-191	CLOSED	NO	NONB		MONB			REACTOR SHIELD COOLING COIL RETURN LINE VENT
									•	VALVE. PAID SHOWS NO CAP OR BACKUP
			•							The state of the s





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## EMBEGENCY CORS COOLING STSTEM SINGLE FAILURE AWALTSIS SAM OMOPRE UNIT 1 BOUNDARY VALVE AWALTSIS

(SAPBTY BBLATED BOUNDARY-) (	TAG D	BC/AUTO?	TAG #	MC/AUTO?	REMARES
6.4.71 _CCM-493CLOSEDNO ROWB				SCCW RETURN OR BACEUP	. ARADER. SAMPLE YALVE PAID .SHOVS . NO . CAP
····		·			
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	o mater 11 -				
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SECTION 7: SALTWATER COOLING

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#### SALTWATER COOLING NOTES

- 1. Item numbers in this section have been assigned as follows:
  - 07.1: Train A SWC pumping, valves and boundary devices
  - 07.2: Train B SWC pumping, valves and boundary devices
  - 07.3: Auxiliary SWC pumping, valves and boundary devices
  - 07.4: Common flow path and boundary devices.
- 2. Table 7-1 is the Failure Modes and Effects Analysis (FMEA) for the SWC function. Table 7-2 is the associated boundary valve analysis.
- 3. Potential single failure susceptibilities in the FMEA table are flagged with "\*" as the first character of the associated ECCS EFFECTS field. Other open items (eg. required procedure or calculation changes) are flagged with "\*" as the first character of the REMARKS field.
- 4. Potential single failure susceptibilities in the Boundary Valve Analysis table are flagged with "\*" in the unlabelled field adjacent to REMARKS. Items flagged with "#" in the unlabelled field adjacent to REMARKS are acceptable from a single failure standpoint subject to credit for SEP Topic III-6 seismic boundary criteria.

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#### SALTWATER COOLING SYSTEM REFERENCES

Piping and Inst	rumentation Diagrams
5178330	Circulating Water System (Sh 1)
5178331	Circulating Water System (Sh 2)
5178350	Salt Water Cooling System
5178380	Service and Domestic Water System (Sh 1)
Elementary Diag	
455378	MOV-720A, MOV-720B
455513	MOV-9, MOV-11, MOV-12
455514	MOV-10
5149919	Salt Water Cooling Pumps G-13A, G-13B
5149975	Lockout Relays, Train B SISLOP
5150354	Auxiliary Salt Water Cooling Pump
5150885	480 V Bus Undervoltage Relays
Procedures	
SO1-1.0-23	Transfer to Cold Leg Injection and Recirculation
SO1-2.4-1	Loss of Saltwater Cooling System
S01-7-11	Saltwater Cooling System
SO1-14-40	Control of Locked Valves
SO1-V-2.15	Inservice Testing of Valves Program
Ohban' Barraraha	
Other Documents	
SD-S01-330	System Description: Component Cooling Water
	System
SD-S01-340	System Description: Saltwater Cooling System
SD-S01-580	System Description: Safety Injection,
	Recirculation and Containment Spray Systems
M89048	Response to Generic Letter 88-14, "Instrument Air
	Supply System Problems Affecting Safety Related

Systems", dated July 5, 1989

Supply System Problems Affecting Safety Related

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TABLE 7-1: SALTWATER COOLING FMEA



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## EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT ! TABLE 7-1: SALTWATER COOLING SYSTEM FMEA

	ITEM #	DBAICE ID	COMPONENT ID	FAILURE MODE	LOCAL SPEECTS AND DEPENDENT FAILURES	MRTBOD OF DRTECTION	INBERENT COMPRESATING PROVISIONS	RPPRCT ON BCC2	SSATSG
		MANUAL VALVES, TRAIN A FLON	······································	OPEN	POTENTIAL RUN-OUT OF TRAIN A SWC PUMP IP SWC-304 MOT TREOTTLED TO ( 3500 CPM	LOCAL INDICATION, PRRIODIC_	ADMINISTRATIVELY CONTROLLED VALVE LOCKING TO PRECLUDE FAILURE, REDUNDANT TRAIN	POTRUTTAL INOPERABILITY OF TRAIN A SWC	NORMAL POSITION INCLUDES: SUC-380, 302, 304. SERVICE WATER SUPPLY TO SUC PUMP BRARINGS (SUC-306, 310, 312)
	A9 4 A1 A1 A	HANNET WATERS		· atáana ·					NOT REQUIRED FOR LONG-TERM POST-ACCIDENT SERVICE IF ALTERNATE COOLING PROVIDED
		TRAIN A PLOY CRECE VALVES,		MOME (SVERIAE)	TRAIN A SUC PUMP OR CCU BRAT	TESTING LOCAL INDICATION, PERIODIC	REDUKDANT TRAIL	INOPERABILITY OF TRAIN A SUC	INCLUDES SUC-382
   	07.1.02.01.1	TRAIN A PLON MANUAL VALVES, TRAIN A ROUNDART	'	OPEN	LO SCREIN AVEN SISLEM OF DIABBBION OL LBVIN V RAC LFOR	TESTING PERIODIC SURVEILLANCE	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A SUC, POTENTIAL INTARE AREA PLOODING	
<u></u>	A2 1 A2 A1 2	MARINE WATER			ATHORPHERS, OR DYPASS OF TRAIN A SUC MI				EXPANSION JOINT PAILURE. SEE TABLE 7-2 POR DETAILED BOUNDARY VALVE ANALYSIS
		MANUAL VALVES, TRAIN A BOUNDARY CRECE OR BELIEF		MORNAL (PASSIVE)	NORB	PERIODIC SURVEILLANCE	NONE BEGNIEED  NONE BEGNIEED	NOME. APPLICABLE VALVES PROVIDE	INCLUDES RY-59
	07.1.03.01.1	VALVES, TRAIN A BOUNDARY G-13A	PUMP/MOTOR	LOW PLOW	· · · · · · · · · · · · · · · · · · ·	PERIODIC TESTING	REDUNDANT TRAIN	THERMAL RELIEF PROTECTION OF CCW HEAT RECHANGERS IMPPERABILITY OF TRAIN A SUC	
	07.1.03.02.1		SWGR #1 (52-1114)	OPBN	CCW MI TRAIN A SWC PUMP FAILS TO START OR TRIPS APTER STARTING	PBRIODIC TESTING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A SUC	NORMAL POSITION FOR STANDBY SERVICE
	01.1.01.02.2	G-13A	8VGR #1 (52-1114)	CLOSED	TRAIN A SUC PUMP STARTS OR FAILS TO TRIP, RESULTING IN OUT OF SEQUENCE BUS LOADING	CONTROL BOOM INDICATION	REDUNDANT TRAIN FOR SISLOP, NOME REQUIRED FOR SIS	POTENTIAL LOSS OF TRAIN A RESCRECAL POWER DOR TO OUT OF SEQUENCE BUS LOADING DURING	MORMAL POSITION WITH TRAIN A SUC IN OPERATION
	07.1.03.03.1	G-13A	SV-81	OPBN (OB)	POR BISLOP NOMB	COCAL INDICATION	NOME BEGULEED	SISLOP, NOUS FOR SIS	SERVICE WATER (SOLATION TO TRAIN A SWC PUMP BEARINGS.
									NORMAL POSITION IS OPEN SITE PUMP RUMNING. SOLEMOID VALUE WIRED ACROSS 2 OF 3 PUMP MOTOR
	07.1.03.03.2	G-13A	8V-81	CLOSED (OPP)	POTRNTIAL LONG-TERM DRGRADATION OF TRAIN A SUC	LOCAL INDICATION, PERIODIC TESTING (OF PUMP)	REDUNDANT TRAIN	POTENTIAL INOPERABILITY OF TRAIN A SWC	PBASES
	07.1.03.03.3	G-13A	9V-81	SHORY/GROUND	PUMP BRABINGS DURING MORNAL OR POST-ACCIDENT OPERATION LOSS OF TRAIN A SMC PUMP DUR TO OVERLOAD TRIP RESULTING	CONTROL BOOM INDICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A SWC	
			·		PROM FAULT ACROSS THE MOTOR PHASES WHICH POWER SOLEMOID VALVE	•			
	07.1.03.04.1	G-13A	889 1 (29-1,3)	CONTACTS OPEN (OFF)	TRAIN A SWC PUMP AUTOSTART ON 818/91810P DISABLED, OTBER AUTO-START SIGNALS AND MANUAL START/STOP UNAPPECTED	PBRIODIC TESTING	REDUNDANT TRAIN	INOPERABLLITY OF TRAIN A SWC FOR INJECTION, INITIAL RECIRC	NORMAL POSITION. SIS/SISLOP AUTO-START DORS NOT REQUIRE PUMP CONTROL SWITCH IN AUTO



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### EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OMOPRE UNIT 1 TABLE 7-1: SALTWATER COOLING SYSTEM FMEA

	[TBH	DBAICE ID	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT FAILURES	DETECTION METROD OF	INHERRNY COMPRHENTING PROVISIONS	EPPECT ON ECCE	RRHARES
	1. <b>03.04.2</b> G	-111 <u>.</u>	889 1 (29-1,3)	CONTACTS CLOSED (ON)	TRAIN A ANC PUMP AUTO-STARTS, CANNOT BE MANUALLY TRIPPED. UV TRIP UNAPPECTED		REDUNDANT TRAIN FOR SISLOP,	POTENTIAL INOPERABILITY OF TRAIN A SLECTRICAL POWER DUE TO OUT OF SEQUENCE BUS LOADING FOR SISLOP, MORE FOR SIS	RELOADING APTER DG REEWERGIZES
	1.03.05.1 G		63 (52-1214 LOW DISCH PRESS RELAY)	(077)	TRAIN A SWC PUMP AUTO-START ON G-13E LOW DISCHARGE PRESSURE DISABLED, NO EFFECT ON		NOME SECULES DE SISTATOP	REDUCED RELIABILITY OF TRAIN A SWC POR NON-SIS/SISLOP SVENTS, NONE POR SIS/SISLOP	
97.1	1.03.05.2 G	-134	63 (52-1214 LOW DISCH PASSS BELAT)		SIS/SISUOP AUTO-START TRAIN A SWC PUMP AUTO-STARTS IF IS AUTO		REDUMBANT TRAIN FOR SISLOP, NOW REQUIRED FOR SIS	TRAIN A BLECTRICAL POUR DUR TO OUT OF REQUENCE BUS LOADING FOR SISLOP, NOME FOR SIS	
07.1	1.03.06.1 G		86 (52-1214 OVLD 	CONTACTS OPEN (OFF)	TRAIN A SWC PUMP AUTO-START ON G-138 OVERLOAD OR BUS UNDERVOLTAGE DISABLED, NO RFFECT ON SIS/SISLOP	• • • • • • • • • • • • • • • • • • • •	(SANE AS 7.1.3.5.1)		CLOSURE
	1.03.06.2 G		86 (52-1214 OVLD BRLAT)	(ON)	AUTO-START (SANK AS 7.1.3.5.8)	(SAME AS 7.1.3.5.2) .	(SAME AS 7.1.3.5.2)	·	*(SAME AS 1.1.3.5.2)
97.1 !	1.03.Q7,1,G	-174	UV RELAY)	(OPP)	TRAIN A SUC PUNP NILL NOT TRIP ON SUGR \$1 UNDERVOLTAGE	PRRIQUIC TRATING	NONE SECULES FOR SIS	POTENTIAL LOSS OF TRAIN A BLECTRICAL POWER DUE TO OUT OF SEQUENCE BUS LOADING FOR SISLOP, NOWE FOR SIS	
	1.03.01.2 G	- "	27-112 (UV RILAT)	CONTACTS CLOSED (ON)		PERIODIC TESTING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A SUC	
91.1	1.01.01.1_G	-134	53 (52-1114 LOW DISCH PRESS BELAT)	O <b>N</b>	TRAIN A SUC PUMP LOW DISCHARGE PRESSURE AUTO-START SIGNAL TO G-13B, NO EPPRCT ON TRAIN A SUC	CONTROL BOOK INDICATION	REPUNDANT TRAIN (A) POR SISLOP, MONE REQUIRED POR SIS	BLECTRICAL POWER DUE TO OUT OF	INCLUDES PS-38. CIRCUIT ASHED ST RELAT 62 (TDC) 3-SEC AFTER TRAIN A SWC PUMP BREE CLOSES
07.1	1.03.04.2 G	-114	63 (52-1114 LON DISCH PRESS RELAT)	OFF	TRAIN A SWC PUMP LOW DISCHARGE PRESSURE AUTO-START SIGNAL DISABLED TO G-13B, NO SPPECT	PERIODIC TESTING	NONE SECULERY LOS SIS/SISTOL	REDUCED RELIABILITY OF YRAIN B SUC FOR NON-SIS/SISLOP EVERTS, NONE FOR SIS/SISLOP	MORNAL POSITION
07.1	1.03.09.1 G	-134	86 (52-1114 OVLD RELAT)	OM .	ON TRAIN A SUC TRAIN A SUC PUMP TRIPS AND CANNOT BE RESTARTED, SENDS AUTO-START SIGNAL TO G-13B	CONTROL ROOM INDICATION	NONE SISLOP, REDUNDANT TRAIN POR 519	POTENTIAL CONCURRENT LOSS OF	OUT OF AUTO OR BUS VOLTAGE CALCULATIONS REVISED TO CONSIDER SWC PUMP START
07.1	1. <u>0</u> 3.09.2 G	-134	86 (52-1114 OVLD	088	TRAIN A SUC PUMP OVERLOAD AND	(SANB AS 7.1.3.8.2)	(SAMR AS 1.1.2.8.2)	(SISTOS ONTA)	NORMAL POSITION
07.1	1.03.10.1 G	134	•	OM	SIGNAL DISABLED TO G-13B AUTO-OPEN SIGNAL TO MOV-720B, DIVERTING CCW FLOW FROM COMMON BRADER THROUGH TRAIN A CCW HI. REDUCES CCW COOLING CAPACITY IF TRAIN A SWC PUMP NOT RUNNING		TRAIN A SUC PUMP TO RESTORE COOLING FOR NON-SIS/SISLOP EVENTS W/ TRAIN B SUC PUMP RUNNING. NONE REQUIRED FOR SIS/SISLOP OR M/ TRAIN A SUC PUMP RUNNING	REDUCTION OF CCW ARAT REMOVAL CAPACITY FOR NOW-SIS/SISLOF EVENTS W/ TRAIN B SWC PUMP RUNNING, NOME FOR SIS/SISLOP OR B/ TRAIN A SWC PUMP RUNNING	NORMAL POSITION WITH TRAIN A



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	ITBN \$	DRAICS ID	COMPONENT ID	PAILURE HODE	LOCAL EPPECTS AND DEPENDENT FAILURES	MRTROD OF	INHERENT COMPRISATING	RPFRCT ON ECCS	BENARES
il						and the desired and the section of t			
	_ 07,1,03.10.1	l G=13A	(RBLAT)		AUTO-OPEN SIGNAL TO MOY-7208 DISABLED, PREVENTING AUTOMATIC ALIGNMENT OF TRAIN A CCW BE	PBRIODIC_TRATING	REDUNDANT TRAIN FOR INJECTION, INITIAL RECIRCULATION	INOPERABLISTY OF TRAIN A	SAC BARD IN STANDS SERVICE
,		LG-134	SERVICE WATER .	PRESSURE LOW,		CONTROL BOOM INDICATION	NONR. BACKUP BRANKING COOLING	POTENTIAL INCREMABILITY OF SMC FOR LONG-TERM POST-SIS/SISLOP	SCORRON-CAUSE FAILURE HAT OCCUR BUE TO POSTULATED
					PUMP BRABINGS, POTENTIAL SALTMATER BACEPLOW THROUGH		POST-SIS/SISLOP OPRBATION	OPERATION	CONCURRENT SEISHIC EVENT. BACKUP BEARING COOLING STEPS
l I					NON-SRISHIC LINES POST-SIS/SISLOP				REQUIRED IN BOLA. ALSO, PAILURE REDUCES PUMP OUTPUT UNTIL BOUNDARY VALVES LOCALLY
,   .					· <del>- /</del> · · · · · · · · · · · · · · · · · ·				CLOSED, SO THAT PUMP IST REQUIRED WITE BACKPLOW COMDITIONS
	07.1.03.12.1	G-134	SUGR #1 125VDC CONTROL POWER	NOTES FOR	TRAIN A SUC PUMP CANNOT BE STARTED OR TRIPPED, TRAIN A LOW DISCEARGE PRESSURE,	CORTROL BOOK INDICATION	REDUNDANT TRAIN (VITE MANUAL START CAPABILITY FOR NON-SIS/SISLOP SYENTS)	INOPERABILITY OF TRAIN A SUC, REDUCED RELIABILITY OF TRAIN S SUC POR NON-SIS/SISLOP BYENTS	
. i					OVERLOAD AND BUS UNDERVOLTAGE AUTO-START SIGNALS TO G-138 DISABLED			,	
	07.2.01.01.1	TRAIN B PLON		OPRN	POTRUTTAL RUN-OUT OF TRAIN B SWC PUMP IF SWC-303 MOT TRROTTLED TO < 3500 GPM	LOCAL INDICATION, PERIODIC TESTING	ADMINISTRATIVELY CONTROLLED VALVE LOCKING TO PERCLUDE PAILURE, REDUNDANT TRAIN	POTRUTIAL INOPERABILITY OF	NORMAL POSITION. INCLUDES: SWC-379, 301, 303. SERVICE WATER SUPPLY TO SWC PUMP
', 									BEARINGS (SUC-307, 311, 313) NOT REQUIRED FOR LONG-TERM POST-ACCIDENT SERVICE IF
!		HABUAL VALVES, TRAIN B PLON		CLOSED	TRAIN B SUC PUMP OR CCW BRAT BICHANGER ISOLATED	LOCAL INDICATION, PRRIODIC TRATEING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B SWC	ALTERNATE COOLING PROVIDED
  -  -		CHRCE VALVES, TRAIN B FLOW		NOME (BY32[AE)	ALUBRATAN AR BRITIS A ANA STAN	LOCAL INDICATION, PERIODIC TESTING	8881748 1 4 8 <b>6</b> 8 4 7 M		INCLUDES SUC-381
	97.2.02.01.1	TRAIN B BOUNDA		OPEN	DIVERSION OF TRAIN B SWC FLOW TO SCREEN WASH SYSTEM OR ATMOSPHERE, OR BYPASS OF TRAIN B SWC BI	ARRIODIC ANKABILITABLE	BROUNDAMY TRAIN	INOPERABILITY OF TRAIN 8 SEC. POTENTIAL INTARE AREA FLOODING	BEPAUSION JOINT PAILURE. SBB TABLE 1-2 FOR DETAILED
	07.2.02.01.1	HANUAL VALVES, TRAIN B BOUNDA	87	CLOSED	NONE	PERIODIC SURVEILLANCE	MONE BEGULEED	HONE	BOUNDARY VALVE ANALYSIS
	01.2.02.02.1	CHECE OR RELIE VALVES, TRAIN BOUNDARY	P	NORMAL (PASSIVE)	NORE	PERIODIC SURVEILLANCE	NOME BEGLIEBD	NOME. APPLICABLE VALUES PROVIDE TERRNAL BELIEF PROTECTION OF CCW BEAT EXCHANGERS	INCLUDES SA-28
	07.2.03.01.1		PUNP/NOTOR	FOR BFOR	REDUCED TRAIN 8 SWC PLOV TO	PBRIODIC TRATING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B SWC	
	01.2.03.02.1	G-13B	SWGR #2 (52-1214)	OPBN	TRAIN B SWC PUMP PAILS TO START OR TRIPS APTER STARTING	PBRIODIC TESTING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B SWC	NORMAL POSITION FOR STANDST
! ! 	07.2.03.02.1	C G-13B	SWGR #2 (52-1214)	CLOSED	TRAIN B SWC PUMP STARTS OR FAILS TO TRIP, RESULTING IN OUT OF SEQUENCE BUS LOADING FOR SISLOP	CONTROL BOOM INDICATION	REDUNDANT TRAIN FOR BISLOP, NONE BEQUIRED FOR BIS	POTENTIAL LOSS OF TRAIN B BLECTRICAL POWER DUE TO OUT OF SEQUENCE BUS LOADING DURING SISLOP, NOWE FOR SIS	BORNAL POSITION WITH TRAIN B SWC IN OPERATION



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## EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE AMALTSIS SAM OMOPRE UNIT 1 TABLE 7-1: SALTWATER COOLING SYSTEM PREA

ITEM #	DRAICE ED	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT PAILURES	DETECTION .	INTEREST CONFENSATING PROVISIONS	EFFECT ON BOCS	BEHARES
01,2.03,03,1 <u>G</u>	-138	84-65	OPBM	HONE	FOCAT INDICATION	NONE BEGNIESD	NON B	SERVICE WATER ISOLATION TO TRAIN 8 SUC PUMP SEARINGS.
	····		108)					MORMAL POSITION IS OPEN WITH PUMP RUNNING. SOLEMOID VALUE
07.1.01.01.1 G	.11 <b>8</b>	84-85	CLOSED	POTENTIAL LONG-TERM	LOCAL INDICATION, PERIODIC	REDUNDANT TRAIN	POTENTIAL INOPERABILITY OF	WIRED ACROSS 2 OF 3 PUMP HOTOR PRASES
4119.44.95(4.4			(011)		TRETING (OF PUMP)	100000000000000000000000000000000000000	TRAIN B SUC	
07.2.03.03.3 G-	138	8V-82	SHORT/GROUND	LOSS OF TRAIN & SUC PURP BUE TO OVERLOAD TRIP RESULTING FROM FAULT ACROSS THE MOTOR PRASSES WHICH POWER SOLEMOID VALVE	CONTROL ROOM INDICATION	REDUNDANT TRAIB	INOPERABILITY OF TRAIN B AND	
01.2.03.04.1 G	-138	SEQ 2 (29-9,11)	CONTACTS OPEN (OPP)	TRAIN 8 SEC PUMP AUTO-START ON SIS/SISLOP DISABLED, OTHER AUTO-START SIGNALS AND NAMUAL START/STOP UMAPPECTED	PERIODIC TESTING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B SWC FOR INJECTION, INITIAL RECIRC	NORMAL POSITION. SIS/SISLOP AUTO-START DORS NOT REQUIRE PUMP CONTROL SWITCE IN AUTO
01.2.03.64.2 G-		98Q Z (29-9,11)	CONTACTS CLOSED	TRAIN & SUC FUNP AUTO-STARTS, CANNOT BE MANUALLY TRIPPED. UV TRIP UNAPPRICTED		REDUNDANT TRAIN FOR BISLOP, NOME REQUIRED FOR SIS	POTRATICAL INOPRESSICITY OF TRAIN B ELECTRICAL POWER DUE TO OUT OF SEQUENCE BUS LOADING FOR SISLOP, NOW FOR SIS	
07.2.03.05.1 G	-138	\$3 (\$2-1114 LOW DISCE PRESS RELAY)	CONTACTS OPEN (OPP)	TRAIN B SWC PUMP AUTO-START ON G-13A LOW DISCHARGE PRESSURE DISABLED, WO EPPECT ON	PRRIODIC TRATING	NONE REQUIRED FOR SIS/SISLOP	REDUCED RELIABILITY OF TRAIN S SWC FOR NOW-SIS/SISLOP SVENTS, NOWE FOR SIS/SISLOP	
67.2.03.05.2 G-	-110	63 (52-1114 LOW DISCR PRESS RELAT)	(ON) CONTACTS CLOSED	SIS/SISLOP AUTO-START TRAIN B SUC PUMP AUTO-STARTS IP IN AUTO	CONTROL BOOK INDICATION	REDUNDANT TRAIN FOR SISLOP, NOWE REQUIRED FOR SIS	POTENTIAL INOPERABILITY OF TRAIN & SLECTRICAL POWER DUE TO OUT OF SEQUENCE BUS LOADING FOR SISLOP, NORE FOR \$18	•
								CONCURRENT MITH DC BEEK
01.2.03.06.1 G-	131	86 (52-1114 OYLD BBLAT)	CONTACTS OPEN (OFF)	TRAIN B SHC PUMP AUTO-START ON G-134 OVERLOAD OR BUS UNDERVOLTAGE DISABLED, NO RPRCT OR BIS/SISLOP	(SAME AS 7.2.3.5.1)	(SARE AS 7.2.3.5.1)	(SAME AS T.2.3.5.1)	
07.2.03.06.2 G	138	86 (52-1114 OVLD RELAT)	CONTACTS CLOSED	AUTO-START {SAMB AS 7.2.3.5.2}	(SAME AS 1.2.3.5.2)	(SAME AS 7.2.3.5.2)	(SAME AS 7.2.3.5.2)	*(SAHE AS 1.2.3.5.2)
01.2.03.07.1 G-	111	21-112 (UV RBLAY)	CONTACTS OPEN (OFF)	TRAIN B BUC FUMP WILL NOT TRIP ON SUGR & UNDBRVOLTAGE	PERIODIC TESTING	BEDUNDANT TRAIN FOR SISLOP, NOME REQUIRED FOR SIS	POTENTIAL LOSS OF TRAIN 8 BLECTRICAL POWER DUB TO OUT OF SEQUENCE BUS LOADING FOR	ROBHAL POSITION. SWGR \$2 UNDERVOLTAGE RELAT
07.2.01.01.2 G	138	27-112 (UV RELAT)	CONTACTS CLOSED	TRAIN B SWC PUMP TRIPS, CANNOT BB RESTARTED	CONTROL BOOM INDICATION, PERIODIC TESTING	REDUNDANT TRAIN	SISLOP, NORE FOR SIS EMOPERABILITY OF TRAIN B SWC	





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	ITBN 4	DRAICE ID	COMPONENT ID	FAILURE HODE	COCAL EPPECTS AND DEPENDENT PAILURES	MRTROD OF DETECTION	INTERINT COMPENSATING PROVISIONS	SPPECT ON ECCS	REMARIS
! 0?	/.2.03.08.1 (	G-138	_ 83 .(58-1214 LOW DISCU PRESS BBLAT)		TRAIN B.SVC PUMP LOW DISCHARGE PRESSURE AUTO-START SIGNAL TO G-13A, NO EFFECT ON TRAIN B	CONTROL ROOM INDICATION	SISLOP, NOWE REQUIRED FOR SIN	POTRNTIAL LOSS OF TRAIN A	
01	7.2.03.00.2 (	G-138	63 (52-1214 LOW - DISCO PRESS RELAY)		PRESSURE AUTO-START SIGNAL DISABLED TO G-13A, NO EFFECT	PERIODIC TESTING	HOME REQUIRED FOR BIS/SISLOP	SISLOP, NORE FOR SIS REDUCED RELIABILITY OF TRAIN A SWC FOR NOW-SIS/SISLOP EVENTS, NORE FOR SIS/SISLOP	MORRAL POSITION
	.2.03.05.1 (	G-130	86 (52-1214 OVLD RELAT)		•	CONTROL BOOM INDICATION	NOME SISLOP, REDUMBANT TRAIN	*POTENTIAL LOSS OF SUC PUNCTION FOR SISLAP, DUB TO LOSS OF TRAIN	OUT OF AUTO OR BUR YOLTAGE
1					AUTO-START SIGNAL TO G-13A			B SWC PUMP (SIS/SISLOP) AND POTENTIAL CONCURRENT LOSS OF TRAIN A SUSCINICAL POWER DUE TO OUT OF SEQUENCE BUS LOADING	CALCULATIONS BRVISED TO CONSIDER SHC PUMP START _CONCURRENT_NITE_RG_BRIR CLOSURE
	.1.03.09.2 (	G-138	86 (52-1214 OVLD BELAT)	OFF	TRAIN B SUC PUMP QUERLOAD AND BUS UNDERVOLTAGE AUTO-START	(SAHR A9_7,2,3,4,2)		(SISTOD ONLY)	NOBITY F SOSTITOR
01	.3.03.10.1 (	G-138	SZI/AI(RBLAT)	OM	AUTO-OPEN BIGNAL TO BOY-720A. DIVERTING CCW FLOW FROM COMMON		TRAIN B SUC PUMP TO RESTORS COOLING FOR MON-SIS/SISLOP	CAPACITY FOR MON-SIS/SISLOP	BAC DOME STANDING
			,		BRADER THROUGH TRAIN & CCU HI. BROUCHS CCU COOLING CAPACITY. IF TRAIN & ANC PUMP NOT RUNNING		SIS/SISLOP OR N/ TRAIN D SWC SIS/SISLOP OR N/ TRAIN D SWC PURP RUNNING	A/ LEVIN 9 SAC SURS BORNING Brentug" none bos bis/sis/sis/of ob Bashle a/ Levin 7 sac boss	
01	,2.03.10.2_	G-138	(RELAT)	QPP	AUTO-OPRN BIGNAL TO MOV-720A DISABLED, PREVENTING AUTOMATIC ALIGNMENT OF TRAIN B CCW BX		BROUNDANT TRAIN FOR INJECTION, INITIAL BECIRCULATION	INITIAL BECIRCULATION AND INITIAL BECIRCULATION	SMC PUMP IN STANDAY SERVICE
01 :	<u> .</u> 2.03.11.1 (	G-138 <u></u> .	SBRYICE WATER	PRESSURE LOW	POTENTIAL LONG-TREM DEGRADATION OF TRAIN B SUC PUMP BEARINGS, POTENTIAL SALTWATER BACEFLOW THROUGE	CONTROL BOOM INDICATION	NORE, BACKUR BEABUNG COOLING REQUIRED FOR LONG-TERM POST-BIS/BISLOP OPERATION	SPOTRUTIAL INOPERABILITY OF ENC POR LONG-TERM POST-SIS/SISLOP OPERATION	PCOMMON-CAUSS PAILURE MAY OCCUR DUR TO POSTULATED CONCURRENT SRISHIC SYSHT. BACGUP BRARING COOLING STEPS
					NON-SEISHIC FINES BOST-SIS/SISFOD				PAILURE REDUCES PUMP OUTPUT UNTIL BOUNDARY VALYER LOCALLY
, !	4. 								CLOSED, SO TEAT PURP IST REQUIRED WITH BACEFLOW CONDITIONS
· 07	'. <b>1.01</b> .1 <b>2</b> .1 (	G-13B	EWGR #2 125VDC CONTROL POWER	AOTIZ FOR	TRAIN B SWC PUMP CANNOT BE STARTED OR TRIPPED, TRAIN B LOW DISCHARGE PRESSURE, OVERLOAD AND BUS UNDERVOLTAGE	CONTROL BOOM INDICATION	REDUNDANT TRAIN (NITH MANUAL START CAPABILITY FOR MON-SIS/SISLOP EVENTS)	INOPERABILITY OF TRAIN B SUC, REDUCED RELIABILITY OF TRAIN A SUC FOR NON-SIS/SISLOP BYENTS	
	.1.01.01.1	MANUAL VALVBS,		OPEN	AUTO-START SIGNALS TO G-13A DISABLED AUX SWC PUMP ALIGNED TO TRAIN	LOCAL INDICATION, PRRIODIC	REDUNDANT TRAIN (A) FOR	POTENTIAL INOPERABILITY OF	BORNAL POSITION (RECEPT
		TATE SEC STON			B CCM BI	TRSTING	SIS/SISLOP EVENTS	TRAIN B SWC DUE TO BACRFLOW TEROUGH MON-SAFETT RELATED PIPING PROM AUI SWC PUMP, POTENTIAL INTARE ARRA PLOODING	SWC-381). INCLUDES BWC-342, 343, 345, 370. VACUUM PRIMING





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## EMERCENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAM OMOPRE UNIT 1 TABLE 1-1: SALTWATER COOLING SYSTEM PREA

		DRVICE ID	COMPONENT ID	FAILURE HODE	LOCAL EPPECTS AND DEPENDENT PAILURES	METROD OF DETECTION	INDERBUT COMPENSATING PROVISIONS	SPERCT ON ECCS	REMARES
					ABLEMANN LEIPONNO	hallanitab	1901191919	SELENT OR SOME	esuases
	07.3.01.01.2	MANUAL VALVES,		CLOSED	AUI SUC PUMP ISOLATED.	LOCAL INDICATION, PRRIODIC	BEDUNDANT SAPETE BELATED	_INOPERABILITY_OF_AUX_BUC_PUBP	NORMAL POSITION FOR SMC-181
:		AUX SUC PLON				TESTING	TRAINS .		WITH PUMP OPP. PUMP USED TO HERT TRON SPEC 3.3.1 ACTION
1									POR G-13A/N INOPERABLE, BUT NOT SUITABLE FOR LONG-TERM
									OPERATION DUE TO POTENTIAL SUCTION STRAINER CLOGGING
	47.3.41.02.1	CHECK VALVES, AUX SUC PLON		NOME (PASSINE)		LOCAL INDICATION, PRRIODIC TRATING			INCLUDES SUC-338 (PUMP) AND 344 (VACUUM PRINTES SYSTEM)
		MANUAL VALTES,		Obeni	TAT BAC BAMS DESTREMENT OF TO			INOPERABLIST OF AUX SNC PURP	JES TABLE 7-2 POR DETAILED
j		AUI SWC BOUNDART MANUAL VALVES,		CLOSEB	LOSS OF SUCTION/PRIME CONTROL	PRRIODIC SURVRILLANCE	TRAINS BONE REQUIRED	NOME	BOUNDARY VALVE ANALYSIS
1		AUX SUC BOUNDARY				LEBIOAIC SORARIPESHOR	sour maderna	Pve1	
	07.3.02.02.1	CARCE OR RELIEF VALVES, AUX SYC		NORMAL (PASSIVE)					THERE ARE NO VALVES IN THIS CATEGORY
	07.3.03.01.1	BOUNDART	PUMP/MOTOR	FOR STOR	REDUCED AUX SWC PUMP FLOW	PERIODIC TESTING	REDUNDANT SAFREE RELATED	INOPERABILITY OF AUX SEC PUMP	AUI SUC PUMP IS NOT CREDITED
. 1	***********	u-110		000 1000	STREET NOT SHE LOSI LOSA	LESTONIC ISASIMO	TRACES	INVESTIGATION OF ANY SEC 1021	POR SIS/SISLOP EVENTS (IR, IS NON-SRISHIC), BUT MAT BE
							<u> </u>		REQUIRED PER TECH SPEC 3.3.1
				*					ACTION STATEMENT FOR INOPERABILITY OF G-13A OR B
	07.3.03.02.1	G-11C	SUGR #3	OPEN	AUX PUMP FAILS TO START OR	PRRIODIC TRATING	(SAME AS T.3.3.1.1)	(SAME AS 7.3.3.1.1)	MORMAL POSITION. PUMP MUST BE
!			(52-1313)		TRIPS AFTER STARTING				STARTED MANUALLY TO MEST TROM SPEC 3.3.1 ACTION STATEMENT
									REQUIREMENTS FOR C-114 OF B
	07.3.03.02.2	G-13C	SWGR #3	CLOSED	AUI SWC PUMP STARTS OR PAILS	CONTROL ROOM INDICATION	NORE SEGUISED	HOME FOR SIE/SISLOP	SWGR #3 [SOLATED ON SIS/SISLOP
			(52-1313)		TO TRIP				
	07.3.03.03.1	G-13C	SV-82	OPRN (ON)	HONE	LOCAL INDICATION	HOME BEQUIRED	NONE	ISA ISOLATION TO VACUUM PRINING SYSTEM BOUCTOR, MORMAL
				(or)					POSITION IS OPEN WEEK AUX SEC
•			au 44.	41.00Bb					PUMP IS ROWNING
L	07.3.03.03.1	6-130	8V-37A	CLOSED (OFF)	AUI SWC PUMP DISABLED DUB TO LOSS OF SUCTION/PRIME CONTROL		BEDUNDANT SAPETT BELATED TRAINS	INOPERABILITY OF AUX SUC PUMP	BEGRIES FOR AVENAN BEINE SOURCED ATTAR OBERING
J.				(***)		1001110 (11 11111)			SYSTEM OPERATION
·'	07.3.03.03.3	G-13C	än-jiŸ	SHORT	LOSS OF AUX SWC PUMP DUE TO	CONTROL BOOM INDICATION	REDUNDANT SAPETY RELATED	INOPERABILITY OF AUX SWC PUMP	125VDC STSTEMS UNGROUNDED
					PRASE TO PRASE FAULT TEROUGH SOLENOID VALVE		TRAINS		
	07.3.03.04.1	0-13C	21-112	CONTACTS OPEN	AUX BUC PUMP WILL NOT TRIP ON	PBRIODIC TESTING	MONE REQUIRED FOR 113/813LOP	NOME FOR SIB/BISLOP	MORNAL POSITION. SUGR \$1
			(UV BELAT)	(OFF)	SWGR #1 UNDBRVOLTAGE IF				UNDERVOLTAGE RELAT. SWGE #3
.:	01.3.03.04.2	G-13C	27-112	CONTACTS CLOSED	RUNNING AUI BWC PUMP TRIPS, CANNOT BE	CONTROL ROOM INDICATION.	REDUNDANT SAPETE RELATED	INOPERABILITY OF AUX BUC PUMP	ISOLATED ON SIE/SISLOP
		• • • • • •	(UV BELAT)	(ON)	RESTARTED	PERIODIC TESTING	TRAINS		
	07.3.03.05.1	G-13C	SERVICE WATER	PRESSURE LOW	POTRUTIAL LONG-TERM DECRADATION OF AUX SWC PUMP	CONTROL ROOM INDICATION	REDUNDANT SAFETT RELATED	POTENTIAL INOPERABILITY OF AUX SWC PUMP	AUX SUC PUMP IS NOT CREDITED FOR SIS/BISLOP BURNTS (IR, IS
					BRARINGS	• •	TRAINS	all roar	NON-SEISHIC), NOE IS IT
									SUITABLE FOR LONG-TERM
									OPERATION FOR NON-SIS/SISLOP EVENTS DUE TO THE POTENTIAL
									POR SUCTION STRAINER CLOGGING

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### BHERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN QNOFRE UNIT L TABLE 1-1: SALTWATER COOLING SYSTEM FREA

	•• ••					***************************************			
	1 M871	DAVICE ID	COMPONENT ID	PAILURE HODE	LOCAL RPPRCTS AND DEPENDENT PAILURES	METHOD OF Detection	INBERENT COMPENSATING PROVISIONS	BEFECT ON ECCS	ESHARES
İ									,
!	07.1.03.05.1	G-13C	_[\$4	PRESSURE LOW	ANT SAC BAND DISVERED DAN LO	CONTROL BOOM INDICATION	ERDUNDANT SAFETY RELATED	INOPERABILITY OF AUX SWC PUMP	AUI SEC PURP IS NOT CREDITED
					LOSS OF SUCTION/PRIME CONTROL		TRAINS		POR SIS/SISLOP EVENTS (IE, IS
<u></u>									NON-SRISHIC), NOR IS IT SULTABLE FOR LONG-TERM
1									OPERATION FOR HON-SIS/SISLOP
į									SABILIS DAR TO LOS SOLBILLY
·	01.3.03.07.1	G-11C	SUGE #1 125VDC	VOLTS LOW	AUE SUC PUNP CANNOT BE STARTED	CONTROL ROOM INDICATION	REDUNDANT SAPETY RELATED	INOPERABLETT OF AUE SUC	FOR SUCTION STRAINER CLOGGING
1			CONTROL POWER		OR TRIPPED		TRAINS		SIS/SISLOP IRRESPECTIVE OF
í	<del></del>	. —————							TRIP STATUS OF ITS INDIVIDUAL
	07.4.01.01.1	MANUAL VALVES.		OPEN	MONE	PERIODIC SURVEILLANCE	NOME REQUIRED	RORE	LOADS MORNAL POSITION. INCLUDES:
.		CORNOR PLOW PATE				14510410 608181902009	2441 99441934		SUC-305
Ì		MANUAL VALVES,		CLOSED	SUC DISCEARGE TO OUTFALL	PRRIODIC SURVEILLANCE	PAILURE PRECLUDED BY	INOPERABILITY OF BOTH TRAINS OF	
		CORNOR PLOW PATE			BLOCKED FROM BOTH CCV BI		ADMINISTRATIVELY CONTROLLED	SUC/CCU BRAT REMOVAL	
	01.4.61.02.1	CRECE VALVES,		MONE (PASSIVE)			VAUVA DOUBLING	······································	THERE ARE NO VALUES IN THIS
	47 4 49 41 1	COMMON PLOW PATH		4504	<b></b>		•	•	CATEGORY
<u> </u>		COMMON BOUNDARY		OPEN	ANC DISCURSE PROM BOTH CCM HI PARALLELED WITH CIRC WATER	MERIODIC RABILLYRCE	PAILURE PRECLUDED BY ADMINISTRATIVELY CONTROLLED	POTENTIAL INOPERABILITY OF BOTE TRAINS OF SUC/CCU HEAT REMOVAL	
					PUMP SUPPLY TO TPCM MI,		ATTAR FOCEING	FOR SIS EVENTS, NOME FOR SISLOP	
		· ·			POTENTIALLY REDUCING SWC PLOW			(IN UNICE CIEC WATER PUMPS ARE	
ļ					WEEN CIRC WATER PUMPS ON			TRIPPED AND LOCKED OUT).	APALTSES
l Im. m		MARUAL VALVES,		CLOSED	NORS	PERIODIC SURVEILLANCE	NONE REQUIRED	POTENTIAL INTARE AREA PLOODING	·
		COMMON SOUNDARY							
:		MANUAL VALVES, CROSS-CONNECT		OPRN	SWC PUMPS PARALLED AT CCW HI INLETS, POTENTIAL PAILURE OF	PERIODIC BURARILLANCE	FAILURE PRECLUDED BY ADMINISTRATIVELY CONTROLLED	POTENTIAL INOPERABILITY OF BOTH SAPETT RELATED SWC PUMPS DUE TO	·
					RUNNING SWC PURP DUR TO RUNOUT		VALVE LOCKING	SEQUENTIAL RUN-OUT/PAILURE OF	
								OPERATING PUMP, AUTO-START OF	
-								STANDST PUMP AND ITS SUBSEQUENT ROS-OUT/PAILURE	
!		MANUAL VALVES,		CLOSED	NONE	PERIODIC SURVEILLANCE	HOME REQUIRED	HONE	NORMAL POSITION
İ		CHOSE CONNECT	<del></del>	MORMAL (PASSIVE)					
İ		VALVES, COMMON		BURGAL (PASSIVE)					THERE ARE NO VALVES IN THIS CATRGORY
! 		BOUNDARY			•				
	of. T. 03. 01. 1	NOA-2	VALVE/ACTUATOR	OPBN	NONE DURING NORMAL OPERATION.	LOCAL INDICATION	BRICTOR TRIP/TURBING TRIP	POTENTIAL TROPERSUICITY OF BOTE	
1					IN FORS ON SACACEM COOFING		OCCURS AUTOMATICALLY ON SIS/SIBLOP	TRAINS OF SUC/CCM BRAT BEHOVAL PRIOR TO TURBING TRIP	NORMAL OPERATION. GATE CLOSED (TO 6%) AND INTARE RECIRC GATE
i		***************************************			CAPACITY DUB TO BERVATED				OPENED FOR BEAT TREAT
İ					SUCTION TEMPERATURE PRIOR TO				- <del>-</del>
,	07.4763.0172	HOV-9	VALVE/ACTUATOR	CLOSED	TURBING TRIP INTARR GATE DROPS TO SUMP	LOCAL INDICATION	NONE FOR THIRCTION, INITIAL	FLOSS OF BUCTION NEED TO BOTH	SAE DATENHE SHIP DESTRUCTION
			,		STOPS AT 6% OPEN POSITION.		RECIRCULATION OR LONG-TERM.		LOCATED SUPPLICIENTLY ABOVE SWC
					MORNAL POR BRAT TREATMENT		AUX SWC PUMP FOR INTERIM		PUMP SUCTION TO PREVENT LOSS
							SEEVICE		OF BUC PP NPSH. AUX BUC PUMP IS NON-SAPETT RELATED AND
i								•	POWERED PROM SWGR \$3, WEICH ES
			,						ISOLATED ON SIS/SISLOP





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ITEE \$	DEAICE ID	COMPONENT ID	FAILURE MODE	LOCAL REFECTS AND DEPENDENT FAILURES	METHOD OF Detection	INBREBUT COMPENSATING PROVISIONS	SPPECT ON BCCS	BIRIRES
07.4.03.02.1		(E-CH). 38	_CONTACTS CLOSED (OPP)	GATE ACTUATOR POWER NOTLOCKED-OUT ON SISLOP	PARLODIC_TESTING	RONE BEGÜLBED	NOMB	MORMAL POSITION. ECC-2 LOCKOUT BRLAT. SWGR \$3 ISOLATED ON SIS/SISLOP INDEPENDENT OF LOCKOUT RELATS:
01.4.03.02.2	ROA-3	86 (H3-3)	CONTACTS OPEN (ON)	GATE ACTUATOR POWER LOCERD-OUT, GATE PAILS AS-IS	PERIODIC TESTING	NORE REQUIRED	HOME	
01.4.03.03.1	104-1		Aords fon	GATE PAILS AS-19	FOCAT INDICATION	NONE BEGUIDED ENON	_Ronf	
01.4.04.01.1		VALVE/ACTUATOR	OPEN	NONE DURING NORMAL OPERATION.		BEACTOR TRIP/TURBING TRIP	POTENTIAL INOPERABILITY OF BOTH	
				DURING BEAT TREAT_MOULD RESULT IN LOSS OF SMC/CCM COOLING CAPACITY DUB TO BLEVATED SUCTION TEMPERATURE PRIQE TO		OCCURS AUTOMATICALLY ON	PRIOR TO TURBINE TRIP	AND OUTPALL BECIEC GATE OPENED FOR BEAT TREAT
07.4.04.01.2	MOA-10	VALUE/ACTUATOR	CLOSED	TURBLES TRIP OUTFALL GATE BLOCES CIRC WATER BISCHARGE PROS. CONDENSERS, NO. RPFRCT ON SMC		NORE SEGULEED	NOMS	SUC DISCEARGES TO OUTPALL PIPE DOWNSTREAM OF QUITALL GATE, SO
01.4.04.02.1		L3-2 (MOV-12)	CONTACTS OPEN	OUTFALL GATE CANNOT BE CLOSED TO LESS THAN 20%. DURING HEAT		REACTOR TRIP/TURBINE TRIP OCCURS AUTOMATICALLY ON	POTENTIAL INOPERABILITY OF BOTA TRAINS OF SUC/CCU MEAT REMOVAL	
		······································		TREAT WOULD RESULT IN LOSS OF SUC/CCW COOLING CAPACITY DUB TO BLEVATED SUCTION TEMPERATURE PRIOR TO TURBINE TRIP	,	818/818109	CABILITY PRIOR TO TURBIER TRIP	FOR MORNAL OPERATION
<u>.07.1.01.02</u> .2	NOA-10	(¥0A-15) Fā-5	COMTÁCIA CLOARD	OUTPALL GATS CAN BE FULLT CLOSED WITHOUT OUTPALL BECIEC GATS BRING FULLY OPEN. NO RPFRCT ON SWC	PERIODIC TRATING	NORE BEGREED	MONE	
07.4.04.03.1	HOV-10	86 (H3-3)	CONTACTS CLOSED (OPP)	GATE ACTUATOR POWER NOT LOCKED-OUT ON BISLOP	PBRIODIC TESTING	NONE ERQUIRED	NOME	MORMAL POSITION. MCC-3 LOCEOUT BRLAT. SWGR #3 ISOLATED ON SIS/SISLOP INDEPENDENT OF
07.4.04.03.2	HOA-10	86 (83-3)	CONTACTS OPEN	GATE ACTUATOR POWER LOCEED-OUT, GATE FAILS AS-IS	PERIODIC TRATING	MOME BEGUERED	HOME	LOCEOUT BELATS
07.4.04.04.1	HOV-10	MCC-3 (42-1370)	VOLTS LOW	GATE PAILS AS-IS	LOCAL INDICATION	HOME BEQUIRED	HOME	
<u> </u>	#QV-11	VALVE/ACTUATOR	OPEN	NORE DURING BRAY TREAT. DURING MORNAL OPERATION WOULD RESULT IN LOSS OF SWC/CCW COOLING CAPACITY DUR TO BLEVATED	FOCAL INDICATION	BEACTOR TRIP/TURBLES TRIP OCCURS AUTOMATICALLY OR SIS/SISLOP	POTENTIAL INOPERABLLITY OF BOTE TRAINS OF SUC/CCW BRAT REMOVAL PRIOR TO TURBINE TRIP	
_07,[.05.0],2	RÕÀ-İI	YALYB/ACTUATOR	CLO3BD .	SUCTION TEMPERATURE PRIOR TO TURBINE TRIP NOME DURING MORNAL OPERATION. DURING SEAT TREAT, REDUCES INTARE PLOW TO CIRC WATER AND SWC PUMPS TO THAT TEROUGE HOV-9 AT 6% OPEN	LOCAL INDICATION	NORE FOR INSECTION, INITIAL RECERCULATION OF LONG-PERM. AUI SHE PUMP FOR INTERINERSCINCULATION SERVICE	TRAINS OF SWC PUMPS, POTENTIALLY CAUSING LOSS OF BOTH PUMPS FOR SIS RYENTS (NO	SCIEC WATER PUMP SUCTION NOT LOCATED SUPPICIENTLY ABOVE SWC PUMP SUCTION TO PREVENT LOSS OF SWC PUMP MPSE. AUT SWC PUMP IS NON-SAPETY RELATED AND POWERED PROM SWCR \$3, WBICH IS ISOLATED ON SIS/SISLOP



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## EMERGRACY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM OMOFRE UNIT 1 TABLE 7-1: SALTWATER COOLING SYSTEM PREA

1168 4	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL RPFECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	PROGUSTORS  (MERRENT COMPENSATING	SPPECT ON BCCS	REMARES
01.4.05.02.1 #	0V-11	86(#3-3)	CONTACTS CLOSED	GATE ACTUATOR POWER NOT LOCEED-OUT ON SISLOP	PRRIQUIC TRATING	NORE SEGUISED	BONB	MORNAL POSITION. MCC-3 LOCEOUT RELAT. SUGR 83 ISOLATED ON SIS/AISLOP INDEPENDENT OF
07.4.05.02.2 H		86 (83-3)	CONTACTS OPEN (ON)	GATE ACTUATOR POWER LOCERD-OUT, GATE PAILS AS-IS	PERIODIC TESTING	RORE SEGNISED	NONE	LOCKOUT RELAYS
<u>'01.4.05.03.1 m</u>	0A-11	HCC-1	AOTIS TOA	GATE PAILS AS-IS	FOCAL INDICATION	NONE EEGNIEED	NONE	
97.4.96.01.1 #	OA-15	(42-1373) VALVE/ACTUATOR	OPED	MOME DURING BEAT TREAT. DURING MORBAL OPERATION MOULD RESULT IN LOSS OF SWC/CCW COOLING CAPACITY DUE TO ELEVATED SUCTION TEMPERATURE PRIOR TO		BEACTOR TRIP/TURBINE TRIP OCCURS AUTOMATICALLY OF 818/818LOP	POTENTIAL INOPERABILITY OF BOTH TRAINS OF SUC/CCM REAT RESOVAL PRIOR TO TURBINS TRIP	
07.4.06.01.2 H	DY-12	VALVE/ACTUATOR	CLOSED	TURBINE TRIP  NOW BURING MORNAL OPERATION.  PUBLING MEAT TREAT WOULD BLOCK  CIRC WATER PURP DISCHARGE PROM		BONE EFFORED	RONE	POSITION DURING MORNAL OPPRATION
67.4.06.02. <u>1 m</u>	DV-12	<u>86 (H3-3)</u>	CONTACTS CLOSED (OFF)	COMBRIBE, NO EPPECT ON SWC GATE ACTUATOR POWER NOT LOCEED-OUT ON BISLOP	PERIODIC TESTING	NONE ESCRIBSO	NOME	NORMAL POSITION. MCC-3 LOCKOUT RELAT. SUGR #3 ISOLATED ON SIS/SISLOP INDEPENDENT OF
07.4.06.02.2 M	)A-15	86 (83-3)	CONTACTS OPEN	GATE ACTUATOR POWER LOCEED-OUT, GATE PAILS AS-IS	PARIODIC TESTING	NONE REQUIRED	HOHE	LOCROUT BELATS
67.4.06.03.1 HC	N-13	NCC-3	VOLTS LOW	GATE PAILS AS-18	LOCAL INDICATION	NONE BEQUIRED	NONE	
87.4.97.01.1 MG	) <b>V-\$</b> )V-10	(42-1376) VALVE/ACTUATOR	MORMAC	NONE	LOCAL INDICATION	NORE SEGUISED	NON8	
B(	)V-11 )V-12			· ·· · · · · · · · · · · · · · · · · ·				· · · · · · · · · · · · · · · · · · ·
. 80	V-12 V-13 V-13	VALVE/ACTUATOR	BRAT TREAT	MOV-9 CLOSED TO 65, MOV-11 OPENED, MOV-10 CLOSED, MOV-12 OPENED. RESULTS IN LOSS OF SUC/CCU COOLING CAPACITY DUE	LOCAL INDICATION	REACTOR TREP/TURBINE TREP OCCURS AUTOMATICALLY ON S18/S13LOP	POTENTIAL INOPERABILITY OF BOTE TRAINS OF SUC/CCU BRAT REMOVAL PRIOR TO TURBINE TRIP	
				TO BLEVATED SUCTION TEMPERATURE PRIOR TO TURBINE TRIP	· · · · · · · · · · · · · · · · · · ·			
	V-9 V-10 V-11 V-12	VALVE ACTUATOR	SBISHIC	GATES MOV-10, 11, 12 PAIL CLOSED, GATE MOV-9 PAILS TO 65 OPEN POSITION ON BUMP STOPS	COMPROL ROOM ANNUNCTATION, LOCAL INDICATION	NONE FOR INJECTION OR RECIRC (NON-SEISHIC AUX SMC PUMP ALSO LOST)	POTENTIALLY CAUSING LOSS OF	*GATE ACTUATORS ARE NON-SEISMIC. CIRC WATER PUMP SUCTION NOT LOCATED SUPPICIENTLY ABOVE SWC PUMP SUCTION TO PREVENT LOSS OF SWC
							PRIOR TO SISLOP	PUMP MPSA

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TABLE 7-2: SALTWATER COOLING BOUNDARY VALVE ANALYSIS





# EMERGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONOPRE UNIT: BOUNDARY VALVE ANALYSIS

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		(SAPRT	F BELATED	BOUNDARY-)	CSAPETT RELATED BACEUP	·	NOM-SAPRTY BRLATED BACKUP		
!   . : !	1788 /	TAG A			TAG #	NC/AUTO?	TAG #	MC/AUTO?	REMARTS
1	A1 1 AL	_CV9:526 _	CLAGEN	100					
	41.11.41	049:350 _		{104	· · · · · · · · · · · · · · · · · · ·				G-134 DISCHARGE CROSS-CONNECT TO TPCW HI CIRC
	07.1.02	MATHORN	CLOSED	#0	NONE	MOME			WATER INLET AND SCREEN WASE PUMPS
:	61.1.03_		CLOSED	.100	NOME	HORE			G-11A (NSTRUMBNY (PS-28/PL-T3) VENT G-13A DISCRARGE RRADER VENT
1	07.1.04		CLOSED	100	MONE	MONE			G-13A DISCRARGE BRADER DRAIN
	01.1.05		CLOSED	10	MONE	HOMB			TRAIN A CON BY TUBE-SIDE INCET BRAD VENT
<u></u>	07.1.06		CLOSED	10	NONE	MONE			TRAIN A CCU MI TUBE-SIDE INLET BEAD DRAIN
	07.1.07		CLOSED	NO	NORE	NONE			TRAIN A CON ME TUBE-SIDE OUTLET MEAD VENT
:	07.1.08		CLOSED	MO	MONE	ROUR			TRAIN A CCW ME TUBE-SIDE OUTLET MEAD DRAIN
·	01.1.01		CLOSED	110	MONT	NONE			TRAIN A CON ME TUBB-SIDE DP-INDICATOR VENT
ĺ	07.1.10		CFOSED	MO	NONE	HOME			TRAIN A CCN ME TURE-SIDE DP-INDICATOR VENT
. ]	67.1.11		CLOSED	10	NONE .	MONE			TRAIN A CCU MI TUBE-SIDE DP-INDICATOR VENT
· ',	07.1.12	"Āntiņai ""	CLOSED	<u> 110</u>	HONE	HONE			TRAIN A CCN BE TUBB-SIDE DP-INDICATOR EQUALIZATION
						•			VALUE. VALUE OPEN COULD RESULT IN PARTIAL SYPASS
•	07.1.13	RY-56	RELIEF		NONE REQUIRED				OF AT PLOY
	07.2.01		CLOSED	729	TON BACKED				TRAIN A CCV BY TURE-SIDE TREEMAL RELIEF
		•••	45444						G-11B DISCHARGE CROSS-CONNECT TO TPCW HI CIRC
.1	07.2.02	UNENOVA	CLOSED	MO	NONE	RMOM			WATER INLET AND SCREEN WASH PUMPS G-13B INSTRUMENT (PS-29/P[-74]) WENT
	07.2.03	8VC-337	CLOSED	10	NONE	POYE			C-138 DISCHARGE BRADER VEHT
	01.2.04	9VC-335	CLOSED	NO	MONE	BONE			G-138 DISCHARGE BRADER DRAIN
	01.2.05	8WC-363	CLOSED	110	HOME	NONS			TRAIN & CCW SI TUBE-SIDE INLET BEAD VENT
· i	01.2.06	84C-367	CLOSED	NO	NORE	MONE			TRAIN & CON BY TUBE-SIDE INCET BEAD DRAIN
	07.2.07	8WC-365	CLOSED	NO	ROMS	NONE			TRAIN & CON ME TUBE-SIDE OUTLET BEAD VEN.
·		-9MC-364	-CLASRA	MA · · · · · · ·	MAMP	MAND			
			-EF8819 —	<b>R</b> V	1818	1811			TRAIN A GEN AX TURK-BIRK SPITATIONAGE PRAN
1	07.2.10		CLOSED	MO	NONE	MOMB	•		TRAIN B CCM MI TUBE-SIDE DP-INDICATOR VENT
			CLOSED	110	NONE	NONE			TRAIN B CCM BI TUBE-SIDE OP-INDICATOR VENT
!	07.2.12	ONTHONN	CLOSED	NO	HOMB	NONB			TRAIN & CCW BY TUBE-SIDE DP-INDICATOR EQUALIZATION
.]									VALVE. VALVE OPEN COULD RESULT IN PARTIAL BYPASS
.}	07.2.15	89.31	RELIEF		NOWE REQUIRED				OP 11 PLOY
•:	07.3.01		CLOSED	MO	NONE TEACHER	MOME			TRAIN & CON BE TUBB-SIDE THREMAL RELIEF
1	01.3.02		CLOSED	RO	MONE	NOME			AUX SUC PUMP PRINTING TANK DRAIN
	67.3.03		CLOSED		NOVE	HONE		·	AUX SUC PUMP PRIMING TAME VENT AUT AUC PUMP SUCTION GAGE GLASS DRAIN VALVE
1	07.1.04	SWC-340	CLOSED	NO	NONE	NONE			AUI SWC PUMP CASING VENT
4	07.3.05	SWC-346	CLOSED	MO	NORE	NOME			ANY SAC LOUL CERTIES AND AND
	01.3.06	8VC-353	CLOSED	10	NONE	MONR			AUI SUC PUMP CASING DEALE
i	01.3.07	UNENOVN	CLOSED	MO	CAP	2022			AUI SUC PUMP INSTRUMENTATION VENT
1	97.3.08	8MC-348	CLOSED	MO	NONE	NORE			PRINING STOTEM SERVICE WATER ISOLATION. VALVE OPEN
i					The state of the s				WOULD DISABLE PRINING/SUCTION CONTROL
i	07.4.01	3AC-311	CLOSED	NO	NONE	CAP			CCW HI SWC LOOP SEAL VENT. VALVE OPEN COULD RESULT
·			<del></del>			•		Ť	IN ME AIR BINDING UNDER LOW INTAKE WATER LEVEL
:	** * **								CONDITIONS
	07.4.02	2AC-308	CLOSED	NO	NOME	CW9-529, 530		OPEN :	SUC OUTLET BEADER CROSS-CONNECT TO TPCN SI CIRC
						POV-1, 1			WATER SUPPLY HEADER. VALVE OPEN MAY REDUCE SWC
1							• • • •		PLOW DUR TO BACKPRESSURB PROM CIRC WATER PUMP
									OPERATION. BACEUP VALVES POV-7 AND 8 AUTO-OPEN

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SECTION 8: SAFETY INJECTION ACTUATION

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#### SAFETY INJECTION ACTUATION SYSTEM NOTES

1. Item numbers in this section have been assigned as follows:

O8.1: Train A actuation instrumentation and logic (including block permissive instrumentation for Train B)

08.2: Train B actuation instrumentation and logic

08.3: Common (4 kV bus undervoltage) instrumentation

- 2. This section covers the Safeguards Sequencers (SEQs) including input instrumentation and manual actuate, block and reset controls, for both the SIS (Safety Injection Signal only) and SISLOP (SIS with concurrent Loss of Offsite Power) conditions. The failure modes and effects for individual SEQ output relays (ie, individual SEQ controlled loads) are addressed in the applicable FMEA tables for the actuated systems. The SEQ actuated 480V lockout relays are addressed in Section 12 of this analysis.
- 3. Potential single failure susceptibilities in the FMEA table are flagged with "\*" as the first character of the associated ECCS EFFECTS field. Other open items (eg. required procedure or calculation changes) are flagged with "\*" as the first character of the REMARKS field.

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#### SAFETY INJECTION ACTUATION SYSTEM REFERENCES

One Line Diagra	ms_
5102173	125 VDC System No. 1
5102174	120 VAC Vital Bus System - Train A
5149348	125 VDC System No. 2
5159826	120 VAC Vital Bus System - Train B
Elementary Diag	
N1546 Sh 3	Station Loss of Voltage Auto Transfer
63715	Safety Injection System (Sh 1, 2)
63716	Reactor Protection System (Sh 1, 2)
449408	FCV-456 and CV-142
455457	FCV-1112 Solenoid Valve
5130351	4.16 kV Busses Undervoltage Relays
5149630	4.16 kV Bus Diesel Generator Breakers
5150874	Safety Injection Sequencer No. 1
5150875	Safety Injection Sequencer No. 2
5150876	4.16 kV Busses Undervoltage and Generator
	Frequency Relays
5151366	Diesel Generator No. 2 Engine Control System
	(Sh3)
5159760	Containment Isolation System, PT-1120A, PT-1120B
	& PT-1120C - Train A
5159776	Containment Isolation System, PT-1121A, PT-1121B
	& PT-1121C - Train B
5168185	Safety Injection Actuation and High Radiation
	Alarm System
5180711	Pressurizer Pressure Safety Injection Actuation
	System, PT-3000A, PT-3000B & PT-3000C - Train B
5202910	FCV-457, FCV-458, CV-142, CV-143, CV-144
Other Drawings	
451356	Loop Diagram - Pressurizer Pressure (Train 2)
5149178	Load Sequence Table, Train 1 (Sh 1)
5149179	Load Sequence Table, Train 1 (Sh 2)
5149180	Logic Diagram - Sequencer
5149181	Load Sequence Table, Train 2 (Sh 1)
5149182	Load Sequence Table, Train 2 (Sh 2)
5156589	Block Diagram - Sequencer No. 1 SLSS
5156592	Sequencer Module Data - Relay Driver Outputs
	(Sh1)
5156593	Sequencer Module Data - Relay Driver Outputs
	(Sh2)
S6N297	Schematic Logic - Sequencer (CCC Vendor Drawing)
	- · · · · · · · · · · · · · · · · · · ·
<u>Procedures</u>	
SO1-1.0-10	Reactor Trip or Safety Injection
SO1-1.0-12	SI Termination
SO1-1.0-20	Loss of Reactor Coolant
SO1-1.0-23	Transfer to Cold Leg Injection and Recirculation
SO1-1.0-30	Loss of Secondary Coolant
SO1-1.0-32	Loss of RHR Following Loss of Secondary Coolant
	in Containment

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Steam Generator Tube Rupture Monthly Sequencer Testing SO1-1.0-40 SO1-12.3-7

Other Documents

System Description: Safety Injection, Recirculation and Containment Spray Systems SD-S01-580

System Description: Safeguard Load Sequencing SD-S01-590

System

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TABLE 8-1: SAFETY INJECTION ACTUATION FMEA





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## EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM OMOPRE UNIT 1 TABLE 8-1: SAPETY INJECTION ACTUATION FMBA

	ITEM \$	DEVICE ID	COMPONENT ID	PAILURE MODE	LOCAL BFFECTS AND DEPENDENT FAILURES	METEOD OF	INERERNY COMPENSATING	EFFECT ON ECCS	REMARES
	08.1.01.01.1	PT=430, LOOP	. PT-430	81G⊭AL BIGB	1/3 P2R PRESSURE INPUTS DISABLED TO SEQ 1 AND BLOCE PERMISSIVE FOR SEQ 1 AND 2, LOGIC BECOMES 2/2 FOR BOTH	CONTROL ROOM INDICATION, ANNUNCIATION, PRRIODIC TRETING		BEDUCED BELIABILITY FOR SEQ 1 (SIS/SISLOP) AND SI BLOCK PERHISSIVE FOR SEQ 1 AND 2	INCLUDER PT-430, TE-430, PC-4300, PC-4301 AS PRE RPS SINGLE PAILURE ANALYSIS (N39405)
-	08.1.01.01.2	PT-430 LOOP	PT-430 	SIGNAL LOW	PUNCTIONS 1/3 PZE PRESSURE [MPUTS TRIPPED TO SEQ 1 AND BLOCK PERKISSIVE FOR SEQ 1 AND 2, LOGIC BECOMES 1/2 FOR BOTH FUNCTIONS	CONTROL ROOM INDICATION, ANNUNCIATION, PRRIODIC TESTING	REDUNDANT PER PRESSURE CHANNELS	BEDUCED REDUNDANCY AGAINST SEQ 1 SIS/SISLOP AND SI BLOCK PREMISSIVE FOR SEQ 1 AND 2	
; 	08.1.01.02.1	PT-430 LOOP	PC-430G PC-430G1	INPUT OPEN	(SAMB AS 4.1.01.01.2)	(SAME AS 8.1.01.01.2)	(SAHR AS 8.1.01.01.2)	(SAME AS 8.1.01.01.2)	SEQ 1 IMPUT BISTABLE AND RELAT
-	08.1.01.02.2	PT-430 LOOP	PC-430G PC-430GI	INPUT SBORT	1/3 PZE PERSSURE IMPUTS DISABLED TO SEQ 1, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	PBRIODIC TRATING	REDUNDANT SEG/TRAIN	BEDUCED BRUIABILITY FOR SEG 1 SIS/SIBLOP	
	08.1.01.02.3	PT-430 LOOP	PC-430G PC-430GI	TRIPPED	1/3 PZR PRESSURE INPUTS TRIPPED TO SEQ 1, LOGIC BECOMES 1/2 ON REMAINING	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT PZR PRESSURE CHANNELS	REDUCED REDUNDANCY AGAINST SEQ 1 S18/818LOP	
	08.1.01.02.4	PT-430 LOOP	PC-430G PC-430GI	AS-IS (UNTRIPPED)	CHANNELS (SAME AS 0.1.1.2.2)	(SAMB AS 8.1.1.2.2)	(SAME AS 8.1.1.2.2)	(SAME AS 8.1.1.2.2)	
	08.1.01.03.1	PT-430 LOOP	PC-4301 PC-43011	INPUT OPEN	(SAME AS 8.1.1.1.2)	(SAME AS 8.1.1.1.2)	(SAME AS 8.1.1.1.2)	(SAME AS 8.1.1.1.2)	SI BLOCE PERMISSIVE IMPUT BISTABLE AND RELAT
	08: 1:01:03:2	PT-430 LOOP	PC-4301 PC-43011	- INPUT SBORT · -·	1/3 PZR PRESSURE IMPUTS DISABLED TO BLOCK PREMISSIVE POR SEQ 1 AND 2, LOGIC BROOMES	· PERIODIC TESTING	- REDUNDANT-PZB-PRBSSURS CHANNELS	REDUCED RELIABILITY FOR SEG 1 AND 2 SI BLOCE PERMISSIVE	
	08.1.01.03.3	PT-430 LOOP	PC-4301 PC-43011	TRIPPED	2/2 ON REMAINING CHANNELS 1/3 PZE PRESSURE INPUTS TRIPPED TO BLOCK PREMISSIVE FOR SEQ 1 AND 2, LOGIC BECOMES	PERIODIC TESTING	REDUNDANT PZR PRESSUEE CHANNELS	REDUCED REDUNDANCY AGAINST SEQ 1 AND 2 SI BLOCK PERHISSIVE	
	08.1.01.03.4	PT-130 LOOP	PC-4301 PC-43011	AS-IS (UNTRIPPED)	1/2 ON REHAINING CHANNELS (SAME AS 8.1.1.3.2)	(SAMB AS 8.1.1.3.2)	(SAMB AS 6.1.1.3.2)	(SANE AS 8.1.1.3.8)	
}	08.1.01.04.1 1	PT-430 LOOP	VITAL BUS \$1 (8-1101V)	VOLTS LOW	1/3 PZE PRESSURE INPUTS DISABLED TO SEQ 1 AND TRIPPED TO BLOCE PERMISSIVE FOR SEQ 1 AND 2, LOGIC BROOMES 2/2 AND 1/2 RESPECTIVELY ON REMAINING	CONTROL ROOM INDICATION, ANNUNCIATION		REDUCED RELIABILITY FOR SEQ 1 SIS/SISLOP AND REDUCED REDUNDANCY AGAINST SI BLOCK PERMISSIVE FOR SEQ 1 AND 2	1/3 SEQ BLOCK PERHISSIVE COULD ALSO RESULT IF VITAL BUS AUTO-TRANSFER OCCURS DURING FAILURE TRANSIENT
	08.1.01.05.1 8	T-430 LOOP	RBG BUS \$1 (8-11R4)	VOLTS LOW	CHANNELS 1/3 PZR PRESSURE INPUTS TRIPPED TO SEQ 1 AND BLOCK PERHISSIVE FOR SEQ 1 AND 2, LOGIC BECOMES 1/2 ON REMAINING	CONTROL ROOM INDICATION, ANNUNCIATION		REDUCED REDUNDANCY AGAINST SEQ 1 818/515LOP AND 81 BLOCK PREMISSIVE FOR SEQ 1 AND 2	
	08.1.02.01.1 <sub>.</sub> P	T-431 LOOP	PT-431	SIGNAL BIGB	CHANNELS 1/3 PZR PRESSURB INPUTS DISABLED TO SEQ I AND BLOCE PBEHISSIVE FOR SEQ I AND 2, LOGIC BECOMES 2/2 FOR BOTH FUNCTIONS	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	BRDUNDANT SEQ/TRAIN FOR SIS/SIBLOP, REDUNDANT PZE PRESSURB CHANNELS FOR SI BLOCE PREMISSIVE	REDUCED BELIABILITY FOR SEQ 1 (SIS/SISLOP) AND SI BLOCE PERMISSIVE FOR SEQ 1 AND 2	INCLUDES PT-431, TE-431, PC-431E, PC-431G AS PER EPS SINGLE FAILURE ANALYSIS (M39405)





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## EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPPE UNIT 1 TABLE 8-1: SAPETY INJECTION ACTUATION PMBA

ITBN #	DRAICE ID	COMPONENT ID	PAILURB MODE	LOCAL EPPECTS AND DEPENDENT PAILURES	HRTHOD OP DBTECTION	INHERRNY COMPENSATING PROVISIONS	BFFBCT ON BCC8	REMARCS
08.1.02.01.2	PT-431_LOOP.	PT-431	SIGNAL LOV	1/3 PZR PRESSURS IMPUTS TRIPPED TO SEQ 1 AND BLOCE PREMISSIVE FOR SEQ 1 AND 2, LOGIC BECOMES 1/2 FOR BOTE FUNCTIONS	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING		BRDUCED REDUNDANCY AGAINST SEQ 1 BIS/SISLOP AND SI BLOCK PERMISSIVE FOR SEQ 1 AND 2	
00.1.02.02.1	PT-431 LOOP	PC-431B PC-431BX	INPUT OPEN	(SAME AS 8.1.02.01.2)	(SAME AS 8.1.02.01.2)	(SAHE AS 8.1.02.01.2)	(SAME AS 8.1.02.01.2)	SEQ 1 IMPUT BISTABLE AND BELAY
08.1.02.02.2	PT-431 LOOP	PC-431B PC-431BI	INPUT SBORT	1/3 PZR PRESSURE IMPUTS DISABLED TO SEQ 1, LOGIC BECOMES 2/2 ON REMAINING	PERIODIC TESTING	REDUNDANT SEG/TRAIN	REDUCED RELIABILITY FOR SEQ 1 818/818LOP	
08.1.02.02.3	PT-431 LOOP	PC-431B PC-431BI	TRIPPED	CHANNELS 1/3 PZE PERSSURE INPUTS TRIPPED TO SEQ 1, LOGIC BECOMES 1/2 ON REMAINING	CONTROL ROOM INDICATION, ANNUNCIATION	ERDUNDANT PER PERSSURE CHANNELS	REDUCED REDUNDANCY AGAINST SEQ 1 818/818LOP	
08.1.02.02.4 ;	PT-431_LOOP	PC-431E PC-431E1	AS-IS (UNTRIPPED)	CHAMBELS (SAME AS \$.1.2.2.2)	(SANB 48 8, 1.2.2.2)	(SAME 48 4,1.2.2.2)	(8AHR AB 8,1,2.2.2)	
08.1.02.03.1 P	PT-431 LOOP	PC-431G PC-430GI	IMPUT OPBN	(SAME AS 8.1.2.1.2)	(SAMB AB 8.1.2.1.2)	(SABE AS 8.1.2.1.2)	(SAME AS 8.1.2.1.2)	SI BLOCK PERMISSIVE IMPUT BISTABLE AND RELAT
08.1.02.03.2 P	PT-431 LOOP	PC-431G PC-430GI	INPUT SHORT	1/3 PZE PRESSURE IMPUTS DISABLED TO BLOCE PERMISSIVE FOR SEQ 1 AND 2, LOGIC BECOMES	PERIODIC TESTING	REDUMDANT PZR PRESSURE Ceannels	REDUCED RELIABILITY FOR SEQ 1	
08.1.02.03.3 P	7-431 LOOP	PC-431G PC-430GI	TRIPPED	2/2 ON REMAINING CHANNELS 1/3 PZR PRESSURE INPUTS TRIPPED TO BLOCK PERMISSIVE	PERIODIC TESTING	REDUNDANT PZR PRESSURE CHANNELS	REDUCED REDUNDANCY AGAINST SEQ 1 AND 2 SI BLOCE PERHISSIVE	
08.1.02.03.4 P	7-431 1.00P	PC-431G	AS-IS (UNTRIPPED)	POR SEQ 1 AND 2, LOGIC BECOMES 1/2 ON REMAINING CHANNELS (SAME AS 8.1.2.3.2)	{SAMB AS 8.1.2.3.2}	(SAME AS 8.1.2.3.2)	{SAME AS 8.1.2.3.2}	
08.1.02.04.1 P		PC-431GI VITAL BUS \$2 (8-1201V)	VOLTS LOW	1/3 PZR PRESSURR IMPUTS DISABLED TO 8BQ 1 AND TRIPPED	CONTROL ROOM INDICATION,	REDDUDANT SEQ/TRAIN FOR SIS/SISLOP, REDUNDANT PZR		1/3 SEQ BLOCE PERMISSIVE COULD ALSO RESULT IP VITAL BUS
				TO BLOCK PERMISSIVE FOR SEQ I AND 2, LOGIC BECOMES 2/2 AND 1/2 RESPECTIVELY ON REMAINING CHANNELS		PRESSURE CHANNELS FOR BLOCE PREMISSIVE	PERMISSIVE FOR SEQ 1 AND 2	AUTO-TRANSPER OCCURS DURING PAILURE TRANSIENT
08.1.02.05.1 P	T-431 LOOP	RBG BUS #2 (8-1284)	VOLTS LOW	1/3 PZR PRESSURE INPUTS TRIPPED TO SEQ 1 AND BLOCE PREMISSIVE FOR SEQ 1 AND 2.	CONTROL BOOK INDICATION, ANNUNCIATION	REDUNDANT PZE PRESSURE CBANNELS	ERDUCED REDUNDANCY AGAINST SEQ 1 SIS/SISLOP AND SI BLOCE	
				LOGIC BECOMES 1/2 ON REMAINING CHANNELS			PERMISSIVE FOR SEQ 1 AND 2	
08.1.03.01.1 P	T-432 LOOP	PT-432	SIGNAL BIGB	PERMISSIVE POR SEQ 1 AND 2,	CONTROL BOOM INDICATION, ANNUNCIATION, PERIODIC TESTING	PRESSURE CHANNELS FOR SI BLOCK	REDUCED RELIABILITY FOR SEQ 1 (313/813LOP) AND 81 BLOCK PERMISSIVE FOR SEQ 1 AND 2	INCLUDES PT-432, TE-432B, PC-432C, PC-432D AS PBR RPS SINGLE PAILURE ANALTSIS
0 <u>8</u> .1.03.01.2 P1	T-432 LOOP	PT-432	SIGNAL LOW	LOGIC BECOMES 2/2 POR BOTH FUNCTIONS 1/3 PZE PRESSURE IMPUTS TRIPPED TO SEQ 1 AND BLOCK PREMISSIVE POR SEQ 1 AND 2, LOGIC BECOMES 1/2 POR BOTH FUNCTIONS	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	PERHISSIVE REDUNDANT PZR PRESSURE CHANNELS	BEDUCED REDUNDANCY AGAINST EEQ 1 SIS/SISLOP AND SI BLOCK PERMISSIVE FOR SEQ 1 AND 2	(H39405)





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### EMBRGBNCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPER UNIT 1 TABLE 8-1: SAPETY INJECTION ACTUATION PERA

							•	
ITRH #	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT PAILURES	MRTHOD OF DBTECTION	PROATBIONS IMPERBAL COMBERSALING	RFFRCT ON BCC8	REMARES
08.1.01.02.1_1	PT-132 LOOP	PC-432C	IMPUT OPEN	(BAHE AS S.1.03.01.2)	(SAMB AS 8.1.03.0).2)	(SAME AS 8.1.03.01.2)	(SAME AS 8.1.03.01.2)	SEQ 1 LUPUT BISTABLE AND RELAY
08.1.03.02.2 1	PT-432 LOOP	PC-432C1 PC-432C PC-432C1	INPUT SHORT	1/3 PZR PRESSURE IMPUTS DISABLED TO SEQ 1. LOGIC	PERIODIC TESTING	REDUNDANT SEG/TRAIN	REDUCED BELIABILITY FOR SEQ 1 \$19/818LOP	
				BECOMES 2/2 ON REMAINING CHANNELS		,		
08.1.03.02.3	PT-432 LOOP	PC-432CI	TRIPPRO	1/3 P2R PRESSURE INPUTS TRIPPED TO SEQ 1, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	CONTROL ROOM INDICATION, ANNUNCIATION	REDUEDANT PER PRESSURE CHANNELS	REDUCED REDUMDANCY AGAINST SEQ 1 SIS/SISLOP	
08.1.03.02.4	7-432 LOOP	PC-432C PC-432CI	A8-IS (UNTRIPPED)	(SAME AS 8.1.3.2.2)	(SAME AS 8.1.3.2.2)	(SAME AS 8.1.3.2.2)	(8.5.5.1.8 8A SHAR)	
08.1.03.03.1	7-432 LOOP	PC-432D PC-432DI	INDUT OBEN	(SAME AS 8,1.3.1.2)	(SAME AS 8.1.3.1.2)	(SAME AS 8.1.3.1.2)	(SAMB AS 8.1.3.1.2)	SI BLOCK PERMISSIVE INPUT BISTABLE AND RELAT
08.1.03.03.2 5	PT-432 LOOP	PC-432D PC-432DI	INPUT SHORT	1/3 PZE PRESSURE INPUTS DISABLED TO BLOCE PERHISSIVE	PREIODIC TESTING	REDUNDANT PIR PRESSURE Crannels	REDUCED RELIABILITY FOR SEQ 1	
08.1.03.03.3 F	T-437 LOOP	PC-432D	TRIPPBD	POR SEQ 1 AND 2, LOGIC BECOMES 2/2 ON REMAINING CHANNELS 1/3 PZR PRESSURE INPUTS	PBRIODIC TRATING	REDUNDANT PER PRESSURE	REDUCED REDUNDANCY AGAINST SEQ	
	1 100 0001	PC-432DI		TRIPPED TO BLOCK PERMISSIVE POR SEQ 1 AND 2, LOCIC BECOMES 1/2 ON REMAINING CHANNELS		CHANNELS	1 AND 2 SI BLOCE PERMISSIVE	
08.1.03.03.4 P	T-432 LOOP	PC-432D PC-432DI	AS-IS (UNTRIPPED)	(SAHB AS 8.1.3.3.2)	(SAME AS 8.1.3.3.2)	(SABR AS 0.1.3.3.2)	(SAHR AS 8.1.3.3.2)	
08.1.03.04.1 P	T-432 LOOP	VITAL BUS 13	VOLTS LOW	1/3 PZR PRESSURE INPUTS DISABLED TO SEQ 1 AND TRIPPED TO BLOCE PERMISSIVE FOR SEQ 1 AND 2, LOGIC BECOMES 2/2 AND	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT BEG/TRAIN FOR BIB/BISLOP, REDUNDANT FOR PRESSURE CHANNELS FOR BLOCE PERHISSIVE	REDUCED RELIABILITY FOR SEQ 1 SIS/SISLOP AND REDUCED REDUNDANCY AGAINST SI BLOCK PERMISSIVE FOR SEQ 1 AND 2	1/3 SEQ BLOCE PERHISSIVE COULD RESULT IF VITAL BUS AUTO-TRANSPER OCCURS DURING FAILURE TRANSIENT
08.1.03.05.1 P	T-432 LOOP	RRG BUS #3 (8-13R4)	AOF18 FOM	1/2 RBSPBCTIVBLY ON RBMAINING CHANNELS 1/3 PZE PRESSURE INPUTS TRIPPED TO SEQ 1 AND BLOCK PERMISSIVE POR SEQ 1 AND 2, LOGIC BECOMES 1/2 ON REMAINING	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT PZR PRESSURE Channels	REDUCED REDUMDANCY AGAINST SEQ 1 SIS/SISLOP AND SI SLOCE PERMISSIVE FOR SEQ 1 AND 2 -	
	T-431 LOOP	SW. PR/430	CONTACTS OPEN	CHANNELS LOW PZR PRESSURE SIGNAL TO RECORDER. NO EFFECTS ON	NOME REQUIRED	NONE BEGNIEED	NOME	SER RPS SINGLE FAILURE ANALYSIS (M39405)
08.1.04.01.2 P	T-431 LOOP	BW. PR/430	CONTACTS CLOSED	INSTRUMENT LOOPS PARALLELING OF 3/3 PZR PRESSURE INPUTS TO SEQ 1 AND	PERIODIC TESTING	REDUNDANT SEQ/TRAIN FOR SIS/SISLOP, NOWE FOR BLOCK	REDUCED RELIABILITY FOR SEQ 1 SIS/SISLOP AND SI BLOCK	
P	T-432 LOOP		•	BLOCK PERMISSIVE FOR SEQ 1 AND		PERMISSISVE	PREBISSIVE FOR REQ 1 AND 2	
-	T-430 LOOP T-431 LOOP T-432 LOOP	SW. PR/430	CONTACTS GROUNDED	CURRENT LOOP RESISTORS SHORTED CAUSING BIGE LOOP SIGNALS AND DISABLING 3/3 PZR PRESSURE INPUTS TO SEQ 1 AND BLOCK PERMISSIVE FOR SEQ 1 AND 2		REDUNDANT SECTRAIN FOR SIGNISTOP, NOME FOR LOSS OF BLOCK PERHISSIVE	SEQ 1 SIS/SISLOP DISABLED,	INABILITY TO UNBLOCE SEQ: RESULTS IN LOSS OF SECONDARY RECIEC VIA INABILITY TO REOPEN CV-142/143/144





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## EMBEGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT 1 TABLE 8-1: SAPETE INJECTION ACTUATION PMBA

	ITBH #	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL BPPECTS AND DBPENDENT FAILURES	MRTHOD OP DRTECTION	INHERRNY COMPRISATING Provisions	REFERCT ON ECCS	RBHARIS
	08.1.05.01.1	PT-1120A LOOP	PT-1120A PA-1120A PC-1120-2 (E1-2)	TRIPPED	1/3 CONTAINMENT PRESSURE INPUTS TRIPPED TO SEQ 1, LOGIC BECOMES 1/2 ON REMAINING	CONTROL ROOM INDICATION.	REDUNDANT TRAIN A CONTAINMENT PRESSURE CHANNELS	REDUCED REDUNDANCY AGAINST SEQ 1 318/818LOP	SRQ_1_INPUT.BISTABLE.AND.RELAY
·	08.1.05.01.2	PT-11204 LOOP	PT-11204 PA-11204 PC-1120-2 (E1-2)	AS-18 (UNTRIPPED)	CHANNELS 1/3 CONTAINMENT PRESSURE INPUTS DISABLED TO SEQ 1, LOGIC BROOMES 2/2 ON REMAINING	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT SEQ/TRAIM	REDUCED RELIABILITY FOR SEQ 1 SIS/SISLOP	
	08.1.06.01.1	PT-1120B LOOP	PT-1120B PA-1120B PC-1120-2 (E2-2)	TRIPPBD	CHANNELS 1/3 CONTAINMENT PRESSURE INPUTS TRIPPED TO SEQ 1, LOGIC BECOMES 1/2 ON REMAINING	CONTROL ROOM INDICATION, ANNUNCTATION	REDUNDANT TRAIN A CONTAINMENT PRESSURE CRANNELS	FEDUCED SEDUNDANCI AGAINST SEQ	SEQ 1 INPUT BISTABLE AND RELAT
	08.1,06,01,2	PT-1120B_LOOP_	PT-1120B PA-1120B PC-1120-2 (K2-2)	AS-IS (UNTRIPPED)	CHANNELS 1/1 CONTAINMENT PRESSURE INPUTS DISABLED TO SEQ 1, LOGIC BECORES 2/2 ON REMAINING	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT SEG/TRAIN	REDUCED BELIABILITY FOR SEQ 1 SIS/SISLOP	
	08.1.07.01.1	PT-1120C LOOP	PY-1120C PA-1120C PC-1120-2 (44-2)	TRIPPRD	CHANNELS 1/3 CONTAINMENT PERSOURS INPUTS TRIPPED TO SEQ 1, LOGIC BECORES 1/2 ON REMAINING	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT TRAIN A CONTAINMENT PRESSURE CHANNELS	REDUCED REDUNDANCY AGAINST SEQ 1 818/819LOP	SEQ 1 ISPUT BISTABLE AND RELAT
	08.1.07.01.2	PT-1120C LOOP	PY-1120C PA-1120C PC-1120-2 (E4-2)	AS-IS (UNTRIPPED)	CHANNELS 1/3 CONTAINMENT PRESSURE IMPUTA DISABLED TO SEG 1, LOGIC BECOMES 2/2 ON REMAINING	CONTROL BOOM INDICATION, ANNUNCIATION	REDUNDANT SEQ/TRAIN	REDUCED RELIABILITY FOR SEQ 1 SIS/SISLOP	
		PT-1120A PT-1120B PT-1120C LOOPS	TB-1120	OUTPUT VOLTS LOW	CHANNELS 3/3 CONTAINMENT PRESSURE INPUTS DISABLED TO SEQ 1	CONTROL BOOM INDICATION, PERIODIC TESTING	REDUNDANT SEQ/TRAIN		MEST POWER SUPPLY. CONTAINMENT BIGE PRESSURE SIS CREDITED FOR MAIN PRED ISOLATION AND CONTAINMENT SPRAY PERMISSIVE
		PT-1120A PT-1120B PT-1120C LOOPS	VITAL BUS 81 (8-1112V)	AOL18 FOR	3/3 CONTAINMENT PRESSURE IMPUTS DISABLED TO SEQ 1	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT SEQ/TRAIN	SEQ 1 CONTAINMENT WIGH PRESSURE SIS/SISLOP DISABLED	FOR MSLB INSIDE CONTAINMENT CONTAINMENT BIGE PRESSURE SIS CREDITED FOR MAIN FRED ISOLATION AND CONTAINMENT SPEAT PREMISSIVE FOR MSLB
	08.1.09.01.1	SEQ 1 SI BLOCE	SW. CS-1	CONTACTS OPEN	RBLAY AT SBAL-IN CIRCUIT DISABLED, CAUSING SEQ 1 SI AUTO-BLOCK (YS. PERMISSIVE) ON	PBRIODIC TESTING	REDUNDANT SBQ/TRAIN	8BQ 1 818/818LOP DISABLED	IMBIDE CONTAINMENT CONTACTS WORMALLY CLOSED TO ENERGIZE RELAY AT
	08.1.09.01.2	SEQ 1 81 BLOCE	SW. CS-1	CONTACTS CLOSED	2/3 LOW PZR PRESSURE CHANNELS RELAT AI CANNOT BE DB-ENERGIZED FOR SEQ 1 SI BLOCK	PRRIODIC TRSTING	REDUNDANT SEQ/TRAIN	SEQ 1 818/SISLOP DISABLED	- 1
•	08.1.09.02.1	SEQ 1 SI BLOCK	AI	INPUT OPBN	SEQ 1 SI BLOCKED	CONTROL ROOM ANNUNCIATION	BEDUNDANT SEQ/TRAIN	SEQ 1 SIS/SISLOP DISABLED	BRLAY IS DE-EMERGIZE FOR SI BLOCK
	08.1.09.02.2	SBQ 1 SI BLOCK	AÎ	INPUT SBORT		CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT SRQ/TRAIN FOR INJECTION, NOME FOR RECIRCULATION	SSEQ 1 AND SI BLOCK POR SSQ 2 DISABLED	<del></del>



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### BUBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT 1 TABLE 8-1: SAPETT INJECTION ACTUATION PREA

·}	· · · <del>-</del> · ·							
ITEN #	DBVICB ID	COMPONENT ID	PAILURE HODE	LOCAL BPPECTS AND DEPENDENT FAILURES	MBTHOD OF DBTBCTION	PROATRIONS IMBRERAL CONDERSYJING	BPPRCT ON BCCS	REMARES
00 1 00 02 1	. SBQ_1_SI_BLOCE,	4.	O.M.	(CIMB 40 A 1 A 1 A)	(CIMB to 8 t 8 t 9)	/D.WD 40 8 1 8 1 91	/CIMD 40 6 1 6 1 91	
08.1.09.02.4	SBQ 1 SI BLOCK	_A4	OFF (BLOCK)	(SAME AS \$.1.9.1.2) (SAME AS 8.1.9.2.1)	(SARE AS 9.[.7.].4]		(SAMB AS 8.1.9.1.2) (BAMB AS 8.1.9.2.1)	
08.1.10.01.1		R-11A _(RELAT)	CONTACTS OPBN	LOSS OF DG VOLTS/FREQ INPUT TO SEQ 1, DISABLING SISLOP LOAD	PERIODIC TESTING		•	DG VOLTS/FREQ BELAT
08.1.10.01.2	DG #1	R-11A (RBLAY)	CONTACTS CLOSED	SEQUENCING DG VOLTS/PREQ INPUT TO SEQ 1, CAUSING PREMATURE SISLOP LOAD	PERIODIC TESTING	(SAMB AS 8.1.10.1.1)	(SAME AS 8.1.10.1.1)	
1				SEQUENCING AND POTENTIAL DG PAILUES				
08.1.10.02.1	DG A1	152-11C14	OPEN	LOSS OF DG BREE CLOSED INPUT	PBRIODIC TESTING	(8AMB AS 8.1.10.1.1)	(SAER AS 8.1.10.1.1)	
1		a CONTACT		TO SEQ 1, DISABLING SISLOP LOAD SEQUENCING		•		
08.1.10.02.2	DG 11	152-11014	CLOSED	DG BRES CLOSED INPUT TO SEQ 1,	PRRIODIC TRATING		REDUCED BELIABILITY OF TRAIN A	· · · · · · · · · · · · · · · · · · ·
		"a" CONTACT		CAUSING SISLOP LOAD SEQUENCING CONCURRENT WITH DG BREE CLOSE SIGNAL			POR SISLOP	
08.1.11.01.1	SBQ 1	89-2164 (SIS INITIATE)	CONTACTS OPEN	SEQ 1 SIE/SISLOP CANNOT BE MANUALLY INITIATED. NO EPPECT ON AUTO INITIATION	PERIODIC TESTING		REDUCED RELIABILITY OF TRAIN A FOR SIS/SISLOP	
08.1.11.01.2	·	89-2164 (SIS INITIATE)	CONTACTS CLOSED	1/2 SERIES CONTACTS CLOSED IN SEQ 1 MANUAL SIS CET. TRIP/NORMAL/RESET SWITCH	PBRIODIC TESTING		REDUCED REDUMBANCY AGAINST SEQ 1 918/818LOP	
08.1.11.02.1		BS-2166 (SIB RESET)	CONTACTS OPEN	UWAPPECTED SEQ 1 SIS/SISLOP CANNOT BE BESET APTER SI BLOCE,	PERIODIC TESTING	REDUNDANT SEG/TRAIN FOR SECONDARY RECIRC PUMPING, NONE	STRAIN A SECONDARY RECIRC PUMPING DISABLED, LOSS OF	CV-142/143/144 ACTUATED CLOSED BY REDUNDANT SOLEMOID VALVES
				PREVENTING REALIGNMENT/RESTART OF TRAIN A SI/FW PUMPS AND REOPENING OF CV-142/143/144			SECONDARY RECIRC PLOW PATE	(ONE PER SEQ/TRAIN PER CV). CLE AND HLE UNAPPECTED BY THIS PAILURE SINCE PCV-1112
			· · · · · · · · · · · · · · · · · · ·	POR SECONDARY RECIRCULATION				(SV-1112) HAS AN OVERFIDE SWITCH/RELAT TO PREMIT MODULATION/CLOSURE EVEN WITH
								SIS/SISLOP STILL PRESENT
08.1.11.02.2	8BQ 1	88-2166 (SIS RESET)	CONTACTS CLOSED	1/2 SERIES CONTACTS CLOSED IN SEQ 1 SIS RESET CET.	PERIODIC TESTING		BEDUCED RELIABILITY OF SEQ 1 SIS/SISLOP FOR SELOCA, SGTR AND	
1	690 I	era	COMPACE ORDIN	TRIP/NORMAL/RESET SWITCH UNAPPROTED	DDD LOD LG - DG-LVO		MSLB	DARLINE GRIERAL AN GLOG
08.1.11.03.1	9BA 1	SIS TRIP/NORML/RESET	CONTACTS OPEN	SBQ 1 MANUAL SIS, SIS BESET Disabled, preventing:	PERIODIC TESTING	REDUNDANT SEQ/TRAIN FOR INJECTION AND SECONDARY RECIRC	*REDUCED RELIABILITY OF TRAIN A	ROTARY SWITCH ON BLSS BURWRILLANCE PANEL
		(SWITCH)		REALIGNMENT/RESTART OF TRAIN A SI/FN PUMPS, REOPENING OF		PUMPING, NOWE FOR SECONDARY	SECONDARY RECIEC PUMPING DISABLED, LOSS OF SECONDARY	SUBTRIBLERUS FARSE
08.1.11.03.2	SBQ 1	SIS TRIP/NORML/RESET	CONTACTS CLOSED	CV-142/143/144 1/2 SBRIES CONTACTS CLOSED IN SEQ 1 MANUAL SIS, SIS RESET	PERIODIC TESTING	REDUNDANT SWITCHES	RECIRC PLOW PATE REDUCED REDUNDANCY AGAINST SEQ 1 S18/818LOP AND 818/818LOP	
08.3.11.04.1	SBQ 1	(SWITCH) BS-2165 (LOP INITIATE)	CONTACTS OPEN	CETS. BB-2164, 2166 UNAPPECTED	PBBIODIC TESTING	BEDUNDANT SEQ/TRAIN	RESET REDUCED RELIABILITY OF SEQ 1 LOP/SISLOP	





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## EMBERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS \_\_\_\_\_ SAN ONOPRE UNIT 1.\_\_\_\_\_\_\_ TABLE 8-1: SAPETY INJECTION ACTUATION FREA

ITEM # DBV	CB ID COMPONENT	T ID FAILURE MODE	LOCAL BPFECTS AND DEPENDENT PAILURES	METHOD OF	INBERRNT COMPRESSATING PROVISIONS	BFFECT ON BCCS	REMARES
08.1.11.04.2_SBQ.1	BS-2165 (LOP INITIA	CONTACTS CLOSED	1/2 SERIES CONTACTS CLOSED IN SEQ I MANUAL LOP CET. TRIP/NORMAL/RESET SWITCH UNAPPECTED	PERIODIC TESTING	REDUNDANT SWITCE	REDUCED REDUKDANCY AGAINST SEQ I LOP/SISLOP	
08.1.11.05.1 SBQ 1	BS-2167 (LOP BBSBT)	CONTACTS OPEN	SEQ I LOB/LOP CANNOT SE MAMUALLY RESET TO PREMIT RESTART OF TRAIN A NOW-SAFRIT LOADS FOR SECONDART	PBRIODIC TESTING	REDUNDANT SEQ/TRAIN	TRAIN A SECONDARY BECIEC DISABLED BY LOCK-OUT OF NON-SAPETY LOADS	
08.1.11.05.2 SEQ 1	BS-2167 (LOP RESET)	CONTACTS CLOSED	RECIRCULATION POLLOWING SIBLOP 1/2 BERIES CONTACTS CLOSED IN SEQ I MANUAL LOB/LOP ERSET CET. TRIP/NORMAL/RESET SWITCE UNAPPECTED		REDUNDANT SEQ/TRAIN	REDUCED RELIABILITY OF SEQ 1 LOB/LOP/SISLOP	
08.1.11.06.1 SBQ 1	LOP TRIP/WORML/ (SWITCE)		SEQ 1 MANUAL LOP, LOB/LOP RESET DISABLED, PREVENTING RESTART OF TRAIN A NON-SAFETY LOADS FOR SECONDARY EXCIRC	PERIODIC TESTING	REDUNDANT SEQ/TRAIN	TRAIN A NON-SAFETY LOADS DISABLED FOR SECONDARY RECIECULATION	ROTARY SWITCH ON SLSS SURVEILLANCE PANEL
08.1.11.06.2 SEQ 1	LOP TRIP/NORML/ (SWITCB)	CONTACTS CLOSED	1/2 SERIES CONTACTS CLOSED IN SEQ 1 MANUAL LOP AND LOB/LOP RESET CETS. BS-2165, 2167	PREIODIC TESTING	REDUNDANT SWITCERS	REDUCED REDUNDANCY AGAINST SEQ 1 LOP/SIBLOP AND AGAINST RESET OF LOB/LOP/SIBLOP	·
08.1.11.07.1 SRQ 1	SUBCRANNEL (LOGIC)	I TRIPPED	UNAPPECTED 1/2 REDUNDANT SEQ 1 SUBCHANNELS ACTUATED, LOB/LOP/SIS/SISLOP LOGIC AND TIMING BECOMES 1/2 ON	CONTROL BOOM INDICATION, PERIODIC TESTING	REDUNDANT SUBCRANNEL	REDUCED REDUNDANCY AGAINST SEQ 1 LOB/LOP/SIS/SISLOP	
08.1.11.07.2 SBQ 1	SUBCHANNEL (LOGIC)		REMAINING SUBCHANNEL 1/2 REDUNDANT SEQ I SUBCHANNELS PAILED, DISABLING	PERIODIC TESTING	REDUNDANT SEQ/TRAIN	TRAIN & LOB/LOP/SIS/SISLOP DISABLED	
08.1.11.08.1 SEQ 1	SUBCHANNEL (LOGIC)	T TRIPPED	2/2 LOGIC FOR SEQ 1 (SAMB AS 8.1.11.7.1)	(BAHR AB 8.1.11.7.1)	(SAME AS 8.1.11.7.1)	(SAME AS 8.1.11.7.1)	
08.1.11.08.2 SBQ 1	SUBCRANNEL (Logic)		(BAMB AS 8.1.11.7.2)	(8AMB AS 8.1.11.7.2)	(SANR AS 0.1.11.7.2)	(SANE AS 8.1.11.7.2)	
08.1.12.01.1 SBQ 1 08.2.01.01.1 PT-3000A	125 YDC BUB (72-124) LOOP PTC-3000A	TRIPPED	SEQ I DISABLED  1/3 PZE PEESSUEE INPUTS TRIPPED TO SEQ 2, LOGIC BECOMES 1/2 ON REMAINING	CONTROL ROOM INDICATION CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT SEQ/TRAIN REDUNDANT PER PRESSURB CHANNELS	TRAIN A LOB/LOP/SIS/SISLOP DISABLED REDUCED REDUNDANCY AGAINST SEQ 2 SIS/SISLOP	SEQ OUTPUT RELATS ARE EMBRGIZE TO ACTUATE INCLUDES PTY-3000A, PTB-3000A
08.2.01.01.2 PT-3000A	LOOP PYC-3000A	AS-IS (UNTRIPPED)	CHANNELS 1/3 PZB PRESSURB INPUTS DISABLED TO SEQ 2, LOGIC BECOMES 2/2 ON REMAINING	PERIODIC TESTING	BBDUNDANT SEQ/TBAIN	REDUCED RELIABILITY FOR SEQ 2 SIS/SISLOP	
08.2.02.01.1 PT-3000B	LOOP PYC-3000B	TRIPPBD	CHANNELS 1/3 PZR PRESSURE INPUTS TRIPPED TO SEQ 2, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT PER PRESSURE Chammels	REDUCED REDUNDANCY AGAINST SEQ 2 SIS/SISLOP	INCLUDES PEV-3000B, PYB-1000B





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### EMBEGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFER UNIT 1.

TABLE 4-1: SAFETY INJECTION ACTUATION FR	FHBA	
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ITBN #	DRVICE ID	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT PAILURES	METEOD OF DETECTION	INBERENT COMPENSATING PROVISIONS	BPFECT ON RCCS	REMARES
08.2.02.01.2	. PT-3000B LOOP.	PTC-3000B	AS-1S (UNTRIPPED)	1/3 PZR PRESSURE INPUTS DISABLED TO SEQ 2, LOGIC BECORES 2/2 ON REMAINING CHANNELS	PBB10D1C, TBBT1MG	REDUNDANT_SEQ/TRAIN	REDUCED_RELIABILITY_FOR_88Q_2_ 818/818LOP	
08.2.03.01.1	PT-3000C LOOP	PTC-3000C	TRIPPBD	1/3 PZB PRESSURE INPUTS TRIPPED TO SEQ 2, LOGIC BECOMES 1/2 ON REMAINING	CONTROL BOOM INDICATION, ANNUNCIATION	REDUNDANT PER PRESSURE CHANNELS	REDUCED REDUNDANCY AGAINST SEQ 2 818/818LOP	INCLUDES PTV-3000C, PTB-3000C
08.2.03.01.2	PT-3000C LOOP	PTC-3000C	AS-IS (UNTRIPPED)	CHANNELS 1/3 PZE PERSSURE IMPUTS DISABLED TO SBQ 2, LOGIC BECOMES 2/2 ON REMAINING	PBRIODIC TESTING	REDUNDANT SEQ/TRAIN	REDUCED RELIABILITY FOR SEQ 2 818/818LOP	
00 0 01 01 1	/NOR HORAL			CHANNELS		,	•	•
08.2.05.01.1		PY-1121A PA-1121A PC-1121-1 (K1-2)	TRIPPRO	1/3 CONTAINMENT PRESSURE INPUTS TRIPPED TO SEQ 2, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	CONTROL BOOM INDICATION, ANNUNCIATION	REDUNDANT TRAIN B CONTAINMENT PRESSURE CHANNELS	EBDUCED REDUNDANCY AGAINST SEQ 2 318/818LOP	SEQ 2 INPUT BISTABLE AND RELAY
08.2.05.01.2	PT-11214 LOOP	PT-1121A PA-1121A PC-1121-1 (E1-2)	AS-IS (UNTRIPPED)	1/3 CONTAINMENT PRESSURE INPUTS DISABLED TO SEQ 2, LOGIC BECOMES 2/2 ON REMAINING	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT SEQ/TRAIN	REDUCED RELIABILITY FOR SEQ 2 SIS/SISLOP	
08.2.06.01.1	PT-11218 LOOP	PY-1121B PA-1121B PC-1121-1 (E2-2)	TRIPPED	CHANNELS 1/3 CONTAINMENT PRESSURE IMPUTS TRIPPED TO SEQ 2, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	CONTROL BOOM INDICATION,	REDUNDANT TRAIN & CONTAINMENT PRESSURE CHANNELS	EBDUCED REDUNDANCY AGAINST SEQ 2 918/918LOP	SEQ 2 IMPUT BISTABLE AND RELAY
08.2.06.01.2	PT-1121B LOOP	PY-11218 PA-11218 PC-1121-1 (E2-2)	AS-IS (UNTRIPPED)	1/3 CONTAINMENT PRESSURE IMPUTS DISABLED TO SEQ 2, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	CONTROL BOOM INDICATION, ANNUNCIATION	SEDUMDANT SEQ/TRAIN	REDUCED RELIABILITY FOR SEQ 2 SIS/RISLOP	
08.2.07.01.1	PT-1121C LOOP	PT-1121C PA-1121C PC-1121-1 (E4-2)	TRIPPRD	1/3 CONTAINMENT PRESSURE IMPUTS TRIPPED TO SBQ 2, LOGIC BECOMER 1/2 ON REMAINING CHANNELS	CONTROL BOOM INDICATION, ANNUNCIATION	REDUNDANT TRAIN & CONTAINMENT PRESSURE CHANNELS	REDUCED REDUNDANCY AGAINST SEQ 2 818/818LOP	SEQ 2 IMPUT BISTABLE AND RELAY
08.2.01.01.2	PT-1121C LOOP	PE-1121C PA-1121C PC-1121-1 (E4-2)	AS-IS (UNTRIPPED)		CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT SEQ/TRAIN	REDUCED RELIABILITY FOR SEQ 2 SIS/SISLOP	
<del></del>	PT-3000A/B/C LOOPS PT-1121A/B/C LOOPS	Y8-1121	OUTPUT VOLTS LOW	3/3 PZE PRESSURE AND CONTAINMENT PRESSURE INPUTS DISABLED TO SEQ 2	CONTROL ROOM INDICATION, PBRIODIC TESTING	REDUNDANT SEQ/TRAIN	SEQ 2 BIS/SISLOP DISABLED	NEST POWER SUPPLY
08.2.08.02.1		VITAL BUS #5 (8-2901V)	WOL BELLOW	3/3 PZR PRBSSURB AND CONTAINMENT PRBSSURB INPUTS DISABLED TO SEQ 2	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT SEQ/TRAIN	SEQ 2 SIS/SISLOP DISABLED	
	SEG S SI BLOCK	SW. CS-2	CONTACTS OPEN	RBLAT BY SEAL-IN CIRCUIT DISABLED, CAUSING SEQ 2 SI AUTO-BLOCE (VS. PERMISSIVE) ON 2/3 LOW PZE PERSSUES CHANNELS	PBRIODIC TESTING	REDUNDANT SEQ/TRAIN	SBQ 2 \$18/818LOP DISABLED	CONTACTS NORMALLY CLOSED TO EMBRGIZE RELAY PE





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### EMBRGENCY CORB COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM ONOFRE UNIT 1 TABLE 8-1: SAFETY INJECTION ACTUATION FMEA

ITEM & DBVICE ID	COMPONENT ID	PAILURE MODE	LOCAL REPECTS AND DEPENDENT PAILURES	MBTHOD OF DBTECTION	PROAISIONS INSERSAL CONDENSALING	EPPECT ON BCC8	REMARES
08,2,09.01,2.88Q 2.51 BLOC	L\$¥,_C8-2	CONTACTS CLOSED	DE-ENERGIZED FOR SEQ 2 SI	PRRIODIC TRATING	PRDUNDANT SEG/TRAIN	SEG 2 818/8181QP DIBARLED .	
08,2,09,02.1_BBQ_2_S1_BLOC	LBI	INPUT OPBN	SEG 3 SI BLOCKED	CONTROL BOOM ANNUNCTATION	BRDUNDANT BB9/TRAIN	886 5 818/818POb DISVERSO	BRUAY IS DE-BURRIGUER FOR SI
08.2.09.02.2 SEQ 2 SI BLOC	E DI	INPUT SHORT	RELAY BE DE-ENERGIZED. PAULT CURRENT CAUSES PC-430IN,	CONTROL BOOM INDICATION, ANNUNCIATION	REDUNDANT SECTEAN FOR INJECTION, NOW FOR	SER 2 AND SI BLOCK FOR SER 1	SEG I AND \$ SI BLOCE PREMISSIVE CETS USE ADJACENT
			PC-431GE, PC-432DE TO PAIL A8-IS (CLOSED) BT CONTACT WELDING IN SEQ 2 SI BLOCK CET. PAULT WILL OPEN 125 VDC BREE		RECIRCULATION		CONTACTS PROM SAME PER PRESSURE RELATS. 100A BREE RATING TOO HIGH TO PROTECT RELATS
08.2.09.02.3 SEQ 2 SI BLOC	I 8I	ON	12-212 SBRVING SEQ 2 (SAME AS 8.2.9.1.2)	(SAME AS 8.2.9.1.2)	(SAME AS \$.2.9.1.2)	(SAME AS 8.2.9.1.2)	
08.2.09.02.4 SEQ 2 SI BLOC		OFF (BLOCE)	(SAMB AS 8.2.9.2.1)	(SAME AS 0.2.9.2.1)	(BAME AS 0.2.9.2.1)	(8AMB AS 8.2.9.2.1)	
08.2.10.01.1 DG #2	R-11A (RBLAY)	CONTACTS OPEN	LOSS OF DG VOLTS/PREQ INPUT TO SEQ 2, DISABLING SISLOP LOAD	PERIODIC TESTING	REDUNDANT SEQ/TRAIN	TRAIN B DISABLED FOR SISLOP	DG VOLTS/FREQ BELAT
08.2.10.01.2 DG #2	R-11A (BBLAT)	CONTACTS CLOSED	SEQUENCING DG VOLTS/FREQ INPUT TO SEQ 2, CAUSING PREMATURE SISLOP LOAD SEQUENCING AND POTENTIAL DG	PRRIODIC TRATING	(SAHE AS 8.2.10.1.1)	(BANR AS 8.2.10.1.1)	
08.2.10.02.1 DG 42	152-12C15 "a" CONTACT	OPEN	PAILURE LOSS OF DG BREE CLOSED IMPUT TO BEQ 2, DISABLING SISLOP LOAD SEQUENCING	PRRIODIC TRATING	(SAME AS 8.2.10.1.1)	(SAME AS 8.2.10.1.1)	
08.2.10.02.2 DG \$2	152-12C15 "a" CONTACT	CLOSED	DG BEER CLOSED INPUT TO SEQ 2, CAUSING SISLOP LOAD SEQUENCING CONCURRENT WITE DG BREE CLOSE SIGNAL		BEDONDANI SEG\ISTIN	PROUCED RELIABILITY OF TRAIN B	
08.2.11.01.1 SRQ 2	89-3164 (SIS INITIATE)	CONTACTS OPEN	SEQ 2 SIS/SISLOP CANNOT BE MANUALLY INITIATED. NO EPPECT ON AUTO INITIATION	PERIODIC TESTING	EBDUNDANT SEQ/TRAIN	REDUCED RELIABILITY OF TRAIN B POR SIS/SISLOP	
08.2.11.01.2 SEQ 2	83-3164 (818 INITIATE)	CONTACTS CLOSED	1/2 SERIES CONTACTS CLOSED IN SEQ 2 MANUAL SIS CET. TRIP/MORMAL/RESET SWITCH UNAPPECTED	PBRIODIC TESTING	BEDUNDANT SWITCH	REDUCED REDURDANCY AGAINST SEQ 2 SIS/SISLOP	
08.2.11.02.1 SBQ 2	BS-3166 (SIS BBSBT)	CONTACTS OPEN	SEQ 2 SIS/SISLOP CANNOT BE RESET AFTER SI BLOCK,	PRRIODIC TRATING	REDUBDANT SEQ/TRAIN FOR SECONDARY RECIRC PUMPING, NO	STRAIN S SECONDARY RECIEC ME PUMPING DISABLED, 1088 OF	CV-142/143/144 ACTUATED CLOSED BY REDUNDANT SOLENOID VALVES
			PREVENTING REALIGNMENT/RESTART OF TRAIN B 91/FW PUMPS AND REOPENING OF CV-142/143/144 POR SECONDARY RECIRCULATION		POR SECONDARY RECIEC PAYS	SECONDARY RECIEC PLOW PATE	(OMB PRE SEQ/TRAIN PRE CV). CLE AND HLE UNAPPECTED BY THIS FAILURE SINCE PCV-1112 (SV-1112) HAS AN OVERFIDE SWITCE/RELAY TO PERMIT MODULATION/CLOSURE EVEN WITE
08.2.11.02.2 SBQ 2	88-3166 (SIS RESET)	CONTACTS CLOSED	1/2 SERIBS CONTACTS CLOSED IN SBQ 2 SIS RESET CET. TRIP/NORMAL/RESET SWITCH	PBRIODIC TESTING	REDUNDANT SEQ/TRAIN	REDUCED RELIABILITY OF SEQ 2 SIS/SISLOP FOR SELOCA, SGTR AND HSLB	SIS/SISLOP STILL PRESENT

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				LOGAL BEORGES	MARAS AN	Tunnana company	TA A ST OF STREET, ASSESSMENT OF STREET, AND STREET, A	
ITEN #	DRVICE ID	COMPONENT ID	FAILURE HODE	LOCAL BFFBCTS AND DBFBNDBNT FAILURBS	METROD OF DRTRCTION	PROVISIONS INSERBNT COMPRESSIONS	EPPECT ON BCCS	REMARES
08.2.11.03.1_S	Q_2			SBQ 2 MANUAL SIS, BIS RBSB7	PBRIODIC TESTING	ERDUNDANT SEG/TRAIN FOR	*REDUCED RELIABILITY OF TRAIN E	
		TRIP/NORML/RESET (SWITCE)	·	DISABLED, PREVENTING: REALIGNMENT/RESTART OF TRAIN ESI/PW_PUMPS, REOPENING OF		RECIRC PATE	SECONDARY RECIEC PUMPING DISABLED, LOSS OF SECONDARY	SURVEILLANCE PANEL
08.2.11.03.2 SE	Q 2	SIS TRIP/WORML/RESET	CONTACTS CLOSED	CV-142/143/144 1/2 SBRIBS CONTACTS CLOSED IN SBQ 2 MANUAL SIS, SIS RBSRT		REDUNDANT SWITCHES	RECIEC PLOW PATH REDUCED REDUMDANCY AGAINST SEQ 2 818/913LOP AND 818/918LOP	
08.2.11.04.1 SE	Q 2	(SWITCH) HS-3165 (LOP INITIATE)	CONTACTS OPEN	CETS. BS-3164, 3166 UNAPPECTED SEQ 2 LOP/SISLOP CANNOT BE MANUALLY INITIATED. NO EFFECT	PBRIODIC TRATING	REDUNDANT SEQ/TRAIN	RESET REDUCED RELIABILITY OF SEQ 2 LOP/SISLOP	
08.2.11.04.2 SB	Q 2	BS-3165 (LOP_INITIATE)	CONTACTS CLOSED	ON AUTO INITIATION 1/2 SERIES CONTACTS CLOSED IN SEQ 2 MANUAL LOP CET.	PBRIODIC TRSTING	BEDUNDANT SWITCE	REDUCED REDUNDANCY AGAINST SEQ 2 LOP/818LOP	
08.2.11.05.1 SB	Q. Z	B3-3167	CONTACTS OPEN	TRIP/NORMAL/RESET SWITCH UNAFFECTED SEQ 2 LOB/LOP CANNOT BE	PBRIODIC TESTING	REDUNDANT SEQ/TRAIN	TRAIN B SECONDARY RECIRC	
		(LOP RESET)		MANUALLY BESET TO PERMIT BESTART OF TRAIN B NON-SAPETY LOADS FOR SECONDARY			DISABLED BY LOCK-OUT OF NON-SAPETY LOADS	
08.2.11.05.2 SB	Q 2	BS-3167 (LOP RESET)	CONTACTS CLOSED	RECIRCULATION FOLLOWING SISLOP 1/2 SERIES CONTACTS CLOSED IN SEQ 2 MANUAL LOB/LOP RESET			REDUCED RELIABILITY OF 8EQ 2	
08.2.11.06.1 SE	n <b>1</b>	LOP	CONTACTS OPEN	CET. TRIP/NORMAL/RESET SWITCE UNAPPRECIED				
	<u> </u>	TRIP/NORML/RESET (SWITCE)		SEQ 2 MANUAL LOP, LOB/LOP RESET DISABLED, PREVENTING RESTART OF TRAIN B NON-SAFETY LOADS FOR SECONDARY RECIRC	PBBIODIC TESTING		TRAIN B NON-BAPETY LOADS DISABLED FOR SECONDARY RECIECULATION	BOTARY SWITCH ON SLSS SURVEILLANCE PAREL
08.2.11.06.2 SE	1	LOP TRIP/NORML/RESET (SWITCH)	CONTACTS CLOSED	1/2 BBRIES CONTACTS CLOSED IN SEQ 2 MANUAL LOP AND LOB/LOP RESET CETS. 89-3165, 3167	PBRIODIC TESTING		REDUCED REDUNDANCY AGAINST SEQ 2 LOP/SISLOP AND AGAINST RESET OF LOB/LOP/SISLOP	
08.2.11.07.1 SE	2	SUBCHANNEL I (LOGIC)	TRIPPRD	UNAPPECTED 1/2 REDUNDANT SEQ 2 SUBCHANNELS ACTUATED,	CONTROL ROOM INDICATION, PRESIDENCE TESTING		REDUCED REDUNDANCY AGAINST SEQ 2 LOB/LOP/SIS/SISLOP	
				LOB/LOP/SIS/SISLOP LOGIC AND TIMING BECOMES 1/2 ON REMAINING SUBCHANNEL				
08.2.11.07.2 SE	2	SUBCHANNEL I (LOGIC)	AS-IS (UNTRIPPED)	1/2 REDUNDANT SEQ 2 SUBCHANNELS PAILED, DISABLING 2/2 LOGIC FOR SEQ 2	PRRIODIC TRATING		TRAIN B LOB/LOP/SIS/SISLOP DISABLED	
08.2.11.08.1 SBG		(FOCIC)	TRIPPBD	(SAMB AS 8.2.11.7.1)	(SAME AS 8.2.11.7.1)	(SAMB AS 0.2.11.7.1)	(SAMB AS \$.2.11.7.1)	
08.2.11.08.2 586		SUBCHANNEL Y (LOGIC)	AS-IS (UNTRIPPED)	(SAME AS 8.2.11.7.2)	(SAME AS 8.2.11.7.2)	(SAMB AS \$.2.11.7.2)	(BAMB AS 8.2.11.7.2)	
08.2.12.01.1 SEG	2	•	VOLTS LOW	SEQ 2 DISABLED	CONTROL BOOM INDICATION		TRAIN B LOB/LOP/SIS/SISLOP DISABLED	SEQ OUTPUT RELATS ARE EMERGIZE TO ACTUATE





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### BMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS TABLE 8-1: SAFBIT INJECTION ACTUATION PHEA

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	ITBN #	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL BPFECTS AND DEPENDENT PAILURES	METHOD OF Detection	INSERBNY COMPRNSATING Provisions	BFFECT ON BCCS	REMARES
	08.3.01.01.1.BU	3. #1C	127-3 (UV RELAT)	AS-IS (UNTRIPPED)	1/2 REDUMDANT BUS 1C UV INPUTS DISABLED TO SEQ 1 AND 2. SEQ 1 LOS LOGIC AND SEQ 1 AND 2 LOP LOGIC FOR BUS 1C UV BECOME 1/1	İ	BEDUNDANT RELAY	REDUCED RELIABILITY FOR SEQ 1  LOS AND SEQ 1 AND 2 LOP	INCLUDES POTENTIAL TRANSFORMER
	08.3.01.01.2 BUS	/11C	127-3 (UV RBLAT)	TRIPPRD	ON REMAINING CHANNELS 1/2 REDUNDANT BUS IC UV INPUTS TRIPPED TO SEG 1 AND 2. SEG 1	PERIODIC TESTING	REDUNDANT SEQ/TRAIN	TRAIN A DISABLED FOR BOTH SIS/SISLOP BY LOS TRIP OF LOAD	
:					INITIATES LOB AND SEQ 2 LOP LOGIC BECOMES 1/2 ON BUS 2C UV INPUTS			GROUP A. REDUCED REDUXDANCY AGAINST SEQ 2 LOP/SISLOP	RETRIPS DG BREE BURING SISLOP
4	08.3.01.02.1 BUS	110	127-3E (AUE RELAY)	AS-19 (UNTRIPPED)	1/2 REDUNDANT BUS IC UV IMPUTS DISABLED TO SEG 1. SEG 1 LOB AND LOP LOGIC FOR BUS IC UV BECOME 1/1 ON REMAINING	PBBIODIC TESTING	REDUNDANT SEQ/TRAIN	REDUCED RELIABILITY FOR SEQ 1 LOB/LOP	
<u>-</u>	08.3.01.02.2_BUS		121-31 (AUX RBLAY)	TRIPPBD	CHANNELS	PRRIODIC TRATING	BBDUNDANT_RB9/TRAIN	TRAIN A DISABLED FOR BOTH SIS/SISLOP BY LOB TRIP OF LOAD GROUP A	PAILURE PERVENTS START OF LOAD GROUP A LOADS DURING SIS AND RETRIPS DG BREE DURING SISLOP
	08.3.01.03.1 BUS		(AUI BELAY)	AS-IS (UNTRIPPED)	1/2 REDUNDANT BUS 1C UV INPUTS DISABLED TO SEQ 2. SEQ 2 LOP LOGIC FOR BUS 1C UV BECOMES 1/1 ON REMAINING CRANNELS	PRRIODIC TRATING	REDUNDANT SEQ/TRAIN	BEDUCED RELIABILITY FOR SEQ 2 LOP	
1	08.3.01.03.2 BUS	<b>1</b> 10	127-71 (AUI RELAY)	TRIPPED	1/2 REDUNDANT BUS 1C UV INPUTS TRIPPED TO SEQ 2. SEQ 2 LOP LOGIC BECOMES 1/2 ON BUS 2C UV INPUTS		REDUNDANT SEQ/TRAIN	REDUCED REDUNDANCY AGAINST SEQ 2 LOP/SIELOP	
	08.3.01.04.1 BUS	F1C	127-9 {UV RBLAY}	A8-IS (UNTRIPPED)	(SAHR AS 8.3.1.1.1)	(SAMB AS 8.3.1.1.1)	(BAHE AS 8.3.1.1.1)	(BAME AS 8.3.1.1.1)	
	08.3.01.04.2 BUS	•	127-9 (UV RBLAY)	TRIPPED	(SAHE AS 8.3.1.1.2)	(8AME AS 8.3.1.1.2)	(SAME AS 8.3.1.1.2)	(SAME AS 0.3.1.1.2)	<u> </u>
-	08.3.01.05.1 BUS		121-91 (AUI BELAT)	AS-IS (UNTRIPPED)	(SAME AS 8.3.1.2.1)	(SANB 48 8.3.1.2.1)	(SAMB AS 8.3.1.2.1)	(SAMB AS 8.3.1.2.1)	
	08.3.01.05.2 BUS		127-91 (AUI BBLAY)	TRIPPED	(SAME AS 8.3.1.2.2)	(SAHE AS 8.3.1.2.2)	(S.1.1.2.2)	(SAME AS 8.3.1.2.2)	
	08.3.01.06.1 BUS	•	127-111 (AUI RBLAT)	AS-IS (UNTRIPPED)	(SAME AS 8.3.1.3.1)	(SAME AS 0.3.1.3.1)	(SAME AS 8.3.1.3.1)	(SAME AS 8.3.1.3.1)	
· •	08.3.01.06.2 BUS		127-111 (AUI RBLAY)	TRIPPBD	(S.E. [. S. B. BHAR)	(SAMB AS 8.3.1.3.2)	(SAME AS 8.3.1.3.2)	(S.C.1.C. 8 8A BMAR)	
	08.3.01.07.1 BUS	•	BUS \$1C 125YDC CONTROL POWER	VOLTS LOW	127-91, 127-111 TRIPPBD. SRQ 1 INITIATES LOB, SRQ 2 LOP LOGIC BECOMES 1/2 ON BUS 2C UV		REDUNDANT SEQ/TRAIN	TRAIN A DISABLED FOR BOTE SIS/SISLOP BT LOB TRIP OF LOAD GROUP A. REDUCED REDUNDANCY AGAINST SEQ 2 LOP/SISLOP	RELATS ARE DE-ENERGIZE TO ACTUATE. FAILURE PREVENTS START OF LOAD GROUP A LOADS DURING SIS AND RETRIPS DG
•	08.3.02.01.1 BUS	• • • • • • • • • • • • • • • • • • • •	127-4 (UV BBLAY)	AS-IS (UNTRIPPED)	INPUTS 1/2 REDUNDANT BUS 2C UV INPUTS DISABLED TO SEQ 1 AND 2. SEQ 2 LOB LOGIC AND SEQ 1 AND 2 LOP LOGIC FOR BUS 2C UV BECOMB 1/1 ON REMAINING CHANNELS	PERIODIC TESTING	REDUNDANT RELAT	REDUCED RELIABILITY FOR SEQ 2 LOB AND SEQ 1 AND 2 LOP	BRBAKER DURING SISLOP INCLUDES POTENTIAL TRANSPORMER





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178H, #	DEAICE ID	COMPONENT ID	PAILURB MODE	LOCAL BPPRCTS AND DRPRNDRNT PAILURES	BRIECTION .	INSERBNT COMPENSATING PROVISIONS	APPRET ON RCC8	REMARES
08.1,02.01,2 B	U8_82C	127-4 (UV BBLAY)	TBIPPBD	1/2 REDUNDANT BUS 2C UY INPUTS TRIPPED TO SEQ 1 AND 2. SEQ 2 INITIATES LOB AND SEQ 1 LOP LOGIC BECOMES 1/2 ON BUS 2C UT INPUTS		MIAST/988 THADHUDES	TRAIN & DISABLED FOR ROTH SIS/SISLOP BY LOB TRIP OF LOAD GROUP A. REDUCED REDUNDANCY AGAINST SEQ 1 LOY/SISLOP	FAILURE PREVENTE START OF LOAD GROUP A LOADS DURING SIS AND RETRIPS DG BREE DURING SISLOP
08.3.02.02.1 BI	U8 #2C	127-41 (AUI BELAT)	AS-19 (UNTRIPPED)	1/2 REDUNDANT BUS 2C UV INPUTS DISABLED TO SEQ 1. SEQ 1 LOP	PRRIODIC TRATING	REDUNDANT SEQ/TRAIN	REDUCED RELIABILITY FOR SEQ 1	
08.3.02.02.2 B		127-41 (AUI RBLAY)	TRIPPRO	LOGIC FOR BUS 2C UV BECOMES 1/1 ON ERMAINING CRANNELS 1/2 REDUNDANT BUS 2C UV INPUTS TRIPPED TO SEQ 1. SEQ 1 LOP LOGIC BECOMES 1/2 ON BUS 1C UV INPUTS		REDUNDANT SEG/TRAIN	REDUCED REDUEDANCY AGAINST SEQ 1 LOP/SISLOP	
08.3.02.03.1 BL	JS 12C	127-81 (AUI RELAY)	AS-18 (UNTRIPPED)	1/2 REDUNDANT BUS 2C UV INPUTS DISABLED TO SBQ 2. SEQ 2 LOB AND LOP LOGIC FOR BUS 2C UV BROOMB 1/1 ON REMAINING	PRRIODIC TRATING	REDUNDANT SEQ/TRAIN	REDUCED RELIABILITY FOR SEQ 2 LOB/LOP	
08.3.02.03.2 BU	19 #2C	127-81 (AUX RELAT)	TRIPPED	CHANNELS 1/2 REDUNDANT BUS ZC UV INPUTS TRIPPED TO SEQ 2. SEQ 2	PERIODIC TESTING	REDUNDANT SEG/TRAIN	TRAIN B DISABLED FOR BOTE SIS/SISLOP BY LOB TRIP OF LOAD	FAILURE PREVENTS START OF LOAD GROUP A LOADS DURING SIS AND
08.3.02.04.1 BU	8 12C	127-10 (UV RELAY)	AS-IS (UNTRIPPED)	INITIATES LOB (SAUB AS 8.3.2.1.1)	(SABB AS 8.3.2.1.1)	(BAHB AS 0.3.2.1.1)	GROUP A (SAME AS \$.3.2.1.1)	RETRIPS DG BREE DURING SISLOP
08.3.02.04.2 BU	- •	127-10 (UV BELAT)	TRIPPED	(SAMB AS 8.3.2.1.2)	(SAME AS 8.3.2.1.2)	(SAME AS 8.3.2.1.2)	(BAHB AS 8.3.2.1.2)	
08.3.02.05.1 BU		127-101 (AUT RELAY)	AS-IS (UNTRIPPED)	(SAME AS 8.3.2.2.1)	(SAME AS 8.3.2.2.1)	(SAME AS 9.3.2.2.1)	(SAME AS 8.3.2.2.1)	
08.3.02.05.2 BU 08.3.02.06.1 BU	*= *****	(AUI RELAY)	TRIPPED	(SAMB AS 8.3.2.2.2)	(SAMB AS 8.3.2.2.2)	(SAME AS 0.3.2.2.2)	(SAMB AS 8.3.2.1.2)	
08.3.02.06.2 BU	. ~-	(AUX RELAY)	AS-IS (UNTRIPPED) TRIPPED	(SAME AS 8.3.2.3.1)	(SAMB AS 8.3.2.3.1)	(SAMB AS 6.3.2.3.1)	(BANE AS 8.3.2.3.1)	
08.3.02.07.1 BUS		(AUX RELAY)	VOLTS LOW	(SAME AS 8.3.2.3.2) AUX RELATS 127-41, 127-81,	(SAME AS 8.3.2.3.2)  CONTROL ROOM INDICATION	(SAME AS 8.3.2.3.2) REDUNDANT SEC/TRAIN	(SAME AS \$.3.2.3.2)	
· - · · · · · ·		CONTROL POWER		127-107, 127-121 TRIPPED. SEQ 2 INITIATES LOB, SEQ 1 LOP LOGIC BECOMES 1/2 ON BUS 1C UV INPUTS	OVERNO ROUGE INSIDATIUS	PERVENIE SEALIETE	TRAIN B DISABLED FOR BOTH SIS/SISLOP BY LOD TRIP OF LOAD CROUP A. REDUCED REDUNDANCY AGAINST SEQ 1 LOP/SISLOP	RBLAYS ARE DE-EMERGIZE TO ACTUATE. PAILURE PREVENTS START OF LOAD GROUP A LOADS DURING SIS AND RETRIPS DG BREE DURING SISLOP

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SECTION 9: CONTAINMENT SPRAY ACTUATION

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#### CONTAINMENT SPRAY ACTUATION SYSTEM NOTES

- 1. Item numbers in this section have been assigned as follows:
  - 09.1: Train A actuation instrumentation and logic
  - **09.2:** Train B actuation instrumentation and logic
- 2. This section covers the Containment Spray Actuation System (CSAS) input instrumentation and logic. The failure modes and effects for individual CSAS output relays (ie, individual CSAS controlled loads) are addressed in FMEA Table 5-1.
- 3. Potential single failure susceptibilities in the FMEA table are flagged with "\*" as the first character of the associated ECCS EFFECTS field. Other open items (eg. required procedure or calculation changes) are flagged with "\*" as the first character of the REMARKS field.

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#### CONTAINMENT SPRAY ACTUATION SYSTEM REFERENCES

One Line Diagrams
64383 CSAS Inverter System

Elementary Diag	rams
64354	Containment Spray Actuation System, Train A Power
	and Control (Sh 1)
64355	Containment Spray Actuation System, Train A Power
	and Control (Sh 2)
64365	Containment Spray Actuation System, Train B Power
	and Control (Sh 1)
64366	Containment Spray Actuation System, Train B Power
	and Control (Sh 2)
5130351	4.16 kV Buses Undervoltage Relays
5130826	Containment Spray and Hydrazine Addition Control
	System, Train A (Sh 1)
5130827	Containment Spray and Hydrazine Addition Control
	System, Train A (Sh 2)
5159793	Containment Spray and Hydrazine Addition Control
	System, Train B (Sh 1)
5180775	Containment Spray and Hydrazine Addition Control
	System, Train B (Sh 2)
Procedures	
SO1-1.0-23	Transfer to Cold Leg Injection and Recirculation
SO1-1.5.1	Response to High Containment Pressure
SO1-12.3-35	Containment Spray and Recirculation Safety
	Related Alignment
SO1-12.8-5	Cold Operability Test of Containment Spray
	Actuation System
Other Documents	
SD-S01-580	System Description: Safety Injection, Recircula-
	tion and Containment Spray Systems
SD-S01-590	System Description: Safeguard Load Sequencing
	System

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TABLE 9-1: CONTAINMENT SPRAY ACTUATION FMEA





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# EMBERGENCY CORE COOLING STSTEM SINGLE PAILURE ANALYSIS SAN ONOPER UNIT 1 TABLE 9-1: CONTAINMENT SPRAY ACTUATION PREA

ITB# #	DRAICR ID	COMPONENT ID	PAILURE HODE	LOCAL BPFECTS AND DEPENDENT PAILURES	METHOD OF Detection	INEERBRY COMPRESSIONS PROVISIONS	RPPRCT ON BCC3	RSHARES
	PT-501 LOOP	PIS-511 (BISTABLE)	TRIPPRD	CHANNEL A HI-BI CONTAINMENT PRESSURE SIGNAL VIA DB-ENERGIZING RELAY ACIA TO TRAIN A CSAS, AND BCIB TO	CONTROL BOOM INDICATION, ANNUNCIATION	NOME REQUIRED FOR CRAS INITIATION, REDUNDANT CONTAINMENT PRESSURE CRANNELS AND SEQ IMPUTS TO PREVENT	TRAIN A AND TRAIN B CRAS LOGIC BECOMES 1/2 ON REMAINING CONTAINMENT PRESSURE CRANNELS WITE CONCURRENT SIS/SISLOP FROM	PT-501, TEST SWITCH AND RESISTOR. CRAS LOGIC FOR BACH
<u></u>		<del></del>		TRAIN B CSAS. CHANNELS B AND C BI-BI CONTAINMENT PRESSURE AND BBQ (SIS/SISLOP) INPUTS UNAPPECTED		SPURIOUS CSAS	RESPECTIVE SEQ	BI-BI CONTAINMENT PRESSURE. BISTABLE PAILURE IN TRIPPED STATE BOUNDS COIL SHORT IN OUTPUT RELATS
09.1.01.01.2 ]	7-501 LOOP	PIS-511 (BISTABLE)	UNTRIPPED	CHANNEL A RI-BI CONTAINMENT PRESEURE INPUT DISABLED TO TRAIN A AND TRAIN B CSAS VIA	PBRIODIC TESTING	REDUNDANT CONTAINMENT PRESSURE CHANNELS	TRAIN A AND TRAIN B CSAS LOGIC	MORNAL POSITION. OUTPUT RELATS ARE MORNALLY EMERGIZED, AND
<del>.</del>				RBLATS ACIA AND BCIS REMAINING EMERGIZED. CHAMMBLE B AND C BI-BI CONTAINMENT PRESSURE AND SEQ (SIS/SISLOP) IMPUTS UMAFFECTED			WITH CONCURRENT SIS/SISLOP FROM RESPECTIVE SEQ	
09.1.01.02.1 P		FOOD DAR RODDFA	IMPUT OPEN	(SAME AS 9.1.1.1)	(SAME AS 9.1.1.1)	(SAME AS 9.1.1.1)	(SAME AS 9.1.1.1.1)	
09.1.01.02.2 P	7-501 LOOP	LOOP PWR SUPPLY	INPUT SHORT	VITAL BUS \$1, CAUSING LOSS OF POWER TO PIS-510, -511, LIS-500A, PIS-520, -521, -522	CONTROL ROOM ENDICATION, ANNUNCIATION		TRAIN A AND B CSAS LOGIC BECOMES 1/2 ON REMAINING CONTAINMENT HI-BI PRESSURE CHANNELS WITE CONCURRENT	
				AND OUTPUT RELATS, RESULTING IN COME A DI-BI PRESS SIGNAL TO TRAIN A AND B CSAS LOGIC AND DISABLING LOW LEVEL TRIP			SIS/SISLOP PROM BESPECTIVE SEQUENCES	
<u>09.1.01.03.1 P</u>	r-501 LOOP	ACIA (RBLAY)	TRIPPBD	OF TRAIN A BYDRAZING PUMP CRANNEL A BI-BI CONTAINENT PRESSURE SIGNAL TO TRAIN A CSAS LOGIC. CHANNELS B AND C BI-BI CONTAINMENT PERSSURE AND	CONTROL ROOM INDICATION	CHANNELS AND SEQ INPUTS TO PREVENT SPURIOUS TRAIN A CSAS		BBLAY IS DE-EMBRGIZE TO TRIP
				SEQ (SIS/SISLOP) IMPUTS UNAPPECTED			CONCURRENT SIS/SISLOP PROM SEQ 1. TRAIN B CSAS LOGIC UNAPPECTED	
09.1.01.03.2 P	r-\$01_LOOP	ACIA (RBLAY)	UNTRIPPBD		PBRIODIC TBSTING	REDUNDANT CONTAINMENT PRESSURE CHANNELS, REDUNDANT TRAIN	ORAFISCIBO TRAIN A CSAS LOGIC BECOMBS 2/2 ON REMAINING CONTAINMENT BI-BI PRESSURE CHANNELS WITH CONCURERNT SIS/SISLOP PROM SEQ 1. TRAIN B CSAS LOGIC	
09.1,01.04.1 P1	L-501 LOOP	BCIB (RELAY)	TRIPPED	INPUTS UNAPPRETED CHANNEL A BI-BI CONTAINMENT	CONTROL ROOM INDICATION		UNAPPECTED TRAIN B CSAS LOGIC-BECONES 1/2 -	ORIAN TO DO DUDANT
	· - · · · · · · · · · · · · · · · ·			CERSSUPE SICHAL TO TRAIN B C HI-HI CONTAINMENT PRESSURE AND SEQ (SIS/SISLOP) INPUTS		PRESTA CALLANT CORNORS AND SECOND	PERSONE CHAMBELS OF THE THE SECONDUCTURE THE SECONDUCTURE OF S	REPUT -12 DR-RNEEGISE TO -ABIL-
. 09.1.01.04.2 PT	-501 LOOP	BCIB (RBLAY)	UNTRIPPED	UMAPPROTED CHAMBEL A HI-BE CONTAINMENT PRESSURE INPUT DISABLED TO TRAIN B CSAS LOGIC. CHAMBELS B AND C HI-BE CONTAINMENT PRESSURE AND SEQ (313/319LOP) INPUTS UMAPPROTED	PBRIODIC TBSTING	REDUNDANT CONTAINMENT PRESSURE CHANNELS, REDUNDANT TRAIN	UNAPPECTED TRAIN B CSAS LOGIC BECOMES 2/2 ON REMAINING CONTAINMENT BI-SI PRESSURE CHANNELS WITH CONCURRENT SIS/SISLOP PROM SEQ 2. TRAIN A CSAS LOGIC UNAPPECTED	





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### BHBRGENCY CORB COOLING STATEM SINGLE FAILURE ANALYSIS SAM ONOFRE UNIT 1 TABLE 9-1: CONTAINMENT SPEAT ACTUATION PREA

ITBN \$	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL BPPBCTS AND DBPRNDENT PAILURBS	MBTHOD OF DRTBCTION	INHERENT COMPENSATING PROVISIONS	BPPBCT ON BCC8	REMARKS
		·					•	•
09.1.01.05.1	PT-501 LOOP	VITAL BUS \$1	VOLTS LOW	LOSS OF POWER TO PIS-510,	CONTROL ROOM INDICATION,	REDUNDANT CONTAINMENT PRESSURE	TRAIN A AND B CSAS LOGIC	
		(8-1116V)		-511, LIS-500A, PIS-520, -521,	ANNUNCIATION	CHANNELS AND SEC INPUTS TO	BECOMES 1/2 ON REMAINING	
				-522 AND OUTPUT RELATS,	•	PRRVENT SPURIOUS CSAS	CONTAINMENT BI-BI PRESSURE	
				RESULTING IN COML A MI-MI			CRANNELS WITH CONCURRENT	
				PRESS SIGNAL TO TRAIN & AND B			SIS/SISLOP PROM RESPECTIVE SEQUENCER	
		•		CRAS LOGIC AND DIRABLING LOW				
				BTDBAZINE PUMP				
69.1.02.01.1	(NOT USED)							
	889 1	_SŲBÇBANNBL I	CONTACTS OPEN.	LOGIC RELAYS APIA, APIB, AVIA.	PERIODIC TRATING	BROUNDANT TRAIN	CRAS TRAIN A DISABLED	CHAN LOGIC BROUIRES 2/2 TRIP
		(29-5,6)	(UNTRIPPED)	AVIS REMAIN DE-ENERGIZED,				OF SEQ 1 SUBCEAUMEL I AND T
				DISABLING 1 OF 2 REQUIRED SEQ				INPUTS CONCURRENT WITH 2/3
				I INPUTS TO CSAS TRAIN A LOGIC				CONTAINMENT BI-HI PRESSURE
09.1.03.01.2	286 i	SUBCHANNEL I	CONTACTS CLOSED	LOGIC BELAYS APIA, APIB, AVIA,	•		TRAIN A CRAS LOGIC DECORES 1/1	
	•	(29-5,6)	(TRIPPED)	AVIS ENERGIZE, PROVIDING 1 OF		CONTAINMENT NI-NI PRESSURE INCUTS TO PRESENT SPUBLOUS	ON SERVINING SEG SUBCRIMUST	
	:			2 REQUIRED SEQ 1 IMPUTS TO		CS72	WITH CONCURRENT 2/2 NI-BI CONTAINMENT PRESSURE	
09.1.03.02.1	980 1	SUBCHANNEL Y	CONTACTS OPEN	LOGIC RELAYS APYA, APYB, AYYA,	PRRIODIC TRATING	REDUNDANT TRAIN	CSAS TRAIN A DISABLES	CSAS LOGIC REQUIRES 2/2 TRIP
03.1.03.06.1	·	(29-7,8)	(UNTRIPPED)	AVYB REMAIN DE-ENERGIZED,	. DETARTA IBRITAR			OF SEQ 1 SUBCHANNEL I AND I
		1-5 *1*1		DISABLING I OF 2 REQUIRED SEQ	a service a conservation and experience are set of the service and experience are			INPUTS CONCURRENT WITH 1/3
				I INPUTS TO CSAS TRAIN A LOGIC				CONTAINMENT HI-HI PRESSURE
09,1.03.02.2	98Q 1	SUBCEANNEL Y	CONTACTS CLOSED	LOGIC RELATS APTA, APTB, AVTA,	CONTROL BOOM_INDICATION,		TRAIN_A_CSAS_LOGIC_BECOMES_1/1_	
		(29-7,8)	(TRIPPED)	AVYB BNERGIZE, PROVIDING 1 OF		CONTAINMENT BI-NI PRESSURE	ON BEHAINING SEQ SUBCEAUNEL	
				2 REQUIRED SEG 1 IMPUTS TO		INPUTS TO PREVENT SPURIOUS	WITH CONCURRENT 2/3 HI-HI	
	710 110 10	144 49 4001.55	CONFICER OFFI	CSAS TRAIN A LOGIC	DEDIANCA BRONCHA	CSAS	CONTAINMENT PRESSURE	110 AUTHERADE DELATE ADD
09.1.04.01.1	UNDERVOLTAGE	127-31 (RELAY)	CONTACTS OPEN	1 OF 2 REDUNDANT BUS IC	PBRIODIC TESTING	REDUNDANT RELAT, REDUNDANT	CSAS POR SISLOP CONDITIONS	DE-ENERGIZE TO TRIP
	CHUSEVULIAGE		(OM)	UNDERVOLTAGE INPUTS DISABLED TO TRAIN A CSAS TIME DELAY		IBALM	SAME AND STORMS COMMISSIONS	DE-DESCRIPS IN TULL
				RELATS APOR, AVOR				
09.1.04.01.2	BUS #10, 20	127-31 (RBLAY)	CONTACTS CLOSED	BUS IC UNDERVOLTAGE SIGNAL TO	CONTROL ROOM ANNUNCIATION	REDUNDANT INPUTS FOR \$18.	REDUCED RELIABILITY OF TRAIN A	TRAIN A CSAS LOADING WILL
	UNDERVOLTAGE		(OPP)			REDUNDANT TRAIN POR SISLOP		POLLOW BUS 1C (TRAIN B)
			• •	APDR, AVDR. DELAY LOGIC			CONDITIONS	VOLTAGE RECOVERY AND SEQ 1
				BBCOMES 1/2 ON BUS 2C				LOAD GROUP D DELAT. THE
	. <del>_</del>		* :	UNDBRYOLTAGE INPUTS			,	PAILURE WITH A CONCURRENT BUS
								2C LOB WOULD CONSTITUTE A
								DOUBLE PAILURE SCHMARIO, WHICE
09.1.04.02.1	BUR 410 20	127-41 (RBLAY)	CUNTACTS UDDA	1 OF 2 REDUNDANT BUS 2C	PRRIODIC TESTING	REDUNDANT RELAT, REDUNDANT	REDUCED RELIABILITY OF TRAIN A	
V3.1.01.01.1	UNDERVOLTAGE	IST TA (BBUAT)	(ON)	UNDERVOLTAGE IMPUTS DISABLED	restubic issilan	TRAIN	CSAS FOR SISLOP CONDITIONS	DR-RWRRGIZE TO TRIP
	ANABIODINGS		lout	TO TRAIN A CSAS TIME DELAT		5 mm r m	AGES 148 GIRDOL AMBRITANT	an avadation to this
				RELATS APDR. AVDR				
09.1.04.02.2	BUS #10, 20	127-41 (RBLAY)	CONTACTS CLOSED	BUS 2C UNDERVOLTAGE SIGNAL TO	CONTROL ROOM ANNUNCIATION	REDUNDANT INPUTS POR SIS,	REDUCED RELIABILITY OF TRAIN A	
	UNDERVOLTAGE		(0PP)	TRAIN A CSAS TIME DELAY RELAYS		REDUNDANT TRAIN FOR SISLOP	CSAS FOR SIS AND SISLOP	
•		•	•	APDR, AVDR. DELAY LOGIC			CONDITIONS	
				BECOMES 1/2 ON BUS 1C				
				UNDERVOLTAGE INPUTS				





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	ITEM, #	DBAICE ID	COMPONENT ID	FAILURE MODE	LOCAL BPFECTS AND DEPENDENT PAILURES	MBTHOD OF DBTBCTION	INSERBUT COMPRUSATING PROVISIONS	BFFBCT ON BCC8	BRUARES
!	09.1.01.01.1	BUS AIC, AC.		CONTACTS OPEN	(SAMB AS 9-1,-5-,1-,1)	(SAMB AS 9.1.4.1.1)	(SAMB_AS_8.1.4.1.1)	(8688 AS 5.1.4.1.1)	(L. L. L. L. C. SA. BHAR)
	09.1.04.03.2	BUS #1C, 2C UNDERVOLTAGE	127-91 (RBLAT)	CONTACTS CLOSED (OPP)	(SAMB AS 9.1.4.1.2)	(SAME AS 9.1.4.1.2)	(SAMS AS 9.1.4.1.2)	(SAME AS 9.1.4.1.2)	(SAME AS 9.1.4.1.2)
	09.1.04.04.1	BUS AIC, 2C UNDERVOLTAGE	127-101 (RBLAT)		(SAMB AS 9.1.4.2.1)	(SAME AS 9.1.4.2.1)	(SAME AS 9.1.4.2.1)	(SAME AS 9.1.4.2.1)	(SAMB AS 9.1.4.2.1)
	09.1.04.04.2	BUS ALC. ZC UNDERVOLTAGE	127-101 (RBLAT)	CONTACTS CLOSED (OFF)	(SAMB AS 9.1.4.2.2)	(SAME AS 9.1.4.2.2)	(9ANR AS 9.1.4.2.2)	(9ANB AS 9.1.4.2.2)	
		BUS \$1C, 2C UNDERVOLTAGE	BUS &IC	VOLTS LOW	RBLATS 127-31 AND 127-91 DB-8NBRG128. TRAIN A CSAS TIEB	CONTROL ROOM ANNUMCIATION	REDUNDANT INPUTS FOR SIS,	REDUCED RELIABILITY OF TRAIN A CSAS FOR SIS AND SISLOP	POLLON BUR 2C (TRAIN B)
					DELAT RELAT APDR, AVDR LOGIC BECOMES 1/2 ON BUS 2C UV			CONDITIONS	VOLTAGE RECOVERY AND SEQ 1 LOAD GROUP D DELAY. THIS PAILURE IS NOT CREDIBLE WITE
					LNPUTS				CONCURRENT BUS 2C LOS, SINCE THAT WOULD BE A DOUBLE FAILURE SCHARIO
].]	09.1.04.06.1	BUS BIC, 2C UNDERVOLTAGE	BUS #2C	VOLTS LOW	BBLAYS 127-41 AND 127-101 DB-BHBRGIZB. TRAIN A CSAS TIMB DBLAY BBLAY APDR, AVDR LOGIC	CONTROL BOOM ANNUNCIATION	REDUNDANT INPUTS FOR SIS, REDUNDANT TRAIN FOR SISLOP	REDUCED RELIABILITY OF TRAIN A CSAS FOR SIS AND SISLOP CONDITIONS	TRAIN A CSAS LOADING WILL POLLOW BUS IC (TRAIN A) VOLTAGE RECOVERT AND SEQ I
	09.1.05.01.1	CSAS TRAIN A	APCIA, APCIB T) (RBLATS)	ÓN (UNTRIPPBD)	BECOMES 1/2 ON BUS 1C UV INPUTS CHANNEL A BI-BI CONTAINMENT PRESSURE INPUT DISABLED TO	PBRIODIC TRSTING	BEDUNDANT CONTAINMENT PRESSURE CHANNELS, REDUNDANT TRAIN	TRAIN A CHAS PUMP LOGIC BECOMES	CHANNEL A PUMP MATRIX RELAYS.
_				. ,	TRAIN A PUMP MATRIE. CHANNEL A VALVE MATRIE, CHANNELS B, C AND SEQ I (SIS/SISLOP) IMPUTS UNAPPECTED			BI-BI PRESSURE CHANNELS WITH CONCURRENT SIS/SISLOP PROM SEQ 1	PARALLEL BELAY APCIC PROVIDES CONTROL ROOM INDICATION
	09.1.05.01.2	CSAS TRAIN A (CHANNEL A TES	APCIA, APCIB P) (RBLAYS)	OPP (TRIPPRD)	CHANNEL A HI-BI CONTAINMENT PRESSURE SIGNAL TO TRAIN A PUMP MATRIX. CHANNEL A VALVE MATRIX, CRANNELS B, C AND SEQ	PBRIODIC TESTING	REDUMDANT CONTAINMENT PRESSURE CEANNELS AND SEQ INPUTS TO PREVENT SPURIOUS CSAS	TRAIN A CSAS PUMP LOGIC BECOMES 1/2 ON RÉMAINING CONTAINMENT BI-BI PRESSURE CHANNELS WITH CONCURRENT SIS/SISLOP PROM SEQ	
	86 1 05 01 0	0040 BB4TH 4	40011 40010	FURNIS ARRU	1 (919/81SLOP) IMPUTS UMAPPECTED			1	
		CSAS TRAIN A (CHANNEL A TES CSAS TRAIN A	APCIA, APCIB  T) (RBLATS)  APCIA, APCIB	INPUT OPBN	(SAMB AS 9.1.5.1.2)	(SAME AS 9.1.5.1.2)	(SAME AS 9.1.5.1.2)	(SAME AS 9.1.5.1.2)	BOINING DATIFIED AD ANNINGTARAD
		(CHANNEL A TES	•	INDOL SHORL	LOSS OF 15VDC POWER SUPPLIES  APSA AND APSB, CAUSING TRIP OF  3/3 BI-BI CONTAINMENT PRESSURE		BRDUNDANT TRAIN	TRAIN A CSAS LOGIC DISABLED	BOUNDS FAILURE OF ANNUNCIATOR RELAT APCIC. CSAS OUTPUT RELATS ARE EMERGIZE TO
			· .		CHANNELS, DISABLING 2/2 SEQUENCER BUBCHANNEL IMPUTS AND ALL CSAS OUTPUTS IN TRAIN				ACTUATE. APSA AND APSB OUTPUTS ARB PARALLELED
	09.1.05.02.1	CSAS TRAIN A (CHANNEL A TES	APCIS (TEST SWITCH)	CONTACTS OPEN	A CSAS LOGIC RELATS APCIA, APCIB DR-EMBRÖIZE, CAUSING CHANNEL A HI-HI CONTAINMENT PRESSURB SIGNAL TO TRAIN A CSAS PUMP			TRAIN A CSAS PUMP LOGIC BECOMES 1/2 ON REMAINING CONTAINMENT HI-HI PRESSURE CHANNELS WITH CONCURRENT SIS/SISLOP FROM SEQ	
! !					MATRII. CHANNBLS B, C AND SEQI (SIS/SISLOP) INPUTS UNAPPECTED			1	



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#### EMBRGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONOPRE UNIT 1 TABLE 9-1: CONTAINMENT SPRAY ACTUATION PHEA

LTBN #.	DBAICR ID	COMPONENT ID	PAILURE MODE	LOCAL BPPECTS AND DEPENDENT PAILURES	METHOD OF Detection	INHERBNY COMPENSATING PROVISIONS	BPPECT ON ECCS	REMARES
		***************************************	·					
09.1.05.02.2	(CRANNEL A TEST)		CONTACTS CLOSED	PRESSURE MATRIX RELATS APCIA,	PRRIODIC TRATING	NONE BEGUIEED	NOMB	MORNAL POSITION
09.1.05.03.1	CSAS TRAIN A	AVCIA, AVCIB	ON (UNTRIPPED)	APCIB CANNOT BE TESTED CHANNEL A BI-BI CONTAINMENT	PERIODIC TESTING	REDUNDANT CONTAINMENT PRESSURE	TRAIN A CSAS VALVE LOGIC	MORNAL POSITION. TRAIN A
	(CHANNEL A TEST)	(RELATS)	" ·	PRESSURE INPUT DISABLED TO TRAIN A VALVE MATRIE. CHANNEL A PUMP MATRIE, CHANNELS B, C			BROOMES 2/2 ON REMAINING CONTAINMENT HI-HI PRESSURB CHANNELS	CHANNEL A VALUE MATRIX RELAYS. PARALLEL RELAY AVCIC PROVIDES CONTROL ROOM INDICATION
				AND SEQ 1 (SIS/SISLOP) INPUTS UNAPPROTED				
09.1.05.03.2	CSAS TRAIN A (CHANNEL A TEST)		OPP (TRIPPRD)		PERIODIC TESTING	REDUNDANT CONTAINMENT PRESSURE CHANNELS AND SEQ INPUTS TO	TRAIN A CSAS VALVE LOGIC BECOMES 1/2 ON REMAINING	
	CONTRADO & 1821)	(BEDATO)		VALVE MATRIE. CHANNEL A PUMP MATRIE, CHANNELS B, C AND SEQ		PREVENT SPURIOUS CSAS	CONTAINMENT BI-BI PRESSURE CHANNELS WITH CONCURRENT	
				1 (SIS/SISLOP) INPUTS UNAFFECTED			SIS/SISLOP PROB SEQ 1	
09.1.05 <u>.03.</u> 3	(CHANNEL A TEST)	AVCIA, AVCIB	INPUT OPBN	(SAME AS 9.1.5.3.2)	(SAME AS 9.1.5.3.2)	(S.E.2.1.9 EA BHAR)	(SAMB AS 9.1.5.3.2)	
09.1.05.03.4	CSAS TRAIN A (CHANNEL A TEST)	AVCIA, AVCIB	IMPUT SHORT	(SAME AS 9.1.5.1.4)	(SAME AS 9.1.5.1.4)	(SAME AS 9.1.5.1.4)	(4.1.5.1.¢ EA BHAR)	BOUNDS FAILURE OF ANNUNCIATOR RELAT AVCIC. CSAS OUTPUT
			· •	- · · · · · · · · ·			a company to the second control of the control of t	RELATS ARE EMERGIZE TO ACTUATE. APSA AND APSE OUTPUTS ARE PARALLELED
09.1.05.04.1	CSAS TRAIN A (CHANNEL A TEST)		CONTACTS OPEN	RELATS AVCIA, AVCIB DR-BNBRGIZE, CAUSING CHANNEL A HI-HI CONTAINMENT PRESSURE	CONTROL ROOM INDICATION		TRAIN A CSAS VALVE LOGIC BECONES 1/2 ON BENAINING CONTAINMENT NI-BI PRESSURE	
				SIGNAL TO TRAIN A CSAS VALVE MATRIX. CHANNEL B, C AND SEQ 1 (SIS/SISLOP) INPUTS UNAPPECTED			CRANNELS WITE CONCURRENT SIS/SISLOP PROM SEQ 1	
09.1.05.04.2	CSAS TRAIN A (CHANNEL A TEST)		CONTACTS CLOSED		PERIODIC TESTING	NONE BEGUIRED	MONE	NORMAL POSITION
09.1.06.01.1	CSAS TRAIN A (CHANNEL B TEST)		ON (UNTREPPED)		PERIODIC TESTING	CHANNELS, REDUNDANT TRAIN		BORNAL POSITION. TRAIN A CHANNEL B PUMP MATRIX RELATS. PARALLEL BELAT APCZC PROVIDES
		····		VALVE MATRIX, CHANNELS A, C AND SEQ 1 (SIS/SISLOP) IMPUTS UNAFFECTED			CONCURRENT SIS/SISLOP PROM SEQ 1	CONTROL BOOM INDICATION
09.1.06.01.2	(CBANNBL B TBST)		OFF (TRIPPED)	CHAMMBL B HI-HI CONTAINMENT PRESSURE SIGNAL TO TRAIN A PUMP MATRIX. CHAMMBL B VALVE	PBRIODIC TBSTING	CHANNELS AND SEQ EMPUTS TO	TRAIN A CSAS PUMP LOGIC BECOMES 1/2 ON REMAINING CONTAINMENT HI-HI PRESSURE CHANNELS WITH	
				MATRIE, CHANNELS A, C AND SEQ 1 (SIS/SISLOP) INPUTS UNAPPECTED			CONCUBRENT SIS/SISLOP FROM SEQ 1	
09.1.06.01.3	CSAS TRÁIN Á (CHANNEL B TEST)	APCZA, APCZB	INPUT OPEN	(SAME AS 9.1.6.1.2)	(SAME AS 9.1.6.1.2)	(S.1.3.1.0 EA BHAR)	(SAME AS 5.1.6. f.2)	
09.1.06.01.4		APCZA, APCZB	INPUT SHORT	LOSS OF 15VDC POWER SUPPLIES APSA AND APSB, CAUSING TRIP OF 3/3 HI-HI CONTAINMENT PRESSURE CHANNELS, DISABLING 2/2 SEQUENCER SUBCHANNEL INPUTS		BBDUNDAMT TRAIN	TRAIN A CSAS LOGIC DISABLED	BOUNDS FAILURE OF ANNUNCIATOR RELAY APCZC. CSAS OUTPUT RELAYS ARE EMERGIZE TO ACTUATE. APSA AND APSE OUTPUTS ARE PARALLELED
				AND ALL CRAS OUTPUTS IN TRAIN				

A CSAS LOGIC



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ETBE &	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL SPERCTS AND DEPENDENT PAILURES	METHOD OF Detection	INHERRNY COMPENSATING PROVISIONS	SPPRCT ON BCCS	REMARES.
09.1.06.02.	1 CSAS TRAIN A (CHANNEL B TEST)		CONTACTS OPEN	RELATS APCZA, APCZB  DB-ENERGIZE, CAUSING CHANNEL B  BI-HI CONTAINMENT PRESSURE  SIGNAL TO TRAIN A CSAS PURP		PREVENT SPURIOUS CSAS	1/2 ON REMAINING CONTAINMENT AI-BI PRESSURE CHANNELS WITH CONCURRENT_SIS/SISLOP_PROM_SEQ_	
09.1,06.02.	2 CSAS TRAIN A		CONTACTS CLOSED	MATRII. CHANNELS A, C AND SEQI (SIS/SISLOP) INPUTS UNAPPECTED CHANNEL B BI-BI CONTAINMENT		NONE BEGATESO	MORE	MORMAL POSITION
09.1.06.03.	1 CHANNEL B TEST)		OM (UNTRIPPED)	CHANNEL B NI-BI CONTAINMENT PRESSURE INPUT DISABLED TO TRAIN A VALVE MATRIE. CHANNEL B PUMP MATRIE, CHANNELS A, C			TRAIN A CSAS VALVE LOGIC  DECOMES 2/2 ON REMAINING CONTAINMENT BI-BI PRESSURE CRANNELS	HORMAL POSITION. TRAIN A CSANNEL B VALVE MATRIX RELAYS. PARALLEL RELAY AVCZC PROVIDES CONTROL BOOM INDICATION
_ 09.1.06.03.;	2 CSAS TRAIN A (CHANNEL B TEST)		OFF (TRIPPED)	AND SEQ ! (SIS/SISLOP) IMPUTS UNAPPECTED CEANMEL B BI-BI CONTAINMENT PRESSURE SIGNAL TO TRAIN A VALVE MATRII. CHANNEL B PUMP MATRII, CHANNELS A, C AND SEQ		PREVENT SPURIOUS CSAS	BECOMES 1/2 ON REMAINING CONTAINMENT NI-BI PRESSURE CRANNELS NITH CONCURRENT	
09,1,06.03.	3 CSAS TRAIN A		IMPUT OPBM	1 (SIS/SISLOP) INPUTS UNAPPECTED		(SANS AS 1.1.6.3.2)	818/818LOP FROM SRQ 1 _{8ABE AS 3.1.5.3.2}	
09.1.06.03.	(CHANNEL B TEST) 4 CSAS TRAIN A (CHANNEL B TEST)	AVCZA, AVCZB	IMPUT SHORT	(SAME AS 9.1.6.1.4)	(SAMB AS 9.1.6.1.4)	(SAME AS 9.1.6.1.4)	(SAMB AS 9.1.6.1.4)	BOUNDS PAILURE OF ANNUNCIATOR RELAY AYCEC. CRAS OUTPUT RELAYS ARE EMERGIZE TO ACTUATE. APSA AND APSE OUTPUTS ARE PARALLELED
09.1.06.04.	CSAS TRAIN A (CHANNEL B TEST)		CONTACTS OPEN	RELATS AVCZA, AVCZB DB-RUBRGIZR, CAUSING CHAMBEL B BI-BI CONTAINMENT PRESSURE SIGNAL TO TRAIN A CSAB VALVE MATRIX. CHAMBEL A, C AND SEQ 1			TRAIN A CSAS VALVE LOGIC BECORES 1/2 ON REMAINING CONTAINMENT BI-BI PRESSURE CRANNELS WITH CONCURRENT SIS/SISLOP FROM SEQ 1	
09.1.06.04.	2 CSAS TRAIN A (CHANNEL B TEST)	AVC29 (TRST SWITCH)	CONTACTS CLOSED	(\$13/\$13LOP) INPUTS UMAPPECTED CHANNEL B HI-HI CONTAINMENT PRESSURE MATRIX RELAYS AVC2A, AVC2B CANNOT BE TESTED	PBRIODIC TESTING	NONE SEGUIBED	NOME	NORMAL POSITION
09.1.07.01.	1 CSAS TRAIN A (CHANNEL C TEST)	•	ON (UNTRIPPED)	CHANNEL CHI-BI CONTAINMENT PRESSURE INPUT DISABLED TO TRAIN A PUMP MATRIE. CHANNEL CVALVE MATRIE, CHANNELS A, B AND SEQ I (SIS/SISLOP) INPUTS		REDUNDANT CONTAINMENT PRESSURE CHANNELS, REDUNDANT TRAIN		CHANNEL C PUMP MATRIX BELAYS. PARALLEL BELAY APC3C PROVIDES
09,1.07.01.	2 CSAS TRAIN A (CBANNBL C TRST)	*	OFF (TRIPPED)	UNAPPECTED CHANNEL C BI-HI CONTAINMENT PRESSURE SIGNAL TO TEAIN A PUMP MATRII. CHANNEL C VALVE MATRII, CHANNELS A, B AND SEQ I (SIS/SISLOP) INPUTS UNAPPECTED	PBBLODIC TBSTING	BEDUNDANT CONTAINMENT PRESSURE CHANNELS AND SEQ IMPUTS TO PREYENT SPURIOUS CSAS	TRAIN A CSAS PUMP LOGIC BECOMES 1/2 ON BEMAINING CONTAINMENT BI-BI PRESSURE CRANNELS WITH CONCURRENT SIS/SISLOP FROM SEQ 1	



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#### EMBRGENCY CORE COOLING STSTEM SINGLE FAILURE ANALTHIS SAM OMOFRE UNIT 1 TABLE 9-1: CONTAINMENT SPRAF ACTUATION FREA

	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL RPPECTS AND DEPENDENT PAILURES	MBTBOD OF DBTBCTION	IMBERBUT COMPRESATING PROVISIONS	EPPECT ON ECCS	BRHARRS
09.1.07.01.3 CS	A. HIAST. BA	APC3A, APC3B	EMPUT OPBM.	(SAMB AS 9.1.7.1.2)	(SAMR AS 9.1.7.1.2)	(SANR AS 9.1.7.1.2)	(SAME AS 9.1.1.1.2)	
(0	BANNEL C TEST)	(RELAYS)		•		•	•	
09.1.07.01.4 C8		APCJA, APCJB (RBLAYS)	INPUT SHORT	LOSS OF 15VDC POWER SUPPLIES APSA AND APSB. CAUSING TRIP OF	CONTROL ROOM INDICATION	REDUNDANT TRAIN	,	BOUNDS PAILURE OF ANNUNCIATOR RELAT APCIC. CSAS OUTPUT
				3/3 BI-BI CONTAINMENT PRESSURE				BELAYS ARE EMERGIZE TO
				CHANNELS, DISABLING 2/2 SEQUENCER SUBCHANNEL INPUTS				ACTUATE. APSA AND APSB OUTPUTS ARE PARALLELED
				AND ALL CRAS OUTPUTS IN TRAIN				572 1457445454
69.1.07.02.1 CS	A WILLE DA	10019	CONTACTS OPEN	A CSAS LOGIC RELAYS APCIA, APCIB	CONTROL ROOM INDICATION	**************************************	MD41W 4 6040 BIND 10010 BB004B0	
	BANNBL C TEST)		COMINCIS UPBR	DB-ENERGIZE, CAUSING CHANNEL C			TRAIN A CRAS PUMP LOGIC BECOMES 1/2 ON REMAINING CONTAINMENT	-
	•	•		HI-HI CONTAINMENT PRESSURE		PREVENT SPURIOUS CSAS	NI-NI PRESSURB CHANNELS WITH	
	·			SIGNAL TO TRAIN A CSAS PUMP MATRIX. CHANNELS A, B AND SRQ1			CONCURBENT SIS/SISLOP PROM SEQ	
				(819/918LOP) IMPUTS UNAPPECTED				
09.1.07.02.2 CS	AS TRAIN A HANNBL C TEST)		CONTACTS CLOSED	CHANNEL C DI-BI CONTAINMENT	PRRIODIC TRATING	NORE BEGATERD	NORE	NOBNAL POSITION
(0	QAAMSU C 1831)	(1831 2411CH)		PRESSURB MATRIX BELATS APCSA, APCSB CANNOT BE TESTED				
09.1.07.03.1 CS			ON (UNTRIPPED)	CHANNEL C HI-BI CONTAINMENT	PBRIODIC TESTING	REDUNDANT CONTAINMENT PRESSURE		NORMAL POSITION. TRAIN A
(0	MANNEL C TEST)	(BBLATS)		PRESSURE INPUT DISABLED TO TRAIN A VALVE MATRIE. CHANNEL	•	CHANNELS, REDUNDANT TRAIN	BECOMES 2/2 ON BENAINING	CHANNEL C VALVE HATRIE RELATS.
				C PUMP MATRIX, CHANNELS A. B			CONTAINMENT BI-BE PRESSURE CHANNELS	PARALLEL RELAY AVC3C PROVIDES CONTROL ROOM INDICATION
				AND SEQ 1 (SIS/SISLOP) INPUTS	The same of the sa			
09.1.07.03.2 CS	AS TRAIN A	AVCJA, AVCJB	OFF (TRIPPED)	UNAPPECTED CHANNEL C HI-HI CONTAINMENT	PRRIODIC TESTING	REDUNDANT CONTAINMENT PRESSURE	TRAIN A CRAS VALVE LOGIC	•
	HANNEL C TEST)		1	PRESSURE SIGNAL TO TRAIN A		CHANNELS AND SEQ INPUTS TO	BROOMES 1/2 ON REMAINING	
				VALVE MATRIX. CHANNEL C PUMP		PREVENT SPURIOUS CSAS	CONTAINMENT RI-SI PRESSURE	
		<del></del> · · ·	•	HATRII, CHANNELS A, B AND SEQ I (SIS/8ISLOP) INPUTS			CBANKELS WITH CONCURRENT SIS/SISLOP PROM SEQ 1	* * **********************************
44 1 05 43 4 44		.W	Tunua Annu	UNAPPECTED			• • • • • • • • • • • • • • • • • • • •	
09.1.07.03.3 CS	AS TRAIN A BANNEL C TEST)	AVCJA, AVCJB	INPUT OPEN	(SAMB AS 9.1.7.3.2)	(SAME AS 9.1.7.3.2)	(SAMB AS 9.1.7.3.2)	(SANR AS 9.1.7.3.2)	or the same property property and a special control of the Addition
09.1.01.01.4 CS		AVC3A, AVC3B	INPUT SHORT	(SAME AS \$.1.7.1.4)	(8ANB AS \$.1.7.1.4)	(SAHE AS \$.1.7.1.4)	(SAME AS 9.1.7.1.4)	BOUNDS FAILURE OF ANNUNCIATOR RELAY AVC3C. CSAS OUTPUT
								RELAYS ARE EMERGIZE TO ACTUATE. APSA AND APSE OUTPUTS ARE PARALLELED
09.1.07.04.1 CS			CONTACTS OPEN	RELATS AVCJA, AVCJB	CONTROL ROOM INDICATION	REDUNDANT CONTAINMENT PRESSURE		
(0	BANNEL C TEST)	(1881 SALLCR)		DB-BNBBGIZE, CAUSING CHANNEL C BI-BI CONTAINMENT PRESSURE			SECONES 1/2 ON SEMAINING CONTAINMENT BI-BI PRESSURE	
**************************************		***		SIGNAL TO TRAIN A CSAS VALVE	,	The second secon	CHANNELS WITH CONCURRENT	
				MATRIE: CHANNEL A, B AND SEQ 1			SIS/SISLOP FROM SEQ 1	
09.1.07.04.2 CS	AS TRAIN A	AVC19	CONTACTS CLOSED	(SIS/SISLOP) IMPUTS UNAPPROTED CHANNEL C RI-HI CONTAINMENT	PRRIODIC TESTING	NONE BEQUIRED	NONB	HORNAL POSITION
(C	HANNEL C TEST)	(TEST SWITCE)		PRESSURE MATRIX RELATS AVCJA,			*****	
				AVCJB CANNOT BE TESTED			# 1 May 1 A A A A A A A A A A A A A A A A A A	





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### EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM OMOPRE UNIT 1 TABLE 9-1: CONTAINMENT SPEAT ACTUATION FMBA

ITEN \$	DRAICE ID	COMPONENT ID	PAILURE HODE	LOCAL EFFECTS AND DEPENDENT FAILURES	MBTHOD OF DETECTION	INBERRNT COMPENSATING PROVISIONS	REPECT ON ACCS	REMARES
09.1.08.01.1	CSAS TRAIN A (SBQ 1 TBST)	APIA_(RBLAY)	TRIPPBD (ON)	RELAT PROVIDES 1 OF 2 REQUIRED SEQ 1 IMPUTS TO CSAS TRAIN A PUMP LOGIC	PRRIODIC TRSTING	REDUNDANT SEG SUBCHANNEL AND CONTAINMENT BI-BI PRESSURS INPUTS TO PERVENT SPURIOUS CRAS ACTUATION OF TRAIN A PUNI	CSAS LOGIC FOR TRAIN A PUMPS BECOMES 1/1 ON REMAINING SEQ SUBCRANNEL WITE CONCURRENT 2/3 NI-NI CONTAINNENT PRESSURE.	
	CSAS TRAIN A (SBQ 1 TBST)	APIA (RBLAY)	UNTRIPPED (OFF)	1 OF 2 REQUIRED SEQ 1 IMPUTS DISABLED TO TRAIN A PUMP LOGIC, VALVE LOGIC (INCLUDING	PBBIODIC TESTING	REDUNDANT RELAT INPUT PROM VALVE LOGIC (AVSS), REDUNDANT TRAIN	TRAIN A VALUE LOGIC AND TRAIN B UNAPPROTED REDUCED RELIABILITY OF TRAIN A	*MORMAL POSITION. RELAY PAILURE NOT DETECTABLE FROM CSAS CABINET INDICATION
	CSAS TRAIN A (SEQ 1 TEST)	APIA (RBLAT)	INPUT OPEN	REDUNDANT IMPUT PROM RELAT AVS3) AND TRAIN B UNAPPROTED (SAME AS 9.1.8.1.2)	(SAME AS 9.1.8.1.2)	(SAME AS 9.1.0.1.2)	(SANR AS 9.1.0.1.2)	PROVIDED BY PARALLEL ESLAY APER ************************************
	CSAS TRAIN A (SBQ 1 TEST)	APIA (RBLAT)	INDUE SHORT	APSA AND APSB ON RELAY TEST OR SEQ I SIS/SISLOP SIGNAL, CAUSING TRIP OF 1/3 CONTAINMENT HI-BI PRESSURE	PERIODIC TESTING	RECUMDANT TRAIN	TRAIN A CSAS INOPERABLE	APIB BOUNDS FAILURE OF AMMUNCIATOR/TEST RELAY APIB. CSAS OUTPUT BELAYS ARE EMERGIZE TO ACTUATE. APSA AND APSB OUTPUTS ARE PARALLELED
09.1.98.02.1	CSAS TRAIN A	APIS (TEST SWITCH)	MORMAL	CHANNELS, DISABLING 2/2 ABQ SUBCHANNEL INPUTS AND ALL CSAS OUTPUTS IN TRAIN A CBAS LOGIC BELAY APIA CANNOT BE TESTED	PBRIODIC TESTING	MONE BEGALESD	NONB	
09.1.08.02.2	CSAS TRAIN A (SEQ 1 TEST)	APIS (TEST SWITCE) AVIA (RELAT)	TRST TRIPPED (ON)	(SAME AS \$.1.8.1.1)  RELAT PROVIDES 1 OF 2 REQUIRED	CONTROL ROOM INDICATION, PERIODIC TESTING PERIODIC TESTING	(SAME AS S.T.S.1.1)  REDUNDANT SEQ SUBCEANMEL AND	(SAME AS S.1.8.1.1)  CRAS LOGIC FOR TRAIN A VALVES	
	(38Q   TEST)			SBQ I INPUTS TO CSAS TRAIN A VALVE LOGIC	190,170	CONTAINMENT NI-RI PRESSURE INPUTS TO PREVENT SPURIOUS CSAS ACTUATION OF TRAIN A	BECOMES I/I ON REMAINING SEQ SUBCHANNEL WITH CONCURRENT 2/3 BI-BI CONTAINMENT PRESSURE,	
09.1.08.03.2	CSAS TRAIN A (SBQ 1 TBST)	AVIA (BBLAY)	UNTRIPPRD (OPP)	1 OF 2 REQUIRED SEQ 1 INPUTS DISABLED TO CSAS TRAIN A VALVE LOGIC, PUMP LOGIC UNAFFECTED		VALVES REDUNDANT TRAIN	YEARN A VALVE LOGIC AND TEATH B UNAPPECTED TRAIN A CSAS VALVE ACTUATION INOPERABLE	*MORMAL POSITION. RELAT  FAILURE NOT DETECTABLE FROM  CSAS CABINET INDICATION  PROVIDED BY PARALLEL RELAT
	CSAS TRAIN A (SEQ 1 TEST)	AVIA (RBLAY)	INPUT OPBN	(SAME AS 9.1.8.3.2)	(SAME AS 9.1.8.3.2)	(BANR AS 9.1.8.3.2)	(SAME AS 9.1.8.3.2)	AVIB  *FAILURB NOT DETECTABLE FROM CSAS CABINET INDICATION
09.1.08.03.4	CSAS TRAIN A	AVIA (BBLAY)	IMPUT SHORT	(SAMB AS 9.1.8.1.4)	(SAME AS 9.1.8.1.4)	(SAME AS 9.1.8.1.4)	(SAME AS 9.1.8.1.4)	PROVIDED BY PARALLEL RELAY AVIS BOUNDS PAILURE OF ARMUNCIATOR/TEST RELAY AVYS.
			·					CSAS OUTPUT RELATS ARE ENERGIZE TO ACTUATE. APSA AND APSE OUTPUTS ARE PARALLEDED





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FOR CHAS LOADS

#### BMBRGBNCT CORB COOLING SYSTBM SINGLE PAILURE ANALYSIS SAM ONOPRE UNIT 1 TABLE 9-1: CONTAINMENT SPRAY ACTUATION PMBA

ITBN	DBAICE ID	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT FAILURES	MRTHOD OF Drtrction	INHERENT COMPENSATING PROVISIONS	EFFECT ON ECCS	REMARES .
_ 09.1.08.04.1	1 CSAS TRAIN A	_ AVIS	NORMAL	RBLAT AVIA CANNOT BE TESTED	PRRIODIC TRSTING		MONR	NORMAL.
AG 1 AR AR 1	(SEQ 1 TEST) CSAS TRAIN A	(TEST SWITCH)				• • • • • • • • • • • • • • • • • • • •		
	(SBQ .1 .TEST)	(TEST_SWITCE)	TBST	(SAME AS 9.1.8.3.1)	CONTROL BOOM INDICATION, PERIODIC TESTING	(SAME AS 9.1.8.3.1)	(SAME AS 9.1.8.3.1)	
09.1.08.05.	(SBQ 1 TBST)	APTA (RELAT)	TRIPPED (ON)	(SAME AS 9.1.8.1.1)	(SAMB AS 9.1.8.1.1)	(SAMB AS \$.1.8.1.1)	(SAME AS 9.1.8.1.1)	
09.1.08.05.1	CSAS TRAIN A	ARTA (RBLAY)	UNTRIPPED (OPP)	(SAME AS 9,1.8.1.2)	(SAME AS 9.1.8.1.2)	(8,1,8,1,8,8,8,8,8)	(\$,1,8,11€, \$A,8MA8)	*NORMAL POSITION. RELAT PAILURE NOT DETECTABLE PROM
	, · · ·				. <u>.</u>		The statement of the st	CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAT
	CSAS TRAIN A	APYA (RELAY)	IMPUT OPBM	(SAMB AS 9.1.8.1.2)	(8AMB AS 9.1.8.1.2)	(SANE AS 9.1.8.1.2)	(SAME AS 9.1.8.1.2)	APTB  *BELAT FAILURE NOT DETECTABLE
			••					PROMICSAS CABINET INDICATION PROVIDED BY PARALLEL RELAY APTE
09.1.08.05.4	(SEQ 1 TEST)	.APTA (RBLAT)	INPUT SHORT	(SAMB AS 9.1.8.1.4)	(8AMB AS 9.1.8.1.4)	(8AM8_AR_9.1.4.1.4)	(8AMR_AR 9.1.8.1.4)	BOUNDS PAILURE OF
				<u> </u>				ANNUNCIATOR/TEST RELAT APTE. CSAS OUTPUT RELATS ARE RNERGIZE TO ACTUATE, APSA AND
	CSAS TRAIN A	APTS (TEST_SWITCH)	MORMAL	RELAT APTA CANNOT BE TESTED	PERIODIC TESTING	NORE REQUIRED	MOMB	APSB OUTPUTS ARB PARALLELED
09.1.08.06.2	CSAS TRAIN A	APTS (TEST SWITCH)	TEST	(SAME AS 9.1.8.1.1)	CONTROL BOOM INDICATION, PERIODIC TESTING	(SAUR AS 9.1.0.1.1)	(SAME AS 9.1.8.1.1)	
09.1.08.07.1	(SEQ 1 TEST)	AVYA (BBLAY)	TRIPPED (ON)	(SAME AS 9.1.8.3.1).	(SANE AS 9.1.0.3.1)	(SAMB AS 9.1.8.3.1)	(1.6.6.1.0 BA SHAR)	(SANB AS 9.1.0.1.1)
	CSAS TRAIN A _(SEQ 1_TEST)	AVTA (RBLAY)	UNTRIPPED (OFF)	(SAME AS 9.1.8.3.2)	(SAME AS 9.1.8.3.2)	(SAME AS 9.1.8.3.2)	(SAME AS 9.1.8.3.2)	*NORMAL POSITION. BELAT FAILURE MOT DETECTABLE FROM
								CSAS CASIBBY INDICATION PROPYIDED BY PARALLEL RELAY
09.1.08.07.3	CSAS TRAIN A (SEQ 1 TEST)	AVYA (RBLAY)	INPUT OPBN	(SAMB AS 9.1.8.3.2)	(SAME AS 9.1.8.3.2)	(2.C.S.1.8 BA BMAE)	(SAME AS 9.1.8.3.2)	AYTR  *BBLAY PAILURB NOT DETECTABLE FROM CSAS CABINET INDICATION PROYIDED BY PARALLEL RELAY
	CSAS TRAIN A (SBQ 1 TBST)	AVYA (RBLAY)	INPUT SHORT	{SAMB AS 9.1.8.1.4}	(SAMB AS 9.1.8.1.4)	(SANE AS 9.1.8.1.4)	(SAME AS 9.1.8.1.4)	AVIB BOUNDS FAILURE OF
		<del></del>	•		·- ···· · · · · · · · · · · · · · · · ·			ANNUNCIATOR/TEST ESLAT AVIB. CSAS OUTPUT ESLATS ARE BNERGIZE TO ACTUATE. APSA AND
09.1.08.08.1	CSAS TRAIN A (SEQ 1 TEST)	AVYS (TBST SWITCH)	NORMAL	RELAT AVES CANNOT BE TESTED	PERIODIC TESTING	NOME BEGNIESD	NOMB	APSB OUTPUTS ARE PARALLELED
09.1.08.08.2	CSAS TRAIN A	AVYS (TBST SWITCH)	TBST	(SAME AS 9.1.8.3.1)	CONTROL ROOM INDICATION, PERIODIC TESTING	(SAMB AS 9.1.8.3.1)	(SAME AS 9.1.8.3.1)	
	CSAS TRAIN A {UV TRST}	APDR (TOR BBLAY)	OFP	CSAS TRAIN A PUMP LOGIC DELAY Disabled, Valve Logic Delay		NOMB SEGUISED	MONE	NORMAL POSITION. NO REPECT FOR SIS. POR SISLOP, RELAT IS
				AND SEC LOAD GROUP D TIMBES UNAPPECTED				DE-EMERGIZED FOR CSAS PERMISSIVE 10 SEC FOLLOWING 4 LY BUS VOLTABE RECOVERY SO THAT SEQ LOAD GROUP D 11 SEC TIME DELAY CONTROLS START TIME



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ITEM #	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL REFECTS AND DEPENDENT FAILURES	METHOD OF Detection	SECATATORA IMEREBAT CORDENSTATING	BPFECT ON ECCS	BEHARES
		<i>" Sib</i> oodaaaaaa					Carrier of the second of th	
.09.1.09.01.2 (	CSAS TRAIN A	APDR	ON .	CSAS TRAIN A PUMP LOGIC	CONTROL ROOM INDICATION,	REDUNDANT TRAIN	TRAIN A CSAS PUMP ACTUATION	,
(	(UV TEST)	(TDR RBLAY)		DISABLED, OUTPUT RELATS APSI THROUGH APS9 CANNOT BE ENERGIZED	PBRIODIC TESTING		INOPERABLE	
09.1.09.01.3	CSAS TRAIN A (UV TEST)	APDR (TDR RELAY)	INPUT OPRN	(SAME AS 9.1.9.1.1)	(SAME AS 9.1.9.1.1)	(SAME AS 9.1.9.1.1)	(SAME AS 9.1.9.1.1)	
09.1.09.01.4		APDR	INPUT SHORT	LOSS OF 15VDC POWER SUPPLIES	CONTROL POOM INDECATION	REDUNDANT TRAIN FOR CSAS, NONE	STRAIGHT PART I NITERIA	BREAKERS COORDINATED WITE
	(UV TEST)	(TOR RELATE	18101 08021	APSA AND APSB. DR-RNRRGIZING	CONTROL BOOK LEDICATION	POR VITAL BUSSES		VITAL BUS PREDERS, BOYEVER
•		(,,,,		TRAIN A CSAS LOGIC AND			VITAL BUSSES \$1 AND \$3A	PAILURE (SHORT OF BOTH +15VDC
				POTRUTIALLY IMPACTING VITAL			•••••••	AND -15VDC ON APRA AND APRA)
7710 0				BUS DI (8-1115V POR APSA) AND				MAY CAUSE AUTO-TRANSFER OF
				VITAL BUS \$3A (8-1314V POR		•	•	BOTH WITAL BUSSES PRIOR TO
				APSB)				TRIP OF APSA/APSB LOAD
09.1.09.02.1	CSAS TRAIN A (UV TEST)	APDRS (TRST SWITCE)	MORMAL	RELAY APOR CANNOT BE TESTED	PERIODIC TESTING	NOME BEQUIRED	RORE	BRBAEBRS
09.1.09.02.2		APDRS	TEST	(SANE AS 9.1.9.1.2)	(SAMB AS 9.1.9.1.2)	(SAME AS 9.1.9.1.2)	(SAME AS 9.1.9.1.2)	
	(UV TRST)	(TEST SWITCH)	••••		Janes wa attracted	farma wa arrestrat	Janea na arreatiol	
•	CSAS TRAIN A	AVDR	OFF	CSAS TRAIN A VALVE LOGIC DELAT	PERIODIC TESTING	NOME REQUIRED	MONE	
· · · · ·	(UV TBST)	(TOR RELAY)		DISABLED, PUMP LOGIC DELAY AND				
				SRQ LOAD GROUP D TIMERS UNAPPROTED				
09.1.09.03.2		AVDR	ON	CSAS TRAIN A PUMP LOGIC	CONTROL ROOM INDICATION,	REDUNDANT TRAIN	TRAIN A CRAS VALVE ACTUATION	
1	(UV TEST)	(TDR RELAY)		DISABLED, OUTPUT RELAYS AVS1	PRRIODIC TESTING		INOPERABLE	
	72.7 221.71.7.7.7.7.			THRU AVSS CANNOT BE BURRGIZED				
•	(UV TBST)	AVDR (TDR RELAY)	IMPUT OPBN	(SAME AS 9.1.9.3.1)	(SAME AS 9.1.9.3.1)	(SAME AS 9.1.9.3.1)	(SAME AS 9.1.9.3.1)	
	CSAS TRAIN A		INPUT SHORT	LOSS OF 15VDC POWER SUPPLIES	CONTROL BOOM INDICATION	REDUNDANT TRAIN FOR CSAS, NOME		BRRAEBRS COORDINATED WITH
	(UV 1891)	(TDE BELAY)		APSA AND APSB, DB-BNBRGIZING		FOR VITAL BUSSES		VITAL BUS PREDERS, BOVEVER
				TRAIN A CSAS LOGIC AND POTENTIALLY INPACTING VITAL			ALLY BORSES \$1 THE \$3T	PAILURE (SHORT OF BOTH +15VDC AND -15VDC ON APSA AND APSB)
				BUS \$1 (8-1115V POR APRA) AND				MAY CAUSE AUTO-TRANSPER OF
				VITAL BUS #34 (8-1314V FOR	•			BOTE VITAL BUSSES PRIOR TO
				APSB)				TRIP OF APSA/APSB LOAD
			•	. 377				BREARRS
09.1.09.04.1 C	CSAS TRAIN A (UV TEST)	AVDRS (TEST SWITCE)	NORMAL	RELAT AVDR CANNOT BE TESTED	PERIODIC TESTING	NOME BEGNIESD	NOMB	
09.1.09.04.2 0	CBAS TRAIN A (UV TBST)	AVDRS (TBST SWITCH)	TEST	(SAME AS 9.1.9.3.2)	(SAMR AS 9.1.9.3.2)	(SAME AS 9.1.9.3.2)	(SAME AS 9.1.9.3.2)	
09.1.10.01.1	CSAS TRAIN A	APNIA, APNZA	TRIPPED	BELAT PROVIDES 1 OF 2 REQUIRED	PERIODIC TESTING	REDUNDANT MATRIX OUTPUT BELAT	CSAS LOGIC FOR TRAIN A PUMPS	*RELAYS ARE DE-EMERGIZE TO
	(LOGIC)	(RELATS)	(OME BELAY)	HATRIX SIGNALS TO TRAIN A CSAS		AND REDUNDANT VALVE LOGIC TO	BECOMES 1/1 ON REMAINING MATRIX	ACTUATE. RELAY FAILURE NOT
				PUMP OUTPUT RELATS		PREVENT SPURIOUS CSAS	OUTPUT BELAT	DETECTABLE PROM CSAS CABINET INDICATION PROVIDED BY
								PARALLEL RELAYS APRIE OR APRIE
09.1.10.01.2	CSAS TRAIN A	APMIA, APMZA (BBLAYS)	UNTREPPED (ONE RELAY)	I OF 2 REQUIRED MATRIX OUTPUT RELAYS DISABLED FOR CSAS TRAIN	*******	BEDUNDANT TRAIN	CBAS TRAIN A PUMP ACTUATION INOPERABLE	WORMAL POSITION (BURBGIZED)





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## EMBRGBACT CORE COOLING STSTEM SINGLE FAILURE ANALTSIS SAM ONOFRE UNIT 1 TABLE 9-1: CONTAINMENT SPRAT ACTUATION FMBA

LTEN #	DBAIGB ID	COMPONENT ID	PAILURE HODE	LOCAL SPPECTS AND DEPENDENT PAILURES	METHOD OF Detection	PROATSIONS [MEBBERAL COMBERSYLING	EPPECT ON ECCS	REMARES
09,1,10.01.;	CSAS TRAIM A (LOGIC)	APMIA, APMZA (RBLATS)	INPUT OPEN (OMB RELAT)	(SAMB AS 9.1.10.1.1)	(\$4MB AS 9.1.10.1.1)	(SAME AS 9.1.10.1.1)	(SAMB AS 9.1.10.1.1)	*(SAME AS 9.1.10.1.1)
	CSAS TRAIN A	APHIA, APHZA (BBLAYS)	INPUT SHORT (ONB RELAT)	APSA AND APSB, PREVENTING	CONTROL BOOM INDICATION, PREIODIC TESTING	REDUNDANT TRAIN	TRAIN A CSAS INOPERABLE	BOUNDS SEORT OF ANY OUTPUT RELAT APS THRU APS OR AVS I
			_	SWERGIZATION OF COAS TRAIN A OUTPUT RELATS				THRU AVSS. CSAS OUTPUT RELATS ARE EMERGIZE TO ACTUATE. APSA AND APSE OUTPUTS ARE
05.1.10.02.1	CSAS TRAIN A	RMS-2020A (INITIATE PUMPS)	CONTACTS OPEN	TRAIN A CSAS PUMPS ACTUATED, SIGNAL RESET CANNOT BE SRALED-IN. TRAIN A CSAS VALVE	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT LOGIC FOR TRAIN A VALVES TO PREVENT SPURIOUS CSAS	REDUCED REDUNDANCY AGAINST SPURIOUS CSAS	PARALLELEO
09.1.10.02.1	CSAS TRAIN A	RMS-2020A (INITIATE PUMPS)	CONTACTS CLOSED	LOGIC UNAPPRETED	PERIODIC TESTING	REDUNDANT TRAIN	REDUCED RELIABILITY OF TRAIN A	NORMAL POSTION
				LBYRL. NO SPPECT ON AUTOMATIC ACTUATION				• .
09.1.10.03.1	CSAS TRAIN A (LOGIC)	AVMIA, AVMŽA (RBLATS)	TRIPPED (ONE RELAT)	RBLAY PROVIDES 1 OF 2 REQUIRED MATRIX SIGNALS TO CSAS TRAIN A VALVE OUTPUT RELAYS		REDUNDANT MATRIX OUTPUT RELAY TO PREVENT SPURIOUS CSAS	CSAS LOGIC POR TRAIN A VALVES BECOMES 1/1 ON REMAINING MATRIX OUTPUT RELAY	DETECTABLE FROM CSAS CABINET
09.1.10.03.2	CSAS TRAIN A	AVNIA, AVNZA	UNTRIPPED	1 OF 2 REQUIRED MATRIX OUTPUT	PRRIODIC TESTING	REDUNDANT TRAIN	CSAS TRAIN A VALVE ACTUATION	INDICATION PROVIDED BY PARALLEL RELAYS AVMIB OR AVM2B MORMAL POSITION
	(LOGIC)	(RELATS)	(ONE BELAY)	RBLAYS DISABLED FOR CSAS TRAIN A VALVES			INOPERABLE	
ree e e l'impaire l'il	(LOGIC)	AVNIA, AVNZA (RBLAYS)	INPUT OPBN (ONB RBLAY)	· · · · · · · · · · · · · · · · · · ·	(SAMB AS \$.1.10.3.1)	(SAHE AS 9.1.10.3.1)	(1.1.1.1.1 EA BHAR)	*(SAHB AS 9.1.10.3.1)
05.1.10.03.4	(LOGIC)	AVMIA, AVMZA (RELATS)	INPUT SHORT (ONE RELAY)	LOSS OF 15VDC POWER SUPPLIES APSA AND APSB, PREVENTING BNBEGIZATION OF CSAS TRAIN A	CONTROL BOOM INDICATION, PERIODIC TESTING	REDUNDANT TRAIN	CSAS TRAIN A INOPERABLE	BOUNDS SHORT OF ANY OUTPUT RELAT APSI THRU APSS OR AVS! THRU AVSS. CSAS OUTPUT RELATS
				OUTPUT RELAYS				ARE BUBRGIZE TO ACTUATE. APSA AND APSE OUTPUTS ARE
09.1.10.04.1	CSAS TRAIN A	RMS-2060A (INITIATE	CONTACTS OPBN	CSAS TRAIN A VALVES ACTUATED, SIGNAL RESET CANNOT BE	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT LOGIC FOR TRAIN A PUMPS TO PREVENT SPURIOUS CSAS		PĀRĀLŪBLED
09 1 10 04 2	CSAS TRAIN A	VALV89) RMS-2060A	CONTACTS CLOSED	SBALED-IN. TRAIN A PUMPS UNAPPECTED TRAIN A CSAS VALVES CANNOT BE	DECIMAL TERRING	REDUNDANT TRAIN	REDUCED RELIABILITY OF TRAIN A	NULL BUILLING THEORY
***************************************	(LOGIC)	(INITIATÉ VALVES)	ANNUAL OFFICER	ACTUATED MANUALLY AT SYSTEM LEVEL. NO EPPECT ON AUTOMATIC ACTUATION	COMPOSITO INSTITUTE	BRANDARET INGIE	CSAS TABLETT OF TAKE A	nyundu tuuttiva
09.1.10.05.1	CSAS TRAÍN A (LOGIC)	RMS-2070A, -2080A (HANUAL BESET)	CONTACTS OPEN (NORMAL)		PBRIODIC TESTING	TRAIN A VALVE REALIGHMENT IN RECIRC, BEDUNDANT TRAIN FOR	TRAIN A CSAS CANNOT SE BRORT POR VALVE BRALIGHMENT IN BRCIRC, REQUIRING USE OF	NORMAL POSTTION
09.1.10.05.2	CSAS TRAIN A	RM9-2070A,	CONTACTS CLOSED	TRAIN A CSAS PUMPS AND VALVES		AUTO-RBINITIATION IN SMALL Brbar Bybhts Brdundant train	OVERBIDES WHICH BLOCK AUTO-BRINITIATION TRAIN A CSAS INOPERABLE	· · · · · · · · · · · · · · · · · · ·
	(LOGIC)	-2080A (Manual Beset)	(RESET)	CANNOT BE ACTUATED MANUALLY OR AUTOMATICALLY AT SYSTEM LEVEL				



## EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 9-1: CONTAINMENT SPRAY ACTUATION FMBA

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	ITBH \$	DBVICE ID	COMPONENT ID	PAILURE MODE	LOCAL EFFECTS AND DEPENDENT PAILURES	METHOD OF Detection	IMBRENT COMPENSATING PROVISIONS	BFFRCT ON BCCS	REMARES
:	09.1.11.01.1	CSAS TRAIN A	APSA	OUTPUT YOLTS LOW	POWER LOST FROM APSA, NO	LOCAL INDICATION, PRRIODIC	REDUNDANT TRAIN	BRDUCED RELIABILITY OF TRAIN A	BORS NOT INCLUDE OUTPUT SHORT
,		(POWER)	(15VDC PWR SUPL)		BPPECT ON TRAIN A CSAS LOGIC DUB TO REDUNDANT SUPPLY APSE			C318	WHICH IS BOUNDED BY INPUT SHORT OF CONNECTED RELATS
` 'I		CSAS TRAIN A (POWER)	(15VDC PWB SUPL)		(SAME AS 9.1.11.1.1)	(SAME AS 9.1.11.1.1)		(SAMB AS 1,1.11.1.1)	
, <u> </u>	09.1.11.01.3	(PONBR)	APSA (15VDC PWB SUPL)	INPUT SHORT	VITAL BUS \$1 (8-1115V) BRBAKBR TRIPS OPEN AND DR-RHERGIZES	CONTROL BOOM INDICATION	9.1.11.1.1)	(SANB AS 9.1.11.1.1)	PAILURE NAT ALSO RESULT IN AUTO-TRANSFER OF VITAL BUS AL
					APSA. NO BPPRCT ON TRAIN A CSAS LOGIC DUB TO REDUNDANT SUPPLY APSB				TO BACKUP SOURCE PRIOR TO ISOLATION OF FAULT BY LOAD BREAKER
	09.1.11.02.1	CHAS TRAIN A (POWER)	APSB (15VDC PWR SUPL)	OUTPUT VOLTS LOW	POWER LOST FROM APSE. NO RPPECT ON TRAIN A CSAS LOGIC DUB TO REDUNDANT SUPPLY APSA	LOCAL INDICATION, PERIODIC TESTING	REDUNDANT TRAIN	REDUCED RELIABILITY OF TRAIN A	
,		CSAS TRAIN A (POWER)	APSB (15VDC PWR SUPL)		(SAMB AS 9.1.11.2.1)	(SAME AS 9.1.11.2.1)	(SAHB AS 9.1.11.2.1)	(BARE AS 9.1.11.2.1)	
	_09.1.11.02.3	CSAS TRALNA (POVBR)	APSB	INPUT SHORT	VITAL BUS \$3 (4-1314Y) BRBARRR TRIPS OPEN AND DE-ENERGIZES APSB	CONTRÓL BOOM INDICATION		(8AUR_AS_5.1.1.2.1)	
	_09. <u>1.11</u> .03. <u>1</u>	CSAS TRAIN A (POWER)	_VITAL_BUS_BI (8-1115V)	VOLTS LOW	ISYDC POWER SUPPLY APSA DR-BHBRG[ZED. NO BPFECT ON TRAIN A CSAS LOGIC DUB TO REDUNDANT SUPPLY APSB	CONTROL BOOM INDICATION	REQUINDANT TRAIN	BROUCED RELIABILITY OF TRAIN A CSAS	
		CHAS TRAIN A (POWER)	VITAL BUS 43 (8-1314V)	VOLTS LOW	15VDC POWER SUPPLY APSB DB-BNBRGIZED	CONTROL ROOM INDICATION	REDUNDANT TRAIN	REDUCED RELIABILITY OF TRAIN A	APSA AND APSB OUTPUTS ARB PARALLELED
	<u>09.2.01.01.1</u>	PT-502 LOOP	PIS-512 (BISTABLE)	TRIPPED	CHANNEL B RI-BI CONTAINMENT PRESSURE SIGNAL VIA DE-BHERGIZING RELAT ACZA TO TRAIN A CSAS, AND BC2B TO	CONTROL ROOM INDICATION, ANNUNCIATION	NOME REQUIRED FOR CSAS INITIATION, REDUNDANT CONTAINMENT PRESSURE CHAMMELS AND SEQ IMPUTS TO PREVENT	TRAIN A AND TRAIN B CSAS LOGIC BECOMES 1/2 ON REMAINING CONTAINMENT PRESSURE CHANNELS WITH CONCURRENT SIS/SISLOP FROM	PT-502, TEST SWITCE AND RESISTOR. CSAS LOGIC FOR BACE
				-	TRAIN B CSAS. CHANNELS A AND C BI-HI CONTAINMENT PRESSURE AND BRQ (SIS/SISLOP) INPUTS		SPURIOUS CSAS	BESPECTIVE SEQ	BISTABLE PAILURE IN TRIPPED STATE BOUNDS COIL SHORT IN
	09.2.01.01.2	PT-502 LOOP	PIS-512 (BISTABLE)	UNTRIPPED	UNAPPECTED CHANNEL B HI-BI CONTAINMENT PRESSURE INPUT DISABLED TO	PBBIODIC TESTING	REDUNDANT CONTAINMENT PRESSURE CHANNELS	TRAIN A AND TRAIN B CSAS LOGIC BECOMES 2/2 ON REMAINING	OUTPUT RELATS NORMAL POSITION, OUTPUT RELATS ARE NORMALLY EMBEGIZED, AND
					TRAIN A AND TRAIN B CSAS VIA RBLAYS ACZA AND BCZB RBMAINING BNBRGIZBD. CHANNBLS A AND C		37771	CONTAINMENT PRESSURE CHANNELS WITE CONCURRENT SIS/SISLOP PROM RESPECTIVE SEQ	
:					BI-BI CONTAINMENT PRESSURE AND SEQ (SIS/SISLOP) INPUTS UNAFFECTED				
:	09.2.01.02.1	PT-502 LOOP	LOOP PWR SUPPLY	INPUT OPBN	(SAME AS 9.2.1.1.1)	(SAHE AS 9.2.1.1.1)	(SAMB AS 9.2.1.1.1)	(SAMB AS 9.2.1.1.1)	W 1 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -
	<u>. 09</u> .2.01.02.2	PT-502 LOOP	LOOP PWB SUPPLY 610	INPUT SHORT	FUSE BLOWS IN SUPPLY FROM CSAS INVERTER, CAUSING LOSS OF POWER TO PIS-512, LIS-500B, PIS-501 AND OUTPUT RELATS, RESULTING IN CHNL B BI-BI	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT CONTAINMENT PRESSURE CHANNELS AND SEQ INPUTS TO PREVENT SPURIOUS CSAS	BROOMES 1/2 ON BRHAIMING CONTAINMENT BI-BI PRESSURE CHANNELS WITH CONCURRENT SIS/SISLOP FROM RESPECTIVE	
!	÷				PRESS SIGNAL TO TRAIN A AND B CSAS LOGIC AND DISABLING LOW LBVBL TRIP OP TRAIN B			SEQUENCES .	

HYDRAZINE PUMP



#### BHBBGBNCT CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS

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ITBH #	DBVICE ID	COMPONENT ID	FAILURE MODE	LOCAL BPFRCTS AND DBPBNDBMT FAILURES	METHOD OF	INBERBNT COMPRESATING PROVISIONS	RPFRCT ON ECCS	PRHARES
09,2,01.01.1 P	T-502_L00P	ACZA (BRLAY)	TRIPPRO	CHANNEL B.BI-BI. CONTAINMENT. PRESSURE SIGNAL TO TRAIN A CSAS LOGIC. CHANNELS A AND C BI-BI. CONTAINMENT. PRESSURE AND		REQUINDANT CONTAINMENT PRESSURE CHANNELS AND SEQ INPUTS TO PREVENT SPURIOUS TRAIN A CSAS	TRAIN A CSAS LOGIC BROOMS 1/2 ON REMAINING CONTAINMENT BI-BI PRESSURE CHANNELS WITH CONCURRENT SIS/SISLOP FROM SEQ	RBLAY_IS_DB-RWRRGIZB_TO_TRIP
0 <u>9. 2.01.03.2 P</u>	<b>1-502 L</b> 00P	_ACZA (BBLAY)	UNTRIPPED	SBQ (SIS/SISLOP) IMPUTS UNAPPECTED CHANNEL B BI-BI CONTAINMBUT PRESSURE IMPUT DISABLED TO TRAIN A CSAS LOGIC. CHANNELS A AND C &I-BI CONTAINMBUS	PBRIODIC TBRTING	CHAMMBLS, BEDUNDANT TRAIN	1. TRAIN B CSAS LOGIC UNAPPECTED TRAIN A CSAS LOGIC BECOMES 2/2 ON REMAINING CONTAINMENT BI-BI PRESSURE CHANNELS WITE	
_09.2,01 <u>.04</u> .1 Pi	r-502 LOOP	BC2B (RBLAY)	TRIPPED	PRESSURE AND SRY (SIS/SISLOP) INPUTS UNAPPRECTED CHANNEL B BI-BI CONTAINMENT PRESSURE SIGNAL TO TRAIN B CSAS LOGIC. CHANNELS A AND C BI-BI CONTAINMENT PRESSURE AND		REDUNDANT CONTAINMENT PRESSURE CHANNELS AND SEQ INPUTS TO PREVENT SPURIOUS TRAIN B CSAS	CONCURRENT SIS/SISLOP PROM SEQ 1. TRAIN B CSAS LOGIC UNAPPECTED TRAIN 8 CSAS LOGIC BECOMES 1/2 ON REMAINING CONTAINENT HI-BI PERSSURE CEANNELS WITE CONCURRENT SIS/SISLOP PROM SEQ	BRUAY_19_DR-EMBRG12R_TO_TRIP
09,2.01.04,2 P1	r-502_Loop	BC2B_(RBLAY)	UNTRIPPED	SEQ (SIS/SISLOP) IMPUTS UMAPPECTED CHANNEL B EI-HI CONTAINBENT PRESSUBE IMPUT DISABLED TO TRAINIB CSAS LOGIC. CHANNELS A AND C 81-81 CONTAINMENT	***************************************	REDUNDANT CONTAINMENT PRESSURE CHANNELS, REDUNDANT TRAIN	2. TRAIN A CSAS LOGIC UNAPPECTRO TRAIN 8 CSAS LOGIC BECCHES 2/3 ON RENAINING CONTAINMENT BI-NI PRESSURE CHANNELS WITH CONCURRENT \$18/8181.0P PROM SEQ	
09.2.01.05.1 PT	205 rõõb	CSAS INVERTER (TO2-2)	AOF13 FOM	PRESSURE AND SEQ (SIS/SISLOP) IMPUTS UNAPPECTED LOSS OF POWER TO PIS-512, LIS-500B, PIS-501 AND OUTPUT RELATS, RESULTING IN CENL B HI-RI PRESS SIGNAL TO TRAIN A	CONTROL ROOM INDICATION,	REDUNDANT CONTAINMENT PRESSURE CHANNELS AND SEQ INPUTS TO PREVENT SPURIOUS CSAS	2. TRAIN A CSAS LOGIC UNAPPECTED TRAIN A AND B CSAS LOGIC BECONES 1/2 ON REMAINING CONTAINMENT BI-BI PRESSURE	
				AND B CSAS LOGIC AND DISABLING LOW LEVEL TRIP OF TRAIN B BYDRAZING PUMP			CHANNELS WITH CONCURRENT . SIS/SISLOP FROM RESPECTIVE SEQUENCES	
09.2.02.01.1 PT 09.2.02.01.1 PT		PIS-513 (BISTABLE)	TRIPPED	CHANNEL C BI-BI CONTAINMENT PRESSURE SIGNAL VIA	CONTROL ROOM INDICATION,	NOME REQUIRED FOR CSAS INITIATION, REDUNDANT	TRAIN A AND TRAIN B COAS LOGIC	PT-503, TEST SWITCH AND
·		.: .		DB-BHBBGIZING BBLAT ACJA TO TRAIN A CSAS, AND BC3B TO TRAIN B CSAS. CRANNELS A AND B RI-BI COMTAINMENT PRESSURE AND SRQ (SIS/SISLOP) INPUTS UNAPPECTED		AND SEQ INPUTS TO PREVENT	CONTAINMENT PRESSURE CHANNELS WITH CONCURRENT SIS/SISLOP FROM RESPECTIVE SEQ	
09.2.02.01.2 PT	-503 LOOP	PIS-513 (BISTABLE)	UNTRIPPBD	CHANNEL C HI-BI CONTAINMENT PRESSURE INPUT DISABLED TO TRAIN A AND TRAIN B CSAS VIA RBLAYS ACJA AND BCJB REMAINING BNBRGIZED. CHANNELS A AND B	PERIODIC TESTING	CHANNELS	TRAIN A AND TRAIN B CSAS LOGIC BECOMES 2/2 ON REMAINING CONTAINMENT PRESSURE CHANNELS WITH CONCURRENT SIS/SISLOP PROM RESPECTIVE SEQ	MORNAL POSITION. OUTPUT RELAYS ARE NORMALLY EMERGIZED, AND DB-EMERGIZE TO TRIP
				BI-BI CONTAINMENT PRESSURE AND SBQ (SIS/SISLOP) INPUTS UNAFFECTED				





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## EMBRGENCY CORB COOLING SYSTEM SINGLE PAILURE AWALTSIS SAW OWOPRE UNIT 1 TABLE 9-1: CONTAINMENT SPEAT ACTUATION PHEA

ITBH &	DBAICE ID	COMPONENT ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METROD OF DETECTION	INHERRNY COMPRESATING PROVISIONS	BPFRCT ON BCCS	REMARES
09.2,02.02.1	PT-503 LOOP	LOOP PWR SUPPLY	[MPUT OPBN	(SAME AS 9.2,2.1.1)	(SAMB AS 9.2.2.1.1)	(8AMB AS 9.2.2.1.1)	(SAMB AS 9.2.2.1.1)	
09.2.02.02.2	PT-503 LOOP	LOOP PWR SUPPLY	IMPUT SHORT	PUSE BLOWS IN SUPPLY FROM CSAS INVERTER, CAUSING LOSS OF			TRAIN A AND B CRAS LOGIC BECORES 1/2 ON REMAINING	
				POWER TO PIS-513, MOV-883. POSITION INDICATION AND PIS-513 OUTPUT BELATS,		PREVENT SPURIOUS CSAS	CONTAINMENT BI-BI PRESSURE CHANNELS WITE CONCURRENT SIS/SISLOP PROM RESPECTIVE	
				RESULTING IN COME C BI-BI PROSS SIGNAL TO TRAIN A AND B CSAS LOGIC	·		SEGNERICEE	
09.2.02.03.1	PT-503 LOOP	ACSA (RBLAY)	TRIPPED	CHANNEL C HI-BI CONTAINMENT PRESSURE SIGNAL TO TRAIN A CSAS LOGIC. CHANNELS A AND B	CONTROL ROOM INDICATION		TRAIN A CSAS LOGIC BECOMES 1/2 ON REMAINING CONTAINMENT BI-BI PRESSURE CHANNELS WITH	BBLAY IS DE-EMBRGIZE TO TRIP
			•	BI-BI CONTAINMENT PRESSURE AND SEQ (SIS/SISLOP) INPUTS UNAPPECTED	-		CONCURRENT SIS/SISLOP FROM SEQ 1. TRAIN B CSAS LOGIC UNAPPROTED	
09.2.02.03.2	PT-503 LOOP	ACJA (RBLAT)	ÜNTREPPBD	CHANNEL C HI-BI CONTAINMENT PRESSURE INPUT DISABLED TO TRAIN A CSAS LOGIC. CRANNELS A	PERIODIC TESTING	REDUNDANT CONTAINMENT PRESSURE CHANNELS, REDUNDANT TRAIN	TRAIN A CSAS LOGIC BECOMES 2/2 ON REMAINING CONTAINMENT BI-BI PRESSURE CHANNELS WITH	
				AND B BI-BI CONTAINMENT PRESSURE AND SEQ (SIS/SISLOP) INPUTS UNAPPECTED			CONCURRENT SIS/SISLOP PROM SEQ 1. TRAIN B CSAS LOGIC UNAPPECTED	
09.2.02.04.1	PT-503 LOOP	BC38 (RELAT)	TRIPPRD	CHANNEL C BI-HI CONTAINMENT PRESSURE SIGNAL TO TRAIN B CSAS LOGIC. CHANNELS A AND B	CONTROL BOOM INDICATION	REDUNDANT CONTAINMENT PRESSURE CHANNELS AND SEQ INPUTS TO PREVENT SPURIOUS TRAIN B CSAS		RELAT IS DE-EMBRGIZE TO TRIP
				HI-HI CONTAINENT PERSSUÉR AND SRQ (SIS/SISLOP) INPUTS UNAPPECTED			CONCURRENT SIS/SISLOP FROM SEQ 2. TRAIN A CSAS LOGIC UNAPPECTED	
09.2.02.04.2	2 PT-503 LOOP	BC3B (RBLAY)	UNTRÎPPBD	CHANNEL C HI-HI CONTAINMENT PRESSURE INPUT DISABLED TO TRAIN B CHAS LOGIC. CHANNELS A	PERIODIC TESTING	REDUNDANT CONTAINMENT PRESSURE CHANNELS, REDUNDANT TRAIN	TRAIN B CSAS LOGIC BROOMES 2/2 ON BENAINING CONTAINMENT BI-BI PRESSURE CHANNELS WITH	
		<del></del>		AND B HI-BI CONTAINMENT PRESSURE AND SEQ (SIS/SISLOP) INPUTS UNAPPECTED			CONCURRENT SIS/SISLOP PROE SEQ 2. TRAIN A CSAS LOGIC UNAPPECTED	
09.2.02.05.1	1 PT-503 LOOP	CSAS INVERTER (TO2-3)	AOT 43 FOA	LOSS OF POWER TO PIS-513, MOV-883 POSITION INDICATION, AND PIS-513 OUTPUT RELATS,	CONTROL BOOM INDICATION, ANNUNCIATION	REDUNDANT CONTAINMENT PRESSURE CHANNELS AND SEQ INPUTS TO PREVENT SPURIOUS CSAS	TRAIN A AND B CSAS LOGIC BECOMES 1/2 ON REMAINING CONTAINMENT HI-BI PRESSURE	
				RESULTING IN CONL C NI-BI PRESS SIGNAL TO TRAIN A AND B CSAS LOGIC			CHANNELS WITH CONCURRENT SIS/SISLOP PROM RESPECTIVE SEQUENCER	
09.2.03.01.1	1 930 2	SUBCHANNEL 1 (29-5,6)	CONTACTS OPEN (UNTRIPPED)	LOGIC BELAYS BPIA, BPIB, BVIA, BVIB BEMAIN DB-BNBRGIZED, DISABLING 1 OF 2 REQUIRED SEQ	PRRIODIC TRSTING	BRDUNDANT TRAIN	CSAS TRAIN B DISABLED	CSAS LOGIC REQUIRES 2/2 TRIP OP SEQ 2 SUBCHANNEL I AND Y INPUTS CONCURRENT WITH 2/3
09.2.03.01.2	2 9BQ 2	SUBCHANNEL I (29-5,6)	CONTACTS CLOSED (TRIPPED)	2 IMPUTS TO CRAS TRAIN B LOGIC LOGIC BELATS BPIA, BPIB, BVIA, BVIB BMRRGIZE, PROVIDING I OF 2 REQUIRED SEQ 2 IMPUTS TO CSAS TRAIN B LOGIC	CONTROL ROOM INDICATION,	REDUKDANT 3EQ SUBCHANNEL AND CONTAINMENT BI-BI PRESSURE INPUTS TO PREVENT SPURIOUS CSAS	TRAIN B CSAS LOGIC BECOMES 1/1 ON REMAINING SEQ SUBCHANNEL WITH CONCURRENT 2/1 HI-BI CONTAINMENT PRESSURE	CONTAINMBHT BI-BI PRESSURE



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### EMBERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 9-1: CONTAINMENT SPRAY ACTUATION FMBA

[TBH	DRAICR ID	COMPONENT ID	FAILURB MODB	LOCAL EPPECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INBRENT COMPRISATING PROVISIONS	RPPRCT ON BCCS	PEHADES
09,2.03.02.1	SBQ 2	SUBCBANNEL_Y (29-7,8)	CONTACTS OPBN (UNTRIPPED)	LOGIC RELATE BPTA, BPTB, BYTA, BYTE REMAIN DE-ENERGIZED, DISABLING 1 OF 2 REQUIRED SEQ 2 IMPUTS TO CSAS TRAIN B. LOGIC.		REDUEDANT TRAIN	CSAS_TRAIN_B_DISABLED	CSAS LOGIC REQUIRES 2/2 TRIP OF SEQ 2 SUBCHANNEL I AND Y INPUTS CONCURRENT WITE 2/1 CONTAINMENT HI-BL PRESSURS
09.2.03.02.2		SUBCHANNEL T (29-1,8)	CONTACTS CLOSED (TRIPPED)	LOGIC BELATS BPTA, SPTB, SVTA, BYTH ENERGIZE, PROVIDING 1 OF 2 REQUIRED SEQ 2 INPUTS TO	CONTROL ROOM INDICATION, PERIODIC TESTING	ERDUNDANT SEQ SUBCHANNEL AND CONTAINMENT BI-BI PRESSURE INPUTS TO PREVENT SPURIOUS CSAS	TRAIN B CSAS LOGIC BECOMES 1/1 ON REMAINING SEQ SUBCHANNEL WITS CONCURRENT 3/3 BI-RI CONTAINMENT PRESSURE	
09.2.04.01.1	BUS \$1C, 2C Undbryoltage	127-11 (RBLAT)	CONTACTS OPEN	UNDERVOLTAGE INPUTS DISABLED	PERIODIC TESTING	BEDUNDANT BELAT, REDUNDANT TRAIN	ERDUCED RELIABILITY OF TRAIN B	UV AUXILIARY RELATS ARE DR-ENERGIZE TO TRIP
	BUS \$1C, 2C UNDERVOLTAGE	<u>127-71</u> (BBLAT) .	CONTACTS CLOSED (OPP)	TO TRAIN B CSAS TINE DBLAY BELAYS BPDR, BVDR BUS IC UNDERVOLTAGE SIGNAL TO TRAIN B CSAS TINE DBLAY BBLAYS BPDR, BVDR. DBLAY LOGIC BECOMES 1/2 ON BUS 2C	CONTROL BOOM ANNUNCIATION	BEDUNDANT INPUTS FOR SISTOP	REDUCED RELIABILITY OF TRAIN B CSAS FOR SIS AND SISLOP	TRAIN B CSAS LOADING WILL POLLOW BUS &C VOLTAGE RECOVERY AND SEQ 2 LOAD GROUP B DELAY
09.2.04.02.1	BUS \$1C, 2C UNDERVOLTAGE	127-BI (RBLAT)	CONTACTS OPEN	UNDBRVOLTAGE IMPUTS 1 OF 2 REDUNDANT BUS 2C UNDBRVOLTAGE IMPUTS DISABLED	PERIODIC TESTING	REDUNDANT RELAY, REDUNDANT Train	REDUCED RELIABILITY OF TRAIN B	UV AUXILIARY BBLAYS ARB DB-BWRRGIZE TO TRIP
	BUS \$1 <u>C, 2</u> C_ Undervoltage	127-81 (RELAT)	CONTACTS CLOSED (OPF)	TO TRAIN B CSAS TIRE DELAY RELAYS BPDR, BVDR BUS 2C UNDERVOLTAGE SIGNAL TO TRAIN B CSAS TIRE DELAY EBLAYS BPDR, BVDR. DELAY LOGIC BECOMES 1/2 ON BUS 1C	CONTROL ROOM ANNUNCTATION	BRDUNDANT INPUTS FOR SIS.  REDUNDANT TRAIN FOR SISLOP	RADUCED RELIABILITI OF TRAIN E CRAS FOR SIS AND SISLOP	TRAIN B CSAS LOADING WILL POLLOW BUS IC (TRAIN A) VOLTAGE RECOVERT AND SEQ 2 LOAD CROUP D DELAT. TRIS PAILURE WITH A CONCURRENT BUS
no senso - con de	n - y - y-squisquiry alon dillibronomicon sa	an a serana an anna a serana a s	-	UNDERVOLTAGE INPUTS				IC LOB WOULD CONSTITUTE A DOUBLE FAILURE SCENARIO, WHICH
09.2.04.03.1	BUS #1C, 2C	127-111 (BBLAY)	CONTACTS OPEN	(BAME AS 9.2.4.1.1)	(SAME AS 9.2.4.1.1)	(SAME AS 9.2.4.1.1)	(SAHE AS 9.2.4.1.1)	IS NOT CREDIBLE (SAME AS 9.2.4.1.1)
	BUS \$1C, 2C UNDERVOLTAGE	. ,	CONTACTS CLOSED (OPP)	•	(SAME AS 9.2.4.1.2)	(BAMB AS 9.2.4.1.2)	(SAMB AS 9.2.4.1.2)	(SAME AS 9.2.4.1.2)
09.2.04.04.1	BUS ALC, ZC Undrryoltage Bus Alc, ZC	127-121 (BBLAY)	CONTACTS OF BN (ON) CONTACTS CLOSED	(SAME AS 9.2.4.2.1) (SAME AS 9.2.4.2.2)	(SAMB AS 9.2.4.2.1)	(SAME AS 9.2.4.2.1) (SAME AS 9.2.4.2.2)	(SAME AS 9.2.4.2.1) (SAME AS 9.2.4.2.2)	(SAME AS 9.2.4.2.1)
	UNDERVOLTAGE BUS \$1C, 2C UNDERVOLTAGE	BUS \$1C	(OPF) VOLTS LOW	RELATS 127-71 AND 127-111 DB-EMBRGIZE. TRAIN B CSAS TIME DBLAT RBLAT BPDR, BVDR LOGIC BECOMES 1/2 ON BUS 2C UV	CONTROL BOOM WHINCISTION	REDUNDANT INPUTS FOR SIS, REDUNDANT TRAIN FOR SISLOP	REDUCED RELIABILITY OF TRAIN B COMDITIONS	TRAIN B CSAS LOADING WILL POLLOW BUS 2C VOLTACE RECOVERY AND SEQ 2 LOAD GROUP D DELAY
09.2.04.06.1	BUS #1C, 2C UNDERVOLTAGE	BUS 12C	VOLTS LOW	INPUTS  BREATS 127-BI AND 127-12I  DB-BNBBGIZE. TRAIN B CSAS TIME  DREAT BREAT BPDR, BVDR LOGIC  BBCOMBS 1/2 ON BUS 1C UV	CONTROL ROOM ANNUNCIATION	BEDUNDANT INPUTS FOR SIS, BEDUNDANT TRAIN FOR SISLOP	REDUCED RELIABILITY OF TRAIN A CSAS FOR SIS AND SISLOP CONDITIONS	TRAIN B CSAS LOADING WILL POLLOW BUS IC (TRAIN A) WOLTAGE RECOVERY AND SEQ 2 LOAD GROUP D DELAY. THIS
				INPUTS		•		PAILURE IS NOT CREDIBLE WITH CONCURRENT BUS IC LOB, SINCE THAT WOULD BE A DOUBLE PAILURE SCENARIO



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### EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 9-1: CONTAINMENT SPRAY ACTUATION FMSA

ITEN A	DBVICB ID	COMPONENT ID	PAILURB MODE	LOCAL EPPECTS AND DEPENDENT FAILURES	MBTROD OF DBTBCTION	INERRRUT COMPRESSATING PROVISIONS	RPPRCT ON ECCS	REMARES
	CSAS TRAIN B (CHANNBL A TRST)		ON (UNTREPPED)	CHANNEL A BI-BI CONTAINMENT PRESSURE INPUT DISABLED TO TRAIN B PURP MATRIX. CHANNEL A VALVE MATRIX, CRANNELS B. C			TRAIM R CHAS PUMP LOGIC BECOMES 2/2 ON REMAINING CONTAINMENT 81-81 PRESSURE CHANNELS WITH CONCURRENT RIS/SIELOP FROM SEQ	PARALLEL RELAY BPCIC PROVIDES
	CSAS TRAIN B (CHANNEL A TEST)		OPF (TRIPPBD)	AND SEQ 2 (SIS/SISLOP) IMPUTS UNAPPECTED CHANNEL A RI-BI CONTAINMENT PERSOURE SIGNAL TO TRAIN A PUMP HATRII. CHANNEL A VALVE HATRII, CHANNELS B, C AND SEQ		BEDUNDANT CONTAINMENT PRESSURE CEANNELS AND SEQ INPUTS TO PREVENT SPURIOUS CSAS	2	
09.2.05.01.4		(RBLAYS) BPCIA, BPCIB	INPUT OPEN	2 (SIS/SISLOP) IMPUTS UMAPPECTED (SAMB AS 9.2.5.1,2) LOSS OF 15VDC POWER SUPPLIES	(SAME AS 9.2.5.1.2) CONTROL BOOM INDICATION	(SANE AS 9.2.5.1.2)	E (SAME AS 9.2.5.1.2) TRAIN A CSAS LOGIC DISABLED	BOUNDS PAILURE OF ANNUNCIATOR
	(CHANNEL A IBST)	(RELAYS)		BPSA AND BPSB, CAUSING TRIP OF 3/3 BI-BI CONTAINMENT PRESSURE CHANNELS, DISABLING 2/2 SEQUENCER SUBCHANNEL INPUTS AND ALL CRAS OUTPUTS IN TRAIN				RELATS ARE EMERGIZE TO ACTUATE. BPSA AND BPSO OUTPUTS ARE PARALLELED
	CSAS TRAIN B(CHANNEL A TEST)		CONTACTS OPEN	B CSAS LOGIC  BBLATS BPCIA, BPCIB  DB-BWBRGIZB, CAUSING CHANNEL A  EI-BI CONTAINMENT PRESSURE SIGNAL TO TRAIN B CSAS PUMP		PREVENT SPURIOUS CSAS	TRAIM B CSAS PUNP LOGIC BECOMES 1/2 ON REMAINING CONTAINERS 1/2 OF PERSONE CEANNELS WITH CONCURRENT SIS/SISLOP FROM SEQ 2	
	CSAS TRAIN B (CHANNEL A TEST)		CONTACTS CLOSED	MATRIE. CHAMMELS B, C AND SEQ 2 (313/313LOP) INPUTS UNAPPECTED CHAMMEL A HI-BI CONTAINMENT PRESSURE MI-BI RELATS BPCIA, DOCA CANNOT BY TREES	PBRIODIC TBSTING	NOME REQUIRED	NORB	NORNAL POSITION
	CSAS TRAIN B (CHANNEL A TEST)		ON (UNTRIPPED)	BPCIB CANNOT BE TESTED CHANNEL A RI-BI CONTAINMENT PRESSURE HUPUT DISABLED TO TRAIN B VALVE MATRII. CHANNEL A PUMP MATRII. CHANNELS B. C.	PERIODIC TESTING	REDUNDANT CONTAINMENT PRESSURE CHANNELS, REDUNDANT TRAIN	TRAIN 8 CSAS VALVE LOGIC BECOMES 2/2 ON REMAINING CONTAINMENT BI-BI PERSOURS CRANNELS WITH CONCURRENT	NORMAL POSITION. TRAIN 8 CRANNEL A VALVE MATRIE RELAYS. PARALLEL RELAY SYCIC PROVIDES CONTROL ROOM INDICATION
	CSAS TRAIN B (CHANNEL A TEST		OPP (TRIPPED)	AND SEQ 2 (SIS/SISLOP) INPUTS UNAPPECTED CHANNEL A BI-BI CONTAINMENT PRESSURE SIGNAL TO TRAIN B VALVE MATRIX. CHANNEL A PUMP	PBRIODIC TESTING	REDUNDANT CONTAINMENT PRESSURE CHANNELS AND SEQ INPUTS TO PREVENT SPURIOUS CSAS	SIS/SISLOP FROM SEQ 2 TRAIN S CSAS VALVE LOGIC BECOMES 1/2 ON REMAINING CONTAINMENT SI-SI PRESSURE	
09.2.05.03.3	CSAS TRAIN B	BÝCIÁ, BÝČIB	INPUT OPBN	MATRII, CRIMMRLS B, C AND SBQ 2 (SIS/SISLOP) IMPUTS UNAPPRCTRD (SAMR AS 9.2.5.3.2)	(SAMB AS 9.2.5.3.2)	(SAME AS 9.2.5.3.2)	CHANNELS WITH CONCURRENT SIS/SISLOP PROM SEQ 2 (SAME AS 9.2.5.3.2)	
09.2.05.03.4	(CHANNEL A TEST CSAS TRAIN B (CHANNEL A TEST	BVCIA, BVCIB	INPUT SHORT	(SAME AS 9.2.5.1.4)	(SAME AS 9.2.5.1.4)	(SAHB_AS_9.2.5.1.4)	(SAME_AS_9,2.5.1.4)	BOUNDS FAILURE OF AMMUNCIATOR RELAT BYCIC. CSAS OUTPUT RELATS ARE RESCIZE TO ACTUATE. BPSA AND BPSE OUTPUTS ARE PARALLELED



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### BHREGENCY CORE COOLING STATEM BINGLE FAILURE AMALTSIS SAN ONOPRE UNIT 1 TABLE 9-1: CONTAINMENT SPRAT ACTUATION PREA

				* # # · ·				
ITEM A	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL BPPECTS AND DEPENDENT FAILURES	MBTHOD OF DRTBCTION	INHERBNT COMPRUSATING PROVISIONS	SPPRCT ON BCCS	BRHARES
professional and a second	*	*	· •					
09.2.05.04.1	. CSAS_TRAIN B	BVCIS	CONTACTS OPEN	RELATS BUCIA, BUCIE	CONTROL ROOM INDICATION	REDUNDANT CONTAINMENT PRESSURE	TRAIN B CRAS VALVE LOGIC	
	(CHANNEL A TEST)			DE-ENERGIZE, CAUSING CHANNEL A			BECOMES 1/2 ON REMAINING	·
				HI-HI CONTAINMENT PRESSURE			CONTAINMENT SI-BI PRESSURE	
				SIGNAL TO TRAIN & CSAS VALVE			CRANNELS WITH CONCURRENT	
	•			HATRII. CHANNEL B, C AND SEQ 2		•	819/318LOP PROM 889 2	·
				(SIS/SISLOP) INPUTS UNAPPRICTED		MANE BOARTEED	MOMB	NORMAL POSITION
09.2.05.04.2	CSAS TRAIN B	BVC1S	CONTACTS CLOSED		PRRIODIC TRATING	NONE REQUIRED	NUB .	BURGAL PUBLITUR
	(CHANNEL A TEST)	(TEST SULTCE)		PRESSURE MATRIX RELATS BYCIA,				
		BDC9+ BDC9B	AN (INSPIREDA)	BVCIB CANNOT BE TESTED CHANNEL B HI-BI CONTAINMENT	PERIODIC TRSTING	BENINDTER CUMPTINNESS DESGLIDS	TRAIN B CRAS PUMP LOGIC BECOMES	MORNAL POSITION. TRAIN R
03.2.00.01.1	(CHANNEL B TEST)		ON (UNTRIPPED)	PRESSURE INPUT DISABLED TO	PARTONIC INSTITUTE	CHANNELS, REDUNDANT TRAIN	2/2 ON REMAINING CONTAINMENT	CHANNEL & PUMP MATRIX RELAYS.
	[CE4860L 8 1831]	(machio)		TRAIN B PUMP MATRIE. CHANNEL B		AMENALA BRADANTI IDEIL	MI-MI PRESSURE CHANNELS WITH	PARALLEL RELAY BPC2C PROVIDES
				VALVE MATRIE, CHANNELS A, C			CONCURRENT SIS/SISLOP PROM SEQ	
				IND SEQ 2 (813/918LOP) IMPUTS			1	
	•			UNAPPRETED	•			
09.2.06.01.2	CSAS TRAIN B	BPCZA, BPCZB	OFF (TRIPPED)	CHANNEL B BI-BI CONTAINMENT	PERIODIC TESTING	REDUNDANT CONTAINMENT PRESSURE	TRAIN B CSAS PUMP LOGIC BECOMES	
	(CHANNEL B TEST)			PRESSURE SIGNAL TO TRAIN B		CHANNELS AND SEQ INPUTS TO	1/2 ON REMAINING CONTAINMENT .	
	•	•		PUMP MATRIX. CHANNEL B VALVE	-	PREVENT SPURIOUS CSAS	BI-BI PRESSURE CHANNELS WITH	•
				MATRII, CHANNELS A, C AND SEQ			CONCURRENT SIS/SISLOP PROM SEQ	
				1 (SIS/SISLOP) INPUTS			2	
				UNAPPECTED				
09.2.06.01.3	CSAS TRAIN B	BPC2A, BPC28	INPUT OPEN	(SAME AS 9.2.6.1.2)	(SAHB AS 9.2.6.1.2)	(S.1.3.5.6 EA BMAE)	(SAMS AS 9.2.6.1.2)	
	(CHANNEL B TEST)							BOUMER BUTTING AD ANNUAGIASAD
09.2.06.01.4		BPCZA, BPCZB	INPUT SHORT	LOSS OF 15VDC POWER SUPPLIES		REDUNDANT TRAIN	TRAIN B CSAS LOGIC DISABLED	BOUNDS PAILURE OF ANNUNCIATOR RELAT BPC2C. CSAS OUTPUTS
	(CBANNEL B TEST)	(RELAYS)		BPSA AND BPSB, CAUSING TRIP OF				RELAYS ARE ENERGIZE TO
				3/3 HI-HI CONTAINMENT PRESSURE				ACTUATE. BPSA AND BPSB OUTPUTS
				CHANNELS, DISABLING 2/2				ARB PARALLELED
				SEQUENCER SUBCHANNEL INPUTS AND ALL CSAS OUTPUTS IN TRAIN				
				B CSAS LOGIC				4
09.2.08.02.1	CSAS TRAIN B	BPC2S	CONTACTS OPEN	RBLAYS BPCZA, BPCZB	CONTROL ROOM INDICATION	REDUNDANT CONTAINMENT PRESSURE	TRAIN B CSAS PUMP LOGIC BECORES	
	(CHANNEL B TEST)			DB-ENERGIZE, CAUSING CHANNEL B		CHANNELS AND SEQ INPUTS TO	1/2 ON REMAINING CONTAINMENT	
	,,			BI-BI CONTAINMENT PRESSURE		PREVENT SPURIOUS CRAS	BI-BI PRESSURE CRANKELS WITH	
				SIGNAL TO TRAIN B CSAS PUMP		·	CONCURRENT SIS/SISLOP PROK SEQ	
				MATRII. CHANNELS A, C AND SEQ			1	
				2 (SIS/SISLOP) INPUTS				
				UNAPPECTED				UZAULI TAAFFIIAN
09.2.06.02.2	CSAS TRAIN B		CONTACTS CLOSED	CHANNEL B HI-HI CONTAINMENT	PBBIODIC TBSTING	NONE REGALBED	NOME	NORMAL POSITION
	(CHANNEL B TEST)	(TBST SWITCH)		PRESSURB MATRII RELATS BPCZA,		,		
	- == 12 == 21 == == -	·=::::::::::::::::::::::::::::::::::::		SPC2B CANNOT BE TESTED		SPANNE AND COMMITTING PARCELLE	SPITH B COLD WILLS LOOKS	NODWAL BOOTSTON SDAIN
09.2.06.03.1	CSAS TRAIN B	•	ON (UNTRIPPED)	CHANNEL B BI-BI CONTAINMENT	PERIODIC TESTING	REDUNDANT CONTAINMENT PRESSURE		NORMAL POSITION. TRAIN B
	(CBANNEL B TEST)	(RELAYS)		PRESSURE INPUT DISABLED TO		CHANNELS, BEDUNDANT TRAIN	BRCOMBS 2/2 ON REMAINING CONTAINMENT HI-BI PRESSURE	CHANNEL B VALVE MATRIX RELAYS. PARALLEL RELAY BYC2C PROVIDES
		-		TRAIN B VALVE HATRIE. CHANNEL			CHANNELS	CONTROL ROOM INDICATION
				B PUMP MATRIT, CHANNELS A, C AND SEQ 2 (SIS/SISLOP) INPUTS			Dushanu	ACREMAN BOOM INDICATION .



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#### BMBRGBMCT CORR COOLING STSTEM SINGLE FAILURE ANALTSIS SAM OMOPPE UNIT 1 TABLE 9-1: CONTAINMENT SPEAT ACTUATION PMBA

LTRN #	DRAICR ID	COMPONENT ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	INBERENT COMPENSATING PROVISIONS	BPFRCT ON ECCS	BENTEES
09.2.06.03.2	CSAS TRAIN B		OFF (TRIPPRO) _	CHANNEL B BI-BI CONTAINMENT PRESSURE SIGNAL TO TRAIN B VALVE MATERIA. CHANNEL B PUMP MATERIA, CHANNELS A, C AND SEQ.	·	PREVENT SPURIOUS CSAS	TRAIN B CSAS VALVE LOGIC SECONDS 1/2 ON REMAINING CONTAINENT EI-EI PRESSURE CRANNELS WITS CONCURRENT	
09.2.06.03.3	CSAS TRAIN B	BVCZA. BVCZR	INPUT OPEN	2 (SIS/SISLOP) INPUTS UNAPPECTED (SAME AS 9.2.6.3.2)		(SAMB AS 9.2.6.3.2)	SIS/SISLOP PROM SEQ 2 (SAME AS 9.2.6.3.2)	
09.2.06.03.4	(CHANNEL B TEST) CSAS TRAIN B	(RBLATS) BVC2A, BVC2B	INPUT SHORT	(SAHE AS 9.2.6.1.4)	(SAME AS \$.2.6.1.4)	•	(SAME AS 9.2.6.1.4)	BOUNDS FAILURE OF ANNUNCIATOR
	_(CHANNBL, B_TBST).	[ESLATO]			And a second second second second second second			RBLAY BYCZC, CSAS QUTPUT RBLAYS ARE EMBRGIZE TO ACTUATE. BPSA AND BPSB OUTPUTS ARE PARALLELED
09.2.06.04.1	CSAS TRAIN 8 (CHANNEL B TEST)		CONTACTS OPEN	RELATS BYCZA, BYCZB DR-ENBEGIZE, CAUSING CHANNEL B BI-BI CONTAINMENT PRESBURE	CONTROL BOOM INDICATION	PREVENT SPURIQUE CSAS	DECOMES 1/2 ON REMAINING CONTAINMENT MI-HI PRESSURE	
				SIGNAL TO TRAIN 8 CSAS VALVE MATRIX. CHANNEL A, C AND SEQ 2 (SIS/SISLOP) INPUTS UNAPPECTED			CRANNELS WITH CONCURRENT SIS/SISLOP FROM SEQ 2	
09.2.06.04.2	CSAS TRAIN B (CHANNEL B TEST)		CONTACTS CLOSED		PERIODIC TESTING	NOME BEGUIEED	NONB	MORMAL POSITION
	CSAS TRAIN B (CHANNEL C TEST)		ON (UNTBIPPED)	CHANNEL C BI-HI CONTAINMENT PRESSURE INPUT DISABLED TO TRAIN B PUMP MATRIE. CHANNEL C VALVE MATRIE, CHANNELS A, B AND SEQ 2 (SIS/SISLOP) IMPUTS	PBRIODIC TRATING	CHANNELS, REDUNDANT TRAIN		CHANNEL C PUMP MATRII RELAYS. PARALLEL RELAY BPC3C PROVIDES
	CSAS TRAIN B (CBANNEL C TEST)	' <del>-</del>	OPF (TRIPPED)	UNAPPECTED CHANNEL C BI-BI CONTAINMENT PERSSURE SIGNAL TO TRAIN B PUBP BATRII. CBANNEL C VALVE MATRII, CBANNELS A, B AND SEQ 2 (SIS/SISLOP) INPUTS UNAPPECTED	PRBIODIC TRATING	CHANNELS AND SEQ INPUTS TO PREVENT SPURIOUS CSAS	TRAIN B CSAS PUMP LOGIC BECOMES 1/2 ON REMAINING CONTAINMENT EI-BI PRESSURE CHANNELS WITE CONCURRENT SIS/SISLOP FROM SEQ 2	
	CSAS TRAIN B (CHANNEL C. TEST)	BPCJA, BPCJB (BBLAYS)	INPUT OPBN	(9AHB AS 9.2.7.1.2)	(SAME AS 9.2.7.1.2)	(SAMB AS 9.2.7.1.2)	(SAME AS 9.2.7.1.2)	
09.2.07.01.4	CSAS TRAIN B (CHANNEL C TEST)	BPC3A, BPC3B (RBLATS)	INPUT SHORT	LOSS OF 15VDC POWER SUPPLIES BPSA AND BPSB, CAUSING TRIP OF 3/3 BI-BI CONTAINMENT PRESSURE CHAMBLS, DISABLING 2/2 SEQUENCER SUBCHANNEL INPUTS		REDUNDANT TRAIN	TRAIN B CSAS LOGIC DISABLED	BOUNDS FAILURE OF AWNUNCIATOR ERLAT BPCIC. CSAS OUTPUT RELATS ARE EMERGIZE TO ACTUATE. BPSA AND BPSB OUTPUTS ARE PARALLELED
09.2.07.02.1	CSAS TRAIN B (CHANNEL C TEST)	BPC19 (TBST SWITCE)	CONTACTS OPEN	AND ALL CRAS OUTPUTS IN TRAIN B CRAS LOGIC RELATS SPCIA, BPC3B DE-RHREGIZE, CAUSING CHANNEL C BI-HI CONTAINMENT PRESSURE SIGNAL TO TRAIN B CRAS PUMP HATRIL CHANNELS A, B AND SEQ 2 (\$19/915LOP) INPUTS	CONTROL ROOM INDICATION	REDUNDANT CONTAINMENT PRESSURE CHANNELS AND SEQ INPUTS TO PREVENT SPURIOUS CSAS	TRAIN B CSAS PUMP LOGIC BROOMSS 1/2 ON REMAINING CONTAINBRAT BI-HI PRESSURE CHANNELS WITH CONCURRENT SIS/SISLOP FROM SEQ 2	· · · · · · · · · · · · · · · · · · ·

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### BRERGENCY CORE COOLING STATEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 9-1: CONTAINMENT SPRAY ACTUATION FREA

\$ M871	DBAICB ID	COMPONENT ID	PAILURB MODE	LOCAL EFFECTS AND DEPENDENT PAILURES	METROD OF DETECTION	PROVISIONS  INDERBRY COMPRHETING	RPPRCT ON BCC8	REBARIS
_09,2.0 <u>7</u> .02,1	CSAS_TRAIN_B(CHANNBL C TEST)	BPC3S(TBST SWLTCB)	CONTACTS CLOSED	CHANNEL C BI-BI CONTAINMENT PRESSURE MATRIE BELATS BPCJA, BPC3B CANNOT BE TESTED	_PBRLODIC_TRSTING	MONE BEGÜTBED	NONS	MORMAL POSITION
	(CHANNEL C TEST)		ON (UNTRIPPED)		·	REDUNDANT CONTAINMENT PRESSURE CRANNELS, REDUNDANT TRAIN	TRAIN D. CSAS VALVE LOGIC BECOMES 2/2 ON REMAINING CONTAINMENT BI-BI PRESSURE CRANNELS	NORMAL POSITION. TRAIN B
09.2.07.03.1	CSAS TRAIN B (CHANNEL C TEST)		OPP (TRIPPRD)	UNAPPECTED CHANNEL C BI-BI CONTAINMENT PRESSURB SIGNAL TO TRAIN B VALVE MATRIX. CHANNEL C PUMP HATRIX, CHANNELS A, B AND SEQ		PREVENT SPURIOUS CSAS	TRAIN & COAS VALVE LOGIC BECOMES 1/2 ON BENAINING CONTAINMENT BI-BI PRESSURE CHANNELS WITH CONCURENT	
0 <u>9.</u> 2. <u>01</u> .01.3	CSAS TRAIN B		INPUT OPRM	2 (819/818LOP) INPUTS UNAPPECTED (SAME AS 9.2.1.3.2)	(SANS AS 9.2.7.3.2)		#18/#18LOP PROM 8EQ 2	
09.2.07.03.4	(CHANNEL C TEST) CSAS TRAIN B (CHANNEL C TEST)	BVC3A, BVC3B	INPUT \$80RT	(SAMB AS 9.2.7.1.4)	(SAME AS 9.2.7.1.4)	(SAME AS 9.2.7.1.4)	(SAME AS 9.2.7.1.4)	BOUNDS FAILURE OF ANNUNCIATOR RELAT SUCIC. CSAS OUTPUT RELATS ARE EMBEGIZE TO
9.2.07.04.1	CSAS TRAIN B (CHANNEL C TEST)		CONTACTS OPEN	RELATS BYCJA, BYCJB DE-RWRGIZB, CAUSING CHANNEL C HI-HI CONTAINMENT PERSSURE	CONTROL ROOM INDICATION	REDUNDANT CONTAINMENT PRESSURE CRANNELS AND SEQ IMPUTS TO PREVENT SPURIOUS COAS	TRAIN B CSAS VALVE LOGIC BECOMES 1/2 ON REMAINING CONTAINENT SI-SI PRESSURE	ACTUATE. BPSA AND BPSB OUTPUTS ARE PARALLELED
				SIGNAL TO TRAIN B CSAS VALVE MATRIE. CHANNEL A, B AND SEQ 2 (SIS/SISLOP) INPUTS UNAPPRICTED			CHANNELS WITH CONCURRENT	
9.2.07.04.2	(CBANNEL C TEST)	BVC33 (TBST SWITCH)	CONTACTS CLOSED	CHANNEL C HI-BI CONTAINMENT PRESSURE MATRIX RELAYS BYCJA, BYCJB CANNOT BE TESTED		NORB BEGALEED	NOME	NORMAL POSITION
9.2.08.01.1	CSAS TRAIN B (SBQ 2 TEST)	BPIA (RELAY)	TRIPPED (ON)	RELAY PROVIDES 1 OF 2 REQUIRED SEQ 2 IMPUTS TO CSAS TRAIN B PUMP LOGIC	PERIODIC TESTING	REDUNDANT SEQ SUBCRANNEL AND CONTAINMENT BI-BI PRESSURE INPUTS TO PREVENT SPURIOUS CSAS ACTUATION OP TRAIN B PUMP	BECOMES 1/1 ON REMAINING SEQ SUBCRANNEL WITE CONCURRENT 2/3 HI-BI CONTAINMENT PRESSURE,	
9.2.08.01.2	CSAS TRAIN B (SBQ 2 TRST)	BPÍA (RBLAY)	UNTREPPRO (OFF)	1 OF 2 BEQUIERD SEQ 2 IMPUTS DISABLED TO TRAIN B PUMP LOGIC, VALVE LOGIC (INCLUDING	PERIODIC TESTING	REDUNDANT RELAT INPUT PROM VALVE LOGIC (8493), REDUNDANT TRAIN	TRAIN B VALVE LOGIC AND TRAIN A UNAPPROTED REDUCED RELIABILITY OF TRAIN B CSAS PUMP ACTUATION	PAILURE NOT DETECTABLE PRON
9.2.08.01.3		BPIA (RBLAY)	INPUT OPEN	REDUNDANT INPUT FROM RELAT 8V33) AND TRAIN A UNAPPECTED (SAME AS 9.2.8.1.2)	(SAME AS 9.2.8.1.2)		(SANE AS 9.2.8.1.2)	CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAY BPIB *RELAY FAILURE NOT DETECTABLE
	(SBQ 2 TBST)	·						PROM CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAY BPIB



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[TRH ]	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL BPPECTS AND DEPENDENT FAILURES	MBTHOD OF DBTBCTION	INBBERNT COMPENSATING	BPFBCT ON BCCS	REMARES
09.2.08.01.4	CSAS TRAIN B	RPTA (RRIAT)	INPUT SHORT	LOSS OF 15VDC POWER SUPPLIES	PERIODIC TRATING	REDUNDANT TRAIN	TRAIN B CSAS INOPERABLE	BOUNDS PAILURE OF
	(88Q 2 TEST)	nīšvi (eprės)	fator anom	BPSA AND BPSB ON RELAY TEST OR SEQ 2 SIS/SISLOP SIGNAL.		BAAAAANI ISHLU		ANNUNCIATOR/TEST RELAY BPIB. CSAS OUTPUT RELAYS ARE
				CAUSING TRIP OF 3/3				BUBRGIZE TO ACTUATE, BOSA AND
				CONTAINMENT HI-HI PRESSURE CHANNELS, DISABLING 2/2 SEQ				BPSB OUTPUTS ARE PARALLELED
				SUBCHANNEL INPUTS AND ALL CSAS	•			
			-	OUTPUTS IN TRAIN B CRAS LOGIC				
	CSAS TRAIN B	BPIS	MORMAL	RELAT BPIA CANNOT BE TESTED	PRRIODIC TRUTING	HOME BEGAIRED	NORE	
	(989 2 TEST) CSAS TRAIN B	(TBST SWITCH)	TRST	(SAME AS 9.2.8.1.1)	CONTROL ROOM INDICATION.	(SAME AS 9.2.8.1.1)	(SAME AS 9.2.8.1.1)	
	(SEQ 2 TEST)	(TEST SWITCH)			PERIODIC TRATING		•	•
	CSAS TRAIN B	BAIN (BBFUL)	TRIPPED (ON)	RELAT PROVIDES 1 OF 2 REQUIRED SEC 2 INPUTS TO CSAS TRAIN B	PRRIODIC TESTING	REDUNDANT SEQ SUBCHANNEL AND CONTAINMENT BI-BE PRESSURE	DECORES 1/1 ON REMAINING SEQ	
	(SEQ 2 TEST)			ANTAR FORIC		INPUTS TO PREVENT SPURIOUS CSAS ACTUATION OF TRAIN B	SUBCHANNEL WITH CONCURRENT 2/3 RI-BI CONTAINMENT PRESSURE,	
						VALVES	TRAIN B VALVE LOGIC AND TRAIN A	
09.2.08.03.2	CSAS TRAIN B	BVIA (RELAT)	UNTRIPPED (OFF)	1 OF 2 REQUIRED SEQ 1 INPUTS	PERIODIC TESTING	REDUNDANT TRAIN	TRAIN B CSAS VALVE ACTUATION	MORNAL POSITION. RELAY
	(SBQ 2 TBST)			DISABLED TO CSAS TRAIN B VALVE LOGIC, PUMP LOGIC UMAPPECTED	of Education - Education Commence		INOPERABLE	PAILURE NOT DETECTABLE FROM CSAS CABINET INDICATION
								PROVIDED BY PARALLEL RELAY
09.2.08.03.3	CSAS TRAIN B (SBQ 2 TBST)	BVIA (BBLAY)	INPUT OPBN	(SAME AS 9.2.8.3.2)	(SAME AS 9.2.8.3.2)	(SAME AS 9.2.8.3.2)	(SAME AS 9.2.8.3.2)	*FAILURE NOT DETECTABLE PROM CRAS CABINET INDICATION
								PROVIDED BY PARALLEL RELAT
09.2.08.03.4	CSAS TRAIN R	BVIA (RELAY)	INPUT SHORT	(SAME AS 9.2.8.1.4)	(SAME AS 9.2.8.1.4)	(4.1.8.2.¢ RA BMAR)	(SAME AS 9.2.8.1.4)	BVIB BOUNDS PAILURE OF
	(SEQ 2 TEST)		inioi paoai	(0000 40 0.0.0111)	100000000000000000000000000000000000000	10000 00 0101011		ANNUNCIATOR/TEST RELAT BYES.
								CSAS OUTPUT RELATS ARE
					Mark that the state of the stat			BYBRGIZE TO ACTUATE. BPSA AND BPSB OUTPUTS ARE PARALLELED
09.2.08.04.1	CSAS TRAIN B	BVIS	NORMAL	RELAY BVIA CANNOT BE TESTED	PERIODIC TESTING	NOME BEGULBED	HONB	NORMAL
	(98Q 2 1891)	(TEST SWITCH)	BD0#	10.440 in a a a a 11.	ACHEDAL BOOM THREE-ERS	(SAMB AS 9.2.8.3.1)	(SAME AS 9.2.6.3.1)	
09.2.08.04.2	(SEQ 2 TEST)	BVIS (TBST SWITCH)	TBST	,	CONTROL ROOM INDICATION, PREIODIC TESTING	(JAME &3 3.4.6.J.I)	(3408 43 3.6.5.J.1)	
09.2.08.05.1	CSAS TRAIN B	BPYA (BBLAY)	TRIPPED (ON)	(SAME AS 9.2.8.1.1)	(SAME AS 9.2.8.1.1)	(SAME AS 9.2.8.1.1)	(SAME AS 9.2.8.1.1)	
	(98Q 2 TB9T)	00W1 /DD/AW1	HUMBIADAD (ADC)	(0.48 10.8 8 8 8 8)	101HP 10 0 8 8 1 81	/OLMO 10 6 9 8 1 91	(OLMP 10 4 9 0 1 9)	.UADMAI DAGISIAN DRIAT
	(SEQ 2 TEST)	BPTA (RBLAY)	UNTRIPPED (OPP)	(S.1.8.2.8 BMAE)	(SAME AS 9.2.8.1.2)	(SAME AS 9.2.8.1.2)	(SAMB AS 9.2.8.1.2)	*NORMAL POSITION. RELAT  FAILURE NOT DETECTABLE FROM
								CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAT BPYB
09.2.08.05.3	CSAS TRAIN B	BPTA (RBLAY)	INPUT OPBN	(SAMB AS 9.2.8.1.2)	(SAME AS 9.2.8.1.2)	(SAME AS 9.2.8.1.2)	(SAMB AS 9.2.8.1.2)	RELAY FAILURE NOT DETECTABLE
	(SBQ 2 TBST)							PROM CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAY
								IBOTIUBU DI TABALLAL BALAS





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### BHBRGBNCY CORB COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 9-1: CONTAINMENT SPRAY ACTUATION PHBA

•		DRAICE ID	. COMPONENT ID	FAILURB MODB	LOCAL BPPBCTS AND DEPENDENT PAILURES	MBTHOD OF	INHERBUT COMPRUSATING PROVISIONS	EPPECT ON BCC8	BEHARES
		(SEQ 2 TEST)	BPTA (RBLAT)		(SABE AS 9.2.8.1.4)	(SAHE AS 9.2.8.1.4)	(SAHB. AS. 9.2.8.1.4)	(SAMB AS 9.2.8.1.4)	BOUNDS PAILURE OF ANNUNCIATOR/TEST RELAY BPTB. CSAS OUTPUT RELATS ARE ENERGIZE TO ACTUATE. BPSA AND
i i	09.2.08.06.1		BPTS (TBST SWITCH)	MORHAL	RELAY BPYA CANNOT BE TESTED	PERIODIC TESTING	NOMS BEGAILED	MOMB	BPSB OUTPUTS ARE PARALLELED
	09.2.08.06.2		BPTS (TRST SWITCH)	TEST	(SAMB AS 9.2.8.1.1)	CONTROL BOOM INDICATION, PERIODIC TESTING	(BAHE AS 9.2.8.1.1)	(SAME AS 9.2.8.1.1)	
		CSAS TRAIN 8 (SEQ 2 TEST)	BYTA (BBLAT)	TRIPPED (ON)	(SAME AS \$.2.8.).1)		(1.6.0.3.C 84 BHA8)	(L, C, E, S, E SA SHAR)	
! !	09.2.08.01.2		BVTA (RELAT)	UNTRIPPRO (OP?)	(SAMB AS 9.2.8.3.2)	(SAME AS 9.2.8.3.2)	(SAME AS 9.2.8.3.2)	(SAME 48 9.2.8.3.2)	*NORMAL POSITION. RELAY PAILURE NOT DETECTABLE PROM
									CSAS CABINET INDICATION PROVIDED BY PARALLEL BELAY BYTE
!	09.2.08.07.3	CSAS TRAIN B (SBQ 2 TEST)	SYTA (BBLAT)	IMPUT OPBM	(SAME AS 9.2.8.3.2)	(SAME AS 9.2.8.3.2)	(SAME AS 9.2.8.3.2)	(SAME AS 9.2.8.3.2)	PRELAY PAILURE NOT DETECTABLE PROM CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAY
	09.2.08.07.4		BVYA (RELAT)	INPUT SHORT	(SANB AS 9.2.8.1.4)	(SAMB AS 9.2.8.1.4)	(SAMB AS 9.2.8.1.4)	(SAME AS 9.2.8.1.4)	BYTE  BOUNDS FAILURE OF ANNUNCIATOR/TEST RELAT BYTE.
ı									CSAS OUTPUT BELATS ARE BMBRGIZE TO ACTUATE. BPSA AND BPSB OUTPUTS ARE PARALLEURD
		(SEQ 2 TEST)	BYTS (TEST SWITCH)	NORMAL	RELAT BYTH CANNOT BE TESTED	PERIODIC TESTING	RONE BEGUISED	HONB	At AG AGEL A ER BOOT UP THAT CODE
	09.2.08.08.2	CSAS TRA(N B (SEQ 2 TEST)	(TRST SWITCH)	TEST	{SAMB 43 9.2.8.3.1}	CONTROL ROOM INDICATION, PERIODIC TESTING	(SAME AS 9.2.8.3.1)	[\$ANB_A\$_9.2.0.1.1]	
	09.2.09.01.1	CSAS TRAIN B	BPDR (TDR_RBLAY)	OFF	CSAS TRAIN B PUMP LOGIC DELAT DISABLED, VALVE LOGIC DELAT		NOME REGULERD	NONE	NORMAL POSITION. NO REPRET FOR SIS. FOR SISLOP, RELAT IS
					AND SEQ LOAD GROUP D TIMBES UNAPPECTED				DB-RHBRGIZED FOR CSAS PERMISSIVE 10 SEC FOLLOWING 4 BY BUS YOLTABE RECOVERS SO
· 				<del></del>					THAT SEQ LOAD GROUP D 11 SEC TIMB DELAY CONTROLS START TIMB POR CSAS LOADS
	09.2.09.01.2	CSAS TRAIN B (UV TEST)	BPDR (TDR RBLAY)	ON	CSAS TRAIN B PUMP LOGIC DISABLED, OUTPUT RELATS BPS1 THROUGH BPS9 CANNOT BB	CONTROL BOOM INDICATION, PRRIODIC TRATING	REDUNDANT TRAIN	TRAIN B CSAS PUMP ACTUATION INOPERABLE	
<b>,</b>	09.2.09.01.3	CSAS TRAIN B (UV TEST)	BPDE (TDE BBLAY)	INPUT OPBN	BNBEGIZED (SAMB AS 9.2.9.1.1)	(SAMB AS 9.2.9.1.1)	(SAME AS 9.2.9.1.1)	(SAMB AS 9.2.9.1.1)	
•	09.2.09.01.4		BPDR (TDR BELAY)	INPUT SHORT	LOSS OF ISVDC POWER SUPPLIES BPSA AND BPSB, DB-ENERGIZING TRAIN B CSAS LOGIC AND POTENTIALLY IMPACTING CSAS INVERTER (702-1)	CONTROL BOOM INDICATION	REDUNDANT TRAIN FOR CSAS	TRAIN B CSAS INOPERABLE	CSAS OUTPUT RELATE ARE EMBRGIZE TO ACTUATE. BPSA AND BPSB OUTPUTS ARE PARALLELED

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SECTION 10: STANDBY POWER

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#### STANDBY POWER SYSTEM NOTES

- 1. Item numbers in this section have been assigned as follows:
  - 10.1: Train A Emergency Diesel Generator, 4 kV breaker and dependencies
  - 10.2: Train B Emergency Diesel Generator, 4 kV breaker and dependencies
- 2. This section covers the Emergency Diesel Generators (EDGs), their 4kV breakers and control/power dependencies. Failures of EDG auxiliaries are bounded by the engine/generator or control/power failures, since each EDG is provided with a separate train-aligned auxiliary system.
- 3. Potential single failure susceptibilities in the FMEA table are flagged with "\*" as the first character of the associated ECCS EFFECTS field. Other open items (eg. required procedure or calculation changes) are flagged with "\*" as the first character of the REMARKS field.

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#### STANDBY POWER SYSTEM REFERENCES

	rumentation Diagrams
5178800	Diesel Generator #1 Fuel Oil System
5178805 ·	Diesel Generator #1 Lube Oil System (Sh 1)
5178806	Diesel Generator #1 Lube Oil System (Sh 2)
5178810	Diesel Generator #1 Cooling Water System
5178815	Diesel Generator #1 Starting Air System (Sh 1)
5178816	Diesel Generator #1 Starting Air System (Sh 2)
5178820	Diesel Generator #1 Combustion Air Intake-Exhaust
5178825	Diesel Generator #1 Instrument and Control Air
5178830	Diesel Generator #2 Fuel Oil System
5178835	Diesel Generator #2 Lube Oil System (Sh 1)
5178836	Diesel Generator #2 Lube Oil System (Sh 2)
5178840	Diesel Generator #2 Cooling Water System
5178845	Diesel Generator #2 Starting Air System (Sh 1)
5178846	Diesel Generator #2 Starting Air System (Sh 2)
5178850	Diesel Generator #2 Combustion Air Intake-Exhaust
5178855	Diesel Generator #2 Instrument and Control Air
3178833	blesel Generator #2 instrument and control Air
One Line Diagra	
5102173	125 VDC System #1
5146828	Main One Line Diagram
5149348	125 VDC System #2
5149306	MCC-1B
5149307	MCC-2B
3149307	MCC-2B
Elementary Diag	rane
5149630	4 kV Bus Diesel Generator Breakers
5151363	
5151364	Diesel Generator #1 Engine Control Diesel Generator #2 Engine Control
3131364	blesel Generator #2 Engine Control
Other Drawings	
5149178	Load Sequence Table, Train 1 (Sh 1)
5149179	Load Sequence Table, Train 1 (Sh 1)  Load Sequence Table, Train 1 (Sh 2)
5149181	Load Sequence Table, Train 1 (Sn 2)
5149182	Load Sequence Table, Train 2 (Sh 1)
	Load Sequence Table, Train 2 (Sh 2)
5149957 5149958	Emergency Operating Condition, Train 1
5149956	Emergency Operating Condition, Train 2
Procedures	
S01-1.0-10	Peactor Trin or Cafety Industry
SO1-1.0-60	Reactor Trip or Safety Injection Loss of All AC Power
SO1-1.0-61	
SO1-1.0-01 SO1-2.6-4	Loss of All AC Power Recovery Loss of DC Bus
S01-2-0-4 S01-9-2	
S01-10-1	4160 V System Operations
SO1-10-2	Diesel Generator Operations
S01-10-3	Diesel Generator Starting Air System
POT-10-2	Diesel Generator Control and Instrument Air
SO1-10-4	System Control Control
S01-10-4	Diesel Generator Cooling Water System
S01-10-5	Diesel Generator Fuel System
S01-10-6	Diesel Generator Lube Oil System
S01-12.2-6	Electrical Distribution Weekly Surveillances
1	

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S01-12.3-10 S01-12.3-37 S01-12.3-38	Diesel Generator Load Test Diesel Generator #1 Safety Related Alignment Diesel Generator #2 Safety Related Alignment
Other Document	<u>s</u>
SD-S01-120	System Description: 4160 V System
SD-S01-590	System Description: Safeguard Load Sequencing System
SD-S01-600	System Description: Diesel Generator System
M89048	Response to Generic Letter 88-14, "Instrument Air Supply System Problems Affecting Safety Related Systems", dated July 5, 1989

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TABLE 10-1: STANDBY POWER FMEA





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## BHERGENCY CORE COOLING STOTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 10-1: STANDET FORER STOTEM (DIESEL GENERATORS) FREA

1788 /	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL ÉPPECTS AND DEPENDENT PAILURES	METROD OF DRIECTION	INHERBNY COMPRUSATING PROVISIONS	SPPECT ON SCCS	REMARES
10.1.01.01.1 DG	11	RNGIMB/GBNERATOR	PAIL TO START/RUB	NOME FOR SIS. LOSS OF TRAIN A		MOME REQUIRED FOR SIS.  BEDUNDANT TRAIN/DG FOR LOS, LOP AND SISLOP	NOME FOR SIS. FOR LOB. LOF AND SISLOP, IMMEDIATE LOSS OF 4 LV AND 480 V AC POWER, WITS BELATED LOSS OF 125 VDC BUS A1	FUEL, COOLING AND RELATED SUPPORT STSTEMS
10.1.01.01.2 DG	<b>H</b>	BUGINB/GENBRATOR	OUTPUT VOLTS/FREQ	(SAME AS 10.1.1.1)	(8AMR AS 10.1.1.1.1)	(SAMB AS 10.1.1.1.1)	AFTER BATTERY DISCHARGE (SAME AS 10.1.1.1.1)	
10:11:01:02:1 DG	11	88Q 1 (15-5, 1)		LOSS OF DC FIELD, CAUSING INOPERABILITY OF TRAIN A 44V AND 480 V SEE POWER DURING	PERIODIC TESTING	(SAME AS 10.1.1.1.1)	(\$1.1.1.1) A STORE SATERARY	NORMAL POSITION. DG PIBLD RESET CONTACTS
10.1.01.02.2 DG	#1 	8BQ 1 (15-5, 7)	CONTACTS CLOSED (ON)	LOB, LOP AND SISLOP (SABE AS 10.1.1.2.1)	{SAME AS 10.1.1.1.1}	(SAME AS 10.1.1.1.1)	(SAME AS 10.1.1.1.1)	NORMAL SEQ OUTPUT IS MOMENTARY, MAINTAINED CLOSED CONDITION PREVENTS NORMAL
10.1.01.03.1 DG	11	88Q 1 (22-1, 3)	CONTACTS OPEN (OPF)	START CIRCUIT #1 DISABLED POR DG. DG WILL START AS BERDED	PERIODIC TESTING	REDUNDANT TRAIN/DG	REDUCED RELIABILITY FOR TRAIN A FOR LOS, LOP AND SISLOP	PIRLD RESPONSE
  10:1:01:03:2 DG* 	11	SEQ 1 (22-1, 1)	CONTACTS CLOSED	POR LOB, LOP AND SISLOP ON START CIRCUIT \$2 START SIGNAL TO START CIRCUIT \$1 OF DG, CAUSING DG BNGINE START BUT NO FIELD RESET	CONTROL BOOM INDICATION	MONR. BEGAIRED	TRAIN A DG RTARTS, REMAINS AVAILABLE FOR LOB, LOP AND	
70.1.01.04.1 DG	11	88Q 1 (22-5, 1)	CONTACTS OPEN (OFF)	START CIRCUIT #2 DISABLED. DG WILL START AS MEEDED FOR LOB. LOP AND SISLOP ON START	PBRIODIC TESTING	REDUNDANT TRAIN/DG	SISLOP  REDUCED BELIABILITY FOR TRAIN A FOR LOB, LOP AND SISLOP	MORNAL POSITION. DC START CIRCUIT \$2
10.1.01.04.2 DG	<b>#</b> 1	SEQ 1 (22-5, 1)	CONTACTS CLOSED	CIRCUIT \$1 START SIGNAL TO START CIRCUIT \$2 OF DG, CAUSING DG ENGINS	CONTROL ROOM INDICATION	NOME REQUIRED	TRAIN A DG STARTS, BRMAINS AVAILABLE FOR LOB, LOP AND	
10.1.01.05.1 DG	N	8BQ 1 (14-1, 3)	CONTACTS OPEN (ON)	START BUT NO FIELD RESET DG EMERGENCT SHUTDOWN COIL BLOCEED. NORMAL FOR LOB, LOP, SIS AND SISLOP	CONTROL BOOK INDICATION, ANNUNCIATION	NONE BEGULERD	SISLOP HOME. MORMAL FOR LOB/LOP/SIS/SISLOP RESPONSE OF	BICITATION SHUTDOWN CET BLOCE CONTACTS
10.1.01.05.2 DG	•	(14-1, 3)	CONTACTS CLOSED (OFF)	DG BHERGENCY SHUTDOWN COLL CANNOT BE BLOCKED	PERIODIC TESTING	BEDUNDANT TRAIN/DG	TRAIN A DG REDUCED RELIABILITY OF TRAIN A DG	NORMAL POSITION
10:1:01:08:1 DG		(BBLAY)	OFF	LOSS OF DG VOLTS/FRBQ SIGNAL		- ERDUNDANT TRAIN/DG	TRAIN A DC BREAKER WILL NOT CLOSE AUTOMATICALLY POLLOWING SISLOP	WORNAL POSITION
		(RBLAY)	•	DG VOLTS/PREQ SIGNAL TO SEQ 1, RESULTING IN PREMATURE DG BREE CLOSING DURING SISLOP	PRRIODIC TESTING	REDUNDANT TRAIN/DG	POTENTIAL TRAIN A PAILURE DURING SISLOP DUE TO PREMATURE LOAD SEQUENCING	
10:1:01:01:1-BG	11	HCC-18	AOFIE FOR	LOSS OF ESSENTIAL	CONTROL-BOOM ANNUNCTATION	EBDUNDANT TRAIN/DG	DELAYED LOSS OF TRAIN A DG FOR LOB, LOP AND SISLOP	
10.1:01:08.1 DG (		(72-105)	VOLTS LOW -	LOSS OF DG FIBLD FLASH AND GOVERNOR CONTROL POWER	CONTROL ROOM ANNUNCIATION	REDUNDANT TRAIN/DG	LOSS OF TRAIN A DG FOR LOB, LOP AND SISLOP	
	* . > 201004	(11014)	VIDA	DG CANNOT BUBBGIZE BUS SIC FOR LOB, LOP AND SISLOP	PERIODIC TESTING	REDUNDANT TRAIN/DG	LOSS OF TRAIN A 4kV AND 480°V POWER FOR LOB, LOP AND SISLOP	NORMAL POSITION



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## EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 10-1: STANDBY POWER SYSTEM (DIESEL GENERATORS) FREA

	ITBN #	DBAICE ID	COMPONENT ID	PAILURE MODE	LOCAL BEPECTS AND DEPENDENT PAILURES	METHOD OF Detection	PROVIDIONS PROVIDIONS	RPFRCT ON RCCS	REMARES
· 	10.1.02.01.2 D	G DI BREALER	BUS \$10	CLOSED	DG BRBAEER WILL HOT TRIP ON LOB/LOP/SIS/SISLOP, CAUSING DECRADED TRAIN A RESPONSE DUR	CONTROL ROOM INDICATION, PERIODIC TESTING	MONE	*DBGRADBD TRAIN A RESPONSE AND PAILURE OF TRAIN O FOR SIX WITE LOSS OF OFFSITE OWNE	
				· · · · · · · · · · · · · · · · · · ·	TO SIS SLOCE LOADING AND PAILURE OF TRAIN B DUE TO DELATED OR PREVENTED BUS SIC UNDERVOLTAGE SIGNAL	· · · · · · · · · · · · · · · · · · ·			UNLESS SISLOP LOGIC CHANGED TO
 i	10.1.02.02.1 D		98Q 1 (21-9, 11) 98Q 1	, ,	DG BREAKER WILL NOT CLOSE AUTOMATICALLY ON SISLOP DG BREAKER CLOSE SIGNAL,	PBRIODIC TRATING  CONTROL ROOM INDICATION	REDUNDANT TRAIN/DG  REDUNDANT TRAIN/DG	INOPERABILITY OF TRAIN A FOR SISLOP INOPERABILITY OF TRAIN A FOR	MORNAL POSITION
			(21-9, 11)		PARALLELING DG TO OPPSITE SYSTEM PREMATURELY DURING SIS AND DG TESTING. MAY CAUSE DG			LOB/LOP/SES/SESLOP	
.· 	10.1.02.03.1 D	G \$1 BRBAEBR	88Q 1 (14-5;7)	CONTACTS OPEN (OPF)	DAMAGE DUB TO MOTORING AND/OR BUS DEGRADATION (SAME AS 10.1.2.1.2)	(SAHR AS 10.1.2.1.2)	(SAMB AS 10.1.2.1.2)		*NORMAL POSITION. (SAME AS
; !	10.1.02.03.2 D	G #1 BREAKER	989 1 (14-5, 7)	CONTACTS CLOSED (ON)	(SAME AS 10.1.2.1.1)	PERIODIC TESTING	(SAME AS 10.1.2.1.1)	(SAMB AS 10.1.2.1.1)	MORMAL MOMENTARY SIGNAL. MAINTAINED SIGNAL PREVENTS DG BREE PROLOSURE
	10.1.02.04.1 D	G #1 BRBAERB	152-11C14 "a" CONTACT	OPBN	LOSS OF DC BREE CLOSED SIGNAL TO SEQ 1, PREVENTING AUTOMATIC LOADING ON SISLOP		ERDUNDANT TRAIN/DG	INOPERABILITY OF TRAIN A FOR	MORNAL POSITION WITH DC BREE OPEN
	10.1.02.04.2 D	G #1 BRBAEBR	152-11C14 "a" CONTACT	CLOSED	DG BRER CLOSED SIGNAL TO SEQ 1, CAUSING SISLOP LOADING	PBRIODIC TESTING	REDUNDANT TRAIN/DG	REDUCED RELIABILITY OF TRAIN A FOR SISLOP	
	10.1.02.05.1 D	G #1 BREAKER	BUS #1C 125VDC	VOLTS LOW	CONCURRENT WITE SEQ BIGMAL TO- CLOSE BREE INABILITY TO TRIP DG BREE IF	PREIODIC TESTING	NONE FOR BREE CLOSED,	SINOPERABILITY OF TRAIN A FOR	· ·
!	F STREET, F 1100 parties St. comp				CLOSED OR TO CLOSE DG BREELIF		OPEN TRAIN/DG FOR BRIE	SIS AND SISLOP, WITH CONCURRENT INOPERABILITY OF TRAIN B DUE TO DELATED OR PREVENTED BUS \$1C UNDERVOLTAGE, IF BREE INITIALLY	RELIEF DURING DG TESTING UNLESS SIELOP LOGIC CRANGED TO
. <u> </u> 	10:2.01 <del>.</del> 01:1-D	G 12	BNGINB/GENERATOR	PAIL TO START/RUN	NONE FOR SESTICES OF TRAIN B	CONTROL-ROOM-INDICATION,	NONE ERQUIRED FOR SIS.	CLOSED. TRAIN B UNAPPECTED FOR 818 NOVE FOR 818. FOR LOB, LOP AND	
<u> </u> 					4 EV AND 480 V POWER POR LOB, LOP AND SISLOP		REDUNDANT TRAIN/DG FOR LOB, LOP AND SISLOP	SISLOP, IMBEDIATE LOSS OF TRAIN B 4 kV AND 480 V AC POWER, WITE DELAYED LOSS OF 125 VDC BUS \$2-	FUEL, COOLING AND RELATED
.!	10.2.01.01.2 D	G 12	BNGINB/GBNBRATOR	OUTPUT VOLTS/PBBQ	(SAMB AS 10.2.1.1.1)	(SAMB AS 10.2.1.1.1)	(SAME AS 10.2.1.1.1)	AFTER BATTERY DISCHARGE (SAMB AS 10.2.1.1.1)	
î L.	10.2.01.02.1 D	G	88Q 2 (15-5, 7)	CONTACTS OPEN (OPP)	LOSS OF DG FIBLD, CAUSING INOPBRABILITY OF TRAIN B 444	PBRIODIC TESTING	(SAMB AS 10.2.1.1.1)	•	NORMAL POSITION DG FIBLD RESET CONTACTS
· · · · ·	10.2.01.02.2 D	G <b>12</b>	SEQ 2 (15-5,7)	CONTACTS CLOSED (ON)	AND 480 Y BUS POWER DURING LOB, LOP AND SISLOP {8AME AS 10.2.1.2.1}	(SAME AS 10.2.1.1.1)	(SAMB AS 10.2.1.1.1)		NORMAL SEQ OUTPUT IS HORBHTART. WAINTAINED CLOSED
		•							CONDITION PREVENTS HORMAL PIELD RESPONSE





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## EMBEGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OMOFRE UNIT 1 TABLE 10-1: STANDBY POWER SYSTEM (DIESEL GENERATORS) FREA

•								
ITRE #	DBVICE ID	COMPONENT ID	FAILURB MODB	LOCAL BPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	INHERBUT COMPRUSATING PROVISIONS	RPPRCY ON RCC8	REMARES
10.2.01.03.1 D	G #2	SEQ 2	CONTACTS OPEN (OPEN)	START CIRCUIT \$1 DISABLED. DG	DPDIONIC TRETING	REDUNDANT TRAIM/DG	DUNISCO DOLLARI TOT DOD SDAIN D	NADMAI BAGTEIAN BG GEARS
		(22-1, 1)	COMINCIA OF BM (OFF)	WILL START AS BEEDED FOR LOB," LOP AND SISLOP ON START CIRCUIT 42	LPRIORIC INSTITUT	BBUUNDAR! 1ERIN/VG	POR LOB, LOP AND BISLOP	CIRCUIT 31
10:2:01:03:2·D	G 12	SEQ 2 (22-1, 3)	CONTACTS CLOSED	START SIGNAL TO START CIRCUIT \$1 OP DG, CAUSING DG RNGINB START BUT NO PIBLD RESET	CONTROL BOOM INDICATION	NONE BEGAIESD	TRAIN 8 DG STARTS, REMAINS AVAILABLE POR LOB, LOP AND SISLOP	
10.2.01.04.1 D	G 12	(22-5, 1)	CONTACTS OPEN (OFF)	START CIRCUIT \$2 DISABLED. DG WILL START AS MEEDED FOR LOB, LOP AND SISLOP ON START	PBRIODIC TESTING	REDUNDANT TRAIN/DG	BROUCED RELIABILITY FOR TRAIN B FOR LOB, LOP AND SISLOP	NORMAL POSITION. DG START CIRCUIT \$2
10.2.01.04.2 D	G 12	SBQ 2 (22-5, 1)	CONTACTS CLOSED	CIRCUIT \$1 START SIGNAL TO START CIRCUIT \$2 OF DG, CAUSING DG BNGINE START BUT NO FIBLD RESET	CONTROL ROOM INDICATION	NORE ESCALSED	TRAIN B DG STARTS, REMAINS AVAILABLE FOR LOB, LOP AND SISLOP	
10.2.01.05.1 D	G <b> 2</b> 	9BQ 2 (14-1, 3)	CONTACTS OPEN (ON)	DG RHRRGRNCY SEUTDOWN COIL BLOCERD. NORMAL FOR	CONTROL BOOM INDICATION, ANNUNCIATION	ROME SEGUIRED	HOME. MORNAL FOR LOB/LOP/SIS/SISLOP RESPONSE OF	BICITATION SHUTDOWN CET BLOCK CONTACTS
10.2.01.05.2 D	G 12	SBQ 2 (14-1, 3)	CONTACTS CLOSED (OPP)	LOB/LOP/SIS/SISLOP COIL CANNOT BE BLOCKED	PERIODIC TESTING	REDUNDANT TRAIN/DG	TRAIN B DG REDUCED RELIABILITY OF TRAIN B DG	MORMAL POSITION
10.2.01.06;1 D	3 12	(RBLAY)	OPP	LOSS OF DG VOLTS/PREG SIGNAL TO SEG 2	PBRIODIC TESTING	REDUNDANT TRAIN/DG	TRAIN B DO BREAKER WILL NOT CLOSE AUTOMATICALLY POLLOWING SISLOP	MORNAL POSITION
10.2.01:06:2 D	) ·  2 · · · · · · · · · · · · · · · · ·	R-11A (RBLAY)	ON .	DG VOLTS/PREQ SIGNAL TO SEQ 2. RESULTING IN PRENATURE DG BREE CLOSING DURING SISLOP	PRRIODIC TESTING	REDUNDANT TRAIN/DG	POTRIFIAL TRAIN 8-PAILURE DURING SISLOP DUE TO PREMATURE LOAD SEQUENCING	
10.2.01.01.1 D	) <b>#2</b> ······ ···	ACC-2B	VOLTS LOW	LOSS OF ESSENTIAL	CONTROL ROOM ANNUNCEATION	REDUNDANT TRAIN/DG	LOSS OF TRAIN B DG FOR LOB, LOP AND SISLOP	
10.2.01;08:1 bt		(72-210)	VOLTS LOW	LOSS OF DG FIELD PLASE AND		BEDUNDANT-TRAIN/DG	LOSS OF TRAIN B DO FOR LOB; LOP AND SISLOP	
10.2.02.01.1 DO		BUS #2C (12C15)	OPBN	DG CANNOT RMREGIZE BUS \$2C FOR LOB, LOP AND SISLOP	PERIODIC TESTING	REDUNDANT TRAIN/DG	LOSS OF TRAIN B 4kV AND 480 V POWER POR LOB, LOP AND SISLOP	
10.2.02.01.2 00	, se profits	BUS \$2C (12C15)	CLOSED		CONTROL ROOM INDICATION, PERIODIC TESTING	NORE	*DEGRADED TRAIN & RESPONSE AND PAILURE OF TRAIN A FOR SIS WITE LOSS-OP-OFFSITE-POWER	•
		······································		TO SIS BLOCK LOADING AND FAILURS OF TRAIN A DUE TO DELATED OR PREVENTED BUS \$20			PAGE AL ALLETIS LARDS	UNLESS SISLOP LOGIC CHANGED TO SISLOB
10.2.02.02.1 DO	\$ \$ BRBAKER	SEQ 2 -{21-9, 11} · · ·	CONTACTS OPEN (OFF)	UNDBRYOLTAGE SIGNAL  DG BREAKER WILL NOT CLOSE AUTOMATICALLE ON SISLOP	PBRIODIC TESTING	BEDUNDANT TRAIN/DG	INOPERABILITY OF TRAIN B FOR	NORMAL POSITION
10.2.02.02.2 00	#2 BREAEBR	9BQ 2 (21-9, 11)	CONTACTS CLOSED (ON)	DG BRBAKER CLOSE SIGNAL, PARALLELING DG TO OPPSITE	CONTROL ROOM INDICATION	BEDUNDANT TRAIN/DG	INOPERABILITY OF TRAIN B FOR LOB/LOP/SIS/SISLOP	
				STSTEM PREMATURELY DURING SIS AND DG TESTING. MAT CAUSE DG DAMAGE DUE TO MOTORING AND/OR BUS DEGRADATION				





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# EMBEGENCY CORS COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONOPRE UNIT 1 TABLE 10-1: STANDBY POWER SYSTEM (DIESEL GENERATORS) PHEA

ITBM #	DBAICB ID	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT PAILURES	MBTHOD OF DRTBCTION	BEOATSIONS INHERBRAL CONDENSATING	BFFRCT OH BCCS	REMARES
10.2.02.03.1 DG	#2 BRBARBR		CONTACTS OPEN (OFF)	(SANS AS 10.2.2.1.2)	(SAME AS 10.2.2.1.2)	(SAME AS 10.2.2.1.2)	*(SAHE AS 10.2.2.1.2)	SHORMAL POSITION. (SAME AS
10.2.02.03.2 DG	#2 BRBARBR	(14-5, 7) SEQ 2 (14-5, 7)	CONTACTS CLOSED (ON)	(SAMB AS 10.2.2.1.1)	PBRIODIC TESTING	(SAME AS 10.2.2.1.1)	(SAUR AS 10.2.2.1.1)	10.2.2.1.2) HORMAL HOMENTARY SIGNAL. MAINTAINED SIGNAL PREVENTS DG
10.2.02.04.1 DG	\$2 BEBACES	152-12C14 "a" CONTACT	OPBN	LOSS OF DG BREE CLOSED SIGNAL TO SEQ 2, PREVENTING AUTOMATIC		REDUNDANT TRAIN/DG	INOPERABILITY OF TRAIN B FOR	BREE RECLOSURE MORMAL POSITION WITH DG BREE OPEN
10.2.02.04.2 DG	#2 BREATER	152-12014 "a" CONTACT	CLOSED	LOADING ON SISLOP DG BRIB CLOSED SIGNAL TO SEQ 2, CAUSING SISLOP LOADING	PERIODIC TESTING	REDUNDANT TRAIN/DG	REDUCED RELIABILITY OF TRAIN B POR SISLOP	
10.2.02.05.1 DG	#2 BREATER	BUS \$2C 125VDC CONTROL POWER	VOLTS LOW	CONCURRENT WITH SEQ SIGNAL TO CLOSE BREE INABILITY TO TRIP DG BREE IF CLOSED OR CLOSE DG BREE IF OPEN	PRRIODIC TESTING	NOME FOR BREE CLOSED,  REDURGANT TEATH/DG FOR BREE  OPEN	SINOPREABILITY OF TRAIN B FOR SIS AND SISLOF, WITH CONCURRENT INOPREABILITY OF TRAIN A DUE TO DELAYED OR PREVENTED BUS \$2C	ACTION FOR BLUGLE PAILURE RELIEF DURING DG TESTING UNLESS SISLOP LOGIC CHANGED TO
			•				UNDERVOLTAGE, IF BEER INITIALLY CLOSED. TRAIN A UNAPPECTED FOR 819	8 ( S L O 8
					,,			
				, , <u>, , , , , , , , , , , , , , , , , </u>				
		<u> </u>						,
- 2 - 1	•••							
		* ************************************						
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SECTION 11: VITAL AND REGULATED POWER

#### VITAL POWER SYSTEM NOTES

1. To facilitate possible future changes to the SONGS 1 electrical system, Item numbers in this section have been assigned as follows:

	Train A	<b>A</b>			Train B		
11.1:	Vital/Reg	Bus	#1	11.5:	Utility Bus		
11.2:	Vital/Reg	Bus	#2	11.6:	Vital Bus #5/6		
11.3:	Vital/Reg	Bus	#3/3A	11.7:	CSAS Inverters		
11.4:	Vital/Reg	Bus	#4				

This does not affect the automated sorts for electrical and other dependencies, as the ITEM\_NO field is not used as the sorting key.

- 2. An automated sort of vital power dependencies (COMP\_ID =
   'CSAS INV', 'REG BUS', 'UTILITY BUS', OR 'VITAL BUS', AND
   (ITEM\_NO <> '11' AND FAIL\_MODE = 'VOLTS LOW')) is provided
   in Table 11-2 as an aid to the reviewer.
- 3. Cross-references to the Reactor Protection System Single Failure Analysis (M39405), Section 8 have been provided where applicable.
- 4. Potential single failure susceptibilities in the FMEA table are flagged with "\*" as the first character of the associated ECCS EFFECTS field. Other open items (eg. required procedure or calculation changes) are flagged with "\*" as the first character of the REMARKS field.

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#### VITAL AND REGULATED POWER SYSTEM REFERENCES

#### One Line Diagrams

64383 CSAS Inverter System

5102174 120VAC Vital Power System, Train A 5159826 120VAC Vital Power System, Train B

#### Procedures

SO1-2.6-3 Loss of Vital or Utility Bus

SO1-9-13 Inverter and Vital Bus Operation

SO1-12.2-6 Electrical Distribution Surveillance

SO1-12.3-17 Electrical Transfer Switches Alignment Check

#### Other Documents

SD-S01-150 System Description: Maintained 120VAC System

TABLE 11-1: VITAL/REGULATED POWER FMEA



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## EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM ONOPRE UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

ITRN #	DBAICB ID	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND Dependent Pailures	METHOD OF DETECTION	PROVISIONS INHEERNY COMPRASAYING	BPFECT ON BCCS	BEHARIS
11.1.01.01	.1 VITAL BUS \$1	[NABBA18B \$1	INPUT OPEN	INTERRUPTION OF POWER TO VITAL BUS \$1 AND REG BUS \$1 RCCS AND OTHER LOADS DURING		REDUNDANT SEQ/TRAIN POR BIS/SISIOP AND NPRAY, BEDUNDANT PZE PRESSURE	INOPSRABILITY OF 1/2 MI-PLOW CONTLINUIST SPRIT VILUES AND SEC \$1 (SI CONTAINMENT	SER ITEMS 1.4.6.5.3, 1.4.6.5.1, 1.4.18.5.1,
				AUTO-TRANSPER TO MCC-2 POWERED BACEUP BOURCE (UP TO 10 BEC - PLUS TRANSPER SW DELAY TIME DURING SISLOP)		CEVANNERS LAR ASS BFOCE	· · · · · · · · · · · · · · · · · ·	2.4.8.3.1, 2.4.9.6.1, 3.1.4.6.1, 3.1.10.2.1, 3.2.10.2.1, 5.1.4.5.1, 5.1.5.4.1, 5.1.6.6.1, 6.1.5.2.1, 8.1.1.4.1,
			<del>-</del>					8.1.15.1, 8.1.18.2.1, 9.1.1.5.1, 9.1.11.3.1. 8BB SBCTION & OP M39405 FOR RPS RPPRCTS. CV-517 SBUTS
11.1.01.01	.2 VITAL BUS #1	INVERTER \$1	INPUT SHORT .	125 VDC BREAKER 12-115 TRIPS, INTERRUPTING POWER TO VITAL BUS \$1 AND REGULATED BUS \$1 DURING AUTO-TRANSPER TO MCC-2	CONTROL ROOM ANNUNCIATION, LOCAL INDICATION	(SAME 48 11.1.1.1.1)	(SAME AS 11.1.1.1)	(SAMB AS 11.1.1.1.1)
11.1.01.01.	3 VITAL BUS #1	[WVBRTER #1	OUTPUT VOLTS LOW	POWERED BACEUP SOURCE (UP TO 10 SEC PLUS TRANSPER SWITCH DBLAT TIME DURING SISLOP)			·	
11.1.01.01	4 VITAL BUS #1	INABELBE \$1	OUTPUT SHORT OR GROUND	(SAMB AS 11.1.1.1.1) (SAMB AS 11.1.1.1.2)	CONTROL BOOM ANNUNCIATION, CONTROL BOOM ANNUNCIATION, LOCAL INDICATION	{SAME AS 11.1.1.1.}	(SAMB_AS_11.1.1.1.1)(SAMB_AS_11.1.1.1.1)	(SAMB AS 11.1.1.1.1)
		AUTO TPER SW \$1		VITAL BUS SI AND REG BUS \$1 CANNOT BE TRANSPERRED TO THE MCC-2 POWERED BACKUP SOURCE VITAL BUS \$1 AND REGULATED BUS	PERIODIC TESTING  CONTROL ROOM ANNUNCIATION.	PROUNDARY TRAIN AND CHARMELS FOR APPROTED BCCS PUNCTIONS REDUNDARY SEQ/TRAIN FOR	BUS \$1 AND REGULATED BUS \$1 BCCS LOADS THOPBRABILITY OF 1/2 HI-PLOS	STECH SPEC ACTION BUTRY REQUIRED FOR THIS PAILURE SEE ITEMS 1.4.6.5.3.
	<del>,</del>			#1 CANNOT BE POWERED FROM INVERTER #1, RESULTING IN UP TO 10 SEC INTERRUPTION OF POWER TO VITAL BUS #1 AND REG	LOCAL INDICATION	SIS/SISLOP AND SPRAY, REDUNDANT PRE PRESSURE CRANNELS FOR SEQ 92 BLOCE	CONTAINMENT SPRAY VALVES AND SEQ \$1 (HI CONTAINMENT PRESSURE), REDUCED REDUNDANCY	1.4.6.5.4, 1.4.12.5.1, 2.4.8.3.1, 2.4.9.6.1, 371.4.611, 371710221,
		<del></del>		BUS \$1 POWBERD ECCS LOADS  DURING SISLOP (IE, TIME FOR DG \$2 TO START AND RE-EMBEGIZE		PBRMISSIVE	AGAINST 88Q \$1 AND 2 BLOCE PERMISSIVE	3.2.10.2.1, 5.1.4.5.1, 5.1.5.4.1, 5.1.6.6.1, 6.715.3.1, 6.711.4.1, 8.1.1.5.1, 8.1.8.2.1,
11.1.01.02.	3 VITAL BUS \$1	AUTO IPRR SW #1	CONTACTS OPEN	FOR OL BORR TO ALLY BAR \$1		REDUNDANT TRAIN POR CSAS AND	INOP OF 1/2 BI-PLOW CONTAINMENT	9.1.1.5.1. 1/3 SEQ BLOCK PERM **B/G-A-OVERPILL RELAY ACT IF AUTO-IPER OCCURS
				AND REGULATED BUS \$1 ECCS AND OTHER LOADS	PBBIODIC TBSTING	SIS/SISLOP, ALT PATH FOR BLR, PZR PRESS CHALS FOR SEQ \$2 BLOCE PERMISSIVE, PORV FOR SGTR. HOV-1100C CLOSES FOR		CREDITED FOR HISLE OR LOCA
			· -·			INJECTION	AGAINST SBQ #2 BLOCK PERMISSIVE. POTENTIAL OPERATION OF BOTE CHG PPS DURING	
AMA							INJECTION. 1/2 PORY/BLOCE VV	





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#### BHERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

· -	. ITEH #	 D	BVICE ID	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT FAILURES	DETECTION OF	INSERBAL COMPENSTATING	RPFRCT ON RCCS	REMARES
	11.1.01.02.	.4 VITAL	BUS \$1	AUTO IPER SW \$1	CONTACTS CLOSED	INVERTER \$1 AND 37.5 EVA ALTBRUATE SOURCE PROM MCC-2 PARALLELED. IF OUT OF PRASE, INVERTER MAT CURRENT-LIMIT AND TRIP INTERNALLT, LEAVING VITAL	TESTING	(SAMB AS 11.1.1.2.2)	• · · · · - · · · · - · - · · ·	FIECH SPEC ACTION BUTER REQUIRED WITH THIS FAILURE
	11.1.01.02.	.5 VITAL	.Bu3-≬t	AUTO IFBR SW \$1	CONTACTS GROUNDED	BUS \$1 AND RRG BUS \$1 ON BACKUP SOURCE PROM MCC-2 LOSS OF VITAL BUS \$1, REGULATED BUS \$1 AND 37.5kVA BACKUP SOURCE PROM MCC-2,	CONTROL BOOM INDICATION AND	SBLOCA CLR, REDUND VLV/TRAIN FOR SPRAY AND SIS/SISLOP, ALT	LOSS OF CLE CAPABILITY FOR	UTILITY BUS LOAD ITEMS 1.4.16.11.1, 2.4.12.1.1,
						INCLUDING LOSS OF UTILITY BUSTINGER AT OUTPUT BREAKER TRIPS	.:	PATE FOR BLE, PZE PERSS CRILS FOR SI BLOCK, HOV-1100C CLOSES	CONTAINMENT SPRAY VALVES, SEG SI, BLR PRIMARY PATH. REDUCED REDUNDANCY AGAINST SI BLOCK PREM, OP OF 2 CHG PP DURING INJ	
_	11:1.01:03:	:1 VITAL	- BUS - #1	VITAL BUS \$1 AC	3 OPRN	LOSS OF POWER TO VITAL BUS \$1 AND REG BUS \$1 BCCS AND OTHER LOADS	•	(SAHE AS 11:1:1:2:3)		MSLB OR LOCA (SAMB AS 11.1.1.2.3)
	11:1:01.03:	:2 VITAL	BUS #1	VETAL BUS #1 ACT	3 CLOSED	VITAL BUS \$1 BREAKER WILL NOT OPEN IF NEEDED TO ISOLATE PAULT	PBRIODIC TRSTING	- NONE SEGUISED		NON-SAFETT BELATED LOADS BAYS  10CPRSO.49(b)(2) ISOLATION  WHICH COORDINATES WITH LOAD  BREAKERS. THIS FAILURE PLUS  BROAD POUR TO BE BLANK ARRICH STORY
		.3 VITAL	BUS #1	- VITAL BUS \$1 ACE	B INPUT SHORT OR Ground	(SAHE AS:11:1.1.2.5)	CONTROL ROOM ANNUNCIATION -	-{SAMB-AS-11.1.2.5}	-{\$AHB-A8-11-1-1:1:8:5}	OUTSIDE TER PLANT DESIGN BASIS (SAME AS -11:1:1:1:5) - PAULT WILL CAUSE UNDERVOLTAGE CONDITION AT TRANSPER SWITCH, WEICE TERM-AUTO-TRANSPERS PAULT TO NCC-2 POWERED 37.5
										EVA BACIUP SOURCE, CAUSING CONCURRENT LOSS OF UTILITY BUS
	11.1.01.04.	.1 VITAL	BUS #1	(BREAKER)	OPBN	LOSS OF VITAL BUS \$1 POWER TO INSTRUMENT BACK B3/R4, INCLUDING 1/3-P2R PRESSURE	CONTROL BOOM INDICATION, ANNUNCIATION		REDUCED BRLIABILITY FOR SEQ #1 SIS/SISLOP AND AGAINST SI BLOCK PERMISSIVE FOR SEQ #1 AND SEQ	SECTION 8 OF M19405 FOR RPS
1						INPUTS TO SEQ #1 AND BLOCE PERMISSIVE FOR SEQ #1 AND SEQ	•	BLOCE PERMISSIVE	12	
	11.1.01.05.	.1 VITAL	BUS #1	8-1102V (BREARRE)	OPBN	\$2 LOSS OF VITAL BUS \$1 POWER TO 1/3 STM GRM WIDE BANGE LEVEL INDICATION (NOW-PAME) AND	CONTROL BOOM INDICATION	NOME SEGUISED		SEE ITEM 5.3.5.4.1. CV-92 SAPETY PUNCTION IS PAIL-CLOSED FOR RCCS
<u> </u>	11.1.01.06.	.1 VITAL	BUS #1	8-1103V (BRBAKER)	OPBN	SPHERE PIRE LOOP VALVE CV-92 LOSS OF VITAL BUS #1 POWER TO INSTRUMENT RACE R1/R2	•	NOMB BEGNIESD	NOMB	NO BCCS EQUIPMENT ON THIS SOURCESEE SECTION-8-OP-
	11.1.01.07.	.1 VITAL	BUS 11	8-1104V (BRBARER)	OPBN	LOSS OF VITAL BUS \$1 POWER TO STSTEM FREQUENCY RECORDER AND BUS UNDERVOLTAGE	CONTROL ROOM ANNUNCIATION	NONE REQUIRED	NOMB	M39405 FOR BPS BFFECTS NO BCCS BQUIPMENT ON THIS SOURCE: SBE SECTION 8 OF M39405 FOR BPS BFFECTS
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#### EMBRGENCY CORE COOLING SYSTEM SINGLE PAILURE AMALYSIS SAN OMOFRE UNIT 1 TABLE 11-1: VITAL AND REGULATED FOWER SYSTEM

ITBN #	DBVICE ID	COMPONENT ID	PAILURB MODB	LOCAL EPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	PROAISIONA IMABBANA COMBANATING	RPPRCT ON RCC8	REMARIS
11.1.01.08.1	VITAL BUS \$1	8-1105V {BRBARBR}	OPBM	LOSS OF WITAL BUS \$1 POWER TO INSTRUMENT BACK BIO/BII, INCLUDING S/G OVERFILL PROTECTION RELAY	CONTROL ROOM INDICATION,	NORE SEGUISED		SBB ITEM 1.4.6.5.4. SBB SBCTION 8 OF H39405 FOR BPS BPFBCT8
11.7.01.097	VITAL BUS 11	8-1106Y (888AE8R)	OPBM	LOSS OF VITAL BUS BY POWER TO INSTRUMENT BACE BS	CONTROL BOOM INDICATION	BONE BEGDIESED		NO ECCE EQUIPMENT ON THIS SOURCE. SEE SECTION 8 OP M39405 FOR RPS EFFECTS
11,3,01,10.1	ALAYF. BOB. 194	(BREARER)	OPBN .	LOSS OF REG BUS \$1 POWER TO BCCS AND OTHER LOADS	CONTROL BOOM INDICATION, ANNUNCIATION			3588 TYBRS T.4.6.5.3, 2.4.9.6.1, 3.1.4.6.1,
						S/Gs FOR SECONDARY RECIEC	RECIRC TO S/G A	S/G OVERPILE PROTECTION CIRCUIT DISCONNECTED PENDING
11.1.01.11.1		\$-1108V (BREAEBR)	OPBN	LOSS OF VITAL BUS \$1 POWER TO BORON MONITOR		NONE BEGUIRED	MONB	CYCLE IS MODIFICATIONS SOURCE
11.1.01.12.1	VITAL BUS 11	(BRBARBR)	OPBM	LOSS OF WITAL BUS SI POWER TO INSTRUMENT RACE R7, INCLUDING PIC-1111		HOV-1100C CLOSES AS REQUIRED FOR INJECTION. NORE REQUIRED PRIOR TO SEQ BLOCK/RESET OR DURING RECIRC	POTENTIAL OPERATION OF 2 CHARGING PUMPS DURING INJECTION (AFTER SEQ BLOCE/RESET)	BRB 1488 2.4.8.3.1
11.1.01.13.1	VITAL BUS \$1	8-1110V (BRBAERR)	OPBN	MONB	A 20 - 1 - 1 - 20 - 20 - 20			[THIS BREAKER IS CURRENTLY A
11.1.01.14.1	IE EUB JATIV	8-1111V (BRBARER)	OPEN	LOSS OF VITAL BUS \$1 POWER TO CVCS AND CONTAINMENT SPRAY SYSTEMS, INCLUDING CV-525 AND CV-82	COMPROL ROOM INDICATION	NONE REQUIRED FOR CONTAINMENT SPRAY, RECIRC PUMP BEAD TO MAINTAIN LOOP SEAL FOR CONTAINMENT ISOLATION	LOSS OF CONTAINMENT ISOLATION VALVING FOR SPRAT PRIBERATION	FOR CONTAINMENT SPRAY SAFETY PUNCTION, CV-525 FAILS CLOSED
11.1.01.15.1	VITAL BUS \$1	8-1112V — (BRBAEBR)	OPBM	LOSS OF VITAL BUS \$1 POWER TO 1/2 PORYS AND ITS BLOCK VALVE, SI BEADER VENT VALVES SV-7028/D AND 3/3 CONTAINMENT	ANNUNCIATION	REDUNDANT TRAIN/SEQUENCEE FOR SIS/SISLOP, REDUNDANT PORT FOR SGTR	SEQ \$1 INOPERABLE (HI	POR CONTAINMENT ISOCATION SAPERT PUNCTION SEE ITEMS 1.4.12.5.1, 8.1.8.2.1. 8V-702B/D SAFETY PUNCTION IS FAIL-CLOSED. PORV NOT CREDITED FOR MSLB OR LOCA
11.1.01.16.1	VITAL BUS \$1	8-11[]V (BRBAESS)	OPBN	PRESSURE INPUTS TO SEQ A1 LOSS OF VITAL BUS A1 POWER TO CONTAINMENT SPRAY SYSTEM,			CONTAINMENT SPRAY PATES	SEE ITEM 5.1.4.5.1. VALVE SAFETY FUNCTION IS TO REMAIN
11.1.01.17.1	VITAL BUS \$1	8-1114V - (BRBAEBR)	OPBN	LIMITER VALVES (CV-517) LOSS OF VITAL BUS \$1 POWER TO CCW STSTEM, INCLUDING 1/2		BUNDERS TOE BECIEV		CLOSED FOR RECIRCULATION SEE ITEM 6.1.5.2.1. VALVE SAPETY PUNCTION IS PAIL-OPEN
11.1.01.18.1		8-1115V (BRBAERR)	OPBN	RECIRC BY VALVES (CV-737A) LOSS OF VITAL BUS \$1 POWER TO CSAS TRAIN A	CONTROL BOOM INDICATION		REDUCED RELIABILITY OF TRAIN A	SBB 1788 9.1.11.3.1
11.1.01.19.1	ALLYE BOS \$1	8-1116V (BRBAERR)	OPBN	LOSS OF VITAL BUS \$1 POWER TO COMTAINMENT SPEAT, INCLUDING 1/3 CONTAINMENT PRESSURE INPUTS TO TRAIN A/8, AND G-200A LOW LEVEL TRIP		REDUNDANT BI-BI CONTAINMENT PRESSURE CHANNELS AND SEQ TO PREVENT SPURIOUS CSAS.  REDUNDANT HYDRAZINE PUMP		





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#### EMBEGENCY CORE COOLING SYSTEM SINGLE FAILURE AMALYSIS SAN OMOPER UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

· ·	(TRM \$	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL EFFECTS AND DEPENDENT PAILURES	MBTHOD OF DBTBCTION	PROATRIONS INGRESSEL CONDENSATING	EPPECT ON ECCS	BENARES
	11.1.02.01.1	REGULATED BUS #1		INPUT OPBN	LOSS OF REGULATED BUS \$1 POWER		ALTERNATE PATE FOR BLR,	INOPERABILITY OF BLE PRIMARY	1888 IYENS 1.4.6.5.3,
			(TWINCO)		TO BCCS AND OTHER LOADS	ANNUBCIATION	BLOCK PRRHISSIVE, REDUNDANT	PATH, REDUCED REDUNDANCY AGAINST SEQ \$1 819/818LOP AND SI BLOCE PERMISSIVE FOR SEQ \$1	SECONDARY RECIRC BPFECTS [F
							S/GS FOR SECORDARY RECIRC	AND \$2, LOSS OF SECONDARY RECIRC TO S/G A	8/G OVERPILL PROTECTION CIRCUIT DISCONNECTED PRINTING CYCLE 12 MODIFICATIONS
	1171.02.0172	*REGULATED BUS . \$1	(TMINCO)	INPUT SHORT	REGULATOR \$1 PERDER BREAKER  8-11074 TRIPS, CAUSING LOSS OF REG BUS \$1 POWER TO ECCS AND OTHER LOADS	CONTROL ROOM INDICATION, ANNUNCIATION	(SABE AS 11:1:2:1:1)	(SAME AS 11.1.2.1.1)	-{SAHY AS-11.172.1.11}
; .!	11.1.02.01.1	REGULATED BUS #1	REGULATOR #1 (TWINCO)	OUTPUT VOLTS LOW	(SAME AS 11.1.2.1.1)	CONTROL ROOM INDICATION, ANNUNCIATION	(SANE AS 11.1.2.1.1)	(SAME 48 11.1.2.1.1)	(SAME AS 11.1.2.1.1)
; .! 		REGULATED BUS 1	(PUSB)	OPBN	INSTRUMENT RACE BIO/RII, Including S/G A OVERFILL	CONTROL ROOM INDICATION, ANNUNCIATION	HOME REQUIRED FOR SE, REDUNDANT S/Gs FOR SECONDARY BECIEC	NOME FOR SI, LOSS OF BECOMDARY BECIEC TO S/G A	RPPRCTS IF S/G OVERFILL - PROTECTION CIRCUIT -
					PROTECTION INPUT CHANNEL			•	DISCONNECTED PRODUING CYCLE 12  MODIFICATIONS. SEE SECTION 8  OF M39405 FOR RPS EFFECTS
	-11.1:02.03.1	REGULATED BUS #1	8=11R2 (PUSB)	OPEN	LOSS OF REG BUS \$1 POWER TO	CONTROL ROOM INDICATION	HONR BEGUIEED	RORB	NO ECCS EQUIPMENT ON THIS SOURCE. SEE SECTION 8 OF M39405 FOR RPS EFFECTS
	11.1.02.04.1	BEGULATED BUS \$1	8-11R3 (PUSR)	OPEN	HONB				[THIS POSITION CURRENTLY A SPARE]
	11.1.02.05.1	REGULATED BUS \$1	8-1184 (PUSB)	OP8N	LOSS OF REG BUS \$1 POWER TO INST RACE R3/R4, INCLUDING 1/3 PZR PRESSURE IMPUTS TO SEQ \$1	CONTROL BOOM INDICATION, ANNUNCIATION	REDUNDANT PZR PRESSUBE Channels	REDUCED REDUNDANCY AGAINST SEQ \$1 818/813LOP AND SI BLOCK PRENIESIVE FOR SEQ \$1 AND \$2	SBE ITEM 8.1.1.5.1. SBE SBCTION 8 OF M19405 FOR RPS
					AND BLOCK PERMISSIVE FOR SEQ			inentantia top and it was be	
		REGULATED BUS #1	(FUSB)	OPBN	LOSS OF REG BUS #1 POWER TO INST RACE RT (CVCS) LOSS OF REG BUS #1 POWER TO	CONTROL ROOM INDICATION	NONE BEGAIEED	HONE	NO BCCS EQUIPMENT ON THIS
 !			-(PUSE)		INST BACE RS				SOURCE: SER SECTION & OF H19405 FOR RPS REPRECTS
	11.1.02.08.1	REGULATED BUS \$1	8-11R7 (PUSB)	OPBN	LOSS OF REG BUS \$1 POWER TO REACTOR INSTRUMENTATION IN	CONTROL BOOM INDICATION	ALTERNATE BLE PATE	LOSS OF PRIMARY BLR PATE	SBB ITEMS 2.4.9.6.1, 3.1.4.6.1, 3.1.10.2.1.
	******				PANBL COS, INCLUDING PCV-1112, PCV-430C/B				PCV-430C/B SAPETE FUNCTION IS FAIL-CLOSED. PCV-1112 SAPETE FUNCTION IS FAIL CLOSED FOR
1	11.1.02.09.1	REGULATED BUS \$1		OPEN	LOSS OF REG BUS \$1 POWER TO	CONTROL ROOM INDICATION	NONE BEQUIRED	MONB	CLE, MODULATE FOR BLR NO BCCS EQUIPMENT ON THIS
	11.1.02.10.1	REGULATED BUS #1	8-1129 (PUSB)	OPBW	HISCELLANGOUS NIS LOADS LOSS OF REG BUS \$1 POWER TO BUS UNDERVOLTAGE RELAT	CONTROL ROOM ANNUNCIATION	NOMB BROMIBBD	NONB	RONECE NO BCC2 ECHIPMENT ON THIS SOURCE

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#### EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1

TABLE	11-	l: '	VITAL	AND	REGULATED	POWER	SYSTEM
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ITEM #	DRAIGE ID	COMPONENT ID	PAILURE MODE	LOCAL BPFECTS AND DBPENDENT PAILURES	MRTHOD OF	INHERENT COMPENSATING PROVISIONS	EFFECT OF ECCS	ERMAPES
	REGULATED BUS	1 8-11R10 (PUSB)	OPBM	NOMB				(TRIS FUSE CURRENTLY A SPARE)
11.2.01.01.1	VITAL BUS \$2	INVERTER #2	INPUT OPEN	INTERRUPTION OF POWER TO VITAL BUS \$2 AND REG BUS \$2 RCCS AND OTHER LOADS DURING		BEDUNDANT SEQ/TRAIN FOR SIS/SISLOP, REDUEDANT PZR	REDUCED BELIABILITY FOR SEQ #1 #18/#19LOP AND AGAINST SEQ #1	1.4.7.5.4, 5.2.5.4.1,
				AUTO-TRANSPER TO MCC-2 POWERED BACEUP SOURCE (UP TO 10 SEC		BLOCK PREMISSIAN Brock bremissian Brock bremissian	THE AT PROCE LEGISLIAN	6:2:5:2:1; 6:4:7:2:1; 8.1.2:4.1; 8.1.2.5.1. INTERRUPTION OF POWER TO PORV
i				PLUS TRANSFER SWITCE DELAY DURING SISLOP)				AND ITS BLOCK VALVE MAS NO REFECT DUE TO AVAILABILITY OF BACKUP MITROGEN FOR
11.2.01.01.2	ITAL BUS #2	INVERTER #2	INPUT SHORT	125VDC BREAKER 72-136 TRIPS,	CONTROL ROOM ANNUNCIATION,	(SANE AS 11.2.1.1.1)	(SAMB AS 11.2.1.1.1)	REPOSITIONING: CV-114 AND CV-7378 FAIL OPEN AS REQUIRED (SAME AS 11.2.1.1.1)
1		· · · · · · · · · · · · · · · · · · ·		INTERRUPTING POWER TO VITAL  BUS \$2 AND REGULATED BUS \$2  DURING AUTO-TRANSPER TO MCC-2  POWERED BACKUP SOURCE (UP TO-	LOCAL INDICATION			
11.2.01.01.3	ITAL BUS 12	INVERTER #2	OUTPUT VOLTS LOW	10 SEC DURING SISLOP) (SAME AS 11.2.1.1.1)	CONTROL ROOM ANNUNCIATION,	(SAHR AS 11.2.1.3.1)	(SAME AS 11.2.1.1.1)	(SAMB AS 11.2.1.1.1)
11.2.01.01.4 V	ITAL BUS #2	INVERTER \$2	SO TROBE TUSTUO DRUGAD	(SAMB AS 11.2.1.1.2)	LOCAL INDICATION  CONTROL ROOM ANNUNCIATION,  LOCAL INDICATION	(SAME AS 11.2.1.1.1)	(SAME AS 11.2.1.1.1)	(SAME AS 11.2.1.1.1)
<u> </u>  -  -		AUTO IPBR SW #2		VITAL BUS \$2 AND REC BUS \$2 CANNOT BE TRANSPERRED TO THE MCC-2 POWERED BACKUP SOURCE	PRRIODIC TESTING	BBDUNDANT-TRAIN-AND-CHANNELS- FOR APPECTED ECCS PUNCTIONS	REDUCED BELIABILITY-OF-VITAL BUS \$2 AND REGULATED BUS \$2 BCCS LOADS	TREE SPEC ACTION BUTET
11.2:01:02:2 V	TAL BUS \$2	- AUTO IPRR SW #2	ALTERNATE	VITAL BUS #2 AND REGULATED BUS #2 CANNOT BE POWERED FROM INVERTER #2, RESULTING IN UP	-CONTROL BOOM ANNUNCIATION, LOCAL INDICATION	BROUNDANT BRO/TRAIN FOR SIS/SISLOP, REDUNDANT PZR PRESSURE CRANNELS FOR SEQ \$2	-REDUCED-RELIABILITY-FOR SEQ-61- SIS/SISLOP AND AGAINST SEQ 61 AND 62 BLOCK PERMISSIVE	
				TO 10 SEC INTERRUPTION OF POWER TO VITAL BUS \$2 AND REG BUS \$2 POWERED ECCE LOADS		Brock-58881881A8		-8:1:2:4:1; 8:1:2:5:1: 1/3-38Q BLOCE PERMISSIVE AND S/G 8 OVERFILL PROTECTION RELAT
				DURING SISLOP (IR, TIME FOR DG \$2 TO START AND RE-ENERGIZE MCC-2 POLLOWING LOP)				- ACTUATION - IF - AUTO - TRANSPRE OCCURS
	TTAL-BUS-\$2	AUTO IPBR 9W #2	CONTACTS OPEN	- LOSS OF POWER TO VITAL BUS 12 - AND REGULATED BUS 12 BCCS AND OTHER LOADS		819/SISLOP, REDUNDANT PZE PRESSURE CHANNELS FOR SEQ \$2	-REDUCED-RELIABILITY-OP-889-81 813/818LOP AND AGAINST 889 \$1 AND \$2 BLOCK PERMISSIVE. 1/2	NOT CREDITED FOR MSLB OR LOCA. CV-114 AND CV-7378 FAIL OPEN
11.2.01.02.4 V	ITAL BUS #2	AUTO IPER SW #2	CONTACTS CLOSED	ENVBRTBR #2 AND 37.5 EVA	CONTROL BOOM ANNUNCIATION,	PORY/BLOCE VALVE FOR SGTR (SAMB AS 11.2.1.2.2)	PORVE AND ITS BLOCK VALVE	AS REQUIRED.
				ALTERNATE SOURCE PRON MCC-2 PARALLELED. IF OUT OF PBASE, INVERTEE MAY CURRENT-LIMIT AND TRIP INTERNALLY, LEAVING VITAL BUS \$2 AND REG BUS \$2 ON BACEUP SOURCE PRON MCC-2	TESTING			REQUIRED WITH THIS PAILURE
 !								**************************************



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## RHERGENCY CORR COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT I TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

ITBN 4	DEVICE ID	COMPONENT ID	PAILURE MODE	LOCAL BPFBCTS AND DBPBNDBNT FAILURES	METROD OF DETECTION	BEGALATORA IMPERRAL COMBERATITING	RPPRCT ON RCCS	REMARES
11.2.01.02.5 V	ITAL BUS \$2	AUTO IPER SU \$2	CONTACTS GROUNDED	LOSS OF VITAL BUS \$2, BEGULATED BUS \$2 AND 37.54VA	CONTROL BOOM INDICATION AND ANNUNCIATION	NOME FOR SI/RCS INVENTORY OR SBLOCK CLE, ENDUBLINY	SPOTENTIAL UNISOL DIVERSION OF	(SAME AS 11.2.1.2.2). ALSO SEE
	,			BACEUP SOURCE PROM MCC-2, INCLUDING LOSS OF UTILITY BUS INVERTER \$2 OUTPOT BREAKER	• · · · · · · · · · · · · · · · ·	SEQ/TRAIN POR SIS/SISLOP AND P2R PRESS CHALS FOR SEQ \$2	LOSS OF CLR CAPABILITY FOR SBLOCA. REDUCED RELIABILITY FOR	1.4.16.11.1, 2.4.12.1.1, 1 2.4.27.4.1, 2.4.28.4.1.
	· · · · · · · · · · · · · · · · · · ·	<del> </del>		TRIPS		PORY POR SGTR	BEG \$1 AND \$2 BLOCK PREMISSIVE.  1/2 PORVE AND \$2 BLOCK PREMISSIVE.	3.2.15.2.1 PORVs NOT CREDITED
11.2.01.03.1 V	TAL BUS #2	VITAL BUS \$2 AC	B OPBN	LOSS OF POWER TO WITAL BUS \$2 AND REG BUS \$2 BCCS AND OTHER LOADS		(SANE AS 11.2.1.2.3)	(SAMB AS 11.2.1.2.3)	(SAME AS 11.2.1.2.3)
11.2.01.03.2 V	TAL 809 #2	VITAL BUS #2 AC	B CLOSED	VITAL BUS \$2 BRBAKER WILL NOT OPEN IP NEEDED TO ISOLATE PAULT	PRRIODIC TRATING	NONE BEQUIRED	MOMB	NON-SE LOADS HAVE 10CPESO.49(b)(2) ISOLATION
	-							WRICE COORDINATES WITH LOAD BREAKERS. THIS PAILURE PLUS BUS FAULT DURING SIS/SISLOP IS
\$1.2.01.03.3 VI	TAL BUS #2	VITAL BUS 12 AC	B INPUT SHORT OR GROUND	(SAMB AS 11.2.1.2.5)	CONTROL BOOM ANNUNCIATION	(SAMB AS 11.2.1.2.5)	(SAME AS 11.2.1.2.5)	OUTSIDE THE PLANT DESIGN BASIS (SAME AS 11.2.1.2.5). FAULT WILL CAUSE UNDERVOLTAGE
<del> </del>	· - · - · ·	<del></del>						COMPLITION AT YMANSPER BUTTCH, WHICH THEM AUTO-TRANSPERS PAULT TO MCC-2 POWERD 37.5
11.2.01.04.1 VI	TAL BUS #2	8-1201V (BRBAER)	OPBN	LOSS OF VITAL BUS \$2 POWER TO		REDUNDANT SEQ/TRAIN FOR	REDUCED RELIABILITY FOR SEQ \$1	EVA BACKUP BOURCE, CAUSING CONCURRENT LOSS OF UTILITY BUS SBB ITEM 8.1.2.4.1. SBB
:		(DEDARSE)		INSTRUMENT RACE 23/24, INCLUDING 1/3 PZR PRESSURE INPUTS TO SEQ #1 AND BLOCE	ANNUNCIATION	PRESSURE CHANNELS FOR SEQ #2 BLOCE PERMISSIVE	95 PERMISSIVE POR SEQ 41 AND SEQ PERMISSIVE POR SEQ 41 AND SEQ	SECTION S OF E39405 FOR EPS EPPECTS
				LABERNISSIABLEON SEG \$1. THD 280.	The state of the s			
11.2.01.05.1 VI	TAL BUS #2	8-1202V -(BREARBE)	OPBN	LOSS OF WITAL BUS \$2 POWER TO	CONTROL BOOM INDICATION	MONE BEGALESD	NONE .	NO ECCS EQUIPMENT ON THIS
11.2.01.06.1 VI	TAL BUS #2	8-1203V 	OPBN	INDICATION (NON-PAMI) LOSS OF VITAL BUS \$2 POWER TO		NONE BEQUIEED	MOHB	NO ECCS EQUIPMENT ON THIS
11.2.01.07.1 VI	TAL BUS #2	8-1204V	OPEN	LOSS OF VITAL BUS \$2 POWER TO		MONE REQUIRED	MAND	BOURCE: BBE SECTION 8 OF M39405 FOR RPS BPFECTS
·		(BRBAUBR) -	<del></del>	RCP THERMAL BARRIER ISOLATION	CANTEN SOAD MENUNCIALING	WAND PORATED	NONE	SBB [TBH 6.4.7.2.]
11.2.01.08.1 VI	TAL 809 #2	8-1205V (BREAKER)	OPEN	VALVES TO CV-122A, B AND C LOSS OF VITAL BUS \$2 POWER TO INSTRUMENT RACE R10/R11;	-	NONE BEGRIESD	NONE	SBR ITEM 1.4.1.5.4. SBR
				INCLUDING S/G B OVERPILL PROTECTION RELAY	ANNUNCIATION			SECTION 8 OF MIGGOS FOR RPS BPPECTS
11.2.01.09;1 VI	TAL BUS 12	8-1206V (BRBAEBE)	OPBN	LOSS OF VITAL BUS \$2 POWER TO INSTRUMENT BACE R5	CONTROL BOOM INDICATION	NONE BEGALEED	NOBE	BO BCCS EQUIPMENT ON THIS SOURCE. SEE SECTION 6 OF M39405 FOR RPS BFFECTS





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## EMERGENCY CORE COOLING STATEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

ITEN #	DBAICE ID	COMPONENT ID	FAILURB HODB	LOCAL RPPRCTS AND DEPENDENT PAILURES	MBTHOD OF DBTBCTION	INBRERAL COMBENSTAING	BPFECT ON BCCS	REMARES
11.2.01.10.	1 VITAL BUS \$2	8-1207V	OPBN	LOSS OF REG BUS \$2 POWER TO	CONTROL ROOM INDICATION,	REDUNDANT PZR PRESSURE	REDUCED REDUNDANCY AGAINST SEQ	*SER [TEMS 1.4.7.5.3.
·		(BRBAKSR)		RCCS AND OTHER LOIDS	ANNUNCIATION	CHIMBLE FOR SEQ. BEDUNDANT S/G: FOR SECONDARY RECIEC	\$1 \$137\$18LOP AND SI BLOCK PRINISSIVE FOR SEQ \$1 AND \$2, LOSS OF SECONDARY RECIRC TO \$/6	8.1.2.3.1. NO SECONDARY RECIRC RPPECTS IP S/G OVERPILL PROTECTION CIRCUIT
11.2.01.11.	I VITAL BUS #2	8-1208V	OPEN	LOSS OF VITAL BUS \$2 POWER TO	CONTROL ROOM INDICATION	NONE REQUIRED	NOME	DISCONRECTED PROFING CYCLE 12 MODIFICATIONS NO BCCS EQUIPMENT ON THIS
		(BERATER)		CONTROL ROD POSITION INDICATION SYSTEM		NAME BOOKERS	8028	SOURCE SQUIPMENT OF 1213
11.2.01.12.	VITAL BUS #2	8-1209¥	OPBN	LOSS OF VITAL BUS \$2 POWER TO	CONTROL ROOM INDICATION,	NONE BEGAILED	RONE	NO ECCS EQUIPMENT ON THIS
	1 VITAL BUS #2	8-1210V (BRBAKER)	OPEN	LOSS OF VITAL BUS \$2 POWER TO S/G BIGH LBVBL TRIP BBLAT		NONE SEGUIDED	NORE	NO BCCS RQUIPMENT ON THIS
11.2.01.14.7	TVITAL BUS \$2	(BBBARBR)	OPBN	LOSS OF VITAL BUS \$2 POWER TO DG BUILDING FIRE PROTECTION SYSTEM	CONTROL ROOM INDICATION	NONE BEGLIEBD	RONB	NO RCCS EQUIPMENT ON THIS
11.2:01.15:1	VITAL BUS \$2	8-1212V (BRBAEBE)	OPEN	(SABE AS 11.2.1714.1)	CONTROL BOOM INDICATION	(SAME AS 11.7.1.14.1)	(SANS AS 11.2.1.14.1)	(SAMB 43-11.7.1.14.1)
11.2.01.16.1	VITAL BUS #2	8-1213V (BRBAERR)	OPBN	LOSS OF VITAL BUS \$2 POWER TO	CONTROL ROOM INDICATION	NONE REQUIRED	RONB	NO ECCS EQUIPMENT ON THIS
11.2.01.17.1	VITAL BUS #2	8-1214V (BRBAKER)	OPBN	LOSS OF VITAL BUS \$2 POWER TO CCW AND CONTAINMENT SPRAY SYSTEMS, INCLUDING CY-7318 AND		NONE BEGRIERD	NONB	SER ITEMS 5.2.5.4.1 AND 6.2.5.2.1. BAPBYY PUNCTION IS PAIL-OPEN FOR BOTH VALVES
[1.2.01.18.1	VITAL BUS 82	8-1215V (BRRAKER)	OPBN	CV-114 LOSS OF VITAL BUS \$2 POWER TO			INOPERABILITY OF 1/2 PORVS AND	PORVS NOT CREDITED FOR MALE OR
11.2.01.19.1	VITAL BUS 82	8-1216V (BREALER)	OPBN	1/2 PORVE AND ITS BLOCK VALUE LOSS OF VITAL BUS \$2 POWER TO MIS AND BUS UNDERVOLTAGE RELAY		NONE BEGUIRED	- ITS BLOCK VALVE FOR SIGTE	LOCA NO BCCS EQUIPMENT ON THIS SOURCE. SEE SECTION 8 OF
11.2.02.01.1	BEGULATED BUS \$	REGULATOR #2 (TWINCO)	INPUT OPEN	LOSS OF REGULATED SUS \$2 POWER TO ECCS AND OTHER LOADS	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT PZR PRESSURE CHANNELS FOR SEQs, REDUNDANT		8.1.2.5.1. NO SECONDARY RECIRC
						S/Ga FOR BECONDARY RECIRC	PERMISSIVE FOR SEC 11 AND 12; LOSS OF SECONDARY RECIEC TO S/G B	PROTECTION CIRCUIT DISCONNECTED PRODUING CYCLE 12
11.2.02.01.2	REGULATED BUS \$2	REGULATOR #2 (TWINCO)	INPUT SHORT	REGULATOR #2 FREDER BREAKER 8-12074 TRIPS, CAUSING LOSS OF	ANNUNCIATION	(SAMB AS 11.2.2.1.1)	(SAME AS 11.2.2.1.1)	MODIFICATIONS (SAME AS 11.2.2.1.1)
11 9 09 01 4	DBCIII 1925 DIIO 44	DDCIII 4900 44	AUSTIN HATE AND	REG BUS \$2 POWER TO ECCS AND OTHER LOADS				
		(TWINCO)	OUTPUT VOLTS LOW	(SAME AS 11.2.2.1.1)	CONTROL BOOM INDICATION, ANNUNCIATION	(SAME AS 11.2.2.1.1)	(SAME AS 11.2.2.1.1)	(SAHE AS 11.2.2.1.1)
11.2.02.02.1	REGULATED BUS \$2	8-12R1 (PUSB)	OPBN .	LOSS OF REG BUS \$2 POWER TO INSTRUMENT RACE RIG/RII, INCLUDING S/G B OVERPILL	CONTROL BOOM INDICATION, ANNUNCIATION	NOME REQUIRED FOR SI, REDUNDANT S/G= FOR SECONDARY	·	BPPBCTS IF 8/G OVERFILL
				PROTECTION INPUT CHANNEL		#aV1BV		PROTECTION CIRCUIT DISCONNECTED PENDING CYCLE 12 MODIFICATIONS. BEE SECTION 8
	·····			• • • •		TO ME AND AND AND ADDRESS OF THE PARTY OF TH		OF HISHOS POR RPS RPPRCTS



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## EMBEGENCY CORE COOLING SYSTEM SINGLE FAILURE AMALTSIS SAN ONOPRE UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

	ITBH #	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT PAILURES	MBTROD OF DETECTION	INSERBLY COMBENSATING	EFFECT ON ECCS	BENTETS
	11.2.02.03.1	REGULATED BUS	2 8-1282 (FUSE)	OPBW	LOSS OF REG BUS 42 POWER TO	CONTROL ROOM INDICATION	HONB ESONIESD	NORE	NO RCCS EQUIPMENT ON THIS SOURCE. SEE SECTION 8 OP M39405 FOR RPS RPPRCTS
; ;	11.2.02.04.1	REGULATED BUS'	(FUSB)	OPEN	NONE				[THIS POSITION CURRENTLY
	11.2.02.05.1	REGULATED BUS S	( PUSB)	OPBN	LOSS OF REG BUS \$2 POWER TO INST RACE R3/R4, INCLUDING 1/3 PZE PRESSURE IMPUTS TO SEQ \$1		REDUNDANT PER PRESSURS CHANNELS	REDUCED REDUNDANCY AGAINST SEQ \$1 \$18/818LOP AND \$1 BLOCK PERMISSIVE FOR SEQ \$1 AND \$2	SEE TIEM 8.1.2.5.1. SEE SECTION 8 OF M39405 FOR RPS RFFECTS
! !					AND SCOCK PERMISSIVE FOR SEQ.				
` 	11:2.02:06.1	REGULATED BUS	2 8-1285 · · · (PUSB)	OPBN	HONE				[THIS FUER CURRENTLY SPARE]
<u>'</u>	11.2.02.07.1	REGULATED BUS #	2 8-1286 —(PUSB)————	OPBN	LOSS OF REG BUS \$2 POWER TO	CONTROL ROOM INDICATION, ANDUNCIATION	NONE BEGNIERD	ROAR	NO ECCS RQUIPMENT ON THIS SOURCE. SEE SECTION S OF M39405 FOR RPS EFFECTS
		REGULATED BUS-	(PUSB)	OPEN	- NONB				[THIS PUSE CURRENTLY SPARE]
		REGULATED BUS		OPBN	NONE				[THIS PURE CURRENTLY SPARE]
'. .!		REGULATED BUS #		OPBN	LOSS OF REG BUS \$2 POWER TO BUS UMBERVOLTAGE RELAT	CONTROL ROOM ANNUNCIATION	NOME BEGALBED	MONE	NO RCCS RQUIPMENT ON THIS ROURCE
		REGULATED BUS	(PUSE)	OPEN	MONB				[THIS FUSE CURRENTLY SPARE]
		VITAL-808-43		INPUT OPEN · · ·	BUS \$3, 3A AND REG BUS \$3 RCCS AND OTHER LOADS DURING AUTO-TRANSPRR TO MCC-2 POWERED	LOCAL INDICATION	REDUNDANT SEQ/TRAIN FOR SIS/SISLOP, REDUNDANT PZR PRESSURE CHANNELS FOR SEQ \$2 BLOCE-PREMISSIVE		
		11 manual and 11			BACKUP SOURCE (UP TO 10 SEC PLUS TRANSPER SWITCH DELAT TIME DURING SISLOP)		200V& 12501651.V2		4.1.3.2.1, 8.1.3.4.1, 9.1.11.4.1
	11.3.01.01.2	VITAL BUS #3	INVERTER 1)	INPUT SHORT		CONTROL BOOM ANNUNCIATION, LOCAL INDICATION	(SAME AS 11.3.1.1.1)	(SAME AS 11.3.1.1.1)	(SAME AS 11.3.1.1.1)
					#3 DURING AUTO-TEAMSPER TO MCC-2 POWERED BACKUP SOURCE				
;			•		(UP TO 10 SBC PLUS TRANSPBR SWITCH DELAY TIME DURING SISLOP)				
	11.3.01:01:3	·· EN BUB JATIV	··· INABALB 13	OUTPUT VOLTS LOW	(SAMB AS 11.3:1:1:1)	CONTROL BOOM -ANNUNCIATION			(SAMB AS 11:3:1:1:1)
	11.3.01.01.4	VITAL BUS #3	INVERTER #3	OUTPUT SHORT OR GROUND	(SAMB AS 11.3.1.1.2)	CONTROL BOOM ANNUNCTATION, LOCAL INDICATION	(SAMB AS 11.3.1.1.1)	(SANE AS 11.3.1.1.1)	(SAME AS 11.3.1.1.1)
:							•		



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# EMBEGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONOFRE UNIT I TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

	ITBH #	DRVICE ID	COMPONENT ID	PAILURE MODE	LOCAL RPPECTS AND DBPENDENT PAILURES	NETHOD OF	BEOATSTONS JAHREBAL COMBENSTAING	EPPECT ON ECCS	REMARES
11.	.3.01.02.1	ITAL BUS #3	AUTO IPER SW #3	NORMAL	VITAL BUS \$3, 3A AND REG BUS \$3 CANNOT BE TRANSPERRED TO	PERIODIC TESTING	REDUNDANT TRAIN AND CHANNELS FOR APPROTED ROOS FURCTIONS	REDUCED RELIABILITY OF VITAL 808 83, 34 AND REGULATES BUS \$1	*TECH SPEC ACTION ENTRY REQUIRED FOR THIS PAILURE
11.	3.701.702.72 TV	TTAL BUS 43	AUTO XFEE SW #3	- ALTERNATE	THE MCC-2 POWERED BACEUP SOURCE VITAL BUS \$3, 3A AND REGULATED BUS \$3 CANNOT BE POWERED FROM INVERTER \$3, RESULTING IN UP	CONTROL BOOM ANNUNCIATION, LOCAL INDICATION	BEDUNDANY SEQTYPAIN FOR SIS/SISLOP, REDUNDANY PZE	BCCS LOADS  REDUCED RELIABILITY FOR SEQ \$1  \$13/919LOP AND AGAINST SEQ \$1	BBE TYENS 1.4.8.5.3, 1.4.8.5.4, 1.4.9.10.1,
		······································			TO 10 SEC INTERRUPT OF POWER TO WITAL BUS \$3, 34 AND REG BUS \$3 POWERED ECCE LOADS		BEGGE PRESISSIVE BEGGE PRESISSIVE	AND \$2 BLOCK PERHISSIVE	1.4.18.3.1, 2.4.25.4.1, 3.1.12.4.1, 3.2.16.2.1, 4.1.3.2.1, 8.1.3.4.1, 9.1.11.4.1. 1/3 880 BLOCK
[] ] 	3.01/02/3 W	ITAL BUS JATI	AUTO IPER SW #3	CONTACTS OPEN	DURING SISLOP (IR, TIME FOR DG \$2 TO START AND RB-BNRRGIZE HCC-2 AFTER LOP) LOSS OF PORE TO VITAL BUS \$3,	CONTROL ROOM ANNUMCIATION,	- HONE BOB CUR OB CUE/AUB BLOA	SF088 Ob CFB FMD CFB/BFB AFOR	PREMISSIVE AND S/C C OVERPILL  PROTECTION RELAY ACTUATION IF AUTO-IFEE OCCURS  [SAME AS 11.3.1.2.2 POR BCCS]
					3A AND REGULATED BUS \$3 BCCS AND OTHER LOADS	PERIODIC TRAINE	BLOCK PERMISS, NOWE FOR	BELIABILITY OF SEQ \$1 SIS/SISLOP AND IGAINST SEQ 71 AND \$2 BLOCK PREMISSIVE, LOSS	POR R.G. 1.97 AND THE STSTEMS, REDUNDANT TRAIN B SYSTEMS PROVIDE SAPETY PUNCTION
11.1	).01.02.4 V	ITAL BUS #3	AUTO IPRE SW \$3	CONTACTS CLOSED	INVESTER \$3 AND 37.5 hVA ALTERNATE SOURCE FROM MCC-2	CONTROL ROOM ANNUNCIATION, LOCAL INDICATION, PRRIODIC	SECONDARY RECIRC  (SAME AS 11.3.1.2.2)	OF SECONDARY RECIRC TO 8/G A/B/C (SAME AS 11.3.1.2.2)	STECH SPEC ACTION BATES REQUIRED WITE TRIS FAILURE
					PARALLELED. IP OUT OF PHASE, INVESTER MAY CURRENT-LIMIT AND TRIP INTERNALLY, LEAVING WITAL BUS \$3, 34 AND REG BUS \$3 ON	TESTLEG			
	1.01.02.5 V	TAL BUS #3	AUTO TPER SW #3	CONTACTS GROUNDED	BACRUP SOURCE PROM MCC-2 LOSS OF VITAL BUS \$3, 3A AND REGULATED BUS \$3 AND 37.5kVA BACRUP SOURCE PROM MCC-2,	CONTROL ROOM INDICATION AND ANNUNCIATION	AND CLR/HLR PLO BAL, BROUND	*POTENTIAL UNISOL DIVERSION OF *SI/RCS-INVENTORT TO RCDT, LOSS- OF CLE AND CLE/FLE FLOW	(SAME AS 11.3.1.2.2). ALSO SEE UTILITY BUS LOAD ITEMS 1.4.16.11.1, 2.4.12.1.1,
		***************************************		••	INCLUDING LOSS OF UTILITY BUS. INVERTER #3 OUTPUT BREAKER TRIPS.		PZB PRBSS CENLS FOR SEQ \$2 "BLOCK PRRN," NONE FOR SECONDARY RECIRC	BALANCE, AND (POE SBLOCA) CLE PUMPING: BEDUCED BELIABILITY FOR SEQ \$1 SIS/SISLOP AND AGAINST SEQ \$1 AND \$2 BLOCE	2.4.27.4.1. 2.4.28.4.1.
11.3	1.01.03.1 VI	TAL BUS 63	VITAL BUS 13 ACB	OPBM	LOSS OF POWER TO VITAL BUS \$3 AND REG BUS \$3 RCCS AND OTHER	CONTROL ROOM ANNUNCIATION,	REDUNDANT SEQ/TRAIN FOR	PRRHISSIVE, LOSS OF SECONDARY RECIRC TO S/G A/B/C REDUCED RELIABILITY FOR SEC AL	SER ITEMS 1.4.8.5.3,
: 	17 <b>2::0</b> 0.10:1	TAL BUS \$3	VITAL BUS \$3 ACB	CLOSBD	LOADS  VITAL BUS \$3 BRBANKR WILL NOT		SS BFOCK BERNISSIAE LSB BERSENEE CHANNETS LOU SEÓ	SIS/SISLOP AND AGAINST SEQ \$1 AND \$2 BLOCE PERMISSIVE AND TRAIN A CSAS NOVE	1.4.8.5.4, 8.1.3.4.1, 9.1.11.4.1 NON-SR LOADS HAVE
<u>.</u>		<del>-</del>			OPEN IF MEBDED TO ISOLATE FAULT				10CPR50.49(b)(2) ISOLATION WHICH COORDINATES WITH LOAD BREAKERS. THIS PAILURE PLUS
									BUS FAULT DURING SIS/SISLOP IS OUTSIDE THE PLANT DESIGN BASIS





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#### BUBBERDUCT CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAM ONOFRE UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

ITEM A	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL BPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	INSERBRAT COMPRESSIBLE PROVISIONS	BPFRCT ON BCCS	REMARES
11.3.01.0	3.3 VITAL BUS #3	VITAL BUS \$3 AC	B INPUT SHORT OR	(SAMB AS 11.3.1.2.5)	CONTROL BOOM ANNUNCIATION	(SAMB AS 11.3.1.2.5)	(SAMB AS 11.3.1.2.5)	(SAMB AS 11.3.1.2.5). PAULT
.! 		······································		· · · · · · · · · · · · · · · · · · ·				WILE CAUSE UNDERVOLTAGE CONDITION AT TRANSPER SWITCH, WHICE TREM AUTO-TRANSPERS
.! .: 	1:1 VITAL BUS #3		OPRN 1	. LOGO OF MISSI NIM 44 COMPS SO				FAULT TO MCC-2 POSERED 37.5 EVA SACEUP SOURCE, CAUSING CONCURRENT LOSS OF UTILITY BUS
		(BRBAKER)	oras	LOSS OF VITAL BUS \$3 POWER TO INSTRUMENT RACE R3/R4, INCLUDING 1/3 PZR PRESSURE	ANNUNCIATION	REDUNDANT SEQTRAIN FOR SIS/SISLOP, REDUNDANT PZR PRESSURE CRANNELS FOR SEQ \$2	REDUCED RELIABILITY FOR TRO \$1 819/818LOP AND AGAINST SI BLOCI PREMISSIVE FOR SEQ \$1 AND SEQ	ARCTION & OF M39405 FOR RPS
	·			PERMISSIVE FOR SEQ \$1 AND SEQ \$2		BLOCK PERMISSIAR	11	
11.3.01:0	i.1 VITAL BOS #3	(BRBAEBR)	OPEN	LOSS OF VITAL BUS \$3 POWER TO 1/3 STM GEN WIDE RANGE LEVEL INDICATION (NON-PANI)	CONTROL BOOM INDICATION	HOME ERGUISED	BORB	NO RCCS EQUIPMENT ON THIS
1173.01:00	.1 VITALIBUS 133	(BREALER)	OPBN	LOSS OF VITAL BUS \$3 POWER TO INSTRUMENT RACE B1/R2	CONTROL BOOM INDICATION, ANNUNCIATION	BORE ERGNIERD	NORE	NO BCCS EQUIPMENT ON THIS BOURCE. SEB SECTION & OF
11.3.01.07	.1 VITAL BUS 83	(BRBAKER)	OPBN	LOSS OF VITAL BUS \$3 POWER TO ECP EMBRGENCY THERMAL BARRIER PUMP PERSSURE TRANSMITTER	CONTROL ROOM ANNUNCIATION	NOME - BEGALERAD	1018	M39405 FOR RPS RFFECTS  NO ECCS RQUIPMENT ON THIS SOURCE. RCP EMERGENCE TERRNAL BARRIER PUMP NOT CREDITED FOR
11.3.01.08	, YETAL BUS 13	8-1305V (BREAKER)	OPBN	LOSS OF VITAL BUS \$3 POWER TO INSTRUMENT RACE RIO/RII, INCLUDING S/G C OVERFILL	CONTROL ROOM INDICATION, ANNUNCIATION	NONE SECULESD	NONB	SISTSISLOP EVENTS SEE ITEM 1.4.8.5.4. SEE SECTION 8 OF M39405 FOR RPS
11.1.01.09	.1 VITAL BUS #3	8-1306V (BRBABER)	OPBN	PROTECTION RELAT	CONTROL BOOM INDICATION	NONE BEGNIERD	MOMB	BPPECTS NO BCCS EQUIPMENT ON THIS
i 11.1.01.10	.1 VITAL BUS \$3	8-1307V	OPBN	LOSS OF REG BUS \$3 POWER TO	CONTROL ROOM INDICATION.	REDUNDANT PZR PRESSURE	DEDUCED DEDUCADANCA TOTANGA 030	SOURCE. SEE SECTION 8 OF M39405 FOR RPS EPPECTS SEE ITEMS 1.4.8.5.3, 8.1.3.5.1
		(BEBAIRE)		BCCS AND OTHER LOADS	ANNUNCIATION	CHANNELS FOR SEQ., REDUNDANT S/G FOR SECONDARY RECIRC	\$1 SIS/SISLOP AND BY BLOCK PERMISSIVE FOR SEQ \$1 AND \$2, LOSS OF SECONDARY RECIEC TO 8/G	
:	.1 VITAL BUS #3	8-1308V (BRBAEBE)	OPEN	MONE			С	(THIS POSITION CURRENTLY SPARRI
	.1 VITAL BUS 43	8-1309V (BRBAERR) 8-1310V	OPBN -	MONE				THIS POSITION CURRENTLY SPARE
k	.1 VITAL BUS #3	(BREAKER) 8-1311V	OPBN	MONE	· · · · · · · · · · · · · · · · · · ·			[THIS BREAKER CURRENTLY SPARE]
: 	.1 VITAL BUS \$3	(BRBAER) (BRBAEER)	OPBN	LOSS OF WITAL BUS \$3 POWER TO 1/3 STM GEN WIDE RANGE LEVEL INDICATION (NOW-PANI) AND BUS	CONTROL ROOM INDICATION,	MOMB. BBGnibbd	MORE	SPARE) 100 ECCS EQUIPMENT ON THIS SOURCE
				UNDERVOLTAGE RELAY	<del>-</del>			



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## BERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 11-1: "VITAL AND REGULATED POWER SYSTEM"

ITBN (	DBAICB ID	COMPONENT ID	PAILURE MODE	LOCAL RPPECTS AND DEPENDENT PAILURES	MBTBOD OF DBTBCTION	PROVISIONS  INSERBNA_CONDERSTAING	EFFECT ON ECCS	REMARES
11.1.01.1	16.1 VITAL BUS #3	8-1313V	OPRN	NOMB .				ITHIS POSITION CURRENTLY
•	11.1 VITAL BUS 43	(8884EBE) 8-1314V (8884EBE)	OPEN	LOSS OF VITAL BUS \$3 POWER TO CONTAINMENT SPRAT STREM	CONTROL BOOM INDICATION	BEDUNDANT TRAIN	REDUCED RELIABILITY OF TRAIN A	SPARE
†	8.1 VITAL BUS 63	(BRBARSE) 8-1316V	OPEN	LOSS OF VITAL BUS \$3 POWER TO	CONTROL ROOM INDICATION	NONE SEQUIRED	MONE	(THIS POSITION CURRENTLY
11.3.02.0	I.1 REGULATED BUS	#3 REGULATOR #3	INPUT OPRN	NIS .	ANNUNCIATION			NO ECCS EQUIPMENT ON THIS SOURCE. SEE SECTION 8 OF H39405 FOR RPS RPFECTS
		(IMINCO)		TO ECCS AND OTHER LOADS		REDUNDANT PER PRESSURE CHANNELS FOR SEC., REDUNDANT S/Gs FOR SECONDART RECIEC	BROUCED REDUNDANCY AGAINST SEQ #1 SIS/SISLOP AND ST BLOCK PREMISSIVE FOR SEQ #1 AND \$2, LOSS OF SECONDARY RECIRC TO 8/G	8.1.3.5.1. NO BECOMDARY RECIRC BPPBC18 IP 8/G OVERPILL
11.3.02.0	1.2 REGULATED BUS	#3 REGULATOR #3	INPUT SHORT	ERGULATOR #3 FREDER BREAKER  8-1307V TRIPS, CAUSING LOSS OF	CONTROL ROOM INDICATION,	(SAMB AS 11.3.2.1.1)	C (SAME AS 11.3.2.1.1)	DISCONNECTED PENDING CYCLE-12 HODIFICATIONS (SAND AS 11.3.2.1.1)
;   11:3.02.0	1.3 REGULATED BUS		OUTPUT VOLTS LOV	REG BUS 43 POWER TO BCCS AND OTHER LOADS	CONTROL-ROOM-INDICATION,	(SANR-19-11-3-2-1-1)	""(SAHB-AS-11:3:2:1:1)	-{SANR-AS-11-3:2:1:1}
11.3.02.0	Z.1 REGULATED BUS	(TWINCO) 13 8-1381 (PUSB)	OPBN .	LOSS OF REG BUS \$3 POWER TO	ANNUNCIATION CONTROL ROOM INDICATION, ANNUNCIATION	NOWE REQUIRED FOR SI,	NONE FOR SI, LOSS OF SECONDARY	*SRB ITEM 1.4.8.5.3. NO BCCS RPPBCTS IF S/G OVERPILL
				PROTECTION INPUT CHANNEL		BRCIRC		PROTECTION CIRCUIT DISCONNECTED PRINTING CYCLE 12 HODIFICATIONS BER-SECTION 8
11.3.02.0	3.1 REGULATED BUS	#3 8-13R2 (PUSB)	OPBN	LOSS OF REG BUS \$1 POWER TO	CONTROL ROOM INDICATION	NONE ESCUESO	NORB	OF M39405 FOR RPS BPFECTS NO ECCS EQUIPMENT ON THIS SOURCE - SEE-SECTION S OF
11:3.02.0	Ari regulated bus y		OPBN	NONB				H19405 FOR RPS RFFRCTS  [TRES POSITION CURRENTLY
: 	5:1 REGULATED BUST	(PUSB) #3 -8-13R4 =	OPBN		CONTROL ROOM-INDICATION.	PROJECT PROPERTIES	- Brduced - Brdundanct - Against - 8eg -	SPARE
		(PUSB)		INST RACE 83/84, INCLUDING 1/3 PZR PRESSURE INPUTS TO 88Q \$1 AND BLOCK PRRHISSIVE POR 88Q		CHAMBLS	\$1 SIS/SISLOP AND SI BLOCE	SECTION 8 OF M39405 FOR RPS RPPECTS
. 1 . 3 . 62 . 66	1 REGULATED BUS	11-8-1185	OPBN · · · · ·	\$1 AHD \$2				
	.1 REGULATED BUS 1	(PUSB) 13 8-13R6	OPBN	LOSS OF REG BUS #3 POWER TO	CONTROL ROOM INDICATION,	NOME BEGUIERD		[THIS FUSE CURRENTLY SPARE]
		(PUSB)		INST BACE B5	ANNUNCIATION			SOURCE: SEE SECTION 8 OF

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## EMBEGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONOFRE UNIT I TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

ITRN #	DBAICE ID	COMPONENT ID	PAILURB MODE	LOCAL BPPBCTS AND DBPBNDBNT FAILURBS	DRIECTION MRIHOD OF	PROAISIONS INTERSENT CONDENSATING	RPPRCT ON ECCS	REMARES
11.3.02.08.1	REGULATED BUS	)	OPBM	NOMB				[THIS PUSE CURRENTLY SPARE]
11.3.02.09.1	REGULATED BUS		OPEN	MONB				[THIS PUSE CURRENTLY SPARE]
11:3.02.10.1	BECULATED BUST		OPBN	LOSS OF REC BUS \$3 POWER TO	CONTROL BOOM ANNUNCTATION	HOMB. BREATERA	BORB	NO ECCS EQUIPMENT ON THIS SOURCE
11:3.02:1171	REGULATED BUS	)3 8-13B10''-'' (PUSB)	OPEN	NONE				[THIS FOSE CURRENTLY SPIRE]
11.3.03.01.1	VITAL BUS 83A	VITAL BUS \$3A	OPBN	LOSS OF POWER TO VITAL BUS \$3A (	CONTROL ROOM INDICATION,	CUR/BLE PLOY BALANCE		88E [7888 1.4.9.10.1, 174.19.371, 2.4.25.4.1, 3.1.12.4.1, 3.2.16.2.1, 4.1.3.2.1 FOR ECCS LOADS. FOR
	VITAL BUS 134		CLOSED	UTOLI DIO 194 poniuon utti mam	IRDIANIA SPARING	WANN PROPERTY.	POTENTIALLY BICERDING BECIEC PUMP LIMITATIONS	R.G. 1.97 AND THE SYSTEMS, REDUNDANT TRAIN B SYSTEM PROVIDES SAPETT FUNCTION
11.3.03.01.2	TITAL BUS \$34	ACB		VITAL BUS \$3A BREAKER WILL BOT F OPEN IF WEEDED TO ISOLATE FAULT	BRIODIC TESTING	NONE BEQUIERD	NOME	NON-BE COIDS HAVE LOCPESO.49(b)(2) ISOLATION WRICH COORDINATES WITH LOAD BREAKERS. THIS PAILURE PLUS
11:3.03:01.3	VITAL BUS \$3A	··VITAL BUS \$3A	IMPUT SHORT OR GROUND	(SAMB AS 11.3.1.2.5)	ONTROL ROOM ANNUNCIATION	(SAME AS 11.3.1.2:5)	(SANR AS 11.3.1.2.5)	BUS FAULT DURING SIS/SISLOP IS OUTSIDE THE PLANT DESIGN BASIS (SAME AS 11.3.1.2.5). FAULT NILL CAUSE UNDERVOLTAGE CONDITION AT TRANSFER SWITCE,
								WEICH THEM AUTO-YEARSPERS PAULT TO MCC-2 POWERED 37.5 EVA BACRUP SOURCE, CAUSING
11.3.03.02.1	VITAL BUS #3A	8-3301 (BBBAESE)	OPBN	NOME				CONCURRENT LOSS OF UTILITY BUS THE STATE OF THE SPARE OF
•	VITAL BUS \$3A		OPBN	NONS				[THIS BREAKER CURRENTLY SPARE]
	VITAL BUS #3A	8-3303 (BRBAEBR)	OPEN	NONB				[THIS BREAKER CURRENTLY SPARE]
į	VITAL BUS DA	8-3304 (BRBAKER)	OPBN	MONB				[THIS BREAKER CURRENTLY SPARE]
:	VITAL BUS #3A	(BEBAEBR) 8-3306	OPBN OPBN	NONE		•		[THIS BREAKER CURRENTLY SPARE]
	VITAL BUS #3A		OPEN	LOSS OF VITAL BUS \$3A POWER TO C	ONTROL ROOM ANNIBERTATION	NOME REQUIRED	MONB	[THIS BREAKER CURRENTLY SPARE]
	VITAL BUS 13A	(BRBAEBR)	OPBN ·	BI BADIATION AUTO-ALERT SYSTEM LOSS OF WITAL BUS \$3A POWER TO C		MONE SHORIEBD		NO ECCS EQUIPMENT ON THIS SOURCE NO ECCS EQUIPMENT ON THIS
		(BRBARBR)		TRAIN A CONTAINMENT AND MAIN STEAM LINE BI RAD MONITORS				SOURCE. B.G. 1.97 AND THI REQUIRED EQUIPMENT, NOT
· · · · · · · · · · · · · · · · · · ·	·						-	REQUIRED FOR ECCS. REDUNDANT



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#### BMBRGBNCY CORE COOLING SYSTEM SINGLE FAILURE AWALTSIS SAM ONOFRE UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

ITBN 8	DBVICB ID	COMPONENT ID	FAILURB MODE	LOCAL BPFBCTS AND DBPBNDBNT FAILURES	MBTHOD OF	INHERENT COMPENSATING PROVISIONS	APPROT ON RCCS	REMARES
11.3.03.10.1 V	VITAL BUS \$3A	8-3309 (BRBAERR)	OPBM	LOSS OF VITAL BUS \$3A POWER TO CO	INTROL BOOM ANNUNCIATION	MOME SEGUISED	NONE	NO ECCS EQUIPMENT ON THIS BOURCE. R.G. 1.97 AND THI BEQUIRED EQUIPMENT, NOT
11.3.03.11.1 V	VITAL BUS \$3A	8-3310 (BREATER)	OPBN .	LOSS OF VITAL BUS \$3A POWER TO CO TRAIN A CONTAINMENT WIDE RANGE PRESSURE, RIDROCEN AND WATER LEVEL HOWITORS	INTROL BOOM ANNUNCIATION	MOME SEGUISED	NOMB	REQUIRED FOR ECCS. REDUNDANT HORITORS IVILIBLE OF TRIM B NO ECCS RQUIPHENT ON THIS SOURCE. R.G. 1.37 AND THE REQUIRED RQUIPHENT, BOT REQUIRED FOR ECCS. REDUNDANT
"11:3:03:12:1 V	VITAL'BUS'BIA'	8-3311 (BRBAEBE)	OPBN	LOSS OF VITAL BUS \$34 POWER TO CO	BALEOF BOOK TARREST IN	NONE BEGOISED	BORB	HONITORS AVAILABLE ON TRAIN B BBE ITEM 3.2.16.2.1. VALVE SAPETY PUNCTION IS PAIL-CLOSED
י הנהנסמהוודיי	VITAL-BUS \$3A	(BREARER)	OPRN	INCLUDING CY-562 LOSS OF WITAL BUS 1534 POWER TO CC TRAIN A RCS BIGS-POINT WENT STSTER	NAMED FOOM SUMMERCEATION	BONE BEGLIESD	BONE	NO ECCS EQUIPMENT ON THIS SOURCE. THE REQUIRED RQUIPMENT, NOT REQUIRED FOR
11.3.03.14.1 V	VITAL BUS \$3A	8-3313 (BEBAEER)	OPBN	LOSS OF VITAL BUS \$3A POWER TO CO CLE PLOW INDICATION FOR 2/3 PE RCS LOOPS		NORS VAVILABLE	ECLE FLOW TO RCS LOOPS B AND C WOULD BE INCREASED PER PROCEDURE, RESULTING IN CLE AND CLE/ELE FLOW INSALANCE.	
11.3.03.15.1 V	ITAL BUS \$3A	8-3314 (BREAEBR)	OPBN	LOSS OF VITAL BUS \$3A POWER TO CO	NTROL ROOM INDICATION	MONS EBQUIEBD	POTENTIALLY TECEBOING RECIEC PUMP LIMITATIONS NONE	SBR ITEM 1.4.19.3.1. VALVE SAFBTY PUNCTION IS FAIL-CLOSED
11.3.03.16.1 ¥	VITAL BUS \$3A	8-3315 (BRBAEBR)	OPBN	INCLUDING CY-955 AND CY-956 LOSS OF VITAL BUS \$3A POWER TO CO TRAIN A APW, INCLUDING		REDUNDANT APM TRAIN TO PROVIDE STM GEN MR LEVEL INDICATION AND PLOW, NOWE REQUIRED FOR AUTOMATIC BLOWDOWN ISOLATION,	AND APW PLOW DISABLED, BLOWDOWN ISOLATED, LOSS OF SECONDARY	SER ITEMS 1.4.9.10.1, 4.1.3.271 STH CEN BLOWDOWN ISOLATION VALVE SAFETT PUNCTION 18 FAIL-CLOSED
11.3.03.17.1 V	TITAL BUS \$3A	8-3316 (BREAKER)	OPBN	FOR S/G A/B/C LOSS OF VITAL BUS \$3A POWER TO CO TURBING DRIVEN AFW PUMP G-10 AN	· · · · · · · · · · · · · · · · · · ·	NONE BEGLIESD NONE BEGLIES		NO RCCS EQUIPMENT ON THIS SOURCE. REDUNDANT TRAIN B APE
11.3.03.18.1 ¥	ITAL BUS \$3A	8-3317 (BRBAEBR)	OPBN	NONB				WILL PROVIDE AFT FLOW AS REQUIRED FOR S/G BRAT REMOVAL [TBIS BREAKER CURRENTLY SPARE]
11.3.03.19.1 V	-	8-3318 (BREAKER)	OPEN	MOMB				[THIS BREAKER CURRENTLY SPARE]
{1.3.03:20.1-V		(BREATER) 8-3320	OPBN	NOMB				THIS BREAKER CURRENTLY SPARE;
11.3.03.22.1 Y	ITAL BUS \$3A	(BRBARBR) 8-3321 (BRBARRR)	OPBN	NOMB				[TEIS BREAKER CURRENTLY SPARE]



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#### EMBRGBNCT CORE COOLING STSTEM SINGLE FAILURE ANALYSIS SAN OMOPRE UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER STSTEM

	ITEM #	DRAICE ID	COMPONENT ID	PAILURB MODB	LOCAL BPPBCTS AND DBPBNDBNT FAILURBS	DETECTION	INHERRNT COMPRESATING PROVISIONS	BPFBCT ON BCCS	REMARKS
					T. T. T. T. T. T. T. T. T. T. T. T. T. T				
11	.3.03.23.1	VITAL BUS \$3A	8-3322 (BRBATER)	OPBN	NONE				[THIS BREAKER CURRENTLY SPARE]
11	.3.03.24.1	ALL BAR \$34	8-3323 (BRBARBR)	OPEN	MONB				(THIS BREARBE CURRENTLY SPARE)
1 11	11.01.25.7	ALLY BOA 137.	8-3324 (BRBAEBR)	OPBN	LOSS OF VITAL BUS 43A POWER TO BUS UNDERVOLTAGE RELAT	CONTROL BOOM ANNUACIATION	RORE BEGAIRED	NOME	NO ECCS EQUIPMENT ON THIS
. 11	.4.01.01.1	VITAL BUS 84	INVERTER 14	INPUT OPEN	POTENTIAL INTERBUPTION OF	CONTROL BOOM ANNUNCTATION,	NORE LOS RESTOD	*POTENTIAL LOSS OF TRAIN A AND	SEE 172HS 1.4.9.5.1,
					POWER TO VITAL BUS \$4 AND REG BUS \$4 ECCS AND OTHER LOADS DURING AUTO-TRANSPER TO MCC-3	LOCAL INDICATION		DUB TO OUT OF SEQUENCE BUS LOADING OF CCW PUMPS RESULTING	2.4.8.3.2, 2.4.22.1.1,
				· · · · · · · · · · · · · · · · · · ·	POWERED BACKUP SOURCE (UP TO 10 SEC DURING SISLOP)			FROM PC-605	3:2:9:3:7, 3:2:13:2:1; 3:2:14:4:1, 6:4:5:1:1, 5:4:6:3:1: PAILURB MODE
									COMBERVATIVELY ASSUMED. MORMAL OPERATION OF STATIC IPER SWITCE DOES NOT RESULT IN
11.	.4.01.01.2	VITAL BUS 14	INVERTER #4	IMPUT SHORT	125VDC BEBARER 72-131 TRIPS, INTERRUPTING POWER TO VITAL	CONTROL ROOM ANNUNCIATION, LOCAL INDICATION	(SAME AS 11.4.1.1)	*(SAMB AS 11.4.1.1.1)	INTERPOPTION (SAME AS 11.4.1.1.1)
					BUS \$4 AND REGULATED BUS \$4  DURING AUTO-TRANSPER TO MCC-2  POWERED BACEUP SOURCE (UP TO				
. 11.	4.01.01.3	VITAL BUS #4	INABBABB \$4	OUTPUT VOLTS LOW	10 SEC DURING SISLOP) (SAME AS 11.4.1.1.1)	CONTROL ROOM ANNUNCIATION, LOCAL INDICATION	(SAME AS 11.4.1.1.1)	*(SANE AS 11.4.1.1.1)	(SAME AS 11.4.1.1.1)
11.	.4.01.01.4	VITAL BUS #4	INABBIBB 14	OUTPUT SHORT OR GROUND	(SAME AS 11:4.1:1.2)	CONTROL ROOM ANNUNCIATION,	- (8ANR-18-11-4-1:1:1)	*(SAME AS 11:4:1:1:1)	(SAHB AS 11:4:1:1:1)
11.	.4.01.02.1	VITAL BUS #4	AUTO IPER SW	NORMAL	VITAL BUS #4 AND REG BUS #4	PERIODIC TESTING	REDUNDANT TRAIN AND CHANNELS	REDUCED RELIABILITY OF VITAL	STECH SPEC ACTION ENTRY
1			(INVERTER \$4)		CANNOT BE TRANSPERRED TO THE THE MCC-2 POWERED 7.5 EVA BACEUP SOURCE		POR-APPROTED RCCS-PUNCTIONS	BUS \$4-AND REGULATED BUS \$4 BCCS LOADS	BEQUIRED FOR THIS PAILURE
	:4:01:02.2	VITAL BUB 14TIV	(INVERTER \$4)	- ALTBRNATE	VITAL BUS \$4 AND REGULATED BUS \$4 CANNOT BE POWERED FROM INVERTER \$4, RESULTING IN UP	LOCAL INDICATION	HONE FOR BESLOP	**POTENTIAL LOSS OF TRAIN A AND 8 BLECTRICAL POWER FOR SISLOP DUB TO OUT OF SEQUENCE BUS	
					TO 10 SECTINTERRUPT OF POWER - TO VITAL BUS \$4 AND REG BUS \$4 POWERED ECCS LOADS DURING			-LOADING OF CCV-PUMPS RESULTING- PROM PC-605	3:1:3:2:1; 3:2:9:2:1; 3:2:9:3:1; 3:2:13:2:1; 3:2:14:4:1; 6:4:5:1:1;
					SISLOP (IR, TIME POR DG 82 TO START AND RE-EMBRGIZE MCC-2 APTER LOP)				-6.4.6;3:1
	.4.01:02:3	VITAL BUS #4	AUTO IFER SW (INVERTER \$4)	CONTACTS OPEN -	LOSS OF POWER TO VITAL-BUS-84 AND REGULATED BUS 84 BCCS AND OTHER LOADS	CONTROL ROOM ANNUNCIATION, PERIODIC TESTING	- NONE-POR SISLOP-OR-BLR	POTENTIAL LOSS OF TRAIN A AND BELECTRICAL POWER FOR SISLOP DUE TO OUT OF SEQUENCE BUS	BEGD FOR BACEUP PRIMARY PATE PLO DETERMINATION OR JUMPER
								- LOADING OF CCU-PUMPS-RESULTING- PROM PC-605. BLR PRIMARY AND ALTBRMATE PATHS ALSO LOST	HOV-813 CONTROLS TO MITIGATE LOSS OF BLR PUNCTION. BOL
	·								- CHANGE BEQD-IBBESPECTIVE OF



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## EMBEGENCY CORE COOLING SYSTEM SINGLE FAILURE AMALTSIS SAN ONOPRE UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

!!		DRAIGR ID	COMPONENT ID	FAILURB MODB	LOCAL RPPRCTS AND DEPRHOBENT PAILURES	MRTHOD OF DRTECTION	INHERENT COMPENSATING PROVISIONS	BPPECT ON BCCS	BENARES
	11.4.01.02	.4 VITAL BUS 14	AUTO IPER SU (INVERTER 34)	CONTACTS CLOSED	INVERTER #4 AND 7.5 EVA ALTERWATE SOURCE PROM MCC-2 PARALLELED. IP OUT OP PRASE, INVERTER MAT CURRENT-LIMIT AND TRIP INTERMALLY, LEAVING VITAL	CONTROL ROOM ANNUNCIATION, PRRIODIC TRATING	(SANB AS 11.4.[.2.2)	*(SAME 49 11.4.1.2.2)	SEGUISED ALLE LEIZ BYTTORE STECH SESC VCLION ERIEL
-	11.4.01.02	.5 VITAL BUS \$4	(INABELES \$4)	CONTACTS GROUNDED	BUS \$4 AND RRG BUS \$4 ON MCC-2 POWBRED 1.5 EVA BACKUP SOURCE		BONE FOR BISLOP OR BLE, TCV-601A/B BLOCE VALVES/FLOW LIBITING COLLARS FOR CCW PLOW	DUE TO OUT OF SEQUENCE BUS	BUS LOADS NOT APPECTED DUB TO SEPARATE PUSE FOR 1.5 EVA IPME
							JO RCCR FOYDR	LOADING OF CCW PUMPS RESULTING PROM PC-605. BLR PRIMARY AND ALTERNATE PATRS ALSO LOST AND CCW PLOW REDUCED TO MINIMUM POR	PRIMERY, WHICE PROTECTS 37.5 EVA IPME SERVING UTILITY BUS AND BACKUP FOR VITAL/REGULATED
	11.4.01.03	.I VITAL BUS \$4	MAN IPRE SV 64	MORMAL	VITAL BUS \$4 AND REG BUS \$4 CANNOT BE TRANSPERRED PROM INVESTER OR MCC-2 POWERED 7.5 kya backup source to McC-2 POWERED 37.5 kya backup source	PERIODIC TESTING	NOME SEGUISED	BCCS LOADS	INVERTER STATIC TRANSPER SWITCH WILL AUTO-TRANSPER WITAL BUS \$4 AND REGULATED BUS \$4 TO NCC-2 POWERED 1.5 EVA
	11.4.01.03.	2 VITAL BUS \$4	MAN IPBR SV \$4	ALTERNATE	VITAL BUS \$4 AND RBG BUS \$4	LOCAL INDICATION	NONE FOR SISTOD	*POTENTIAL LOSS OF TRAIN A AND	BOURCE AND BACK AS REQUIRED.  MCC-2 POWERED 31.5 BYA SACRUP  VIA MANUAL TRANSPER SWITCE NOT  REQUIRED FOR TRESS BUSSES  SER ITERS 1.4.9.9.1.
-	,				CANNOT BE POWERED FROM INVERTER #4 OF BCC-2 POWERED TO 1.5 BYA BACEUP SOURCE, RESUlting in up to 10 Sec Intereupt of Power to Vital			B BLECTRICAL POWER FOR SISLOP DUE TO OUT OF SEQUENCE BUS LOADING OF CCW PUMPS RESULTING PROM PC-605	2.4.4.2.1, 2.4.5.1.1, 2.4.2.2.2, 2.4.22.1.1, 3.1.3.2.1, 3.2.9.2.1, 3.2.9.3.1, 3.2.11.2.1,
	11,4,01,03.	3 VITAL BUS \$4	HAN IPBE SA \$4	CONTACTS OPEN	BUS \$4 AND REG BUS \$4 POWERED BCCS LOADS DURING SISLOP (IR, TIME TO START AND LOAD DG \$2) LOSS OF POWER TO VITAL BUS \$4		NOME FOR SISLOP OR BLB		3727147417, 6.4.51771, 6.4.6.3.1 #{SABB AS 11.4.1.3.2}. ROJ RRY
-					AND REGULATED BUS #4 ECCS AND OTBER LOADS	PRRIODIC TRATING		PC-605. BLR PRIMARY AND ALTERNATE PATHS ALSO LOST	PLO-DETERMINATION OR JUMPER ACROSS PT-4251 CONTACTS IN MOV-813 CONTROLS TO MITIGATE LOSS OF BLR FUNCTION. BOI CHANGE BEQD IRRESPECTIVE OF
	11.4.01.03.	4 VITAL BUS \$4	MAN IPBR SW #4	CONTACTS CLOSED	INVERTEE #4 AND MCC-2 POWERED 37.5 EVA BACEUP SOURCE PARALLELED. IF OUT OF PHASE.	CONTROL BOOM ANNUNCIATION, PRRIODIC TESTING	(SAME AS 11.4.1.3.2)	*(SAME AS 11.4.1.3.2)	TRIA FAILURE DUB TO INADEQUATE FIT(FT)=1112 RANGE *TRCA SPRC ACTION ENTRY REQUIRED WITH TRIS FAILURE
1					INVERTER MAY CURRENT LIMIT WITH INTERNAL TRIP AND AUTO-TRANSPER TO NCC-2 POWERED 7.5 EVA BACRUP SOURCE				





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## EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT I TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

LTBN 8	DRAICR ID	COMPONENT ID	FAILURB MODB	LOCAL EPFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EPPRCT ON ECCS	BEHARIS
11.4.01.03.5 VI	TAL BUS #4	HAN IPBR SV \$4	CONTACTS GROUNDED	LOSS OF VITAL BUS \$4 AND  REGULATED BUS \$4, MCC-2  POWERED 7.5 EVA AND 37.5 EVA  BACKUP SOURCES, INCLUDING LOSS	CONTROL ROOM INDICATION AND	HOME FOR SISLOP, BLE OR SI/RCS INVENTORY, YCV-501A/B BLOCK VALVES/COLLARS FOR CCV FLOW TO RCCS LOADS		*(SAME AS 11.4.1.3.2 AND 11.4.1.3.3.) ALSO SEE UYILITY BUS LOAD ITEMS 1.4.16.11.1, 2.4.12.1.1, 2.4.27.4.1,
				OF UTILITY BUS			UNISOCABLE DIVERSION OF BIJECS - INVENTORY TO ECOT. HER PRIMARY AND ALTERNATE PATRS ALSO LOST "AND CCW PLOW REDUCED TO MINIMUM	2.4.28.4.1, 3.1.7.1.1, 3.2.12.11.1, 3.2.15.2.1
11.4.01.04.1 VI	TAL BUS \$4	VITAL BUS 84 AC	B OPBN	LOSS OF POWER TO VITAL BUS \$4 AND REG BUS \$4 ECCS AND OTERR LOADS		NOWE FOR SISLOP OR BLR, TCV-601A/B BLOCE VALVES/COLLARS FOR CCW PLOW TO	FOR ECCS LOADS  *POTENTIAL LOSS OF TRAIN A AND  **BEECTRICAL FOURS POR SISLOP	**************************************
				· · · · · · · · · · · · · · · · · · ·			FROM PC-505. HLE PRIMARY AND ALTERNATE PATHS ALSO LOST AND CCW PLOW REDUCED TO MINIMUM FOR	3.1.3.2.1, 3.2.3.2.1, 3.3.9.3.1, 3.2.13.2.1,
11.4.01.04.2 VI	TAL BUS \$4	VITAL BUS 84 AC	B CL0980	VITAL BUS \$4 BREAKER WILL NOT OPEN IF NEEDED TO ISOLATE	PERIODIC TESTING		NORB	ITEM 11.4.1.3.3 NON-SR LOADS NAVE TOCPESO: 49(5)(2) ISOLATION WHICH COORDINATES WITH LOAD
11.4.01.04.3 VI1	TAL BUS 84	VITAL BUS \$4 AC	B INPUT SHORT OR GROUND	(SAMB AS 11.4.1.4.1)	CONTROL ROOM ANNUNCIATION	(SAME AS 11.4.1.4.1)	F(SAME AS 11.4.1.4.1)	BREAEBES. THIS PAILURE PLUS BUS PAULT DURING SIS/SISLOP IS OUTSIDE THE PLANT DESIGN BASIS *(SAME AS 11.4.1.4.1). FAULT WILL CAUSE UNDERVOLTAGE
								CONDITION AT INVESTEE AUTO-TRANSPER SWITCH, WHICH THEN AUTO-TRANSPERS PAOLT TO HCC-2 POWERD 7.5 EVA BACKUP
1174:01.0971-VI7	AL-BUS-14	8-14014	OPBN .	WONR			······································	SOURCE. SEPARATE PUSE ON 7.5 EVA TREE PRIMARY PROTECTS 37.5 EVA TREE SUPPLYING UTILITY BUS
<del></del>		(BRBAERR)						THEIS BREAKER CURRENTLY SPARE. LOAD DELETED BY MMP 3548]. SEE SECTION 8 OF M39405 FOR RPS RFFECTS
11.4.01.06.1 VIT	AL BUS #4	8-1402V (BRBARBR)	OPEN	LOSS OF VITAL BUS \$4 POWER TO VERTICAL BOARD COS, INCLUDING TO CV-410, 411, 412, 413 AND TCV-601A/B		COLLAR		3:2:13:2:1, 3:2:14:4:1, 6:4:5:1:1: VALVBS CV-410, 411,
11.4.01.07.1 VIT	AL BUS #4	8-1403V (BRBAEER)	OPBN	LOSS OF VITAL BUS #4 POWER TO INSTRUMENT BACE BI/B2	CONTROL ROOM INDICATION		MONB	412, 413 SAPBTT FUNCTION IS PAIL-CLOSED NO RCCS EQUIPMENT ON TEIS SOURCE. SEE SECTION 8 OF M39405 FOR RPS EFFECTS

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## EMERGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

ITEM /	DBATCB ID	COMPONENT ID	FAILURB MODE	LOCAL BFPECTS AND DEPENDENT PAILURES	METHOD OF Detection	I WEBRENT COMPRESATING PROVISIONS	RPPRCT ON RCCS	REMARES
11.4.01.08	1 VITAL BUS #4	8-1404V	OPBN	LOSS OF VITAL BUS \$4 POWER TO	CONTROL BOOM INDICATION	NONE ESCAIGED	MONB	NO BCC8 EQUIPMENT ON THIS
11.4.01.09	.1 VITAL BUS #4	(BBBATBR) 8-1405¥ (BRBAKBR)	OPEN	PAMEL COS LOSS OF VITAL BUS \$4 POWER TO BUS UNDERVOLTAGE RELAT	CONTROL BOOM ANNUNCIATION	NOME BEGUIRED	NONB	NO ECCS EQUIPMENT ON THIS SOURCE
11:4:01:10	I VITAL BUS \$4	8-1406V (BRBAIBE)	OPBN	LOSS OF VITAL BUS \$4 POWER TO INSTRUMENT RACE RS, INCLUDING PRESSURIZER PRESSURE INTERLOCE FOR MOV-813		PRIMARY PATH FOR HER	INOPERABILITY OF BLE ALTERNATE PATS	
! · 11.4.01.11.	1 VITAL BUS 14	8-1401V	OPBN	NOMB				[THIS BREAKER CURRENTLY SPARE.
11.4.01.12	1 VITAL BUS #4	8-1408¥	OPBM	LOSS OF REGULATED BUS 14 POWER	CONTROL ROOM INDICATION,	ALTERNATE ELR PATH	LOSS OF BLE PRIMARY PATH	19RE ITEMS 3.1.3.2.1,
11.4.01.13	1 VITAL BUS #4	8-1409V	OPBN	TO BCCS AND OTHER LOADS	ABBUNCIATION	NONE PROVIDED		3.2.9.2.1. SBR SECTION & OF H39405 FOR RPS RPPRCTS
		(BRRAERE)		LOSS OF VITAL BUS \$4 POWER TO CONTROL ROD DEVIATION RACE RIS-		NONE BEGRIEFO	HOME	NO ECCS EQUIPMENT ON THIS
1	1 VITAL BUS #4	8-1410V (BRBAEBR)	OPEN	LOSS OF VITAL BUS \$4 POWER TO		HONE BEGNIESD	HOME	NO BCCS EQUIPMENT ON THIS
11:6:01.15	1 VITAL-BUS-#4	(BRBARBR)	OPEN	"-LOSS OF VITAL BUS 14 POWER TO " BORIC ACID BLENDING	CONTROL ROOM INDICATION	ROMB BEGAIRED	NORE	NO ECCS EQUIPMENT ON TELS SOURCE. BORIC ACID SYSTEM NOT CREDITED FOR SIS/SISLOP EVENTS
11.4.01716;	T-ATLY ENG. TYLLTA. I.	(BREAEBR)	-OP8N	LOSS OF VITAL BUS #4 POWER TO THE SEAL INJECTION PLOW INDICATION	CONTROL-BOOM INDICATION	MONB. BEGNI BED	BONE	NO ECCS EQUIPMENT ON TRIS
11.4:01.17.	1 - VITAL - BUS - \$4	(BBBYRBB) 	OPBN	LOSS OF VITAL BUS 14 POWER TO STEAM DUMP CONTROL STSTEM	CONTROL BOOM INDICATION	NONE BEGNEES -	MONE	NO ECCS EQUIPMENT ON THIS SOURCE. STEAM DUMP NOT REQUIRED FOR SAPE BOT SHUTDOWN
11.4.01.18.	1 VITAL BUS \$4	8-1414V (BREARBR)	OPBN	LOSS OF VITAL BUS \$4 POWER TO RELAT RACE 211, INCLUDING MEN CRECE VALVE BACEUP MODE RELATS		NONE BEGNIEED	MONE	POLLOWING BIS/SISLOP-BYENTS  BEE ITEM 1.4.9.9.1
11.4.01.19.	1 VITAL BUS \$4	8-1415V (BBBAKER)	OPBN	LOSS OF VITAL BUS \$4 POWER TO RELAY RACE B12, INCLUDING		FOR SIS	*POTENTIAL LOSS OF TRAIN A/B BLECTRICAL POWER DUE TO OUT OF SEQUENCE-BUS-LOADING OF-CCV	SRE ITEM 6.4.6.3.1
11.4.01.20.	I VITAL BUS 84	8-1416V (BREAEBR)	OPBN	LOSS OF VITAL BUS \$4 POWER TO CVCS, INCLUDING LC-\$100B.		REDUNDANT TRAIN B CONTROLLERS	PUMPS LOSS OF TRAIN A CONTROL FOR CLR	SBB ITEMS 2.4.4.2.1,
				PIC-1111, PCV-1115A/D, B/B, C/F AND LO-LO-LO TRIP OF G-8A		PCV-1115D/B/F, NOV-1100C CLOSES AS BERD TO PREVENT LOSS 	FCV-1115A/D, B/E, C/F, TRIP OF TRAIN B CHARGING PUMP DURING	0.7.9.0.0)
					•	RECIRC	OP SECOND CHARGING PUMP PRIOR TO SIS/SISLOP AND AFTER SEQ	
11.4.01.21.	I VITAL BUS 14	8-1417V (BRBAERR)	OPBN	LOSS OF REGULATED BUS \$4 POWER TO MIS AND BOD STEP CONTROL	CONTROL ROOM ANNUNCIATION		BLOCE/BESET	NO BCCS BQUIPHENT ON THIS SOURCE. SEE SECTION 8 OF H39405 POR RPS BPPECTS



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#### EMBRGBNCY CORE COOLING STSTEM SINGLE FAILURE ANALYSIS SAN OMOFRE UNIT I TABLE 11-1: VITAL AND REGULATED POWER STSTEM

ITRN \$	DBVICE ID	COMPONENT ID	FAILURB MODB	LOCAL BPPECTS AND DEPENDENT PAILURES	MBTHOD OF DETECTION	INBERBUT COMPRUSATING PROVISIONS	RPPRCT ON RCCS	REMARES
11.4.01.22.1	VITAL BUS \$4	8-1418V	OPBN	LOSS OF REGULATED BUS \$4 POWER TO BCP SEAL BYPASS FLOW	CONTROL ROOM ANNUNCIATION	NOMB BEGUIRED	HONB	NO ECCS EQUIPMENT ON THIS
11.4.02.01.1	REGULATED BUS A	4 REGULATOR #4	INPUT OPEN	INDICATION LOSS OF REGULATED BUS \$4 POWER		ALTERNATE PATE FOR ELE	LOSS OF BLE PRIMARY PATH	888 [TBMS 3.1.3.2.1, 3.2.9.2.1
11.4.02.01.2	BEGULATED BUS #		INPUT SHORT	BEGULATOR #4 PREDER BREATER 8-1408V TRIPS, CAUSING LOSS OF		(SAME AS 11.4.8.1.1)	(SAHR AS 11.4.2.1.1)	(SAME AS 11.4.2.1.1) PAILURE MAT ALSO CAUSE INVERTER
				REG BUS 14 POWER TO ECCS AND TO THE LOADS			:	AUTO-TRIMSPER SUITCH TO TRIMSPER TO (AND, DEPENDING ON FAULT CLEARING TIME, REMAIN
	REGULATED BUS (	(TWINCO)	OUTPUT VOLTS LOW	(SAME AS 11.4.2.1.1)	CONTROL ROOM INDICATION, ANNUNCIATION	(SAME AS 11.4.2.1.1)	(SAHB AS 11.4.2.1.1)	ON) BACKUP SOURCE (SAMB AS 11.4.2.1.1)
	REGULATED BUS !	(PUSE)	OPBN	BUS UNDERVOLTAGE RELAT	CONTROL ROOM ANNUBCIATION	HOME SECULESED	FORE	NO BCCS BOMINERAL ON THIS
11.4.02.03.1	REGULATED BUS #	(FUSE)	OPBN .	LOSS OF REG BUS 64 POWER TO INSTRUMENT RACE R1/R2	CONTROL ROOM INDICATION	RONE ESCALESO	NOMB	NO ECCS EQUIPMENT ON THIS SOURCE. HE SECTION & OP M39405 FOR EPS EFFECTS
111.4:02:04.17	REGULATED BUS 🕻	4-8-14B3	OPBN	HOM8				[THIS POSITION CURRENTLY SPARE)
11:4.02.05.1	REGULATED BUS	(PUSB)	OPEN	LOSS OF REG BUS \$4 POWER TO INST RACE R3/R4	CONTROL BOOM INDICATION	NOME ERGOLERD	BONS	NO RCCS EQUIPMENT ON THIS SOURCE. SEE SECTION 8 OF M39405 FOR RPS RPPRCTS
11:4:02:06:1 1	REGULATED BUS :	4 · 8 - 1 4 R 5 · · · · · · · · · · · · · · · · · ·	OPBN	LOSS OF REG BUS #4 POWER TO THE CH21, CC	CONTROL ROOM INDICATION	HOME REQUIRED	NORR	NO ECCS EQUIPMENT ON THIS
11.4.02.07.1 1	REGULATED BUS #	4 8-1486 	OPBN		CONTROL ROOM INDICATION, ANNUNCIATION	PRIMARY BLS PATE	INOPERABILITY OF ALTERNATE BLE PATH, DUE TO INABILITY TO CLEAR PC-4251 INTERLOCE TO MOY-813	
•	REGULATED BUS :	(FUSB)	OPBN	LOSS OF REG BUS \$4 POWER TO PAWEL COS	CONTROL BOOM INDICATION	HORE REGAINED	RONE	NO ECCS EQUIPMENT ON THIS
11.4.02.09.1	REGULATED BUS A	( 8-14B8 	OPEN	LOSS OF REG BUS \$4 POWER TO VERTICAL BOARD COS	CONTROL ROOM INDICATION	ROME BEGNIEED	NORE	NO BCCS EQUIPMENT ON TRIS
11.4.02.10.1	REGULATED BUS A	4 8-1489 (PUSB)	OPBN .	LOSS OF RBG BUS \$4 POWER TO INSTRUMENT RACE R6 (CVCS) INCLUDING PIT-1112	CONTROL ROOM INDICATION	ALTREMATE BLE PATE	LOSS OF PLOW INDICATION	
11.4.02.11.1	REGULATED BUS 1	4 8-14R10 (PUSB)	OPBN		ANNUNCIATION	NONE BEGATER	NORB	NO ECCS EQUIPMENT ON THIS SOURCE
11.5.01.01.1 (	UTILITY BUS	HAN IPBB S₩ ∳7	NORMAL (NCC-2)	UTILITY BUS IS ALIGNED TO BACEUP SOURCE FOR VITAL BUSSES	PBRIODIC TRSTING	TRAIN B POWER TO BUR PRIMARY AND ALTERNATE PATH VALVES	REDUCED RELIABILITY OF BLE PRIMARY PATH (CV-305 POWER	*TECH SPBC ACTION ENTRY REQUIRED FOR THIS FAILURE
				\$1," 2, 3/3A AND 4 PROM MCC-2," CANNOT BE REALIGNED TO TRAIN A (MCC-1)			CARROT BE SWING ALIGNED TO SAPETY RELATED POWER;	

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#### EMBEGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT 1

TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

ITBN #	DEAICE ID	COMPONENT ID	FAILURB MODE	LOCAL RPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	INHBERNT COMPENSATING PROVISIONS	BPFECT ON BCCS	REMARES
11.5.01.01.2	UTILITY BUS	MAN IPBR SW 87	ALTERNATE (MCC-1)	LOSS OF POWER TO UTILITY BUS AND BACKUP SOURCE FOR VITAL BUSSES \$1, 2, 3/3A	LOCAL INDICATION	NONE FOR SI/RCS INVENTORY DIVERSION OF FOR CLE PUMPING CAPABILITY FOR SELOCA. ALTERNATE PATE FOR ELE	*POTENTIALLY UNISOLABLE DIVERSON OF STACE INVESTORY TO ECOT, LOSS OF CLE PUMPING CAPABILITY FOR SBLOCA, LOSS OF	2.4.28.4.1, 3.1.7.1.1, 3.2.12.11.1, 3.2.15.2.1. PUSES
							BLR PRIMARY PAYS	BROVED PRE TRCE SPEC 4.1.1 PREVENT POWER VIA MCC-1 RVEN WITE TRANSPER SWITCE IN THIS POSITION
11.5.01.01.4	ENG 411711	MAN IPER SV \$7	CONTACTS CLOSED	TRAIN A (HCC-1) AND TRAIN B (HCC-2) PERDS PARALLELED	PRRIODIC TRATING	PUSES FOR ALTERNATE FEED PROM MCC-1 REMOVED PER TECH SPEC 4.1.1	DUR TO PARALLELBING THROUGH	STECE SPEC ACTION ENTRY REQUIRED WITH THIS FAILURE
11.5.01.01.5	UTILITY BUS	MAN IPBR SW 87	CONTACTS GROUNDED	LOSS OF UTILITY BUS AND MCC-2 POWBERD BACKUP SOURCE FOR VITAL BUSSES 11, 2, 3/34 AND	CONTROL ROOM INDICATION AND	(SAME AS 11.5.1.1.2)	MANUAL TRANSPER SWITCH *(SAMB AS 11.5.1.1.2)	(SAME AS 11.5.1.1.2)
	UTILITY BUS	AUTO IPER SW \$6	NORMAL	4. POWER ALSO LOST TO ROD CONTROL SYSTEM UTILITY BUS IS ALIGNED TO MCC-2 POWERED 37.5 EVA BACKUP SOURCE FOR VITAL BUSSES 41, 2, 3/3A, WILL NOT AUTO-TERMSFER TO NON-SAPETY ERLATED BACKUP	PBRIODIC-TESTING	MORE ERQUIERD	NOMB.	HOM-SAFETY RELATED SOURCE CANNOT BE CREDITED IN MODES 1-4
1.5.01.02.2	UTILITY BUS	AUTO IPBR SW 66	ALTERNATE	SOURCE FROM TRAIN A LIGHTING SWGR UTILITY BUS CONNECTED TO NON-SAPETY RELATED TRAIN A	LOCAL INDICATION	(SAME AS 11.5.1.8.2)	*(9AHB AB 11.5.1.1.2)	(SAME AS 11.5.1.1.2)
				LIGHTING SWGR, WHICH MAY BE A COMMON-CAUSE PAILURE AND IS ISOLATED ON SISLOP				<del>*************************************</del>
1.5.01.02.3 t		AUTO IPBR 9W 46 -		LOSS OF POWER TO UTILITY BUS	PERIODIC TESTING	•		(SAHB "AS" 11:571:1:2)
		avio arab de \$0		TRAIN 8 (HCC-2) AND MOM-SAPRTY RELATED AUTREMATE SOURCE PROM- TRAIN A (LIGHTING SWE) PARALLELED, RESULTING IN DEGRADATION OF TRAIN 8 (HCC-2) OR FAILURE OF 37.5 EVA IPMR	PBRIODIC TESTING	(SAME AS 11.5.1.1:2)	*(SAHE AS 11.5.1.1.2)	ATECH SPEC ACTION ENTRY REQUIRED WITH THIS FAILURE
1.5.01.02.5 1	UTILITY BUS	AUTO IFBR SW 16	CONTACTS GROUNDED	PRIMARY PUSH AND LOSS OF UTILITY BUS LOSS OF UTILITY BUS AND MCC-2 POWERED BACKUP 37.5 kVA BACKUP	CONTROL ROOM INDICATION AND ANNUNCIATION	•	*{SAMB AS 11.5.1.1.2}	(SAME AS 11.5.1.1.2)
i.5.01.03.1 L		MCC-1 (8-1181)	VOLTS LOW	SOURCE FOR VITAL BUSSES \$1, 2; 3/3A LOSS OF BACEUP SOURCE FROM HCC-1 TO UTILITY BUS AND VITAL BUSSES 1, 2, 3/3A AND 4	LOCAL INDICATION, PRRIODIC	TRAIN B POWER TO BLE PRIMARY	REDUCED RELIABILITY OF BLR -PRIMARY PATH (CV-205 CANNOT BE - SWING ALIGNED TO SAPETY RELATED POWER!	*TECH SPEC ACTION ENTRY REQUIRED WITH THIS FAILURE



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#### EMBRGENCY CORE COOLING STSTEM SINGLE FAILURE AWALYSIS SAW ONOPRE UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

ITRH #	DBAICR ID	COMPONENT ID	FAILURB MODB	LOCAL BFFECTS AND DBPENDBNT PAILURES	BETROD OF	INBERBRY COMPENSATING PROVISIONS	RPPRCT ON BCC9	REMARES
11.5.01.03.2	UTILITY BUS	HCC-2 {8-1238}	AOTAS FOR	LOSS OF POWER TO UTILITY BUS AND BACKUP SOURCE FOR VITAL BUSSES \$1, 2, 3/34 AND 4 FROM	LOCAL INDICATION, PERIODIC TESTING	NOME FOR SI/RCS INVENTORY DIVERSION OR FOR CLE PUMPING FOR SELOCA. ALTERNATE FERD	POTENTIAL UNISOLIBLE DIVERSION OF SI/RCS INVENTORY TO RECOY,	SPECIFY LOCAL OPERATOR ACTION
			~~	BCC-2			LOSS OF CLR PUMPING CAPABILITY FOR SBLOCA. REDUCED RELIABILITY OF SLR PRIMARY PATE	TO MEALICH HABUAL TRANSFER SMITCH \$7 TO RESTORE SAFETY RELATED POWER PROMISEN
	JTELETY BUS	-LIGHTING-SWGR	- volts lov	LOSS OF AUTONATIC BACKUP	-LOCAL-INDICATION,-PERIODIC	WOUR TROUGERS	- HONR	TRAIN TO UTILITY BUS IN SUPPORT OF BLE PRIMARY PATH NON-SAPRTY RELATED BOURCE
	1971 TOB AND	(NSR)	4884	SOURCE FOR UTILITY BUS FROM TRAIN A	TRSTING	•		CANNOT BE CREDITED IN MODES 1-4
		UTILITY BUS-ACS	OPKI	ECCS AND OTHER LOADS	CONTROL ROOM INDICATION, AMNUNCIATION	DIVERSION OR POR CLR PUMPING	LOSS OF CLR PUMPING CAPABILITY	2.4.12.1.1, 2.4.27.4.1,
11.5.02.01.2	TILITY BUS	UTILITY BUS ACB	CLOSED	UTILITY BUS BREAKER WILL NOT	PERIODIC TESTING	NOME SEGUISED	PRIMARY PATE MONE	NON-SAFETT RELATED LOADS HAVE
				OPEN IP MERDED TO ISOLATE				POCPRSO.49(b)(2) ISOLATION WHICH COORDINATES WITH LOAD BREAKERS. THIS FAILURE PLUS
11.5.02.01.3 U	TILITY BUS	UTILITY BUS ACB	INPUT SHORT OR	(SAME AS 11.5.1.1.2)	CONTROL ROOM ANNUNCIATION	(SAMB 43 11.5.1.1.2)	P(SAHR AS 11.5.1.1.2)	BUS FAULT DURING SIS/SISCOP IS OUTSIDE THE PLANT DESIGN BASIS (SAME AS 11.5.1.1.2). FAULT
								WILL RESULT IN UNDERVOLTAGE CONDITION, CAUSING IPER SW #6 TO AUTO-TRANSPER TO NON-SAPETY
11.5.02.02.1 U	TILITY BUS	8-1501 (BRBAEBB)	OPBN	LOSS OF UTILITY BUS POWER TO INCORE PLUI MAPPING DB-HUMIDIFIERS	CONTROL BOOM ANNUNCIATION	NONE BEQUIEBD		RELATED LIGHTING SWGR NO ECCS EQUIPMENT ON THIS SOURCE
11.5.02.03.1 U	TILITY BUS	8-1502 (BRBAEBE)	OPBN	LOSS OF UTILITY BUS POWER TO VAPOR SEAL BEAD TANK SYSTEM, INCLUDING HCV-427A/B/C CONTROL			SPOTENTIAL UNISOLABLE DIVERSION OF SI/RCS INVENTORY TO ECDY,	SBR [TRN 2.4.28.4.]
				PRIATS		INJECTION OR CLE PLON	BCS SEVER DAR TO CONTINUED EARCTIONING OF CONTINUED EARCTION OF CUR. STOM-	
11.5.02.04.1 U	TILITY BUS	8-1503 (BERAEER)	OPBN	MOMB				[THIS POSITION CURRENTLY SPARE]
11.5.02.05.1 U		8-1504 (BRBAERR)	OPBN	CONTRACT POWER SYSTEM	CONTROL ROOM ANNUNCIATION	NOME BEGNIERD		NO ECCS EQUIPMENT ON THIS SOURCE
11:5:02:06:1-U		** 8-1505 ** (BRBAKBR) 8-1506	OPBN OPBN	BUS UNDBRYOLTAGE RELAT LOSS OF UTILITY BUS POWER TO	CONTROL ROOM ANNUNCIATION	NOME ERGOIRED		NO BCCS EQUIPMENT ON THIS SOURCE NO BCCS EQUIPMENT ON THIS
11.5.02.08.1 U	* [	(BRBARBE)		STEAM DUMP STSTEM (CONDENSER)				SOURCE
11.7.VE.VO.1 U	117111 003	8-1507 (BREAEBR) ~	OPBN	LOSS OF UTILITY BUS POWER TO BAIN STBAN BYPASS INDICATION	CONTROL ROOM INDICATION	NOME REQUIRED		NO ECCS EQUIPMENT ON THIS SOURCE



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#### BRERGENCY CORE COOLING SYSTEM SINGLE PAILURE AWALTSIS SAN ONOPRE UNIT I TABLE 11-1: VITAL AND RECULATED POWER SYSTEM

ITRM #	DRAIGR ID	COMPONENT ID	PAILURB MODE	LOCAL EPPECTS AND DEPENDENT PAILURES	METHOD OF Detection	INUBERRY COMPRESATING PROVISIONS	BPPRCT ON RCC8	REMARES
11.5.02.09.1	UTILITY BUS	8-1508 (BRBARBR)	OPEN	LOSS OF UTILITY BUS POWER TO VERTICAL BOARD COS, INCLUDING CV-304/305, CV-288	CONTROL ROOM INDICATION	ALTERNATE BLE PATE	INOPERABILITY OF BLE PRIMARY PATE	3.1.7.1.1, 3.2.15.2.1. VALVES
11.5.02.10.1	JTILITY BUS	8-1509	OPEN .	LOSS OF UTILITY BUS POWER TO	CONTROL BOOM INDICATION	NOME BEGAIRED	MONB	PAIL CLOSED ON LOSS OF POWER. CV-305 SAPETY PUNCTION FOR BLR IS TO OPEN NO BCCS EQUIPMENT ON THIS
T11:5:02:11:1		(BRBAKER) 8-1510 (BRBAKER)	OPEN	VERTICAL BOARD RECORDERS LOSS OF UTILITY BUS POWER TO PERMISSIVE INDICATION	CONTROL BOOM INDICATION	HORE SEGUISED	NOME	SOURCE SQUIPHENT ON THIS
11.5.02.12.1		8-1511 (BRBAKER) 8-1512	OPBN	LOSS OF UTILITY BUS POWER TO MAIN CRUBERATOR MODITORING LOSS OF UTILITY BUS POWER TO		NOME BEGRIESD	NORE	NO ECCS EQUIPMENT ON THIS SOURCE NO ECCS EQUIPMENT ON THIS
THT\$:02.14.711		(BRBAKER) "8-1513 (BRBAKER)	OPBN	BICITER LIMITER LOSS OF UTILITY BUS POWER TO THE SPERRE SUMP ALTERNATOR		BORK AKÖGISKA	HONB	BOURCE EQUIPMENT ON THIS
11.5.02.15.1		8-1514 (BREAKER) 8-1515	OPBN	LOSS OF UTILITY BUS POWER TO OSCILLOGRAPH LOSS OF UTILITY BUS POWER TO		NOME BEGRIESD	MONB	SOURCE NO ECCS EQUIPMENT ON THIS SOURCE
1175.02:17.7**		(BRBAEBR) -8-1516 (BRBAEBR)	OPBN	PIRB DRIRCTION SYSTEM LOSS OF UTILITY BUS POWER TO		NONE BEGAIESD	ROBE	NO BCCS EQUIPMENT ON THIS SOURCE NO BCCS EQUIPMENT ON THIS
11.5.02.18.1 L		8-1517 (BERAKER) 8-1518	OPBN	ANNUNCIATOR LOSS OF POWER LOSS OF UTILITY BUS POWER TO PW BEATER LEVEL ALARM		NONE BEGUIEED	HOM8	SOURCE SQUIPMENT ON THIS
		(BRBAEBR)	OPBN	LOSS OF UTILITY BUS POWER TO VBRTICAL BOARD COS, INCLUDING CV-202/203/204 AND CV-406A/B -		NONE FOR BELOCA	*POTENTIAL LOSS OF CLR PUMPING CAPABILITY FOR SBLOCA	2.4.27.4.1, 3.2.12.11.1
11.5.02.20.1 ( 11:5:02:21:1-t		8-1519 (BRBAEBR) -8-1520	OPBN .	LOSS OF UTILITY BUS POWER TO VITAL ARBA ALARMS LOSS OF UTILITY BUS POWER TO		NONS BEGAIESD	NOAR	NO RCCS EQUIPMENT ON THIS
11.5.02.22.1 (	TILITY BUS	(BR8AEB8) 8-1521 "(BRBAEBR) "	OPBN .	VERTICAL BOARD COS LOSS OF UTILITY BUS POWER TO FM TRANSMITTER	CONTROL BOOM INDICATION	NORE BEGNIESD	HORB	SOURCE NO ECCS EQUIPMENT ON THIS SOURCE
11.5.02.23.1 U	TILITY BUS	8-1522 -(BRBARBR) · · ·	OPBN	LOSS OF UTILITY BUS POWER TO	CONTROL BOOM INDICATION	NONE BEGAIESD	NONE	NO BCCS EQUIPMENT ON THIS SOURCE. COAD ADDED BY MEP 1584
11.6.01.01.1 V	ITAL BUS \$5/6	INVESTER #5	INPUT OPBN		CONTROL ROOM ANNUNCIATION, LOCAL INDICATION	REDUNDANT TRAIN FOR SISLOP, NOWE REQUIRED FOR SIS	INOPERABILITY OF TRAIN B (SEQUENCER) FOR SISLOP, NOWE	SER ITEM 8.2.8.2.1. PAILURE HODE CONSERVATIVELY ASSUMED. HORHAL OPERATION OF STATIC
				AUTO-TRANSFER TO BACEUP SOURCE PROM MCC-2 (UP TO 10 BEC DURING SISLOP)				IPER SWITCH DORS NOT RESULT IN INTERBUPTION
11.6.01.01.2 V	ITAL BUS \$5/6	INVERTER #5	INPUT SHORT	125VDC BREAKER 72-217 TRIPS,	CONTROL BOOM ANNUNCIATION, LOCAL INDICATION	(SAME AS 11.6.1.1.1)	(SAMB AS 11.6.1.1.1)	(SAMB AS 11.6.1.1.1)
				AUTO-TRANSPER TO MCC-2 POWERED BACEUP SOURCE (UP TO 10 SEC DURING SISLOP)		,		



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#### BREEGENCY CORE COOLING SYSTEM SINGLE FAILURE AMALYSIS SAN ONOFRE UNIT I TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

ITBN \$	DBAICE ID	COMPONENT ID	FAILURE MODE	LOCAL REFECTS AND DEPENDENT FAILURES	METHOD OF Driection	INHERBUT COMPROSATING PROVISIONS	EFFECT ON ECCS	ESHARES
11.6.01.01.1	VITAL BUS \$5/6	INVERTER #5	OUTPUT VOLTS LOW	(SAME AS 11.6.1.1.1)	CONTROL ROOM ANNUNCIATION,	(SAMB AS 11.6.1.1.1)	(SAME AS 11.6.1.1.1)	(SAME AS 11.6.1.1.1)
11.6.01.01.4	VITAL BUS \$5/6	INVERTER #5	OUTPUT SHORT OR GROUND	(SAME AS 11.6.1.1.2)	CONTROL ROOM ANNUNCIATION, LOCAL INDICATION	(SAMB AS 11.6.1.1.1)	(SAME AS 11.6.1.1.1)	(SAME AS 11.6.1.1.1)
11.6.01.02.1	VITAL BUS \$5/6	AUTO IPER SW (INVERTER \$5)	BORNAL	VITAL BUSSES 15/6 CANNOT BE TRANSPERBED TO THE MCC-2 POWERED 15 EVA BACEUP SOURCE		REDUNDANT TRAIN FOR APPROTED RCCS PUNCTIONS	BUSSES 85/6 ECCS LOADS	STRCE BPBC ACTION BHTRY REQUIRED POR THIS PAILURE. MANUAL TRANSPER SWITCE
11.6.01.02.2	VITAL BUS \$5/6	AUTO IPER SW (IMVERTER AS)	ALTERNATE	VITAL BUSSES \$5/6 CANNOT BE POWERED PROM INVESTER \$5,	LOCAL INDICATION	REDUNDANT TRAIN FOR SISLOP, NONE REQUIRED FOR SIS	INOPERABILITY OF TRAIN B FOR SISLOP, MONE FOR SIS	AVAILABLE BUT BOT CREDITED 888 1788 8.2.8.2.1
				RESULTING IN UP TO 10 SEC INTERRUPT OF POWER TO VITAL BUS \$5/6 POWERED ECCS LOADS DURING SISLOP (IE, TIME POR DG				
		,		\$2 TO START AND RE-ENERGIZE MCC-2 APTER LOP)	·		· American	
11:6:01:02:3-1	VITAL BUS 65/6"	AUTO IPBR SW (INVERTER \$5)	CONTACTS OPEN	LOSS OF POWER TO VITAL BUS 85/6 ECCS AND OTHER LOADS	CONTROL ROOM ANNUNCIATION, PRIODIC TESTING		SCLE FLOW TO 1/3 ECS LOOPS WOULD BE INCREASED PER PROCEDURE, RESULTING IN CLE AND	SBE ITEMS 1.4.9.11.1, 1.4.11.5.1, 2.4.24.3.1, 3.1.11.3.1, 3.2.17.3.1,
						AHD AFVAS	CLR/BLR FLOW IMBALANCE, POTENTIALLY BICERDING RECIRC PUMP LIMITATIONS. TRAIN B	
11:6.01.02.4 V	/LTAL-BUS-\$5/6-	AUTO IPBR-SW	CONTACTS CLOSED	INVERTER #5 AND MCC-2 POWERED	-CONTROL ROOM ANNUNCTATION		SEQUENCER AND APP INOPERABLE, LOSS OF SECONDARY RECIEC TO S/G A/B/C AFTER MPW PP TRIPPED (SAME-AS-11-6:1-2:2)	STRCE SPEC ACTION ENTRY
		(INVERTER #5)		15 EVA BACKUP SOURCE PARALLBLED. IF OUT OF PEASE,	PBRIODIC TESTING	(4442 44 11.411.516)	farms we it. a.r.e.el	REQUIRED WITH THIS FAILURE
				INVERTER MAY CURRENT-LIMIT AND TRIP INTERNALLY, LEAVING VITAL BUSSES \$5/6 ON MCC-2 POWERED 15 EVA BACKUP SOURCE				
11.6.01.02.5 V	ITAL BUS #5/6	AUTO IPER SW (INVERTER \$5)	CONTACTS GROUNDED	LOSS OF VITAL BUSSES \$5/6 AND MCC-2 POWBRED 15 EVA BACEUP	CONTROL ROOM INDICATION AND ANNUNCIATION	(SAMB AS 11.6.1.2.3)	*(SAMB AS 11.6.1.2.3)	{SANB AS 11.6.1.2.3}
11.6.01.03.1 V	ITAL BUS \$5/6	MANUAL IPER SW (INVERTER 45)	JAMBON		PBRIODIC TESTING	NOME SECULBED	NONE	INVERTER STATIC TRANSPER SWITCH WILL AUTO-TRANSPER
	75041 BHO AC 40			INVERTER \$5 TO MCC-2 POWERED —				VITAL BUSSES \$576 TO HCC-2 POWBRED 15 EVA BACKUP SOURCE AS BEQUIRED
	TIAL BUS \$5/6	- MANUAL-IPRR SW (INVERTER #5)	ALTBRNATS	POWERED PROM INVERTER \$5, RESULTING IN UP TO 10 SEC	LOCAL-INDICATION	(SANB-AS 11:0:1.2:2)	(SAMB AS-11:6:1:2:2)	(SAMB-AS-11:6:1:2:2)
				INTERRUPT OF POWER TO VITAL BUS \$5/6 POWERED BCCS LOADS DURING SISLOP (IB, TIME TO				
				START AND LOAD DG \$2)	- 4-			* ****



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## EMBEGENCY CORE COOLING STSTEM SINGLE PAILURE ANALYSIS SAN ONOPER UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

ITBN #	DRAICS ID	COMPONENT ID	PAILURE MODE	LOCAL EPPECTS AND DEPENDENT PAILURES	METEOD OF Detection	INUBERNT COMPRESSIONS PROVISIONS	BPPECT ON BCCS	REMARES
11.6.01.03.3	VITAL BUS \$5/6	MANUAL IPER SW	CONTACTS OPEN	LOSS OF POWER TO VITAL BUS	CONTROL BOOM ANNUNCIATION, PERIODIC TRATING	(SAME AS 11.6.1.2.3)	*(SAME AS 11.6.1.2.3)	(SAME AS 11.6.1.2.3)
11.6.01.03.4	VITAL BUS \$5/6		CONTACTS CLOSED	INVERTER #5 AND HCC-2 POWERED 15 EVA BACEUP SOURCE PARALLELED. IF OUT OF PHASE,		(SAME AS 11.6.1.2.2)	(SAME AS 11.6.1.2.2)	STRCE SPEC ACTION ENTRY
				INVERTER MAY CURRENT LIMIT AND TRIP ENTERNALLY, LEAVING VITAL BUSSES 45/6 ON MCC-2 POWERED				
11.6.01.03.5	VITAL BUS 45/6	MANUAL IFER SW 	CONTACTS GROUNDED	15 EVA BACEUP SOURCE LOSS OF VITAL BUSSES \$5/6 AND MCC-2 POWERED 15 EVA BACEUP		(SAME AS 11.6.1.2.3)	*(BAMB AS 11.6.1.2.3)	(SAHB AS 11.6.1.2.3)
1.6.01.04.1	VITAL BUS \$5/6		VOLTS LOW	SOURCE Logs of Baceup Source From	LOCAL INDICATION, PERIODIC		REDUCED BELIABILITY OF VITAL	
11.6.02.01.1	VITAL BUS #5	VITAL BUS #5 ACE	OPBN	LOSS OF POWER TO VITAL BUS \$5 ECCS AND OTHER LOADS			WOULD BE INCREASED PER	SEE ITEMS 1.4.9.11.1, 2.4.24.3.1, 3.1.11.3.1,
						CLR/BLR FLOW BALANCE	PROCEDURE, RESULTING IN CLR AND CLR/BLR PLOW IMBALANCE, POTENTIALLY RECERDING RECIRC	3.2.11:2:1, 4:2:3:2:1, 8.2.8.2.1
	W	Weens and 10					PUMP-LIMITATIONS. TRAIN-B	
	VITAL-BUS \$5	-VITAL-BUS \$5 ACB	CLOSED	OPEN IF BEEDED TO ISOLATE PAULT	PRRIODIC TRATING	MONE-BEGUISSD	BO118	NON-SAPETT RELATED LOADS BAVE TO COPE 50.49(b)(2) ISOLATION WHICH COORDINATES WITH LOAD
1-6-09-01-1-1	WF941- 8110-45		INDUS GROUP OF	40.00			•	BUS PAULT DURING SIS/SISLOP IS OUTSIDE THE PLANT DESIGN BASIS
			GROUND	(SAME AS 11:6.1:2.3)		(SAHB-AS-11.6.1.2.3)		(SAME AS 11:6.2.1:1). PAULT WILL CAUSE CONCURRENT LOSS OF VITAL BUS \$6
1:0:02:02:1=1	ATTAL BUS-85	8-2901 (BREAKER)	-OPBN	BLOWDOWN ISOLATION AND MPW	CONTROL BOOM INDICATION, ANNUNCIATION	SIS/SISLOP, REDUNDANT S/G NR AND WR LEVEL INDICATION POR	LOSS OF SECONDARY RECIRC TO S/G	988 17885 1:4:9:11:1; 4.2.3.2.1, 8.2.8.2.1
				RELATS, AND 3/3 SEQ 82 PZR PRESSURE AND CONTAINMENT		BLOWDOWN ISOLATION, NONE FOR SECONDARY RECIPC	-A/B/C-APTER-MPW-PUMPS-TRIPPED	
					<u> </u>			
	VITAL BUS \$5	8-2902 (BRAKER)	OPEN	PRESSURE CHANNELS	<u>-</u>			[THIS BREAKER CURRENTLY SPARE]
	VITAL BUS \$5	(BERAKER)	OPBN - · · · · · · · · · · · · · · · · · ·	PRESSURE CHANNELS	CONTROL ROOM INDICATION, PBRIODIC TRESTING			•





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# BMBRGBNCY CORE COOLING SYSTEM SINGLE PAILURE AMALYSIS SAN OMOFRE UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

	ITEM #	DRAICE ID	COMPONENT ED	PAILURB MODB	LOCAL BPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	INBREENT COMPENSATING PROVISIONS	BPPECT ON BCCS	REMARES
	11.6.02.05.1	VITAL BUS #5	8-2904 (BREATER)	OPBN	LOSS OF VITAL BUS \$5 POWER TO MONITOR	CONTROL ROOM ANNUMERATION	NOME BEGUIESD	KONB	NO ECCS EQUIPMENT ON THIS SOUECE. B.G. 1.37 AND THI REQUIRED EQUIPMENT, NOT
	11.6.02.06.1	VITAL BUS #5	8-2905 (BRBAERR)	OPBN	LOSS OF VITAL BUS \$5 POWER TO TRAIN B CONTAINMENT WIDE RANGE PRESSURE, STOROGEN AND WATER LEVEL MONITORS		NOME BEGILEED	HOME	REQUIRED FOR ECCS. REDUNDANT NOBITOES AVAILABLE ON TRAIN A NO ECCS EQUIPMENT ON THIS SOURCE. R.G. 1.97 AND THI REQUIRED EQUIPMENT, BOY REQUIRED FOR ECCS. REDUNDANT
		VITAL BUS 15	8-2906 (BRBAEB)	OPBW	NONE			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	MONITORS AVAILABLE ON TRAIN A
	11.6.02.08.1	VITAL BUS 15	8-2907 (BRBAEBE)	OPBN .	LOSS OF VITAL BUS \$5 POWER TO TRAIN B CONTAINSONT AND MAIN STRAN LINE BI RAD MONITORS	CORTROL BOOR ANNUACTATION	BONE_BRÖNIBER	BONB	NO ECCS EQUIPMENT ON YMIN SOURCE. E.G. 1.97 AND THI REQUIRED EQUIPMENT, NOT
	11.6.02.09.1	VITAC BUS 155	8-2908 (BRBAKBR)	· OPBN	LOSS OF VITAL BUS \$5 POWER TO TRAIN B PZR SAPRTY VALVE	CONTROL BOOM THDICATION	NONE, BEGALBED	MORE	REQUIRED FOR ECCS. REDUNGANT HOWITORS AVAILABLE ON TRAIN A  NO ECCS REQUIPMENT ON THIS
  -  -					POSITION INDICATION				SOURCE, R.G. 1.97 AND THI REQUIRED ROUIPMENT, NOT REQUIRED FOR RCCS. REGUNDANY HONITORS AVAILABLE ON TRAIN A
		VITAL BUS \$5	(BRBAIER)	OPBN	LOSS OF VITAL BUS \$5 POWER TO HISCELLANBOUS CONTAINMENT ISOLATION VALVES, INCLUDING CV-526	CONTROL ROOM INDICATION	HOMB_BRÉDITERD	HOME	SER TYRE J. Z. 11. Z. 1. VALVE SAPRTY PUNCTION IS PAIL-CLOSED
-	11.6.02.11.1	VITAL BUS \$5	8-2910 (BRBAEBR)	OPBN	FLOW INDICATION  LOSS OF ALLYF BRO \$2 BOARS TO BROWN THE STATE BROWN TO FOR THE STATE BROWN		MONE BEGNIBED	NOMB	NO BCCS BQUIPMENT ON THIS SOURCE. R.G. 1.97 AND THI REQUIRED EQUIPMENT, BOY
									REQUIRED FOR RCCS. REDUNDANT MONITORS AVAILABLE ON TRAIN A
3	11.6.02.12.1	VITAL BUS 45	8-2911 (BBBAEBR)	OPBN	MORE				(THIS BERAKER CURRENTLY SPARE)
. ;		VITAL BUS 15	(BBBAEBR)	OPBN	HOBB -			•	[THIS BREAKER CURRENTLY SPARE]
-	11.6.02.14.1		8-2913 (BRBAKER)	OPBN	NOMB				[THIS BREARER CURRENTLY SPARE]
1	11.6.02.15.1		8-2914 (BRBAEBR)	OPEN	NOMB				(THIS BREAKER CURRENTLY SPARE)
			(BREAKER)	OPEN	NORB				[THIS BREAKER CORRENTLY SPARE]
   :	11.6.02.17.1	**************************************	8-2916 (BREAKER)	OPBN	NONE				[THIS BEBARER CURRENTLY SPARE]



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#### EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE AWALTSIS SAN ONOFRE UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

,								
1788 }	DBVICE ID	COMPONENT ID	FAILURB MODE	LOCAL EPPECTS AND DEPENDENT PAILURES	DETECTION OF	INTEREST COMPRISATING	EPPECT ON ECCS	REMARES
11.6.02.18.1	VITAL BUS \$5	8-2917 TBRBAKERI	OPRM	NOME				[THIS BEBAKER CURRENTLY SPARE]
•	VITAL BUS \$5	8-2918 (BRBAEER)	OPEN	MOMB			·	[TEIS BERAKER CURRENTLY SPARE]
	VITAL BUS 45	8-2919 (BRBAKER) 8-2920	OPEN	MORE				[THIS BERAKER CURRENTLY SPARE]
	VITAL BUS #5		OPEN	NOME				[THIS BREATER CURRENTLY SPARE]
.: .:11.\$;02.23.1	VITAL BUS -15	(BRBAEBR) 8-2922	OPEN	- NONB				[THIS BREAKER CURRENTLY SPARE]
11.6.02.24.1	VITAL BUS 15	(BRBAIBE) 8-2923 (BRBAIRE)	OPBN	NOMB				(THIS BERAERE CURRENTLE SPARE)
· ·	VITAL BUS 45	8-2924 (BRBARRR)	OPEN	LOSS OF VITAL BUS \$5 POWER TO BUS UNDERVOLTAGE RELAT	CONTROL ROOM ANNUNCIATION	NORE REGULERD	NORB	NO ECCS EQUIPMENT ON THIS
117.6703.01.1	VITAC BUS 16	TITAL BUS \$6 AC	B OPBN	LOSS OF POWER TO VITAL BUST & RCCS AND OTHER LOADS	CONTROL ROOM INDICATION, ANNUNCIATION	NONE BEGLIEED	E088	SEE ITERS 1.4.11.5.1 AND 3.2.17.3.1
11:6.03:01.2	VITAL BUS \$6		B CLOSED	WITAL BUS \$6 BREAKER WILL MOT OPEN IP NEEDED TO ISOLATE PAULT	-PBRIODIC TRSTING	NONE-BEGAIRED	NORE	NOW-SAPETY RELATED LOADS HAVE 10CPRSO.49(b)(2) ISOLATION WHICH COORDINATES WITH LOAD
,								BREARERS. THIS PAILURE PLUS BUS PAULT DURING SIS/SISLOP IS OUTSIDE THE PLANT DESIGN BASIS
		-VITAL BUS \$6 ACE	GROUND	(SAMB AS 11.6.1.2.3)	CONTROL ROOM ANNUNCIATION	(SANB-AS-11:6:1:2:3)	*(SAMB AS 11.6.1.2.3)	(SANE AS 11.6.1.2.3). PAULT WILL CAUSE CONCURRENT LOSS OF VITAL BUS #5
! :	VITAL-BUS #6	(BRBAEBR)	OPEN	LOSS OF VITAL BUS \$6 POWER TO CONTAINMENT ISOLATION VALVES, INCLUDING CV-957	CONTROL ROOM INDICATION	NORE BEGRIESE	HONE	BER TIEM 3.2.19.3.1. VALVE SAFETT PUNCTION IS FAIL-CLOSED
		(BRBARBR)	OPBN	LOSS OF VITAL BUS \$6 POWER TO TRAIN B SI BBADBR VENT ISOLATION VALVES SV-102A/C	CONTROL-ROOM ENDICATION	NONE SEGUISED	HOME	SEE TYBE 1.4:11.5:1
11:8:03:04:1	VITAL BUS 16	(BREARER)	OPBN	LOSS OF VITAL BUS #8 POWER TO PASS ISOLATION VALVE SV-3303	CONTROL BOOM INDICATION	NOME REGUIRED	NONE	NO ECCS EQUIPMENT ON THIS SOURCE. R.G. 1.97 OR THI REQUIRED EQUIPMENT, NOT
11.6.03.05.1	VITAL BUS \$6	8-3004 (BRBAKER)	OPBN	LOSS OF VITAL BUS 86 POWER TO PASS BCS SAMPLE ISOLATION VALVES	CONTROL ROOM INDICATION	NONE BEGALEED	NONB	REQUIRED FOR BCCS  NO BCCS EQUIPMENT ON THIS  SOURCE. R.G. 1.97 OR THI  REQUIRED EQUIPMENT, NOT
11.6.03.06.1	VITAL BUS \$6	8-3005 -(BBBAEBR)	OPEN	LOSS OF VITAL BUS AS POWER TO TRAIN B BCS HIGH-POINT VENT STSTEM	CONTROL BOOM ANNUNCLATION	MOMB EBQUIBBD	MONE	REQUIRED FOR ECCS NO ECCS EQUIPMENT ON THIS SOURCE E.G. 1:97 OR THI REQUIRED EQUIPMENT, NOT REQUIRED FOR ECCS. REDUNDANT
				-			*	STOTEM ON TRAIN A



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#### EMERGENCY CORE COOLING SISTEM SINGLE FAILURE ANALYSIS SAM OMORRE UNIT 1 TABLE 11-1: VITAL AND REGULATED POWER SYSTEM

ITBM #	DBAICR ID	COMPONENT ID	PAILURE MODE		OCAL REPECTS AND DEPENDENT FAILURES	MBTECTION	PROVISIONS PROVISIONS	BPFBCT ON BCC8	BEHARES
11.6.03.07.1	VITAL BUS 86	8-3006 (BRBAIRE)	OPBN	NONE					[THIS BREAKER CURRENTLY SPARE]
11.6.03.08.1	VITAL BUS \$6	1-3007 (BRRATER)	OPBW	NONB					(THIS BREAKER CURRENTLY SPARE)
11.6:03.09.1	VETAL BUS 16	8-3008 (BRBAEBR)		NONE		-			THIS BREAKER CURRENTLY SPARE)
	VITAL BUS 16	8-3009 (888AERR)	OPEN	MONB					[THIS BREAKER CURESHTLY SPASE]
	VITAL BUS #6	8-3010 (8RAKRR)	OPRW	NONE			· ·		(THIS BREAKER CURRENTLY SPARE)
•	VITAL BUS 16	(BREAKER)	OPEN	NONE .	· · · · · · · · · · · · · · · · · · ·				TRIS-BREAKER-CURRENTLY-SPARE)
11.6.03.14.1		8-3012 (BREARER) 8-3013	OPBN OPBN	MONE					[THIS BREAKER CURRENTLY SPARE]
	VITAL BUS \$6	(BRBAERR) -8-3014	OPRE	. NONE					[THIS BREAKER CURRENTLY SPARE]
11.6.03.16.1	•	(BREAKER) 8-3015	OPBN	NONB					[THIS BREAKER CURRENTLY SPARE]
11.6.03.17.1	VITAL BUS #6	8-3016	OPBN	NONE					[THIS BREAKER CURRENTLY SPARE]
11:6:03:18.1-	VITAL-BUS-86	(BREATER) 8-3017 (BREATER)	OPBN	- NONB	· · · · · · · · · · · · · · · · · · ·	***			-{THIS-BREAKER-CURRENTLY-SPARE;
11.6.03.19.1	VITAL BUS 46	8-3018 (BRBAIRR)	OPBN	MONB					[THIS BREATER CURRENTLY SPARE]
11.6.03.20.1	VITAL BUS \$6	8-3019 (BREAKER)	OPEN	NONB					(THIS BERAKER CURRENTLY SPARE)
	VITAL-BUS-16	(BRBAEBE)	-OPBW	NON8					-{TRIS-BREAKER-CURRENTLY-SPARE}-
11.6.03.22.1		0-3021 	OPBN	MONE					(THIS BREAKER CURRENTLY SPARE)
11.6.03.23.1   11-6-03-94-1-1	VITAL BUS 16	(BREARRY)	OPBN	NONB					[THIS BREAKER CURRENTLY SPARE]
11.6.03.25.1		(BRBAEBR)	OPBN	800M·	WITH BUR AC BOURD TO SOUR	NAL BOOM ANNINGTABLES			-{THIS-BREAKER-CURRENTL <del>T-S</del> PARE}-
	CSAS INVERTER	(BRBAEBR)	INPUT OPEN	BUS UND	VITAL BUS AS POWER TO CONTI REVOLTAGE RELAY		NONE REQUIRED		NO BCCS EQUIPMENT ON THIS SOURCE
				TRAIN B		ICIATION	REDUNDANT TRAIN AND SEQ INPUTS, REDUNDANT TRAIN A	TRAIN B CSAS INOPERABLE, TRAIN A CSAS WILL ACTUATE UPON SEQ \$1	OPERATORS THAT CONTAINMENT
		77 d deservations	· · · · · · · · · · · · · · · · · · ·	RBLATS 1	O TRAIN A AND B CSAS, CONTROLLERS FOR 3/3 CONTROL VALVES		B/B, C/P	SIGNALS FROM PAILED BELATS),	WITH THIS FAILURB. SEB ITEMS 2.4.23.1.1, 5.2.4.5.1,
1.7.01.01.2	CSAS INVERTER	INVERTERS A/B	INPUT SHORT	125VDC E		OL ROOM INDICATION,	(SAMB AS 11.7.1.1.1)	INOPERABLE (SAME AS 11.7.1.1.1)	5.2.6.6.1, 9.2.1.5.1, 9.2.2.5.1, 9.2.11.3.1 (SAMB AS 11.7.1.1.1).
	••			CSAS LOG PRESSURE	IC, 2/3 CONTAINMENT OUTPUT BELAYS TO	vini1V#			INVERTER CABINET CONTAINS 2  REDUNDANT INVERTERS. HOWEVER, THE SECOND INVERTER IS NOT
		•			AND B CSAS, TRAIN B BRS FOR 3/3 CLR FLOW		•	• • • • •	TECH SPEC REQUIRED, AND MUST BE ASSUMED A PRE-EXISTING



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#### BNBRGBNCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 11-1: VITAL AND RECULATED POWER SYSTEM

ITEM & DRVICE ID	COMPONENT ID	FAILURR MODE	LOCAL REFECTS AND DEPENDENT PAILURES	METHOD OF Detection	INBERRNT COMPRESSATING PROVISIONS	BPPRCT ON BCCS	BBMARES
11.7.01.01.3 CSAS INVESTER	INVERTERS A/B	OUTPUT VOLTS LOW	(SAMB AS 11.7.1.1.1)	CONTROL ROOM INDICATION,	(SAME AS 11.7.1.1.1)	(SAME AS 11.7.1.1.1)	(SAME AS 11.7.1.1.2)
11.1.01.01.4 CSAS INVERTER	INVESTEES A/B	OUTPUT SHORT OR GROUND	(SAMB AS 11.7.1.1.2)	CONTROL ROOM INDICATION, ANNUNCIATION	(SAME AS 11.7.1.1.1)	(SAHE AS 11.7.1.1.1)	(SAME AS 11.7.1.1.2)
11.7.02.01.1 CSAS INVERTER	YOZ-1 (PUSE)	OPBN	LOSS OF CSAS INVERTER POWER TO TRAIN B CSAS LOGIC, 1/3 CONTAINMENT PRESSURE	CONTROL ROOF INDICATION, ANNUNCIATION	REGUNDANT TRAIN, BROUNDANT CONTAINMENT PRESSURE CHANNELS	PRESSURE IMPUTS TO TRAIN A AND	988 TYBHS 5.2.6.6.1 AND 9.2.11.3.1
TILT.02.02.1 CSAS INVERTER		OPRN	TRANSMITTERS TO TRAID A AND B CSAS. LOW LEVEL TRIP OF TRAIN B STORAZINE PUMP ALSO DISABLED			B COAS, REDUCED RECIEBLETT OF TRAIN B STORAZINE PUMP	
THE STATE OF THE S	(PUSB)	VFB#	LOSS OF CSAS INVESTEE POWER TO 1/3 CONTAINMENT PRESSURE TRANSMITTERS TO TRAIN A AND B	CONTROL ROOM INDICATION, ANNUNCIATION	ERDUNDANT TRAIN, BEDUNDANT CONTAINMENT PRESSURE CHANNELS	PRESSURE IMPUTS TO TRAIN A AND B CSAS, REDUCED ERLIABILITY OF	388 Term 9.2.1.5.1
11.7.02.03.1 CSAS INVERTER	T02-3	OPBN	CSAS. LOW LEVEL TRIP OF TRAIS  B STORAZINE PUMP ALSO DISABLED LOSS OF CSAS INVESTER POWER TO	CONTROL ROOM INDICATION,	REDUNDANT CONTAINMENT PRESSURE		SBE [TBM 9.2.2.5.1
			CHANNEL OUTPUT RELAYS FOR TRAIN A AND B CSAS, MOV-883	ABRUNCIATION	CHARRES AND SEQ TRPUTS TO PREVENT SPURIOUS CSAS	CHANNELS TETPPED TO TRATE A AND B CSAS, LOGIC BECOMES 1/2 ON REMAINING CHANNELS WITE	
11.7.02.04.1 CSAS INVERTER	102-4 (FUSE)	OPEN	POSITION INDICATION ON CSAS  PANBL LOSS OF CSAS INVERTER POWER TO TRAIN B CONTAINMENT SPRAY PLOW	CONTROL ROOM INDICATION	REDUNDANT HI-FLOW PATE THROUGH	CONCURRENT BIS/BISLOP FROM  RESPECTIVE SEQUENCER  1 OF 2 REDUNDANT MI-SLOW	SBS ITEM 5.2.4.5.1. VALVE
			FINITES ANTAR CA-218		REDUNDART TRAIN A VALVE CV-518 FOR INJECTION, NOWE REQUIRED FOR RECIRCULATION	CONTAINMENT SPRAY PATHS INOPERABLE FOR INJECTION. NO REPECT ON ARCIRCULATION	BAPBTY FUNCTION IS OPEN (BNBRGIZED) FOR INJECTION MODE, CLOSED (DB-BNBRGIZED)
11.7.02.05.1 CSAS [NVBRTBR	¥02-5	OPBN	LOSS OF CSAS INVESTED POWER TO	PBRIODIC TRATING	MOMB BRONIBED	NOME .	FOR RECIRCULATION  NO RCCS EQUIPMENT ON THIS
11.1.02.06.1 CSAS INVERTER	T02-6 (PUSB)	OPBN	ALARM CONTROL LOSS OF CSAS INVERTER POWER TO TRAIN B CONTROLLERS FOR CLR	CONTROL ROOM ENDICATION, ANNUNCIATION	REDUNDANT TRAIN A CONTROLLERS FOR FCV-1115A/D, B/B, C/F	LOSS OF 1/2 REDUNDANT CONTROLLERS FOR BACE CLE PATE	80URCE
			PLON CONTROL VALVES				

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TABLE 11-2: SORT OF VITAL/REGULATED POWER DEPENDENCIES



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#### EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT I SORT FOR BLECTRICAL/ACTUATION DEPENDENCIES

ITBN #	DRAICE ID	COMPONENT ID	FAILURB MODB	LOCAL BPPECTS AND DEPENDENT PAILURES	DETECTION METHOD OF	PBOATSTONS IMBERNA CONDENSYAING	BPFBCT ON BCCS	REMARES
05.2.06.06.1	G-2008	CSAS INVERTER (YOZ-1)	VOLTS LOW	LOSS OF POWER TO PT-502, PIS-512, PIS-501 AND LIS-500A LOOPS, CAUSING LOW CW. B	CONTROL ROOM INDICATION,	REDUNDANT CHANNELS POR CSAS, REDUNDANY MYDRAZINE PUMP	LOSS OF 1 OF 3 REDUNDANT CONTLINUERRY BY-BY PRESSURE INPUTS TO CSAS TRAIN A/8 LOGIC	
				CONTAINMENT PRESSURE SIGNAL TO CSAS A/B LOGIC, AND DEPRAYING			TRAIN D WYDRAZINE PUMP	
	CSAS TRAIN B	CSAS THVERTER —	VOLTS LOW	LOW LEVEL TRIP OF TRAIN B BYDRAZINE PUMP 15 YDC POWER BUPPLIES BPSATAND	CONTROL ROOM INDICATION	REDUNDANT TRAIN	THOPERABILITY OF TRAIN & COAS	OUTPUY RELLYS LINE RUREGIZE YO
972:01 <del>70</del> 5. <u>1</u> -	(POWBR)	(YO2-1) CSAS INVERTER	. AUI 46 IVA	BPSB DE-BRERGIZED, DISABLING OUTPUT RELATS FOR CSAS TRAIN B				ACTUATE
		(TO2-2)		LIS-500B, PIS-501 AND OUTPUT RELATS, RESULTING IN CENL B	CONTROL ROOM INDICATION, ANNUNCIATION	PREVENT SPURIOUS CSAS	BECOMES 1/2 ON REMAINING CONTAINMENT BI-BI PRESSURE	
				BI-BI PRESS BIGNAL TO TRAIN A AND B CSAS LOGIC AND DISABLING LOW LEVEL TRIP OF TRAIN B			CHANNELS WITE CONCURRENT SIS/SISLOP PROM RESPECTIVE SEQUENCER	
9.2.02.05.1	PT-503 LOOP	CSAS INVERTER		LOSS OF POWER TO PIS-513, LOSS OF POWER TO PIS-513, LOY-283 POSITION INDICATION,	CONTROL ROOM INDICATION,	REDUNDANT CONTAINMENT PRESSURS CHANNELS AND SEQ INPUTS TO	TRAIN A AND 8 CRAS LOGIC 8ECOMES 1/2 ON REMAINING	
				AND PISTO IN CHARLE CRIMEN, PRESS SIGNAL TO TRAIN A AND B		PREVENT SPURIOUS CSAS	CONTAINMENT TEL COACORRENT SIS/SISLOP PROM RESPECTIVE	
5.2.04.05.1	CV-518	CSAS INVERTER (TO2-4)	VOLTS LOW	CSAS LOGIC CV-518 PAILS CLOSED, CANNOT BE REOPENED	CONTROL INDICATION	REDUNDANT NI-PLOW PATH THROUGH CV-517 FOR INJECTION, NOWE	SEQUENCER 1 OF 2 REDUNDANT HI-PLOW SPRAY PATHS INOPERABLE FOR INJECTION,	
	PCV-1115D PCV-1115B PCV-1115P	CSAS INVERTER (TO2-6)	AOTAS TOR		CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT TRAIN A CONTROLLERS	CONTROLLERS FOR BACH OF	
1.4.06.05.3		REG BUS #1	VOLTS LOW	S/G A OVERPILL PROTECTION	CONTROL ROOM INDICATION,		PCV-1115D/B/F POR CLR PLOW CONTROL MONR POR SI, LOSS OF SECONDARY	DRIAT ACTUATED ON DECD
	CY-142	(8=1181)	Annual of State ( ) A comband A		ANNUNCIATION	RECURD BY SIGN FOR SECONDARY	RECIRC TO 8/G A	INDICATED LEVEL BY 3/G WE CONTROL CHANNEL, BOWBYEE CIRCUIT TO BE DISCONNECTED
								PENDING CTCLE 12 OVERPILL PROTECTION MODIFICATIONS. LT-453 LOOP PAILS HIGH ON LOSS
8.1.01.05.1	PT-430 LOOP	REG BUS \$1 (8-11R4)	AOFLS FOA	TRIPPED TO SEQ 1 AND BLOCK	CONTROL ROOM INDICATION, ANNUNCIATION	CHANNELS	REDUCED REDUNDANCY AGAINST SEQ 1 813/813LOP AND SI BLOCK	OP POWER
				PERMISSIVE FOR SEQ 1 AND 2, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	-		PREMISSIVE FOR SEQ 1 AND 2	
274:09:06:1"	PCY-1112	REG BUS #1(8-1127)	VOLTS LOW	PCV-1112 FAILS CLOSED AFTER SV-1112 DE-ENERGIZED (BY	CONTROL ROOM INDICATION	ALTERNATE BLE PATE	LOSS OF BLE PRIMARY PATH	



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# EMERCENCI CORE COOLING SISTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT 1 SORT FOR ELECTRICAL/ACTUATION DEPENDENCIES

ITBN #	DEVICE ID	COMPONENT ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	DETECTION	PROATRIONS  LINBRABAL COMBENSTAING	RPFRCT ON RCCS	BEHARES
03.1.04.06.1	PCV-1112	RBG BUS \$1	VOLTS LOW	PCV-1112 PAILS CLOSED AFTER	CONTROL ROOM INDICATION	ALTERNATE BLR PATE	LOSS OF BLR PRIMARY PATE	
		(8-11R7)		SV-1112 DE-BHERGIZED (BY OVERRIDE OR SEQ BLOCK/RESET)				
03.1.10.02.1	PCV-430C	REG BUS \$1 (8-1187)	VOLTS LOW	DIVERSION OF PRIMARY PATE BLR		ALTERNATE BLE PATE	LOSS OF BLE PRIMARY PATE	
01.4.07.05.3		REG BUS #2 (8-1281)	VOLTS LOW	SIGNAL CLOSES PCV-457 AND	CONTROL ROOM INDICATION, ANNUNCIATION		MOME FOR SI, LOSS OF SECONDARY RECIRC TO S/G B	INDICATED LEVEL BY 8/G MR
-						RECIEC	•	CONTROL CHANNEL, HOWEVER CIRCUIT TO BE DISCOMMECTED PRINTING CICLE 12 OVERFILL
								PROTECTION HODIFICATIONS. LT-454 LOOP PAILS HIGH ON LOSS OF POWER
08:1:02:05:1-7	T-431 LOOP	REG BUS #2	AOTA3 FOM	TRIPPED TO SEQ 1 AND BLOCK PREMISSIVE FOR SEQ 1 AND 2,LOGIC BECOMES 1/2 ON BEHALBUING	ANNUNCIATION	REDUNDANT PZR PRESSURE CEANNELS	REDUCED BEDUKDANCT AGAINST SEQ 1 818/818LOP AND 81 BLOCK PERMISSIVE FOR SEQ 1 AND 2	
A1 1 A0 A5 3 5	nau 454	DDG DUG 44	WALES 101	CHANNELS		NAME DESIGNATIONS BOD OF	MANUE DAD DE 1000 AD GRANNIET	POLAR LORILABER ON RECE
01.4.08.05.3 F		RBG BUS #3 (8-13R1)	VOLTS LOW	S/G C OVERFILL PROTECTION	CONTROL ROOM INDICATION,	NONE REQUIRED FOR SI,	MONE FOR SI, LOSS OF SECONDARY -RECIRC-TO 8/0-C	RELAT ACTUATED ON HIGH
				CV-143		BBCIBC		CONTROL CHANNEL, HOWEVER CIRCUIT TO BE DISCONNECTED PRINTING CYCLE 12 OVERPILL
								PROTECTION MODIFICATIONS. LT-455 LOOP PAILS BIGB ON LOSS OF POWER
08.1.03.05.1 F	T-432 LOOP	RBG BUS \$3 (8-13R4)	VOLTS LOW	1/3 PZB PRBSSURB INPUTS TRIPPED TO BEG I AND BLOCK	CONTROL BOOM INDICATION, ANNUNCIATION	REDUNDANT PZR PRESSURB Channels	REDUCED REDUNDANCY AGAINST SEQ 1 SIS/SISLOP AND SI BLOCK PRENISSIVE FOR SEQ 1 AND 5	OF TOTAL
				LOGIC BROOMES 1/2 ON REMAINING CHANNELS	ė		randinatia ton and 1 and 0	
<del>03</del> .2:09:02:1-8 8	OV-834	RBG BUS - \$4 (8-14R6)	·· VOLTS LOW ···	- PRESSURIZER - PRESSURE - INTERLOCE CLEARS, PREMITTING REMOTE - MANUAL OPENING OF - MOV-813 - AND - MOV-834	-CONTROL-ROOM-INDICATION; PRRIODIC TRSTING	MONE-REQUIRED FOR ALTERNATE HLR	-NONE-FOR-ALPERNATE-ELE	REDUNDANT-VALVES HOV-814-AND- HOV-833 PROVIDE ECS INTEGRITT. LOSS OF POWER TO PT-425 LOOP CAUSES-PC-425 TO BURROIZE
				HOV-013 AND DOV-033				OUTPUT RELAY PC-4251, CLOSING PERHISSIVE CONTACTS IN
03.1.03.02.1 F	TT-1112 LOOP	REG BUS #4 (8-1489)	VOLTS LOW	DOWNSCALE PAILURE OF BLE PRIMARY PATH FLOW INDICATION	CONTROL ROOM INDICATION	ALTERNATE BLE PATE	LOSS OF BLR PRIMARY PATH	-MOV-813/834-OPRNING-GIRCUITS *RANGR INADEQUATE FOR ELR PRINARY PATH PUNCTION, BACKUP
			- VOLTS LOW	- VALVES FAIL-AS-IS, CONTROL	-CONTROL ROOM INDICATION		- POTENTIAL UNISOLABLE DIVERSION	
	CV-4218 CV-421C	(8-1502)		RBLAT OPERATE AND RESET COILS CANNOT BE EMERGIZED TO CHANGE STATE OF CONTACTS IN SOLEMOID		CUR PLOM NOME BROWINGS FOR INTECTION OF	OP SIZECT INVENTORY TO ECDT, NOWE FOR INJECTION OR CLE PLOW DUE TO CONTINUED PUNCTIONING OF	



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TRIP

# EMBRGENCT CORE COOLING STSTEM SINGLE FAILURE ANALTSIS SAN OMOFRE UNIT I SORT FOR ELECTRICAL/ACTUATION DEPENDENCIES

ITRE #	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL RPPBCTS AND DBPBNDBNT FAILURBS	METROD OF Detection	Inerpry Corpry 1116	BPPBCT ON BCC9	BEMARES
	<del></del>		·					
2.4.12.01.1 CV		ITILITY BUS	VOLTS LOW	CV-304 AND CV-305 CLOSE,	CONTROL ROOM INDICATION,		LOSS OF CHARGING PUMP INJECTION	
. CV	-305	8-1508)		CAMOOT BE OPENED, ISOLATING CHARGING PUMP INJECTION PATH TO RCS LOOP A AND HER PRIMARY PATH. VALUES FAIL TO CER	ANNUNCIATION	PATH FOR BLR, NONE BEQUIESO FOR CLR	PATH TO RES LOOP A AND BLE PRIMARY PATH, HOME FOR CLE	INJECTION
1.1.07.01.1 CV	104	ITILITY BUS	VOLTS LOW	POSITION	COURTS BOOM INDIGNOISM	HAMS DAG INIDAGIAN BERINGANG	LAGO AD GRADATNA BUNA TRIBARION	PAGE RATING NOW ADDRESS DAD
		8-1508)	40E13 CO4	CV-304 AND CV-305 CLOSE,  CANNOT BE OPENED, ISOLATING CHARGING PUMP INJECTION PATE TO RCS LOOP A AND BLE PRIMARY	CONTROL ROOM INDICATION, ANNUNCIATION	PATE FOR MLE, NORE REQUIRED  FOR CLE	LOSS OF CHARGING PURP INJECTION PATH TO BUS LOOP A AND BUR PRIMARY PATH, MONE FOR CLE	INJECTION. BRALIGHMENT OF UTILITY BUS VIA TRANSPER SW \$7 REQUIRED TO PERCLUDE
				PATH. VALVES PAIL TO CLE POSITION				COMMON-MODE FAILURE OF HEE (DUE TO LOSS OF TRAIN B POWER) BY BESTORING SAFETY-BELATED
.1.15.02.1 CV		TILITT 8U3 8-1508)	VOLTS LOW	VALUE PAILS TO MORMAL POSITION	CONTROL ROOM INDICATION	REDUNDANT VALVES CV-287 AND ECV-1117 PREVENT DIVERSION OF ACTERNATH ECE PLOY TO LOOP B	NORE	POWER TO CALLTAN FOR
.4.16.11.1 CV	-202, 203,	TILITY BUS	VOLTS LOW	SOLENOID VALVES FOR CV-202.	CONTROL ROOM INDICATION	COLD LEG MONE REQUIRED	KONB	
	1, 287	8-1518)		203, 204, 287 AND BRO BBLAYS 81-10, 83-12 DB-BNRRGIZE, ISOLATING LRTDOWN AND BICESS				Many Street Control
.4.27.04.1 CV CV		TILITY BUS 8-1518)	VOLTS LOW	CV-406A AND CV-406B OPBN, BYPASSING MOV-1100C,	CONTROL ROOM INDICATION	NOME FOR SELOCA, REDUNDANT CHECK VALVE AND CHARGING PUMP		MUST BE PAIL CLOSED AND/OR
				POTENTIALLY GAS-BINDING BOTS CHARGING PUMPS DURING VCT LBVBL TRANSIBNT PRECEDING		FOR RECIRC IN OTHER EVENTS	PRE-SELECTED CHARGING FUMP FOR OTHER BYBHTS	REVISED TO REQUIRE VALVE CLOSED AND PRECLUDE START OF
				PRESELECTED PUMP DURING LBLOCA, MSLB, 8GTR INJECTION.				LOCKED-OUT PUMP SIMILAR TO MOV-1100C PAILURE TO CLOSE
.2.12.11.1 CV	-202, 203, 204 (	T[L[TT BU9 8-1518]	VOLTS LOW	NO RPPECT IF DUBING RECIRC SOLBHOID VALVES FOR CV-202, 203, 204 AND SEQ RELATS 83-10, 83-12 DB-BNERGIZE, ISOLATING	CONTROL BOOM INDICATION	NONE BEGUIEED	HORE	·
.1.01.04.1 PT	-430 LOOP \	ITAL BUS #1	VOLTS LOW	LETDOWN FROM LOOP A COLD LEG 1/3 PZR PRESSURE IMPUTS	CONTROL ROOM INDICATION,	REDUNDANT SEQ/TRAIN FOR	REDUCED RELIABILITY FOR SEQ 1	1/3 SEQ BLOCE PERMISSIVE COULD
		8-1101V)		TO BLOCK PERMISSIVE FOR SEQ 1 AND 2, LOGIC BECOMES 2/2 AND		SIS/SISLOP, REDUNDANT PZE PRESSURE CHANNELS FOR BLOCK PRENISSIVE	SIS/SISLOP AND REDUCED REDUNDANCY AGAINST SI BLOCE PERMISSIVE FOR SEQ 1 AND 2	ALSO RESULT IF VITAL BUS AUTO-TRANSPER OCCURS DURING PAILURE TRANSIBNT
.3.05.04.1 CV		ITAL BUS #1	VOLTS LOW	1/2 RESPECTIVELY ON REMAINING THANNELS VALVE PAILS IN CLOSED	CONTROL ROOM INDICATION	NOME BEGNIEED	NOME	
.4.06.05.4 PC	V-156 Y	8=3102V) ITAL BUS #1 8-1105V)	VOLTS LOW	POSITION, CANNOT BE OPENED 8/G A OVERFILL PROTECTION SIGNAL DISABLED TO PCV-456 AND	CONTROL ROOM INDICATION, ANNUNCIATION	NOMB BEGNIERD	NONB	RELAT IS ENERGIZE TO ACTUATE AND PAILS OFF ON LOSS OF VITAL
			· · ·	CY-112				BUS POWER, HOWEVER CIRCUIT TO BE DISCONNECTED PENDING CYCLE 12 OVERPILE PROTECTION



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## EMBEGENCY CORE COOLING STATEM SINGLE PAILURE ANALYSIS SAN ONOPER UNIT 1 SORT FOR BERCTRICAL/ACTUATION DEPRHÓBNOISES

ITBN #	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT FAILURES	DETECTION	INBERRY COMPRISATING PROVISIONS	RPFRCT ON RCC8	REMARES
02.4.08.03.1	PIC-1111 LOOP	VITAL BUS \$1	VOLTS LOW	LOW DISCEARGE PRESSURE	CONTROL ROOM INDICATION,		POTENTIAL OPERATION OF 2 .	
		(8-1109V)		ADTO-START BYCHAL TO BOTH CBARGING PUMPS, CAUSING START OF IDLE PUMP DURING NORMAL	ANNUNCTATION		CHARGING PUMPS DURING INJECTION (APTER SEQ BLOCE/RESET)	
				OPERATION AND APTER BEQ BLOCK/RESET				
03.2.10.02.1	CV-525	VITAL BUS #1	VOLTS LOW	VALVE PAILS CLOSED	CONTROL ROOM INDICATION	NONE REQUIRED	NOMB	INTERNAL DUMP VALVE IS
05.1.05.04.1	CV-82	(8-1111A) ALLYP BR 91 (8-1111A)	VOLTS LOW	CV-82 FAILS OPEN, CANNOT BE RECLOSED	CONTROL ROOM INDICATION	NONE REQUIRED FOR CONTAINMENT SPRAY, RECIRC PUMP MEAD TO		DE-EBREGIZE TO ACTUATE *BOI PERMITS SPRAY PUMP TRIP APTER PRESSURE REDUCTION
						CONTAINERS ISOLATION		POST-LOCA. NOT CONSISTENT WITH SEP TOPIC VI-4 BASIS FOR ACCEPTIBILITY OF CONTAINMENT
								INDIATION CONFIGURATION FOR THE SPRAY PENETRATION
01.4.12.05.1		VITAL BUS \$1	VOLTS LOW	TRAIN A SI LOOP B AND C VENT	CONTROL ROOM INDICATION	NOME BEGILBED	HOME	135 11321 13451211105
	9V-102D	(8-11127)		IRRESPECTIVE OF CIS				
08.1.08.02.1		VITAL BUS AL	VOLTS LOW	3/3 CONTAINMENT PRESSURE	CONTROL ROOM INDICATION,		SEQ 1 CONTAINMENT NIGE PRESSURE	CONTAINMENT BIGH PRESSURE SIS
	PT-11208 PT-1120C LOOPS	(8-11124)		INPUTS DISABLED TO SEQ I	ANHUNCIATION			CREDITED FOR MAIN PERD ISOLATION AND CONTAINMENT SPRAY PERMISSIVE FOR MSLB
05.1.04.05.1	CV-517	VITAL BUS \$1 (8-11134)	VOLTS LOW	CV-517 FAILS CLOSED, CANNOT BE REOPENED	CONTROL INDICATION		1 OF 2 REDUNDANT RI-PLOW SPRAY PATHS INOPERABLE FOR INJECTION,	THEIDE CONTAINMENT
06.1.05.02.1	CV-737A	VITAL BUS \$1 (8-1114V)	VOLTS LOW	VALVE PAILS OPEN, ALIGNING CCW PLOW TO RECIEC BY	CONTROL BOOM INDICATION	-	NO REFERENCE ON RECIRCULATION MONE	
	CSAS TRAIN A (POWBR)	VETAL BUS-\$1 (8-1115V)	-VOLTS LOW	DR-BHERGIZED, NO EPPECT ON TRAIN A CRAS LOGIC DUE TO REDUNDANT SUPPLY APRE	CONTROL ROOM INDICATION		REDUCED RELIABILITY OF TRAIN A	
05.1.06.06.1	G-200A	VITAL BUS \$1 (8-1116V)	AOT48 FOA	LOSS OF POWER TO PT-501, PIS-511, PIS-500, LIS-500A,	CONTROL BOOM INDICATION, ANNUNCIATION	REDUNDANT ETDRAZINE PUMP	LOSS OF 1 OF 3 REDUNDANT CONTAINMENT BI-EI PRESSURE	
							INPUTS TO CSAS TRAIN A/B-LOGIC AND REDUCED RELIABILITY OF TRAIN A BYDRAZINE PUMP	
AA 1 A1 A7 ·	NO 541 1000			LOW LEVEL TRIP OF TRAIN A BYDRAZINE PUMP				
- 1.60:10:11.EV	PT-561-LOOP	(8-1116V)	- VOLTS LOW	LOSS OF POWER TO PIS-510, -511, LIS-500A, PIS-520, -521, -522 AND OUTPUT RELATS,		PREVENT SPURIOUS CSAS	BECOMES 1/2 OF REMAINING CONTAINMENT HI-BI PRESSURE	
				PRESS SIGNAL TO TRAIN A AND B			CHANNELS WITH CONCURRENT SIS/SISLOP PRON RESPECTIVE	



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## EMBRGBNCT CORB COOLING SYSTEM SINGLE PAILURE ANALTSIS SAN ONOPRE UNIT 1 "SORT FOR BLECTBICAL/ACTUATION DEPENDENCIES"

[TBH #	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	DETECTION	LEGATISTONS  LEGATISTONS  INNERSAL CONSERVATING	BFFBCT ON BCC8	BRHARES
08.1.02.04.1 P	T-431 LOOP	VITAL BUS #2 (8-1201V)	VOLTS LOW	1/3 PZR PRESSURE IMPUTS  DISABLED TO BEG 1 AND TRIPPED	CONTROL ROOM INDICATION,	BEDUNDANT SEQ/TRAIN POR	REDUCED RELIABILITY FOR SEQ 1	1/3 880 BLOCK PERMISSIVE COULD
		(0-16014)		TO BLOCK PERHISSIVE FOR SEQ 1 AND 2, LOGIC BECOMES 2/2 AND 1/2 RESPECTIVELY ON REMAINING	ASSOCIATION	•	REDUNDANCY AGAINST SI BLOCK PERMISSIVE FOR SEQ 1 AND 2	AUTO-TRANSPER OCCURS DURING PAILURE TRANSIENT
6.4.07.02.1 C		VITAL BUS #2	VOLTS LOW	CHANNELS CV-722A, B AND C PAIL OPEN.	CONTROL ROOM INDICATION	HORE BEGNIESD	NOMB	VALVES MORMALLY OPEN,
-	V-722B V-122C	(8-1204V)		THERMAL BARRIBE COILS FOR BCP-A, B AND C				REMOTE-MANUALLY CLOSED FOR THREMAL BARRIER COIL FAILURE ONLY
1174:07:05:4°F C	CV-457 V-144	VITAL BUS 82 (8-1205V)	AOL13 FOA	S/G B OVERFILL PROTECTION SIGNAL DISABLED TO PCV-457 AND CV-144		NONE SEGUESTO	NONE	RREAT IS EMERGIZE TO ACTUATE AND PAILS OPP ON LOSS OF VITAL BUS POWER, NOWEVER CIRCUIT TO BE DISCOMMENTED PENDING CYCLE
								12 OVERPILL PROTECTION HODIPICATIONS. ANNUNCIATION OCCURS ON HISMATCH CHANNEL
5.2.05.04.1 C	V-114	VITAL BUS #2	VOLTS LOW	CY-114 FAILS OPEN, CANNOT BE	CONTROL ROOM INDICATION	NOME REQUIRED FOR CONTAINMENT		TRIP *BOI PERMITS SPRAY PUMP TRIP
		(8-1214V)		RECLOSED		SPRAY, EBCIEC PUMP BEAD TO MAINTAIN LOOP SEAL POR CONTAINMENT ISOLATION		APTER PRESSURE REDUCTION POST-LOCA. NOT CONSISTENT WITE SEP TOPIC VI-4 BASIS FOR ACCEPTIBILITY OF CONTAINMENT
								ISOLATION COMPIGURATION FOR THE SPRAY PRINTERATION
6:2:05:02:1 C		(8-1214V)		PLOW TO RECIEC BY		MONR REQUIRED	KONB	
8.1.03.04.1 P	T-43Z LOOP	4117 BR3 \$3	VOLTS LOW	1/3 PZR PRESSURE IMPUTS  DISABLED TO SEQ 1 AND TRIPPED  TO BLOCK PREMISSIVE FOR SEQ 1	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT SEQ/TEAIN FOR SIS/SISLOP, REDUNDANT FER PRESSURE CHANNELS FOR BLOCK	REDUCED RELIABILITY FOR SEQ 1 SIS/SISLOP AND REDUCED REDUNDANCY AGAINST SI BLOCE	1/3 SEQ BLOCK PERMISSIVE COULD RESULT IP-VITAL BUS AUTO-TRANSPER OCCURS DURING
			***************************************	AND 2, LOGIC BECOMES 2/2 AND 1/2-RESPECTIVELY-ON REMAINING		PBRHISSIVE CHARRALS FOR BLOCK	PERMISSIVE FOR SEQ 1 AND 2	PAILURE TRANSIENT
01.4.08.05.4 P	CV-458 V-143		VOLTS LOW	CHANNELS  8/G C OVERPILL PROTECTION	CONTROL ROOM INDICATION,	NOME EEGLIBED	MONE	RELAT IS ENERGIZE TO ACTUATE AND PAILS OPP ON LOSS OF VITAL
·	- T. T.	,		CV-143	nectro 1 6 1 4 7 H			BUS POWER, HOWEVER CIRCUIT TO BE DISCONNECTED PENDING CTCLE
	··- ··· <u> </u>		en en en en en en en en en en en en en e		·			12 OVERFILL PROTECTION  MODIFICATIONS. ANNUNCIATION OCCURS ON MISMATCE CHANNEL TRIP
9.1.11.04.1 C; () 3 <b>-2.16:02-1</b> C;	POWBR)	VITAL BUS #3 (8-1314V) VITAL-BUS #3A	VOLTS LOW	DB-BNBRG12BD	CONTROL BOOM INDICATION	REDUNDANT TRAIN	REDUCED RELIABILITY OF TRAIN A CSAS	
	r-2114B LOOP	(8-3311V) VITAL BUS ADA			CONTROL ROOM INDICATION	NONB - REQUIRED		*PAN 11159/P PATEURS AND
		(8-3313A)		LOW CLR PLOW INDICATION POR - BCS LOOPS B AND C	CONTROL BOOM INDICATION, -PBRIODIC TESTING-	NONE AVAILABLE	*CLE FLOW TO RCS LOOPS B AND C WOULD BE INCREASED PER PROCEDURE, RESULTING IN CLE AND CLE/ELE PLOW IMBALANCE, AND	PI-2114B/C PAILURES CANNOT BE
				•			POTENTIALLY BICEBDING BECIEC	



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#### EMERGENCY CORE COOLING SYSTEM SINGLE PAILURE AMALYSIS SAM OMOFRE UNIT 1 SORT FOR ELECTRICAL/ACTUATION DEPENDENCIES

1788 \$	DRAICS ID	COMPONENT ED	PAILURE MODE	LOCAL RPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	INGERENT COMPRESATING PROVISIONS	BFFECT ON BCCS	BEHARES
	PT-2114B LOOP PT-2114C LOOP	ACE EUB JATIV (VCICC-B)	AOFLE FOR	SCR FOODS B AND C	CONTROL BOOM INDICATION, PRECODIC TESTING		PROCEDURE, RESULTING IN CLE AND	PI-2114B/C FAILURES CANNOT BE DISTINGUISHED DURING COMBINED
91.4719.03.1	CV-955	VITAL BUS \$34	VOLTS LOW	LOOP'S, C RCS SAMPLE PLOY	CONTROL ROOM INDICATION		POYENTIALLY EXCEEDING ENCINC PUMP LIMITATIONS	CLE/BLE WITHOUT BQ FIT-1112 LOOP. CHINGING PUMP ANNETEE CHARGING PUMP FLOW VALUE BAPETY FUNCTION IS TO
	CV-956	(8-3314V) VITAL BUS #3A		ISOLATED  MFW CHRCE VALVE BACKUP HODE IS		•		PAIL CLOSED
	CV-112;143;144			ARBED FOR B/G A/B/C. FCV4 AND CV4 WILL CLOSE VIA RESPECTIVE SOLEMOIDS IF TURBINE IS TRIPPED (TTIZ CONTACTS CLOSED) AND BOTH MFW PUMPS ARE TRIPPED	ANNUECTATION	SECONDARA RECIEC	PUMPS TRIPPED	TATALOGICAL REGULED FOR LEAD LIFTING, USE OF MANUAL BYPASS OR MFM PUMP BREAKER RACKOUT/RECLOSE TO MITIGATE THIS PAILURE FOR BECONDINY RECIRC. AMBUNCIATION OCCURS
	····			("b" CONTACTS CLOSED)				PROM APWAS-A ACTUATION OR TROUBLE
	LT-2400A LT-2400B LT-2400C LOOPS	VITAL BUS \$34 (8-3315V)	VOLTS LOW	TRAIN A MARROW RANGE LEVEL INDICATION AND APW TUTO-ACTUATION DISABLED,	CONTROL BOOM INDICATION, ANNUNCIATION	REDUNDANT APM TRAIN TO PROVIDE MR LEVEL INDICATION AND PLOW, MONE REQUIRED FOR AUTOMATIC	INDICATION AND APW PLOW	
				BLONDOWN ISOLATED ON TRAIN A APM RELAY DR-BNEBGIZING		Broadoam Isoration		
02.4.07.01.1	CV-410 CV-411	VITAL BUS #4 (8-1402V)	VOLTS LOW	CV-410 AND CV-411 CLOSE, ISOLATING SEAL WATER RETURN TO	CONTROL BOOM INDICATION	NORE SEGUISED	NONB	
3.1.13.02.1	CV-413	VITAL BUS #4 (8-1402V)	VOLTS LOW	VALVE PAILS CLOSED	CONTROL ROOM INDICATION	NONE SEQUIRED	NONE	
03:2:14:04:11	CA-415	VITAC BUS #4	-AOF13 FOA	VALVE PAILS CLOSED	CONTROL ROOM INDICATION -	MONE BEGALEED	NONE	
06.4.05.01.1	TCV-601B	VITAL BUS #4 -(8-1402V)	VOLTS LOW	TCV-601A/B FAIL OPEN, CAUSING BICESS CCW FLOW TO RER BI B-21A/B AND DIVERTING FLOW	CONTROL ROOM INDICATION	OR FLOW LIMITED BY STEH COLLAR	PLOW TO ECCS LOADS REDUCED TO MINIMUM ACCEPTABLE WITE ONE CCU- PUMP AND REDUCED SPENT PUBL PIT	BLOCK VALVE, OTHER FLOW LIBITED BY STEM TRAVEL COLLAR.
			· · · · · · · · · · · · · · · · · · ·	PROM RCCS LOADS				CONFIGURATION NOT ACCEPTABLE AFTER CYCLE II REPUBLING DUB TO INCREASED SPEHT FUEL PIT SEAT LOAD
)37270970371	ROA-814 ROA-813	VITAL BUS \$4 (8-1406V)	VOLTS LOW		CONTROL ROOM INDICATION, PRIODIC TESTING	PRIMART BLR PATE	INOPERABILITY OF ALTERNATE BLE	VALVE HOV-813 BRQUIBBD TO OPEN- POR ALTERNATE BLE PLOW PATH. PC-4251 RBLAT 19
								BWBRGIZE-TO-ACTUATE FOR CONTACT CLOSUBE IN VALVE OPENING CIRCUIT
	PCV-456;457;458 - CV-142,143,144	VITAL BUS \$4 (8-1414V)	VOLTS LOW	NEW CORCE VALVE BACEUP HODE	PERIODIC TESTING		NONE FOR SI AND SECONDARY	OUTPUT/ISOLATION RELATS ARE EMBRGIZE TO ACTUATE
				T PCV-458; CV-142/143/144 TRAIN A SVs, TTIZ-ISO: PCV-457/458, CV-143/144 TRAIN B SVs,				



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# EMERGENCY CORE COOLING STATEM SINGLE FAILURE AWALTSIS SAM OMOPRE UNIT 1 SORT FOR BLECTRICAL/ACTUATION DEPENDENCIES

ITEM #	DBAICE ID	COMPONENT ID	PAILURE MODE	LOCAL REPECTS AND DEPENDENT FAILURES	METHOD OF Detection	BEOATSTONS THREEBAL COMBERSTING	RFFECT ON ECCS	BEHARES
06.4.06.03.1	PC-605 LOOP	VITAL BUS A4	VOLTS LOW	AUTOSTART SIGNAL TO CCW AND	CONTROL ROOM INDICATION,	NONE FOR SISLOP, NONE REQUIRED	SPATENTIAL LAGG OF TRAIN A AND	
		(B-14154)		PAREGREY TREEMIL BARRIER PUMPS, CAUSING PUMPS TO START AS SOOD AS RESPECTIVE BUS	PERIODIC YESTING	FOR BIS	B ELECTRICAL POSER DUE TO OUT OP SEQUENCE BUS LOADING DURING SISLOP, NOWE FOR 213	
02.4.04.02.1	LC-11008 LOOP	VITAL BUS \$4 (V3141-8)	VOLTS LOW	VOLTAGE AVAILABLE LOW VCT LEVEL SIGNAL TO MOV-1100B/C/D, CAUSING	CONTROL ROOM INDICATION		TRAIN B CHARGING PUMP WILL NOT AUTO-START DURING INJECTION,	CHARGING PUMPS MOT CREDITED POR INJECTION
				MOV-1100B/D OPENING AND MOV-1100C CLOSING IF IN AUTO. ALSO CAUSES LO-LO-LO TRIP OF			PRAST ARIE OARBRIDS  BOA WATEVER DOS BECIEC ALAR	
2.4.08.03.2	PIC-1111 LOOP	VITAL BUS #4	VOLTS LOW	G-8A. NO REPECT ON BEQ ACTUATION OR POST-818/818LOP LOW CHARGING PUMP DISCHARGE	CONTROL ROOM INDICATION,	NONS BEQUIEED DUBING	NOME. START OF ONE CHARGING	
		[8-14167]		PRESSURE BIGNAL TO AUTO-START CET OF BOTE CHARGING PUMPS, CAUSING START OF IDLE PUMP		NIN/NINLOP. NOV-1108C CLOSES AS REQUIRED TO PREVENT GAS	PUMP AND TRIP/LOCKOUT OF OTHER ON SIS/SISLOP IS UNAPPROTED, AND RESTART OF DE-SELECTED PUMP	
				DURING MORNAL UPS AND FOLLOWING SEQ BLOCK/RESET. DOBS NOT APPECT 818/818LOP			POLLOWING BEG BLOCK/RESET IS ACCEPTABLE AS LONG AS MOV-1100C MAS CLOSED	
	PCV-1115A/D PCV-1115B/B PCV-1115C/P	VITAL BUS- #4 (8-1416V)	VOLTS LOW	TRIP OF DE-BELECTED PUMP PCV-1115A/B/C FAIL OPEN AND PCV-1115D/R/F FAIL CLOSED IF	CONTROL BOOM INDICATION			*HYDRAULIC CALC REQUIRED TO VERIFY FLOW THROUGH WIDE OPEN
	FC4-11136/F			TRAIN A CONTROLLERS ALIGNED.  CLE PLOW CANNOT BE TEROTTLED  BELOW ABOUT 80 GPM PER RCS			C, AND INABILITY TO THROTTLE CLR PLOW BELOW ABOUT 80 GPM PER LOOP FOR COMBINED CLR/HLR	PCV-1115478/C AND UPPER LIMIT POR PRIMARY PATH BLR PLOW TO REMAIN WITEIN RECIRC PUMP PLOW
1.4.09.11.1	PCV-456,451,458 CV-142,143,144	VITAL BUS #5 (8-2901V)	VOLTS LOW	LOOP  MPW CBECK VALVE BACKUP MODE IS ARMED FOR S/G A/B/C. PCVs AND			BRCIRC TO S/G A/B/C AFTER MPW	LIFTING, USE OF MANUAL BYPASS
				CVA WILL CLOSE VIA RESPECTIVE SOLENOIDS IF TURBINE IS TRIPPED (TIEZ CONTACTS CLOSED)			PUMPS YR I PPBD	VALVES OF MFW PUMP BREARRY RACEOUT/RECLOSE TO MITIGATE THIS FAILURE FOR SECONDARY
1.2.03.02.1	LT-3400A	VITAL BUS \$5	VOLTS LOW	("b" CONTACTS CLOSED) TRAIN B NARROW RANGE LEVEL	CONTROL ROOM INDICATION,	REDUNDANT APY TRAIN TO PROVIDE		BRCIEC. ANNUNCIATION OCCURS ON APPAS-B ACTUATION OR TROUBLE
	LT-3400C LOOPS	(8-2901V)		INDICATION AND APP AUTO-ACTUATION DISABLED, BLOWDOWN ISOLATED ON TRAIN B APP RELAT DE-ENERGIZING	ANNUNCIATION		INDICATION DISABLED, BLOWDOWN ISOLATED	
	PT-3000A/B/C	VITAL BUS #5 -(8-2901V)	VOLTS LOW	3/3 PZE PRESSURE AND CONTAINMENT PRESSURE IMPUTS	CONTROL ROOM INDICATION,	REDUNDANT SEQ/TRAIN	BEQ 2 SIS/SISLOP DISABLED	
 	PT-1121A/B/C LOOPS			DISABLED TO SEQ 2				
	PT-31144 T00P	VITAL BUS #5 (8-2903V)	AOTIS TOR	ECS FOOD T BC2 FOOD THDICATION LOS	CONTROL ROOM INDICATION	i	BR INCREASED PER PROCEDURE,	TPCV-IIISD PAILURE AND PI-3114A PAILURE CANNOT BE DISTINGUISHED DURING CONBINED FIR/BIR MITTOUT PO PIR-1119
							BICBEDING RECIEC PUMP	LOOP. CHARGING PUMP AMMETER USED TO DETERMINE TOTAL





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## EMBRGENCY CORE COOLING SYSTEM SINGLE PAILURE AMALTSIS SAM OMORRE UNIT 1 SORT FOR BLECTRICAL/ACTUATION DEPENDENCIES

ļ 	ITBM #	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT FAILURES	MBTHOD OF DBTBCTION	PROVISIONS  INSERRAL COMPRESSIONS	APPRET ON BCC8	REMARES
	93.1.11.03.1	PT-3114A LOOP	VITAL BUS \$5	VOLTS LOW	CON CLR PLOW INDICATION FOR	CONTROL ROOM INDICATION	NOMB TATIFURE	*CLR PLOW TO RCS LOOP A WOULD BE INCHESSED PER PROCESURE, RESULTING IN CLR AND CLR/BLR PLOW INBALANCE, AND POTENTIALLY RICERDING RECIEC PORP PLOW	*PCY-1115D PAILURE AND PI-3114A PAILURE CANNOT BE DISTINGUISHED DURING COMBINED CLE/BLR WITHOUT BQ PIT-1112
	3:2:11.02:1			MOLTS FOR	- AVTAS-AVITS CFOSED	CONTROL BOOM ENDICATION	HORE SEGULESO	LINITATIONS  NONE	LOOP. CHARGING FUMP AMMERER USED TO DETERMINE TOTAL CHARGING PUMP PLON INTERNAL DUMP VALVE IS DE-EMERGIZE TO ACTUATE
0	1.2.17.03.1	CV-951	VITAL BUS 16	VOLTS LOW	VALVE FAILS CLOSED	CONTROL BOOM INDICATION	NORE BEGNIESD	NORB	OB SACROLLE TO ROTORIS
	1.4.11.05.1	8V-702A 8V-702C	VITAL BUS \$6 (8-30024)	VOLTS LOW	TRAIN B SI LOOP B AND C VENT ISOLATION VALVES CLOSE IRRESPECTIVE OF CIS	CONTROL ROOM INDICATION	NOME ERGUIDED	NONE	•
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SECTION 12: AUXILIARY POWER

#### AUXILIARY POWER SYSTEM NOTES

- 1. The Auxiliary Power System FMEA, Table 12-1, is printed in several parts, due to the size of this database section:
  - a. 4 kV System
  - b. 480 V System
  - c. 125 VDC System
  - d. Common
- 2. To facilitate anticipated changes to the SONGS 1 electrical system, Item numbers in this section have been assigned as follows:

Train A	Train B
12.1: 4 kV Bus 1A, 1B	12.2: 4 kV Bus 1B, 2C
12.3: 480 V Bus #1	12.4: 480 V Bus #2
12.5: [future]	<b>12.6:</b> 480 V Bus #3
12.7: 125 VDC Bus #1	<b>12.8:</b> 125 VDC Bus #2
12.9: Co	ommon

This does not affect the automated sorts for electrical and other dependencies, as the ITEM\_NO field is not used as the sorting key.

- 3. Because long-term ECCS operation could be required beyond the capacity of the on-site Diesel Generator fuel storage tanks, the ability to retransfer ECCS loads from the Diesel Generators to an offsite source (normal or alternate), is conservatively considered to be a required ECCS function for SISLOP events. For purposes of this evaluation, repairs of common-cause failures of the non-seismic switchyard and transformer equipment are assumed, but repairs to mitigate single active failures are not.
- 4. An automated sort of auxiliary power dependencies (COMP\_ID = 'BUS', 'MCC', 'SWGR', OR '125VDC BUS') is provided in Table 12.2 as an aid to the reviewer.
- 5. Potential single failure susceptibilities in the FMEA table are flagged with "\*" as the first character of the associated ECCS EFFECTS field. Other open items (eg. required procedure or calculation changes) are flagged with "\*" as the first character of the REMARKS field.

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#### AUXILIARY POWER SYSTEM REFERENCES

### I. 4kV SYSTEM AND COMMON:

•	
One Line Diagram	
5145331	220 kV Switchyard (Positions 1 - 6)
5146828	Main One Line Diagram
	•
Elementary Diag	rams
N1545 Sh 20	Main Transformer Protection, 220 kV Circuit
	Breaker Position Relays
N1545 Sh 21	Auxiliary Transformer C Loss of Voltage Relays
N1545 Sh 28	Auxiliary Transformer C Differential and Sudden
N1343 BH 20	Pressure Relays
N1545 Sh 34	Generator Disconnect Switch
N1546 Sh 1	Auxiliary Transformer A and B 4.16 kV ACBs
N1546 Sh 2	Auxiliary Transformer C 4.16 kV ACB
N1546 Sh 13	Station Loss of Voltage Auto-Transfer Sh 1
N1546 Sh 14	Station Loss of Voltage Auto-Transfer Sh 2
5130351	4.16 kV Bus Undervoltage Relays
5145385	220 kV PCB 1 - 6 Breaker Failure Protection
5145395	Auxiliary Transformer C 220 kV PCB Protection
5149630	4.16 kV Diesel Generator Breakers
5150335	Reactor Coolant Pumps
5150356	Exciter 4.16 kV ACB
5150876	4.16 kV Bus Undervoltage and Underfrequency
	Relays
5151031	Station Service Transformer #1 and 2 4.16 kV ACBs
5151224	4.16 kV Bus Reactor Bypass Breakers RX1 and RY1
5151922	Station Service Transformer #3 4.16 kV ACB
5152239	4.16 kV Bus Tie 1A-1C and 1B-2C ACBs
5156238	220 kV PCB 1 Control
5156239	220 kV PCB 2 Control
5156249	220 kV PCB 5 and 6 Breaker Failure Protection
Other Drawings	
5149178	Load Sequence Table, Train 1 (Sh 1)
5149179	Load Sequence Table, Train 1 (Sh 2)
5149181	Load Sequence Table, Train 2 (Sh 1)
5149182	Load Sequence Table, Train 2 (Sh 2)
	Total defluence range, rrain a (on a)
Procedures	
SO1-1.0-10	Reactor Trip or Safety Injection
SO1-1.0-40	Steam Generator Tube Rupture
SO1-1.0-60	Loss of All AC Power
SO1-1.0-61	Loss of All AC Power Recovery
SO1-2.6-4	Loss of DC Bus
SO1-9-2	4160 V System Operations
S01-10-1	Diesel Generator Operations
SO1-12.2-6	
S01-12.2-6 S01-12.3-10	Electrical Distribution Weekly Surveillances
PAT-15.2-10	Diesel Generator Load Test
Other Documents	
SD-S01-110	Curation Descriptions and last sells
OD OTTITU	System Description: 220 kV Switchyard

SD-S01-120	System Description:	4160 V System
SD-SO1-590	System Description:	Safeguard Load Seque

encing

System Description: Diesel Generator System SD-S01-600

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### AUXILIARY POWER SYSTEM REFERENCES (continued)

### II. 480V SYSTEM:

,	
One Line Diagram	
5146828	Main One Line Diagram
	480V Bus #1
5148063	480V Bus #2 and 3
Elementary Diagr	rams:
450528	Bus #2 Emergency Power 480V ACB
455417	Motor Control Center 480V ACB
455429	Station Service Transformer #3 480V ACB
455430	Bus #1-3 Tie 480V ACB
455431	Bus #2-3 Tie 480V ACB
5150158	SIS/SISLOP Lockout Relays
5150408	Station Service Transformer #1 480V ACB
5150409	Station Service Transformer #2 480V ACB
	480V Bus #1, 2 and 3 Undervoltage Relays
	480V Bus #1 125VDC Control
· ·	480V Bus #2 125VDC Control
	<del>"</del>
5151906	480V Bus #3 125VDC Control
Other Drawings	
449227	Schematic, Main Transformer (incl. cooling)
5149178	Load Sequence Table, Train 1 (Sh 1)
5149179	Load Sequence Table, Train 1 (Sh 2)
5149181	Load Sequence Table, Train 2 (Sh 1)
5149182	Load Sequence Table, Train 2 (Sh 2)
5149955	SIS/SISLOP Lockout Relays, Train 2 (Sh 1)
5149957	Emergency Operating Condition, Train 1
5149958	Emergency Operating Condition, Train 2
5149974	SIS/SISLOP Lockout Relays, Train 1
5149975	SIS/SISLOP Lockout Relays, Train 2 (Sh 2)
Procedures	
SO1-1.0-10	Reactor Trip or Safety Injection
SO1-1.0-40	Steam Generator Tube Rupture
SO1-1.0-60	Loss of All AC Power
SO1-1.0-61	Loss of All AC Power Recovery
SO1-2.6-4	Loss of DC Bus
SO1-2.6-7	480V System Grounds or Faults
501-9-2	4160V System Operations
SO1-9-3	480V System Operations
SO1-9-4	12kV / 480V Transformer Operations
SO1-12.2-6	Electrical Distribution Weekly Surveillances
Other Documents	
SD-S01-120	System Description: 4160V System
SD-S01-130	System Description: 4160V System System Description: 480V and 12kV System
SD-S01-590	. <u>-</u>
	System Description: Safeguard Load Sequencing System

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#### AUXILIARY POWER SYSTEM REFERENCES (continued)

#### III. 125VDC SYSTEM:

125VDC System No. 1 5102173 5149348 125VDC System No. 2

**Procedures** 

SO1-1.0-60 Loss of All AC Power

SO1-1.0-61 Loss of All AC Power Recovery

SO1-2.6-4 Loss of DC Bus

SO1-9-12 Battery Charger Operation

SO1-12.2-6 Electrical Distribution Weekly Surveillances

Other Documents

SD-S01-140

System Description: 125VDC System
System Description: Safeguard Load Sequencing SD-S01-590

System

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TABLE 12-1: AUXILIARY POWER FMEA

PART I: 4 kV SYSTEM

				LOCAL BPPBCTS AND	METHOD OF	INHEBENT COMPENSATING		
ITBN #	DBAICE ID	COMPONENT ID	PAILURE MODE	DSPENDENT FAILURES	DETECTION	PROVISIONS	RPFRCT ON BCCS	BRMARRS
12,717,01.01.1	X-MINDING	<del></del>	OPBN	LOSS OF POWER IN ONE OR MORE	_ PBQ1VV15		TUANDUIBYFYEE AB BRITH A BAN	AAAN AANA KASTAU AWAA
	CURRENT LIMITI BEACTOR		VI SH	PHASES OF TRAIN A DURING DG TESTING WITH NORMAL OFF-SITE	Legitonic 1831fing		INOPERABLETTY OF TRAIN A FOR SIS DURING DG TRSTING, NONE FOR SIS DURING NORMAL OPERATION OR	
				SOURCE ALIGNED. NOME WITE Bypass breaker closed		FOR BISLOP	FOR SISCOP	
	I-WINDING CURRENT LIMITI BBACTOR	NC	SHORT	LOSS OF FAULT PROTECTION FOR ONE OR MORE PHASES OF TRAIN A DURING DG TESTING WITH MORNAL	PBRIODIC TESTING	REDUNDANT TRAIN FOR DG TESTING, NOWE REQUIRED FOR NORMAL OPERATION	POTENTIAL INOPERABILITY OF TRAIN A DURING DG TESTING, NONE	*TECH SPEC ACTION BUTEY REQUIRED FOR DG LOAD YESTING
			GROUND	OFF-SITE SOURCE ALIGNED LOSS OF NORMAL OFF-SITE SOURCE	TONTROL ROOM TENICATION	REDUNDANT TRAIN FOR SIS, MONE	FOR MORNAL OPERATION	PONIUN AP 9 AB WARD BUILDO
	CURRENT LINITINES			(C-IPMB E-WINDING) FOR TRAIN A WITH GROUND OF MORE THAN ONE		BEQUIRED FOR SISLOP	SIS	CHOUND OF Z OR MORE PHASES  REQUIRED FOR THIS FAILURE IN UNGROUNDED DELTA-CONNECTED
				PHASE				SYSTEM. YRIP OF PERDER BREE LICOZ ISOLATES GROUND FAULT ON SISLOP
12.1.02.01.1	(BERAIRE)	BRBAEBE	OPEN	C-IPME X-VINDING BRACTANCE CANNOT BE BYPASSED, RESULTING IN DEGRADED TRAIN A VOLTAGE	CORTROL ROOM INDICATION	BEGUIERD FOR SISTOS  BEGUIERD FOR SISTOS	THOPBRABILITY OF TRATE A POR 818. NO RPPECT FOR SISLOP	TINCLUDES CONTROL BOOK BANDSWITCH MS-123. TRCH MPBC ACTION BUTET REQUIRED FOR THIS
				CORDITIONS DURING SIS LOADING TRANSIENT WITH NORMAL OPF-SITE SOURCE ALIGNED. NO RPPECT				CONDITION (EC. DURING DG SURVEILLANCE) BECAUSE OF BUS VOLTAGE DEGRADATION WEICH
12.1.02.01.2	162.1071	0004890	CI AGRA	DURING SISLOP DUR TO 11CO2				MOOFD OCCUB ON BIR
	(BSBARER)	BRBARER	CLOSED	C-IPMR I-MINDING REACTANCE BTPASSED, RESULTING IN POTENTIAL FOR BICESSIVE PAULT CURRENTS DURING DG TESTING	CONTROL BOOM INDICATION, ANNUNCIATION	OPERATION OF SIS/SISLOP	POTENTIAL INOPERABILITY OF TRAIN A DURING DG COAD TESTING, NOME FOR NORMAL OPERATION OR SIS/SISLOP	MORMAL POSITION. DG BREAKER TRIPPED ON SIS/SISLOP IF CLOSED
				WITE NORMAL OPP-SITE SOURCE " ALIGNED. NO EPPECT ON SIS LOADING TRANSIENT				
	(BRBAESR)	"b" CONTACT	OPRN	(SAMB AS 12.1.2.1.1)	PRRIODIC TESTING	(1.1.3.1.31 RA BHAR)	(1.1.1.1 EA BHAB)	STECE SPEC ACTION ENTRY REQUIRED FOR DG LOAD TESTING
12.1.02.02.2		152-11C14 "b" CONTACT	CLOSED	INTERLOCE FROM DG BREARER DEFEATED, PERMITTING REACTANCE TO BE BYPASSED DURING DG LOAD	PBRIODIC TESTING	(SAMB AS 12.1.2.1.2)	(SAME AS 12.1.2.1.2)	*NORMAL POSITION. TRCH SPEC ACTION ENTRY REQUIRED FOR DC LOAD TESTING
	152-IRXI (BRBAERR)	TS2-11C14	OPBN	TESTING	PERIODIC TESTING	(SAMB AS 12.1.2.1.1)	(SANR 18-12.1.2.1.1)	STECE SPEC ACTION BUTEY REQUIRED FOR DG LOAD TESTING
2.1.02.03.2	159-1071	152-11014	CI AGDA	BREATER CLOSED, EVEN IN DG				
	(BRBARBR)	CBLL SWITCH	CLOSED	INTERLOCE FROM DG BREARER DEPRATED, PERMITTING REACTANCE TO BE BTPASSED DURING DG	PRRIODIC TESTING	(SAME AS 12.1.2.1.2)		*MORMAL POSITION. TECH SPEC ACTION ENTRY REQUIRED FOR DC LOAD TESTING
2.1.02.04.1	152-1BII (BRBARBR)	BUS \$1C 125VDC CONTROL POWER	VOLTS LOW	BRBAKBR TESTING C-IFMR I-WINDING REACTANCE BYPASS BREAKER CANNOT BE	CONTROL BOOM INDICATION		INOPERABILITY OF TRAIN A WITH	*TECE SPEC ACTION ENTRY REQUIRED WITE BYPASS BREAKER
-		(011014)		REPOSITIONED. IF OPEN, DEGRADES TRAIN A VOLTAGE CONDITION DURING SIS LOADING		··- · · · · · · · · · · · · · · · · · ·		HISPOSITIONED
				TRANSIENT. IF CLOSED, RESULTS IN POTENTIAL FOR BICESSIVE FAULT CURRENTS DURING DG				

TESTING

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ITBN \$	DEVICE ID	COMPONENT 10	PAILURE HODE	LOCAL BPFBCTS AND DBPBNDBNT FAILURES	DETECTION OF	INHBRBNT COMPRESATING PROVISIONS	BPPBCT ON BCCS	REMARES
12.1.03.01.1	152-11002	BREAKER	OPBN	LOSS OF NORMAL OFF-SITE SOURCE	CONTROL ROOM INDICATION	REDUNDANT TRAIN FOR SIS, NOME	INOPERABILITY OF TRAIN A FOR	*MORMAL PERDER BREAKER FOR BUS
	(BREAEBR)			FOR TRAIN A. NORMAL POLLOWING SISLOP. NO REPECT IF BUS ALC		BEQUIEED FOR SISLOP	SIS, MONE FOR SISLOP	AIC. TRCH SPBC ACTION BUTBY REQUIRED FOR THIS CONDITION
		·		BHEBGIZED FROM ALTREMATE SOURCE VIA TIE BREATER 11001				DUE TO INABILITY OF ALTERNATE OPPSITE SOURCE TO MAINTAIN ADEQUATE BUS VOLTAGE DURING
12.1.03.01.2	152-11CO2 (BRBAEBE)	BRBARBR	CLOSED	NORMAL OFF-SITE SOURCE CANNOT BE ISOLATED FROM BUS \$1C,	CONTROL ROOM INDICATION, PERIODIC TESTING		*INOPERABILITY OF TRAIN A FOR SISLOP, INOPERABILITY OF TRAIN	
		eman armamo artisto de 1 de a		DEGRADING TRAIN A SISLOP RESPONSE BY EMBEGIZING C-IPME VIA I-SECONDARY. ALSO PERVENTS		FOR 819	B FOR SISLOP WITH DEGRADED GRID CONDITIONS, NOME FOR SIS	
				TRAIN B SISLOP FOR DEGRADED GRID CONDITIONS DUB TO INABILITY TO OBTAIN TRAIN A				
12.1.03.02.1	152-11CO2 (BRRAEBE)	194 (RBLAY)	CONTACTS OPEN (OFF)	LOB BRBARBE WILL NOT TRIP ON SEQ (LOB, LOP, SISLOP) OR SUS	PBRIODIC TESTING	(SAMB AS 12.1.3.1.2)	*(8ANB AS 12.1.3.1.2)	BELAY ACTUATED BY SEQ 1 OR BUS \$1C UW RELAY 127-511
12.1.03.02.2	152-11CO2 (BRBAEER)	194 (RBLAY)	CONTACTS CLOSED (ON)	RECLOSED AFTER 2 SECOND TIME	CONTROL ROOM INDICATION, ANNUNCIATION	(SAME AS 12.1.3.1.1)	(SAME AS 12.1.3.1.1)	*SURVEILLANCE TESTING MUST SPECIFICALLY CORCE FOR RELAY
				DBLAY				CONTACT PAILURB, SINCE TOR PREVENTS RETRIP IF BRIE SUBSEQUENTLY RECLOSED
T277:03:03.1	152-11CO2 (BRBAEBB)	C-IFME PROTECTIVE TRIPS	CONTACTS OPEN	BRBARBR WILL NOT TRIP IN BYBNT OF C-IFMR DIFFBRBNTIAL, SUDDBN PRESSURE OR OTHER TROUBLE.		NOWE REQUIRED FOR SIS/SISLOP	NONE FOR SIS/SISLOP	NORMAL POSITION OF CONTACTS.  FAILURE ADDRESSES ONE TRIP PUNCTION (CONTACT SET) AT A
				BENAINING C-IPME TRIPS TO 11CO2 UNAPPECTED				TIME. REMAINING PROTECTIVE TRIPS PREVENT FAULT PROPAGATION TO 4 KV SWGR RM
12.7.03.03.2	152-11CO2 (BRBAEBR)	C-IPMB PROTECTIVE TRIPS	CONTACTS CLOSED	BREATER TRIPS IF CLOSED, CAUSING LOB FOR TRAIN A. WORMAL FOR SISLOP WITH C-IPME TROUBLE. WO BPFECT IF BUS #1C BWEEGIZED FROM ALTERNATE	CONTROL BOOM INDICATION, ANNUNCIATION	REDUNDING TRAIN FOR SIS, MOME BEQUIRED FOR SISLOP OR IF BUS BIC BUBBGIZED FROM ALTERNATE SOURCE	SIS, NOME FOR SISLOP OR IF BUS	STRCE SPEC ACTION BUTET REQUIRED FOR THIS CONDITION
12/1/03/04/1	152-11C0Z (098AEB8)	BREES 71001, 11404, 11014, 1811	CONTACTS OPBN	SOURCE VIA TIE BREAKER 11001 BUS \$10 PARALLELED ALARM INOPERABLE. NO EFFECT ON BREE OPERATION	PBREODIC TESTENC	NOME BECALERY	NONB	PUSBS PROTECT BEER CONTROL SCHEME FROM ALARM CET FAILURE. ALARM ACTUATED IF DG
		*a CONTACTS	··· · · ·					PARALLECED TO C-IPME W/RII CLOSED OR IF DG OR C-IPMR PARALLECED TO ALTERNATE SOURCE
12.1.03.04.2	152-11CO2 (BRBARBR)	11A04, 11C14,	CONTACTS CLOSED	BUS \$1C PARALLELED ALARM CANNOT BE CLEARED. NO EFFECT	PBRIODIC TESTING	NONE REQUIEED	NONB	(MACM/A-1PHR)
		"a" CONTACTS		ON BREE OPERATION				

## BMBRGBNCY COBE CO SAN ONORRE UNIT I TABLE 12-1: POWER DISTRIBUTION SYSTEM FMBA

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ITBM 1	DRAICR ID	COMPONENT ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF Detection	INUBRENT COMPENSATING PROVISIONS	BPFECT ON ECCS	REMARES
12.1.03.05.1 152	:-11C02	"A" CONTACTS	CONTACTS OPEN	BUS \$1C PARALLELED ALARM AND	PERIODIC TESTING	REDUNDANT TRAIN FOR SISLOP,	POTENTIAL LONG-TERM	TECH SPEC ACTION ENTRY
(BR	BAEBR)			DG DROOP CETS DISABLED.		NOME REQUIRED FOR SIS	INOPERABILITY OF TRAIN A DG DUB	
		Management of the contract of		BESULTS IN ISOCHRONOUS DG MODE			TO INABILITY TO TRANSPER BUS	DROOP MODE REQUIRED FOR
				WHICH CAN CAUSE DG OVERLOAD			#1C PRON DG TO ALTERNATE OR	PARALLELED OPERATION TO PERMIT
				TRIP DURING PARALLELED OPERATION FOR TESTING OR			NORMAL OFFSITE SOURCE WITHOUT	CONTROL OF DG LOADING. DROP AND PICKUP OTHERWISE REQUIRED
				POLLOWING OFF-SITE POWER			2004 or 2008 Parisa	444 114441 418481111 114411111
				RESTORATION POST-SISLOP				
12.1.03.05.2 152	-11002	"a" CONTACTS	CONTACTS CLOSED	BUS \$1C PARALLELED ALARM WILL	PBRIODIC TRATING	BEDUNDANT TRAIN FOR SISLOP,	INOPERABILITY OF TRAIN A DG	STECH SPEC ACTION BUTRY
2B)	(BARBR)			OCCUB W/ BUS BNERGIZED PRON		HOME REQUIRED FOR SIS		REQUIRED FOR THIS PAILURE.
				OTHER SOURCES. DG DROOP CET				MORNAL POSITION. ISOCHRONOUS
<del></del>				ALSO BNABLED, RESULTING IN LOSS OF DG PREQUENCY CONTROL				MODE REQUIRED FOR LOB, LOP OR SISLOP OPERATION TO ENSURE
				POR SISLOP				PROPER PREQUENCY FOR LOAD
								MOTOR PERFORMANCE
12.1.03.06.1 152	-11C02	"b" CONTACTS	CONTACTS OPEN	BUS #1C CANNOT BE RE-EMERGIZED	PERIODIC TESTING	MONE REQUIRED	NONE. NO INTERPUPTION OF BUS	NORMAL POSITION. DROP AND
(BB	BALBR)			FROM ALTERNATE SOURCE			SIC BCCS LOADS WILL OCCUR	DICTOR MIFT BERAFT IN
				POST-TRIP BICEPT BY DROP AND			DURING DROP AND PICKUP OF BUS	INTERRUPTION OF RCP OPERATION,
19 1 03 05 9 159	11003	*** CONTICTO	CON-1446 G1 0000	PICEUP OF BUS \$1A	DEDITABLE SPORTUC	NONE SEGUISED	PI A	IP RESTARTED, FOR SGTR EVENTS BREAKER AUXILIARY CONTACT
12.1.03.06.2 152	BAEBR)	"b" CONTACTS	CONTACTS CLOSED	INTERLOCK TO BUS TIR BREAKER LICOL DRPBATED, PERMITTING	LBRIANIC IRSIING	MOND EDMOISON	MONE	PAILURE AND CONCURRENT
100				MORNAL OPPSITE SOURCE AND MAIN				OPERATOR BREOR REQUIRED TO
				GENERATOR TO BE PARALLELED				PARALLEL MAIN GENERATOR
				HANUALLY THROUGH BUS \$10				THROUGH BUS \$1C. THIS IS A
				DURING WAIN GENERATOR				DOUBLE PAILURE SCRUARIO WHICH
				COAST-DOWN				IS OUTSIDE SIS/SISLOP DESIGN
T12:1:03:07:1T152	-11009	186, 1861	ON .	BREARER TRIPS AND SENDS	CONTROL ROOM INDICATION	BEDUNDANY YRATN	INOPERABLETTY OF TRAIN A	BASIS OF PLANT OVERLOAD LOCK-OUT PREVENTS
	LEARER)	(RBLAYS)	UM	OVERLOAD LOCK-OUT SIGNAL TO	CONTROL BOOK INDICATION	BDDORDAME INALM	INVESTIGATION OF THEIR A	CLOSING BREES TO A PAULTED BUS
,	,	(200)		BLOCK CLOSING OF DG BRER AND				
				BUS TIR BREE TO PREVENT				
				RE-ENERGIZING POTENTIALLY				
				FAULTED BUS. NO EFFECT IF DG				
				OR BUS TIR BREAKER ALREADY				
12.1.03.07.2 152	:-11C02	186, 1861	022	CLOSED BREAKER OVERLOAD TRIP	PERIODIC TESTING	NOWE REQUIRED FOR SIS/SISLOP	NONE FOR SIS/SISLOP	NORMAL POSITION. BUS FAULT
	BARBE	(BBLAYS)		DISABLED. IF A FAULT OCCURS,				PLUS BREE OVERCOAD RELAY
,	•	•		POTENTIALLY RESULTS IN 4kV				PAILURE IS A DOUBLE PAILURE
				ROOM BLECTRICAL PIRE		<u> </u>		SCHNARIO WHICH IS OUTSIDE
								SIS/SISCOP DESIGN BASIS OF
12 1 61 60 1 154	-11002	Bild File 13Enbe	VALTE LAW	0001800 C14404 60 4018000 AG	CUMADUI DUUM IMPIGMATUR	DENINGER TRACE TRACEION	INCORDABILITY OF TOALS A POD	PLANT PAILURE TO TRIP 11002 WOULD
12.1.03.08.1 152	BVEBB	BUS BIC 125VDC CONTROL POWER	VOLTS LOW	BRBARBR CANNOT BR TRIPPED OR BECLOSED, DEGRADING TRAIN A	CONTROL ROOM INDICATION	REDUNDANT TRAIN FOR SISLOP, NONE REQUIRED FOR SIS	INOPERABILITY OF TRAIN A FOR SISLOP, NORE FOR SIS	RESULT IN ENERGIZING C-YPHR
101		CONTRACT TOTAL		SISLOP RESPONSE		andormen ton min		PROM DG #1 VIA BUS #1C
12.1.04.01.1 152	-11404	BRBAEER	OPBN	LOSS OF POWER TO BCPS A AND C	CONTROL BOOM INDICATION	NORMAL OFFSITE SOURCE FOR SIS,	TRAIN A ALTERNATE OFFSITE	*NORMAL POSITION DURING PLANT
(88	BYERE!			IP DURING POWER OPERATION. BUS		BEDUNDANT TRAIN FOR SISLOP	SOURCE INOPERABLE, RESULTING IN	
				\$1A AND \$1C CANNOT BE PED PROM			POTENTIAL LONG-TERM	MAIN GRN TO GRID. SGTR DOSB
				ALTERNATE OFFSITE SOURCE		A	INOPERABILITY OF TRAIN A FOR	CALC RBV (TO PRECLUDE CREDIT
			•	(MAIN/A IPMRS)			SISLOP DUB TO INABILITY TO	POR RCPs) AND ROL REV REQD
							TRANSPER BUS AIC PRON DG TO OPFSITE SOURCE WITH C-XPMR	SINCE CANNOT START RCPs PRON BUS \$1C/2C POST-SIS/SISLOP
		•					RELATED LOP	WITHOUT INTERRUPTION OF BOCS
								LOADS DUB TO VOLT TRANSIBHT

PRESSURE, OR OVERCURRENT

	•	•				or the contract and the same contract of		
ITEM #	DRAICE ID	COMPONENT ID	FAILURE MORE	LOCAL BFFBCTS AND DEPENDENT FAILURES	MBTHOD OF DBTBCTION	INHERENT COMPENSATING PROVISIONS	RPFECT ON BCCS	REMARES
2.1.04.01.2	152-11404	BREARR	CLOSED	BUS DIA CANNOT BE ESCLATED	CONTROL ROOM INDICATION,	NONE REQUIRED FOR \$18/\$15LOP	NOME FOR SIS/SISLOP	NORMAL POSITION DURING POWE
	(BEBARER)		00000	PROM A-IPME AND MAIN GENERATOR FOR STARTUP OR LOVATS.	•	NAME SENTINGS	MAND CAR GIRLSTRACE	OPS. SWID SEER TRIPS AND RO OVERCURRENT TRIPS ISOLATE
··				INTERLOCES PREVENT CLOSURE OF BUS \$1C TIE BREAKER WITH MAIN GENERATOR TRIPPED (VOLTS LOW)				BMBRGT SOURCES FROM POTENTI MAIN CEMBRATOR PAULTS
				AND BOS BIC BURRGIZED PROM C-IPMR. NO BPFBCT IF BUS \$1C BURRGIZED FROM DG				•
.1.04.02.1	152-11A04 (BRBARBE)	BBI (BBLAY)	CONTACTS OPEN (OPP)	AUTONATIC PROLOSE OF BRIE FOR LOVATS IS DISABLED. MANUAL BREATER RECLOSURE FOR	PBRIODIC TESTING	NOMB_BESCOTABO	NORB	NORMAL POSITION. OPERATOR ACTION REQUIRED TO ALIGN ALTERNATE OPPSITE SOURCE EN
				ALIGNMENT OFF ALTERNATE OFFSITE SOURCE UNAFFECTED				TP COVATS PUNCTIONS AS
.1.04.02.2	(BEBAKES)	BBI (BBLAY)	CONTACTS CLOSED  (ON)	LOVATS RECLOSE SIGNAL TO BRAR, CAUSING PRENATURE RECLOSING	PRRIODIC TRATING	NONE BEGUIESD	NOWB	PARTIFICATION REQUIRED THAT
				BBFORE 18kV ISOLATION COMPLETE		******		FRETAL STATE BELLOIM (40R)
								PAILURE DUE TO PLASHOVER B RESIDUAL OUTPUT OF GENERATI
	152-11A04 (BRBAEBE)	186-1, 186-2, 186-2A (RBLAYS)	. OP?	AUTOMATIC TRIP OR LOCEOUT OF BREAKER OR INTERLOCE TO BUS TIR BRER 11001 TO ISOLATE	PBRIODIC TRSTING	NONE BEGNIESD	NOME	BACTUP TRIP FROM A-XPHR 18 OVERCURRENT ISOLATES FAULT FROM MAIN GENERATOR AND
	- ··			OVERCURRENT IS DISABLED				TRANSPORMER. FAULT CANNOT I (RB) BNBRGIZED WITHOUT A SE PAILURE (BG. BACKUP TRIP
	·	Market and all the second second second second						PAILURE OR OPBRATOR IN CLOS BUS TIE BRER), WHICH IS OUTSIDE SIS/SISLOP DESIGN BASIS
1.04.03.2	152-11A04 (BRBARBE)	186-1, 186-2, 186-2A (RBLAYS)	ON	BREAKER TRIPS, CANNOT BE RECLOSED TO ALIGN ALTERNATE OFFSITE SOURCE TO BUS \$10	CONTROL ROOM INDICATION	NORMAL OFFSITE SOURCE FOR SIS. REDUNDANT TRAIN FOR SISLOP	TRAIN A ALTERNATE OPPSITE SOURCE INOPERABLE, RESULTING IN	STECH SPEC ACTION BATES
		(200810)		VITALIB BOOKS TO BOR \$10			INOPERABILITY OF TRAIN A FOR SISLOP DUE TO INABILITY TO	
							TRANSPER BUS & C FRON DG TO OPPSITE SOURCE WITH C-IPMR RELATED LOP	
12.1:04.04.1 152-11A04 (BRBARBR)		TOTHER MAIN GEN MAIN/A/B-EPHR PROTECTIVE TRIPS	CONTACTS OPEN (OPP) S	BREATER WILL NOT TRIP IN EVENT OF IPMR DIFPERENTIAL, SUDDEN PRESSURE OR OTHER MAIN	PBBLODIC TBSTING	NONE BEGUEERD	NONE	MORNAL POSITION OF CONTACTS FAILURE ADDRESSES ONE TRIP FUNCTION (CONTACT SET) AT 1
			••	GRNBRATOR, MAIN IPMR OR A/B			,	TIMB. REMAINING PROTECTIVE TRIPS PREVENT PAULT
::1.04.04:2 152-11A04 (BRBAKER)		OTHER MAIN GEN MAIN/A/B-IPHE PROTECTIVE TRIPS	CONTACTS CLOSED (ON)	(SAMB AS 12.1.4.3.2)	CONTROL BOOM INDICATION	(SAMB AS 12.1.4.3.2)	(SAHB-AS-12.1.4.3.2)	PROPAGATION TO 4 EV ROOM  TECH SPEC ACTION ENTRY  REQUIRED FOR THIS CONDITION CONTACTS CLOSED ON
					······································	·		OUT-OP-STRP, OVERSPERD, LOS OP PIBLD, DIPPERENTIAL, NEGATIVE PHASE SEQUENCE,
						•	·	STATOR CROUND, SUDDEN

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ITBN \$	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL BEPECTS AND DEPENDENT FAILURES	NETHOD OF DETECTION	INBERBNY COMPRESATING PROVISIONS	BPFBCT ON BCCS	BEMARES
2.1.04.05.1	152-11404 (BRBAIRE)	194-2 (BBLAY)	CONTACTS OPBN	BRBARBR WILL NOT AUTOMATICALLY TRIP ON LOVATS SIGNAL (MAIN GRN TRIPPRD, NOTOR OPBRATED	PBBIODIC TBSTING	NOMB BEGNIEED	MONB	NORMAL POSITIOM. OPERATOR ACTION REQUIRED TO ALIGN ALTERNATE OPPSITE SOURCE EVEN
			• • • • • •	DISCONNECT CLOSED AND BUS \$1C/2C UNDERVOLTAGE). MANUAL TRIP AND RECLOSE UNAFFECTED				IP LOVATS PUNCTIONS AS DESIGNED
	(BRBAERR)	194-2 (RELAY)	CONTACTS CLOSED (ON)		CONTROL BOOM INDICALTON	(SANB AS 12.1.4.3.2)	(9AME AS 12.1.4.3.2)	STECH SPEC ACTION BUTEV REQUIRED FOR THIS CONDITION
2.1.04.06.1	152-11404 (BBBARBR)	"a" CONTACTS	CONTACTS OPBN	LOSS OF BERR CLOSED INTERLOCE TO RCP SLOW COASTDOWN ENABLE, SOURCES PARALLELED ALARM AND LOVATS END-OF-SEQUENCE	CONTROL ROOM INDICATION	NONE REQUIRED FOR SISLOP  ERDUNDANT TRAIN FOR SISLOP	POTENTIAL LONG-TERM INOPERIBILITY OF TRAIN A POR SISLOP DUE TO INABILITY TO TRANSPER BUS SIC FROM DG TO	*TECH SPEC ACTION BATET  REQUIRED FOR THIS COMDITION.  LOVATS AND RCP SLOW COASTDOWN  MOT CREDITED IN SIS/SISLOP
				INDICATION. LOSS OF DECOP  BNABLE INPUT PREVENTS TRANSPER OF BUS \$1C PROM DG TO ALTERNATE OPPSITE SOURCE			OFFSITE SOURCE FOR C-IFER RELATED LOP, WITHOUT LOSS OF ECCS LOADS	BVBNTS
				WITHOUT DROP AND PICEUP				
271704.0672	152-11A04 (BRBAEBE)	"a" Contacts	CONTACTS CLOSED	BCP SLOW COASTDOWN BNABLED, DC \$1 DROOP BNABLED WITE BUS \$1A/IC TIB BREAKER CLOSED.	CONTROL BOOM INDICATION	NOME BEQUIEED	NONB	*BOI REV REQD: IFRE FROM DG TO ALT OFFSITE SOURCE MUST OCCUR WITH BUS \$18 EMERGIZED BEFORE
				LOVATS MAY INDICATE  BND-OF-SEQUENCE PRIOR TO 11A04  RECLOSURE. DROOP BNABLED			·	TIR BREE CLOSED, WITH THIS PAILURE
			•	PREVENTS ISOCHRONOUS OPERATION OF DG WITH BUS \$1A-1C TIE-BREE CLOSED				
	152-11A04 (BBBAEBB)	"b" CONTACTS	CONTACTS OPEN	LOSS OF BREE OPEN INTERLOCE TO LOVATS AND BUS \$14-1C TIE BREE. LOVATS AUTO-OPEN OF	CONTROL ROOM INDICATION	MONE_REQUIERD_FOR_SIS/SISCOP_	NONE FOR SISTRESCOP	
				MOTOR OPERATED DISCORNECT AND RECLOSE OF 11A04/11804 DISABLED. TIE BEER CANNOT BE			·	
				CLOSED TO RE-ENERGIZE BUS \$1A T PROM OPPSITE BICEPT BY DROP AND PICEUP OF BUS \$1C				
	152-TTAO4 (BBBARBB)	b° CONTACTS	CONTACTS CLOSED "	TRIBRLOCK DISABLED TO BUS	CONTROL BOOM THDICATION	MONE ERGOTERD FOR SIZASISTOD	NOME FOR BIS/SIBLOP	SECOND PAILURE (OR OPERATOR BREOR) WEEDED POR PARALLELING OR HOD PAILURE TO OCCUR, WHICH
				GENERATOR TO HORMAL OFFSITE SOURCE THROUGH BUS \$1C. NO BFFECT ON MOD DUR TO SEPARATE				BASIS
·· <b>-</b>				GENERATOR VOLTS OPEN PERMISSIVE AND TRIP OF BUS LOAD BREAKERS				
	152-11AD4 (BRBAEBE)	BUS \$1A 125VDC CONTROL POWER	VOLTS LOW	BRER CANNOT BE TRIPPED IF CLOSED OR RECLOSED IF OPEN, RESULTING IN LOSS OF ALTERNATE	CONTROL BOOM INDICATION	NORMAL OFFSITE SOURCE FOR SIS, REDUNDANT TRAIN FOR SISLOP	TRAIN A ALTERNATE OPPSITE SOURCE INOPERABLE, RESULTING IN POTENTIAL LONG-TERM	
				OFFSITE SOURCE TO BUS \$10			INOPERABILITY OF TRAIN A FOR SISLOP DUE TO INABILITY TO TRANSFER BUS &IC FROM DG TO	

## SAN ONOFRE UNIT ! TABLE 12-1: POWER DISTRIBUTION SYSTEM FMBA

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	LTBM #	DBAIGE ID	COMPONENT ID	PAILUBB HODB	LOCAL BFFECTS AND DEPENDENT FAILURES	HETHOD OF DETECTION	INHBRBNT COMPRNSATING PROVISIONS	BFFECT ON BCCS	REMARES
									•
		WSR LOADS	BREAKER(S)	OPBN	CANNOT BE RESTARTED FOR SCTR. NO BFFECT ON BCCS LOADS	CONTROL ROOM INDICATION	NONE BEGUIERO	NONE	INCLUDES ECF-A, RCP-C BREARRES 152-11A03, 152-11A01 RESPECTIVELT
 	12.1.05.01.2	BUS ATA	BRBATER(S)	CLOSED	RCP A OR C CANNOT BE TELPPED TO CLEAR BUS \$1A	CONTROL ROOM ENDICATION	PLANT STARTUP, OR SISLOP.	EROUCRD BLEC HARGIN ON TRAIN A FOR SIS DURING PLANT S/U (W/ TIB BRER 11CO1 CLOSED). TRAIN A ALT OFFSITE BOURCE ALSO INOP.	OPERATION. TECH SPEC ACTION
		,	•				DOBING MORNAL OF SEATION	RESULTING IN POTENTIAL	SHOWN FOR SIS BY BUS VOLTAGE CALC DC-3325 (DC-3225 FOR
								SISCOP DUE TO THABILITY TO TRANSPER BUS BIC PROM DG TO OPPSITE W/C-1PHR LOP	POST-DCP-3552 COMPIGURATION)
		BUS 114 NSR LOADS	127-11 (RBLAY)	CONTACTS OPEN (OPF)	RCPS'A AND C'WILL NOT TRIP AUTOMATICALLY ON BUS \$1A UNDERVOLTAGE DURING NORMAL MAIN GENERATOR OPERATION. RCP	PERIODIC TESTING		REDUCED RELIABILITY OF YEARN A FOR SIS/SISLOP DURING PLANT STARTUP (WITH BUS \$1A-IC TIR BREE CLOSED). WORE FOR	HOBMAL POSITION. BUS \$1A UNDBRVOLTAGE RELAT
			<del></del>	·	SLOW COASTDOWN UNDERVOLTAGE TRIP, SIS/SISLOP TRIP AND		OPERATION	BIS/BISLOP DURING NORMAL OPERATION	
<u> </u>	12.1.05.02.2	BUS #1A NSR LOADS	127-11 (B8LAY)	CONTACTS CLOSED	MANUAL TRIPS UNAPPECTED  RCPS A AND C TRIP, CANNOT BE RESTARTED WITH MAIN GENERATOR  OPERATING. NO EPPECT ON	· · · · · · · · · · · · · · · · · · ·	NONE REQUIRED FOR SIS/SISLOP	NOME SOE BIS/SISTOD	
					RESTART AFTER MAIN GENERATOR TRIP				
	TZ.1.05.03.1	BUS PIA NSR LOADS	281-I 281-Y	ON (281-1 CLOSED, 281-7 OPEN)	RCP SLOW COASTDOWN UNDERVOLTAGE TRIP SMABLED, NORMAL UNDERVOLTAGE TRIP DISABLED	PERIODIC TESTING	BIS TRIP OF RCPS, DC AND SISLOP TRIP OF TIB BRER DURING PLANT STARTUP, NOMB REQUIRED	STARTUP (WITH BUS \$1A-1C TIR	GRNBRATOR PREQUENCY ( 58 HZ TO SBLBCT RCP SLOW COASTDOWN VS.
   					n 12 volen		POR SIS/SISLOP DUBING WORMAL OPERATION	OPERATION OR AFTER MAIN GENERATOR VOLTS ( 40%	BORMAL AT-POWER UNDERVOLTAGE TRIPS. NO REFECT ON MANUAL TRIP/RESTART OF RCPS FOR SGTR OR ALIGNMENT OF ALTERNATE
	12.1.05.03.2		281- <b>1</b>	OFF	RCP SLOW COASTDOWN	PBRIODIC TESTING	NORE REQUIRED FOR SIS/SISLOP	NONE FOR SIS/SISLOP	OPPSITE SOURCE NORMAL POSITION DURING POWER
		NSB LOADS	281-7	CLOSBO)	UNDERVOLTAGE TRIP DISABLED, MORMAL UNDERVOLTAGE TRIP ENABLED	,			OPERATION
	12.1.05.04.1	NSR LOADS	2271 (RBLAY)	(OPP)	RCP A AND C SLOW COASTDOWN TRIP DISABLED (TRIP WILL NOT OCCUR WITH MAIN GEN VOLTS (	PRRIODIC TRSTING	WORE REQUIEED FOR SIS/SISLOP	NORE FOR STS/STRLOP	RORMAL POSITION: MAIN GENERATOR UNDERVOLTAGE RELAY. SLOW COASTDOWN TRIP ENABLED
! !	14 -1-04 -44 -4	0110 - 414		COND. COR. CLASS.	40x): MORMAL UNDBRYOLTAGE; SIS/SISLOP AND MANUAL TRIPS UNAPPECTED				OBLY IF BREE 11404 OR 11804 IS CLOSED AND MAIN GENERATOR PREQUENCY IS ( 58 HZ.
	12.1:05:04:2	NSB FOADS	ZZ7I (BBLAY)	(OH)	RCP COASTDOWN TRIP WILL OCCUR- AS SOOM AS MAIN GRMBBATOR PREQUENCY ( 58 HZ, IRRESPECTIVE OF VOLTAGE.	PRRIODIC TESTING	WONE REQUIRED FOR SIS/SISLOP	HONE FOR SIS/SISLOP	RELAT DE-ENBEGIZED WERN HAIN CENBEATOR VOLTS ( 40 % AS PART OF ECP SLOW COASTDOWN SEQUENCE
i			e de pro-		NORMAL UNDERVOLTAGE TRIP, SIS/SISLOP AND MANUAL TRIPS UNAPPECTED				
İ									



# BMBRGBNCY CORB CO SYSTEM SINGLE PAILURE ANALYSIS SAM ONOFRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION STSTEM PMBA

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MAIN/A-IFMR POST-SGTR

ETEM #	DBAICE ID	COMPONENT ID	FALLURB MODE	LOCAL EPPECTS AND DEPENDENT PAILURES	MBTROD OF DBTBCTION	INHERBNT COMPENSATING PROVISIONS	BPFBCT ON BCCS	REMARKS
	ÚS ÁTA SR LOADS	194-2 (RBLAT)	CONTACTS OPEN (OFF)	LOVATS TRIP OF RCPS A AND C DISABLED. NORMAL UNDERVOLTAGE, SIS/SISLOP AND MANUAL TRIPS	PERIODIC TESTING	NOME REQUIRED FOR SIS/SISLOP	NONB FOR SIS/SISLOP	NORMAL POSITION. LOVATS NOT CREDITED FOR SIS/SISLOP BYENTS
2.1.05.05.2 B	US \$1A SR LOADS	194-2 (BBLAY)	CONTACTS CLOSED	UNAPPRETED  LOVATS TRIP OF RCPS A AND C. PUMPS CANNOT BE RESTARTED	PERIODIC TESTING	NOMB REQUIRED FOR SIS/SISLOP	NONE FOR 818/SISLOP	SECTE DOSE CALC REVISION REQUIRED TO PRECLUDE CREDIT
								FOR RCPS. BOI REVISION REQUIRED TO ADDRESS POTENTIAL INABILITY TO RESTART RCPS IN
.1.05.06.1 B	US #1A EDADS	186-SIS (BBLAY)	CONTACTS OPEN (OPP)	SIS/SISLOP TRIP OF RCPS A AND C DISABLED. SISLOP TRIP OF BUS			MARGIN FOR SIS AND REDUCED	UNAPPROTED LOOPS NORMAL POSITION. PAILURE TO TRIP RCPS DUR TO THIS SINGLE
	· · · · · · · · · · · · · · · · · · ·	· ····································		#1A-1C TIE BEBAEER 11CO1 UNAPPECTED		NORE REQUIRED FOR SIS DURING	RELIABILITY FOR SISLOP, DURING PLANT STARTUP (WITH BUS \$1A-IC TIE BREAKER LICOL CLOSED)	
2.1.05.06.2 B	US \$1A SR LOADS	186-SIS (RBLAY)	CONTACTS CLOSED (ON)	RCPS A AND C TRIP, CANNOT BE RESTARTED	CONTROL ROOM INDICATION	NONE REQUIRED FOR SIS/SISLOP	MONE FOR SIS/SISLOP	#SCTE DOSE CALC REVISION REQUIRED TO PRECLUDE CREDIT FOR RCPS
2.1.05.07.1 B	US #1A SR LOADS	BUS #1A 125VDC CONTROL POWER	VOLTS LOW	RCPS A AND C CANNOT BE TRIPPED OR RESTARTED. TIE BREE TRIP	CONTROL ROOM INDICATION		REDUCED TRAIN A SUBCTRICAL MARGIN FOR SIS DURING PLANT S/U [W/ TIN BRNE LICOI CLOSED].	*TECH SPEC ACTION BUTRY
				UNAPPECTED		MORHAL OPBRATION	TRAIN A ALT OPPSITE SOURCE ALSO INOP, CAUSING POTENTIAL LONG	PAILURE TO TRIP RCPs SHOWN ACCEPTABLE FOR SIS BY VOLTAGE
							TERM INOP OF TRAIN A FOR SISCOP DUB TO INABILITY TO TRANSPER BUS SIC PROM DG TO OPPSITE W/	POR POST-DCP 3558 CONFIGURATION)
2.1.06.01.1 B	US \$1A ONTROLS	194-2 (RBLAY)	CONTACTS OPEN (OFF)	BUS \$1A PREDER BRER 11A04 AND BCPS A AND C WILL NOT	PBRIODIC TESTING		C-YPHE LOP HOME FOR SIS/SISLOP	NORMAL POSITION. OPERATOR ACTION REQUIRED TO ALIGN
				AUTONATICALLY TRIP ON LOVATS SIGNAL, CAUSING SLOW RCP COASTDOWN ON MAIN GRNEBATOR			•	ALTREMATE OPPSITE SOURCE EVEN " IP LOVATS PUNCTIONS AS DESIGNED
2.1.06.01.2 B	IIS ALA	194-2 (RBLAY)	CONTACTS CLOSED	TRIPS UNAPPECTED UNDERVOLTAGE TRIP OF ALL RCPS.		MORNAL OPPSITE SOURCE FOR SIS,	TRAIN A ALTERNATE OFFSITE	*TECH SPEC ACTION BHTRY
	ONTROLS		(OM)	BICITER AND BUS FIA/1B PERDER BRERS 11A04 AND 11B04 FOR ANY MAIN GRUBBATOR TRIP WITH MOTOR			SOURCE INOPERABLE, RESULTING IN POTENTIAL LONG-TERM INOPERABILITY OF TRAIN A FOR	
				OPBRATED DISCORNECT CLOSED.  TRIP SIGNALS TO BUS \$18, BCP & AND RICITER RESET WHEN MOTOR			SISLOP DUE TO INABILITY TO TRANSFER BUS \$10 FROM DG TO OPPSITE SOURCE WITE C-IPHR	
2.1.07.01.1 1	69 11001	BREAKER	OPRN	OPERATED DISCONNECT IS OPENED LOSS OF POWER TO RCPS A AND C	CONTROL BOOM INDICATION	NONE REQUIRED FOR SIS.	RELATED LOP. NONE FOR BIS WITE NORMAL OFFSITE SOURCE ALIGNED TRAIN A ALTERNATE OFFSITE	*BOI REVISION REQUIRED TO
	BERVERE)	ORBAADB		DURING PLANT STARTUP, INABILITY TO ALIGN BUS \$1C TO	PERIODIC TESTING	BEDUNDANT TEXTS FOR SISCOP	SOURCE INOP, RESULTING IN POTENTIAL LONG-TERM INOP OP	PRECLUDE RCP RESTART FROM BUS \$1C/2C POST-SIS/SISLOP TO
÷				ALTERNATE SOURCE			TRAIN A FOR SISLOP DUB TO THABILITY TO TRANSPRE BUS FIC PROM DG TO OPPSITE SOURCE FOR	TRANSIBNT. SGTB DOSE CALC
							C-IPME RELATED LOP. RCPS A AND C CANNOT BE RE-EMBEGIZED FROM	CREDIT FOR RCP OPERATION

## EMBRGENCY CORE C SYSTEM SINGLE FAILURE AMALTSIS SAN OMORRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION SYSTEM PHEA

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ITBN #	DEAICE ID	COMPONENT ID	FAILURB MODB	LOCAL BFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INBERBUT COMPRUSATING PROVISIONS	BPFRCT ON BCCS	REMARES
12.1.07.01.2	152-11CO1 (BRBAEBE)	BBBÁÉBB	CLOSED	BUS STA CANNOT BE ISOLATED PROM BUS SIC	CONTROL BOOM INDICATION, PBBIODIC TBSTING	REQUIDANT TRAIN FOR SISLOP, RCP TRIP FOR SIS	TRAIM A INOPERABLE FOR SISLOP, REDUCED ERLIABILITY FOR SIS	EMORMAL DURING PLANT STARTUP OR ALIGNMENT OF ALTREMATE OFFSITE SOURCE TO BUS \$1C. BOI
		,						CHANGE REQUIRED TO PRECLUDE BCP RESTART POST-SIS/SISLOP IN
12.1.07.02.1		186 (11C02)	CONTACTS OPEN	BRRAERR CANNOT BE CLOSED	CONTROL BOOM INDICATION	REDUNDANT TRAIN	TRAIN A INOPERABLE	THIS ALIGNMENT TO PREVENT LOSS OF ECCS LOADS DUE TO SEVERE BUS UNDERVOLTAGE TRANSFENT 11C02-186 BELAT ALSO TRIPS
	(BREARES)		(ON)					11CO2 AND BLOCKS CLOSING OF DG BRER 11C14, RESULTING IN LOSS OF BUS 21C
12.1.01.02.2	152-11COI (BRBARBR)	186 (11002)	CONTACTS CLOSED (OPP)	OVERLOAD INTERLOCE FROM BUS FIC NORMAL PREDER 11CO2 DISABLED, PERMITTING	PBRIODIC TESTING	NORB BEGILERD	NONB	BORMAL POSITION. C-IPMR I-WHOG OVERCURENT LOCKOUT RELAY. SECOND FAILURE (EG. OPERATOR
	The Company of Communication of the Communication o	a. ,		PARALLELING OF BUS DIA TO FAULTED BUS				BRBOR) MERDED FOR PARALLELING TO OCCUR, WHICH IS OUTSIDE
12.1.07.03.1	152-11COT (BRBAESE)	T86-24 (11404)	CONTACTS OPEN (ON)	BRBARBR CANNOT BB CLOSED	CONTROL ROOM INDICATION	NORMAL OFFSITE SOURCE FOR SIS, REDUNDANT TRAIN FOR SISLOP	ALTERNATE OPPSITE SOURCE, RESULTING IN POTENTIAL	SIS/SISLOP DESIGN BASIS 11A04 186-2A RELAT ALSO TRIPS 11A04. RCPS A AND C UNAVAILABLE POST-SGTE AS A
							LONG-TREM INOPERABILITY OF TRAIN A FOR SISLOP DUE TO INABILITY TO TRANSPER BUS \$10	RESULT OF THIS PAILURE
12.1.07.03.2	152-11001	186-2A (11AO4)	CONTACTS CLOSED	OVERLOAD INTERLOCE PROM BUS	PERIODIC TESTING	MONE REQUIRED FOR SIS/SISLOP	PRON DG TO OFFSITE SOURCE WITH C-IPME RELATED LOP NOME POR SIS/SISLOP	NORMAL POSITION. SECOND
	(BREAKER)		(OFF)	\$1A NORMAL PREDER 11AO( DISABLED, PERMITTING PARALLELING OF BUS \$1C TO	100110	MAND TOTAL TOP STATES AND	•	FAILURE (EG. OPERATOR BRROR) MEDBO FOR PARALLELING TO OCCUR, WHICH IS OUTSIDE THE
12.1.07.04.1	152-11CO1 (BRBAKER)	152-11CO2 "b" CONTACTS	CONTACTS OPEN	PAULTED BUS BRBARBR CANNOT BE CLOSED TO BNBRGIZE BUS \$1C FROM	PERIODIC TESTING	WOME REQUIRED FOR SIS/SISLOP	NONE FOR SIS/SISLOP. NO INTERRUPTION OF ECCS LOADS WILL	
		MATERIAL STATES		ALTERNATE OFFSITE SOURCE POST-TRIP BICEPT BY DROP AND PICEUP OF BUS \$1A			OCCUR DURING DROP AND PICKUP OF BUS \$1A	LOSS OF WORNAL OFFSITE SOURCE. CONTACTS PARALLELED WITH 227-Y RELAT CONTACTS (WHICH OPEN ON
			•					LOW MAIN GENERATOR VOLTAGE) IN BREAKER CONTROL CIRCUIT
12.17.07.04.2	15Z-TICO1 (BRBAKBR)	152-11CO2 "b" CONTACTS	CONTACTS CLOSED	INTERLOCE FROM LICOZ DEPRATED, PERMITTING MORNAL OPPSITE SOURCE AND MAIN GENERATOR TO BE PARALLELED MANUALLY TREOUGR		NORR REGUIERD FOR BIS/SISLOP		CONCURRENT OPERATOR BERGE IS REQUIEED FOR PARALLELING TO OCCUB, WHICH IS A DOUBLE PAILURE SCHARTO OUTSIDE THE
	-			BUS \$10 DURING MAIN GENERATOR COASTDOWN	•			SIS/SISLOP DESIGN BASIS
12.1.07.05.1	(BRBAERR)	"b" CONTACTS	CONTACTS OPEN	BREAKER CANNOT BE CLOSED POST-TRIP UNLESS BUS \$1C FEBDER BRER 11CO2 IS OPEN.	PBBIODIC TESTING	NONE REQUIRED FOR SIS/SISLOP		TRANSPER TO ALTBENATE OPPSITE SOURCE NOT REQUIRED FOR SIS, UNAPPECTED FOR SISLOP. FAILURE
, ,			•	REQUIRES TRANSFER BY DROP AND PICEUP FOR SIS. NO REFECT FOR SISLOP OR WITH MAIN GENERATOR ON LINE				DORS NOT PREVENT RCPS A AND C RESTART FOR SCTR FROM ALTERNATE OPPSITE SOURCE, IF NERDED

EMBROSHCY CORS CO TYSTEM SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT I
TABLE 12-1: POWER DISTRIBUTION SYSTEM FREA

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1188 (	DEVICE ID	COMPONENT ID	PAILURE MODE	LOCAL BPPECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	I WHERENT COMPENSATING PROVISIONS	BPFECT ON BCCS	BRMARES
2.1.07.05.2 152 (BR	:-IICOI RBAEBR)	152-11A04 "b" CONTACTS	CONTACTS CLOSED	INTERLOCE FROM 11404 DEFEATED, PREMITTING NORMAL OFFSITE	PBRIODIC TESTING	NOME EBSULEED FOR SIS/SISIOP	NOUR POR SIS/SISLOP	THIS SINGLE FAILURE PLUS CONCURRENT OPERATOR REROR
				SOURCE AND MAIN GENERATOR TO BE PARALLELED MANUALLY TEROUGH BUS \$1C DURING MAIN GENERATOR COASTDOWN. NO EFFECT WITH MAIN			<u> </u>	REQUIRED FOR PARALLELING, WHICH IS A DOUBLE FAILURE OUTSIDE SIS/SISLOP DESIGN BASIS
12.1.07.06.1 152-11C01 (898AR3R)		2277 (RELAT)	CONTACTS OPEN	GENERATOR ON LINE BUS \$1A AND 1C CANNOT BE PARALLELED DURING NORMAL POWER	PBRIODIC TESTING	NOME BEQUIRED FOR 313/31SLOP	NOME FOR 818/918LOP	MORMAL POSITION FOLLOWING PLANT TRIP AND MAIN
				OPBRATION BICEPT BY DROP AND PICTUP OP BITHER BUS. NO EPPECT ON BUS OPERATIONS				GBMERATOR/RCP COASTOOM
.1.07.06.2 152 {08	!-  CO   BARSE	2277 (RBLAT)	CONTACTS CLOSED (OPP)	POST-TRIP INTERLOCE PROM MAIN GENERATOR VOLTAGE DEPEATED, PERMITTING	PBBIODIC TBSTING	NORE REQUIRED FOR SIS/SISLOP	NONE FOR SIS/SISLOP	NORMAL POSITION DURING POWER OPERATION. THIS FAILURE PLUS
				NORMAL OPPSITE SOURCE TO BE PARALLELED MANUALLY WITH MAIN GENERATOR THROUGH BUS \$10				CONCURRENT OPERATOR ERROR DURING SIS/SISLOP EVENT IS A DOUBLE PAILURE WHICH IS
.1.07.07.1 152	2-11C01	SEQ 1	CONTACTS OPBN	DURING MAIN GENERATOR COASTDOWN BREAKER WILL NOT TRIP ON	PRBIODIC TESTING	NOME REQUIRED FOR SIS OR FOR	MOME FOR SIS, POTENTIAL	OUTSIDE PLANT DESIGN BASIS  NORMAL POSITION. TRIP BUSURES
(B2	REARER)	(13-97,11)	(OFF)	SISTOD		SISLOP DURING NORMAL POWER OPERATION. REDUNDANT TRAIN FOR SISLOP DURING PLANT STARTUP	(WITH BUS \$1A/IC TIE BERARRE	THAT DG DORS NOT ATTEMPT TO EMBRGIZE RCP& POST-SISLOP
.1.07.07. <b>2</b> 152 (BR	I-11CO1	SBQ 1 (13-9,11)	CONTACTS CLOSED (ON)	BREAKER TRIPS AND CANNOT BE EBCLOSED, PREVENTING BUS \$1A	CONTROL ROOM INDICATION	NORMAL OFFSITE SOURCE FOR SIS, BEDUNDANT TRAIN FOR SISLOP	ALTERNATE OFFSITE SOURCE,	*TECH SPEC ACTION BUTRY REQUIRED WITH THIS PAILURE
				AND IC PROM BRING PARALLELED "			RESULTING IN POTENTIAL LONG-TERM INOPERABILITY OF TRAIN A FOR SISLOP DUE TO	
	•						THABILITY TO TRANSPER BUS SICTION DG TO OPPSITE SOURCE WITH C-IPHE RELATED LOP	
.1:07:08:1-152 (BB	:-11COI (BARBR)	194 (RBLAY)	CONTACTS OPEN (OPP)	BREATER WILL NOT TRIP ON BUS - \$IC UNDERVOLTAGE. SEPARATE SEQ 1 SISLOP SIGNAL TO BREATER NOT	1	REDUNDANT TRAIN FOR SIS, NOWE REQUIRED FOR SISLOP	REDUCED RELIABILITY OF TRAIN A FOR SIS DURING PLANT STARTUP (WITH BUS \$14/1C TIE BREE	ACTUATED BY SEQ 1 (SISLOP ONLY) OR BUS \$1C UNDERVOLTAGE.
				APPBCTBD			CLOSED). HOME FOR SISLOP DUE TO SEPARATE SISLOP TRIP OF TIE SERR	ABLAY  BBLAY  RBLAY
.1.07.08.2 152 (BB	E-11CO1 REAKER)	194 (BBLAT)	CONTACTS CLOSED (ON)	BREAKER TRIPS, CAN BE RECLOSED IP WEBDED AFTER 2 SEC. IF FAILURE OCCURS WHEN BREAKER	PRRIODIC TRATING	REDUNDANT TRAIN POR SIS, NONE REQUIRED FOR SISLOP	REDUCED RELIABILITY OF TRAIN A FOR SIS DURING PLANT STARTUP (NITS BUS \$14/10 TIE BREE	*TECH SPEC ACTION BUTRY BEQUIRED WITH BUS \$1C BUBRGIZED FROM ALTERNATE
				OPEN (BG. NORMAL POWER OPERATION), WILL NOT			CLOSED). NOME FOR SISLOP DUB TO SEPARATE SISLOP TRIP OF TIE	
				SUBSEQUENTLY TRIP IF MEBDED.  SISLOP TRIP OF BREE UNAFFECTED			D000	

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# MBT1	DBVICE ID	COMPONENT ID	FAILURB MODE	LOCAL BPFECTS AND DEPENDENT FAILURES	MBTHOD OF DBTECTION	INHBERNT COMPRISATING PROVISIONS	BPFBCT ON BCCS	BENARRS
12.1.01.09.1 1	52-11CO1 BREAKER)	"a" CONTACTS	OPBM	SOURCES PARALLELED ALARM AND DG DROOP CIRCUIT IMPUT DISABLED. RESULTS IM	PBRIODIC YESTING	REDUNDANT TRAIN FOR SISLOP, NOME REQUIRED FOR SIS	POTENTIAL LONG-TERM INOPERABILITY OF TRAIN A FOR SISLOP DUE TO INABILITY TO	*NORMAL POSITION DURING POWER OPERATION. TECH SPEC ACTION BUTRY REQUIRED FOR THIS
			· · · · · · · · · · · · · · · · · · ·	ISOCHRONOUS DG MODE IP BREE 11AC4 CLOSED (EG. TO RESTART ECPS), WHICH CAN CAUSE DG			TRANSPER BUS JIC PROM DC TO OPPSITE SOURCE WITH C-IPMR RELATED LOP, WOME FOR SIS	FAILURB. DROOP MODE REQUIRED TO CONTROL DG LOAD WHEN PARALLELED TO OFFSITE SOURCE. OTERRWISE DROP AND PICKUP
				OVERLOAD TRIP DURING TRANSPER BACE TO OPPSITE POWER FOR SISLOP RECOVERY				BEGUIEED
12.1.67.09.2 1	BERAKBE)	"a" CONTACTS	CLOSED	SOURCES PARALLELED ALARM WILL OCCUR WITH BRERS 11A04 AND 11COZ CLOSED (EG. DURING	PERIODIC TESTING	REDUNDANT TRAIN FOR SISLOP, NONE REQUIRED FOR SIS	POTENTIAL INOPERABILITY OF TRAIN A DG FOR SISLOP, NONE FOR SIS	REQUIRED FOR LOB, LOP OR
			:	NORMAL OPERATION). DG DROOP CIRCUIT BWABLED IF BREE 11404 CLOSED (RG. TO RESTART RCPS				SISLOP OPERATION TO BUSURE PROPER PREQUENCY FOR LOAD MOTOR OPERATION
				POST-SIS/SISLOP), RESULTING IN LOSS OF DG PREQ CONTROL FOR SISLOP				
12.1.07.10.1 1	52-11CO1 BRBAKER)	"b" CONTACTS	OPBN	DC BREAKER CANNOY BE CLOSED	PRRIODIC TRATING	REDUNDANT TRAIN FOR SISLOP, NOME REQUIRED FOR SIS	INOPERABILITY OF TRAIN A FOR SISLOP, NOME FOR SIS	NORMAL POSITION DURING PLANT STARTUP. INTERLOCES DO NOT BLOCE CLOSING OP BUS TIE BREE
2.1.07.10.2 1	62 11001	"b" CONTACTS	CLOSED	INTERLOCE TO DG BEBARER	PERIODIC TESTING	NOME REQUIRED FOR SIS/SISLOP	NOME FOR SIS/SISLOP	IICOI IP DG BRER ALREADY CLOSED NORMAL POSITION DURING POWER
	BERNERB)	6 CONTACTS		DISABLED, PREMITTING DG BRRE TO CLOSE WHEN BUS \$1A PARALLELED TO BUS \$1C (EG.	PRETOUTE ISSUING	NORD ERMOTERN FOR STS/STSLOP	NORD FOR 013/313LOF	OPBRATION. SEPARATE SISLOP TRIP OF BREE PREVENTS AUTOMATIC PARALLELING FOR
		·· <del></del> -····   ··   .	, · · · · · · · · · · · · · · · · · · ·	DURING PLANT STARTUP)		en and committee on the control of t	,	SISLOP BUENT. SECOND PAILURE OR OPERATOR BREOR REQUIRED TO INADVERTANTLY PARALLEL FOR SIS
(2777.097711.1 1 (	52-T1CO1 BRBAKER)	(11001)	ON	BREARRY TRIPS AND SENDS OVERLOAD LOCE-OUT SIGNAL TO BLOCE CLOSING OF DG BREE, TO PREVENT RE-EMERCIZING POTENTIALLY FAULTED BUS	CONTROL ROOM INDICATION	NORMAL OPPSITE SOURCE FOR SIS BEDUNDANT TRAIN FOR SISLOP	, INOPERABILITY OF TRAIN A ALTERNATE OFFSITE SOURCE AND DG	
2/1/07/11/72/1 (	52-11CO1 BREAKBR)	186 (11CO1)	OFF	BREAREE OVERLOAD TRIP DISASCE	PREIODIC TESTING	NORE ERQUIRED FOR SIS/SISLOP	NONE FOR SIS/SISCOP	NORMAL POSITION. SEPARATE BUS \$14/1C FEEDER BREAEER OVERCURRENT TRIPS YOULD CLEAS
12.1.07.12.1 1	52-11CO1 BRBARRE)	BUS #1C 125VDC CONTROL POWER	VOLTS LOW	BREAKER CANNOT BE TRIPPED OR RECLOSED, DEGRADING TRAIN A	CONTROL ROOM INDICATION	REDUNDANT TRAIN FOR SISLOP FROM NORMAL ALIGNMENT, NOME	SINOPBRABILITY OF TRAIN A FOR SISLOP, AND TRAIN B FOR SISLOP	FAULTS WITH THIS FAILURE SINCE HAIN GENERATOR COASTDOWN ON APPECTED BUSSES
				TRAIN B SISLOP IF BRBARBR INITIALLY CLOSED TO ALIGN BUS	i	FOR TRAIN A INITIALLY ALIGNED TO ALTERNATE OPPSITE SOURCE	WITH TRAIN A ALIGNED TO ALTERNATE OPPSITE SOURCE	PREVENTS SISLOP DETECTION, WITH OR WITHOUT A CONCURRENT SINGLE PAILURB, TECH SPEC
				SOURCE				1.0.3 ACTION BUTEF 19 BEQUIRE WHENEVER BUS \$1C OR 2C IS ALIGNED TO THE ALTERNATE

### SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPER UNIT 1 TABLE 12-1: POWER DISTRIBUTION SYSTEM PREA

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	•	· · · · · · · · · · · · · · · · · · ·		<u> </u>		THIS BLOCK OF RECORDS RESERVED FOR DUPLICATION OF DG BREAKER RECORDS FROM SECTION
						10, IP REQUIRED)
						,
BREAKER	OPBN		CONTROL BOOM INDICATION			
		IMMEDIATE LOSS OF REP UTR PP,		BACEUP N2) AND 8V-3900 FOR	TO UNISOLABLE BYPASS THROUGH	ADDITIONALLY, ROI REVISION
						PUMPS PRIOR TO LOSS OF 125VDC
		• • • • • • • • • • • • • • • • • • • •		IOS SECONDS ONE SEEL SECONDS		BUS \$1 POR THIS PAILURS, TO
		MPW PP, CHG PP, DG AND DC BUS				BUSURE BE TERMINATION AT LO-LO
/ <del>-</del> · · - · -		\$1 DUR TO LOSS OF COOLING AND BATTERY CHARGING				RUST LEVEL SETPOINT
BREAKER	CŁOSED	NONE	CONTROL BOOM INDICATION	NONE BEGUIRED	MONE	*TECH SPEC ACTION ENTRY
						BRQUIRBD IF 480V SWCR \$1 BRBAERR IN LIEU OF SST \$1 VIA
BUO 410 145WD0	1101.00 1.011	BOD. BOD 4.11100 AD 4074000 AD				TUES BREAKER
•	VOLTS LOW		CONTROL ROOM INDICATION	NOME BEGNIESD	HONB	
	OPRN		CONTROL ROOM INDICATION	HPS POR TOANS BRONTERS THE 20	TARS OF WARREY PAUSE ROUSER VA	SST AS ACC DEEDED ROBINED
	****	SWGR #3 AND MCCS, INCLUDING	***************************************	MIN. OF ACTION TO BESTORE		INCLUDES CONTROL ROOM
		MOV-883 AND DMOV-358/850C UPS		POWER >30 MIN PROM SWGR \$1-3		BANDSWITCH AND LOCAL/REMOTE
		BATTERT CHARGER		OR 2-3 TER BRER		INDICATION. WORNAL POSITION
	****	***************************************				POST-SIS/SISLOP
DESASER	CLOSRO		PRRIODIC TRATING			NORMAL POSITION DURING POWER OPERATION. SWCE 35 POWERED
					•	LOADS NOT ASSUMBD IN DG
				** 1345 (818001)		LOADING OR BUS VOLTAGE CALCS.
		SISLOP UNAPPRETED				AND MUST ALSO BE LOCEED OUT ON
						SISLOP TO PRECLUDE PAILURE
						PROPAGATION PROM UNQUALIFIED
152-12011	OPRN	RDED CANNOT RE DECLOSED IS	PERIODIC TESTING	(91MP AQ 17 1 16 1 11	(91MP 10 19 1 1A 1 1)	MCC-3 IN TURBING SLOC FOR MSLO ONLY ONE BREE (11011 OR 12011)
	01.04		LPSTONIO ISSILMO	(3408 80 16.1.10.1.1)		RACEBO IN AT ONE TIME TO
						PRECLODE PARALLELING REDUNDANT
						4kV BUS \$1C AND 2C
	CLOSEC		PERIODIC TESTING	CBLL SWITCH FROM 12C11	REDUCED REDUNDANCY AGAINST	FICIL MORMALLY RACKED IN AND
-b- CONTACTS		WITH 12C11 BACKED IN		BRBAEBR WHBNEVER 12C11 IS NOT		12C11 BORMALLY TRIPPED AND RACKED OUT (IB, "b" CONTACTS CLOSED)
152-12011	OPBN	BEBARR WILL NOT TRIP OPEN	PERIODIC TESTING			MORNAC POSITION ALLE ISCLE
CBLL SWITCH CONTACTS		WHEN 12CII BACKED IN		CONTACTS FROM 11C11 PROVIDE TRIP AND PREVENT CLOSING OF	PARALLELING BUS #1C AND 2C	BACERD OUT
				12CI1 BYEN IF BACKED IN		
	BUS \$1C 125VDC CONTROL POWER BREARER  BREARER  152-12C11 "b" CONTACTS  152-12C11 "b" CONTACTS	BREATER CLOSED  BUS \$1C 125VDC VOLTS LOW CONTROL POWER BREATER OPEN  BEBATER CLOSED  152-12C11 OPEN  152-12C11 CLOSED  152-12C11 CLOSED  152-12C11 CPEN CONTACTS	SUGR \$1 AND MCCS, INCLUDING IMMEDIATE LOSS OF REP WTR PP, RECIEC, CCW, SWC, 2 MFW 140LATION MOVS, I SI/CLR PLOW PATH, AND DELATED FAILURE OF MFW PP, CBC PP, DG AND DC BUS \$1 DUR TO LOSS OF COOLING AND BATTERY CHARGING NONE  BUS \$1C 125VDC VOLTS LOW BREARER CANNOT BE TRIPPED OR RECLOSED NONE  BUS \$1C 125VDC VOLTS LOW BREARER CANNOT BE TRIPPED OR SECLOSED NONE  BUS \$1C 125VDC VOLTS LOW BREARER CANNOT BE TRIPPED OR RECLOSED NONE  BREARER OPEN LOSS OF POWER TO LOADS ON 4800 SUGR \$3 AND MCCS, INCLUDING MOV-883 AND DMOV-358/850C UPS BATTERY CHARGER  BEBARER CLOSED BREARER WILL NOT TRIP ON SEQ 1 SIS/SISLOP OR BUS \$1C UNDERVOLTAGE. SUGR \$3 480V BERR 52-1303 TRIP ON SEQ 2 SISLOP UNAPPECTED  152-12C11 OPEN BREE CANNOT BE RECLOSED IF TRIPPED (BG. ON SIS/SISLOP)  152-12C11 CLOSED BREE CAN RECRIVE CLOSE SIGNAL WITH 12C11 BACERD IN THE 12C11 BACERD IN THE 12C11 BACERD IN WHEN 12C11 BACERD IN	SNOR \$1 AND MCCS, INCLUDING IMMEDIATE LOSS OF REP WITE PP, REGIEC, CCM, SWC, 2 MPW ISOLATION BOYS, I ST/CLE PLOW PATB, AND DELATED PAILURE OF MPW PP, CEG PP, DC AND DC BUS \$1 DUR TO LOSS OF COOLING AND BATTERT CHARGING  BUS \$1C 125VDC VOLTS LOW BERAEER CLOSED HOME CONTROL BOOM INDICATION  BUS \$1C 125VDC VOLTS LOW CONTROL POWER BREAEER OPEN LOSS OF POWER TO LOADS ON 480V CONTROL BOOM INDICATION SWCR \$1 AND MCCS, INCLUDING HOV-883 AND DHOY-358/850C UPS BATTERT CHARGES  BREAEER CLOSED BREAEER WILL NOT TRIP ON SEQ 1 PERIODIC TESTING SIS/SISLOP OR BUS \$1C UNDERSOLTAGE, SWCR \$1 480V BREE 52-1103 TRIP ON SEQ 2 SISLOP UNAPPECTED  152-12C11 OPEN BREE CANNOT BE RECLOSED IF TEIPPED (BC. ON SIS/SISLOP)  152-12C11 CLOSED BREE CAN RECRIVE CLOSE SIGNAL PERIODIC TESTING "5" CONTACTS WITH IZC11 RACKED IN  152-12C11 OPEN BREE CAN RECRIVE CLOSE SIGNAL PERIODIC TESTING TEIPPED (BC. ON TIS/SISLOP)  152-12C11 OPEN BREE CAN RECRIVE CLOSE SIGNAL PERIODIC TESTING THE IZC11 RACKED IN  152-12C11 OPEN BREERER WILL NOT TRIP OPEN PERIODIC TESTING CELL SWITCH WEEN IZC11 RACKED IN	SNOR \$1 AND NOCS, INCLUDING  IRREDIATE LOSS OF BRY BYP PP,  RECIEC, CCU, SYC, 1 BYP  ISOLATION BOYS, I SIZUE FLOW  PATES, PAIL—CLOSED DEF STEP OF PP,  RECIEC, CCU, SYC, 1 BYP  ISOLATION BOYS, I SIZUE FLOW  PATES, AND DELIAND FAILURE OF  MEW PP, CRG PP, DG AND DG BUS  #I DUR TO LOSS OF COOLING AND  BATTEST CRACKING  BUS \$1C 125YDC VOLTS LOW  BREATEST CRACKING  BUS \$1C 125YDC VOLTS LOW  BREATEST CRACKING  BUS \$1C 125YDC VOLTS LOW  BREATEST CRACKING  BUS \$1C 125YDC VOLTS LOW  BREATEST CRACKING  BUS \$1C 125YDC VOLTS LOW  BREATEST CRACKING  BUS \$1C 125YDC VOLTS LOW  BREATEST CRACKING  BUS \$1C 125YDC VOLTS LOW  BREATEST CRACKING  BUS \$1C 125YDC VOLTS LOW  BREATEST CRACKING  BUS \$1C 125YDC VOLTS LOW  BREATEST CRACKING  BUS \$1C 125YDC VOLTS LOW  BREATEST CRACKING  BUS \$1C 125YDC VOLTS LOW  BREATEST CRACKING  BREATEST CRACKING  BREATEST CRACKING  BREATEST CRACKING  BREATEST CRACKING  BREATEST LOW HOWE  CONTROL POWER  BREATEST LOW HOWE  BREATEST CRACKING  BREATEST LOW HOWE  BREATEST CRACKING  BREATEST VILL NOT TRIP ON SEQ 1  \$152-12C11  OPEN  BREATEST VILL NOT TRIP OPEN  BREATEST VI	SWE 21 JUST CASE STATES CARROT BE TRIPPED OF CONTROL BOOM INDICATION NOWS REQUIRED NOWS  BREATER CLOSED NOWS TRIPPED OF CONTROL BOOM INDICATION NOWS REQUIRED NOWS  BREATER CLOSED NOWS TRIPPED OF CONTROL BOOM INDICATION NOWS REQUIRED NOWS  BREATER CLOSED NOWS REPLIES CARNOT BE TRIPPED OF CONTROL BOOM INDICATION NOWS REQUIRED NOWS  BREATER CLOSED NOWS REALES CANNOT BE TRIPPED OF CONTROL BOOM INDICATION NOWS REQUIRED NOWS  BREATER CARROTH BE TRIPPED OF CONTROL BOOM INDICATION NOWS REQUIRED NOWS  BREATER OPEN COSTO PROPER TO LOADS ON 480W CONTROL BOOM INDICATION NOWS REQUIRED NOWS  BREATER OPEN COSTO PROPER TO LOADS ON 480W CONTROL BOOM INDICATION NOWS REQUIRED NOWS  BREATER CRACERS NOW PROPER TO LOADS ON 480W CONTROL BOOM INDICATION NOWS REQUIRED NOWS  BREATER CRACERS NOW PROPER TO LOADS ON 480W CONTROL BOOM INDICATION NOWS REQUIRED NOWS  BREATER CRACERS NOW PROPER TO LOADS ON 480W CONTROL BOOM INDICATION NOWS REQUIRED NOWS  BREATER CRACERS NOW PROPER TO LOADS ON 480W CONTROL BOOM INDICATION NOWS REQUIRED NOWS  BREATER VILL NOT TRIP ON 580W PRESCOURS NOW PROPER SHORE SHORE \$1 LOADS  BREATER VILL NOT TRIP ON 580W I PROPERTY OF SHORE SHORE \$1 LOADS  BREATER VILL NOT TRIP ON 580W I LOADS NOW INDICATION NOWS REQUIRED TO THE REPORT OF BREAD SHORE \$1 LOADS  BREATER VILL NOT TRIP ON 580W I LOADS NOW INDICATION NOWS REQUIRED TO THE REPORT OF BREAD SHIP TRIP OF BREAD SHIP TRIP OF BREAD SHIP TRIP TRIP OF BREAD SHIP TRIP TRIP TRIP TRIP TRIP TRIP TRIP TR

# Hati	DRAICR ID	COMPONENT ID	FAILURB BODB	LOCAL BFFECTS AND DEPENDENT PAILURES	DETECTION NETHOD OF	INUBRENT COMPENSATING PROVISIONS	BPPBCT ON BCCS	REMARES
T2:77:10.0372	152-11CIT {BRBAKBK}	152-12011 CBLL SWITCH CONTACTS	CLOSED	BREARER WILL TRIP AND CANNOT BE RECLOSED, CAUSING LOSS OF POWER TO LOADS ON 480V SWCR #:		MIN, OP ACTION TO RESTORE POWER > 30 MIN PROM SWGR \$1-3	FORE \$3 FORDS	
				AND MCCS, INCLUDING MOV-883 AND MOV-358/850C UPS BATTERY CHARGER		OR 2-3 TIE BREE		
72.17.10.04.7	152-11CIT (BRBAEBR)	SEQ T (18-2,4)	CONTACTS OPBN (OPP)	BREARER WILL NOT TRIP ON SIS/SISLOP. SWCR #3 480V BRER 52-1303 TRIP ON SRQ 2 SISLOP	PRRIODIC TRATING	(SAME AS 12.1.10.1.2)	(SAME AS 18.1.(0.1.2)	NORMAL POSITION
12.1.10.04.2	152-11C11 (BRBARBR)	SBQ 1 (18-2,4)	CONTACTS CLOSED (ON)	UMAPPECTED BREAKER WILL TRIP, CANNOT BE RECLOSED	CONTROL ROOM INDICATION	(SAMB AS 12.1.10.1.1)	(SAME AS 12.1.10.1.1)	SEQ INPUT TO BREAKER IS A MOMENTARY TRIP. RELAY PAILURE
12.1.10.05.1	152-11C11 (BRBARBR)	127-511 (RBLAY)	CONTACTS OPEN (OPP)	\$1C UNDERVOLTAGE. SIS/SISLOP	PBRIODIC TRSTING	NOME REQUIRED FOR SIS/SISLOP	NONE FOR SIS/SISLOP	BRALS-IN SIGNAL NORMAL POSITION. UNDBRVOLTAGE TRIP AT 11.5 SEC IS NOT
12.1.10.05.2	152-11C11 (BREARER)	127-511 (RBLAT)	CONTACTS CLOSED	TRIP UNAPPECTED  BREAKER WILL TRIP, CANANOT BE RECLOSED	CONTROL BOOM INDICATION	(SAME AS 12.1.10.1.1)	(SAME AS 12.1.10.1.1) -	CREDITED FOR SISCOP BURNES
12.71. (0.705.77		BUS NIC 125VDC CONTROL POWER		BREARER CANNOT BE TRIPPED OR RECLOSED	CONTROL BOOM INDICATION	EBDONDINY TEATH FOR STS, TEATH B TRIP OF BRRR 52-1303 FOR SISLOP, UPS FOR REQUIRED LOADS	SIS, REDUCED RELIABILITY FOR	DC LOADING AND BUS VOLTAGE CALCULATIONS DO NOT INCLUDE SWCR #3 LOADS, AND ISOLATION
						MINUTES TO CLOSE 480 V TIE	BORRAL FORMS TO SEGRE 13 FORDS	HSLB OUTSIDE CONTAINMENT DUB TO UNQUALIFIED MCC-3 IN
12.1.11.01.1	BUS DIC MSR LOADS	BRBARRR	OPBN	TRAIN A MAIN CIRC PUMP, TPCW PUMP, CONDRISATE PUMP(S),	CONTROL GOOM INDICATION	NOMB REQUIRED FOR SIS/SISLOP	NONE FOR SIS/SISLOP	TURBINE BLDG INCLUDES BEBAERES 11CO3, 11CO6, 11CO8, 11CO9, 11C12,
				BRATER DRAIN PUMP OR MORMAL TELESTING TRANSPORMER TRIPS AND CANNOT BE RE-BNERGIZED	)			11013
127171170172	BUS AIC WSR LOADS	BERYES	CLOSED	TRAIN A MAIN CIRC PUMP, TPCW PUMP, CONDRINGATE PUMP(S), HEATER DRAIN PUMP OR MORMAL	CONTROL BOOM INDICATION	REDUNDANT TRAIN	INOPERABILITY OF YEALH A FOR SISLOP, REDUCED RELIABILITY POR SIS	
				LIGHTING TRANSPORMER CANNOT BE TRIPPED ON BUS UNDERVOLTAGE OF SEQ (AS APPLICABLE)				PART OF MPW ISOLATION. VALVES T AND INTERLOCES PREVENT UNANALYZED CONDENSATE
			- , , , ,					TRIP
12.1.12.01.1		127-3	ON	UV AUTILIARY RELAYS 127-31 AND			REDUCED REDUNDANCY FOR BUS \$10	HORMAL POSITION. RELAYS 127-71
	UNDERVOLTAGE AND CONTROL		(VOLTS MORMAL)	127-71 WILL NOT DE-ENERGIZE AS REQUIRED ON BUS UNDERVOLTAGE OR (819)LOP, REDUCING		UV RBLAY 127-9 AND AUT RBLAYS 127-91 AND 127-111 PBBVBNT LOSS OF PUNCTION	CHAS-A AND CHAS-B, LOGIC FOR TRAIN A LOB BECOMES 1/1 ON	AND 127-11X DRIVE TIME DELAY RELAYS 162-7X AND 162-11X RESPECTIVELT TO PREVENT
				REDUNDANCY OF BUS AIC UV INPUTS TO SEQ 1, SEQ 2, CSAS-A AND CSAS-B			BBHAINIRG BUS FIC UV THPUT	"STAGGBRED DG START FOELOWING SISLOP FROM DISABLING AUTO-LOAD LOGIC FOR SLOW TRAIN
	BUS \$1C UNDERVOLTAGE AND CONTROL		OPP	UV AUTILIARY RBLAYS 127-31 AND 127-71 DB-BNBBG12B, SENDING BUS BIC UV SIGNAL TO SBQ 1,	CONTROL BOOM INDICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A	MAINTAINED UV INPUT VILL PREVENT RESTART OF TRAIN A LOADS. TRAIN B SISLOB
				SBQ 2, CSAS-A'AND CSAS-B			±	CONDITION WILL RESULT IN SEQ. 2 SISLOP WITH THIS PAILURE

## BMERGENCY CORE SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT I TABLE 12-1: POWER DISTRIBUTION SYSTEM FREA

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ļ.	ITBN 4	DRAICS ID	COMPONENT ID	FAILURB MODR	LOCAL BEFFECTS AND DEPENDENT FAILURES	MBTHOD OP DBTBCTION	ENHERBNT COMPRHSATING PROVISIONS	BFFBCT ON BCCS	REMARES
	12.1.12.02.1	I BUS PIC UNDERVOLTAGE AND CONTROL	127-5 D (UV RBLAY)	ON (VOLTS WORMAL)	UV AUXILIARY RRLAYS 127-51 AND 127-511 WILL NOT DB-RNBRGIZE AS BRQUIRED ON BUS UNDERVOLTAGE OR (SIS)LOP, DISABLING NORMAL UNDERVOLTAGE TRIP OF TRAIN A 444 LOADS,		NONE REQUIRED FOR SIS/SISLOP	NOME FOR SIS/SISLOP	NORMAL POSITION. LOVATS AND UNIT UV TRIP NOT CREDITED FOR SIS/SISLOP EVENTS, CONTAINMENT SPRAT PUMP ERCEIVES INDEPENDENT TIMING SIGNAL FROM SEQ FOR SISLOP START
	12.1.12.02.2	BUS BIC UNDERFOLTAGE AND CONTROL	127-5 D (UV BBLAY)	OFF (VOLTS LOW)	LOVATS AND UNIT UV TRIP, AND TRAIN A REP WTR PP TIMING INPUT UV AUXILIARY RELAYS 127-51 AND 127-511 DR-EMERGIZE RESULTING IN A BUS AIC UV SIGNAL TO LOVATE AND INVESTIGATED PRATE	G	REDUNDANT TRAIM	INOPERABILITY OF TRAIN A	RANDONLY TIMED PAILURE WILL CAUSE INTERRUPTION OF TRAIN A SISYSISLOP RESPONSE, LOVATS
			THE WAT TOUR OF		LOVATS AND UNIT UV TRIP, TRAIN A REF WIR PP TIMING INPUT AND BUS SIC 44V LOADS. UV TRIP OF BUS SIC 44V LOADS IS BLOCKED APTER I SEC ST A TIME DELAY BELAY				AND UNIT TRIP LOGIC BROOME 1/1 ON BUS \$2C UV IMPUT
	12.1.12.01.1	BUS FIC UNDERVOLTAGE AND CONTROL	125VDC CONTROL D POWER SWITCH 0 11CO2	OPBN	UV AUTILIART RELATS 127-38, 127-78, 127-58 AND 127-581 DB-BHBRGIZE, RESULTING IN A BUS AIC UV SIGNAL TO SEQ 1, SEQ 2, CSAS-A, CSAS-B, LOVATS AND UNIT UV TRIP, TRAIM A REP WTR PP TIMING THPUY AND BUS		BRDUNDANT TRAIN		RANDOMLY TIMED FAILURE WILL CAUSE INTERRUPTION OF TRAIN A SIS/SISLOP RESPONSE. LOVATS AND UNIT TRIP LOGIC BECOME 1/1 ON BUS \$2C UV INPUT. TRAIN B SISLOB WILL RESULT IN SEQ 2
		UNDERVOLTAGE AND CONTROL		CLOSED	BIC 41V LOADS (FOR 1 SBC BEFORE TOR ACTUATION)  UV RELATS 127-3 AND 127-5 PUNCTION NORMALLY  UV AUXILIARY RELAYS 127-91 AND	PRRIODIC TRATING	NORE ESCALESA	MONB	NORMAL POSITION
		UNDERVOLTAGE AND CONTROL		(VOLTS NORMAL)	127-111 WILL NOT DE-BNERGIZE 127-111 WILL NOT DE-BNERGIZE AS REQUIRED ON BUS \$1C UNDERVOLTAGE OR (SIS)LOP, UNDERVOLTAGE OR		PROUNDIRY BUS \$1C UV TWPUTS PROU UV BRLAY 127-3 AND AUI PRLAYS 127-31 AND 127-71	REDUCED EBDUMDANACT FOR BUS BIC UNDERVOLTAGE SIGNAL TO SEQ 1, SEQ 2, CSAS-A AND CSAS-B. TRAIN A TOS LOCIC BECOMES 1/1 ON REMAINING BUS BIC UV INPUTS	
		UNDERVOLTAGE AND CORTROL		OFF (VOLTS LOW)	UV AUTILIART RBLATS 127-91 AND 127-111 DB-BNBRGIZB, SBNDING BUS \$1C UNDERVOLTACE SIGNAL TO SBQ 1, SBQ 2, CSAS-A AND CSAS-B	ANNUNCIATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A FOR SIS, COMTAINMENT SPRAY FOR SISLOP	
1	12:1.12.05.2	UNDBRYOLTAGE AND CONTROL UNDBRYOLTAGE AND CONTROL	11CO3 125VDC CONTROL	CLOSED	UV RELAY 127-9 PUNCTIONS HORMALLY	PERIODIC TESTING	HORE REQUIRED	RONB AS 12.1.12.4.1)	NORMAL POSITION

BHERGENCY CORE CORE STATEM SINGLE FAILURE ANALYSIS

SAN ONOFRE UNIT 1

TABLE 12-1: POWER DISTRIBUTION SYSTEM PREA

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· ·	178H #	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL BPFBCTS AND DBPBNDBNT FAILURES	MBTHOD OF DBTBCTION	INHERENT COMPENSATING PROVISIONS:	BPFBCT ON BCCS	REMARES
		·····	-1-1-1						
! 12		BUS DIC UNDERVOLTAGE AND CONTROL		CONTACTS OPEN (OFF)	BUS DIC LOADS (BICEPT COND, HTR DR, TPCW PP) AND MORMAL PREDER BREAKER WILL NOT TRIP	PBRIODIC TRATING	REDUNDANT TRAIN FOR SISLOP, NOME REQUIRED FOR SIS	INOPERABILITY OF TRAIN A FOR SISLOP, NOME FOR SIS	*NORMAL POSITION. MAINTAINED TRIP SIGNAL REQUIRED FOR NSR LOADS TO PREVENT START
; 					SISTOD SISTOD SISTOD				POST-SISLOP. COMD PPS, HTR DR PP, TPCW PP AND BUS \$1A/1C TIE BRER ARE LOCEED OUT BY
19	)''1' 19 "N£ '9"	BUS FIC	_00V.1	CONTACTS CLOSED	'bug 'Ald toind' iun ben coniena	AAUSAA) BAAU BUAR WAR	255U.T. 0.5 44T1.		SEPARATE MAINTAINED SEQ CONTACTS OR OVERLOAD LOCEOUT RELAY ACTUATION
! !		UNDERVOLTAGE AND CONTROL		(ON)	BUS BIC LOADS AND TIE BEBARBE TRIP	CONTROL ROOM INDICATION	REDUNDANT TRAIN		TRIP SIGNALS AUTOMATICALLY CLEARED BY TIME DELAY RELAY WHICH RESETS UV RELAYS 194 AND 194-1
12	2.1.12.07.1	BUS AIC UNDERVOLTAGE AND	194	CONTACTS OPEN		PERIODIC TESTING	REDUNDANT TRAIN FOR SISLOP,		NORMAL POSITION. COND PPS, HTR
		CONTROL	(BBLATS)		(11CO) AND 11CO2) AND LOADS  (BECBPT NORMAL LIGHTING TRANSPORMER AND SST-1 AND SST-3) WILL NOT TRIP ON BUS		NOME BEQUIEED FOR SIS		DR PP, TPCW PP AND BUS \$1A/IC TIE BREARBE ARE LOCEBO OUT BY SEPARATE MAINTAINED SEQ CONTACTS OR OVERLOAD LOCEOUT
1					\$1C UNDERVOLTAGE OR (BECEPT COND, HTR DE, TPCW PPS AND TER BREE) ON SISCOP				RELAT ACTUATION
		BUS #1C UNDERVOLTAGE AND CONTROL		CONTACTS CLOSED	BUS \$1C PERDER AND THE BREES (11CO) AND 11CO2) AND LOADS	PERIODIC TESTING	NIART THADWUDAR		*LOCKOUT NOT CURRENTLY PROVIDED FOR MSR LOADS, RICEPT
i		CONTROL	(RBLAYS)		(BICEPT NORMAL LIGHTING TRANSPORMER AND SST-1 AND SST-3) TRIP				THOSE RECRIVING A SEPARATE MAINTAINED SISLOP SIGNAL (BG. CONDENSATE AND HEATER DRAIN
12	.1.12.08.1	•	BUS #1C 125VDC	VOLTS LOW		CONTROL ROOM INDICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A	PP) OR SISLOP ACTUATION OF OVERLOAD LOCKOUT (EG. TPCW) CONTROL POWER PROM 11001
		UNDERVOLTAGE AND CONTROL	CONTROC POMER		(11CO1 AND 11CO2) AND LOADS WILL NOT TRIP ON BUS \$1C UNDERVOLTAGE OR SISLOP				CUBICLE
12		T-WINDING CURRENT LIMITING RBACTOR		OPEN .	LOSS OF POWER IN OHE OR MORE PHASES OF TRAIN B DURING DG TRSTING WITH NORMAL OPF-SITE SOURCE ALIGNED. NONE WITH	PRRIODIC TRSTING	DG TESTING, NOME REQUIRED FOR SIS DURING NORMAL OPERATION OR	INOPERABILITY OF TRAIN 8 FOR 813 DURING DG TESTING, NONE FOR 813 DURING NORMAL OPERATION OR FOR 318COP	
12	.2.01.01.2	T-VINDING CUBRENT"LINITING		SHORT		PBRIODIC TESTING	REDUNDANT TRAIN FOR DG	POTENTIAL INOPERABILITY OF	*TECH SPEC ACTION BUTBY
	l	REACTOR			ONE OR MORE PHASES OF TRAIN B TO DURING DC TESTING WITH NORMAL OFF-SITE SOURCE ALIGNED	•	TESTING, NOWE REQUIRED FOR NORMAL OPERATION	TRAIN B DURING DG TESTING, WORE FOR MORMAL OPERATION	REQUIRED FOR DG LOAD TESTING
	(	Y-WINDING TOURRENT LIMITING REACTOR		GROUND	LOSS OF BORNAL OFF-SITE SOURCE (C-IPME T-WINDING) FOR TRAIN B WITH GROUND OF MORE THAN ONE PRASE	CONTROL BOOM INDICATION	BEQUIEED FOR SISTOD BEDOMDENT LEFT HOME	SIS	GROUND OF 2 OR MORE PRASES  REQUIRED FOR THIS FAILURE IN UNGROUNDED DELTA-CONNECTED  SYSTEM. TRIP OF FREDRE BEER
									12COZ ISOLATES THIS GROUND PAULT ON SISLOP

## BMBRGBNCY CORB SAN ONOPRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION SYSTEM PRIBA

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ITBN 4	DRAIGE ID	COMPONENT ID	FAILURR MODE	LOCAL BPFBCTS AND DBPBNDBNT FAILURBS	DETECTION METHOD OF	INHERBUT COMPRESATING PROVISIONS	RPPRCT ON BCC8	REMARKS
12.2.02.01.1 152	-1091	BREARRA	OPEN	C TOWN T HENDENIA ADLANTA	404500 4000 Finance			
	BAEBR)	Dabhada	UPBR	C-IPMB T-WINDING BBACTANCE CANNOT BE BTPASSED, RESULTING IN DEGRADED TRAIN B VOLTAGE	CONTROL ROOM INDICATION	REDUNDANT TRAIN FOR SIS, MONE REQUIRED FOR SISLOP	SIS. NO EFFECT FOR SISLOP	*INCLUDES CONTROL ROOM BANDSWITCH HS-167. TECH SPEC ACTION ENTRY REQUIRED FOR THIS
		****		CONDITIONS DURING SIS LOADING TRANSIENT WITH MORNAL OPP-SITE				CONDITION (RG. DURING DG
				SOURCE ALIGNED. NO EFFECT DURING SISLOP DUE TO 12002				SURVEILLANCE) BECAUSE OF BUS VOLTAGE DEGRADATION WRICE VOULD OCCUR ON SIS
12.2.02.01.2 152-1871 BREATER	BBRARBR	CLOSED	TRIP C-IPMR T-WINDING REACTANCE	CONTROL ROOM INDICATION,	NONE REQUIRED FOR MORMAL	POTENTIAL INOPERABILITY OF	NORMAL POSITION. DG BRER	
(BESALES)		BYPASSED, RESULTING IN POTENTIAL POR RICESSIVE FAULT CURRENTS DURING DG TESTING	ANNUNCIATION	OPERATION OF BIS781SLOP	TRAIN B DURING DC LOAD YESTING, NOME FOR MORNAL OPERATION OR SIS/SISLOP	TRIPPED ON SIS/SISLOP IF		
			WITH NORMAL OFF-SITE SOURCE ALIGNED. NO SPEECT ON SIS			atayatator		
		152-12C15 "b" CONTACT	OPBM -	LOADING TRANSIENT (SAME AS 1272/2/17)	PERIODIC TESTING	(SYME TO 1X:X:1:1)	(SARE AS 12.2.2.1.1)	TECH SPEC ACTION BUTEY
.2.02.02.2 152	-1RT1	152-12015	CLOSBD		PBRIODIC TESTING	(SAME AS 12.2.2.1.2)	(SAME AS 12.2.2.1.2)	REQUIRED FOR DG LOAD TESTING *NORMAL POSITION. TECH SPEC
(88	RYEBB)	"b" "CONTACT		DBPBATED, PERMITTING BEACTARCE TO BE BYPASSED DURING DG LOAD TESTING				ACTION ENTRY ERQUIRED FOR DC LOAD TESTING
.2T02T03T1 152 (BR		15Z-12CIS CBLL SWITCH	OPBN		PERIODIC TESTING	(SAMB_MS_12.2.2.1.1)	(SAME AS 12.3.2.1.1)	TREE SPEC ACTION ENTRY REQUIRED FOR DG LOAD TESTING
.2.02.03.2 152 (BR		152-12C15 CBLL SWITCH	CLOSEO	BREE TEST POSITION INTERLOCE FROM DG BREAKER DEPEATED, PERMITTING REACTANCE	PERIODIC TESTING	(SAMB AS 12.2.2.1.2)	(SAME AS 12.2.2.1.2)	*NORMAL POSITION. TRCE SPEC ACTION ENTRY REQUIRED FOR DG
				TO BE BYPASSED DURING DG BEBAKER TESTING				LOAD TESTING
.2.02.04.1 152		BUS #2C 125VDC CONTROL POWER	VOLTS LOW	C-IPMR Y-WINDING REACTANCE BYPASS BREAKER CANNOT BE	CONTROL ROOM INDICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B WITH	*TECH SPEC ACTION BUTRY
	•	(@12C15)		REPOSITIONED. IP OPEN, DEGRADES TEAIN & VOLTAGE			HYPASS BENEER MISPOSITIONED	REQUIRED WITH BREAKER
				CONDITION DURING SIS LOADING TRANSIBUT. IF CLOSED, RESULTS				
			•	IN POTENTIAL FOR BICESSIVE FAULT CURRENTS DUBING DG				
.2.03.01.1 152	-12C02 BARBR)	BRBAEER	OPBN	TESTING LOSS OF NORMAL OFF-SITE SOURCE	CONTROL BOOM INDICATION	REDUNDANT TRAIN FOR SIS, NOME	INOPERABILITY OF TRAIN B FOR	*NORMAL FREDER BREAKER FOR BUS
(04:				FOR TRAIN B. NORMAL POLLOWING SISLOP. NO BPPECT IP BUS #2C BMBRGIZED PROM ALTERNATE		BEQUIRED FOR SISLOP	SIS, MONE POR SISLOP	SZC. TECH SPEC ACTION ENTRY REQUIRED FOR THIS CONDITION DUB TO INABILITY OF ALTERNATE
				SOURCE VIA TIE BRBAHER 12COI				OFFSITE SOURCE TO MAINTAIN ADEQUATE BUS VOLTAGE DURING SIS LOADING TRANSIENT
.2703.01121152- (BRS	-12COZ	BERAEBE	CLOSZD	NORMAL OFF-SITE SOURCE CANNOT BE ISOLATED FROM BUS \$2C, DEGRADING TRAIN B SISLOP	CONTROL ROOM INDICATION, PERIODIC TESTING	NOME FOR SISLOP WITH DEGRADED	*INOPERABILITY OF TRAIN B FOR	HORNAL POSITION
-				RESPONSE BY ENERGIZING C-IFME VIA Y-SECONDARY, ALSO PREVENTS			CONDITIONS, BONE FOR SIS	
				TRAIN A SISLOP FOR DEGRADED GRID CONDITIONS DUE TO INABILITY TO OSTAIN TRAIN B				

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## BM3RGSNCT CORB C SYSTEM SINGLE FAILUGE ANALYSIS SAN ONOPRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION SYSTEM FHEA

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	ITEM #	DBVICE ID	COMPONENT ID	FAILURE MODE	LOCAL BFFBCTS AND DBPBNDBNT FAILURBS	METHOD OF Detection	INHERBUT COMPRUSATING PROVISIONS	BPFBCT ON BCCS	ERMARES
									***************************************
	12.2.03.02.1	(BEBAEER)	134-4 (RBLAY)	CONTACTS OPEN (OPF)	BERATBE WILL NOT TRIP ON SEQ (LOB, LOP, SISLOP) OR BUS UNDREVOLTAGE SIGNALS	PBRIODIC TESTING	(SAME AS 12.2.3.1.2)	#(SAHE AS 12.2.3.1.2)	BBLAT ACTUATED BY SEQ 2 OR BUS \$2C UV RELAY 127-611
	12.2.03.02.2	152-12C02 (BRHAEBR)	194-4 (RBLAY)	CONTACTS CLOSED (ON)	BRBARRE TRIPS, BUT CAN BE RECLOSED AFTER 2 SECOND TIME DBLAT	CONTROL ROOM INDICATION, ANNUNCIATION	(SAMB AS 12.2.3.1.1)	(SAMB AS 12.2.3.1.1)	*SURVEILLANCE TESTING MUST SPECIFICALLY CRECK FOR RELAY CONTACT FAILURE, SINCE TOE PREVENTS RETRIP IF BRIE
	12.2.03.03.1		C-IPMB	CONTACTS OPEN	BREARBR WILL NOT TRIP IN BURNT		NONE REQUIRED FOR SIS/SISLOP	NOME POR SIS/SISLOP	SUBSEQUENTLY RECLOSED NORMAL POSITION OF CONTACTS.
		(BREAKER)	PROTECTIVE TRIPS	· · · · · · · · · · · · · · · · · · ·	OF C-19MR DIPPERENTIAL, SUDDEN PRESSURE OR OTHER TROUBLE. REMAINING C-19MR PROTECTIVE TRIPS TO 12002 UNAPPECTED				FAILURE ADDRESSES ONE TRIP PUNCTION (CONTACT SET) AT A TIME. REMAINING PROTECTIVE TRIPS PREVENT FAULT
	12.2.03.03.2	152-12C02 [BRRAKER]	C-IFMB PROTECTIVE TRIPS	CONTACTS CLOSED	BREATER TRIPS IF CLOSED,	CONTROL ROOM INDICATION,	REDUNDANT TRAIN FOR SIS, NOME		PROPAGATION TO 4EV SUGR ROOM. STECH SPEC ACTION BUTEY
			PROTECTIVE TRIPS	· .	CAUSING LOB FOR TRAIN B.  MORNAL FOR SISLOP WITH C-IPMR TROUBLE. NO BFFBCT IF BUS \$2C  ENBRGIZED FROM ALTRENATE	ANNUNCIATION	REQUIRED FOR STSLOP	SIS, MONR POR SISLOP	REQUIRED FOR THIS CONDITION DUB TO INABILITY OF ALTERNATE OFFSITE SOURCE TO MAINTAIN ADEQUATE BUS VOLTAGE DURING
	12.2.03.04.1		BREES 12CO1,	CONTACTS OPEN	SOURCE VIA TIE BREAKER 12C01 BUS \$2C PARALLELED ALARM	PBBIODIC TESTING	NOME BEGATERD	NONB	SIS LOADING TRANSIENT PUSES PROTECT BREE CONTROL
		(BRBAKER)	RYI "a" CONTACTS		THOPERABLE. NO EFFECT ON BREE OPERATION				SCHEME PROM ALARM CHT FAILURE. ALARM ACTUATED IF DG PARALLELED TO C-IPME W/RYI
". 4									CLOSED OR IF DG OR C-IPMR PARALLELED TO ALTERNATE SOURCE (MAIN/B-IPMR)
	12.2.03.04.2	152-12COZ (BRBAKER)	BRERS 12CO1, 11BO4, 12C15, BY1	CONTACTS CLOSED	BUS \$2C PARALLELED ALARM CANNOT BE CLEARED. NO EFFECT ON BREE OPERATION	PERIODIC TESTING	NORE EEGTIERD	NONE	•
	12.2.03.05.1	152-12C02 (BRBARBR)		CONTACTS OPEN	BUS \$2C PARALLELED ALARM AND DG DROOP CETS DISABLED. RESULTS IN ISOCERONOUS DG HODE	PBRIODIC TESTING	REDUNDANT TRAIN FOR SISLOP, NONE REQUIRED FOR SIS	POTENTIAL LONG-TERM INOPERABILITY OF TRAIN B DUE TO INABILITY TO TRANSPER BUS \$2C	
					WHICH CAN CAUSE DG OVERLOAD TRIP DURING PARALLED OPERATION			FROM DG TO ALTERNATE OR WORMAL OPPRITE SOURCE WITHOUT LOSS OF	PARALLELED OPERATION TO PERMIT CONTROL OF DG LOADING. DROP
					OPF-SITE POWER RESTORATION POST-SISLOP	- 100 100 100 100 100 100 100 100 100 10			AND PICKUP OTHERWISE REQUIRED
	12.2.03.05.2	(BRBAEBE)	- a CONTACTS	CONTACTS CLOSED	BUS 12C PARALLELED ALARM WILL OCCUR W/ BUS ENERGIZED PROM OTHER SOURCES. DG DROOP CET ALSO ENABLED, RESULTING IN	PBRIODIC TESTING	REDUNDANT TRAIN FOR SISLOP, NONE REQUIRED FOR SIS		*TECH SPEC ACTION ENTRY REQUIRED FOR THIS FAILURE. NORMAL POSITION. ISOCHRONOUS
		and the same of th	<del></del>		LOSS OF DG PREQUENCY CONTROL FOR SISLOP				MODE REQUIRED FOR LOB, LOP OR SISLOP OPERATION TO BUSURE PROPER FREQUENCY FOR LOAD MOTOR PERFORMANCE

BMBRGBNCY-CORB CO SAN ONOFRB UNIT 1
TABLE 12-1: POWER DISTRIBUTION SYSTEM FMBA

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,,	ITEN #	DRAICR ID	COMPONENT ID	PAILURS MODE	LOCAL BPFBCTS AND DBPBNDBNT PAILURBS	MSTHOD OF DBTBCTION	IMBRENT COMPENSATING PROVISIONS	BFFBCT ON BCCS	REMARES
		-							
i 	12.2.03.06.1	132-12002	"b" CONTACTS	CONTACTS OPEN	BUS 12C CANNOT BE RE-ENERGIZED	PRRIODIC TESTING	NONE REQUIRED	NONE. NO INTERRUPTION OF BUS	MORMAL POSITION. DROP AND
		(BRBAKBR)			FROM ALTERNATE SOURCE			\$2C BCCS LOADS WILL OCCUB	PICEUP WILL RESULT IN
H_					POST-TRIP BICEPT BY DROP AND			DURING DROP AND PICEUP OF BUS	INTERRUPTION OF RCP OPERATION,
					PICEUP OF BUS #18			PIB .	IF RESTARTED, POR SCIR BYENTS
	12.2.03.06.2		"b" CONTACTS	CONTACTS CLOSED	INTERLOCE TO BUS TIE BEBARER	PERIODIC TESTING	NOME SECULED	ROMB	BRSAKER AUXILIARY CONTACT PAILURE AND CONCURRENT
l		(BREAEBR)			12CO1 DEPRATED, PERMITTING NORMAL OPPSITE SOURCE AND MAIN				OPERATOR BEROR REQUIRED TO
					GENERATOR TO BE PARALLELED				PARALLEL MAIN GENERATOR
					MANUALLY THROUGH BUS #2C				THROUGH BUS #2C. THIS IS A
					DURING MAIN GRNERATOR				DOUBLE PAILURE SCHNARIO WHICH
li					COAST-DOWN				IS OUTSIDE SIS/SISLOP DESIGN
-					The second bearing the second of the second			THE PROPERTY OF THE PARTY OF TH	BASIS OF PLANT
:.	12.2.03.01.1		186, 1861	ON	BREARRE TRIPS AND SENDS	CONTROL BOOM INDICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B	OVERLOAD LOCK-OUT PREVENTS
		(BRRAEBR)	(BBLAYS)		OVERLOAD LOCK-OUT SIGNAL TO BLOCK CLOSING OF DG BREE AND			-	CLOSING BREES TO A PAULTED BUS
<u> </u>					BUS TIE BEER TO PREVENT				
					RE-BURRGIZING POTRUTIALLY				
					PAULTED BUS. NO RPPECT IP DG				
. —					OR BUS TIE BREAKER ALERADY				
					CLOSED				
[4]	12.2.03.07.2		186, 1861	OFF	BREATER OVERLOAD TRIP	PBRIODIC TESTING	NORE BEGAIRED LOS 813/313FOL	NONE FOR SIS/SISLOP	NORMAL POSITION. BUS PAULT
		(BERYESS)	(BELAYS)		DISABLED. IF A PAULT OCCURS,				PLUS BREE OVERCOAD RELAY PAILURE IS A DOUBLE PAILURE
:					POTENTIALLY RESULTS IN 41V ROOM BLECTRICAL PIRE				SCHNARIO WHICH IS OUTSIDE
[],;			·		SOON BUBUISTORY FIRE				SISTSISCOP DESIGN BASIS OF
									PLANT
-	12.2.03.08.1		BUS #2C 125VDC	VOLTS LOW.		CONTROL BOOM INDICATION	REDUNDANT TRAIN FOR SISLOP,	INOPERABILITY OF TRAIN B FOR	PAILURE TO TRIP 12CO2 WOULD
		(BREATER)	CONTROL POWER		RECLOSED, DEGRADING TRAIN B		NORE BESOISED AOR 318	SISLOP, MORE FOR MIS	RESULT IN RUBECIZING C-YPHE
4					SISLOP RESPONSE		HODELL ADDRESS SAUGE DAD SEE	SDAFW & ALBROWARD APPOINT	FRON DG \$2 VIA BUS \$2C
i	12.2.04.01.1	[BERAKER]	BRBAKBR	OPBN	LOSS OF POWER TO RCP B AND  BICITER IF DURING POWER	CONTROL ROOM INDICATION	NORMAL OPPSITE SOURCE FOR SIS,	TRAIN B ALIBERATE OFFSITE SOURCE TROPERABLE, RESULTING TO	NORMAL POSITION DURING PLANT
		(DESALOR)			OPERATION. BUS \$18 AND \$2C		BUDDANAMI IBATA POR SISTOF	POTENTIAL LONG-TERM	MAIN GEN TO GRID. SGTR DOSE
1					CANNOT BE PED PROM ALTERNATE			INOPERABILITY OF TRAIN B FOR	CALC REV (TO PRECLUDE CREDIT
<u>                                   </u>					OFFSITE SOURCE (HAIN/B IFHES)			SISLOP DUB TO INABILITY TO	LOS SCALL VED ROL BEA BEGO
								TRANSPER BUS \$2C PROM DG TO	SINCE CANNOT START ECPS FROM
								OPPSITE SOURCE WITH C-IPME	BUS #1C/2C POST-SIS/SISLOP
-								RELATED LOP	WITHOUT INTERRUPTION OF ECCS
	12.2.04.01.2	159_11004	BREAKER	CLOSED	BUS BIB CANNOT BE ISOLATED	CONTROL ROOM INDICATION.	NOME REQUIRED FOR SIS/SISLOP	NONE FOR SIS/SISLOP	LOADS DUB TO VOLT TRANSIENT NORMAL POSITION DURING POWER
te	16.6.01.01.2	(BREAKER)	DEDAEDE		PROM B-IPME AND MAIN GENERATOR		MAN BOARTON LOS STATUTORS	BAND LAR SIGNATURE	OPS. SWID BREE TRIPS AND ECP
		, , , , , , , , , , , , , , , , , , , ,			FOR STARTUP OR LOVATS.				OVERCUREBHT TRIPS ISOLATE
					INTERLOCES PREVENT CLOSURE OF				BURRGY SOURCES FROM POTENTIAL
					BUS \$2C TIE BEBAKER WITH MAIN				WAIN GENERATOR PAULTS
1					GENERATOR TRIPPED (VOLTS LOW)				
ul.					AND BUS \$2C BNBBGIZED PROM	with this work in the contract of the contract			
i					C-IPME. NO BPPECT IF BUS \$20" BNERGIZED PRON DG	•			
,					PWEGGIER LEAK DG				

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	•							
LTBN #	DRAICE ID	COMPONENT ED	SYTURE WOOR	LOCAL BFFBCTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHBRBNT COMPRESATING PROVISIONS	BPPRCT ON BCCS	BBMARES
or moved factor rates to be supply								
2.2.04.02.1 1		BBI (RELAY)	CONTACTS OPBN	AUTOMATIC RECLOSE OF BREE FOR	PERIODIC TESTING	NONE BEGNIESD	NOME	MORNAL POSITION. OPERATOR
. (	(BRBAEBE)		(OPP)	LOVATS IS DISABLED. MANUAL				ACTION REQUIRED TO ALIGN
				BREAKER RECLOSURE POR				ALTERNATE OPPSITE SOURCE EVEN
				ALICHMENT OFF ALTERNATE			•	IF LOVATS PUNCTIONS AS
2.2.04.02.2 1	152-11B04	BBI (BBLAT)	CONTACTS CLOSED	OPPSITE SOURCE UNAPPROTED LOVATS RECLOSE SIGNAL TO BREE,	DEDIANIC TRETING	NONE REQUIRED	HONB	DESIGNED SYRRIPICATION REQUIRED THAT
	BREARBE)		(ON)	CAUSING PREMATURE RECLOSING	PARIODIC INDITAG	BOND STAGERDA	PORR	MAIN GENERATOR UNDERVOLTAGE
·			,	BEFORE 18hV ISOLATION COMPLETE				RELAY 2271 SETPONT (40%) [S
	•							LOW BROUGH TO PREVENT HOD
								PAILURE DUB TO PLASHOVER BY
		•						RESIDUAL GENERATOR OUTPUT
1.2.01.03.1 1		186-3, 186-3A,	OPP	AUTOBATIC TRIP OR LOCKOUT OF	PERIODIC TESTING	NOME BEGNISED	NOME	BACKUP TRIP PROM B-IFHR 18kV
(	BREAKER)	186-4		BREAKER OR INTERLOCE TO BUS				OVERCURRENT ISOLATES FAULT
		(BBLAYS)		TIB 12COL TO ISOLATE PAULT ON				FROM MAIN GRUBBATOR AND IPMB.
				B-IPMR 4 by OVERCURRENT IS		·		PAULT CANNOT BB (RB)BNBRGIZED
				DISABLED				WITHOUT A SECOND PAILURE (BG.
								BACKUP TRIP FAILURE OR OPERATOR BEROF IN CLOSING BUS
							·····	TIE BRIE) WHICH IS OUTSIDE
								SIS/SISLOP DESIGN BASIS
2.2.04.03.2 1	52-11804	186-3, 186-3A,	ON	BREAKER TRIPS, CANNOT BE	CONTROL ROOM INDICATION	NORMAL OPPSITE SOURCE FOR SIS,	TRAIN B ALTERNATE OPPSITE	STRCH SPEC ACTION ENTRY
	BEBARBE	(88LAY9)		BECLOSED TO ALIGN ALTERNATE OPPSITE SOURCE TO BUS \$20		BEOUNDANT PRAIN FOR SISLOP	BOURCE INOPERABLE, RESULTING IN POTENTIAL LONG-TERM INOPERABILITY OF TRAIN B FOR	
							SISLOP DUE TO INABILITY TO	
							TRANSPER BUS \$2C FROM DG TO	
							OPPSITE SOURCE WITE C-IPHE	
2.2.04.04.1 1	62 11004	OTHER MAIN GEN	CONTACTS OPEN	BRBAKER WILL NOT TRIP IN EVENT	DESIGNIA PROPING	NONE REQUIRED	RELATED LOP NORE	HODRAL BOSTELON OF COURT COS
	BREAKER)	MAIN/A/B-IFMR	(OPP)	OP IPME DIPPERENTIAL, SUDDEN	PRECODIC INSTING	MONS REMAIRED	NURS	NORMAL POSITION OF CONTACTS. PAILURE ADDRESSES ONE TRIP
		PROTECTIVE TRIPS		PRESSURE OF OTHER MAIN			<del></del>	PUNCTION (CONTACT SBT) AT A
				GRHBRATOR, MAIN IPHR OR A/B			•	TIME. BENAINING PROTECTIVE
			•	IPHR TROUBLE				TRIPS PREVENT FAULT
								PROPAGATION TO 4 EV SWGR ROOM
2.2.04.04.2 1		OTHER MAIN CRN	CONTACTS CLOSED	(SAME AS 12.2.4.3.2)	CONTROL BOOM INDICATION	(SANB AS 12.2.4.3.2)	(SAMB AS 12.2.4.3.2)	*TECH SPEC ACTION BUTET
(	BREAKER)	MAIN/A/8-IPHR	(ON)		·		·	REQUIRED FOR THIS CONDITION.
		PROTECTIVE TRIPS						CONTACTS CLOSED ON
								OUT-OF-STEP, OVERSPEED, LOSS
								OP PIBLD, DIPPBBBNTIAL,
								MEGITIVE PHISE SEQUENCE,
								STATOR GROUND, SUDDEN
.2704.05.1 1	52-11B04	194-3 (RBLAY)	CONTACTS OPEN	BRBAKBR WILL NOT AUTOMATICALLY	DEDIGNIC TRETING	NUMB DEGLIDER	NON E	PRESSURB, OR OVERCURRENT NORMAL POSITION. OPERATOR
	BRRARRE)	(manui)	(022)	TRIP ON LOVATS SIGNAL (MAIN .		nan podaton	WORD	ACTION REQUIRED TO ALIGN
•			,,	GEN TRIPPED, MOTOR OPERATED				ALTERNATE OFFSITE SOURCE EVEN
		•		DISCONNECT CLOSED AND SWGR				TP LOVATS PUNCTIONS AS
				#1C/2C UNDERVOLTAGE). MANUAL TRIP AND BECLOSE UNAPPECTED				DESIGNED

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ITBN #	DRVICE ID	COMPONENT ID	FAILURB MODE	LOCAL BPFBCTS AND DRPRHDBNT FALLURES	MBTHOD OF DBTBCTION	INUBBBHT COMPENSATING PROVISIONS	BPPBCT ON BCCS	REMARES
·								
T2.2.04.05.2	152-11804 (BRBARBR)	194-3 (RBLAY)	CONTACTS CLOSED (ON)	(SAME AS 12.2.4.3.2)	CONTROL ROOM INDICATION	(SAHE AS 12.2.4.3.2)	(S.E. S. S. S. S. S. S. S. S. S. S. S. S. S.	*TECH SPEC ACTION BETRY REQUIRED FOR THIS CONDITION
12.2.04.06.1	152-11804	"a" CONTACTS	CONTACTS OPEN	LOSS OF BREE CLOSED INTERLOCE	CONTROL ROOM INDICATION	NONE REQUIRED FOR SIS,	POTENTIAL LONG-TERM	*TECH SPEC ACTION BUTET
	(BREAKER)			TO RCP SLOW COASTDOWN BNABLE,		BEDUNDANT TRAIN FOR SISLOP		REQUIRED FOR THIS CONDITION.
				SOURCES PARALLELED ALARM AND				LOVATS AND RCP SLOW COASTDOWN
				LOVATS BND-OF-SEQUENCE				NOT CREDITED IN SIS/SISLOP
				INDICATION. LOSS OF DROOP BNABLE IMPUT PREVENTS TRANSFER			OPPSITE SOURCE FOR C-IPME RELATED LOP, WITHOUT LOSS OF	BVBNT9
				OF BUS \$2C PRON DG TO			RCCS LOADS	
		<del></del>		ALTERNATE OFFSITE SOURCE			acco being	
				WITHOUT DROP AND PICAUP				
12.2.04.06.2	152-11804	"a" CONTACTS	CONTACTS CLOSED	RCP SLOW COASTDOWN RWABLED, DG	CONTROL ROOM INDICATION	NONE REQUIRED	NONB	*ROI BRAISION BEGD: ISEE LEGH
	(BREAKBE)			#2 DROOP ENABLED WITH BUS				DG TO ALT OPPSITE SOURCE MUST
				\$1B/2C TIE BREAEER CLOSED.				OCCUR MILE BAS \$18 BARBCISED
	· ···			LOVATS HAY INDICATE				BEFORE TIE BREE CLOSED, WITH
				BND-OP-SEQUENCE PRIOR TO 11804				THIS PAILURE
				RECLOSURE. DROOP ENABLED PREVENTS ISOCHRONOUS OPERATION	,			
				OP DE WITH BUS ALE-2C TIE BREE				
				CLOSED				
12.2.04.07.1	152-11804	"b" CONTACTS	CONTACTS OPEN	LOSS OF BREE OPEN INTERLOCE TO	CONTROL ROOM INDICATION	NOME REQUIRED FOR SIS/SISLOP	NOME FOR SIS/SISLOP	
	(BEBARBE)			LOVATS AND BUS \$18-2C TIR				
				BREE. LOVATS AUTO-OPEN OF	•			
				MOTOR OPERATED DISCONNECT AND			·	
				RECLOSE OF TIAOU/HBOT	, , , , , , , , , , , , , , , , , , , ,			
				DISABLED. TIE BERE CANNOT BE				
				CLOSED TO RE-ENERGIZE BUS #18		,		
				PRON OPPSITE BICEPT BY DROP AND PICEUP OF BUS \$2C				
12.2.04.07.2	152-11804	"b" CONTACTS	CONTACTS CLOSED	INTERLOCE DISABLED TO BUS	CONTROL ROOM INDICATION	NOWE REQUIRED FOR SIS/SISLOP	NONE FOR SIS/SISLOP	SECOND FAILURE (RG. OPERATOR
	(BERYERE)			#18-2C TIB BRER 12COL,				BEROET WEEDED FOR PARALLELING
				PERMITTING PARALLELING OF MAIN				OR HOD PAILURE TO OCCUR, WHICH
				GENERATOR TO NORMAL OFFSITE	•			IS OUTSIDE SIS/SISLOP DESIGN
				SOURCE TBROUGH BUS \$2C. NO				BASIS.
				BFFECT ON MOTOR OPERATED				
	<del></del>			DISCONNECT DUE TO SEPARATE		·		
				CENERATOR VOLTS OPEN				
				PERMISSIVE AND BUS LOAD BREAKER TRIP				
12:2.04:08:1	152-11804	BUS-#1B IZ5VDC	VOLTS LOW	BERE CANNOT BE ABILDED IN	CONTROL BOOM INDICATION	NORMAL OFFSITE SOURCE FOR SIS.	TRAIN B ACTERNATE OFFEITR	TRUE SPRU ACTION BRIEF
	(BEBAEER)	CONTROL POWER		CLOSED OR BECLOSED IF OPEN,		REDUNDANT TRAIN FOR SISLOP	SOURCE INOPERABLE, RESULTING IN	
				RESULTING IN LOSS OF ALTERNATE			POTENTIAL LONG-TERM	•
				OFFSITE SOURCE TO BUS \$20			INOPERABILITY OF TRAIN B FOR	
							SISLOP DUB TO INABILITY TO	
							TRANSPER BUS \$2C PRON DG TO	
							OPPSITE SOURCE WITH C-IPME	

LTBM \$	DBAICR ID	COMPONENT ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	PO DCYTBU METDATAD	INHERBNT COMPENSATING PROVISIONS	BPFBCT ON BCCS	BBMARRS
12.2.705.701.17"BU N9	S 118 R LOADS	BRBAERR(S)	OPBR	BICITER TRIPS AND CANNOT BE STARTED FOR MAIN GENERATOR OPERATION, OR RCP B TRIPS AND	CONTROL ROOM INDICATION	NONE BEGUIBED	NONE	INCLUDES ECP-B, SIGITER SERAKERS 152-11803, 152-11802 RESPECTIVELY
12.2.05.01.2 BU		BRRAEBR(S)	CLOSED	CANNOT BE RESTARTED FOR SCTR. NO EPPECT ON ECCS LOADS RCP B OR BICITER CANNOT BE	CONTROL ROOM INDICATION	BEDUNDANT TRAIN FOR SIS DURING	REDUCED TRAIN B RESCURICAL	*NORMAL POSITION DURING POWER
NS	R LOADS			TRIPPED TO CLEAR BUS \$18		PLANT STARTUP, OR SISLOP. NORMAL OPPSITE SOURCE FOR SIS DURING NORMAL OPERATION	"NARGIN" FOR "SIS "DURING" PLANT" S/U	OPERATION. THE SPHE ACTION BUTHY REQUIRED WITH THIS
							SISLOP DUE TO IMABILITY TO	AND BICITER SHOWN ACCEPTABLE FOR SIS BY VOLTAGE CALCULATION DC-3325 (DC-3225 FOR POST-DCP
12.2.05.02.1 BU	-	127-21 (RBLAY)	CONTACTS OPEN	RCP B AND BECITER WILL NOT	PBRIODIC TESTING	TRIP OF RCP AND TIR BRER FOR	OPPSITE W/ C-IPMS LOP REDUCED RELIABILITY OF TRAIN B	3552 COMPIGURATION) MORNAL POSITION. BUS \$18
	B LOADS	······································	(OPP)	TRIP AUTOMATICALLY ON BUS \$18 UNDREVOLTAGE DURING NORMAL MAIN GENERATOR OPERATION. RCP AND RECITER SLOW COASTDOWN UNDREVOLTAGE TRIP, SIS/SISLOP TRIP AND MANUAL TRIPS		SISLOP DURING PLANT STARTOP, REDUNDANT TRAIN FOR SIS DURING PLANT STARTOP, MONE REQUIRED FOR SIS/SISLOP DURING NORMAL OPS	FOR SIS DURING PLANT STARTUP (WITH BUS \$18-2C TIE BREE	UBDBRVOLTAGB RELAY
12.2.05.02.2 BU	S #1B R LOADS	127-21 (RBLAY)	CONTACTS CLOSED (ON)	UNAPPECTED RCP 8 AND BICITER TRIP. NO RFFECT ON RESTART APTER MAIN GENERATOR TRIP DUE TO LOSS OF	CONTROL BOOM INDICATION, PERIODIC TESTING	NOME ERQUIRED FOR SIS/SISLOP	NOWE FOR SIS/SISLOP	BICITER TRIP CAUSES LOSS OF MAIN GRUERATOR PIECD
12.2.05.03.1 BU	-	281-1	ON	PIBLD RCP AND EXCITER SLOW COASTDOWN	PBRIODIC TESTING	TRIP OF RCP AND TIE BREE FOR	REDUCED RELIABILITY OF TRAIN B	RBLATS BHERGIZED WHEN MAIN
83	R LOADS	281-7	{Z81-I CLOSED, Z81-Y OPEN}	UNDBRVOLTAGE TRIP BHABLED, NORMAL UNDBRVOLTAGE TRIP DISABLED		SISCOP DURING PLANT STARTUP, REDUNDANT TRAIN FOR SIS DURING PLANT STARTUP, NONE REQUIRED	STARTUP (WITH BUS \$18-2C TIE BRER CLOSED), NOME FOR	GENERATOR PREQUENCY ( 58 BZ TO BRLECT SLOW COASTDOWN VS. NORMAL AT-POWER UNDERVOLTAGE
						POR BIS/BISLOP DURING MORNAL OPS	OPERATION OR APTER MAIN CENERATOR VOLTS ( 40%	TRIPS. WO BPFECT ON MANUAL TRIP OP BICITBE OR MANUAL TRIP/RESTART OF RCPS FOR SGTR OR ALIGHMENT OF ALTRENATE
12.2.05.03.2 BUS	S #18	281-1 281-y	OPP (281-1 OPB#, 281-Y	BCP AND BICITER SLOW COASTDOWN UNDERVOLTAGE TRIP DISABLED,	PBBIODIC TESTING	MONE REQUIRED FOR SIE/SISLOP	NONE FOR SIS/SISLOP	OPPSITE SOURCE NORMAL POSITION DUBING POWER OPERATION
127,27,057,04.7°BUS	S #1B		CLOSED)  CONTACTS OPEN (OPP)	NORMAL UNDERVOLTAGE TRIP BMABLED RCP B AND BICITER SLOW	PRRIODIC TESTING	NOME BEGNIESD FOR 313/312F05	NORE FOR SIS/SISLOP	HORMAL POSITION. MAIN
		· , 		COASTDOWN TRIP DISABLED (TRIP WILL NOT OCCUR WITH MAIN GEN VOLTS ( 40%). NORMAL UNDBRYOLTAGE, SIS/SISLOP AND	·			GENERATOR UNDERVOLTAGE RELAY. SLOW COASTDOWN TRIP EMABLED ONLY IP BREE 11404 DR 11804 IS T CLOSED AND MAIN GENERATOR
1272.05.04.2 BUS NSE	T LOADS	2271 (RBLAT)	CONTACTS CLOSED	MANUAL TRIPS UNAPPROTED  ECP B AND BICITER SLOW  COASTDOWN TRIP WILL OCCUR AS  SOON AS MAIN GENERATOR	PBRIODIC TESTING		NONE FOR SIS/SISLOP	PREQUENCY IS ( 58 HZ.  BELAT DB-BHERGIZED WERN MAIN  GENERATOR VOLTS ( 40 % AS PART  OF RCP SLOW COASTDOWN
				PREQUENCT ( 58 HZ, IRRESPECTIVE OF VOLTAGE. NORMAL UNDERVOLTAGE TRIP, SIS/SISLOP AND MANUAL TRIPS UNAFFECTED				SEQUENCE. EXCITER TRIP WILL AFFECT SLOW COASTDOWN OF ALL 3 RCPS BY INTERRUPTING MAIN GENERATOR PIBLD. SIS/SISLOP

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	I HATI	DBAIGE ID	COMPONENT ID	LYITARB MOD8	LOCAL BPPBCTS AND DRPBHDBMT FAILURBS	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	BPFBCT ON BCCS	BEMARKS
	12.2.05.05.1	BUS \$18 MSR LOADS	194-3 (RBLAY)	CONTACTS OPEN (OFF)	LOVATS TRIP OF ECP 8 AND BICITER DISABLED. MORMAL UNDERVOLTAGE, 819/818LOP AND	PBRIODIC TESTING	MONE REQUIRED FOR SIS/SISLOP	NOME FOR \$18/\$18FOb	NORMAL POSITION. LOVATS NOT CREDITED FOR SIS/SISLOP EVENTS
:-	12.2.05.05.2	BUS \$1B MSR LOADS	194-3 (RBLAT)	CONTACTS CLOSED (ON)	MANUAL TRIPS UNAPPROTED LOVATS TRIP OF RCP B AND RICITER. RCP CANNOT BE	PBRIODIC TESTING	HOME BEGUIEED FOR SIS/SISTOD	NORE LOS 818/813 TOL	*SGTE DOSE CALC REVISION REQUIRED TO PRECLUDE CREDIT
1				····	RRSTARTED				FOR RCPS. BOI REVISION REQUIRED TO ADDRESS POTENTIAL INABILITY TO RESTART ECPS IN
	12.2.05.06.1	BUS \$1B NSR LOADS	186-919 (BBLAT)	CONTACTS OPEN (OPF)	SIS/SISLOP TRIP OF RCPS A, B AND C DISABLED. SISLOP TRIP OF BUS \$14-1C AND \$16-2C TIB BUS \$14-1C AND \$16-2C TIB UNAFFECTED		HOME REQUIRED FOR SIS, TIE BEBARRE TRIPS FOR SISLOP	REDUCED BLETRICAL MARGINS ON BOTH TRAINS FOR SIS DURING PLANT STARTUP (TIE BREAKERS 11001 AND 12001 CLOSED).	UNAFFECTED LOOPS MORHAL POSITION. FAILURE TO TRIP RCP& DUB TO THIS SINGLE FAILURE SHOWN ACCEPTABLE FOR SIS BY BUS VOLTAGE CALCULATION
								REDUCED RELIABILITY OF BOTH TRAINS FOR SISLOP WITH TIE BREAKERS CLOSED, NOWE FOR SIS WITH TIE BREAKERS OPEN	DC-3325 (DC-3225 FOR POST-DCP 3552 CONFIGURATION)
		NSR LOADS	(RBLAY)	CONTACTS CLOSED (ON)	BCPS A, B AND C TRIP, CANNOT BE RESTARTED	CONTROL BOOM INDICATION	NOME REQUIRED FOR SIS/SISLOP	NONE FOR \$18/\$18LOP	*SCTE DOSE CALC REVISION REQUIRED TO PRECLUDE CREDIT FOR RCPS
	12.2.05.07.1	BUS \$1B NSR LOADS	CONTROL POWER	VOLTS LOW	RCP B AND BIGITER CANNOT BE TRIPPED OR RESTARTED, SIB/SIBLOP TRIP RELAY 186-31S CANNOT BE BHERGIZED TO TRIP	CONTROL ROOM INDICATION	BORE FOR SIS DURING PLAST STARTUP, REDUNDANT TRAIN AND TIS BREE TRIP POR SISLOP, NONE REQUIRED FOR SIS DURING NORMAL	TRAINS FOR SIS DURING PLANT S/U (W/ TIB BRERS 11CO1, 12CO1	STRUE SPEC ACTION ENTRY
,  					BCP A, B AND C. TIB BRER TRIP UNAPPECTED		OPERATION	SOURCE INOP, CAUSING POTENTIAL	ACCEPTABLE FOR SIS BY BUS VOLTAGE CALCULATION DC-3325
ľ . ––	12:2:06:01:1	RIIS 1818		CONTACTS OPEN	BUS TAIR DEED DOOR TINE - DOOR			BUS \$2C PRON DG TO OPPSITE W/ C-IPNR LOP	COMPEGURATION)
		CONTROLS	174-3 (BbLar)	(OFF)	BUS BIB PERDER BREE 11804, RCP B AND EICITER WILL NOT AUTOMATICALLY TRIP ON LOVATS SIGNAL, CAUSING SLOW RCP	PRRIODIC TRATING	NORR BEGRIBED LOS 212/212705		MORNAL POSITION. OPERATOR ACTION REQUIRED TO ALIGN ALTERNATE OPPSITE SOURCE BYEN THE LOVATE PUNCTIONS AS
					COASTDOWN ON MAIN CEMERATOR VS. PLYMBEL COASTDOWN. MANUAL TRIPS UNAPPECTED				DESIGNED
,   	12.2.06.01.2	•	194-J (BBLAY)	CONTACTS CLOSED		PERIODIC TESTING	NONE REQUIRED FOR SIS/SISLOP	NOME FOR SIS/SISLOP. TRAIN B	STECH SPEC ACTION BUTRY
		CONTROLS		(ON)	BICITER AND BUS \$18 PERDER BREE 11804 FOR ANY MAIN GENERATOR TRIP WITH MOTOR OPERATED DISCONNECT CLOSED.			ALTERNATE OPPSITE AVAILABLE APTER MOTOR OPERATED DISCONNECT	REQUIRED WHENEVER BUS 11C OR
			<del></del>		TRIP SIGNALS BESET WHEN MOTOR OPERATED DISCONNECT IS OPENED				

# EMBRGENCY CORS AND STSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT I TABLE 12-1: POWER DISTRIBUTION STSTEM PHRA

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ITRM #	DRAICE ID	COMPONENT ID	FAILURB MODB	LOCAL BFFECTS AND DEPENDENT FAILURES	MBTHOD OF DBTECTION	INHERENT COMPENSATING PROVISIONS	BPFBCT ON BCCS	REMARES
2.2.07.01.1	152-12COI (BRBAEBR)	BRRAERR—	OPBN	LOSS OF POWER TO RCP B AND BICITER DURING PLANT STARTUP, INABILITY TO ALIGN BUS \$2C TO ALPREWATE OPPSITE SOURCE	PBRIODIC TESTING	NONE REQUIRED FOR SIS, REDUNDANT TRAIN FOR SISLOP	LONG-TERM INOPERABILITY OF	ROI BRYISION REQUIRED TO PRECLUDE BCP RESTART FROM BUS \$1C/CC POST-818/91940P TO
				ALIBERALE UFFSILE SOUSCE			PROM DG TO OFFSITE SOURCE FOR	PREVENT LOSS OF ECCS LOADS DUB TO SEVERE BUS UNDERVOLTAGE TRANSIENT. SGTR DOSE CALC
							C-YPHE RELATED LOP. ECP B CANNOT BE RE-ENERGIZED FROM MAIN/B-IPHE POST-SGTE	REVISION REQUIRED TO PRECLUDE CREDIT FOR RCP OPERATION
2.2.07.01.2	(BREAKER)	BEBAERE	CLOSED	BUS \$18 CANNOT BE ISOLATED FROM BUS \$2C	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT TRAIN FOR SISLOP, RCP TRIP FOR SIS		INORMAL DURING PLANT STARTUP OR ALIGNMENT OF ALTERNATE OPPSITE SOURCE TO BUS \$2C. BOI
						,		CHANGE BEQUIRED TO PRECLUDE BCP RESTART POST-SIS/SISLOP IN THIS ALIGNMENT TO PREVENT LOSS
2.2.07.02.1		186 (12002)	CONTACTS OPBN	BREARBE CANNOT BE CLOSED	CONTROL ROOM INDICATION	REDUNDANT TRAIN		OF BCCS LOADS DUE TO SEVERE BUS UNDERVOLTAGE TRANSIENT 12C02-186 RELAT ALSO TRIPS
	(BBBYEEB)		(ON)					12CO2 AND BLOCKS CLOSING OF DC BRER 12C15, RESULTING IN LOSS OF BUS #2C
	152-12CO1 (BRBAKBR)	186 (12C02)	CONTACTS CLOSED (OPP)	OVERLOAD INTERLOCE FROM BUS \$2C MORNAL PEEDER 12CO2 DISABLED, PREMITTING PARALLELING OF BUS \$18 TO	PBBIODIC TESTING	MONE REGULERO	NONE	NORMAL POSITION. C-XFMM Y-WHDG OVERCURERNT LOCKOUT RELAT. SECOND PAILURE (EG. OPERATOR
··•·0•·0•	169-19001		CONSTRUCTO ODDI	PAULTED BUS				BREOR) WEEDED FOR PARALLELING TO OCCUR, WHICH IS OUTSIDE SIS/SISLOP DESIGN BASIS
	(BRBAEBE)	186-34 [11804]	(ON)	BREARER CANNOT BE CLOSED	"CONTROL ROOM INDICATION"		ALTERNATE OFFSITE SOURCE, RESULTING IN INOPERABILITY OF	
							TRAIN B FOR SISLOP DUE TO INABILITY TO TRANSPER BUS \$2C FROM DG TO OPPSITE SOURCE WITH C-NYME RELATED LOP	PATLURB
.2.07.03.2	152-12CO1 (BRBAEBR)	186-JA (11BO4)	CONTACTS CLOSED (OPP)	OVERLOAD INTERLOCE PROM BUS \$1B MORMAL PERDER 11804 DISABLED, PERMITTING	PERIODIC TESTING	NOWE REQUIRED FOR SIS/SISLOP	NONE FOR 313/813FOb	NORMAL POSITION. SECOND PAILURE (EG. OPERATOR BERGE) WEEDRO FOR PARALLELING TO
.2.07.04.1	152-12COI	152-12CO2 "b" CONTACTS	CONTACTS OPEN	PARALLELING OP BUS \$2C TO FAULTED BUS BREAKER CANNOT BE CLOSED TO	PBRIODIC TESTING		NORE FOR SIS/SISLOP. NO	OCCUR, WHICH IS OUTSIDE SIS/SISLOP DESIGN BASIS INTERRUPTION OF ECP B COULD
		u contacts		BHBRGIZE BUS \$2C PROM ALTBRHATE OFFSITE SOURCE POST-TRIP BICEPT BY DROP AND				NORMAL OPPSITE SOURCE. CONTACTS PARALLELED WITH 227-Y
				PICEUP OF BUS \$18	,			RBLAY CONTACTS (WHICH OPEN ON LOW MAIN GENERATOR VOLTAGE) IN BREAKER CONTROL CIRCUIT

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[TBH #	DRAICR ID	COMPONENT ID	PAILURB MODE	LOCAL BPFBCTS AND DEPENDENT FAILURES	METHOD OF	INUBERNT COMPRISATING PROVISIONS	EPPBET ON BEES	REMARKS
		<del></del>	<del>.</del>					
12.2.07.04.2	152-12CO1 (BRBARBR)	152-12CO2 "b" CONTACTS	CONTACTS CLOSED	INTERLOCE FROM 12CO2 DEFEATED, PERMITTING MORMAL OPPSITE	PBRIODIC TESTING	NOME REQUIRED FOR SIS/SISLOP	NONE FOR SIS/SISLOP	CONCURRENT OPERATOR BREOR IS REQUIRED FOR PARALLELING TO
				SOURCE AND MAIN GRWRRATOR TO BE PARALLELED MANUALLY THROUGH BUS \$2C DURING MAIN GRWRRATOR COASTDOWN				OCCUR, WHICH IS A DOUBLE PAILURE SCHNARIO OUTSIDE THE S18/S13LOP DESIGN BASIS
12.2.07.05.1	152-12C01 (BRBAEBE)	152-11804 "b" CONTACTS	CONTACTS OPEN	BEBARBE CANNOT BE CLOSED POST-TRIP UNLESS BUS \$2C PERDER BERE 12CO2 [9 OPEN.	PRRIODIC TESTING	NOMB SEQUIRED FOR SIS/SISLOP	NONB POR SIS/SISLOP	TRANSPER TO ALTERNATE OFFSITE SOURCE NOT REQUIRED FOR SIS, UNAPPECTED FOR SISLOP, FAILURE
· · ·				REQUIRES TRANSPER BY DROP AND PICEUP POR SIS. NO RPPECT FOR SISLOP OR WITH MAIN GENERATOR ON LINE				DORS NOT PREVENT RCP B RESTART PROM ALT OFFSITE SOURCE, IF MEEDED
12.2.07.05.2	152-12C01 (BRBAEBR)	152-11B04 "b" contacts	CONTACTS CLOSED	INTERLOCK FROM 11804 DEFEATED, PERMITTING NORMAL OPPSITE	PBRIODIC TESTING	NOME BEQUIESD FOR SIS/SISLOP	MOBE FOR SIS/SISLOP	THIS SINGLE PAILURE PLUS CONCURRENT OPERATOR BRROR
	<u>-</u>			SOURCE AND MAIN GENERATOR TO BE PARALLELED MANUALLY THROUGH BUS \$2C DURING MAIN GENERATOR				REQUIRED FOR PARALLELING, WRICE IS A DOUBLE PAILURE OUTSIDE SIS/SISLOP DESIGN
12.2.07.06.1	152-12001	227Y (RBLAY)	CONTACTS OPEN	COASTDOWN. NO EFFECT WITH MAIN GRNERATOR ON LINE BUS \$18 AND 2C CANNOT BE	PERIODIC TESTING	NONE REQUIRED FOR SIS/SISLOP	NONE FOR SIS/SISLOP	BASIS HORMAL POSITION FOLLOWING
	(BREATER)	·	(ON)	PARALLELED DURING MORNAL POWER OPERATION BICEPT BY DROP AND PICTUP OF BITBER BUS. NO BPECT ON BUS OPERATIONS				PLANT TRIP AND MAIN GRNBRATOR/RCP COASTDOWN
12.2.07.06.2	152-12001	227T (RELAT)	CONTACTS CLOSED	POST-TRIP [NTERLOCK PROM MAIN GENERATOR	PERIODIC TESTING	NONE REQUIRED FOR SIS/SISLOP	NONE FOR SIS/SISLOP	NORMAL POSITION DURING POWER
	(BREAEBR)		(099)	VOLTACE DEPENTED, PREMITTING NORMAL OPPSITE SOURCE TO BE PARALLELED MANUALLY WITH MAIN				OPERATION. THIS FAILURE PLUS CONCURRENT OPERATOR BERGE DURING SIS/SISLOP EVENT IS A
				GRNERATOR THEOUGH BUS \$2C DUBING MAIN GENERATOR COASTDOWN				DOUBLE PAILURE WHICH IS OUTSIDE PLANT DESIGN BASIS
12.2.07.07.T	152-12C01 (BREAKER)	SBQ 2 (13-9,11)	CONTACTS OPEN (OPF)	BREATER WILL NOT TRIP ON SISLOP	PRRIODIC TRATING	MOME REQUIRED FOR SIS OR FOR SISLOP DURING MORMAL POWER OPERATION. REDUNDANT TRAIN FOR SISLOP DURING PLANT STARTUP	NOME FOR SIS, POTENTIAL INOPERABILITY OF TRAIN B FOR ISISLOP DURING PLANT STARTUP INITE BUS \$18/20 TIE BERANER	NORMAL POSITION. TRIP ENSURES THAT DG DORS NOT ATTEMPT TO EMBRGIZE ECPS POST-SISLOP
12.2.07.07.2	152-12001	SBQ 2	CONTACTS CLOSED	BREAKER TRIPS AND CANNOT BE	CONTROL BOOM INDICATION	NORMAL OFFSITE SOURCE FOR SIS,	12C01 CLOSED)	STECH SPEC ACTION BUTEY
	(OBBAESE)	(13-9,11)	(ON)	RECLOSED, PREVENTING BUS \$1A and 1C FROM BRING PARALLELED		REDUNDANT TRAIN POR SISLOP	ALTBUNATE OFFSITE SOURCE, RESULTING IN POTENTIAL LONG-TERM INOPERABILITY OF	REQUIRED WITH THIS PAILURE
							TRAIN B POR BISLOP DUB TO IMABILITY TO TRANSPER BUS \$2C PROM DG TO OPPSITE SOURCE WITH C-19RR RBLAYBO LOP	

# EMBRGENCY CORR SAN ONOPRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION STSTEM FREA

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	ITBM #	DBAICE ID	COMPONENT ID	PAILURB MODB	LOCAL BPPBCTS AND DEPENDENT FAILURES	MBTHOD OF DBTECTION	INHBERNT COMPENSATING PROVISIONS	BFFBCT ON BCCS	REMARES
ř.,									
-	12.2.07.08.1	152-12C01 (088A88R)	194-4 (RBLAT)	CONTACTS OPEN (OFF)	BRBARR WILL NOT TRIP ON BUS \$2C UNDERVOLTAGE. SEPARATE SEQ 2 SISLOP SIGNAL TO BREAKER NOT		REDUNDANT TRAIN FOR SIS, NOME REQUIRED FOR SISLOP	REDUCED RELIABILITY OF TRAIN B POR SIS DURING PLANT STARTUP (WITH BUS \$18/2C TIR BREE	NORMAL POSITION. RELAY ACTUATED BY SEQ 2 (SISLOP ONLY) OR BUS #2C UNDERVOLTAGE.
<u>'</u>					APPECTED			CLOSED), NOME FOR BISLOP DUE TO SEPARATE SISLOP TRIP SIGNAL	
-	12.2.07.08.2	152-12CO1 (BEBAKER)	194-4 (BBLAY)	CONTACTS CLOSED (ON)	BREARRE TRIPS, CAN BE RECLOSED IF MEEDED APTER 2 SEC. IF FAILURE OCCURS WHEN BREARRE	PERIODIC TESTING	REDUNDANT TRAIN POR SIS, NOME REQUIRED FOR SISLOP	REDUCED RELIABILITY OF TRAIN B POR SIS DURING PLANT STARTUP (WITH BUS \$18/2C TIE BREE	*TECH SPEC ACTION BWIRY REQUIRED WITH BUS \$2C BWBRGIZED FROM ALTBRNATE
, ,					OPRN (EG. NORMAL POWER OPERATION), WILL NOT SUBSEQUENTLY TRIP IF MERDED. SISLOP TRIP OF BREE UNAPPROYED			CLOSED), NOWE FOR SISLOP DUE TO SEPARATE SISLOP TRIP SIGNAL	OPPSITE SOURCE
1	12.2.07.09.1		"a" CONTACTS	OPBN	SOURCES PARALLELED ALARM AND	PERIODIC TESTING	REDUNDANT TRAIN FOR SISLOP,	POTENTIAL LONG-TERM	*NORMAL POSITION DURING POWER
		(ORBÁRBR)			DC DROOP CIRCUIT INPUT DISABLED. RESULTS IN ISOCHRONOUS DG MODE IP BREE		HOME REQUIRED FOR SIS	INOPERABILITY OF TRAIN B POR SISLOP DUB TO INABILITY TO TRANSPER BUS \$2C PROM DG TO	OPERATION. TECH SPEC ACTION ENTRY REQUIRED FOR THIS FAILURE. DROOP HODE REQUIRED
1					11804 CLOSED (BG. TO RESTART RCPS), WHICH CAN CAUSE DG OVERLOAD TRIP DURING TRANSPER			OPPSITE SOURCE WITH C-IPME RELATED LOP. NONE POR SIS	TO CONTROL DG LOAD WHEN PARALLELED TO OFFSITE SOURCE. OTHERWISE DROP AND PICEUP
					BACK TO OPPSITE POWER FOR				BEQUIRED
	12.2.07.09.2	(BRBARBR)	"a" CONTACTS	CLOSED	SOURCES PARALLELED ALARM WILL OCCUR WITE BERES 11804 AND 12COZ CLOSED (BC. DURING NORMAL OPERATION). DG DROOP	PERIODIC TESTING	REDUNDANT TRAIN FOR SISLOP, HOME REQUIRED FOR SIS	313	MORMAL POSITION DURING PLANT STARTUP. ISOCHRONOUS MODE REQUIRED FOR LOB, LOP OR SISLOP OPERATION TO EMSURE
,					CIRCUIT BHABLED IF BREE 11804 CLOSED (BG. TO RESTART RCPS POST-SIS/SISLOP), RESULTING IN LOSS OF DG PREQ CONTROL FOR				PROPER PERQUENCY FOR LOAD HOTOR OPERATION
	12.2.07.10.1	152-12001	"b" CONTACTS	OPRN	SISLOP DG BRBAKER CANNOT BE CLOSED	PBRIODIC TESTING	REDUNDANT TRAIN FOR SISLOP,	INOPERABILITY OF TRAIN B FOR	MORNAL POSITION DURING PLANT
		(BERYERS)					NOME REQUIRED FOR SIS	SISLOP, NOME FOR SIS	SYARTUP. THYRELOCIS DO NOT BLOCE CLOSING OF BUS TIE BREE 12001 IF DG BREE ALREADY CLOSED
	12.2.07.10.2	152-12CO1 (BREAKER)	*b* CONTACTS	CLOSED	INTERLOCE TO DG BREAKER DISABLED, PERMITTING DG BREE	PBBIODIC TBSTING	NONE REQUIRED FOR SIS/SISLOP	NOME FOR SIS/SISLOP	NORMAL POSITION DURING POWER OPERATION. SEPARATE SISLOP
					TO CLOSE WHEN BUS \$18 PARALLELED TO BUS \$2C (RG. DURING PLANT STARTUP)				TRIP OF BEER PREVENTS AUTOMATIC PARALLELING FOR SISLOP EVENTS. SECOND FAILURE
i									OR OPERATOR BRROR BEQUIRED TO INADVERTANTLY PARALLEL FOR SIS
	12.2.07.11.1	152-12C01 (BBBAEBR)	186 {12CO1}	- N	BREATER TRIPS AND SENDS OVERLOAD LOCK-OUT SIGNAL TO BLOCK CLOSING OF DG BREE, TO PREVENT RE-BNERGIZING POTENTIALLY FAULTED BOS	CONTROL ROOM INDICATION	NORMAL OFFSITE SOURCE FOR SIS, ERDUNDANT TRAIN FOR SISLOP	INOPERABLLITY OF TRAIN B	

## BHERGENUT CORE OF SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION SYSTEM PHEA

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	I HATI	DEALCR TO	COMPONENT ID	FAILURE MODE	LOCAL BPFECTS AND DEPENDENT PAILURES	MBTHOD OP DBTSCTION	INHERRNT COMPRISATING PROVISIONS	BPPBCT ON BCCS	REMARES
, } }	12.2.01.11.2	152-12C01 (BRBAEBR)	T86	OPF	BRRÁKBR OVBRLÓAÐ TRIP DÍSÁBLBÚ	PERIODIC TESTING	NOME REQUIRED FOR SIS/SISLOP	NONE POR SIS/SISLOP	NORMAL POSITION. SEPARATE BUS \$18/2C PERDER BREAKER
\	12.2.07.12.1	152-12C01 (BRRAKER)	BUS #2C 125VDC CONTROL POWER	VOLTS LOW	BRBAEBR CANNOT BE TRIPPED OR RECLOSED. DEGRADING TRAIN B	CONTROL ROOM INDICATION	REDUNDANT TRAIN FOR SISLOP, NONE FOR TRAIN B ALIGNED TO	*INOPERABILITY OF TRAIN 8 FOR SISLOP, AND TRAIN A FOR SISLOP	OVERCURRENT TRIPS WOULD CLEAR PROULTS WITH THIS FAILURE *SINCE MAIN GENERATOR COARTDOWN ON APPROTED BUSSES
		(DADALSA)	CONTACT FORDS		SISLOP RESPONSE AND PREVENTING TRAIN A SISLOP IP BREARER INITIALLY CLOSED TO ALIGN BUS	,	ALTERNATE OFFSITE SOURCE	WITH TRAIN B ALIGNED TO ALTBENATE OFFSITE SOURCE	PREVENTS SISCOP DETECTION, WITH OR WITHOUT A CONCURRENT SINGLE PAILURE, TECH SPEC
					SOURCE				J.O.J BHTRY IS REQUIRED WHENEVER BUS \$1C OR 2C IS ALIGNED TO THE ALTERNATE OPPSITE SOURCE
2	12.2.08.01.1	(NOT USED)							THIS BLOCK OF RECORDS  RESERVED FOR DUPLICATION OF DU
-									BREAKER RECORDS FROM SECTION 10, IF REQUIRED
<u> </u>	12.2.09.01.1	152-12C10 (BRBAEBR)	BRBAEBR	OPBN	LOSS OF TRAIN B 480V LOADS ON SWGR \$2 AND MCCS, INCLUDING INMEDIATE LOSS OF RBF WTR PP,	CONTROL ROOM INDICATION	REDUNDANT TRAIN AND PLON PATHS, PAIL-CLOSED BY-851A (W/ BACEUP W2] AND BY-2900 FOR	TRAIN B BCCS INOPERABLE, TRAIN A CLE BEAT REMOVAL DEGRADED	SST \$2 4kV FREDER BRER. SBB 1TBMS 6.2.4.3.1 AND 7.2.3.2.1. ADDITIONALLY, BOT REVISION
; ,					BBCIRC, CCW, SWC, 2 MPW ISOLATION HOVS, 1 SI/CLR FLOW PATH, WITH DBLAYED FAILURE OF		CONTAINMENT ISOLATION. MONE FOR REDUCED CLR HEAT REHOVAL		REQUIRED TO TRIP TRAIN B SI/FW PUMPS PRIOR TO LOSS OF 125VDC BUS \$2 FOR THIS FAILURE, TO
ļ	<del></del>				MFW PP, CHG PP, DG AND DC BUS \$2 DUB TO LOSS OF COOLING AND BATTERY CHARGING				BNSURE SI TERMINATION AT LO-LO RWST LEVEL SETPOINT
-	12.2.09.01.2	152-12C10 (BRBAEBR)	8RRARR8	CLOSED	NONB	CONTROL BOOM INDICATION	MONE BEGGIEED	NONB	*TECH SPEC ACTION ENTRY REQUIRED IF 480V SWGR \$2 BMBRGIZED FROM BUS 2-3 TIE
-			BUS #2C 125VDC	VOLTS LOW	BRRAKER CANNOT BE TRIPPED OR "	CONTROL ROOM INDICATION		NONE	BREATER IN LIBU OF SST \$2 VIA THIS BREAKER
	12.2.10.01.1	(BRBAKER)	CONTROL POWER BERAEER	OPBN	RECLOSED MONE. BREAKER NORMALLY RACKED		MOME REGUIEED	MOMB	SST 13 41V ALTERNATE PERDER
	16.6.10.01.1	(BBBAESE)			OUT		SARD SOACEDOR	avas	BREARR. INCLUDES CONTROL ROOM HANDSWITCH AND LOCAL/REMOTE INDICATION. NORMALLY RACEED
	12.2.10.01.2	152-12C11 (BRBAEBR)	BRBARBR	CLOSED	NONE. BREAKER NORMALLY RACKED OUT	CONTROL BOOM INDICATION, PBRIODIC SURVBILLANCE	NONE REGUIRED	NOMB	001
	12:2:10:02:1	152-12C11 (BREAKER)	"b" CONTACTS	OPBN	NOMB: BREAKER NORMALLY BACKED OUT	CONTROL ROOM INDICATION, PERIODIC SURVEILLANCE	NONE BEGGIESD	-NONB	
	12.2.10.02.2		152-11C11 "b" CONTACTS	CLCSBO	NOME. BREAKSR NORMALLY RACERD OUT	CONTROL ROOM INDICATION, PREIODIC SUBVEILLANCE	NONE BEGNIESD	HONB	
,1					•				

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DBVICE ID	COMPONENT ID	FAILURE NODE	LOCAL BFFBCTS AND DBPBNDBNT PAILURBS	NETHOD OF DETECTION	INHERBNT COMPRHSATING PROVISIONS	BPFBCT ON BCCS	REMARES
2-12011	152-11011	OPRN	MONE REFERENCEMENT PACESO	CONTROL POOR INDICATION	NORE BEGILLORY	NOMB	
RBARBR)	CBLL SWITCH CONTACTS		007	PERIODIC SURVEILLANCE	NORD EDWOISE	NOWE	
2-12C11 RBAEBR}	152-11C11 CRLL SWITCH CONTACTS	CLOSED	WOME. BREAKER MORMALLY RACERD OUT	CONTROL ROOM INDICATION, PERIODIC SURVEILLANCE	NONE SEGUISED	NONB	
2-12C11 RBAEBR)	(NOT USED)						
2-12C11 RBARBR)	(NOT USED)		-				
RBAEBR)	(RBLAY)	CONTACTS OPEN (OFF)	NOME. BREAKER MORMALLY RACKED OUT	CONTROL ROOM INDICATION, PERIODIC SURVEILLANCE	NOME REQUIRED	NOMB	
REARER)	(RBLAT)	CONTACTS CLOSED (ON)	OUT	PRRIODIC SURVEILLANCE	NONE REQUIRED	HOME	
RBARBR)	CONTROL POWER	AOLLS FOA	NOME. BREAKER NORMALLY RACKED OUT		NOME REGUIEED	NONB	
S #2C NSB ADS	BREARER	OPBN	PUMP, CONDENSATE PUMP(S),	CONTROL ROOM INDICATION	NOME BEGUIRED FOR SIS/SISLOP	NOME FOR SIS/SISLOP	INCLUDES BREAKERS 12003, 12006, 12008, 12009, 12012,
			LIGHTING TRANSPORMER TRIPS AND				12013
AZC NAR	BRARBO	CLOSED	TRAIN B HAIN CIEC PUMP, TPCW PUMP, CONDENSATE PUMP(S),	CONTROL ROOM INDICATION	REDUNDANT TRAIN		
			LIGHTING TRANSPORMER CANNOT BE TRIPPED ON BUS UNDERVOLTAGE OR SEQ (AS APPLICABLE)			113	SIS/SISLOP SIGNALS TO TRIP AS PART OF MPW ISOLATION. VALVES AND INTERLOCES PREVENT UNANALTZED CONDENSATE
							INJECTION EVEN IF PUMPS DO NOT
BRVOLTAGE AND	(IN BRUXA)	ON -{VOLTS NORMAL}	127-81 VILL NOT DE-BURRGIZE AS		UV RELAY 127-10 AND AUT RECAYS	REDUCED REDUNDANCY FOR BUS \$2C UV SIGNAL TO SEQ 1, SEQ 2,	NORMAL POSITION. RELATS 127-41 AND 127-101 DRIVE TIME DELAY
			OR (SIS)LOP, REDUCING		127-101 AND 127-121 PREVENT LOSS OF PUNCTION	TRAIN B LOB BECOMES 1/1 ON	BBLATS 162-41 AND 162-101 RESPECTIVELY TO PREVENT
Var (A. d. d. d. )			EXDUNDANCY OF BUS 12C UV INPUTS TO SEQ 1, SEQ 2, CSAS-A AND CSAS-B			BBMAINING BUS \$2C UV INPUT	STAGGRED DG START POLLOWING SISLOP PROM DISABLING AUTO-LOAD LOGIC POR SLOW TRAIN
BRVOLTAGE AND		OFF (VOLTS LOW)	127-81 DB-BNBRGIZB, SENDING	CONTROL ROOM INDICATION	BEDUNDANT TRAIN	INOPERABILITY OF TRAIN B	MAINTAINED UV INPUT WILL PREVENT RESTART OF TRAIN B
			BUS RZC DV SEGNAL TO SEQ 1. SEQ 2. CSAS-A AND CSAS-B				LOADS. TRAIN A SISLOB CONDITION WILL RESULT IN SEQ #1 SISLOP WITH THIS PAILURE
BRVOLTAGE AND		ON (VOLTS HORMAL)	127-611 WILL NOT DB-BNERGIZE	PBBIODIC TESTING	NONE REQUIRED FOR SIS/SISLOP	NONS FOR SIS/SISLOP	NORMAL POSITION. LOVATS AND UNIT UV TRIP NOT CREDITED FOR
I ROP			AS REQUIRED ON BUS UNDERVOLTAGE OR (SIS)LOP,				SIS/SISLOP EVENTS. CONTAINMENT SPRAY PUNP ERCEIVES
			TRIP OF TRAIN B 44V LOADS, LOVATS AND UNIT UV TRIP, AND	· · · · · · ·			INDBPBNDBNT TIMING SIGNAL PROM SEQ FOR SISLOP START
	-12C11 RARBR)  -12C11 RARBRN  -12C1 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11 RARBRN  -12C11	152-11C11		-12C11 152-11C11 OPEN OUT CONTACTS -12C11 152-11C11 CLOSED WONE. BERATER WORNALLT RACERD OUT CONTACTS -12C11 152-11C11 CLOSED WONE. BERATER WORNALLT RACERD OUT CONTACTS -12C11 [NOT USED] RATER] -12C11 [NOT USED] RATER] -12C11 127-611 CONTACTS OPEN OUT -12C11 127-611 CONTACTS OPEN OUT -12C11 127-611 CONTACTS CLOSED WONE. BERATER WORNALLT RACERD ARRER] -12C11 127-611 CONTACTS CLOSED WONE. BERATER WORNALLT RACERD OUT -12C11 217-611 CONTACTS CLOSED WONE. BERATER WORNALLT RACERD WONE. BERATER WORNALLT RACERD OUT -12C11 217-611 CONTACTS CLOSED WONE. BERATER WORNALLT RACERD OUT -12C11 217-611 CONTACTS CLOSED WONE. BERATER WORNALLT RACERD OUT -12C11 217-611 CONTACTS CLOSED WONE. BERATER WORNALLT RACERD OUT -12C11 217-611 CONTACTS CLOSED WONE. BERATER WORNALLT RACERD OUT -12C11 217-611 CONTACTS CLOSED WONE. BERATER WORNALLT RACERD OUT -12C11 217-611 CONTACTS CLOSED WONE. BERATER DORNALLT RACERD OUT -12C11 217-611 CONTACTS CLOSED WONE. BERATER DURPLES,			12-11-11   132-11-11   192-11   192-11   192-11-11   192-11   192-11   192-11   192-11   192-11   192-11   192-11   192-11   192-11   192-11   192-11   192-11   192-11   192-11   192-11   192-11   192-11   192-11   192-1

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ITBH #	DBAICR ID	COMPONENT ID	FAILURB HODB	LOCAL REPECTS AND DEPENDENT FAILURES	MBTHOD OP DBTBCTION	INHERBUT COMPRESATING PROVISIONS	BPFECT ON BCCS	
12.2.12.02.2	BUS \$2C UNDBRYOLTAGE AND CONTROL	127-6 (UV RELAT)	OPP (VOLTS LOW)	UV AUTILIARY BELATS 127-61 AN 127-611 DB-BNBRGIZB, BBSULTING IN A BUS \$2C UV SIGNAL TO LOVATS AND UNIT UV TRIP, TRAIL	G	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B	RANDONLY TIMED PAILURE WILL CAUSE INTERRUPTION OF TRAIN B SIS/SISLOP RESPONSE. LOVATS AND UNIT TRIP LOCIC BECOME 1/1
·	· · · · · · · · · · · · · · · · · · ·			B REP WIE PP TIMING IMPUT AND BUS \$2C 4kV LOADS, UV TRIP OF BUS \$2C 4kV LOADS IS BLOCKED AFTER I SEC BY A TIME BELAY RELAT				ON BUS BIC UV IMPUT
12.2.12.03.1	BUS \$2C UNDERVOLTAGE AND CONTROL	1254DC CONTROL POWER SMITCH & 12CO2	OPBM	UV AURILIARY BRLAYS 137-41, 127-81, 127-61 AND 127-611 DB-BMBRGIZE, RESULTING IN A BUS 12C UV SIGNAL TO SEQ 1, SEQ 2, CSAS-A, CSAS-B, LOVATS AND UNIT UV TRIP, TRAIN B REP	CONTROL ROOM INDICATION	BEDUNDANT TRAIN	INOPERABILITY OF TRAIN B	BANDONLY TIMBD PAILURE WILL CAUSE INTERRUPTION OF TRAIN B SIS/SISLOP RESPONSE. LOVATS AND UNIT TELP LOGIC BECOME 1/1 ON BUS \$IC UV INPUT. TRAIN A SISLOB WILL RESULT IN SEQ 1
	UNDERVOLTAGE AND CONTROL	12002		WTE PP TIMING INPUT AND BUS \$2C 4AV LOADS (FOR 1 SEC BEFORE TOR ACTUATION) UV BELAYS 121-4 AND 121-6 FUNCTION NORMALLY	PRRIODIC PRSTING	MOMB BEGALERY	MONB	SISLOP WITH THIS PAILURE  NORMAL POSITION
	BUS \$ZC UNDBRVOLTAGE AND CONTROL	127-10 (UV RBLAT)	(VOLTS HORMAL)	AND 127-121 WILL NOT DB-ENERGIZE AS REQUIRED ON BUS \$ZC UNDERVOLTAGE OR [SIS]COP, REDUCING REDUNDANCY OF BUS \$20 UV INPUTS TO SEQ 1, SEQ 2,		RECUMDANT BUS \$2C UV INPOTS PROM UV RELAT 127-4 AND AUX RELATS 127-41 AND 127-81	BRDUCED REDUNDINACY FOR BUS \$2 UNDERVOLTAGE SIGNAL TO SEQ 1, SEQ 2, CSAS-A AND CSAS-B. TRAIL B LOB LOGIC BECOMES 1/1 ON REMAINING BUS \$2C UV INPUTS	
	BUS \$2C UNDERVOLTAGE AND CONTROL	127-10 (UV RELAT)	OFF (VOLTS LOW)	CSAS-A AND CSAS-B UV AUXICIANT RELAYS 127-101 AND 127-121 DB-BNBRGIZB, SENDING BUS #2C UNDBRVOLTAGE SIGNAL TO SBQ 1, SBQ 2, CSAS-A AND CSAS-B	CONTROL BOOM INDICATION, ANNUNCIATION	RBDUNDANT TRAIN	INOPERABILITY OF TRAIN B FOR SIS, CONTAINMENT SPRAY FOR SISLOP	
	UNDERVOLTAGE AND	125VDC CONTROL 125VDC CONTROL 12CO3	OPB#	SAME AS 12.2.[2.4.1]	PERIODIC TESTING	[SAME AS 12.2.12.4.1]	(SAME AS 12.2.12.4.1)	
	UNDERVOLTAGE AND CONTROL	12003		NORMALLY	PERIODIC TESTING	ROME ERGAIDED	MORE	MORNAL POSITION
	BUS 12C UNDERVOLTAGE AND CONTROL		CONTACTS OPEN (OPP)	BUS \$2C LOADS (BICEPT COMD, BTR DR, TPCW PPS) AND NORMAL PREDRE BREE WILL NOT TRIP AND REMAIN OPEN ON SEQ 2 SISLOP	PBRIODIC TBSTING	REDUNDANT TRAIN FOR SISLOP, NONE REQUIRED FOR SIS	INOPERABILITY OF TRAIN B FOR SISLOP, MONB FOR SIS	**************************************
						THE PARTY OF THE P		PP, TPCW PP AND BUS \$1B/2C TIB BRER ARE LOCEED OUT BY SEPARATE MAINTAINED SEQ
								CONTACTS OR OVERLOAD LOCKOUT BELAY ACTUATION

G SYSTEM SINGLE FAILURE AMALYSIS
SAN ONORRE UNIT 1
TABLE 12-1: POWER DISTRIBUTION SYSTEM FREA

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\   	ITSM_#	DBAICE ID	COMPONENT ID	FAILURE MODE	LOCAL BPFBCTS AND DBPBMDBMT PAILURBS	MBTHOD OF DBTBCTION	ENHERBNT COMPENSATING PROVISIONS	RPPRCT ON RCCS	REMARKS
	12.271270672	BUS \$2C UNDERVOLTAGE AND CONTROL	•	"CONTACTS CLOSED (ON)	BUS \$20 LOADS AND TIE BEBARRE TRIP	CONTROL ROOM INDICATION	REDUNDANY YEATN	INOPBEABLEITY OF TRAIN B	TRIP SIGNALS AUTOMATICALLY CLBARRD BY TIME DBLAY BRLAY WHICH RESETS UV BRLAYS 194-4 AND 194-5
	12.2.12.07.1	BUS #2C DØØBBVOLTÅGB AND CONTROL	194-4 194-5 (BBLA79)	CONTACTS OPEN (OPP)	BUS \$2C PREDBR AND TIR BRERS [12C01 AND 12C02] AND 12DAD9 [RECRET ALTBRWATE LIGHTING TRANSPORMER AND SST-1 AND [SST-2] WILL NOT TRIP ON BUS \$2C UNDRRVOLTAGE OR (RICEPT COMD, BTR DR, TPCW PPS AND TIR		REDUNDANT TRAIN FOR SISLOP,	INOPERABILITY OF TRAIN B FOR SISTOP, NOWE FOR SIS	MORMAL POSITION. COND PPS, BTR DE PP, TPCW PP AND BUS \$19/20 TIE BREE ARE LOCKED OUT BY SEPARATE MAINTAINED SEQ CONTACTS OR OVERLOAD LOCKOUT RELAY ACTUATION
	12.2.12.07.2	BUS \$2C UNDERVOLTAGE AND CONTROL	194-4 194-5 (BBLAYS)	CONTACTS CLOSED (OH)	BRER) ON SISLOP BUS 12C PEBDER AND TIE BRERS (12CO1 AND 12CO2) AND LOADS, (BICEPT ALTERNATE LIGHTING, TRANSPORMER AND SST-1 AND SST-1) TRIP	PRRIODIC TRATING	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B	*LOCKOUT NOT CURRENTLY PROVIDED POR MSR LOADS, RICEPT THOSE ERCRIVING A REPARATE MAINTAINED SISLOP SIGNAL (RG. CONDRUSATE AND RRATER DRAIN
									PP) OR SISLOP ACTUATION OF OVERLOAD LOCKOUT (BG. TPCW)
:	12.2.12.08.1	BUS B2C UNDERVOLTAGE AND CONTROL		VOLTS LOW	BUS \$2C FEBDER AND TIE BREES (12CO1 AND 12CO2) AND LOADS WILL NOT TRIP ON BUS \$2C	CONTROL BOOM INDICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B	CONTROL POWER PROM 12CO1
					ONDERVOLTAGE OR SISLOP				
			<u> </u>	<b>.</b>				•	
	, 								
		to make account to the			······································	· ····			

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TABLE 12-1: AUXILIARY POWER FMEA

PART II: 480 V SYSTEM

EMERGENCY CORE

SAN ONOPER UNIT 1

TABLE 12-1: POWER DISTRIBUTION SYSTEM PMBA

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<b>\</b>	ITEM #	DBAICB ID	COMPONENT ID	FAILURE MODE	LOCAL BPPBCTS AND DBPBNDBNT PAILURES	MBTHOD OP DBTBCT <u>lo</u> b	INHERBUT COMPRESATING PROVISIONS	BPFBCT ON BCCS	REMARES
	12.3.01.01.1	52-1102 (BBBAKBR)	BRBAESB	OP8N	INTERRUPTION OF ALL TRAIN A LOADS ON 480V SVGR/MCC, INCLUDING IMMEDIATE LOSS OF TRAIN A RECIRC, REP WTR (SPRAT), BYDRAZINB, CCW AND SVC PUMPS. C/R AND 1/2 MAIN	CONTROL BOOM INDICATION	MOME FOR SIS/SISLOP, TRAIN A 480V PMR VIA SMCR \$1-3 TIE BRER AND SST \$3 POR LO-LO RWST LEVEL TRIP. REDUND MAIN 1PME COOLING FOR ALT OFFSITE SOURCE	INTERRUPTION OF AUXILIARIES	#480V ACB FROM SST \$1. BOI RBV REQD TO PROMPTLY TRIP NON-ESSENTIAL SYGE \$3 LOADS AND RB-ENERGIZE SYGE \$1. CONTAINMENT P/T CALC RBV REQD
					TPMR COOLING, AND DRLAYED LOSS OF MPW PP, DG, AND DC BUS \$1. MOVS FALL AS-IS			INTERRUPTION OF C/R COOLING.  REDUCED RELIABILITY OF ALTERNATE OFFSITE SOURCE	TO INCL 10 HIM INTERRUPT OF CLMG. VERIF OF B/U C/R VENT ADEQUACT ALSO BEQD. MAIN IPHR HAS 2 TRAINS OF FORCED AIR
	12.3.01.01.2	52-1102 (BRBAEBR)	BRBAERR	CLC98D	480V POWER AVAILABLE TO TRAIN A ECCS LOADS PROM SST \$1 AS REQUIRED. HOWEVER, BREE WILL MOT TRIP IF MERDED TO ISOLATE FAULTS DUE TO MON-SE LOADS ON 480V SWCR \$1	CONTROL ROOM INDICATION, PERIODIC TESTING	NORE BEGILESD	NOMB	CLMG NORMAL POSITION. BREE FAILURES BOUND SST \$1 FAILURES, SINCE CERDIT NOT TAREN FOR WSE FANS IN THE RATING. SISLOP TRIP/LOCEOUT AND BREE COORDINATION PREVENT PREDER TRIP WITH MSE LOAD FAILURES. BUS FAULT PLUS BREE FAILURE IS
	12.3.01.02.1		52-1103	OPBN		PBRIODIC TESTING	NONE BESCHIEED	HONE	OUTSIDE SIS/SISLOP DESIGN BASIS *TRCH SPEC ACTION BYTRY
		(BRBAKER)	b CONTACT		SUCR PI-3 TIR BRER 52-1103 IS- IN TRST POSITION. NO RPPRCT IF BRER ALRBADY CLOSED IN HORMAL ALIGNMENY				REQUIRED IF SUCE #1 NOT RHERGIZED VIA BREE 52-1102 PROK SST #1
	12.3.01.02.2	52-1102 (BRBARBR)	52-1103 "b" CONTACT	CLOSED	BERE CAN BE CLOSED TO PARALLEL SST #1 AND SST #3 TEROUGH #80V SWGE #1. NO BFFECT IF BERE ALPRADY CLOSED IN NORMAL ALIGHMENT	PBBIODIC TESTING	NOME ERQUIRED	BROM	NORMAL POSITION. 480V LOAD TRANSPER PROCEDURALLT BY DROP AND PICEUP. PARALLELING SOURCES DURING SIS/SISLOP REQUIRES INTERLOCE FAILURE
									PLUS OPBRATOR BEROR, WEICH IS A DOUBLE FAILURE SCEWARIO OUTSIDE PLANT DESIGN BASIS
	12.3.01.03.1	SZ-110Z (BRBAEBR)	52-1103 133 CONTACT	OPBN	BREE CANNOT BE CLOSED UNLESS SWGR #1-3 TIE BREE IS OPEN. NO BEFFECT IF BREE ALREADY CLOSED	PBRIODIC TESTING	NOME BEQUIRED	NONB	NORMAL POSITION. 133 CONTACTS FROM CBLL SWITCH
	12.3.01.03.2	52-1102   SRBAKER	52-1101 	CLOSED	IN HORMAL ALIGNMENT (SAHE AS 12.3.1.2.2)	PBRIODIC TESTING	(SAME AS 12.3.1.2.2)	(SANB AS 12.3.1.2.2)	480V LOAD TRANSPER PROCEDURATLY BY DEOP AND PICTUP. PARALLELING SOURCES DURING SIS/SISLOP REQUIRES
								•	INTERLOCE FAILURE PLUS OPBRATOR BEROR, WHICH IS A DOUBLE FAILURE SCENARIO OUTSIDE PLANT DESIGN BASIS

## SAN ONOPRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION SYSTEM FHEA

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	ITBH #	DRVICE ID	COMPONENT ID	FAILURB MODB	LOCAL BPPECTS AND DEPENDENT FAILURES	METHOD OF	INHERENT COMPENSATING PROVISIONS	BPFRCT ON BCCS	REMARKS
			* **	• ••					
	12.3.01.04.1	52-1102 (BRBARBR)	*b* CONTACTS	OPBN	BRER CLOSED INTERLOCE TO SWCR \$1-3 TIE BRER PREVENTS TIE BRER CLOSING UNLESS 52-1102 IS		MOMS BROUBSD	NOME. SWGR \$3 CAN BB RB-BWRRGIZED POST-SIS/SISLOP PROM BITHER TRAIN BY OPRNING	NORMAL POSITION
					IN TEST POSITION OR SWGE #3 NORMAL PERDER BRER IS OPEN, AND SWGR #2-3 TIR BRER IS OPEN			ITS NORMAL PERDER BERR 52-1303 AND THEN CLOSING BITHER TIE BRER	
	12.3.01.04.2	52-1102 (BRBAKBR)	6 CONTACTS	ČLOŠBD	BEER OPEN SIGNAL TO SUGE \$1-3 TIE BEER ALLOWS PARALLELING SST \$1 AND 3 TEROUGH 480V SUGE \$1, ALTHOUGE PAULT PROTECTION		NONE REQUIERD	NORB	480V LOAD TRANSPER PROCEDURALLY BY DROP AND PICKUP. PARALLELING SOURCES DURING SIS/SISLOP REQUIRES
 					IS NOT PROVIDED FOR SUCE A COMPIGURATION				INTERLOG FAILURE PLUS OPERATOR REBOR, WHICH IS A DOUBLE FAILURE SCHWARIO
1-	12.3.01.05.1	\$2-1102 (BREAKER)	133 CONTACTS	OPBN	BRER NOT-IN-TEST INTERLOCE TO SUGE \$1-3 TIE BEER PREVENTS	PBRIODIC TESTING	NONE ESCRIBSO	NOME. SWGR #3 CAN BE RE-BMBRGIZED POST-SIS/SISLOP	OUTSIDE PLANT DESIGN BASIS NORMAL POSITION
   		·· -··- <del>-</del>	<del></del>		TIE BEER CLOSING UNLESS 52-1102 OR SWGR #3 WORMAL FBEDER BERE IS OPEN, AND SWGR			PROK BITHER TRAIN BY OPENING MORMAL PERDER BRER 52-1303 AND THEN CLOSING BITHER TIE BRER	
	12.3.01.05.2	52-1102 (BRBAKER)	133 CONTACTS	CLOSED	82-3 TIB BRRR IS OPBH BRRR IN-TRST SIGNAL TO SWGR 81-3 TIB BRRR ALLOWS	PBBIODIC TESTING	NOMB BEGNIESD	NONB	480V LOAD TRANSPER PROCEDURALLY BY DROP AND
				·	PARALLELIMG SST #1 AND 3 THROUGH 480V SWGB #1, ALTHOUGH PAULT PROTECTION IS NOT PROVIDED FOR SUCH A CONFIGURATION				PICEUP. PARALLELING SOURCES DURING SIS/SISLOP REQUIRES INTERLOCE PAILURE PLUS OPERATOR REROR, WHICE IS A DOUBLE PAILURE SCENARIO
	12.3.01.06.1	52-1102 (BRBAKER)	86 (RBLAY)	ON	OVED TRIPS BRIR AND BLOCKS CLOSE OF SWCR #1-3 TIR BRIR. CAUSES LOSS OF ALL TRAIN A	CONTROL ROOM INDICATION	NONE POR INJECT OR RECIEC  {INCLUDING LO-LO RWST LEVEL TRIP]: NONE POR RCP6	STRAIN A BCCS INOPBRABLE, TRAIN B POTENTIALLY INOP DUE TO: UNISOLABLE CCW FLOW BYPASS,	OUTSIDE PLANT DESIGN BASIS *DELATED FAILURES RESULT FROM LOSS OF COOLING OR BATTERY CHARGING. BOI REV RSQD TO TRIP
					480V SWGR/MCC LOADS, INCL IMMBDIATE LOSS OF RECIRC, REF		POST-SCTR. REDUNDANT MAIN IPHR	LOSS OF LO-LO RWST LEVEL TRIP FOR TRAIN A SI/FW, LOSS OF C/R	AFFECTED SI/PW PP BEFORE DC POWER LOST. DOSE CALC BEV REQD
			······································		PUMPS, C/R AND 1/2 MAIN IPMR COOLING, AND DELATED LOSS OF				ONE REP WIR PP AND NO FILTERED BVAC. VERIF OF B/U C/R VENT
	12.3.01.06.2	52-1102 (BBBAEBR)	86 (RBLAY)	OFF.	MPW PP, DG AND DC BUS \$1 BRER WILL NOT TRIP IN BVBNT OF BUS FAULT, NOR LOCK-OUT SWGR	PBRIODIC TESTING			ADEQUACY ALSO REQD NORMAL POSITION. THIS PAILURE PLUS BUS FAULT DURING
			and the same of th		\$1-3 TIB BRER				SIS/SISLOP IS A DOUBLE PAILURE SCEMARIO OUTSIDE PLANT DESIGN BASIS. RELAF DORS NOT PROVIDE
	12.3.01.07.1		SWGR #1 125VBC	VOLTS LOW	BREE CANNOT BE TRIPPED OR	CONTROL BOOM INDICATION	MONS REQUIRED	NONB	OVERLOAD PROTECTION FOR BREE OR 480V SIDE OF SST \$1 BREE NORMALLY CLOSED, NOT
-  -  -		(BERYERB)	"CONTROL POWER "		RECLOSED				REQUIRED TO TRIP OPEN BECEPT FOR PAULT PROTECTION OR RE-ENERCIZING SWGR #1 FROM
	-								SWGR \$3/991 \$3. CAN BE TRIPPED LOCALLY IP MEEDED FOR TIE BREE CLOSURE

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OUTSIDE PLANT DESIGN BASIS

1. :							7 T 20 T 300 SERVICE SERVICE		
;   ;	ITBH #	DRATCR TO	COMPONENT ID	FAILURE MODE	LOCAL BFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	PROAISIONS  IMMERBAT COMPRASATING	BPPECT ON BCCS	BBMARES
-	12.3.02.01.1	52-1103 (BREAKER)	BRBARBR	OPEN	BRER CANNOT BE CLOSED TO BE-EMBRGIZE SWGR #3 FROM TRAIN A 480V SWGR #1	CONTROL BOOM INDICATION, PBBIODIC TESTING	TIR BRER 52-1203 AVAILABLE FOR	RE-ENERGIZING SWGR #3 TBIRD-OF-A-KIND LOADS	MORMAL POSITION
	12.3.02.01.2	52-1103 (BRBAEER)	BRRAIBR	CLOSBD	BREE WILL NOT OPEN ON SIS/SISLOP. POTENTIALLY CAUSES LOSS OR INTERRUPTION OF ALL	CONTROL ROOM INDICATION		(MOY-358/MOY-850C UPS, MOY-883)  TRAIN A POTENTIALLY INOP DUB TO VOLTAGE DEGRADATION AND 8ST	TECH SPEC ACTION BUTEY REQU WITH SWGE \$1-3 OR SWGE \$2-3 TIE BEER CLOSED DURING WORKAL
	· <del></del>	<del></del>	····		TRAIN A 480V LOADS DURING SIS/SISLOP, INCLUDING RECIRC, RBP WTR, BYDRAZINE, CCW AN SWC		REDUNDANT MAIN IPME COOLING FOR ALT OFFSITE SOURCE	SIS/SISLOP LOADING. TRAIN B POTENTIALLY INOP DUB TO	OPS. BOI REV REQD TO PROMPTLY TRIP NON-RSSENTIAL LOADS AND RE-ENERGIZE SYCR 51. LO-LO
	12.3.02.02.1		52-1102	 Oprn	PPS, C/R AND 1/2 MAIN IFMR COOLING, AND DELATED LOSS OF MPW PP, DG AND DC BUS \$1	DDDIANIC POSTINA	MANUE ADMITTAN	COOLING. REDUCED RELIABILITY OF ALTERNATE OFFSITE SOURCE	APPECTED IF 480VAC AND 125VDC LOST W/ REVENUED
		(BRBAIRR)	*b* CONTACT OR	Uran	BREE CANNOT BE CLOSED IF SWGE #3 NORMAL FREDER BREE 52-1303 IS ALREADY CLOSED. PREVENTS RB-RUBEGIZING 480V SWGE #1 PROM 3ST #3/SWGE #3 IN THE		NONE BEGNIESD	MORE	NORMAL POSITION. LOSS OF SST \$1 OR 52-1102 POWER CONTACTS PLUS THIS FAILURE DURING SIS/SISLOP IS A DOUBLE FAILURE SCHMARIO OUTSIDE PLANT DESIGN
24 24 •	12.3.02.02.2	52-1103 (BRBAKER)	52-1102 "b" CONTACT OB	CLOSED	NOBMAL PEEDER BEER DEFRATED. ALLOWS PARALLELING SST \$1 AND	PBBLODIC TESTING	NOME BEGNIESE	NORB	BASIS THIS PAILURE PLUS OPERATOR ERROR PLUS PAULT IS OUTSIDE SIS/SISLOP DESIGN BASIS
,,,	12.3.02.03.1	52-1103 (BREAKER)	52-1203 b CONTACT OR	OPEN	3 THROUGH SWGR \$1, ALTHOUGH BUS NOT FAULT PROTECTED IN SUCH A CONFIGURATION INTERLOCE FROM SWGR \$2-3 TIR BREE PREVENTS BREE CLOSE TO	PERIODIC TESTING	NOME BEGNIEBD	-	52-1203 °b°/133 CONTACTS MAT ALSO PREVENT BECLOSURE OF SUCR
	12.3.02.03.2		133 CONTACT 52-1203	 CLOSBD	BB-BBBRGIZB SWGR #3 FROM TBAIN A SWGR #1 INTERLOCE FROM SWGR #2-3 TIB	PERIODIC TESTING	NONE. ADMINISTRATIVE CONTROLS	PROM TRAIN B VIA SWGR \$2-3 TIE BRER 52-1203 LOSS OF AUTOMATIC PROTECTION	TRAIN A VIA SSY #3  *TROE SPEC ACTION ENTRY REQU
		(BRBARER)	"b" CONTACT OR		BRER 52-1203 DSFRATRD, ALLOWS PARALLELING TRAIR A (SWGR \$1) TO TRAIN B (SWGR \$2) VIA 480V SWGR \$3 IP NORMAL FREDRR BRER		DO NOT ALLOW THIS  COMPIGURATION IN HODRS 1 - 4	AGAINST PARALLELING REDUNDANT	POR THIS CONDITION SINCE HIS/SISLOP TRIP BIGMALS ARE MOMENTARY ONLY (VIA TDR=) AND DO NOT PREVENT PARALLELING BY
	12.3.02.04.1	52-1103 (BRBARRE)	52-1303	OPBN	52-1303 IS OPEN (EG. POLLOWING SISLOP TRIP OF BRER) INTERLOCE PROM SWGR \$3 NORMAL PESDER BRER \$2-1303 PREVENTS	PBRIODIC TESTING	NOMB BBÖNTBBD	NONE. SUGE #3 CAN BE RE-ENERGIZED-POST-SIS/SISLOP	A SUBSEQUENT SINGLE FAILURE OR OPERATOR BEROR APTER TRIP SWGR \$2-3 TIE BERE 52-1203 CLOSE MAY ALSO BE DISABLED BY
	12 1 02 04 2 4		133 CONTACT	CLOOPD	BRER CLOSE TO RE-EMERGIZE SWGR #3 PROM TRAIN A SWGR #1 (IR, W/ 52-1102 CLOSED)	DDDIADIC SDDSTUG	NOVE DECULTORS	PROM TRAIN A VIA THIS BRIR AND SST \$3	52-1303 °b"/133 INTERLOCE
 	12.3.02.04.2	(BR3AR3R)	52-1303 "b" CONTACT OR "133 CONTACT	CLOSED	INTERLOCE PROM SWGR #3 NORMAL PBBDBR BRER 52-1303 DBPBATED. ALLOWS PARALLELING SST #1 AND SST #1 THROUGH 480V SWGR #1.	PERIODIC TESTING	HONB BEGUIRED	HONE	480V LOAD TRANSPER PROCEDURALLY BY DEOP AND PICEUP. PARALLELING SOURCES DURING SIS/SISLOP REQUIRES
			-		ALTHOUGH PAULT PROTECTION IS NOT PROVIDED FOR SUCE A CONFIGURATION				INTERLOCE PAILURE PLUS OPERATOR BEROR, WHICH IS A DOUBLE PAILURE SCENARIO

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	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL BEFECTS AND DEPENDENT FAILURES	DBTBCTION OF	INHBRENT COMPENSATING PROVISIONS	RPPRCT ON BCCS	RBHARES
2.3.02.05.1		52-1102	CONTACTS OPEN		CONTROL ROOM INDICATION	NONE BEGAIRED	NOME. SWER #3 CAN BR	BPPECT OF 86 RELAY FAILURE ON
	(BESAERR)	86 (RELAY)	(ON)	SWGR #1 NORMAL FREDER BRER 52-1102 PREVENTS CLOSING BRER			RB-RURRGIZED POST-SIS/SISLOP PROM TRAIM A VIA BREE 52-1303	BOTH 52-1102 AND 52-1103 IS ADDRESSED IN ITEM 12.3.01.06.1
				TO RE-ENERGIZE SWGR \$3 PROM TRAIN A SWGR \$1			AND SST \$3 OR TRAIN B VIA TIB BRER 52-1203	
2.3.02.05.2		52-1102	CONTACTS CLOSED		PERIODIC TESTING	NONE BEGULBED	HONB	NORMAL POSITION. THIS PAILURE
	(BREARER)	86 (RELAY)	(OFF)	SWGR #1 NORMAL PERDER BRER				PLUS PAULT DURING SIS/SISLOP
				52-1102 DBPBATED. ALLOWS PARALLELING OF SWGR #3 TO				IS A DOUBLE PAILURE SCHWARIO WRICH IS OUTSIDE PLANT DESIGN
			-,	PAULTED BUS				BASIS
2.3.02.06.1	52-1101	52-1303	CONTACTS OPEN	OVERLOAD INTERLOCE PROB.480V	CONTROL ROOM INDICATION	MONE REQUIRED	NOME. SWGR #3 CAM BE	CONCURRENT REFERCT OF 85 AND
	(BRBAESR)	86-1 (RBLAY)	(ON)	SWGR #3 MORNAL PERDER BRER			RB-RNERGIZED PROB TRAIN B VIA	85-1 RELAY OPERATION ON
			1121	52-1303 PREVENTS CLOSING BREE			SWGR #2-3 TIB BRER 52-1203	52-1103, 1203 AND 1303 IS
				TO RE-ENERGIZE SWGR #3 FROM				ADDRESSED IN THE ENTRIES FOR
				TBAIN A 480V SWCR #1				52-1303 IN SECTION 12.6 OF
								THIS ANALYSIS
2.3.02.06.2		52-1303	CONTACTS CLOSED	OVERLOAD INTERLOCE PROM 480V	PERIODIC TESTING	HOME BEGRIEBD	MORE	THIS PAILURE PLUS PAULT DURING
	(BRBARBR)	86-1- (RELAY)	(OPP)	SWGR #3 NORMAL PERDER BRER				SIS/SISLOP IS A DOUBLE PAILURE SCRUARIO OUTSIDE PLANT DESIGN
				52-1303 DEPEATED. ALLOWS				BASIS
				PARALLELING OF SUGR #1 TO FAULTED BUS				pasts
1.3.02.07.1	52-1103	980 1	CONTACTS OPEN	BRER WILL NOT TRIP ON	PERIODIC TESTING	NONE REQUIRED IF BREE	NOWE IP BEER INITIALLY OPEN	NORMAL POSITION. TECH SPEC
	(BRBARBR)	(18-6,8)	(9FP)	SIS/SISLOP TO AUTOMATICALLY	122122	INITIALLY OPBN		ACTION ENTRY REQUIRED IF TIE
	•	• • • •	•	ISOLATE TRAIN A 480V SWGR #1				BREE CLOSED IN MODES 1 - 4
				PROM SWCR DI LOADS				
2.3.02.07.2		SEQ 1	CONTACTS CLOSED	BREE WILL TRIP, IP CLOSED.	CONTROL BOOM INDICATION	NOME BEGUIEED IN BEEK	NONE IF BREE INITIALLY OPEN	
	(BEBAEER)	(18-6,8)	(ON)	HOWBYBR, RESET OF TRIP SIGNAL		INITIALLY OPEN		
				APTER 5 SEC VIA TOR PERVENTS				
2.3.02.08.1	69 1103	"b" CONTACTS	OPRN	SUBSEQUENT RETRIP IF NEEDED BREE CLOSED INTERLOCK TO SWGR	BOBIANIC PROFINC	NAME DESCRIPTION AND SHADE SEEM	NONE FOR SHORT TERM. FOR LONG	MUN-328 WUN-328U HES WHAT
	-(8857KBB)	B COMINCIA	UPAR	#1 PERDER BREE, SWCE #1 PERDER	• •	OPERATOR ACTIONS FOR LONG-TERM		CYCLE > 30 MINUTES TO PERHIT
	[Danagen]			BRER, AND SWCB #2-3 TIB BRER		OTBUNIOR ROLLOWS FOR BONG TERM	RE-EMBRGIZED WITH THIS PAILURE	
	•			PREVENTS THEIR CLOSING, IP			BY LOCALLY RACKING-OUT SWGR	LOCALLY IN THE 4ky ROOM OR
				OPER, UNLESS 52-1103 IS IN THE			AL-3 TIR BRER 52-1103 IN HEV	480V ROOM
		•		TEST POSITION			ROOM AND THEM COMMECTING TO	•
							TRAIN A VIA 52-1303 OR TRAIN B	·
							VIA 52-1203 TO PREVERY LOSS OF	
							NOV-358/NOV-850C UPS	
2.3.02.08.2		"b" CONTACTS	CLOSED	BRER OPEN SIGNAL TO SWGR #1	PERIODIC TESTING	NONE REQUIRED	NONB	NORMAL POSITION. 480V LOAD
	(BERYESE)			PEEDER BRER, SWGR #3 PEEDER				TRANSPER PROCEDURALLY BY DROP
				BRER, AND SWCR #2-3 TIE BRER.				AND PICKUP. PARALLELING SOURCES DURING 813/513LOP
				ALLOWS PARALLELING SST \$1 AND 1 THROUGH 480V SWGR \$1 OR				REQUIRES INTERLOCE PATLAUSE
				PARALLELING TRAIN A AND B				PLUS OPERATOR BEROR, WHICH IS
				THROUGH 480V SWGR 43	•		•	A DOUBLE PAILURE SCRNARIO
				PURACAGE IAAL REAR \$4				OUTSIDE PLANT DESIGN BASIS

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ITBM #	DRAICR ID	COMPONENT ID	PAILURE MODE	LOCAL BPFBCTS AND DBPBNDBNT FAILURBS	MBTHOD OF DRTBCTION	INHBRBNT COMPENSATING PROVISIONS	BFFECT ON BCCS	RBMARES_
2.3.02.09.1 5		133 CONTACTS	OPEN		PBBIODIC TBSTING	REDUNDANT TRAIN & AND B		SINCE MOV-883 ALSO APPECTED
(	(BESAUBE)			SYGR #1 FREDER BRER, SYGR #1		POWERED VALVES FOR CLE,	POST-SIS/SISLOP WITHOUT	AND CANNOT BE CLOSED FOR
	· · · · · · · · · · · · · · · · · · ·			FEBDER BRER, AND SWGR #2-3 TIE		REDUNDANT SI/PW PUMP TRIPS FOR		BECIEC, REDUNDANT CHECK VALVE
				BREE PREVENTS THEIR CLOSING,		FO-TO BASE TRABE TRIB	POWER, DISABLING 1/3 ST VALVES	
				IF OPEN, UNLESS 52-1103 IS			POR LO-LO BUST LEVEL TRIP	TESTING FOR THE BECIEC
2.3.02.09.2 5	(2-11/1)	133 CONTACTS	CLOSED	OPEN BREE-IN-TEST SIGNAL TO SWGR #1	DEDIGATE PROPING	MONE BEONIERD	PUNCTION AND 1/3 CLR PATES MONR	BOUNDARY PUNCTION 480V LOAD TRANSPER
	(BRBAKER)	133 COMINCIS	CEONBR	PERDER BREE, SWGR #3 PERDER	PRIODIC IRSIING	MOND REGULARY		PROCEDURALLY BY DROP AND
,	DESERBE			BRER, AND SWGR 42-3 TIE BRER.				PICEUP. PARALLELING SOURCES
			· · · · -	ALLOWS PARALLELING SST MI AND				DURING SIS/SISLOP REQUIRES
				3 THROUGH 480V SWGR #1 OR				INTERLOCK FAILURE PLUS
				PARALLELING TRAIN A AND B				OPERATOR BREOR, WHICH IS A
				THROUGH 480V SWGR 13				DOUBLE FAILURE SCHNARIO
								OUTSIDE PLANT DESIGN BASIS
2.3.02.10.1 5	2-1103	SWGR #1 125VDC	VOLTS LOW	BREE CANNOT BE TRIPPED OR	CONTROL ROOM INDICATION	MONE REQUIRED IF BREE	NOME IF BREE INITIALLY OPEN.	STECH SPEC ACTION ENTRY
	BREAKER	CONTROL POWER		RECLOSED		INITIALLY OPEN		BRQUIRED IF SWCR \$1-3 TIE BRER
							PROM TRAIN A VIA 52-1303 OR	CLOSED DURING MORNAL OPERATION
							TRAIN B VIA 52-1203	
E. 5.703 . 0 F. T. TE	ICC-1	32-1118	OPBN	LOSS OF POWER TO MCC-1 LOADS,	CONTROL ROOM INDICATION	NONE FOR \$18/818LOP, BEDUNDANT	TRAIN A BCCS INOPERABLE, TRAIN	*HCC-1 480V ACB. C/R DOSE CALC
		(BREAKER)		INCLUDING NOV-1100B/C, 1/3 SI		HAIN REMR COOLING FOR	B POTENTIALLY INOPERABLE DUE TO	BBV REQU TO PRECLUDE CREDIT
				PATHS, 1/3 CLR PATHS, ALT HLR		ALTERNATE OPPSITE SOURCE	INTERRUPTION OF CONTROL ROOM	FOR BVAC FILTER UNIT. ALSO,
				PATH, I RECIRC TRAIN, I			COOLING. REDUCED RELTABILY OF	VERIFICATION REQUITERY
				HYDRAZINB PUMP, 1 CCW TRAIN, 2			ALTERNATE OFFSITE SOURCE. RCPS	PORTABLE BACKUP VENTILATION
				MPM ISOLATION HOVS, CONTROL			ALSO UWAVAILABLE FOR SCTR	PROVIDES ADEQUATE COOLING FOR
				ROOM AND 1/2 NAIN TPHR				C/R EQUIPMENT. CHARGING PUMPS
				COOLING, RCP NOTOR COOLING				ALSO UNAVAILABLE FOR INJECTION
								IP NOV-1100C ON TRAIN A
:73.703.01.2 M	ICC-1	52-1118	CLOSED	480V POWER AVAILABLE TO TRAIN	PERIODIC TESTING	NONE BECALERO	MONB	*RORNAL POSITION. NON-SR LOADS
		(BRBAEBR)		A MCC-1 LOADS. HOWBYBR, BREE				NOT ALL TRIPPED/LOCKED-OUT ON
			,	WILL NOT TRIP IP NEEDED TO				SISLOP. BREES MUST COORDINATE
				ISOLATE PAULTS DUE TO NON-SE				TO PREVENT PREDER TRIP UNDER
				LOADS				SIS AS WELL AS SISLOP. MCC BUS PAULT PLUS BREE PAILURE IS
								OUTSIDE SIS/SISLOP DESIGN
								BASIS
.1.03.02.1 M	ICC-1	MSR LOADS	ON	LOAD(S) WILL NOT TRIP ON	PERIODIC TESTING	(SAME AS 12.3.3.1.1)	*(SAME AS 12.3.3.1.1)	INCLUDES C/R COOLING, RCP
	· · · · · · · · · · · · · · · · · · ·		(BREE CLOSED)	SISLOP OR TO ISOLATE	PRIVATA IBRITAR	facing on speakers:	-fauna ag sasasasses	HOTOR COOLING AND 1 OF 2
			frage cooppal	COMMON-CAUSE FAULTS.				TRAINS OF MAIN IFMR FORCED AIR
				POTENTIALLY BESULTING IN TRIP				COOLING
				OF MCC-1 PREDER BREE 52-1118				
2.3.03.02.2 H	ICC-1	MSR LOADS	OFF	LOSS OF ONE OR HORE MCC-1 MSR	PBRIODIC TRSTING	NONE FOR SIS/SISLOP, REDUNDANT	*POTENTIAL INOPERABILITY OF	*VBRIFICATION REQUIRED OF
	-		(BRER OPEN)	LOADS, INCLUDING CONTROL ROOM		MAIN IPMR COOLING FOR ALT	BOTH TRAINS DUB TO INTERRUPTION	· · · · · · · · · · · · · · · · · · ·
			• • •	AND 1/2 MAIN YPHR COOLING, RCP		OFFSITE SOURCE. NONE FOR RCP.	OF CONTROL ROOM COOLING.	VENTILATION ADEQUACY. MAIN
				MOTOR COOLING		POST-SGTR	REDUCED RELIABILITY OF	IPHR HAS 2 TRAINS OF FORCED
						•	ALTERNATE OFFSITE SOURCE, RCPs	
			and the second second	a company of the party of the same of the			UNAVAILABLE FOR SCTE	

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ITBM #	DRVICE ID	COMPONENT ID	FAILURB MODB	LOCAL BPFBCTS AND DEPBNDENT FAILURES	MBTHOD OP DBTBCTION	INUBRRUT COMPRHSATING PROVISIONS	BPFECT ON BCCS	BEMARKS
12.3.03.02.3 M	CC-1	N38 LOADS	BQ/SBISHIC	POTRUTIAL COMMON-CAUSE PAULT OP MSR LOADS, CHALLENGING MCC-1 LOAD AND PREDER BREES	NONE .	OVERCURERNY TRIP OF INDIVIDUAL LOAD BREES AND BREE COORDINATION TO PREVENT PERDER	INOPERABILITY OF TRAIN A DUE TO	FNOM-SE LOADS NOT ALL ) TRIPPED/LOCKED-OUT ON SISLOP. COMPIGURATION DORS NOT HERT RG
			r 200 - 140 - Lacamanana			BRRY TRIP FOR PAULTS, MONR FOR O/C PAILURE OF LOADS BELOW SETPOINTS		1.75 OR IBBE 384 CRITERIA WHICH REQUIRE TRIP OF ALL NOW-IE LOADS ON A SAPETY
12.3.04.01.1 M	CC-1A	52-1123 (898ABBR)	OPBN .	LOSS OF POWER TO MCC-1A LOADS, INCLUDING TRAIN A MPW PUMP	CONTROL BOOM INDICATION	REDUMDANT TRAIN	TRAIN A INOPERABLE	SIGNAL (IR, SIS AND SISLOP) NCC-1A 480V ACB
12.3.04.01.2 80	CC-1A	52-1123 (BEBAEBE)	CLOSED	LUBE OIL PAN COOLER  4804 POWER AVAILABLE TO TRAIN A MCC-IA LOADS. BOWEVER, BREE	PBRIODIC TESTING	NONE BEGUIEED	NORB	*MORMAL POSITION. NON-SE LOADS NOT TRIPPED/LOCKED-OUT ON
		····		WILL NOT TRIP IP NEEDED TO ISOLATE FAULTS DUE TO NON-SE LOADS				SISLOP. BREES HUST COORDINATE TO PREVENT PERDER TRIP. MCC BUS FAULT PLUS BREE FAILURE IS
12.3.04.02.1 MC	C-1A	NSR LOADS	ON (BRES CLOSED)	LOAD(S) WILL NOT TRIP ON	CONTROL BOOM INDICATION,	(SAMB AS 12.3.4.1.1)	(SAMB AS 12.3.4.1.1)	OUTSIDE SIS/SISLOP DESIGN BASIS INCLUDES MAIN STEAM DUMP
			(BBES C00380)	SISLOP OR TO ISOLATE COMMON-CAUSE PAULTS, POTENTIALLY RESULTING IN TRIP	PRRIODIC TRSTING			SYSTEM HOV:
12.3.04.02.2 HG	C-1A	NSR LOADS	OFF (BRER OPEN)	OF MCC-IA PERDER BREE 52-1123- LOSS OF ONE OR MORE MCC-IA MSR LOADS, INCLUDING MAIN STRAM DUMP ISOLATION MOVE	CONTROL ROOM INDICATION, PRRIODIC TESTING	NOME REQUIRED. BRANCH LIME ISOLATION NOT CREDITED IN MSLB		
12.3.04.02.3 NC	C-1A	NSB LOADS	BQ/SBISHIC	POTENTIAL COMMON-CAUSE PAULT	MONR	NORE REQUIRED. MPW LUBE OIL	OTHERWISE ISOCABLE BYBAN LINE BREAK LOSS OF TRAIN A MPW PP LUBB OIL	SCALCIN ATION DROWING TO
				OF MSR LOADS, CHALLERGING MCC-IA LOAD AND PEEDER BREES. SINCE ALL LOADS RICEPT MFW PP		TRAPERATURE SHOWN BY CALC TO COOLING DURING INJECTION PEASE	PAN COOLER FOR MILE OUTSIDE CONTAINMENT	DEMONSTRATE TWAY OPERATION OF PAN COOLER WOULD NOT ADVERSELY APPECT MPW PUMP PUNCTION FOR
			. Also	LUBB OIL PAN CLE ARE MSE, AND ALL LOCATED IN TURBINE BUILDING, FEEDER BREE MAY TRIP		OP MSUB		MSLB VIA BICESSIVE LUBE OIL TEMPERATURE IN THIS EVENT, CAUSED BY INDUCTION OF STEAM
12.3.05.01.1 MC	C-1B	52-1129	OPBN	PEON CONCURRENT FAULT IN MSLB OUTSIDE CONTAINMENT LOSS OF POWER TO MCC-18 LOADS,	CONTROL ROOM INDICATION	NOME REQUIRED FOR SIS,	TRAIN A INOPERABLE FOR SISLOP,	THROUGH PAN/COIL UNIT
19 3 05 01 4 MG	g 10	(BEBYESS)		INCLUDING TRAIN A DG AUXILIARIES		REDUNDANT TRAIN FOR SISLOP	HORE FOR SIS	
12.3.05.01.2 HC		52-1129 (BRSAMER)	CLOSED	480V POWER AVAILABLE TO TRAIN A MCC-1B LOADS, BOWEVER, BREE WILL NOT TRIP IP NEEDED TO	PBBIODIC TESTING	NONE REQUIRED	NONE	NORMAL POSITION. NON-SR LOADS
				ISOLATE FAULTS DUB TO NON-SR LOADS				SISLOP. HOWEVER, BREES COORDINATE TO PERVENT FEEDER TRIP. MCC BUS FAULT PLUS BREE
12:3:05:02.1 MC	C-1B	WSR LOADS	OH	LOAD(S) WILL NOT TRIP ON	CONTROL BOOM INDICATION,	(SAME AS 12:3:5:1:1)		PAILURE IS OUTSIDE SIS/SISLOP DESIGN BASIS
,			(BRER CLOSED)	SISLOP OR TO ISOLATE COMMON-CAUSE FAULTS, POTENTIALLY RESULTING IN TRIP	PBRIODIC TESTING	(unns 80 16.0.0.1.1)	10.00 a3 16.3.3.[1.1]	INCLUDES THUMBERBOLT SIREM ALTERNATE SUPPLY, DG BLDG RECEPTACLES, SUMP PUMPS AND DG COMPRESSORS

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TIBN 1	DRAICE ID	COMPONENT ID	PAILURB HODB	LOCAL BPPBCTS AND DBPBHDBHT FAILURBS	NETHOD OP DETECTION	INHERRIT COMPRISATING PROVISIONS	BFFECT ON BCCS	REMARKS
2.3.05.02.2	NCC-1B	NSR LOADS	(BRER OPEN)	LOSS OF ONE OR HORR MCC-1B MSR LOADS, INCLUDING ALTERNATE	CONTROL BOOM INDICATION, PERIODIC TESTING	REDUNDANT TRAIN FOR SISLOP, NONE REQUIRED FOR SIS	POTENTIAL INABILITY TO RESTART TRAIN A DG IF OPPSITE POWER IS	OPERATION OF REEP-WARM SYSTEM
				SUPPLY FOR THUMBERBOLT SIREN SYSTEM, 1/2 DG #1 STARTING AIR COMPRESSORS, 1/2 DG #1			LOST APTER INITIAL SIS STARTING ATTEMPTS, DUB TO LOSS OF ERRP-WARM STOTEM. NOWE FOR SIS	ARIOR TO RUGINE OBERATION
				INSTRUMENT AIR COMPRESSORS, OR DG AI KEEP-WARN BEATER			and the state of t	·
.1.05.02.3 1	MCC-1B	NSR LOADS	BQ/SBISHIC	POTENTIAL COMMON-CAUSE PAULT OF MSR LOADS, CHALLENGING	NOMB	OVERCURRENT TRIP OF INDIVIDUAL LOAD BREES AND BREES	*POTENTIAL COMMON-CAUSE INOPERABILITY OF TRAIN A DUE TO	*MON-SR LOADS NOT TRIPPRO/LOCERD OUT ON SISLOP.
	=	***************************************		MCC-18 LOAD AND PREDER BREES		COORDINATION TO PREVENT PREDER BREE TRIP FOR PAULTS, NOME FOR	480V SWGR/MCC DEGRADATION	COMPIGURATION DOBS NOT MEET EG 1.75 OR IBER 384 CRITERIA
						O/C PAILURE OF LOADS BELOW		WHICH REQUIRE TRIP OF ALL MOW-IN LOADS ON A SAPETY
.3.06.01.1	125VDC BUS #1	52-1110	OPBN .	LOSS OF 1 OF 2 PULL CAPACITY	CONTROL ROOM INDICATION		BEDUCED RELIABILITY OF TRAIN A	SIGNAL (IB, SIS AND SISLOP)
.3.06.01.2 1	BATTBRY CHARGERS 125VDC BUS #1	52-1110	CLOSED	CHARGERS FOR DC BUS 31 480V POWER AVAILABLE TO TRAIN	CONTROL BOOM INDICATION		125 VDC CONTROL POWER	CHARGER B IN SERVICE PARALLELING OF BATTERY
	BATTERY CHARGERS	<del></del>		A 125VDC BATTERY CHARGER A				CHARGERS PRECLUDED BY ADMINISTRATIVE CONTROL
	125VDC BUS #1 BATTERY CHARGERS		OPBN	LOSS OF 1 OF 2 FULL CAPACITY CHARGERS FOR DC BUS \$1	CONTROL ROOM INDICATION	REDUNDANT CHARGER	REDUCED RELIABILITY OF TRAIN A 125 VDC CONTROL POWER	NORMAL POSITION WITH BATTERY CHARGER A IN SERVICE
	25VDC BUS \$1 DATTBRY CHARGERS		CLOSED	490V POWER AVAILABLE TO TRAIN A 125VDC BATTERT CHARGER B	CONTROL ROOM INDICATION	NONE BEGALESD		PARALLELING OF BATTERY CHARGERS PERCLUDED BY
.3.07.01.1 [	NOT USEDI				·			ADMINISTRATIVE CONTROL ITHIS BLOCK OF RECORDS
								RESERVED FOR LATER ADDITION OF OTHER THAIN A 480V SWGR \$1 SR LOADS;
. 3.08.01.1 S	WGR #1 WSR OADS	ORBAKER(S)	OPBN	TRAIN A MSR LOAD(S) TRIP, CANNOT BE RESTARTED.	CONTROL BOOM INDICATION, PBRIODIC TESTING	POWERED BY SWGR #2 AND 3 FOR	SUPPLY TO SECONDARY RECIRC	CAN ALSO DISABLE ONE SCREEN WASE PURP, CONDENSER VACUUM
				POTENTIALLY DISABLES 1/3 INSTRUMENT AIR COMPRESSORS FOR SECONDARY RECIRC		SECONDARY RECIRC, NOWE REQUIRED FOR OTHER ECCS PUNCTIONS	PUNCTIONS	PUMP, FIRE PUMP, AND SPHERE ENCLOSURE BUILDING (SEB) SUPPLY OR BIHAUST PAN
1.08.0F.2°S L	OADS	BREAKER(S)	Crozbo	TRAIN A 480V MSE LOAD(S) WILL NOT TRIP ON BUS UNDBRVOLTAGE, SRQ SIGNAL (INCLUDING SISLOP	•	REDUNDANY TRAIN	TRAIN A INOPERABLE FOR SISLOP, REDUCED BELIABILITY FOR SIS	
.3.08.01.3 S	INCR 11 NSR OADS	BRBAEBR(S)	BQ/SBISHIC	OF TRAIN A 480V MSR LOAD(S),	NONE	PERDER BREE TRIP FOR COMPLETE	*POTENTIAL COMMON-CAUSE INOPERABILITY OF TRAIN A DUB TO	
				CHALLENGING SWGR #1 LOAD AND FEEDER BRERS			480Y SWGB/MCC DEGRADATION RESULTING FROM FAILURE TO ISOLATE ALL UNQUALIFIED LOADS	WHICH REQUIRE TRIP OF ALL NOW-IE LOADS ON A SAPETY SIGNAL (IR. SIS AND SISLOP)

12-2

# EMERGENCY CORB SYSTEM SINGLE FAILURS AMALYSIS SAN ONOFRE UNLT 1 TABLE 12-1: POWER DISTRIBUTION SYSTEM FMRA

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<u>.</u>	ITBN #	DEALCE ID	COMPONENT ID	FAILURE MODE	LOCAL BPPBCTS AND DEPENDENT FAILURES	MBTHOD OP DRTBCTION	INUBRENT COMPENSATING PROVISIONS	BPFBCT ON BCCS	REMARES
,	19 74 00 701 71	I SYGR DI	69A' 1	CONTACTO ADDIV	110 All Bal (84° 84° 144° 49° 188 -	Dentanta Spastua	WAVE DOD GTALOS WAVE DOOUTED	Charlies II Fuan Ab Marth - Ban	NORMAL BOOKERON BORG ALGO
	12.3.03.01.1	UNDBRVOLTAGE AND CONTROL	•	CONTACTS OPEN (OPP)	UV AUX BBLAYS 27-111, 27-112 AND 27-113 WILL NOT BNERGIZE AS REQUIRED ON SEQ 1 (SISLOP)	ARRIODIC IRZLING	FOR SIS. REDUNDANT MAIN IPHR	*POTENTIAL INOP OF TRAIN A FOR SISLOP DUB TO SWGR \$1 VOLTAGE DEGRADATION AND/OR DG OVERLOAD,	UNAVAILABLE DUE TO LOSS OF
					ACTUATION. UNDERVOLTAGE ACTUATION UNAPPECTED			W/ POTENTIAL INOP OF TRAIN B DUB TO: UNISOLABLE CCW PLOW BYPASS, LOSS OF LO-LO RWST	PAILURE. MAIN THAN HAS 2 TRAINS OF FORCED AIR COOLING
				•				LEVEL TRIP OF ST/FW. REDUCED RELIABILITY OF ALT OPPSITE SOURCE	
	12.3.09.01.2	SWGR BI UNDERVOLTAGE AND CONTROL		CONTACTS CLOSED (ON)	UV AUT BREATS 27-111, 27-112 AND 27-113 BNBRGIZB, TRIPPING ALL TRAIN A 480V LOADS BICBPT	CONTROL BOOM INDICATION	•	FTRAIN A BCCS INOPERABLE, TRAIN B POTENTIALLY INOPERABLE DUE TO: CCW PLOW BYPASS VIA	NORMALLY MOMENTARY. MAINTAINED SIGNAL DUB TO RELAY FAILURE
					MCCS AND AIR COMPRESSORS, RESULTING IN IMMEDIATE LOSS OF TRAIN A RECIRC, REP WTR,			MOV-720B AND LOSS OF LO-LO RWST LBVBL TRIP OF TRAIN A SI/PW	PREVENTS RESTART OF APPRICTED LOADS
					HYDRAZINB, CCW AND SMC PPS.  DELATED LOSS OF DC BUS \$1 DUB TO LOSS OF BOTH CHGRS				
,	12.3.09.02.1	SWGR #1 UNDBRVOLTAGE AND CONTROL		(VOLTS LOW)	UV AUR RBLÄYS 27-111, 27-112 AND 27-113 BNBRGIZB, TRIPPING ALL TRAIN A 480V LOADS BICBPT	CONTROL ROOM INDICATION	(SAMB AS 12.3.9.1.2)	*(9AMB AS 12.3.9.1.2)	*BOI BRA BEGD TO CLOSE CCW HEAT REMOVAL CAPABILITY
					MCCS AND AIR COMPRESSORS, RESULTING IN IMMEDIATE LOSS OF TRAIN A RECIEC, BEF WTR,				WITH PAILURE OF ONE SWC PUMP, AND TRIP APPECTED SI/PW PUMPS BRFORE DC POWER IS LOST
		··· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ·· ··		000	HYDRAZINB, CCW AND SWC PPS, DBLAYBO LOSS OF DC BUS \$1 DUB TO LOSS OF BOTH CHGRS				
	12.3.09.02.2	SWGR \$1 UNDERVOLTAGE AND CONTROL		OFF (VOLTS NORMAL)	UV AUI BBLAYS 27-111, 27-112 AND 27-113 WILL NOT BNBRGIZB AS BRQUIBBD ON BUS	PERIODIC TESTING	REDUNDARY TRAIN FOR SIS, NORE REQUIRED FOR SISLOP	REDUCED RELIABILITY OF TRAIN A FOR SIS, NOME FOR SISLOP	·
	12.3.09.03.1	SWGR #1	38Q 1	CONTACTS OPEN	UNDBRVOLTAGE. SEQ ACTUATION UNAPPROTED SYGE #1 LOCKOUT RELAY WILL NOT	PRRIODIC TESTING	NONE FOR SISLOP, MONE REQUIRED	*POTENTIAL INOP OF TRAIN A FOR	*NORMAL POSITION. INCLUDES
10	Parties and the second	CONTROL	(10-10,12)	(OPF)	TRIP TRAIN A 480V SWGR #1 WSB LOADS ON SISLOP, INCLUDING AIR COMPRESSORS, PRESSURIZER		FOR SIS, REDUNDANT MAIN XIME COOLING FOR ALTERNATE OFFSITE SOURCE		RESET SWITCH. RCPs ALSO LOST. VERIF REQD THAT PORTABLE B/U VENTILATION FOR C/R PROVIDES
2					BEATER GROUPS X AND C			OF TRAIL B DUE TO: UNISOLABLE CCW FLOW BYPASS, LOSS OF LO-LO RWST LEVEL TRIP OF SI/PW.	ADEQUATE COOLING. DOSE CALC REV REQD TO BLIMINATE CREDIT FOR FILTERED EVAC AND ECPS
	12.3.09.03.2		18Q 1	CONTACTS CLOSED	SWGR #1 LOCKOUT RELAY TRIPS	CONTROL BOOM INDICATION	REDUNDANT AIR COMPRESSORS	BEDUCED RECTABILITY OF ALT OPPSITE SOURCE INOPERABLLITY OF SWGR \$1	POST-SGTR. MAIN 1PME HAS 2 TRAINS OF FORCED AIR COOLING
		UNDREVOLTAGE AND (	10-10,12)	(on)	TRAIN A 180V SWGR FI NSR LOADS, INCLUDING AIR COMPRESSORS, PRESSURIZER BRATER GROUPS A AND C		POWERED FROM SWCR \$2 AND 3 FOR SECONDARY RECIRC, NONE		

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ITEM !	DRAIGE ID	COMPONENT ID	FAILURS MODE	LOCAL BPFBCTS AND DBPRNDBNT PAILURBS	METHOD OF Detection	INHBRBNT COMPRESSATING PROVISIONS	SPFECT ON BCCS	BRADES
							***************************************	
12.3.09.04.1	SWGR &I UNDERVOLTAGE AND CONTROL	86-1 (BBLAY)	TEIP	ALL TRAIN A 480V SWGR #1 MSR LOADS, INCLUDING AIR	CONTROL BOOM INDICATION	(SAMB AS 12.3.9.3.2)	(SAMB AS 12.3.9.3.2)	SWGR \$1 SISLOP LOCKOUT RELAY
12.3.09.04.2		86-1 (RBLAT)	RESET	COMPRESSORS, PRESSURIZER BEATER GROUPS A AND C SWGR &I LOCKOUT RELAT WILL NOT	PBRIODIC TESTING	(SAMB AS 12.3.9.3.1)	*(SAMB AS 12.3.9.3.1)	
	UNDERVOLTAGE AND CONTROL			TRIP TRATE A 1809 SWOR FI WER LOADS ON SISLOP, INCLUDING AIR COMPRESSORS, PRESSURIZER				
12.1.09.05.1	UNDERVOLTAGE AND		CONTACTS OPEN (OPP)	HEATER GROUPS A AND C MCC-1 LOCEOUT RELATS 86-M1-1, 86-M1-2, 86-M1-3 WILL NOT		POR SIS, REDUNDANT MAIN IPHR		NORMAL POSITION. REDUNDANT INPUTS PRON SEQ 1 PREVENT THE
	CONTROL	(T(=5(11) · · · ·		BNBEC128 AS BEQUIRED ON STALOF		COOLING FOR ALTERNATE OFFSITE SOURCE	VOLTAGE DEGRADATION AND/OR DC OVERLCAD, WITH POTENTIAL INOP OP TRAIN B DUR TO: UNISOLABLE	PATLURE UNLESS SEQ 1 LOAD GROUP A OUTPUT OR RELAY DRIVE CARD(8) PAIL. RCP: ALSO LOST.
							CCW PLOW BYPISS, LOSS OF LO-LO BWST LEVEL TRIP OF SI/FW. BEDUCED RELIABILITY OF ALT	
	UNDERVOLTAGE AND		CONTACTS CLOSED (ON)	MCC-1 LOCEOUT RELAYS 86-M1-1, 86-M1-2, 86-M1-3 TRIP AND	CONTROL BOOM INDICATION	NOME FOR ECCS ACTUATION AND CONTROL, REDUNDANT MAIN IPHE	OPPSITE SOURCE *POTENTIAL IMOP OF TRAIN A AND 8 DUE TO LOSS OF CONTROL ROOM	ON SISLOP UNTIL SEQ 1
	CONTROL	(11-9,11)		LOCKOUT MCC-1 WSR LOADS, INCLUDING CONTROL ROOM AND 1/2 MAIN IPMR COOLING, RCP COOLING FANS		COOLING FOR ALTERNATE OFFSITE SOURCE	COOLING APPROTING BOTH TWAINS OF ECCS ACTUATION AND CONTROL. REDUCED RELIABILITY OF	
2.3.09.06.1	SWGR #1	SD-1-3 (RBLAY)	On	MCC-1 LOCEOUT RELATS 86-MI-1,	PBRIODIC TESTING	(SAME AS 12.3.9.5.1)	ALTERNATE OFFSITE SOURCE. ECFS UNAVAILABLE FOR SCTR (SAME AS 12.3.9.5.1)	LOCEOUT RESET RELAY FOR
	CONTROL  CONTROL		e serve	86-MI-2, 86-MI-3 WILL ALTBENATE BETWEEN RESET AND TRIP STATE AS SOON AS SISLOP				B6-H1-1, B6-H1-2, B6-H1-3. INCLUDES HANDSWITCH
		-,,,,,,,,		OR MANUAL LOCEOUT INITIATION OCCURS, AND INMEDIATELY RESET APTER SEQ BLOCK/RESET				
	SWGR #1 UNDERVOLTAGE AND CONTROL	SD-1-1 (RBLAY)	OPP	MCC-1 LOCKOUT RELATS 86-H1-1, 86-H1-2, 86-H1-3 CANNOT BE BESST, PREVENTING RESTART OF	PERIODIC TESTING	(SABB AS 12:3.9.5.2)	" (5.5.5.5 T RATERAR)	HORMAL POSITION. HAIR XPMR HAS 2 TRAINS OF FORCED AIR COOLING
				NCC-T MSB LOADS POST-STSLOP," INCLUDING CONTROL BOOM AND 1/2 MAIN IPMB COOLING, BCP COOLING				
2.3.09.07.1	UNDERVOLTAGE AND	86-6 (RBLAY)	ON	FANS SYGR #1 LOCKOUT RELAY 86-1 AND NCC-1 LOCKOUT RELAYS 86-N1-1,	CONTROL ROOM INDICATION	(SAME AS 12.3.9.5.2)	*(SAMB AS 12.3.9.5.2)	MAIN IFMR HAS 2 TRAINS OF FORCED AIR COOLING
	CONTROL			86-HI-Z, 86-HI-3 TRIP AND LOCKOUT MSR LOADS INCLUDING AIR COMPRESSOR, CONTROL ROOM				
	,	•••		AND 1/2 MAIN IPME COOLING, RCP MOTOR COOLING PAHS AND PRESSURIZER BRATER GROUPS A				

## EMBEGENCY CORE CO SAN ONOPRE UNIT I TABLE 12-1: POWER DISTRIBUTION SYSTEM PHEA

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ITEM # DBVICE ID	COMPONENT LD	FAILURB MODS	LOCAL EPFECTS AND DEPENDENT FAILURES	MBTHOD OF DBTBCTION	INHERBUT COMPENSATING PROVISIONS	BPFBCT ON BCCS	BBNARES
2.3.09.07.2 SMCR \$1 UNDBRYOLTAGE AND CONTROL	86-6 (RBLAT)	OPF	SWGR \$1 LOCKOUT RELAY 86-1 AND MCC-1 LOCKOUT RELATS 86-M1-1, 86-M1-2, 86-M1-3 CANNOT BB	PBRIODIC TESTING	REDUNDANT TRAIN FOR SIS, MONE REQUIRED FOR SISLOP	REDUCED RELIABILITY OF TRAIN A FOR SIS, NOME FOR SISLOP	*MORMAL POSITION. MANUAL ACTUATION OF SISLOP LOCKOUT RELATS COULD BE REQUIRED FOR
			MANUALLY ACTUATED, NO REPECT ON SISLOP ACTUATION				BIS EVENT WITH COMMON-CAUSE PAILURES OF MSR EQUIPMENT DUB TO LACE OF AN AUTOMATIC
	86-M1-1	TRIP	RBLAT TRIPS AND LOCES-OUT ITS		REDUNDANT MAIN 19MR COOLING	REDUCED RELIABILITY OF	TRIP/LOCEOUT AS PRR RG 1.75 AND IBBE 384 MAIN IPMR BAS 2 TRAINS OF
UND REVOLTAGE AND CONTROL	(LOCKOUT RELAY)		MCC-1 MSR LOADS, INCLUDING 1/2 MAIN IPMR COOLING, 2/3 RCP COOLING PAMS. ALSO STARTS		FOR ALTERNATE OFFSITE SOURCE, NOWE FOR ACPS	ALTERNATE OPPSITE SOURCE. RCPs UNAVAILABLE POR SGTR, DUE TO LOSS OF NOTOR COOLING	PORCED AIR COOLING
.3.09.08.2 SWGR #1	86-81-1 NOCHOUT BRIDE	RBSBT	TRAIN A CHARGING PUMP LUBR OIL FAN COOLBR RBLAY WILL NOT TRIP AND LOCKOUT ITS MCC-1 WAR LOADS	PBRIODIC TESTING	(SAME AS 12.3.9.5.1)	*(SAME AS 12.3.9.5.1)	NORMAL POSITION
CONTROL	86-K1-2	TRIP	BBLAY TRIPS AND LOCKS-OUT ITS	CONTROL BOOM INDICATION	RONE	*LOSS OF CONTROL ROOM COOLING,	*VBRIFICATION REQUIRED THAT
CONTROL	[ FOCKOOL RECYL)		MCC-1 MSB LOADS, INCLUDING RCP-A LUBB OIL PUMP, RCP COOLING PAN A-1, BOTH CONTROL ROOM BEAT FUMPS	~ ~		POTBUTIALLY DISABLING BOTH TRAINS OF BCCS ACTUATION AND CONTROL	PORTABLE BACEUP VENTILATION PROVIDES ADBQUATE COOLING. DOSE CALC REV REQD TO
.3.09.09.2 SWGR #1 UNDBRVOLTAGE AND	86-H1-2 / Löcköüt ( relay)	RESET		PBRIODIC TESTING	(SAME AS 12.3.9.5.1)	*(SANE AS 12.3.9.5.1)	BLIMINATE CREDIT FOR FILTERED EVAC AND POST-SGTR ECP OPS MORMAL POSITION
CONTROL 3.09.10.1 SWGB A1 UNDBRVOLTAGE AND	86-MI-3 (LOCEOUT RELAY)	TRIP	BBLAY TRIPS AND LOCES-OUT ITS	CONTROL BOOM INDICATION	NOME BEGUIRED	NORE	BORIC ACID SYSTEM MOT CREDITED FOR SIS/SISLOP RVBNTS. C/R
CONTROL			BORIC ACID TAME HEATERS AND CONTROL BOOM BHERGENCY FILTER UNIT DOCT BEATER			·	DUCT BRATBE NOT CREDITED POST-SIS/SISLOP FOR EMERGENCY SUPPLY FAN/FILTER EFFICIENCY
3.09.10.2 SWGR #1  UNDBRVOLTAGE AND  CONTROL	B6-M1-3 (LOCEOUT BBLAY)	RESET		PBRIODIC TESTING	(SAMB AS 12.3.9.5.1)	*(8AMB AS 12.3.9.5.1)	NORMAL POSITION
	125VDC BUS #1 (72-118)	VOLTS LOW	LOCEOUT RELATS FOR SWGE #1, MCC-1 WILL NOT TRIP AND LOCEOUT THRIR WSR LOADS	PBRIODIC TESTING	NOME FOR SISLOP, NOME REQUIRED FOR SIS, REDUNDANT MAIN IPHE COOLING FOR ALTREMATE OFFSITE	*POTENTIAL INOP OF TRAIN A FOR SISLOP DUE TO 480V SUGE/MCC	RCP# ALSO UNAVAILABLE POR SGTR. MAIN IPMR BAS 2 TRAINS OF FORCED AIR COOLING
					SOURCE .	OVERLOAD, WITH POTENTIAL IMOP OF TRAIN B DUB: UNISOLABLE CCW FLOW BYPASS, LOSS OF LO-LO RUST	
			· · · · · · · · · · · · · · · · · · ·			LEVEL TRIP OF TRAIN A SI/PW. REDUCED RELIABILITY OF ALT OPPSITE SOURCE	•
4.01.01.1 52-1202 (BRBARBR)	BEBASER	OPEN	INTERRUPTION OF ALL TRAIN B LOADS ON 480V SWGE/NCC, INCLUDING INMEDIATE LOSS OF	CONTROL BOOM INDICATION	RBDUNDANT TRAIN, TRAIN B 480V POWBR VIA SWGR \$2-3 TIR BRRR AND 357 \$3 FOR LO-LO RUST	*TRAIN B BCCS INOP POR INJECTION, TRAIN B DG AND MFW PP POTBUTIALLY INOP DUB TO	#480V ACB PROM SST #2. BOI BBV BBQD TO PROMPTLY TRIP BON-BSSRNTIAL SWGR #3 LOADS
e ee			TRAIN B RECIRC, REF WTE (SPRAY), BYDRAZINE, CCW AND SWC PUMPS, 1/2 MAIN IPME		LEVEL TRIP, REDUNDANT MAIN	INTERBUPT OF AUXILIARIES, INCL CLNG. TRAIN A POTENTIALLY INOP FOR RECIEC DUE TO LOSS OF LO-LO	AND BE-BHERGIZE SWGR #2 TO BESTORE POWER TO MOV-850A AND
			COOLING, AND DELAYED LOSS OF		#4484B	RWST LEVEL TRIP OF TRAIN B	TRAIN B SI/PW TERMINATION.

# EMBRGENCY CORE C SYSTEM SINGLE FAILURE ANALYSIS SAN CHOPRE UNIT T TABLE 12-1: POWER DISTRIBUTION SYSTEM FREA

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i .	ITBM #	DRVICE ID	COMPONENT ID	FAILURB MODE	LOCAL BPFBCTS AND DEPENDENT FAILURES	MBTHOD OF DBTBCTION	INEBRENT COMPENSATING PROVISIONS	BPFBCT ON BCCS	BRHABES
	12.4.01.01.2	52-1202 (BRBAEBR)	BERATER	CLOSED	480V POWER AVAILABLE TO TRAIN B ECCS LOADS FROM SST \$2 AS BEQUIRED. HOWEVER, BREER WILL	CONTROL ROOM INDICATION, PERIODIC TESTING	NOMB BEQUIRED	HONB	MORMAL POSITION. BREE FAILURES BOUND SST-\$2 FAILURES, SINCE CREDIT NOT TAKEN FOR MSE FAMS
-					NOT TRIP IF WEBDED TO ISOLATE PAULTS DUB TO NON-SR LOADS ON 480V SWGR \$2				IN 19MB RATING. SISLOP TRIP/LOCEGUT AND BREE COORDINATION PREVENT PREDER
.j_	·								TRIP WITH MSR LOAD FAILURES. BUS FAULT PLUS BREE FAILURE IS OUTSIDE SIS/SISLOP DESIGN BASIS
	12.4.01.02.1	52-1202 (BRBAKER)	52-1203 "b" CONTACT	OPBN	BREE CANNOT BE CLOSED UNLESS SWGE \$2-3 TIE BREE 52-1203 IS IN TEST POSITION. NO EPPECT IF	PRRIODIC TESTING	NOME BEGNIESD	MONB	*TECH SPEC ACTION BUTEY BROWIERD IF SWOR \$2 NOT BUTERGIZED VIA BREE 52-1202
					BRER ALREADY CLOSED IN MORNAL ALIGNMENT				PROM SST #2
<del> </del>   	12.4.51.02.2	52-1202 (BRBAEBR)	52-1203 "b" CONTACT	CLOSED	BREE CAN BE CLOSED TO PARALLEL SST #2 AND SST #3 THROUGH 480V SWGR #2. NO BFFECT IP BREE		None beguteed	MONB	MORMAL POSITION. 480V LOAD TRANSPER PROCEDURALLY BY DROP AND PICKUP. PARALLELING
					ALIGNMENT				SOURCES DURING SIS/SISLOP REQUIRES INTERLOCE FAILURE PLUS OPERATOR REROR, WRICH IS
									A DOUBLE PAILORE SCRNARIO OUTSIDE PLANT DESIGN BASIS
-	12.4.01.03.1	52-1202 (BRSANSE)	52-1203 133 CONTACT	OPBN	BRER CANNOT BE CLOSED UNLESS SWGR #2-3 TIE BRER IS OPEN. NO EPFECT IF BRER ALREADY CLOSED		NONE RESOURED	MONB	NORMAC POSITION. 133 CONTACTS FROM CBLL SWITCH
	12.4.01.03.2	52-1202 (BBBAKBR)	52-1203 133 CONTACT	CLOSED	IN BORNAL ALIGNMENT (SAME AS 12.4.1.2.2)	PRRIODIC TRATING	(SAME AS 12.4.1.2.2)	(SAME AS 12.4.1.2.2)	480V LOAD TRANSPER PROCEDURALLT BY DROP AND
									PICAUP. PARALLELING BOURCES DUBING SIS/SISLOP REQUIRES INTERLOCE PAILURE PLUS
									OPERATOR BERGE, WHICH IS A DOUBLE PAILURE SCENARIO OUTSIDE PLANT DESIGN BASIS
	12.4.01.04.7	SZ-1ZOZ (BRBAKBR)	*b" CONTACT	OPBN	BREE CANNOT BE CLOSED UNLESS T SWGE #2 EMBEGENCY POWER BREE 52-1200 IS IN TEST POSITION.	PRRIODIC TRSTING	NONE BEGAIRED	MONE	ISUGE 32 REERCERCY POWER VIA IFHE PRON SOCRE 12 by LIME VS. SONGS 220 by SWYD. TRCH SPEC
					NO BPPECT IP BREE ALREADY CLOSED IN NORMAL ALIGNMENT				ACTION ENTRY REQUIRED IF SWCR \$2 NOT EMERGIZED VIA BRER 52-1202 FROM SST \$2
-  -  -	12:4:01.04:2	52-1202 (BREAKER)	52-1200 "b" CONTACT	CLOSED	BREE CAN BE CLOSED TO PARALLEL SST #2 AND BMEEGENCY POWER FROM SDGAE THROUGH SWGE #2. NO		NONE BEGUIRED	HONE	NORMAL POSITION. 480V LOAD TRANSPER PROCEDURALLY BY DROP AND PICKUP. PARALLELING
				· •	THE BPPRET IF BREE ALEBADY CLOSED IN NORMAL ALIGNMENT				SOURCES DURING SIS/SISLOP REQUIRES INTERLOCE FAILURE PLUS OPERATOR BREOR, WHICH IS
! *	,								A DOUBLE PAILURE SCENARIC OUTSIDE PLANT DESIGN BASIS

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				LOCAL BFFBCTS AND	METHOD OF	INBERBNT COMPRHSATING		
ITEM #	DRAICR ID	COMPONENT ID	FAILURE MODB	DBPBNDBNT FAILURBS	DETECTION	PROVISIONS	BPPRCT ON BCCS	BEMARES
						***************************************	***************************************	
12.1.01.05.1.5		52-1200	OPEN	BRER CANNOT BE CLOSED UNLESS	PERIODIC TESTING	HONE REGULERD	MONE	NORMAL POSITION, 133 CONTACTS
t	BERAEER)	133 CONTACT		SUCR #2 BHERGENCY POWER BRIE				PROM CRLL SWITCH
				52-1200 IS OPBN. NO BPPBCT IP				
				BRER ALREADY CLOSED IN MORNAL ALIGMMENT				
12.4.01.05.2 5	2-1202	52-1200	CLOSED	(SAMB AS 12.4.1.4.2)	PBRIODIC TESTING	(SAMB AS 12.4.1.4.2)	(SAME AS 12.4.1.4.2)	480V LOAD TRANSPER
	Beriter)	T33 CONTACT						PROCEBURALLY BY DROP AND
								PICKUP. PARALLELING SOURCES
								DURING SIS/SISLOP REQUIRES
					•			INTERLOCE PAILURE PLUS OPERATOR ERROR, WHICH IS A
	•							DOUBLE PAILURE SCENARIO
				· · · · · · · · · · · · · · · · · · ·				OUTSIDE PLANT DESIGN BASIS
12.4.01.06.1 5		"b" CONTACTS	OPBN	BREE CLOSED INTERLOCE TO SWGE	PBRIODIC TESTING	MONE SECULEED	NONB. SWGR #3 CAN BB	NORMAL POSITION
	BERALER)			#2-3 TIB BRIR PREVENTS TIE			RB-RMBRGIZED POST-SIS/SISLOP	
				BREE CLOSING UNLESS 52-1202 IS IN TEST POSITION OR SWGE #3			PROB BITHER TRAIN BY OPENING ITS NORMAL PERDER BREE 52-1303	
				MORMAL PREDER BREE IS OPEN.			AND THEN CLOSING BITHER TIR	
				AND SWCR 41-3 TER BREE IS OPEN	******		5918	
12.4.01.06.2 5		"b" CONTACTS	CLOSBD	BRER OPEN SIGNAL TO SWGR #2-3	PBBIODIC TESTING	NONE BEGUIRED	NOMB	480V LOAD TRANSFER
	ORBARBR)			TIE BREE ALLOWS PARALLELING				PROCEDURALLY BY DROP AND
				SST #2 AND 3 THROUGH 480V SWGR #2, ALTHOUGH PAULT PROTECTION	•			PICEOP. PARALLELING SOURCES
				IS NOT PROVIDED FOR SUCH A.		•		DURING SIS/SISLOP REQUIRES INTERLOCE PAILURE PLUS
				CONFIGURATION				OPERATOR REGOR, WHICH IS A
					•			DOUBLE PAILURE SCHWARIO
12.4.01.07.1.53	9 . 1 9 0 9	"133 CONTACTS "	ADDU	TARER HAR IN BOOK THERRY CONTROL	DEDIANTS MOSTURE:			OUTSIDE PLANT DESIGN BASIS
	BREAKER)	133 COMINCIS	OPBN	BREE NOT-IN-TEST INTERLOCE TO SUCR #2-3 TIE BREE PREVENTS	SRRIODIC ARRAING	NOME REGAIRED	NONE. SUGE 33 CAN BE	NORMAL POSITION
	,			TIE BEER CLOSING UNLESS		•	RB-BNBBGIZBD POST-SIS/SISLOP PROM RITHER TRAIN BY OPENING	
				52-1202 OR SWGR #3 NORMAL			MORNAL ARROBE REKE 25-1303 AND	
•				PREDER BREE IS OPEN, AND SWGR			THEN CLOSING BITHER TIE BREE	
19 3 ATTAT TTE		1131 700051050	41 44 BB	\$1-3 TIE BRER IS OPEN				
12.4.01707.Z"52	388488B)	133 CONTACTS	CLOSED	BRER IN-TEST SIGNAL TO SWGR """ #2-3 TIE BRER ALLOWS	PRRIODIC TRATING	MONE BEGNIERD	NONE	480V LOAD TRANSPER
,-	,			PARALLELING SST #2 AND 3				PROCEDURALLY BY DROP AND PICEUP. PARALLELING SOURCES
				THROUGH 480V SWGR #2, ALTHOUGH				DURING SIS/SISTOP BROOTERS
				PAULT PROTECTION IS NOT				INTERLOCE PAILURE PLUS
				PROVIDED FOR SUCH A				OPERATOR BEROR, WELCH IS A
				COMPIGURATION				DOUBLE PAILURE SCHWARIO
12.4.01.08.1 52	2-1202	86 (RBLAT)	ON	OVED TRIPS BREE AND BLOCKS	CONTROL ROOM INDICATION	NONE PROD FOR INTECTION HOME	*TRAIN B ECCS INOPERABLE, TRAIN	OUTSIDE PLANT DESIGN BASIS
	BREAKER)			CLOSE OF SWGE 12-3 TIE BREE."		FOR RECIRC (INC. LO-LO RWST	A POTENTIALLY INOP DUE TO:	LOSS OF COOLING OR BATTERY
				CAUSES LOSS OF ALL TRAIN B		LEVEL TRIP). REDUNDANT MAIN	UNISOLABLE CCW PLOW BYPASS,	CHARGING. BOI REV REQU TO TRIP
				180V SWGR/MCC LOADS, INCL				APPECTED SI/PW PP BEFORE DC
-				IMMEDIATE LOSS OF RECIEC, REF		SOURCE. NONE FOR ECPS	FOR TRAIN B SI7PW. REDUCED	POWER LOST. SWGR 12 BHERGENCY
				WTR, HYDRAZINB, CCW AND SWC PPS, 1/2 HAIN IPNR COOLING,		POST-SGTE	RELIABILITY OF ALT OFFSITE	POWER FROM SDGAB 12 LV SOURCE
		•						NOT ANALYZED/CREDITED. MAIN
······································				AND DELATED LOSS OF NEW PP, DG			FOR SCTR	IPMR HAS 2 TRAINS OF FORCED

Fage No. 13

BH3RGBNCY CORB

SAN ONOPER UNIT 1

TABLE 12-1: POWER DISTRIBUTION STSTEM PMEA

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	ITEM #	DEATCR ID	COMPONENT ED	FAILURE MODE	LOCAL BFFBCTS AND DBPBNDBNT FAILURBS	MBTHOD OF DBTBCT[ON	INHBERNT COMPENSATING PROVISIONS	BPPBCT ON BCCS	
	12.4.01.08.2	52-1202 (BRBAER)	86 (RBLAY)	OPP	BRER WILL NOT TRIP IN BYRNT OF BUS PAULT, NOR LOCK-OUT SWGR \$2-3 TIB BRER		NOMB SEGUISED	MOMB	NCRMAL POSITION. THIS FAILURS PLUS BUS FAULT DURING SIS/SISLOP IS A DOUBLE FAILURS
		<u></u>							SCHMARIO OUTSIDE PLANT DESIGE BASIS. RELAT DOES NOT PROVIDE OVERLOAD PROTECTION FOR BREE
	12.4.01.09.1	52-1202 (BREAKER)	SWGR #2 125VDC CONTROL POWRR	VOLTS LOW	BRER CANNOT BS TRIPPED OR RECLOSED	CONTROL ROOM INDICATION	NONE REQUIRED	MONE	OR 480V SIDE OF SST \$2 BREE WORMALLY CLOSED, NOT BROUERD TO TRIP OPEN BICEPT
			- <del> </del>						FOR PAULT PROTECTION OR  RR-BURGIZING SWGR #1 FROM  SWGR #3/SST #3. CAN BE TRIPPED  LOCALLY IF MERDED FOR TIE BRER  CLOSURE
!	12.4.02.01.1	52-1203 (BRBARBR)	BBBAEBB	OPBN	BRER CANNOT BE CLOSED TO EB-EMBEGIZE SWOE #1 PROM TRAIN B 480V SWOE #2	CONTROL ROOM INSIGATION, PRRIODIC TRETING	SST \$3/BRIR \$2-1303 AND SWGR \$1-3 TIE BERR \$2-1103 AVAILABLE FOR TRAIN A POWER TO SWGR \$3	RE-BURRGIZING SWCR #3	MORRAL POSITION
	12.4.02.01.2	52-1203 (BRBAEBR)	BEBAEER	CLOSBO	BRER WILL NOT OPEN ON SIS/SISLOP. POTENTIALLY CAUSES	CONTROL ROOM INDICATION	REDUNDANT TRAIN, TRAIN B 480V POWER THRU TIE BRER AND SST \$3	TO VOLTAGE DEGRADATION AND SST	
	······································		··· · ··- ·		LOSS OR INTERRUPTION OF ALL TRAIN B 480V LOADS DURING SIS/SISLOP, INCLUDING RECIRC, REP WTR_BYDRAZINE, CCV AND SWC PPS, 1/2 MAIN IPNE		FOR LO-LO REST LEVEL TRIP, REDUNDANT MAIN TERM COOLING FOR ALT OPPSITE SOURCE	NETARR OVERLOAD BURING SIS/SISLOP LOADING. TRAIN A POTENTIALLY INOP POR RECIRC DUR TO LOSS OF LO-LO EVST LEVEL TRIP OF TRAIN B SI/FW. REDUCED	DC POWER LOST IP CANNOT RE-BNBSGIZE 480V SWGR. LO-LO
	12.4.02.02.1	52-1203 (BRBAKER)	52-1202 *b* CONTACT OR	OPBN .	COOLING, AND DELAYED LOSS OF MPW PP, DG AND DC BUS \$2 BREE CANNOT BE CLOSED IF SWCR \$3 NORNAL FEBDER BREE 52-1303	PBRIODIC TESTING	NOME EBÉNIESO	RBLIABILITY OF ALTERNATE OPPSITE SOURCE	RWST LBVRL TRIP APPECTED IP 4EV POWER BOT LOST WITH 1850 MORHAL POSITION. LOSS OF SST \$2 OR 52-1202 POWER CONTACTS
					IS ALREADY CLOSED. PREVENTS  RE-ENERGIZING 480V SWGR #2  PROM 33T #3/SWGR #3 IN THE  EVENT OF 33T #2 OR 52-1202				PLUS THIS PAILURE DURING BIS/SISLOP IS A DOUBLE FAILURE SCENARIO OUTSIDE PLANT DESIGN BASIS
	12.4.02.02.2	52-1203 (BRBAKER)	52-1202 "b" CONTACT OR 133 CONTACT	CLOSED	PAILURB INTERLOCE FROM 480V SWGR \$2 NORMAL FREDER BREE DEFRATED. ALLOWS PARALLELING 93T \$2 AND 3 THROUGH SWGR \$2, ALTHOUGH	PRRIODIC TESTING	NONE BEGNIESD	MONS	THIS FAILURE PLUS OPBRATOR BREOR PLUS PAULT IS OUTSIDE SIS/SISLOP DESIGN BASIS
1	12.4.02.03.1	52-1203 (BREAKER)	52-1103 "b" CONTACT OR 133 CONTACT	OPBN	BUS NOT PAULT PROTECTED IN SUCH A CONFIGURATION INTERLOCE FROM SWGR \$1-3 TIB BRER PREVENTS BRER CLOSE TO RR-BNREGIZE SWGR \$3 FROM TRAIN	PBRIODIC TESTING		NONB. SYGR #3 CAN BB RE-BNBRGIZED POST-SIG/SISLOP PROM TRAIN A VIA SUCR #1-3 TIB	52-1103 "b"/133 CONTACTS MAY ALSO PREVENT RECLOSURE OF 39GR #3 NORMAL PREORE BERE 52-1303
		··· ··· · · · · · · · · · · · · · · ·			B SACE \$5			BREE 52-1103	TO RB-ENERGIZE SAGE \$3 PROM TRAIR A VIA SST \$5

# EMERGENCY CORE C SYSTEM SINGLE FAILURE ANALYSIS ONOFRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION SYSTEM FMBA

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	LTBH #	DBVICE ID	COMPONENT ID	FAILURB MODR	LOCAL BPPBCTS AND DEPRHOBENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	BPPRCT ON BCCS	REMARKS
:				•					-
}	12.4.02.03.2		52-1101	CLOSBO	INTERLOCK FROM SWGR \$1-3 TIE	PBRIODIC TESTING	HONE. ADMINISTRATIVE CONTROLS	LOSS OF AUTOMATIC PROTECTION	*TECH SPEC ACTION BUTRY REQD
į		(BBBAEBR)	"b" CONTACT OR		BRES 52-1103 DEPEATED. ALLOWS		DO NOT ALLOW THIS	AGAINST PARALLELING REDUNDANT	FOR THIS CONDITION SINCE
		····	133 CONTACT		PARALLBLING TRAIN A (SWGR #1)		CONFIGURATION IN MODES 1 - 4	TRAINS A AND B 480V SWGR	SIS/SISLOP TRIP SIGNALS ARE
j					TO TRAIN B (SWGR #2) VIA 480V			·	MOMENTARY ONLY (VIA TDRs) AND
1					SWGR #3 IP NORMAL FEEDER BREE 52-1303 IS OPER (EG. POLLOWING				DO NOT PREVENT PARALLELING BY
			······································		SISLOP TRIP OF BREE				A SUBSEQUENT SINGLE PAILURE OR OPERATOR BEROR AFTER TRIP
	12.4.02.04.1	52-1203	52-1303	OPRN	INTERLOCE FROM SWGR #3 NORMAL	PERIODIC TESTING	NONE REQUIRED	NONE. SWCR #3 CAN BE	SWGR #1-3 TIB BRER 52-1103
3,		(BREAKER)	"b" CONTACT OR		PERDER BRER 52-1303 PREVENTS			RE-EMBRGIZED POST-SIS/SISLOP	CLOSE MAY ALSO BE DISABLED BY
-			133 CONTACT		BRER CLOSE TO RE-BUBBG[28 SUGE			PROM TRAIN A VIA THIS BREE AND	
. ]					#3 FROM TRAIN B SWGR #2 (IB,			891 #3	
		t4 1685			W/ 52-1202 CLOSED)				
i	12.4.02.04.2	(BRBAKER)	52-1303 "b" CONTACT OR	CLOSED	INTERLOCK PRON SUCE AS NORMAL	PERIODIC TESTING	HOME SECULBED	NONB	480V LOAD TRANSPER
1		(DEBARBE)	133 CONTACT		PREDER BREE 52-1303 DEPRATED. ALLOWS PARALLELING SST 82 AND				PROCEDURALLY BY DROP AND
			133 CONTACT		SST 13 TEROUGH (86V SUCE 12.				PICEUP. PARALLELING SOURCES DURING SIS/SISLOP REQUIRES
. ! 					ALTHOUGH PAULT PROTECTION IS				INTERLOCK PAILURE PLUS
•					NOT PROVIDED FOR SUCE A				OPERATOR BERGE, WHICH IS A
•					CONFIGURATION				DOUBLE PAILURE SCHWARTO
-									OUTSIDE PLANT DESIGN BASIS
٠'	12.4.02.05.1		52-1200	OPBN	INTERLOCK FROM SWGR #2	PRRIODIC TRSTING	NONE BEĞNİBBD	NONE. SUGR #3 CAN BE	480V LOAD TRANSPER
		(BBBYESS)	- b CONTACT OR		BNBBGBBCY POWBE PBBDBB 52-1200			RE-BUERGIZED POSY-SIS/SISLOP	PROCEDURALLY BY DROP AND
٠,			133 CONTACT		PREVENTS BREE CLOSE TO			PROM TRAIN A VIA 52-1203 AND	PICKUP. PARALLELING SOURCES
					BB-BNBRGIZB SWGR #3 PBON TRAIN B SWGR #2 (IB. W/ 52-1202			SST #3 OR 52-1103 AND SWGR #1	DURING SIS/SISLOP REQUIRES
1					CLOSED)				INTERLOCK FAILURE PLUS
.!					000001				OPERATOR BRROR, WHICH IS A DOUBLE PAILURE SCHARIO
									OUTSIDE PLANT DESIGN BASIS
•	12.1.02.05.2		52-1200	CLOSED	INTERLOCE PRON SWGR #2	PERIODIC TESTING	NOME REQUIRED	NONE	480V LOAD TRANSFER
		(BREARER)	"b" CONTACT OR		BHERGENCY POWER PERDER 52-1200			•	PROCEDURALLY BY DROP AND
•			133 CONTACT		DEFEATED, ALCOYS PARALLELING				PICEUP. PARALLELING SOURCES
ĵ					BMBRGBNCY POWER PRON SDGAR		,	•	DURING SIS/SISLOP REQUIRES
					WITH SST #3 VIA SWGR #2, ALTHOUGH PAULT PROTECTION IS				INTERLOCE PAILURE PLUS
					NOT PROVIDED FOR SUCH A				OPBRATOR BRROR, WHICH IS A
.!					CONFIGURATION				DOUBLE PAILURE SCHWARIO OUTSIDE PLANT DESIGN BASIS
<u>,  </u>	TTZ:1:02:06:7	52-1203	52-1202	CONTACTS OPEN	OVERLOAD INTERLOCK TRON 4807	CONTROL ROOM INDICATION -	NORE BEQUIRED	HONE. SUCE 13 CAN BE	BEFRET OF 86 RELIA PAILURE ON
-		(BBBAKBR)	85 (RBLA7)	{ON}	SWGB #2 NORMAL PERDER BRER		aven ordersas	RB-BWERGIZED POST-SIS/S[SLOP	BOTH 52-1202 AND 52-1203 IS
إ					52-1202 PRBVBNTS CLOSING BRER			PRON TRAIN A VIA BREE 52-1303	ADDRESSED IN ITEM 12.4.01.06.1
			* * * * * * * * * * * * * * * * * * * *	•	TO RE-BURRGIZE SUGR #3 PROM			AND SST #3 OF THE BEER 52-1103	
	15 4 65 66 6		**		TRAIN B SWGR #2			PROM SWGR #1	
	12.4.02.06.2		52-1202	CONTACTS CLOSED		PERIODIC TESTING	MONE BEGUIRED	NOME	NORMAL POSITION. THIS PAILURE
4		(BEBAKER!	86 (BSTVA) .	(OFF)	SWOR #2 WORMAL FREDER BRKE			The state of the s	PLUS FAULT DORING SIS/SISLOP
					52-1202 DEPEATED. ALLOWS PARALLELING OF SWGR #1 TO	•			IS A DOUBLE PAILURE SCHWARLO
<u></u> -					PAULTED BUS TO SHOE \$3 10				WHICH IS OUTSIDE PLANT DESIGN
									ENGLU
									1

# EMBERGENCY CORE C SYSTEM SINGLE FAILURE ANALYSIS ONOPER UNIT 1 TABLE 12-1: POWER DISTRIBUTION SYSTEM FREA

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 	TEN \$	DBVICE ID	COMPONENT LD	FAILURS MODE	LOCAL BFFECTS AND DEPENDENT FAILURES	MBTHOD OF Obtraction	INHBERNT COMPRISATING PROVISIONS	RFFBCT ON RCCS	BBMARES
	12.4.02.07.1	52-1203 (BBBARBR)	52-1393 86-1 (RBLAY)	CONTACTS OFBN (ON)	OVERLOAD INTERLOCE FROM 480V SWGR #3 NORMAL PERDER GRER 52-1303 PREVENTS CLOSING BRER TO RE-ENRECIZE SWGR #4 PROM	CONTROL BOOM INDICATION	NONE REQUIRED	NOMB. SWOR #3 CAN BB RB-BWRRGIZBD FROM TRAIN A VIA SWGR #1-3 TIR BRRR 52-1103	CONCURRENT BPPECT OF 86 AND 86-1 BELAT OPERATION ON 52-1103, 1203 AND 1303 IS ADDRESSED IN THE ENTRIES FOR
	12.4.02.01.2	52-1203 (BRBAKER)	86-1 (BBCAY)	CONTACTS CLOSED (OPP)	TRAIN B 480V SWGR \$2  OVERLOAD INTERLOCE FROM 480V  SWGR \$3 WORMIT PREDER BREE  52-1303 DEPEATED. ALLOWS  PARALLELING OF SWGR \$2 TO	PERIODIC TESTING	NONE BEGAIRED	RONB	52-1303 IN SECTION 12.6 THIS PAILURE PLUS PAULT DURING SISTSISTOP IS A DOUBLE PAILURE SCENARIO OUTSIDE PLANT DESIGN BASIS
	12.1.02.08.1	52-1203 (BRBAKER)	98Q 2 (21-5,1)	CONTACTS OPEN (OFP)	PAULTED BUS  BREE WILL NOT TRIP ON SIS/SISLOP TO AUTOMATICALLY ISOLATE TRAIN B 4807 SUGE #2	PERIODIC TESTING	INITIALLY OPEN HOMB BEGUIRED IF BREE	NOWR IF BREE INITIALLY OPEN	*HORMAL POSITION. TECH SPEC ACTION ENTRY REQUIRED IF TIE BREE CLOSED IN HODES 1 - 4
	12.4.02.08.2	52-1203 (BREAKER)	SEQ 2 	CONTACTS CLOSED (ON)	PROM SWGR #3 LOADS BRER WILL TRIP, IF CLOSED. BOWRYRR, RESET OF TRIP SIGNAL	CONTROL ROOM [NDICATION	INITATOTA OBEN None segnibed it bets	NONE IF BEER INITIALLY OPEN	Dago Choson is Unded 1 - 4
, <u> </u>	12.4.02.09.7	52-1203 (BBBABBR)	"A" CONTACTS	" OPBN	AFTER 5 SEC VIA TOE PREVENTS SUBSEQUENT RETRIP IF NEEDED BRIR OPEN SIGNAL TO SWCR \$3 125VDC CONTROL POWER SELECTOR PREVENTS AUTOMATIC TRANSFER OF		NOME KEĞDIBED	HOME	CROSS-TRAIN POWER AND CONTROL ALIGNMENT DURING SIS/SISLOP REQUIRES INTERLOCE FAILURE
			· · · · · · · · · · · · · · · · · · ·		SWGE \$1 CONTROL POWER TO TRAIN B (125VDC BUS \$2) WHEN SWGE \$3 PARALLELED TO SWGE \$2				PLUS OPERATOR ERROR, WHICH IS A DOUBLE FAILURE SCENARIO OUTSIDE PLANT DESIGN BASIS. SWCE 73 CONTROL POWER ANY ALSO
1	12.4.02:09.2	52-1203 (BRSAKSR)	*a* CONTACTS	CLOSED	BREE CLOSED SIGNAL TO SWGE #3 125VDC CONTROL POWER SELECTOR. CONTROL POWER BEHAINS ALIGNED TO TRAIN A (125VDC BUS #1) UNIL REDUNDANT "b" CONTACTS	PERIODIC TESTING	NORE REGUIRED	NOBE	BE MANUALLY SELECTED WITH LOCAL SWITCHES SSI AND SS2 *TECH SPEC ACTION ENTEY BEQUIERD FOR THIS CONDITION, SINCE A SUBSEQUENT SINGLE FAILURE COULD RESULT IN CROSS-TRAIN POWER/CONTROL AT
			alla governa		FROM 52-1203 OPBN				SUGE #3 AND LOSS OF BLECTRICAL SEPARATION BETWEEN REDUNDANT TRAINS & AND B
	12.4.02.10.1	(BERAKER)	*b* CONTACTS	OPEN	BRIR CLOSED INTERLOCE TO SUGE #2 AND 3 FEBDER BRIRS, AND SUGR #1-3 TIE BRER PREVENTS THEIR CLOSING, IF OPEN, UNLESS 52-1203 IS IN THE TEST POSITION. ALSO SENDS BRER			TERM, SWEE \$3 CAN BE RE-BNEEGIZED WITH THIS FAILURE BY LOCALLY RACKING-OUT SWEE \$2-3 TIE BERE 52-1203 IN 480V ROOM AND THEN CONNECTING TO	LOCALLY IN THE 44Y ROOM OR  480Y ROOM. BOI CHANGE REQUIRED  TO INCLUDE PLACING SWGE \$3
   					CLOSED SIGNAL TO SWGR #3 CONTROL POWER SELECTOR, CAUSING LOSS OF SWGR #3 CONTROL PWR	<u> </u>		TRAIN A VIA 52-1303 OR 52-1103 TO PREVENT LOSS OF HOV-358/HOV-850C UPS	CONTROL POWER SELECTOR IN MANUAL TO RE-ESTABLISH 125 VDC CONTROL POWER TO SWGR #3 89ERS
	= 12:4.02.10:2°	52-1203 (BRBAEBE)	"b" CONTACTS	CLOSED	BRER OPEN SIGNAL TO SWGR \$2 AND 3 FEBDER BRERS, AND SWGR \$1-3 TIB BRER. ALLOWS PARALLELING SST \$2 AND 3 THRU 480V SWGR \$2 OR PARALLELING TRAIN A AND B THRU 480V SWGR \$3. ALSO CAUSES SELECTION OF SWGR \$3 CONTROL PME TO TRAIN A IF "a" CONTACT OPEN	PBRIODIC TRSTING	NONE REQUIRED	NOMB	*NORMAL POSITION. TECH SPEC ACTION BUTET REQUIRED FOR THIS CONDITION SINCE A SUBSEQUENT SINGLE PAILURE OR OPERATOR BEROR COULD RESULT IN CEPSS-TRAIN POWER AND CONTROL AT SWCH #3 AND LOSS OF BLECTRICAL SEPARATION SEINEEN REDUNDANT TRAINS

Fage 12/2

#### EMBEGENCY CORE C SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION SYSTEM FMBA

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ITEM \$	DRAICR ID	COMPONENT ID	FAILURB MODE	LOCAL BPFECTS AND DEPENDENT FAILURES	MSTHOD OF DBTBCTION	INBERBNT COMPENSATING PROVISIONS	BPFBCT ON BCCS	REMARES
2.4.02.11.1 5		133 CONTACTS	OPBN	BREE NOT-IN-TEST SIGNAL TO	PBBIODIC TBSTING	REDUNDANT TRAIN A AND B	SWGR #3 CANNOT BE RE-BHE2GIZED	
()	BREAKER)			SWGR #2 FBBDBR BRIR, SWGR #3		POWERED VALVES FOR CLR,	POST-SIS/SISLOP WITHOUT	AND CANNOT BE CLOSED FOR
·· <del></del>				PEEDER BREE, AND SYGR \$1-3 TIE BREE PREVENTS TOBIE CLOSING,		BEDUNDANT SI/FW PUMP TRIPS FOR LO-LO RWST LEVEL TRIP		RECIRC, REDUNDANT CHECK VALVE CRS-301 REQUIRES SEAT LEARAGE
				IP OPEN, UNLESS 52-1203 IS		FO-FO BEST PRIBE INT.	FOR LO-LO RUST LEVEL TRIP	TESTING FOR THE PRCINC
				OPEN OF THE STATE			PUNCTION AND 1/3 CLR PATHS	BOUNDARY FUNCTION
2.4.02.11.2.5		133 CONTACTS	CLOSED	BRER-IN-TEST SIGNAL TO SUGE 72	PRREODIC TESTING	NONE REQUIRED	NONE	490V LOAD TRANSPER
(1	BRBARBR)			PEBDER BREE, SWGR #3 PEBDER				PROCEDURALLY BY DROP AND
				BRER, AND SWGR #1-3 TIE BRER.				PICEUP. PARALLELING SOURCES
				ALLOWS PARALLELING SST #2 AND				DURING SIS/SISLOP REQUIRES
				3 THROUGH 480V SWGR #2 OR				INTERLOCE PAILURE PLUS
		<del> </del>		PARALLELING TRAIN A AND B				OPERATOR ERROR, WHICH IS A DOUBLE PAILURE SCHWARIO
				THEADON SOAS BEING BE				OUTSIDE PLANT DESIGN BASIS
2.4.02.12.1 5	2-1203	SWGR #2 125VDC	VOLTS LOW	BRER CANNOT BE TRIPPED OR	CONTROL ROOM INDICATION	NOME REQUIRED IF BREE	NONE IF BEER INITIALLY OPEN.	TRCH SPRC ACTION BATRY
	BRBAEBE)	CONTROL POWER		RECLOSED		INITIALLY OPEN	SUGR A) CAN BE RE-ENERGIZED	REQUIRED IF SWGE #2-3 TIE BREE
•	•			*			FROM TRAIN A VIA 52-1303 AND	CLOSED DURING NORMAL OPERATION
							SST \$3 OR 52-1103 AND SWGR \$1	·
Z1410310111 M	CC-2	32-1218	OPEN	LOSS OF POWER TO MCC-2 LOADS.	CONTROL ROOM INDICATION	REDUNDANT TRAIN FOR	TRAIN B RCCS INOPERABLE.	*MCC-2 480V ACB. BOI REV REQD
		(BRBAEBR)		INCLUDING MOV-1100C/D, 1/3 SI		SIS/SISLOP, REDUNDANT MAIN	REDUCED RELIABILITY OF ALT	TO RE-ENERGIZE UTILITY BUS
				PATHS, 1/3 CLR PATHS, PRIMARY			OFFSITE SOURCE. RCPs	FROM MCC-1 VIA MTS-7 TO
				AND ALT BLE PATHS, I RECIBO		SOURCE. HOME FOR RCP OPERATION	ONAVAILABLE FOR SCIR	RECOVER BUE PRIMIRY PATE WITH
				TRAIN, 1 STORAZINE PUMP, 1 CCW		POST-SGTR		THIS PAILURE. CHARGING PUMPS ALSO UNAVAILABLE FOR INJECTION
			•	TRAIN, I MPW ISOLATION HOV,  MPW PUMP LUBB OIL PAW CLB, 1/2				IF HOV-1100C IS ON TRAIN B.
				HAIN IPHR COOLING, AND BCP				HAIN IPHR HAS 2 TRAINS OF
			•	MOTOR COOLING				PORCED AIR COOLING
Z747.037017.Z780	CC-Z	52-1218	CLOSED	480V POWER AVAILABLE TO TRAIN	PERIODIC TESTING	NOME REGULBED	HONB	MORNAL POSITION. NON-SE LOADS
		(BREAZBR)		B MCC-2 LOADS. BOWEVER, BRER				NOT ALL TRIPPED/LOCKED-OUT ON
				WILL NOT TRIP IF MEEDED TO				SISLOP. BREES MUST COORDINATE
				ISOLATE PAULTS DUB TO NON-SE				TO PREVENT PERDER TRIP UNDER
				LOADS				SIS AS WELL AS SISLOP. HCC BUS
								PAULT PLUS BRER FAILURE IS
								OUTSIDE SISTSISTOP DESIGN BASIS
2.4.03.02.1 MG	CC-2	NSR LOADS	ON	LOAD(S) WILL NOT TRIP ON	PERIODIC TESTING	(SAME AS 12.4.3.1.1)	(SAME AS 12.4.3.1.1)	INCLUDES RCP MOTOR COOLING, 1
			[BREE CLOSED]	SISLOP OR TO ISOLATE				OF 2 TRAINS OF MAIN 15HR
			•	COMMON-CAUSE FAULTS,				PORCED AIR COOLING
				POTENTIALLY RESULTING IN TRIP				
			•	OF MCC-Z FEEDER BREE 52-1218				
	CC-2	NSR LOADS	OFF	LOSS OF ONE OR HORE MCC-2 MSR		NONE BEQUIRED FOR SIS/SISLOP,		DOSE CALC REV BEQD TO
Z.4.U3.UZ.Z B(			(BRER OPEN)	LOADS, INCLUDING 1/2 MAIN IPMB COOLING, RCP LUBB OIL PUMPS		REDUNDANT MAIN IPMR COOLING	BBLIABILITY OF ALT OFFSITE	BLIMINATE CREDIT FOR RCP
Z.4.03.02.Z B(				CONTRACT REP LUNK DEL PUNES			SOURCE. RCPs UNAVAILABLE FOR SCIR	OPERATION POST-SCIR. NATH THE
Z.4.UJ.UZ.Z BU								
Z.4.UJ.UZ.Z BU				AND HOTOR COOLING		FOR RCP OPERATION POST-SGTR	JULE	HAS 2 TRAINS OF FORCED AIR
	CC-Z	WSR LOADS	RO/SRISMIC	AND MOTOR COOLING	MONR			COOLING
2.4.03.02.2 BC	cc-z	NSR LOADS	BG/2BISHIC	AND HOTOR COOLING POTENTIAL COMMON-CAUSE FAULT	NONB	OVERCURRENT TRIP OF THOIVIDUAL LOAD BREES AND BREE	*POTENTIAL COMMON-CAUSE	COOLING *NON-SE LOADS NOT ALL
	cc-z	MSB LOADS	BQ/SBISMIC	AND MOTOR COOLING	HONB	OARBCORBENT TRID OL INDIALOGYT	POTENTIAL COMMON-CAUSE INOPERABILITY OF TRAIN B DUE TO	COOLING *NON-SE LOADS NOT ALL
	CC-2	NSR LOADS	BQ/SBISHIC	AND MOTOR COOLING  POTENTIAL COMMON-CAUSE FAULT TO P NSB LOADS, CHALLBRGING	NONB	OVERCURRENT TRIP OF THDIVIDUAL LOAD BREES AND BREE	*POTENTIAL COMMON-CAUSE INOPERABILITY OF TRAIN B DUE TO 480Y SWGE/MCC DEGRADATION	COOLING *HOH-SE LOADS NOT ALL TRIPPED/LOCEED-OUT ON SISLOP.
	CC-2	NSR LOADS	BQ/SBISHIC	AND MOTOR COOLING  POTENTIAL COMMON-CAUSE FAULT TO P NSB LOADS, CHALLBRGING	NONB	OVERCURRENT TRIP OF INDIVIDUAL LOAD BERES AND BERE COORDINATION TO PREVENT PERDER	*POTENTIAL COMMON-CAUSE INOPERABILITY OF TRAIN B DUE TO 480V SWCE/MCC DECRADATION BESULTING FROM FAILURE TO	COOLING *NON-SE LOADS NOT ALL TRIPPED/LOCEED-OUT ON SISLOP. CONPIGURATION DOBS NOT MEET EG

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ITSH #	DEALCR ID	COMPONENT ED	FAILURE MODE	LOCAL BPPBCTS AND. DBPBNDBNT PAILURBS	METHOD OF DETECTION	ENDIELORAL ENDIELORAL	BPPBCT ON BCCS	REMARES
12.747047017Y NCC	C-2A	52-1223 (8884889)	OPBN	"LOSS OF POWER TO MCC-ZA LOADS, INCLUDING TRAIN B BYDRAZINE	CONTROL BOOM INDICATION	EBDURDANY TEATH FOR THISCTION,	"STEATH" B ECCS THOPBEABLE, TEAT A POTENTIALLY INOPERABLE FOR	REQU OF ADEQUACY OF PORTABLE
		<u></u>		PUMP, MOV-1100C AND BRACTOR AUX BLOG HVAC			POR CHARGING PUMP ROOM	BACRUP VENTILATION POR CHARGING PUMP ROOM AND ACCESSIBILITY OF ROOM WITH THI
TZ. 1.04.01.Z BCC	C-2A	52-1123 (BRBAEBR)	CLOSED	480V POWER AVAILABLE TO TEAIN B MCC-24 LOADS. HOWEVER, BRIE WILL NOT TRIP IP WEEDED TO	PERIODIC TESTING	HONE BESCHIERD	AORB	SOURCE TERMS ************************************
			· · · · · · · · · · · · · · · · · · ·	ISOLATE FAULTS DUB TO HON-SR				TO PREVENT PERDRE TRIP. MCC BUS PAULT PLUS BRER PAILURE IS OUTSIDE SIS/SISLOP DESIGN
12.4.04.02.1 MCC	C-2A	WSR LOADS	(BRER CLOSED)	LOAD(S) WILL NOT TRIP ON SISLOP OR TO ISOLATE	CONTROL ROOM INDICATION, PERIODIC TESTING	(SAMB AS 12.4.4.1.1)	(SAMB AS 12.4.4.1.1)	BISIS
12.74.704.702.7 <b>2</b> HCC	:-2A	NSR EGADS	OFF	COMMON-CAUSE PAULTS, POTENTIALLY RESULTING IN TRIP OF MCC-24 PREDER BREE 52-1223 LOSS OF DWE OR MORE MCC-24 WSR		- ·	*POTRNTIAL INOPHRABILITY OF	AABBULLCATION BEDD ON YDBOOYCA
			(BRER OPEN)	LOADS, INCLUDING BRACTOR AUX BLDG RVAC	PBRIODIC TRATING	NONE FOR RECIRC	BOTH TRAINS FOR RECIRC DUE TO LOSS OF COOLING FOR CHARGING PUMP ROOM	OF PORTABLE BACKUP VENTILATION FOR CHARGING PUNP ROOM COOLING AND ACCESSIBILITY OF ROOM WITH
2.4.04.02.3 MCC	C-2A	NSR LOADS	BQ/SBISHIC	POTENTIAL COMMON-CAUSE FAULT OF MSE LOADS, CHALLENGING	NONB	REDUNDANT TRAIN FOR INJECTION, NONE FOR RECIRC	PUMP, AND POTENTIAL	THE SOURCE TERMS *(SAME AS 12.4.4.2.2)
·		··		MCC-2A LOAD AND PREDBR BRERS. SINCE ALL LOADS BICEPT "HYDRAZINE PUMP AND MOV-1100C" ARB MSR AND ALL LOCATED IN RI			INOPERABILITY OF BOTH TRAINS FOR BECIRC DUB TO LOSS OF COOLING FOR CHARGING PUMP ROOM	
•			,	AUX BLOG, FEEDER BREE MAY TRIP FROM CONCURRENT PAULT DUE TO POST-LOCA DOSES IN AREA				
2.4.05.01.1 MCC	-28	52-1223 (BRBAKBR)	OPBN	LOSS OF POWER TO MCC-2B LOADS, INCLUDING TRAIN B DC AUTILIARIES	CONTROL BOOM INDICATION	NONE REQUISED FOR SIS, REDUNDANT TRAIN FOR BISLOP	TRAIN B INOPERABLE FOR SISLOP, BONE FOR SIS	MCC-28 480V ACB
2.4.05.01.2 HCC	- 28	52-1229 (BRBARRE)	CLOSED	480V POWER AVAILABLE TO TRAIN B MCC-28 LOADS. BOWEVER, BREE	PBRIODIC TESTING	NOMB BEGUIESD	NONB	*NORMAL POSITION. NON-SR LOADS NOT TRIPPROTECTED FOUT ON
· <b></b> ·-				VILL NOT TRIP IP MEEDED TO ISOLATE PAULTS DUB TO NON-SE LOADS				SISLOP. BOWEVER, BRERS COORDINATE TO PREVENT PREDER TRIP. MCC BUS PAULT PLUS BRER
ZT4.05702717 NOC	-2B	NSR LOADS	ON - (GRECULO RANG)	LOAD(S) WILL NOT TRIP ON		(SANB AS 12:4:5:1:1)	(SANB AS 1274757171)	FAILURE IS OUTSIDE SIS/SISLOP DESICH BASIS INCLUDES THUNDERBOLT SIREN, DG
	·- · · ·			SISLOP OR TO ISOLATE COMMON-CAUSE PAULTS, POTENTIALLY RESULTING IN TRIP	PBRIODIC TESTING			BLDG RECEPTACLES, SUMP PUMPS AND DG COMPRESSORS

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		DEPENDENT FAILURES	DRTECTION	PROVISIONS	BPPBCT ON BCCS	BRMARRS
WSE LOADS	OFF (BRER OPEN)	SIRBN STATEM, 1/2 DG #2		NONE REQUIRED FOR SIS	LOST APTER INITIAL SIS STARTING	OPERATION OF REEP-WARM SYSTEM
		STARTING AIR COMPRESSORS, 1/2 DG #2 INSTRUMENT AIR COMPRESSORS, OR DG #2				
NSR LOADS	BQ/SBISHIC		NONB	OVERCURRENT TRIP OF INDIVIDUAL		*MON-S2 LOADS NOT TRIPPED/LOCKED OUT ON SISLOP.
		MCC-28 LOAD AND PRESER BEERS		BRER TRIP FOR PAULTS, NOWE FOR O/C FAILURE OF LOADS BELOW	480V SWGR/MCC DEGRADATION RESULTING PROM PAILURE TO ISOLATE ALL UNQUALIFIED LOADS	CONFIGURATION DORS NOT MEST RG 1.75 OR IBBE 384 CRITERIA WHICH REQUIRE TRIP OF ALL
8-12B26	OPBN		CONTROL ROOM INDICATION	REDUNDANT CHARGER	REDUCED RELIABILITY OF TRAIN B	NON-IE LOADS ON A SAPETY SIGNAL (IE, SIS AND SISLOP) 480V BRIE POR BATTERY CHARGER
(BREAKER) 8-12B26 (BREAKER)	CLOSED		CONTROL ROOM INDICATION			D PARALLELING OF BATTERY CHARGERS PRECLUDED BY
8-12BJO (BRBAKBR)	OPBN	LOSS OF 1 OF 2 PULL CAPACITY CHARGERS FOR DC BUS #2	CONTROL ROOM INDICATION			ADMINISTRATIVE CONTROL 480V BREE FOR BATTERY CHARGES C
8-12830 (BRBAEBR)	CLOSBD	186V POVER AVAITABLE TO TRAIN B 125VDC BATTERY CHARGER C	CONTROL BOOM INDICATION	NONE BEGNIESD	NOWS	PARALLELING OP BATTERY CHARGERS PRECLUDED BY ADMINISTRATIVE CONTROL
1						480V ACS FOR SWGR \$2 BMBRGENCY POWER FROM SDGAR 12 LY SOURCE.
						THIS SOURCE NOT CREDITED/ANALTZED FOR SIS/SISLOP EVENTS. THEREFORE,
)]						INPACT OF BREAKER FAILURES BOUNDED BY OTHER ENTRIES ABOVE [THIS BLOCK OF RECORDS
						RESERVED FOR LATER ADDITION OF OTHER TRAIN B 480V SWGR #2 SR LOADS]
ISB BRBARBB(S)	OPBN	TRAIN B MSR LOAD(S) TRIP, CANNOT BE RESTARTED.	CONTROL ROOM INDICATION, PBRIODIC TESTING	POWERED BY SWGR \$1 AND 3 POR	SUPPLY TO SECONDARY RECIEC	CAM ALSO DISABLE ONE SCREEN WASE PUMP, CONDENSER VACUUM
		INSTRUMENT AIR COMPRESSORS FOR SECONDARY RECIRC		REQUIRED FOR OTHER ECCS PUNCTIONS	PUNCTIONS	PUMP, FIRE PUMP, AND SPHERE BNCLOSURE BUILDING (SEB) SUPPLY OR BIHAUST FAN
SB BRRAKER(S)	CLOSBD	NOT TRIP ON BUS UNDERVOLTAGE, SEQ SIGNAL (INCLUDING SISLOP	•		•	
- ()	8-12B26 (BREARER) 8-12B26 (BREARER) 8-12B30 (BREARER) 8-12B30 (BREARER)	### LOADS BQ/SBISMIC  ### 8-12826 OPEN (BBEAKER) ### 8-12826 CLOSED (BRRAKER)  #### 8-12830 OPEN (BERAKER)  #### 8-12830 CLOSED (BERAKER)  ###################################	(BREARER)  SE BREARER(S)  (BREARER(S)  (BREARER(S))  (BREA	(BEER OPEN)  LOADS, INCLUDING TRUMBEROLT SIENN STRIKEN, 1/2 DG 12  STRATING ATE COMPRESSORS, 1/2  DG 42 INSTRUMENT AIR  COMPRESSORS, 02 DG 12  EEP - MARKER BRATER  NSR LOADS  EQSEISMIC  POTANTIAL COMMON-CAUSE FAULT MOME  OP MSR LOADS, CHALLENGING  MCC-25 LOAD AND PRODE BRIES  E-12826  OPEN  LOSS OF 1 OF 2 PULL CAPACITY CONTROL ROOM INDICATION  (BERARER)  E-12826  CLOSED  480V POWER AVAILABLE TO TRAIN CONTROL ROOM INDICATION  (BERARER)  B-12830  OPEN  CRARGERS FOR DG BUS 12  4-12830  OPEN  CRARGERS FOR DG BUS 42  4-12830  CRARGERS FOR DG BUS 42  CONTROL ROOM INDICATION,  POTANTIALLY DISABLES 1/3  INSTRUMENT AIR COMPRESSORS FOR BECOME AND TRAIN CONTROL ROOM INDICATION,  FOR MAIN CANNOT BUS 42  CRARGERS FOR DG BUS 42  CRARGERS FOR DG BUS 42  CONTROL ROOM INDICATION,  FOR MAIN CANNOT BUS 42  CRARGERS FOR DG BUS 42  CR	CARSO STREET   1/2 DO 12 STREE	(SEE 0F84) LOADS, ISCOUDING TREMOSEROUS PRESONS A PRESONCE TRAIN BOLLY OFFSITE NOWS IS SUBJECT AND AND A PRESONS AND A PROPERTY POWER IS LOAD AND A PRESONS AND A PROPERTY OF SECTION AND A PROPERTY POWER IS LOAD AND A PROPERTY OF SECTION AND A PROPERTY POWER IS LOAD AND A PROPERTY CARGES FOUL CAPACITY CONTROL ROOM INDICATION REQUIRED OF SECURITY OF TRAIN BOLLY OF T

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itan 1	DBVICE ID	COMPONENT LD	FAILURS MODE	LOCAL BPFBCTS AND DBPBNDBNT PAILUBBS	MBTHOD OP DBTBCTION	INBBRBHT COMPRUSATING PROVISIONS	BPFBCT ON BCCS	BERNESS
12.1.08.01.3	SWGR #2 NSB LOADS	BRBAIBR(S)	EQ/SBISHIC	POTENTIAL COMMON-CAUSE PAULT OF TRAIN B 480V MSE LOAD(S), CHALLBHOING SYGR 42 LOAD AND PERDER BREES	NONB .	BREE COORDINATION TO PREVENT PERDER BREE TRIP FOR COMPLETE FAULTS, MOME FOR OVERCURRENT PAILURE OF LOADS BELOW FAULT PROTECTION SETPOINTS	*POTENTIAL COMMON-CAUSE INOPERABILITY OF TRAIM B DUB TO 480V SMGR/MCC DEGRADATION BESULTING FROM PAILURE TO ISOLATE ALL UNQUALIFIED LOADS	*CONFIGURATION DORS NOT MERT EG 1.75 OR IBBR 384 CRITERIA WBICH REQUIRE TRIP OF ALL NON-18 LOADS ON A SAPETT SIGNAL (IR, 818 AND SISLOP)
12.4.09.01.1	SWGE #2 UNDERVOLTAGE AND CONTROL	SEQ 2 ) (11-2,4)	CÔNTACTS OPBN (OFF)	UV AUT BELAYS 27-111, 27-112, 27-113 AND 27-114 WILL NOT BNBBGIZB AS BEQUIRED ON SEQ 2 [SISLOP] ACTUATION UNDERVOLTAGE ACTUATION UNAPPECTED	PRRIODIC TESTING	FOR SIS, REDUNDANT MAIN IFHR	OM SIS AND BISLOP  RPOTENTIAL INOP OF TRAIN B FOR SISLOP DUE TO SWCE \$2 VOLTAGE BEGRADATION AND/OR DG OVERLOAD, WITH POTENTIAL INOP OF TRAIN A DUE TO: UNISOLABLE CCW FLOW BYPASS, LOSS OF LO-LO RWST	
ñ Ú							RELIABILITY OF ALTERNATE OFFSITE SOURCE	OM SIS/SISLOP VIA SEPARATE SEQUENCER CONTACTS. MAIN IFMR HAS 2 TRAINS OP FORCED AIR COOLING
	SWGR #2 UNDBRYOLTAGE AND CONTROL	98Q 2 (11-2,4)	CONTACTS CLOSED	UV AUT RBLATS 27-111, 27-112, 27-113 AND 27-114 BMBRGIZB, TRIPPING ALL TRAIN & 480V LOADS BICEPT MCCS AND AIR COMPRESSORS, RESULTING IN IMMEDIATE LOSS OF TRAIN B	CONTROL ROOM INDICATION	HOME FOR RECIRC (INCLUDING LO-LO RWST LEVEL TRIP)	*TRAIN B BCCS INOPBRABLE, TRAIN A POTENTIALLY INOPBRABLE DUB TO: CCW PLOW BYPASS VIA MOV-720A AND LOSS OF LO-LO RWST LBVBL TBIP OF TRAIN B SI/FW	SISLOP SIGNAL TO SWCE \$2 UV RELATS IS WORMALLY MOMENTARY. MAINTAINED SIGNAL DUE TO RELAY
	SWGR #2 UNDERVOLTAGE AND CONTROL	27-) (UV BBLAY)	(AOT13 FOM)	RECIRC, REP WTR, BIDRAZINE, CCW AND SUC PPS. DELATED LOSS OP DC BUS \$2 VIA LOSS OF CBGRS UV AUX RELAYS 27-111, 27-112 AND 27-113 BHREGIZE, TRIPPING ALL TRAIN B 480V LOADS RICEPT MCCS AND AIR COMPRESSORS,		(SAMB AS 12.4.9.1.2)	*(SAMB AS 12.4.9.1.2)	MCCS WILL ALSO TRIP WITH THIS PAILURB  *BOI REV REQD TO CLOSE APPROTED CCW HE MOV TO RECOVER CCW HEAT BEHOVAL CAPABILITY WITH PAILURE OF ONE SWC PUMP.
				BESULTING IN IMMEDIATE LOSS OF TRAIN B BECIRC, BEF BTE, HYDRAZINE, CCW AND SWC PPS, DELATED LOSS OF DC BUS #2 VIA				AND TRIP APPECTED SI/PW PUMPS BEFORE DC POWER IS LOST
1 .	SWGR #2 UNDBRVOLTAGE AND CONTROL	27-1 (UV BBLAY)	OPP (VOLTS NORMAL)	LOSS OF CEGRS  UV AUT BBLATS 27-111, 27-112 AND 27-113 WILL NOT BNBBGIZB  AS REQUIRED ON BUS  UNDERVOLTAGE. SEQ ACTUATION	PBBIODIC TESTING	BEDUNDANT TRAIN FOR SIS, NOME BEQUIRED FOR SISLOP	REDUCED RELIABILITY OF TRAIN 8 FOR SIS, NOME FOR SISLOP	
.!	SUCE #2 UNDERVOLTAGE AND CONTROL	•	CONTACTS OPBN (OPF)	UMAPPECTED SWGR #2 LOCKOUT BELAT WILL NOT TRIP TRAIN B 480V SWGR #2 NSR LOADS ON SISLOP, INCLUDING AIR COMPRESSORS, PRESSURIZER		MONE FOR SISLUP, NOME REQUIRED FOR SIS, REDUMDANT MAIN TEME COOLING FOR ALT OFFSITE SOURCE	VOLTAGE DEGRADATION AND/OR DG	RBSBT SWITCH. BOI REV REQD TO TRIP APPROTED SI/PW PP BEFORE
				HEATER GROUPS 8 AND D			OF TRAIN A DUB TO: UNISOLABLE CCW PLOW BYPASS, LOSS OF LO-LO	

# SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT I TABLE 12-1: POWER DISTRIBUTION SYSTEM PHEA

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ITBN #	DRAICE ID COM5	ON THRUC	PAILURB MODE	DEPENDENT FAILURES	DETECTION	SROISIAORA	RPPRCT ON BCCS	REMARKS
	SWGB #2 SBQ Z		CONTACTS CLOSED	SWCR #2 LOCKOUT RELAY TRIPS	CONTROL BOOM INDICATION	REDUNDANT AIR COMPRESSORS	INOPERABILITY OF SWGR \$2	
	UNDERVOLTAGE AND (10-10 CONTROL	, (2)	(ON)	TRAIN B 480V SWGR \$2 WSR LOADS, INCLUDING AIR		POWERED FROM SWGR \$1 AND 3 FOR SECONDARY RECIRC, NOME	POWERED AIR COMPRESSOR FOR SECONDARY RECIRC VALVES, NOME	•
				COMPRESSORS, PRESSURIZER BRATER GROUPS B AND D	The state of the s	REQUIRED FOR OTHER BVENTS	POR OTHER EVENTS	
2.4.09.04.1	SWGR #2 86-2 ( UNDBRVOLTAGE AND	RBLATI	TRIP		CONTROL ROOM INDICATION	(SAMB AS 12.4.9.3.2)	(SAME AS 12.4.9.3.2)	SWGR #2 SISLOP LOCKOUT RELAY
	CONTROL			LOADS, INCLUDING AIR				
		•		COMPRESSORS, PRESSURIZER HEATER GROUPS B AND D				
2.4.09.04.2	SWGR #2 86-2 ( UNDERVOLTAGE AND	RBLAY)	RESET	SWGR #2 LOCKOUT RELAT WILL NOT TRIP TRAIN B 480V SWGR #2 WSR	PERIODIC TESTING	(SAMB AS 12.4.9.3.1)	*(SAMB AS 12.4.9.3.1)	
	CONTROL			COMPRESSORS, PRESSURIZER				
7 7 7 A A A C T T	SWCR 12 SEQ 2		CONTACTS OPEN	HEATER GROUPS B AND D	DDGIANTA BDQGIDA			
	UNDERVOLTAGE AND (12-1,	3)	(OPP)	MCC-2 LOCKOUT RELATS 86-H2-1, TELES 86-H2-2, 86-H2-3 WILL NOT	-	FOR SIS, REDUNDANT MAIN IPHR		INPUTS FROM SEQ 2 PREVENT THIS
	CONTROL (12-5,	7)		BNBRGIZE AS REQUIRED ON SISLOP		COOLING FOR ALTERNATE OFFSITE	VOLT DEGRADATION AND/OR DG OVERLOAD, WITH POTENTIAL INOP	PAILURE UNLESS SEQ 2 LOAD GROUP A OUTPUT OR RELAY DEIVER
							OF TRAIN A DUE TO: UNISOLABLE CCW PLOW BYPASS, LOSS OF LO-LO	CARD(S) FAIL. RCPs ALSO LOST, UNAVAILABLE POR SGTR. MAIN
							REST LEVEL TRIP OF SI/PW.	APRE HAS 2 TRAINS OF FORCED
r=1 · 00=:00 · 0 ·							OFFSITE SOURCE	
	SWCE #2 SEQ 2 UNDBRYOLTAGE AND (12-1,		CONTACTS CLOSED == " (ON)	HCC-2 LOCKOUT RBLAYS 86-H2-1, 86-H2-2, 86-H2-3 TRIP AND	CONTROL ROOM INDICATION	CONTAINEBUT SPRAY PLUS #2 RECOMBINER ON REDUNDANT TRAIN	SPHERE PURGE UNAVAILABLE FOR POST-LOCA BZ CONTROL, REDUCED	TO STATE TO THAT THE TAIL THE TERMS OF THE TRANSPORT OF T
	CONTROL (12-5,	1)	= .	LOCKOUT MCC-2 MSB LOADS, INCLUDING SPHERE PURGE AND		FOR POST-LOCA B2 CONTROL,  REDUNDANT HAIN TEMP COOLING	RELIABILITY OF ALT OPPSITE	BLOCK/RESET. VERIF REQUIPMENT SPRAT
	•			BIHAUST, 1/2 MAIN IPHR COOLING, RCP MOTOR COOLING,		FOR ALT OPPSITE SOURCE		W/ HZ RECOMBINER FOR CONTAINMENT ATMOSPHERE MITING
				BCP-B'LUBE OIL PURP				TO PREVENT POST-LOCA B2
								POCERTS. RCP= ALSO LOST. MAIN IPMR BAS 2 TRAINS OF FORCED
2.4.09.06.1	SWGR #2 SD-1-5	(RBLAY)	ON	MCC-2 LOCKOUT RELATS 86-M2-1,	PERIODIC TESTING	(SANE AS 12.4.9.5.1)	*(SAMB AS 12.4.9.5.1)	AIR COOLING LOCKOUT RESET RELAY FOR
	UNDERVOLTAGE AND			86-H2-2, 86-H2-3 WILL TALTERNATE BETWEEN RESET AND	· · · · · · · · · · · · · · · · · · ·			86-H2-1, 86-H2-2, 86-H2-3. INCLUDES BAHDSWITCH
	oon tuob			TRIP STATE AS SOON AS SISLOP				INCCOURS BRIDGETICE
<del></del>				OR NAMUAL LOCEOUT INITIATION OCCURS, AND IMMEDIATELY RESET			······································	
2.4.09.06.ź	SWGR #2 SD-1-5	(RBLAY)	088	AFTER SEQ BLOCK/RESET MCC-2 LOCKOUT RELATS 86-M2-1,	PBRIODIC TESTING	(SABB AS 12.4.9.5.2)	(SAME AS 12.4.9.5.2)	NORMAL POSITION. MAIN IPMR HAS
	UNDERFOLTACK AND			86-H2-2; 86-H2-3 CANNOT BB			•	- 2 -TRAINS OF PORCED AIR COOLING
	CONTRAL			RESET, PREVENTING RESTART OF MCC-2 WSR LOADS POST-SISLOP,				
				TINCLUDING SPHERE PURGE AND THE			Therefore the statement design and the state common major area as a suspension of an area.	
				COOLING, RCP MOTOR COOLING,				

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LTEM #	DEAICE ID	CONSONENT TO	FALLURS MODE	LOCAL BPFRCTS AND DRPBNDBNT FAILURES	DETECTION OF	INHERBUT COMPENSATING PROVISIONS	BPFBCT ON BCCS	REMARES
	SWGR #2 UNDERVOLTAGE AND	86-7 (RBLAY)	ŌN	SWGR #2 LOCKOUT RBLAT 86-2 AND MCC-2 LOCKOUT RBLATS 86-M2-1, 86-M2-2, 86-M2-3 TRIP AND	CONTROL ROOM INDICATION	(SAMB AS 12.4.9.5.2)	(SAMB AS 12.4.9.5.2)	MAIN IPME BAS 2 TRAINS OF FORCED AIR COOLING
				LOCKOUT MSR LOADS INCLUDING AIR COMPRESSOR, 1/2 MAIN IPHE COOLING, RCP MOTOR COOLING, SPEERE PURGE AND BIBAUST, AND PRESSURIZER REATER GROUPS B				
	SWGR #2 UNDBRVOLTAGR AND CONTROL		OFF	AND D SWGR \$2 LOCKOUT RELAY 86-2 AND MCC-2 LOCKOUT RELAYS 86-M2-1, 86-M2-2, 86-M2-3 CANNOT BE HANUALLY ACTUATED, NO EPPECT	PRRIODIC TRATING	REDUNDANT TRAIN FOR 313, WOME REQUIRED FOR 31SLOP	BEDUCED RELIABILITY OF TRAIN B FOR SIS, MOME FOR SISLOP	*MORMAL POSITION. MANUAL ACTUATION OF SISLOP LOCEOUT RBLATS COULD BE REQUIRED FOR SIS BYENT WITH COMMON-CAUSE
	- ·			ON SISLOP ACTUATION				PAILURES OF MSR EQUIPMENT DUB TO LACE OF AN AUTOMATIC TRIP/LOCEOUT AS PER RG 1.75
		86-M2-1 (LOCHOUT RBLAY)	TRIP	RELAT TRIPS AND LOCES-OUT ITS MCC-2 NSR LOADS, INCLUDING 1/2 HAIN EPHR COOLING, SPHERE COOLING/FILTER FANS, REACTOR		CONTAINMENT SPRAT PLUS H2  RECOMBINER PROM REDUNDANT TRAIN FOR POST-LOCA H2  CONTROL. REDUNDANT MAIN IPMR	PANS UMAVAILABLE POR PORCED CIRCULATION OF SPHERE ATMOSPHERE FOR POST-LOCA H2 CONTROL, REDUCED RELIABILITY OF	AND IRRE 384 *VBRIFICATION REGO OF ADROVACT OF CONTAINMENT SPRAY PLUS H2 RECOMBINER FOR CONTAINMENT ATMOSPARRE MITING TO PREVENT
- ,		<del></del>		CAVITY PANS		COOLING FOR ALTERNATE OFFSITE SOURCE		POST-LOCA H2 POCERTS. MAIN 1PMR HAS 2 TRAINS OF FORCED AIR COOLING
	UNDERVOLTAGE AND CONTROL	86-MZ-I D (LOCKOUT BELAY)	RESET	BBLAY WELL NOT TREP AND LOCKOUT ITS NCC-2 NSB LOADS	PERIODIC TESTING	(SAMB AS 12.4.9.5.1)	*(SAMB AS 12.4.9.5.1)	NORMAL POSITION
	•-	86-H2-2 C (LOCKOUT BBLAY)	TRIP	BELAY TRIPS AND LOCES-OUT ITS MCC-2 NSR LOADS, INCLUDING BCP-B LUBB OIL PUMP, SPHERE	CONTROL BOOM INDICATION	CONTAINMENT SPEAT PLUS HE RECOMBINER PROM REDUNDANT TRAIN FOR POST-LOCA HE CONTROL		AVERIFICATION BROD OF ADROUACY OF CONTAINMENT SPRAT PLUS BZ BECOMBINER FOR CONTAINMENT
2.4.09.09.2		86-H2-Z	RESET	PURGS AND CIRCULATION PANS  RELAY WILL NOT TRIP AND	PBRIODIC TESTING	(SAME AS 12.4.9.5.1)	CONTROL  *(SAMB AS 12.4.9.5.1)	ATHOSPHERE MITTING TO PREVENT POST-LOCA HZ POCKETS NORMAL POSITION
	CONTROL	)"[LOCKOUT"RBLAT]" 86-M2-J	TRIP	LOCKOUT ITS MCC-2 HSB LOADS  RELAT TRIPS AND LOCKS-OUT ITS	CONTROL ROOM INDICATION	CONTAINMENT SPRAY PLUS	PANS UNAVAILABLE FOR SPHERE	*VERIFICATION REQU OF ADEQUACY
	UNDBRYGETACE AND	TLOCKOUT BBLAY)		MCC-Z WSB LOADS, INCLUDING BCP COOLING PANS AND SPHBRB BIHAUST PAN		ESCONDINGE PROM ESDUMDANT TRAIN FOR POST-LOCA H2 CONTROL, NONB FOR RCPS POST-SGER	PURCE FOR POST-LOCA H2 CONTROL OR FOR ECP MOTOR COOLING	OF CONTAINMENT SPEAY PLUS H2 RECOMBINER FOR CONTAINMENT ATHOSPHERE MILING TO PREVENT POST-LOCA H2 POCRETS
	-	86-H2-3 ) (LOCEOUT RELAT)	RBSET	BBLAT WILL NOT TRIP AND LOCKOUT ITS MCC-2 NSB LOADS	PBRIODIC TESTING	(SAMB AS 12.4.9.5.1)	*(SAMB AS 12.4.9.5.1)	NORMAL POSITION
2.4.09.11.1	SWGR #2 UNDBRVOLTAGE AND CONTROL	SEQ 2 ) (11-9,11)	CONTACTS OPEN (OPF)	MCC-ZA LOCROUT RELATS 86-M2A-1, 86-M2A-2 WILL NOT BNBRGIZB ÁS REQUIRED ÓN SIŚLÓP	PERIODIC TRATING	NONE FOR SISLOP, NONE FOR RCPs POST-SGTR, NONE OTHERWISE REQUIRED FOR SIS	*POTENTIAL INOP OF TRAIN B FOR SISLOP DUB TO 480V SWOR/NCC WOLT DEGRADATION AND/OR DC OVERLOAD, WITE POTENTIAL INOP OF TRAIN A DUB TO: UNISOLABLE	NORMAL POSITION. BEDUNDANT INPUTS PROM 88Q 2 NOT PROVIDED POR NCC-2A LOCEOUT ACTUATION
,	: M2					The second secon	CCW PLOW BYPASS, LOSS OF LO-LO RWST LEVEL TRIP OF SI/FW. BCPs UNAVAIL FOR SGTR	

#### SAN ONOFRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION STRING HEAD

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ITEM #	DRAICR ID	COMPONENT ID	FAILURE HODE	LOCAL BFFBCTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	BPFBCT ON BCCS	BEYARRS
12.4.09.11.2	UNDERVOLTAGE AND	SEQ 2 (11-9,11)	CONTACTS CLOSED (ON)	MCC-2A LOCEOUT BBLAYS 86-M2A-1, 86-M2A-2 TRIP AND	CONTROL BOOM INDICATION	HOME REQUIRED FOR INJECTION, MOME FOR RECIRC	*POTENTIAL INOPERABILITY OF BOTH TRAIMS FOR RECIEC DUE TO	*CONTACTS MORMALLY MAINTAINED ON SISLOP UNTIL SEQ 2
	CONTROL			LOCEOUT MCC-2A MSB LOADS, INCLUDING REACTOR AUX BLDG BYAC AND BORIC ACID TANE HRATER, ALSO STARTS TRAIN B			LOSS CF CHARGING PUMP ROOM COOLING	BLOCK/RESET. VERIFICATION REQU OF ADEQUACT OF PORTABLE BACEUP VENTILATION FOR CHARGING PUMP ROOM AND ACCESSIBILITY OF ROOM
12.4.09.12.1	SVGR #2	SD-1-6 (RELAY)	CN C	CHARGING PUMP LUBB OIL FAN COOLBE MCC-2A LOCEOUT BELATS	PRRIODIC TESTING	(SAME AS 12.4.9.11.1)	#(SAHE AS 12.4.9.11.1)	WITH THE SOURCE TERM LOCKOUT RESET RELAT FOR
	UNDERVOLTAGE AND CONTROL			86-M2A-1, 86-M2A-2 WILL ALTERNATE BETWEEN RESET AND TRIP STATE AS SOON AS SISLOP				86-M2A-1, 86-M2A-2. INCLUDES Bandswitch
				OR MANUAL LOCACUT INITIATION OCCURS, AND IMMEDIATELY RESET APTER SEQ BLOCE/RESET				
	UNDERVOLTAGE AND CONTROL	9D-1-4 (RBLAT)	OFF	MCC-2A LOCKOUT BELAYS 86-M2A-1, 86-M2A-2 CANNOT BE RBSBT, PREVENTING RESTART OF	PERIODIC TESTING	(8.11.0.4.31 CA BMAE)	(SAMB AS 12.4.9.11.2)	NORMAL POSITION. BOBIC ACID SYSTEM NOT CREDITED POR SIS/SISLOP EVENTS
				MCC-2A WSR LOADS POST-SISLOP, INCLUDING REACTOR BUILDING SUPPLY PAN AND BORIC ACID TANK BRATER				
	SWGR #2 UNDERVOLTAGE AND CONTROL	86-8 (RBLAY)	ON	MCC-2A LOCKOUT BELATS  86-H2A-1, -2 AND MCC-3 LOCKOUT  RELATS 86-M3-1, -2, -3, -4	CONTROL ROOM INDICATION	NONE BEQD FOR INJECTION, NONE FOR RECIRC	*POTENTIAL INOP OF BOTH TRAINS POR RECIRC DUE TO LOSS OF COOLING POR CHARGING PUMP ROOM	RATING (IR, WITHOUT PANS)
	· · · · · · · · · · · · · · · · · · ·			TRIP AND LOCKOUT MSR LOADS INCLUDING REACTOR AUX BLDG SUPPLY FAN, A/B-IPMR COOLING,	······		COOPING LOR CANROLING LOUL BOOM	ALTERNATE OPPSITE SOURCE DUTY WITHOUT RCPS
1274709.1372	SPCB 12	86-8~(RBLAY) -	- OFF	RCP-C LUBB OIL PUMP, REBEATER STM ISOLATION MOVS MCC-24 LOCKOUT RELATS	PERIODIC TESTING	SANNE - SIE, BUE, NITAL, ANTUNBA	BROUCED RECTABILITY OF TRAIN B	THOUSE DARFFIRM MINUTE
	UNDBRVOLTAGE AND CONTROL			86-M2A-1, -2 AND MCC-3 LOCKOUT BBLAYS 86-M3-1, -2, -3, -4 CANNOT BE MANUALLY ACTUATED.		REQUIRED FOR SISLOP	AND SWING LOADS (SWGR \$3) POR SIS, NONE FOR SISLOP	ACTUATION OF SISLOP LOCKOUT BRLATS COULD BE REQUIRED FOR SIS RVRHT WITH COMMON-CAUSE
				NO BPFBCT ON SISLOP ACTUATION				PAILURES OF MSR EQUIPMENT DUB TO LACE OF AN AUTOMATIC TRIP/LOCEOUY AS PER RG 1.75
12.4.09.14.1	SWGB #2 UNDBRVOLTAGB "AND"	86-N2A-1 (LOCKOUT RELAY)	TRIP	RBLAY TRIPS AND LOCKS-OUT ITS MCC-24 WSR LOADS, THOLUDING	CONTROL BOOM INDICATION	(SAMB AS 12.4.9.11.2)	*(SAMB AS 12.4.9.11.2)	AND IRBE 384 BORIC ACID SYSTEM NOT CREDITED POR 313/313LOP EVENTS
	CONTROL	<b>.</b>		BEACTOR AUX BLDG HVAC AND BORIC ACID TANK BEATER, ALSO STARTS TRAIN B CHARGING PUMP				
12.4.03.14.2	SWGR #2 UNDBRVOLTAGE AND	86-M2A-1 (LOCEOUT RELAY)	RESET	LUES OIL FAN COOLER RELAY WILL NOT TRIP AND LOCKOUT ITS MCC-ZA MSB LOADS	PBRIODIC TESTING	(SAME AS 12.4.9.11.1)	*(SAHB AS 12.4.9.11.1) -	NORMAL POSITION

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#### SAN ONOFRE UNIT ! TABLE 12-1: POWER DISTRIBUTION SYSTEM FARA

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ITBM #	DRAIGE ID	COMPONENT ID	FAILURE MODE	LOCAL BFFBCTS AND Dependent pailures	MBTHOD OF DBTBCTION	INHERBUT COMPRUSATING PROVISIONS	EFFECT ON BCCS	REMARES
			·					
	SUGR #2	86-424-2	TRIP	RELAT TRIPS AND LOCES-OUT ITS	CONTROL ROOM TRATESTES	BONE BEGULEBD	NOME	OSD SYSTEM NOT CREDITED FOR
		(LOCEOUT RELAY)		MCC-2A NSR LOADS, INCLUDING RADWASTB AUTILIABIES AND				SIS/SISLOP BYBNTS
12.4.09.15.2	0 MCD 4.5	00 H21 S	BDG DE	MORMAL 486V POWER TO DEDICATED SAFE SHUTDOWN (DSD) SYSTEM				
		86-M2A-2 TLOCKOUT BRLAY)	RESET	RELAT WILL NOT TRIP AND LOCKOUT ITS MCC-ZA WAR LOADS	PBRIODIC TRSTING	(SAMB AS 12.4.9.11.1)	*(SAHB AS 12.4.9.11.1)	NORMAL POSITION
12.4.09.16.1		125VDC BUS #2	VOLTS LOW	LOCKOUT RELAYS FOR SWGR #2,	PERIODIC TESTING		*POTENTIAL INOP OF TRAIN B FOR	
	CONTROL	1 (12-240)		MCC-2, MCC-2A, SWGR #3, MCC-3 WILL NOT TRIP AND LOCKOUT TRIR MSR LOADS		FOR SIS, ERDURDANT HAIN IPME COOLING FOR ALTERNATE OFFSITE SOURCE		SIS/SISLOP THREPENDENT OF LOCAOUT RELATS. BOI REV REQD TO INDIVIDUALLY ISOLATE
							YEATH A DUB TO: UNISOLABLE CCW PLOW BYPASS, LOSS OF LO-LO RWST	NON-RESERVIAL SWCS \$3/HCC-3
					· / · · · · · · · · · · · · · · · ·		LEVEL TRIP OF TRAIN A SI/PW. REDUCED RECTABILITY OF ALT	SUGR #3 POST-819/913LOP. RCPs ALSO LOST, DWAVATLABLE POR
							OPPRITE SOURCE	SGTR. MAIN IPMR BAS 2 TRAINS OF COOLING
72.3701.0171	[NOT USBD]							THIS BLOCK OF RECORDS RESERVED FOR PUTURE TRAIN A
	52-1303	BREAKER	OPBN		CONTROL ROOM INDICATION			4804 SACE [1]
. +	(BBBAEBR)		<u></u>	RB-BNBRGIZB SWGR #3 PROM SST #3			RE-BURRGIZED PROM TRAIN A (VIA SWGR \$1-3 TIR BRER) AND TRAIN B	TAIBN FOR MIR PANS IN IPHR
							(AIT SACE 15-2 LIE SEEE) 72	
12.6.01.01.2	(BERVEER)	BREARER	CLOSBD	TRAIN A 480V POWER AVAILABLE TO SWING LOADS FROM SST 83.		OPBRATOR ACTIONS FOR LONG TERM		TRIP OF MEY PREDER TO SST #3
				HOWBYRR, BREE WILL NOT OPEN ON SISLOP OR TO ISOLATE FAULTS			RE-EMBRGIZED VIA SET \$3 OR, WITH LOCAL RACE-OUT OF 52-1303,	
				DUE TO MON-SR LOADS ON 480V SWGR \$3/MCC-3. SIS/SISLOP TRIPS OF 4kV PERDER AND 480V			PRON TRAIN A OR B VIA SWGR \$1 AND 2 TIB BREES, RESPECTIVELY	BUS PAULT PLUS BRER PAILURE IS
				TIE BEERS UNAFFECTED				OUTSIDE SIS/SISLOP DESIGN BASIS. UPS DUTY CYCLE > 30 MIN
12.6.01.02.1	52-1303 (BRBANER)	52-1103 "b" CONTACT OR	OPBN	BRER CANNOT BE RECLOSED IF OPEN TO BE-ENERGIZE SWGR #3	PBRIODIC TESTING	SWGR #3 CAN BE RB-BUBBGIZED POST-SIS/SISLOP PROM TRAIN A	REDUCED REDUNDANCY FOR	TO PERMIT LOCAL ACTIONS 52-1103 "b" CONTACTS MAY ALSO
	,	133 CONTACT		PROM SST #3		VIA SUGR \$1-3 TIB BRRR 52-1103		PREVEST CLOSURE OF SWCE \$2-3 TIE BREE TO RE-ENERGIZE SWCE #3 FROM TRAIN B. LOSS OF SST
			•					#1 OR 52-1103 POWER CONTACTS PLUS THIS PAILURE DURING
								SIS/SISLOP IS A DOUBLE PAILURE SCENARIO OUTSIDE PLANT DESIGN-
12.6.01.02.2		52-1103	CLOSED	INTERLOCE PROM 480V SWGR #1-3	PBRIODIC TESTING	NONE BEGUIEED	HONB	BASIS NORMAL POSTITION. THIS PAILURE
	(BREAKER)	"b" CONTACT OR 133 CONTACT		TIB BRER DEPRATED. ALLOWS PARALLELING SST #1 AND 3				PLUS OPERATOR BEROR PLUS FAULT IS OUTSIDE 818/818LOP DESIGN
•				THROUGH SWGR #3, ALTHOUGH BUS NOT FAULT PROTECTED IN SUCH A CONFIGURATION				BASIS

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11.	*** * *								-
	\$ M2T1	DRATCR ID	COMPONENT ID	FAILURE MODE	LOCAL BPPRCTS AND DEPENDENT FAILURES	MBTHOD OF DBTBCTION	INHERENT COMPENSATING PROVISIONS	BPFBCT ON BCCS	REMARES
<sub>*  </sub>									
	12.6.01.03.1	52-1303 (BRBAERR)	52-1203 "b" CONTACT OR 133 CONTACT	Ö?BN "	INTERLOCE PROM SWGR \$2-3 TIE BRER PREVENTS BRER CLOSE TO RE-EMBRGIZE SWGR \$3 FROM SST	PBBLODIC TESTING	NOME BEGNIESD	NOME. SWCR #3 CAN BE &B-BMBRGIZED POST-SIS/SISLOP PROM TRAIN D VIA SWCR #2-3 TIE	52-1203 "b"/133 CONTACTS MAT ALSO PREVENT RECLOSURE OF SWGR 41-3 TIE BEER 52-1103 TO
					13			BRER 52-1203	BB-BNBRGIZE SWGR #1 PROM TRAIN
,-	12.6.01.03.2	SZ-1303 (BRBAIRE)	52-1203 "b" CONTACT OR	CLOSED	INTERLOCE PROM SUGR \$2-3 TIR BREE 52-1203 DEPEATED. ALLOWS	PBRIODIC TRATING	MONE. ADMINISTRATIVE CONTROLS DO NOT ALLOW THIS	LOSS OF AUTOMATIC PROTECTION AGAINST PARALLELING REDUNDANT	STRUM SPEC ACTION BUTRY REGO FOR THIS CONDITION SINCE
		<del></del>	133 CONTACT		PARALLELING 89T #3 TO TRAIN B (SWGR #2) VIA 480V SWGR #3 IP		CONFIGURATION IN MODES 1 - 4	TRAINS A AND B AT 480V SWGR	SIS/SISLOP TRIP SIGNALS ARB MOMENTARY ONLY (VIA TORs) AND
					SWCR \$1-3 TIB BRRR 52-1103 IB OPBM (RG. FOLLOWING SISLOP TRIP OF BRRR)				DO NOT PREVENT PARALLELING BY A SUBSEQUENT SINGLE FAILURE OR OPERATOR BERGE APTER TRIP
	12.6.01.04.1	52-1303 (BRRAKER)	86-3 (RBLA?)	ON	SYGR #3 TREP/LOCKDUT SIGNAL PREVENTS CLOSING BREE TO RB-BNERGIZE SYGR #3 FROM SST	CONTROL ROOM INDICATION	MOMB BEGUIRED	NONE. SUCE \$3 CAN BE RE-ENERGIZED PROM TRAIN A AND 8 AS REQUIRED VIA SUCE \$1-3 OR	SWGR #3 SISLOP LOCKOUT BELAY
					13			SUCR \$2-3 TIE BRERS, RESPECTIVELY	
	12.6.01.04.2	52-1303 (BBBASBS)	86-3 (RELAY)	088	TRAIN B SISLOP TRIP/LOCKOUT OF SWGR #3 DEFEATED. TRAIN A	PERIODIC TESTING	NOME BEGGIESO	MONE. SUGE #3 [SOLATED PROM MORMAL TRAIN A SOURCE AT 4 ky	NORMAL POSITION
			·-· ·		SIS/SISLOP TRIP OF 4 MV FEBDBR 11C11 TO SST #3 UNAPPECTED			BREE ON SIS/SISLOP AS REQUIRED	
	12:6:01:05.1 <sup>-</sup>	(BBBYEBB)	52-1303 86, 86-1 (RBLAYS)	CONTACTS OPEN (ON)	OVERLOAD INTERLOCE PREVENTS CLOSING BREE TO RE-EMBEGIZE SWGR #3 FROM SST #3 OR VIA TIE	CONTROL BOOK INDICATION, ANNUNCIATION	REDUNDANT TRAIN A AND B POWERED VALVES FOR CLR, REDUNDANT SI/PM PUMP TRIPS FOR	SVGB \$3 CANNOT BE RE-ENERGIZED POST-SIS/SISLOP, DISABLING 1/3 SI VALVES FOR LO-LO RUST LEVEL	AND CANNOT BE CLOSED FOR
- <del></del> 	TOTAL PROPERTY.	,		,	BRERS FROM SWGR #1 OR #2	THE PERSON NAMED IN THE PARTY NAMED IN	LO-LO BUST CHURL TRIP	TREP PUNCTION AND 1/3 CLR PATES	CRS-301 BEQUIRES SEAT LEAKAGE TESTING FOR THE RECIRC
	12.6.01.05.2	52-1303 (BRBAKER)	52-1303 86, 86-1 (BBLAYS)	CONTACTS CLOSED (OPF)	OVERLOAD INTERLOCE DEFEATED. ALLOWS PARALLELING OF SUGR \$1 OR 2 TO PAULTED BUS	PBRIODIC TESTING	NOME REGUIRED	MONE	BOUNDARY FUNCTION THIS FAILURE PLUS BUS PAULT DURING SIS/SISLOP IS A DOUBLE FAILURE SCHWARIO OUTSIDE PLANT
.	12.6.01.06.1	52-1303 (BREAEER)	"b" CONTACTS	OPBN	BRER CLOSED INTERLOCE TO SWGR #1-3 TIE BRER AND SWGR #2-3	PBBIODIC TRSTING	NONE REQUIRED FOR SHORT TERM, OPERATOR ACTIONS FOR LONG-TERM	NONE FOR SHORT TERM. FOR LONG	DESIGN BASIS MOV-358/MOV-850C UPS DUTT CYCLE ) 30 MINUTES PERMITS
					TIR BRAD PREVENTS TORIE CLOSING, IF OPEN, UNLESS 52-1303 IS IN THE TEST				CRESIT FOR OPERTOR ACTION LOCALLY IN THE 480V ROOM. NORMAL PERDER BREES 11C11
					POSITION			RACEING-OUT 52-1303 TO TEST	(44Y) AND 52-1303 (480Y) CAN ALSO BE RECLOSED FROM CONTROL ROOM TO RE-EMERGIZE SWGR #3
	12.6.01.06.2	52-1303 (BRBARBR)	*b* CONTACTS	CLOSED	BRER OPEN SIGNAL TO SWGR \$1-3 TIE BRER AND SWGR \$2-3 TIE	PBRIODIC TRATING	MONE BEGUIEED	NONE	FROM 83T #1 480V LOAD TRANSFRR PROCEDURALLY BY DROP AND
					BBRR. ALLOWS PARALLELING SST #1 AND 3 THROUGH 480V SWIST #1 OR PARALLELING TRAIN A (SST	•			PICEUP. PARALLELING SOURCES DURING SIS/SISLOP REQUIRES
					#3) AND B (SWCR #Z) THROUGH				INTERLOCE PAILAURE PLUS OPERATOR BREOR, WHICH IS A DOUBLE PAILURE SCHARIO
									OUTSIDE PLANT DESIGN BASIS

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			LOCAL BPPECTS AND	METHOD OF	INHERENT COMPENSATING		
ITBM # DBVIC	B ID COMPONENT ID	PAILURB MODE	DEPENDENT FAILURES	DBTECTION	PROVISIONS	RPPRCT ON RCCS	REMARES
12.6.01.07.1 52-1303 (888AEB9)	133 CONTACTS	OPBN	SWCR #1-3 TIE BRER AND SWCR	PRRIODIC TESTING	NORE BEGNIEED	NOME. SWGR #3 CAN BB RE-EMERGIZED AS REQUIRED FROM	NORMAL POSITION
			#2-3 TIE BREE PREVENTS THEIR	** ** ** ** **		TRAIN A AND B BY CLOSING SWGR	
			CLOSING, IP OPRN, UNLESS 52-1303 IS OPRN			#1-3 OR SWGR #2-3 TIR BRIES,	
2.6.01.07.2 52-1303	133 CONTACTS	CLOSED		PERIODIC TESTING	NOME REQUIRED	RESPECTIVELY AFTER 52-1303 TRIP	480V LOAD TRANSPER
(BRBARBR)		. 71111	\$1-3 TIE BREE AND SWGR \$2-3		200 20141200		PROCEDURALLY BY DEOP AND
			TIR BRER. ALLOWS PARALLELING				PICEUP. PARALLELING SOURCES
			SST 41 AND 3 THROUGH 480V SWGR		•		DURING SIS/SISLOP REQUIRES
			\$3 OR PARALLELING TRAIN A (SST	•			INTERLOCE PAILURE PLUS
•			#3) WITH TRAIN B (SWGR #2) THROUGH 480V RWGR #3				OPERATOR BREOR, WHICH IS A
		-6.4.					DOUBLE FAILURE SCENARIO OUTSIDE PLANT DESIGN BASIS
2.6.01.08.1 52-1303	SWGR #3 125VDC	VOLTS LOW	BREE CANNOT BE TRIPPED OR	CONTROL ROOM INDICATION	NOME REQUIRED FOR SHORT TERM,		HOV-358/850C UPS DUTY CYCLE >
(BRBAEBE)			RECLOSED		OPERATOR ACTIONS FOR LONG TERM		30 MINUTES TO PERMIT CREDIT
			The second section of the second section is a second section of the second section is a second section of the second section is a second section of the second section is a second section of the second section is a second section of the second section is a second section of the second section is a second section of the second section is a second section of the second section of the second section is a second section of the section of the section of t				POR OPERATOR ACTION LOCALLY IN
•						TRAIN A AND TRAIN 8 BY CLOSING	
						8WGR #1-3 OR 8WGR #2-3 TIR	52-1303 AND RESTORE CONTROL
							POWER (VIA MANUAL SELECTOR
2.6.02.01.1 MCC-3	52-1314	OPEN	LOSS OF POWER TO MCC-1 LOADS,	CONTROL ROOM ENDICATION	NONE FOR LOSS OF SWGR RM HVAC.		SWITCHRS) AS MEEDED SMCC-3 480V ACB. WERIF REQD
	(BRBAEBR)		INCLUDING MOV-358/850C UPS	COMING BOOK TRAILORITOS		BOTH TRAINS DUR TO LOSS OF SWCR	
			BATTERY CHARGER, MOV-883, SWGR				VENTILATION PROVIDES ADEQUATE
			ROOM BVAC, A/B-IFHR COOLING,		SI/PW PUMP TRIPS FOR LO-LO TR	DISABLING 1/3 SI VALVES FOR	COOLING FOR SWGR ROOM
			RCP-C LUBB OIL PUMP, REHEATER			LO-LO RWST LEVEL TRIP PUNCTION	
	•		STM ISOLATION VALVES			AND 1/3 CLE PATHS	"OA" BATING (IB, WITHOUT PANS)
		• •			<del></del>		SUPPICIENT FOR POST-ACCIDENT ALTERNATE OFFSITE SOURCE DUTY
							WITHOUT BCPs
2.6.02.01.2 MCC-3	52-1314	CLOSED	490V POWER AVAILABLE TO MCC-3	PBRIODIC TESTING	MONE REQUIRED		*NORMAL POSITION. NON-SE LOADS
	(BRBAERR)		LOADS. HOWEVER, BREE WILL NOT				NOT ALL TRIPPED/LOCKED-OUT ON
			TRIP IF WERDED TO ISOLATE				SISLOP. BREES MUST COORDINATE
			PAULTS DUB TO NOW-SE LOADS				TO PREVENT PREDER TRIP UNDER
							SIS AS WELL AS SISLOP. MCC BUS
				•			PAULT PLUS BRER PAILURE IS OUTSIDE SIS/SISLOP DESIGN
							BASIS
1.8.02.02.1 MCC-3	. NSB LOADS	ON (BRER CLOSED)	LOAD(S) WILL NOT TRIP ON SISLOP OR TO ISOLATE	PBRIODIC TESTING	(SAME AS 12.6.2.1.1)	*(SAMB AS 12.6.2.1.1)	
			COMMON-CAUSE PAULTS,				
			POTENTIALLY RESULTING IN TRIP				
276702702727WCC-3	NSE LOADS	APP	OP MCC-3 PREDER BREE 52-1314	DODE AREA BRANCHA	WATER BAR TENER BEAUTIFUL TO THE STATE OF TH		
6.4.VE.VE.E 800-3	. MOR TOWNO	(BREE OPEN)	LOSS OF ONE OR MORE MCC-3 WSR LOADS, INCLUDING SWGR RM HVAC,	ARRIODIC LRALING		POTENTIAL INOPERABILITY OF	
		tones oresi	A/B-IPMB COOLING, BCP-C LUBB			BOTH TRAINS DUB TO LOSS OF SWGR RN RVAC	
			OIL PUMP, BEHBATER STM				NOT CERDITED FOR MSLE. AUX IPMR A/B BAVE "OA" RATING ([R.
			ISOLATION VALVES				WITHOUT PANS) SUFFICIENT FOR
							POST-ACCIDENT ALTERNATE
							OFFSITE SOURCE DUTY WITHOUT
							RCPs

EMBEGSNUT CORE OF SYSTEM SINGLE FAILURE ANALYSIS
SAN ONOPRE UNIT 1
TABLE 12-1: POWER DISTRIBUTION SYSTEM FMRA

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	ITBH #	DEALCR ID	COMPONENT ID	FAILURB HODE	LOCAL BFFECTS AND DEPENDENT FAILURES	MSTHOD OF DBTBCTION	INUBRENT COMPRUSATING PROVISIONS	BFFECT ON ECCS	REMARES
·  	12.6.02.02.3 HC		NSR LOADS	BOLGBIONIC	BASENSFAT CAUMAN AARGS BATH 4	MAIR	SIS/SISLOP ISOLATION OF SWGR	*POTENTIAL COMMON-CAUSE	*NON-SR LOADS NOT ALL
	12.0.02.02.3 nc		MR COADS	BQ/SBISHIC	POTBUTIAL COMMON-CAUSE PAULT OF MSB LOADS, CHALLENGING MCC-3 LOAD AND PBBDBR BRERS	NUMS	83, BREE COORDINATION TO PREVENT PERDER TRIP FOR	INOPERABILITY OF BOTH TRAINS DUB TO LOSS OF SUGB RM SVAC	TRIPPED/LOCEED-OUT ON SISLOP. COMPIGURATION DOBS NOT MEET RG
							PAULTS, MONE FOR OVERCURENT PAILURE OF LOADS BELOW SETPOINT		1.75 OR IBBB 384 CRITBBIA WHICH REQUIRE TRIP OF ALL MON-1B LOADS ON A SAPRTY
	12.6.03.01.1 MC	C-3A	52-1307 (BRBAKER)	OPBN	LOSS OF POWER TO MCC-3A LOADS, INCLUDING POST-ACCIDENT	CONTROL BOOM INDICATION	NOME BEGAIRED	NORB	SIGNAL (IN, SIS AND SISLOP) MCC-3A 480V ACB. PASS NOT BEQUIRED FOR DESIGN BASIS
	12.6.03.01.2 BC	:-3A	52-1307 (BRBAKER)	CLOSED	SAMPLING SYSTEM (PASS) 4804 POWER AVAILABLE TO MCC-JA LOADS. HOWEVER, BRIE WILL NOT	PBRIODIC TESTING	NOME ERGAINED	NONE	BIB/BISLOP BUBBY HITIGATION *NORMAL POSITION. BOI BBY REGD TO INDIVIDUALLY ISOLATE
					TRIP ON SIS/SISLOP OR IF  MERDED TO ISOLATE FAULTS DUE  TO NON-SE LOADS				NON-ESSENTIAL LOADS FROM SWEE  #3 BEFORE RE-ENERGIZING  POST-SIS/SISLOP
	11276.703.702.11 TBC	:-)[	TISE LOADS	(BBEZ CLOSED)	ISOLATE COMMON-CAUSE PAULTS, POTENTIALLY RESULTING IN TRIP	CONTROL ROOM INDICATION, PERIODIC TESTING	(37MR_32_18.4.3.1.1)	[SAME AS 12.6.3.1.1]	PASS WOT REQUIRED FOR DESIGN BASIS SIS/SISLOP BYENT MITIGATION
	12.6.03.02.2 MC	)-3A	NSB LOADS	OFF (BRAR OPBN)	OF MCC-JA FEBDER BERR 52-1307 LOSS OF ONE OR MORE MCC-JA WSR LOADS, INCLUDING PASS	CONTROL BOCH INDICATION, PERIODIC TESTING	(SAME AS 12.6.3.1.1)	(SAMB AS 12.6.3.1.1)	PASS NOT REQUIRED FOR DESIGN BASIS SIS/SISLOP EVENT
	12.6.03.02.3 HC	:-3A	NSR LOADS	BQ/SBISHIC	POTENTIAL COMMON-CAUSE FAULT OF MSR LOADS, CRALLENGING	HONR	MONE BESOILED	NORE	HITIGATION PASS NOT REQUIRED FOR SIB/SISLOP DRSIGN BASIS BYENT
					MCC-3A LOAD AND PERDER BERRS.  SINCE ALL LOADS ARE MSE AND LOCATED IN HARSE POST-ACCIDENT				HITIGATION
				•	ENVIRONMENTS, FEEDRE BRIE MAY TRIP FROM CONCURRENT PAULTS POST-ACCIDENT				
12	"[2:6:04:01:1"[N0   12:6:05:01:1   N0	•							[THIS BLOCK OF RECORDS RESERVED FOR LATER ADDITION OF
									OTHER 480A SACE \$1 FOTO31
	12.6.06.01.1 SW		BBBAEBR(S)	OPBN	POTENTIALLY DISABLES 1/3	CONTROL BOOM INDICATION, PERIODIC TESTING	SECONDARY RECIRC, NONE	BEDUCED RELIABILITY FOR ISA SUPPLY TO SECONDARY RECIEC VALVES, NOWE FOR OTHER ECCS	CAN ALSO DISABLE MAIN TURBINE AUX LUBE OIL PUMP
					INSTRUMENT ALE COMPRESSORS FOR SECONDARY RECIRC	y = 110 mm = 100 mm v	REQUIRED FOR OTHER ECCS FUNCTIONS	PUNCTIONS	
	12.6.06.01.2 9W	-	BRBASBB(S)	CLOSED	SWGR #3 480V MSR LOAD(S) WILL NOT TRIP ON BUS UNDERVOLTAGE, SBQ SIGNAL (INCLUDING SISLOP	The state of the s	REDUNDANT TRAIN A AND B POWBRED VALVES FOR CLE, REDUNDANT SI/PW PUMP TRIPS FOR	SWGR #3 INOPERABLE FOR SISLOP, DISABLING 1/3 BI VALVES FOR LO-LO RWST LEVEL TRIP PUNCTION	APPECTED. HOWEVER, IPHES HAVE
					LOCEOUT) OR FAULT		LO-LO RWST LRVBL TRIP	AND 1/3 CLR PATHS (IF NCT	SUPPLICIENT FOR POST-ACCIDENT ALTERNATE OPPSITE SOURCE DUTY

#### SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION SYSTEM FHEA

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	TIER 1	DRVICE ID	COMPONENT ID	FAILURE MODE	LOCAL BFFECTS AND DEPENDENT FAILURES	MBTHOD OF DBTECTION	INUBRENT COMPENSATING PROVISIONS	BFFBCT ON BCCS	8BMARES
, !									
	12.6.05.01.3	SYGR #3 MSR LOADS	BRBARBE(S)	BQ/SBISHIC	POTENTIAL COMMON-CAUSE FAULT OF SWGR #3 480V MSR LOAD(S), CHALLENGING SWGR #3 LOAD AND	NOMB	O/C TRIP OF INDIVIDUAL LOAD BRERS AND BRER COORDINATION TO PREVENT PEEDER (OR TIE) BRER		*COMPIGURATION DORS NOT MERT RG 1.75 OR IERR 384 CRITERIA WHICH REQUIRE TRIP OF ALL
			THE STATE OF THE S		PEBDER BREES		TRIP FOR COMPLETE PAULTS, NOME FOR O/C FAILURE OF LOAD BREES		NOW-IE LOADS ON SAPETY SIGNAL (IE, 815 AND SISLOP). BOI REV REQD TO ISOLATE ALL
								UNQUALIFIED LOADS ON SIS AND	MON-ESSENTIAL LOADS PRIOR TO RE-ENERGIZING SWGR \$3. BRER COORD ALSO REQD FOR TIE BER
	12.6.07.01.1	SWGE \$1 UNDERVOLTAGE AND CONTROL	27-114 (RBLAY)	CONTACTS OPEN (OPP)	UV AUT BRLATS 27-111, 27-112 WILL NOT BNBRGIZB AS BEQUIRBD ON SEQ 2 [SISLOP] ACTUATION TO SWOR \$2. UNDERVOLTAGE	PBBIODIC TESTING	NONE BEÓD	NONE	ALIGN MORMAL POSITION. SWGR #3 ISOLATED BY SEPARATE SIS/SISLOP TRIP OF 41V SST #3
					ACTUATION UNAFFECTED			•	PREDER AND 480V TIE BREES FROM RESPECTIVE SEQUENCERS. UV TRIP REMAINS AVAILABLE FOR MON-SIS/SISLOP EVENTS
	12.6.07.01.2	SWGR #3 UNDERVOLTAGE AND CONTROL	Z7-114 (RBLAT)	CONTACTS CLOSED (ON)	UV AUI BELATS 27-111, 27-112 BHERGIZE, TRIPPING ALL SWGE #3 480V LOADS BICEPT MCCS AND AIR COMPRESSORS, RESULTING IN LOSS	CONTROL ROOM INDICATION	NONE BEGUIEED	NOMB. CCW PUMP G-15C NOT CREDITED FOR TECH SPEC REQUIREMENTS. AUX SWC PP NOT CREDITED BICEPT FOR LOSS OF	SISLOP SIGNAL TO UV AUX RELAY 27-114 IS NORHALLY MONENTARY. MAINTAINED SIGNAL DUE TO EBLAY OR SEQ CONTACT FAILUES
· 					OF CCW PF G-15C, AUX BWC PP, MAIN TURBING AUX LUBB OIL PP, AND CAUSING AUTO-START OF TURBING BHERGRHCF DC LUBB OIL	·		BOTH SUC PP, WHICH REMAIN AVAILABLE FOR THIS PAILURE	PREVENTS RESTART OF APPRICED LOADS
! 	12.6.07.02.1	SWGR #3 UNDBRVOLTAGE AND	27-1 (OV RELAY)	ON (VOLTS LOW)	PUMP (SAME AS 12.6.7.1.2)	CONTROL ROOM INDICATION	(SAME AS 12.6.7.1.2)	(SAME AS 12.6.7.1.2)	
- - -	12.6.07.02.2	CONTROL SWGB #1 "UNDERVOLTAGE AND CONTROL	27-1 (UV RBLAY)	OFF (VOLTS NORMAL)	UV AUX RELAYS 27-111, 27-112 WILL NOT BHERGIZE AS BEQUIRED ON BUS UNDERVOLTAGE. SEQ ACTUATION VIA RELAY 27-114	PERIODIC TESTING	NONE BEGUIEED	NONB. SWGR #3 ISOLATED BY SEPARATE BIS7SISCOP TRIP OF TEV SST #3 PERDER AND 480V TIR BRERS	*MORMAL POSITION. BOI RBV REQD TO INDIVIOUALLY ISCLAYE NON-BSSENTIAL LOADS PRIOR TO RB-BYERGIZING SWGR #3
	12.6.07.03.1	SWGR #3 UNDBRVOLTAGB AND CONTROL	98Q 2 (11-5,7)	CONTACTS OPEN (OFP)	UNAPPECTED SWGR #3 LOCEOUT RELAT WILL NOT TRIP SWGR #3 480V NORMAL	PBRIODIC TESTING	(SAMB AS 12.6.7.2.2)	(SAME AS 12.5.7.2.2)	POST-SIS/SISCOP *(SAMB AS 12.6.7.2.2)
<u> </u>					FREDRE BRER OR MSR LOADS ON SIRLOP, INCLUDING AIR COMPRESSORS AND MAIN TURBINE AUX LUBB OIL PUMP				
	12.6.07.03.2	SMGR #3 UNDBRVOLTAGE AND CONTROL	SEQ 2 (11-5,7)	CONTACTS CLOSED (GN)	480V SWGR #3 NORMAL FEEDER BRER AND WSR LOADS, INCLUDING	CONTROL BOOM INDICATION	REDUNDANT AIR COMPRESSORS POWERED FROM SWGR \$1 AND 2 FOR SECONDARY RECIRC, WONR		SUGR #3 CAN BE RE-BNBRGI2BD PROM TRAIN A OR B VIA SUGR BI-3 OR #2-3 TIE BRRRS,
	<b>-</b>				ALE COMPRESSORS AND MAIN TURBINE AUX LUBE OIL PUMP	<del></del> .	REQUIRED FOR OTHER BYENTS	POR OTHER EVENTS	BBSPBCTIVBLY TO POWBB BSSBNTIAL SWING LOADS (NOV-358/850C UPS AND MOV-883)

# EMBRGENCY CORE C. STREEM SINGLE FAILURE ANALYSIS SAN ONORRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION STREEM FMRA

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ITBH #	DBAICE ID	COMPONENT ID	FAILURS MODE	LOCAL BPFBCTS AND DSPBHDSHT FAILURBS	METHOD OF DRIECTION	INHERBUT COMPENSATING PROVISIONS	BPPSCT ON BCCS	REMARES
	SWGR #3 UNDBRVOLTAGE AND CONTROL	86-J (BELAY)	TRIP	ALL SUGR #3 480V WSR LOADS, INCLUDING AIR COMPRESSORS AND	CONTROL BOOM INDICATION	(SAME AS 12.6.7.3.2)	(SAMB AS 12.6.7.3.2)	SWGR #3 SISLOP LOCKOUT RELAY
12.6.07.04.2	SWGR #3	86-3 (RBLAT)	RESET	MAIN TURBINS AUX LUBS OIL PUMP SWGR \$3 LOCKOUT BELAY WILL NOT		(SAMB AS 12.6.7.3.1)	(SAMB AS 12.6.7.3.1)	
	UNDERVOLTAGE AND			TRIP SUGR #3 480V WSR LOADS ON		(vans at 15.4	(0200 00 10.0.1.0.1)	
	CONTROL			SISLOP, INCLUDING AIR COMPRESSORS AND MAIN TURBINE AUI LUBE OIL PUMP				
	SVGR 11		CONTACTS OPEN	MCC-3 LOCKOUT BELATS 86-H3-1,	PERIODIC TESTING	RONE BEGUIERD	NONE. SUGE #1 ISOLATED BY	MORHAL POSITION. REDUNDANT
	UNDERVOLTAGE AND CONTROL	(13-1,3)	(OPP)	86-M3-2, 86-M3-3 AND 86-M3-4 WILL MOT BNERGIZE AS REQUIRED			SEPARATE TRIP OF 44V 88T \$3 FERDER AND 480V TIE BREES ON	INPUTS PROB SEQ 2 PREVENT THIS FAILURE UNLESS SEQ 2 LOAD
				ON SISLOP	······································		SIS/SISLOP	GROUP A OUTPUT OR RELAY DRIVER
								CARD(S) PAIL. BOI RBV REQD TO
								INDIVIDUALLY TRIP/LOCKOUT
								NON-BSSENTIAL LOADS PRIOR TO RE-EMBRGIZING SWGR #3 POST-SIS/SISLOP
	\$9GB 33		CONTACTS CLOSED	MCC-3 LOCKOUT BELAYS 86-M3-1,	CONTROL ROOM INDICATION	NONE REQUIRED FOR SIS/SISLOP	NONB FOR SIS/SISCOP	CONTACTS NORMALLY MAINTAINED
	UNDBRVOLTAGE AND		(ON)	86-M3-2, 86-M3-3 AND 86-M3-4				ON SISLOP UNTIL SEQ 2
	CONTROL	(13-5,7)		TRIP AND LOCKOUT MCC-3 MSR LOADS, INCLUDING T/B-IPMR				BLOCE/RESET. REHEATER STEAM
				COOLING, RCP-C LUBE OIL PUMP.			F	ISOLATION NOT CREDITED FOR MELB. AUI IPMES A/B HAVE "OA"
				REBEATER STRAM ISOLATION				RATING (IB, WITHOUT PAHS)
				VALVES, CIRC WATER INTARE AND				SUPPICIENT FOR POST-ACCIDENT
				INTARE RECIRC GATES				ALT OFFSITE SOURCE DUTY
7 T 07 06 1"	SWCR 13	'On*1'''& '/oor'ivi ''	Αν	" MAR' 4 TARBAHD'RBT (WG 'BA'N4' !!"	BRDYARIA BRASTUA			WITHOUT BCPs
	UNDERVOLTAGE AND	30-1-0 (BELAI)	UM	MCC-3 LOCKOUT RBLAYS 86-M3-1, 86-M3-2, 86-M3-1 AND 86-M3-4	ARRIODIC ARREING	(SABE AS 12.6.7.5.1)	(SANB AS 12.6.7.5.1)	LOCKOUT RESET RELAY FOR 86-H3-1, 86-H3-2, 86-H3-3 AND
	CONTROL			WILL ALTERNATE BRIVERN SESET				86-M3-4. INCLUDES HANDSWITCH.
				AND TRIP STATE AS SOON AS				BOL REV REQUITO INDIVIDUALLY
				SISLOP OR MANUAL LOCEOUT				TRIP/LOCEOUT NON-BSSENTIAL
				INITIATION OCCURS, AND				LOADS PRIOR TO RE-ENERGIZING
				IMMEDIATELY RESET AFTER SEQ.		• '		SWGR #3 POST-813/SISLOP
2.6.07.06.2	SWGR #3	SD-1-6 (RELAY)	OFF	MCC-3 LOCKOUT RELAYS 86-M3-1,	PRRIODIC TRATING	(SAME AS 12.6.7.5.2)	(SAME AS 12.6.7.5.2)	MORNAL POSITION. AUX IFMRS A/B
	UNDERVOLTAGE AND			86-H3-2, 86-H3-3 "ARD" 86-H3-4" -			(10000 00 10.001.000)	HAVE "OA" RATING (IR. WITHOUT
	CONTROL			CANNOT BE RESET, PREVENTING				PANS) SUPFICIENT POR
				RESTART OF MCC-3 NSB LOADS	·			POST-ACCIDENT ALTERNATE
			*	POST-SISLOP, INCLUDING				OPPSITE SOURCE DUTY WITHOUT
				A/B-IPME COOLING, ECP-C LUBB OIL PP, REBEATER STM ISOLATION				RCPs
				HOVS, CIRC WATER INTAKE AND				
				INTARE RECIRC GATES				
2.6.07.07.1		86-8 (R8LAY)	GN	MCC-ZA LOCKOUT BELATS 86-ZA-1,	CONTROL BOOM INDICATION	NORE REQUIRED FOR INJECTION,	*POTENTIAL INOP OF BOTH TRAINS	
	UNDERVOLTAGE AND CONTROL			-2 AND MCC-3 LOCKOUT RELAYS		HONE FOR RECIRC, NONE FOR RCPs	FOR BECIEC DUE TO LOSS OF	(IE, WITHOUT PANS) SUPPLICIENT
,	CONTRAF			86-M3-1, -2, -3, -4 TRIP AND LOCKOUT NSR LOADS, INCLUDING		POST-SGTB	COOLING FOR CHARGING PUMP BOOM, NONE FOR INJECTION	
<del></del>		<del></del>		REACTOR AUX BLDG SUPPLY PAN.		and the second s		OPFSITE SOURCE DUTY WITHOUT
				A/B-XFMR COOLING, BCP-C LUBE				BV4 B
				OIL PP, REHEATER STM ISOL		·		
				HOVS, CIRC WIR INTAKE AND				

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! ! -	# KET1	DRAIGE ID	COMPONENT LD	PAILURB MODE	LOCAL RPFBCTS AND OBPENDENT FAILURES	MBTHOD OF DBTBCTION	INHERENT COMPENSATING PROVISIONS	BFFBCT ON BCCS	BEMARZS
-	12.6.07.07.2	SNGR 13	, ,	OPP	MCC-ZA LOCKOUT BBLAYS 86-ZA-I,	PRETODIC TRAFING		BEOUCED RELIABILITY OF TRAIN B	
1		UNDBRVOLTAGE AND CONTROL			-2 AND MCC-3 LOCHOUT BRLATS 86-M3-1, -2, -3, -4 CANNOT BR		REQUIRED FOR SISLOP	NONE FOR SISTOS	ACTUATION OF SISLOP LOCEOUT RELAYS COULD BE REQUIRED FOR
					MANUALLY ACTUATED, NO REPRET ON SISLOP ACTUATION				SIS EVENT WITH COMMON-CAUSE PAILURES OF MSR EQUIPMENT DUB TO LACE OF AN AUTOMATIC
	<u>.</u> .					-			TRIP/LOCKOUT AS PRR RG 1.15 AND LERE 384
<u>                                   </u>	12.6.07.08.1	_SVGR_#3 ^UNDBRVOLTACE_AND	86-M3-1 TLOCKOUT RELAY!	TRIP	RELAY TRIPS AND LOCKS-OUT ITS MCC-3 BSR LOADS, INCLUDING	CONTROL BOOM INDICATION	NONE BEGNISED		*VBRIPICATION REQUIRED THAT LOSS OF TURBINE-GENERATOR
		CONTROL			TURBINE-GRABBRATOR AUXILIARIES AND BORIC ACID INJECTION PUMP				HYDROGEN SEAL OIL OR OTHER AUXILIARIES WILL NOT RESULT IN
									FIRE OR RIPLOSION CONCURRENT WITH SIS/SISLOP EVENT. BORIC ACID SISTEM NOT CREDITED FOR
-  - 	12.6.07.08.2	SWGR #3 UNDBRYOLTAGE AND CONTROL	86-H3-1 (LOCEOUT RELAT)	RESET	RBLAY WILL NOT TRIP AND LOCKOUT ITS MCC-3 MSR LOADS	PBRIODIC TESTING	(SAMB AS 12.6.7.5.1)		SIS/SISLOP BYENTS
	12.6.07.09.1		86-M3-2 (LOCEOUT RELAT)	TRIP	RBLAY TRIPS AND LOCES-OUT ITS MCC-3 MSR LOADS, INCLUDING	CONTROL ROOM INDICATION	MONE BEGULEED		*VERIFICATION REQUIRED THAT LOSS OF CEMBRATOR HIDROGEN
		CONTROL	***************************************		TURBINE-GENERATOR AUTILIARIES				SBAL OIL OR OTHER AUTILIABLES WILL NOT RESULT IN BIPLOSION OR FIRE CONCURRENT WITH
	12.6.07.09.2	SWGR #3 UNDBRVOLTAGE AND CONTROL	86-M3-2 (LOCEOUT RELAY)	RESET	RBLAT WILL HOT TRIP AND LOCKOUT ITS MCC-3 MSR LOADS	PERIODIC TESTING	(SAMB AS 12.6.7.5.1)		STS/STSLOP BVENT MORNAL POSITION
; ; ;	12.6.07.10.1	SWGR #3 UNDERVOLTAGE AND	86-M3-3 (LOCEOUT RELAY)	TRIP	RELAT TRIPS AND LOCES-OUT ITS MCC-J NSR LOADS, INCLUDING		NOME FOR ECPS POST-SGTR, MOME OTHERWISE REQUIRED	RCPs UNAVAILABLE FOR SGTE. NCME OTHERWISE	RBHBATER STM ISOLATION NOT CREDITED FOR MSLB
		CONTROL		a, ar ingi. Sir.	RCP-C LUBE OIL PUMP, REBEATER STEAM ISOLATION MOVS, CIRC WATER INTAKE AND INTAKE RECIRC GATES				
 	12.6.07.10.2	SWGR #3 UNDERVOLTAGE AND CONTROL	86-M3-3 (LOCEOUT BELAY)	RESET	RELAY WILL NOT TRIP AND LOCKOUT ITS MCC-3 MSR LOADS	PRREODIC TESTING	(SAMB AS 12.6.7.5.1)	(SAME AS 12.6.7.5.1)	NORMAL POSITION
	12.6.07.11.1		86-M3-4 (LOCEOUT BBLAT)	TRIP	RBLAY TRIPS AND LOCKS OUT ITS MCC-3 MSR LOADS, INCLUDING A/B-IPHR COOLING, REPRAYER	CONTROL ROOM INDICATION	NONE REQUIRED		BRHBATAR STEAM ISOLATION NOT CREDITED FOR MSLB. AUI IFMRS A/B HAVE "OA" RATHUC [IE,
ï	. —				STRAM ISOLATION HOVE				WITHOUT PANS) SUFFICIENT FOR POST-ACCIDENT ALTERNATE OFFSITE SOURCE DUTY WITHOUT
	12.6.07.11.2		86-M3-4	BBSBT	RELAT WILL NOT TRIP AND	PERIODIC TESTING	(SAMB AS 12.6.7.5.1)		BCPs NORMAL POSITION
		UNDBRVOLTAGE AND CONTROL	(POCRODI REPY!)		LOCKOUT ITS MCC-1 BSR LOADS	•			

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1	ITBN #	DSVICE ID	COMPONENT ID	FAILURE MODE	LOCAL BFFECTS AND DBPENDENT FAILURSS	MBTHOD OF DBTBCTION	INHERBAT COMPRASATING PROVISIONS	RPFECT ON BOCS	EBMARAS
	12.6.07.12.	SWGS #3 UNDBRVOLTAGE AND CONTROL	125VDC BUS #2 (72-226)	VOLTS LOW	SWGR #2, MCC-2, MCC-2A, SWGR #3, MCC-3 LOCEOUT RELATS WILL NOT TRIP AND LOCROUT THEIR MSR LOADS	PBBIODIC TESTING	NONE FOR SISLOP, MONE FOR RCPS POST-SGTE, MONE OTHERWISE REQUIRED FOR SIS	*POTENTIAL INOPERABILITY OF TRAIN B FOR SISLOP DUE TO 480V SWOR/MCC VOLT DEGRADATION AND/OR DC OVERLOAD, WITH POTENTIAL INOP OF TRAIN A DUE TO: UNISOLABLE CCW FLOW BYPASS,	LOCKOUT RELATS. BOI BSV REGD TO IMDIVIDUALLY ISOLATE SWGR #3/MCC-3 LOADS PRIOR TO
			Canal Laurehadt					LOSS OF LO-LO RWST LEVEL TRIP OF TRAIN A SI/FW. RCPS ALSO UNAVAILABLE FOR SGTR	POST-SIS/SISLOP
	12.6.08.01.1	CONTROL POWER	SSI (SVITCH)	AUTO	SWGR #3 CONTROL POWER SELECTED TO TRAIN A IP SWGR #2-3 TIE BRRR IS OPEN {*a* CONTACTS OPEN, *b* CONTACTS CLOSED   AND		ROMB &BÖNISED	NOME. SWEE #3 CONTROL POWER AUTO-SELECTS TO TRAIN A OR B AS REQUIRED	ENERGIZED VIA 152-12C11 (TRAIN
	12.6.00.01.7	)" 9WG0" <b>! 1</b>	SS1" (SWETCH)""	ON	SELECTOR SWITCH 932 IS NOT ON  SWGR 43 CONTROL POWER BELECTED		SWCR 83 CAN 88 RR-BYBRG[Z8D	POTENTIAL CROSS-TRAIN ALIGNMENT	B) IN MODES 1 - 4, SINCE SUCH AN ALIGNMENT COULD RESULT IN CROSS-TRAIN POWER AND CONTROL
		CONTROL POWER			TO TRAIN A (IF CONTACTOR 2  BELAY C2A INITIALLY OPP)  IRRESPECTIVE OF SWGR \$2-3 YIE	LOCAL INDICATION	PROM TRAIN A VIA SST \$3 OR SNGR \$1-3 TIR BRER	OF SWGR #3 POWER AND CONTROL IF SWGR #3 RB-ENERGIZED FROM TRAIM B VIA SWGR #2-3 TIE BRID	REQUIRED WITH THIS PAILURS.
					BREE POSITION OR SUBSEQUENT OPERATION OF SELECTOR SWITCH SS2			POST-S18/\$18LOP	POST-SIS/SISLOP
: -	12.6.08.01.3	SAGE 13 CONTROL DOMBS	SSI (SWITCH)	OFF	SWGR #3 CONTROL POWER CANNOT BB SELECTED TO TRAIN A. BBSULTS IN LOSS OF SWGR #3	CONTROL ROOM AND LOCAL INDICATION	SWGR #3 CAN BB RB-BWRRGIZED PROM TRAIN B VIA SWGR #2-3	REDUCED REDUNDANCY FOR RE-EMBRGIZING SWGR #3 POST-818/818LOP. ISOLATION OF	STECH SPEC ACTION BUTET BEQD WITH THIS PAILURE. BOI REV REQD TO INDIVIDUALLY ISOLATE
!					CONTROL POWER AND PAULT PROTECTION DURING NORMAL OPERATION (IE, WITH SWGE 12-3			SWGR \$3 LOADS BY SIS/SISLOP TRIP OF 4kV PREDER AND 480V TIE BRRRS 180LATES CONNON-CAUSE	NON-BESSENTIAL LOADS PRICE TO
	12.5.08.02.1	SVGR 11	52-1203	OPBN	TIB BRER OPEN) SUGR #3 CONTROL POWER WILL NOT	CONTROL ROOM THRICATION.	NONE REQUIRED FOR SHORT TRRE,	PAULTS PROM REDUNDANT TRAINS A AND B	*BOY RBV RBQD FOR LOCAL
		CONTROL POWER	"b" CONTACTS		AUTO-SELECT TO TRAIN A IP SWGE #2-3 TIE BEER IS OPEN. MANUAL BELECTION TO TRAIN A VIA	•	OPERATOR ACTIONS FOR LONG TERM		OPERATOR ACTION TO MANUALLY SELECT CONTROL POWER VIA 951
					SELECTOR SWITCH SSI AND SSZ ARB UNAPPECTED			SITEER TRAIN VIA SWGR \$1-3 AND SWGR \$2-3 TIE BRERS	
	12.6.08.02.2	SWGR #3 CONTROL POWER	52-1203 "b" CONTACTS	CLOSED	SWGR #3 CONTROL POWER SELECTED TO TRAIN A WITH SSI IN AUTO (AND CONTACTOR 2 RELAY C2A	PBRIODIC TESTING	(SAME AS 12.6.8.1.2)	(SAME AS 12.6.8.1.2)	*MORHAL POSITION. TECH SPEC ACTION BUTEY REQU WITH THIS PAILURE
					INITIALLY OPP). MANUAL SBLBCTION TO TRAIN B VIA 991 ANS 882 UNAFFECTED			·	
	12.6.08.03.1	SWGR #1 CONTROL PGW2R	C!A (RELAY)	ON .	SYGR #3 CONTROL POWER SELECTED TO TRAIN A IP SYGR #2-3 TIE BRER IS OPEN ("b" CONTACTS"	PERIODIC TESTING	SYGR #3 CAN BE RE-ENERGIZED PROM TRAIN A VIA SST #3 OR SYGR #1-3 TIR BREK	BEDUCED REDUNDANCY FOR RE-EMERGIZING SWGR #3	*TECH SPEC ACTION BNTRY BRQUIRED WITH THIS FAILURE
1 .		-	-		CLOSED) OR SSI IS ON. CONTROL POWER CANNOT BE SELECTED TO TRAIN B IRRESPECTIVE OF POSITIONS OF SWCR #2-3 TIE				
*					BSER OR SELECTOR SWITCH SS2				·

SYSTEM SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT 1
TABLE 12-1: POWER DISTRIBUTION SYSTEM FREA

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ITBN 6	DRAIGE ID	COMPONENT ID	FAILURB MODR	LOCAL EPFECTS AND DRPENDENT FAILURES	METHOD OF Detection	INUBRENT CONPENSATING PROVISIONS	EPPECT ON BCC3	BEMARKS
1276.788.03.2	SWGR 11 CONTROL POWER	CIÀ (RBLÀY)	OFF	SWCE AS CONTROL POWER CANNOT " BE SELECTED TO TRAIN A. BESULTS IN LOSS OF SWCE AS	PBRIODIC TESTING	(SAMB AS 12.6.8.1.3)	(SAMB AS 12.6.8.1.3)	#{SAMB AS 12.6.3.1.3}
	:			CONTROL POWER AND PAULT PROTECTION DURING NORMAL OPERATION (IR, WITE SUGE \$2-3 TIR BRIE OPER AND 382 NOT IN				
12.6.08.04.1	SWGR #3 Control power	CIB (RBLAT)	ON	ON) SUGE #3 CONTROL POYER AUTO/MANUAL SELECTION TO TRAIL	PLOCAL INDICATION	REDUNDANT CONTACTOR RELATS	REDUCED REDUNDANCY FOR SEPARATION OF TRAIN A (OC BUS	*TECE SPEC ACTION BUTET REQUIRED WITH THIS PAILURE
				A OR B UNAPPECTED. ROWEVER, CROSS-CONNECTS WEGATIVE POLE OP DC BUS II TO DC BUS IZ WERN		vial cent cen	\$1) AND TRAIN B (DC BUS \$2) CONTROL POWER	modernon area rath tarner
	CONTROL POVER	CIB (RELAY)	OFF	TRAIN B CONTROL POWER SELECTED (SAME AS 12.6.8.3.2)	LOCAL INDICATION	(SAMB AŠ 12.5.8.1.3)	(SAMB AS 12.6.8.1.3)	*{SAMB AS 12.6.8.1.3}
12.6.08.05.1	SYGR #3 Control Power	125VDC BUS \$1 (72-116)	VOLTS LOW	LOSS OF TRAIN A CONTROL POWER TO SMGR #3, RESULTING IN LOSS OF PAULT PROTECTION DURING		SWGR \$3 CAN BE RE-EMERGIZED PROM TRAIN B VIA SWGR \$2-3 TIB BRRR	REDUCED REDUNDANCY FOR RE-ENERGIZING RUGE \$3. ISOLATION OF SUGE \$3 LOADS BY	*TECH SPEC ACTION ENTRY REQUIRED WITH THIS FAILURE
			· ·	NORMAL OPBRATION (IB, WITH SWGR \$2-3 TIB BRER OPBN AND SBLECTOR SWITCE SS2 NOT ON]			SIS/SISLOP TRIP OF 4LV PERDER AND 480V TIB BRERS PROVIDES TSOLATION OF COMMON-CAUSE	
	SACB_11	SSZ (SVITCH)	AUTO	SWGR 83 CONTROL POWER BELECTED	LOCAL INDICATION	DABIUGRA RNOK	FAULTS PROM REDUNDANT TRAINS A AND B NOME. SUGR \$3 CONTROL POWER	NORMAL POSITION
	CONTROL POWER	Andri / Branson		TO TRAIN B IF SWGR \$2-3 TIB BRER IS CLOSED ("A" CONTACTS CLOSED, "b" CONTACTS OPEN) AND			AUTO-SBLECTS TO TRAIN A OR B AS REQUIRED	
12.6.08.06.2	SAGE 13	982 (SWITCH)	ON	SELECTOR SWITCH SSI IS NOT ON SWEE \$1 CONTROL POWER SELECTED TO TRAIN BIF CONTACTOR RELAY	LOCAL INDICATION	REDUNDANT CONTACTOR 1 RELAT	REDUCED REDUNDANCY FOR	*TRCH SPEC ACTION BEQUIRED
			<u>-</u>	CIA DB-BNBBGIZES (BG, DUB TO BBLAY PAILURB OB SSI/52-1203 "5" CONTACT STATUS)			\$1) AND TRAIN B (DC BUS \$2) CONTROL POWER	
	CONTROL POWER	SS2 (SWITCH)	OPF	SWGR \$1 CONTROL POWER CANNOT BE SELECTED TO TRAIN B	LOCAL INDICATION		REDUCED REDUNDANCY FOR RE-ENERGIZING SUGE \$3	*TECH SPEC ACTION ENTRY REQUIRED WITH THIS PAILURE
12.6.08.07.1	BNGR #3 Control Power	52-1203 "a" CONTACTS	OPBN	SWGR #3 CONTROL POWER WILL NOT AUTO-SELECT TO TRAIN B IF SWGR #2-3 TIE BEER IS CLOSED.	PBRIODIC TESTING	POR SHORT TREM, SWGR #3 CAN BE RE-BNBRGIZED PROM TRAIN A VIA SST #3 OR SWGR #1-3 TIB BRER.	RB-BNBRGIZING SWGR #3 IN SHORT	*BOI REV REQUIRED FOR LOCAL OPERATOR ACTION TO MANUALLY "SELECT CONTROL POWER VIA SSI
,				MANUAL SELECTION TO TRAIN B VIA SELECTOR SWITCH SSZ UNAFFECTED		OPERATOR ACTIONS FOR LONG TERM	•	AND SS2. UPS DUTT CTCLE > 30 MINUTES PERMITS CREDIT FOR
12.6.08.07.2	CONTROL POURE	52-1203 a CONTACTS	CLOSSO	SWGR \$1 CONTROL POWER SELECTED TO TRAIN B IF CONTACTOR RELAY C1A DE-BNERGIZED (EG. DUE TO	PBBLODIC TBSTING	(SAME AS 12.6.8.6.2)	(SAME AS 12.6.8.6.2)	SWGR #3 AND 951/592 #{SAMB #9 12.6.8.6.2}
				BELAY PAILURE OR SSI/52-1203 "b" CONTACT STATUS)				

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ITEM #	DRAICE ID	COMPONENT ED	FAILUBB MODB	LOCAL BPPRCTS AND DBPRNDENT PAILURES	MBTHOD OF DBTBCTION	INBERBUT COMPENSATIN;	RPPECT ON BCCS	REMARKS
12.6.08.08.1	SWOR #3 CONTROL POWER	CZA (BBLAY)	ON	SWGR #3 CONTROL POWER CANNOT  BE SELECTED TO TRAIN A IRRESPECTIVE OF SSI OR 52-1203  "5" CONTACT STATUS. RESULTS IN		SWGR \$3 CAN BE RB-EMBRG12BD PROM TRAIN B VIA SWGR \$2-3 TI BREB		PTRCH SPRC ACTION ENTRY REQUIRED WITH THIS PAILURE
12.6.08.08.2	SWGR #3	CZA (BBLAY)		LOSS OF FAULT PROTECTION DURING MORNAL OPERATION (18, 3MCR #2-3 TIE BRRE OPEN AND SELECTOR SWITCH \$32 NOT ON) SWCR #3 CONTROL POWER CANNOT	PRRIODIC TRSTING	{SAMR AS 12.6.8.6.3}	AND 480V TIE BREES PROVIDES ISOLATION OF COMMON-CAUSE PAULTS PEON REDUNDANT TELING A AND B (SAME AS 12.6.8.6.3)	*{SAMB AS 12.6.8.6.3}
12.6.08.09.1	CONTROL POWER SUGE #3 CONTROL POWER	C28 (RBLAT)	ON	BE SELECTED TO TRAIN B SUCE #3 CONTROL POWER AUTO/MANUAL SELECTION TO TRAIN A OR B UNAPPECTED. HOWEVER,	LOCAL INDICATION	REDUNDANT CONTACTOR RELATS C1A, C1B, C2A	REDUCED REDUNDANCY FOR SEPARATION OF TRAIN A (DC BUS \$1) AND TRAIN B (DC BUS \$2)	*TECH SPEC ACTION BHTRY REQUIRED WITH THIS FAILURE
12.6.08.09.2		C2B (RBLAY)	OFF	FAILURE CROSS-CONNECTS MEGATIVE POLE OF DC BUS #2 TO DC BUS #1 WEEN TRAIN A CONTROL POWER IS SELECTED (SAME AS 12.6.8.2)	LOCAL INDICATION	(SAME AS 12.6.8.6.3)	CONTROL POWER  (SAME AS 12.6.8.6.3)	*(SAMB AS 12.6.8.6.3)
12.6.08.10.1	CONTROL POWER SWGR #1 CONTROL POWER	125 VDC BUS #2 (72-204)	VOLTS LOW	LOSS OF TRAIN B CONTROL POWER TO SWER #3	LOCAL INDICATION	SWGR #3 CAN BE RE-ENERGIZED FROM TRAIN A VIA SST #3 OR SWGR #1-3 TIB BRRR	REDUCED REDUNDANCY FOR RE-SMBEGIZING SWGR #3	
		·						
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TABLE 12-1: AUXILIARY POWER FMEA

PART III: 125 VDC SYSTEM

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ITBH #	DEATCR TO	CONFONSNT ID	FAILURB MODB	LOCAL EFFECTS AND DEPENDENT FAILURES	DETECTION METHOD OF	INTERBUT COMPENSATING PROVISIONS	BPPBCT ON BCCS	RBMARES
12.7.01.01.1	125VDC BUS #1 BATTBRY CHARGER SET A	CHARGER	INPUT OPBN	LOSS OF 1 OF 2 PULL CAPACITY CHARGERS FOR DC BUS \$1	CONTROL ROOM AND DG LOCAL PANBL ANNUNCIATION, LOCAL INDICATION	REDUNDANT CHARGER	REDUCED RELIABILITY OF TRAIN A 125VDC CONTROL POWER	ANYUNCIATION OCCURS ON LOW BUS VOLTAGE WITH CHARGER &A IN SERVICE. REDUNDANT CHARGER
······································	·							HUST BE MANUALLY ALIGNED. BATTERY DUTY CYCLE (>90 MIN) IS GREATER THAN 30 MIN
								REQUIRED TO PERMIT CREDIT FOR THIS OPERATOR ACTION OUTSIDE CONTROL ROOM
12.7.01.01.2	125VDC BUS \$1 BATTERY CHARGER SET A	CHARGRA	IMPUT SHORT		CONTROL BOOM AND LOCAL INDICATION, ANNUNCIATION AT DO LOCAL PANEL		(SAMB AS 12.7.1.1.1)	300,000
12.7.01.01.3	125VDC BUS #1 BATTERY CHARGER	CHARGER	OUTPUT VOLTS HIGH	RESULTS IN BIGHER THAN ASSUMED VOLTAGE POR TRAIN A 125VDC	LOCAL INDICATION	REDUNDANT TRAIN	POTENTIAL INOPERABILITY OF TRAIN A 125VDC LOADS DUE TO	*CONDITION LIMITED BY CHGB HI-VOLTS SHUTDOWN, VERIF REQD
# #* ·· <b>*</b> , · · <b>····</b>	SET A			LOADS			LOSS OF QUALIFIED LIFE	THAT BQ POR 125 VDC LOADS BOUNDS THIS CONDITION (RG. BQUALIZING CHARGE FOR BATTERY
								BAME). PAILURE DORS NOT IMPACT TRAIN A VITAL/REG BUSSES 1, 2, 1/3A, 4 DUE TO VOLTS REGULATE
	125VDC BUS \$1 BATTERY CHARGER SET A	CHARGER	OUTPUT VOLTS LOW		CONTROL ROOM AND DG LOCAL PANEL ANNUNCIATION, LOCAL	(SAMB AS 12.7.1.1.1)	(SAME AS 12.7.1.1.1)	CAPABILITY OF INVERTEES (SAME AS 12.7.1.1.1)
2.7.01.01.5	125VDC BUS #1 BATTBRY CHARGER	CHARGER	OUTPUT SHORT		INDICATION  CONTROL BOOM AND DG LOCAL  PANEL ANNUNCIATION, LOCAL	(SAME AS 12.7.1.1.1)	(SAME AS 12.7.1.1.1)	(SAME AS 12.7.1.1.1)
	SBT A			TO CLEAR PAULT PROM BUS, RESULTING IN LOSS OF 1 OF 2 FULL CAPACITY CHARGES FOR 125VDC BUS #1	INDICATION			
	125VDC BUS #1 BATTERY CHARGER		OPBN (TRIPPBD)	(SAME AS 12.7.1.1.1)	CONTROL BOOM AND DG LOCAL PANEL ANNUNCIATION, LOCAL	(SAME AS 12.7.1.1.1)	(SAMB AS 12.7.1.1.1)	(SAMB AS 12.7.1.1.1) CHARGER SET A OUTPUT BEBARER ON 125VDC
2.7.01.02.2	BET A 125VDC BUS #1 BATTBRY CHARGER		CLOSED	BREAKER WILL NOT TRIP TO REMOVE CHARGER SA PROK SERVICE	INDICATION PERIODIC TESTING	NOMB BESOTERED	NONS	BUS \$1 THIS PAILURE PLUS CHCR OUTPUT PAULT DURING SIS/SISLOP IS A
	BBT A			OR TO CLEAR PAULT BETYBER CHARGER OUTPUT AND BREAKER				DOUBLE PAILURE SCHWARIG OUTSIDE PLANT DESIGN BASIS. BREE TRIP NOT REGD FOR PAULT
								ON BUS SIDE OF BREE SINCE CECH WILL CURRENT-LIMIT AND BATTERY WOULD NOT FEED FAULT THROUGH
	125VDC BUS \$1 BATTERY CHARGER	CHARGER	INPUT OFBN		CONTROL ROOM AND DG LOCAL PANSL ANNUNCIATION, LOCAL	BEDUNDANT CHARGER	BEDUCED BELIABILITY OF TRAIN A 125 VPC CONTROL POWER	THIS CURRENT PATE
	SET B	•			INDICATION		2.027, 3000000000000000000000000000000000000	SERVICE. BEDUNDANT CHARGER HUST BE MANUALLY ALIGNED.
								BATTERY DUTY CYCLE (>90 MIN) IS GREATER THAN 30 MIN REQUIRED TO PERMIT CREDIT FOR
						•		THIS OPBRATOR ACTION OUTSIDE

BHERGENCY CORE CONTROL SYSTEM SINGLE FAILURS ANALYSIS
SAN ONOFRE UNIT I
TABLE 12-1: POWER DISTRIBUTION SYSTEM FREA

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CONCURRENTLY LOST

LTBH #	DEALCR ID	COMPONENT ID	FAILURE MODE	LOCAL BFFBCTS AND DBPBNDBNT FAILURSS	MSTHOD OF DRIECTION	LINHERBUT COMPRISATING PROVISIONS	BPPRCT ON BCCS	REMARES
T2.7.02.01.	2 125 VDC BUS 11 BATTBRY CHARGER SET B	CHĀRGER	TROPE TOURI	480V BRER 52-1130 TRIPS TO PROTRCT SWGR \$1. RESULTS IN LOSS OF 1 OF 2 PULL CAPACITY	CONTROL ROOM AND LOCAL INDICATION, ANNUNCIATION AT I LOCAL PANEL	(0.00.00.00.00.00.00.00.00.00.00.00.00.0	(SAMB AS [2.7.2.[.])	
12.7.02.01.	3 125VDC BUS #1 BATTBBY CHARGER	CHARGER	OUTPUT VOLTS BIGH	CHARGERS FOR DC BUS \$1 RESULTS IN BIGHER THAN ASSUMED VOLTAGE FOR TRAIN A 125VDC	LOCAL INDICATION	REDUNDANT TRAIN		*CONDITION LIMITED BY CEGR BI-VOLTS SHUTDOWN. VERIF REQ
	38T B			LOIDS				THAT BO FOR 125 VDC LOADS BOUNDS THIS CONDITION (BG. BQUALIZING CHARGE FOR BATTERY
								HARE). VAILURE DOES NOT IMPACT TRAIN A VITAL/REG BUSSES 1, 2, 3/3A, 4 DUR TO VOLTS REGULATE
12.7.02.01.	4 125VDC BUS #1 BATTERT CHARGER	CHARGER	OUTPUT VOLTS LOW	(SAMB AS 12.7.2.1.1)	CONTROL ROOM AND DG LOCAL PAREL ANNUNCIATION, LOCAL	(SAMB AS 12.7.2.1.1)	(SAME AS 12.7.2.1.1)	CAPABILITY OF INVESTERS (SAME AS 12.7.2.1.1)
12.7.02.01.	SET B 5 125YDC BUS \$1 BATTERY CHARGER	CHARGER	THORE TUTTUO	BATTERY CHARGER CURRENT LIMITS, OUTPUT BREAKER TRIPS	INDICATION  CONTROL ROOM AND DG LOCAL  PANBL ANNUNCIATION, LOCAL	(SAME AS 12.7.2.1.1)	(SAME AS 12.7.2.1.1)	(SAMB AS 12.7.2.1.1)
	981 8			TO CLBAR PAULT FROM BUS, RESULTING IN LOSS OF 1 OF 2 FULL CAPACITY CHARGERS FOR 125VDC BUS \$1	INDICATION			
12.7.02.02.	1 125VDC BUS #1 BATTERY CHARGER	72-142 (BREARER)	OPBN (TRIPPBD)	(SAMB AS 12.7.2.1.1)	CONTROL ROOM AND DC LOCAL PANEL ANNUNCTATION, LOCAL	(SAMB AS 12.7.2.1.1)	(SAMB AS 12.7.2.1.1)	(SAME AS 12.7.2.1.1) CHARGER SET 8 OUTPUT BREAKER ON 125VDC BUS #1
12.7.02.02.	SBT B 2 125VDC BUS #1 BATTBBY CHARGER		CLOSED	BEBARBE WILL NOT TRIP TO REMOVE CHARGER #B FROM SERVICE	INDICATION PESIODIC TESTING	NONE BEQUIRED		THIS PAILURE PLUS CHCR OUTPUT PAULT DUBING SIS/SISLOP IS A
The second secon	SBT D			OR TO CLEAR FAULT BETWEEN CHARGER OUTPUT AND BERAKER			٠	DOUBLE FAILURE ECREARIO OUTSIDE PLANT DESIGN BASIS. BREE TRIP NOT REQUIPOR FAULT
								ON BUS SIDE OF BRKE, SINCE CHGE CURRENT-LINITS AND BATTERY WOULD NOT FEED FAULT
12.7.03.01.	1 125VOC BATTERY BANE \$1		OUTPUT VOLTS LOW	NO BPPBCT WITH FULL CAPACITY CHARGER IN SERVICE. LOSS OF	PBRIODIC TESTING	NONE REQUIRED FOR SIS, NONE FOR BISLOP. ALT OR DEDICATED	OPS). INOP OF TRAIN A POR	THROUGH THIS CURRENT PATH SBB ITHMS 12.7.5.5.1, 12.7.5.9.1, 12.7.5.14.2,
				125VDC BUS \$1 LOADS DURING SISLOP BYBNT OR OTHER INTERRUPTION OP PULL CAPACITY		BUENTS AS PBR UPHA	FIRE OR LOSS OF CONTAINMENT	12.7.6.2.1, 12.7.6.2.2, 12.7.6.3.1. SEB FOLLOWING LIEN
				CHARGING, INCLUDING DG #1, MAIN IPMR AND GBN PROTECTION, TRAIN A BCCS LOADS			FAULT OF NON-EQ RCPs/RICITER W/ CONCURRENT LOSS OF BUS/LOAD O/C	PROPAGATION SCENARIO. OVERCURERNT TRIP OF SWYD BREES
12 7 03 01	2 125VDC BATTERY		OUTPUT SHORT	LOSS OF 1254DC BUS \$1 DUE TO	CONTROL ROOM AND DG LOCAL	NOME FOR SIS/SISLOP, ALT OR	PROTECTION  *INOP OF TRAIN A, POTENTIAL	PROTECTS HAIN/C-TFHES FOR PRIMARY SIDE FAULTS ONLY *FAILURE CAUSES LOSS OF
,	BARE \$1			LOW VOLTAGE	PANEL ANNUNCIATION, LOCAL INDICATION	DEDICATED SHUTDOWN FOR NON-SIS/SISLOP BYENTS	INOP OF TRAIN B DUB TO A LY  ROOM FIRS OR LOSS OF  CONTAINMENT INTEGRITE RESULTING	CONTROL PUR TO ALL BUS \$1A/1B/1C BRERS. B/U O/C
							FROM COMMON-CAUSE PAULT OF NON-EQ RCPs (LOCA/MSLB) OR	MAIN GEN BICITER TO PREVENT PROPAGATING COMMON-CAUSE
							BICITER (MSLE O/S CONTAINMENT) W/ CONCURRENT LOSS OF BUS/LOAD OVERCURRENT PROTECTION	FAULTS OF THESE LOADS USING BNERGY OF MAIN GEN/19ME, FOR WHICH LOW-SIDE PROTECTION

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· ·	ITBN \$	DEVICE ID	COMPONENT ID	FAILURE HODB	LOCAL BFFBCTS AND DBPSHDBHT PAILURBS	MBTHOD OF DBTBCTION	INHERBNT COMPRESATING PROVESIONS	BPFBCT ON BCCS	REMARES
									***************************************
į	12.7.03.02.1	TZSVDC BATTERY BANK #1	72-14( (BRBAEBR)	OPEN	(SAMB AS 12.7.3.1.1)	PRRIODIC TRATING	(SANS AS 12.7.3.1.1)	*(SAME AS 12.7.3.1.1)	(SAME AS 12.7.3.1.1)
		125VDC BATTERY	12-141	CLOSED	BRBAKER WILL NOT TRIP IF	PERIODIC TESTING	NOME REQUIRED	NONB	THIS FAILURE PLUS FAULT DURING
		BANE \$1	(BREARBR)		BEQUIEED TO ISOLATE BUS PAULT				SIB/SISLOP IS A DOUBLE PAILURE SCENARIO WHICH IS OUTSIDE THE PLANT DESIGN BASIS
,		125VDC BUS #1 SHUNT		ÔPŚN	LOSS OF 125VDC BUS \$1	CONTROL ROOM AND DG LOCAL PANEL ANNUNCIATION, LOCAL INDICATION	(SAMB AS 12.7.3.1.2)	*(SAMB AS 12.7.3.1.2)	*(SAMB AS 12.7.3.1.2)
į		"125VDC" BUS "#1" Sbunt		SHORT	LOSS OF 125VDC BUS \$1 AMPS INDICATION	LOCAL INDICATION	NONE BEQUIEED	NÓME	
		125VDC BUS #1		GROUND	125VDC BUS #1 POSITIVE OR	CONTROL ROOM AND DG LOCAL	NOME BEGUIRED	NONE	*BOUNDS GROUND OF ANY CTHER
		SAUNT			WEGATIVE FOLE BECOMES GROUNDED	PANBL ANNUMCIATION, LOCAL INDICATION			125VDC BUS AT DEVICE. T/3 ACTION ENTRY REQD FOR THIS COMDITION, SINCE A SECOND
· · -,									COMMON-CAUSE GROUND OF NON-EQ
									#1 SE LOADS. VERIF REQUINE
									GROUND FOR T/S ENTRY IN THIS NORMALLY UNGROUNDED SYSTEM
:		125VDC BUS JI SR LOADS	72-135 (BEBAEBE)	OPBN	LOSS OF THVERTER FOR VITAL/REGULATED BUS #1, CAUSING AUTO-TRANSFER TO	CONTROL ROOM ANNUNCIATION, LOCAL INDICATION	NONE REGULERY	HONE	*TECE SPEC ACTION ENTRY REQUIRED IF VITAL BUS NOT BNBRGIZED FROM INVERTER. MAY
			The opposite to the second sec		BACRUP SOURCE (MCC-2 VIA MANUAL TRANSPER SWITCH 87)	<u> </u>			ALSO RESULT IN INTERRUPTION OF VITAL/REGULATED BUS \$1 LOADS BETHERN TIME OF SISLOP AND
		IATURA RUA AL	•• ••						RE-BURRGIZING HCC-2 FROM TRAIN B DG
		125VDC BUS #1 SR LOADS	72-135 	CLOSED	BREAKER WILL NOT TRIP IP  REQUIRED TO ISOLATE INPUT	PERIODIC TESTING	NONE BEGNISED	NONE	NORMAL POSITION. THIS FAILURE PLUS PAULT DURING SIS/SISLOP
		on Donna	(0234575)		PAULT ON INVERTER \$1				IS A DOUBLE FAILURE SCENARIO
`. <u>}</u>									WHICH IS OUTSIDE THE PLANT
·		125VDC BUS #1 SB LOADS	72-136 (BBBAEBR)	OPBN	LOSS OF INVERTER FOR	CONTROL BOOM ANNUNCIATION,	NONE REQUIRED	NONE	DESIGN BASIS OTHER SPEC ACTION BUTES
		JE PAND	(DBBALDE)		VITAL/REGULATED BUS #2,  CAUSING AUTO-TRANSPER TO	LOCAL INDICATION			REQUIRED IF VITAL BUS NOT BEBRGIZED PRON INVESTEE. MAY
1					BACRUP SOURCE (MCC-2 VIA MANUAL TRANSFER SWITCH #7)				ALSO RESULT IN INTERBUPTION OF
[ <del></del> -				•	muchan insuring sation \$()				VITAL/REGULATED BUS \$2 LOADS BETWEEN TIME OF SISLOP AND
i									RB-BNBRGIZING MCC-2 FROM TRAIN B DG
ļ		125VDC BUS \$1 8B LOADS	72-136 - (BBBAEBR)	CLOSED	BRBAKER WILL NOT TRIP IF BEQUIERD TO ISOLATE INPUT FAULT ON INVERTER #2	PRRIODIC TRATING	MONS RECORRED	NOMB	MORNAL POSITION. THIS FAILURE PLUS FAULT DURING SIS/SISLOP IS A DOUBLE FAILURE SCENARIO
									WHICH IS OUTSIDE THE PLANT DESIGN BASIS



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!	ITEM 4	DRVICE ID	COMPONENT 19	FAILURE MODE	LOCAL BFFECTS AND DEPENDENT FAILURES	MATHOD OF DBTECTION	INHUBBRAT COMPRASATING PROVISIONS	BFFBCT ON BCCS	RSMARKS
	12.7.05.05.1	125VbC 8US 41 SR LOADS	72-137 (BBBAEBR)	. OPBN	LOSS OF INVESTEE FOR VITAL/BEGULATED BUS \$3/3A, CAUSING AUTO-TRANSFEE TO BACEUP SOURCE (MCC-2 VIA MANUAL TRANSFER SWITCH \$7)	CONTROL ROOM ANNUNCIATION, LOCAL INDICATION	MONE REQUIRED	HONB	*TECH SPEC ACTION BUTRY  REQUIRED IF VITAL BUS NOT  BEBROIZED FROM INVESTES. MAY  ALSO RESULT IN INTERRUPTION OF  VITAL/REGULATED BUS #3 LOADS  BETWERN TIME OF SISLOP AND
	12.7.05.03.2	125VDC BUS \$1 SB LOADS	72-137 {BRBARER}	CLOSED	BREATER WILL NOT TRIP IF REQUIRED TO ISOLATE INPUT FAULT ON INVERTER \$3	PRRIODIC TRSTING	MONE ERGUIERD	NOMB	RE-ENERGIZING MCC-2 PROM TRAIN  B DG  NORMAL POSITION. THIS PAILURE  PLUS FAULT DURING BIS7SISLOP  IS A DOUBLE PAILURE SCENARIO  WHICH IS OUTSIDE THE PLANT
	12.7.05.04.1	125VDC BUS \$1 SR LOADS	72-131 {BREARER}	OPBN	LOSS OF INVERTER FOR VITAL/REGULATED BUS \$4, CAUSING AUTO-TRANSPER TO BACEUP SOURCE (MCC-2 VIA MANUAL TRANSFER SWITCE \$7)	CONTROL ROOM ANNUNCIATION, LOCAL INDICATION	NORE BEGUISED	AONB	DESICM BASIS  *TECH SPEC ACTION BUTRY  REQUIRED IF VITAL BUS NOT  EMBEGIZED FROM INVERTEE. MAY  ALSO RESULT IN INTERRUPTION OF  VITAL/REGULATED BUS \$4 LOADS
	12.7.05.04.2	125VDC BUS #1 TSB LOADS	72-131 (BBBAESE)	CLOSED	BSBARBE WILL HOT TRIP IF BSGUIRSD TO ISOLATE IMPUT FAULT ON INVSBIRE 43	PBRIODIC TESTING	NONE BEGALEED	HOMB	BRTWREN TIME OF SISLOF AND  BR-BNBRGIZING MCC-2 FROM TRAIN  B DG  NORMAL POSITION. THIS PAILURE  PLUS FAULT DURING SIS/SISLOP  IS A DOUBLE FAILURE SCENARIO
		125VDC BUS #1 SR LOADS	72-103 (BSBARBR)	OPBN	LOSS OF 125VDC CONTROL POWER TO 4kV BUS \$1A, 1B, 1C, PREVENTING TRIP OR CLOSE OF ANY TIB, PERDER OR LOAD	CONTROL BOOM ENDICATION	NOME FOR SIS/SISLOP. ALT OR DEDICATED SEUTDOWN FOR NOW-SIS/SISLOP EVENTS	TO 4 EV ROOM PIRE OR LOSS OF	#HICH IS OUTSIDE THE PLANT DESIGN BASIS #SEB ITEMS 1.1.3.10.1, 1.1.6.15.1, 1.1.11.4.1, 1.1.12.4.1, 2.1.6.14.1,
					BERAKE ON THESE BUSSES. ALSO RESULTS IN BUS HIC UNDBRYOLTAGE SIGNAL TO TRAIN B SEQ 2 LOP/SISLOP LOGIC			COMMON-CAUSE FAULT OF NON-EQ RCP NOTORS PRO BY MAIN GRW/A/B-IPHR* W/ LOSS OF BUS \$1A/18 CONTROL POWER. BISLOP LOGIC BECOMES 1/2 ON BUS \$2C	8.3.1.7.1, 10.1.2.5.1, 12.1.2.4.1, 12.1.3.8.1, 12.1.4.8.1, 12.1.5.7.1, 12.1.7.12.1, 12.1.9.2.1, 12.1.10.6.1, 12.1.12.8.1, 12.2.5.7.1. B/U PRIBERATION
	12.7.05.05.2	125VDC BUS #1 SR LOADS	72-103 (BRBAESE)	CLOSED	SERR WILL NOT TRIP IF REQUIRED TO ISOLATE INPUT PAULT ON 41V BUS \$1A/18/1C CONTROL BUS	PBBLODIC TESTING	NOME BEGUIRED	NOME	O/C PROTECT REQD FOR RCP HOTORS HOBBAL POSITION. THIS FAILURE PLUS FAULT DURING SIS/SISLOP IS A DOUBLE FAILURE SCREARIO
·	12.7.05.06.1	SB LOADS	72-112 (BEBARER)	OPBN		CONTROL BOOM INDICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A. REDUCED REDUNDARCT FOR RE-EMERGIZING (800 SNGR #) POST-SIS/SISLOP	OUTSIDE THE PLANT DESIGN BASIS  SBE ITEMS 2.1.3.6.1,  5.1.3.6.1, 6.1.3.11.1,  7.1.3.12.1, 12.3.1.7.1,  12.3.2.10.1. LOCAL OPERATOR
***					AND LOSS OF TRAIN A 480V SWGR #1 UV AND FAULT PROTECTION. MCC'S UNAPPECTED FOR SIS, BNTIRE TRAIN LOST DUE TO BUS/DG OVLD FOR SISLOP				ACTION REQUIRED TO THE BRANCE SWOR #3 IF FAILURE OCCURS BEFORE BERE 52-1103 CAN BE OPENED AND WSE LOADS STRIPPED

SYSTEM SINGLE FAILURS ANALYSIS
SAN ONOPER UNIT 1
TABLE 12-1: POWER DISTRIBUTION SYSTEM FMBA

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, !	LIBH 1	DEATCR ID	COMPONENT ID	FAILURB MOD3	LOCAL BFFBCTS AND DEPENDENT FAILURES	MBTHOD OP DBTECTION	INHBBENT COMPENSATING PROVISIONS	BPPBCT ON BCCS	BEMARES
	12.7.05.06.2	125VDC BUS #1 SB LOADS	72-112 (BREAESE)	CLOSED	BRBABBR WILL NOT TRIP IF BRQUIRBD TO ISOLATE INPUT FAULT ON 480V SWGR &I CONTROL	PBRIODIC TESTING	NONE BEQUIRED	NOMB	NORMAL POSITION. THIS FAILURB PLUS FAULT DURING SIS/SISLOP IS A DOUBLE FAILURE SCENARIO
٠.					BUS				WHICH IS OUTSIDE THE PLANT DESIGN BASIS
	12.7.05.07.1	125VDC BUS \$1 SR LOADS	72-105 72-114	OPEN	LOSS OF 125VDC CONTROL POWER TO TRAIN A DG #1	CONTROL ROOM ANNUNCIATION	REDUNDANT TRAIN FOR SISLOP, NOME REQUIRED FOR SIS	INOPERABILITY OF TRAIN A FOR SISLOP, NONE FOR SIS	988 1788 10.1.1.8.1
			72-119 72-126		BICITER/FIBLD, LOCAL PANEL (RIGHT AND LEFT PEED), OR FUEL		NAME PROGRESS LOW OFF	WIJDOF, WORD FOR GIL	
		125VDC BUS #1 SR LOADS	(BRBARBRS) 12-105 12-114	CLOSED	OIL STANDBY PUMP BREAKER(S) WILL NOT TRIP IF REQUIRED TO ISOLATE FAULT	PBRIODIC TESTING	NONE BEONIESD	NOMB	MORMAL POSITION. THIS FAILURE PLUS IMPUT FAULT DURING
			12-119 12-126	••	00 00 00 00 00 00 00 00 00 00 00 00 00				SIS/SISLOP IS A DOUBLE FAILURE SCHWARIO WHICH IS OUTSIDE THE
	12.7.05.08.1	125VDC BUS #1	(BBBARBRS) 72-116	OPBH	LOSS OF TRAIN A 125VDC CONTROL	CONTROL ROOM INDICATION	REDUNDANT TRAIN	REDUCED REDUNDANCY FOR	PLANT DESIGN BASIS *SBE ITEMS 6.3.3.11.1,
		SR LOADS	(BBBAEBB)		POWER TO 480V SWGR #3			RE-EMBRGIZING 480V SWGR #3 POST-818/818LOP	7.3.3.7.1, 12.6.8.5.1. TECH SPEC ACTION BETRY REQUIRED
,								togt-offalatorot	WITE BEER IN THIS POSITION
		125VDC BUS #1 SR LOADS	72-116 (BBBAKBR)	CLOSED	BRBAKBR WILL NOT TRIP IP REQUIRED TO ISOLATE FAULT	PERIODIC TESTING	NOME BEQUIRED	NONB	NORMAL POSITION. THIS PAILURE PLUS FAULT DURING SIS/SISLOP
		on contro	(Dinage)		BEAGLESS IN CAMPULE LANDS				HEIGH BASIS  DOUBLE PAILURE SCENARIO WHICH IS OUTSIDE THE PLANT DESIGN BASIS
		125VDC BUS #1 SR LOADS	72-118 (BREAKSE)	OPBN	LOSS OF 125VDC CONTROL POWER TO 480V SWGR #1/MCC SISLOP	PERIODIC TESTING	NONE FOR SISLOP, MONE REQUIRED FOR SIS. REDUNDANT MAIN IPMR	POTENTIAL INOP OF TRAIN A POR	SBB ITBM 12.3.09.11.1. RCPs ALSO LOST, UNAVAILABLE FOR
		33 COADS	(OMERESS)		LOCKOUT BELATS, DISABLING SEQ		COOLING FOR ALT OFFSITE SOURCE		SCTR. MAIN IPHR BAS 2 TRAINS
• • •					AI SISLOP TRIP/LOCKOUT OF WSR Loads			OVERLOAD, W/ POTENTIAL INOP OF TRAIN B DUE TO: UNISOLABLE CCW FLOW BYPASS, LOSS OF LO-LO EWST	
.				•		. , , ,,,,,,,,,,,,,,,,,,,,,,,,,,		LEVEL TRIP OF TRAIN A SI/FW. REDUCED RELIABILITY OF ALT OPPSITE SOURCE	
		125VDC BUS #1	72-118 (BRBAEBE)	CLOSED	BREASBR WILL NOT TRIP IP BEQUIRED TO ISOLATE PAULT	PBBEODIC TRSTING	NOME BEGULEED	NONE	MORMAL POSITION. THIS PAILURE PLUS PAULT DURING SIS/SISLOP IS A DOUBLE PAILURE SCHWARIO
, ]	12 2 05 10 1	125VDC BUS #1	72-121	OPBN	LOSS OF 125VDC CONTROL POWER	CONTROL DOOM INDICATION	NONE REQUIRED	NOMB	WHICH IS OUTSIDE THE PLANT DESIGN BASIS
		SE LOADS	(BBSARBR)		TO CHEMICAL CONTROL BOARD, INCLUDING SOLENOID CONTROL VALVE (3V-84), CAUSING CLOSURE		WANT BRANTERN	5V50	SER ITEM 4.3.7.6.1. VALVE SAPETY PUNCTION IS PAIL-CLOSED
		125VDC BUS #1	12-121	CLESED	OP S/C BLOWDOWN ISOLATION  VALUES CV-100, 100A, 100B  BRBAKBS WILL NOT TRIP IF	PBBIODIC TESTING	HONE REQUIRED	MONE	NORMAL POSITION. BREAKER IS
r		SR LOADS	(BREAZER)		REQUIRED TO ISOLATE COMMON-CAUSE PAULT				iocpeso.49(b)(2) isolation device for non-qualipied loads on this peeder

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ITEN #	DEVICE ID	COMPONENT ID	FAILURS MODE	LOCAL BFFECTS AND DBPBNDENT FAILURBS	METHOD OF DETECTION	INUBERBUT COMPRUSATING PROVISIONS	EPPBCT ON BCCS	BEMARES
12.7.05.11.1	125VDC BUS #1 SR LOADS	72-122 (99EAEBR)	OPEN	LOSS OF 125VDC CONTROL POWER TO TRAIN A HYDRAZINE ADDITION SYSTEM ISOLATION VALUE SV-600,		BBDUNDANT TRAIN	INOPBRABILITY OF TRAIN A CONTAINMENT SPRAY BYDRAZINE ADDITION SYSTEM	SB3 ITBM 5.1.7.4.1. CONTAINMENT ISOLATION VALVE SAPETT PUNCTION IS PAIL-CLOSED
				CONTAINMENT ISOLATION VALVES CV-537, CV-533, CAUSING VALVES TO PAIL CLOSED				
12.7.05.11.2	TZ5VOC BUS 11 SR LOADS	72-122 (BRBAEBR)	CLOSED	BRBARBR WILL NOT TRIP IF REQUIRED TO ISOLATE COMMON-CAUSE PAULT	PREIODIC TESTING	NOME REQUIRED	NONB	NORMAL POSITION. SEPARATE 10CFR50.49(b)(2) PUSES PROVIDED TO ISOLATE
								NON-QUALIFIED LOADS FROM THIS FREDER (RG. 84-600, WHICH IS ONLY QUALIFIED FOR 2 BRS
12.1.05.12.1	125 VDC BUS #1 SR LOADS	72-123 (BRBAEBR)	OPBN	LOSS OF 125YDC CONTROL POWER TO TRAIN A SAFETT INJECTION	CONTROL ROOM ENDICATION	MONE BEGNIESD	NOMB	POST-LOCA) SEE ITEM 1.4.12.6.1. VALVES SAFETY PUNCTION IS FAIL-CLOSED
				BRADER VENT ISOLATION VALVES SV-702B AND D. CAUSING VALVES TO PAIL CLOSED				
12.7.05.12.2	SR LOADS	72-123 (BRBAKB2)	CLOSED	BRBARRR WILL NOT TRIP TF	PRRIODIC TRATING	NONE REGULERO	NONB	NORMAL POSITION. THIS FAILURB PLUS FAULT DURING SIS/SISLOP IS A DOUBLE FAILURB SCENARIO
12.7.05.13.1	125VDC BUS #1	72-124	OPBN	LOSS OF 125VDC CONTROL POWER	CONTROL ROOM INDICATION	REDUNDANT TRAIN FOR IMJECTION,	INOPERABILITY OF TRAIN A FOR	WHICH IS OUTSIDE THE PLANT DESIGN BASIS SEE ITEM 8.1.12.1.1. SEQ
	SB LOADS	(BBBARBE)		TO SEG \$1, DISABLING TRAIN A ECCS ACTUATION, INCLUDING CONTAINMENT SPRAY ACTUATION		NOWE REQUIEED FOR RECIEC	INJECTION, NOWE FOR RECIRC	OUTPUT EBLAYS ARE EMERGIZE TO ACTUATE. SEQ MORMALLY BLOCERD/RESET AS PART OF
			•	AND DG AUTO-START				RECIEC ENTRY. TREREFORE, MANUAL ACTUATION OF BREAKLERS AND CONTROL OF LOADS CAN BE
12.7.05.13.2	125VDC BUS \$1 SR LOADS	T2-124 (BRBAKER)	CLOSED	BBBARRR WILL NOT TRIP IP BBQUIRBD TO ISOLATR PAULT	PBRIODIC TESTING	NONE BEGUIEED	NONS	CREDITED FOR BECIEC HORMAL POSITION. THIS FAILURE PLUS FAULT DURING SIS/SISLOP
								IS A DOUBLE FAILURE SCREARIO WEICH IS OUTSIDE THE PLANT DESIGN BASIS
T12:7705714.1	SE LOADS	72-128 (888ABB)	OPBN	LOSS OF TRAIN A 125VDC CONTROL POWER TO MAIN STEAM DUMP SYSTEM, RESULTING IN	CONTROL BOOM INDICATION	NORE REQUIRED	BCNB	
				INOPERABILITY OF PAST-OPENING MODE. NORMAL CONTROL MODE AND CONTROL PROM REMOTE SHUTDOWN				
12.7.05.14.2	125VDC BUS #1 SB LOADS	72-129 (BBBAHER)	CFOSBO	PANEL (C-38) UNAPPECTED BEARER WILL NOT TRIP IF BEQUISED TO ISOLATE COMMON-CAUSE FAULT	PBBIODIC TESTING	NONE FOR CCW FLOW BYPASS.  REPAIRS OR ADDITIONAL DG FUBL  FOR C-IFHE RELATED (SIS)LOP	POTENTIAL INOP OF TRAIN A WITH POTENTIAL INOP OF TRAIN B DUB TO: UNISOLABLE CCW FLOW BYPASS" AND INABILITY TO TRANSPER FROM	SOLENOIDS NOT BQ. TECH SPEC ACTION BHTRY REQUIVETE THES
							DG TO OPFSITE SOURCE WTH C-IFME RELATED (SIS)LOP, LOSS OF LO-LG RWST LEVEL TRIP CAPABILITY FOR TRAIN A SI/FW	

13.2%; 13.2%;

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	l DEV	ICE ID	COMPONENT ID	FAILURB MODE	LOCAL BFFBCTS AND DBPBND3NT FAILUBES	METHOD OF Detection	INHERENT COMPENSATING PROVISIONS	BPPECT ON BCCS	REMARES
1217705	.15.1 TZ5VDC SR LOAD		72-130 (888AKSR)	Opbn	LOSS OF 125VDC CONTROL POWER TO TRAIN A SI AND MEM	CONTROL BOOK INDICATION	RECONCANT TRATE	INOPBRABICITY OF TRAIN A SIZEM	SBE TIBES 1.1.4.7.1, 1.1.5.6.1, 1.1.7.5.1,
<u>.                                    </u>					ISOLATION VALVES INCLUDING BV-851/2/3/48, NOV-8508, PCV-1112 (SV-1112 ONLT), PCV-456, CV-142/3/4 (TRAIN A			SECONDARY RECIRC, REDUCED  REGURDANCY FOR MFW ISOLATION	1.1.8.3.1, 1.1.9.4.1, 1.4.9.3.1, 2.4.9.7.1, 2.4.28.5.1, 3.1.4.7.1, 4.3.6.3.1. CHARGING PUMP PLOW
				•.	SV ONLY). VALVES PAIL TO MORMAL OPERATING POSITIONS				NOT CREDITED FOR INJECTION, SV-1112 NORMALLY DE-EMBRGIZED VIA OVERRIDE FOR CLR, ELB PUNCTIONS
12.7.05	.15.2 125VDC SR LOAD		72-130 (BRBAEER)	CLOSBD	BRBATER WILL NOT TRIP IP REQUIRED TO ISOLATE PAULT	PBRIODIC TRSTING	NORS ESONIESD	NOMB	NORMAL POSITION. THIS PAILURE PLUS PAULT DURING SIS/SISLOP IS A DOUBLE PAILURE SCHARIO
12.7.05	16.1"125VDC" SR LOAD	-	72-133 (BRBAEER)	OPBN	LOSS OF TRAIN A 125 VDC CONTROL	PRRIODIC TESTING	NONE BRÉGIESED	HONE	WHICH IS OUTSIDE THE PLANT DESIGN BASIS REACTOR TEIP WORNALLY OCCURS
<u></u>					POWER TO MIS COINCIDENTOR, RESULTING IN REACTOR TRIP AND ROD STOP SIGNALS				POR SIS/SISLOP EVENTS ON LOW PRESSURIZER PRESSURE (SPS OR SEQ) OS HIGH CONTAINMENT
12.7.05	16.2 125VDC SR LOAD		72-134 (BREAKER)	CLOSED	BRBAKER WILL NOT TRIP IP REQUIRED TO ISOLATE FAULT	PERIODIC TESTING	NONE BEGUIDED	NONB	PRESSURE (SEQ ONLY) HORMAL POSITION: THIS PAILURE PLUS FAULT DURING HIS/HISLOP IS A DOUBLE PAILURE SCRNARIO
12.7.05.	17.1 125VDC 1 SR LOAD		72-141 (BRBAKBR)	OPEN	LOSS OF 125VDC POWER TO	PBRIODIC TESTING	Caainbar akon	NOMB	WBICH IS OUTSIDE THE PLANT DESIGN BASIS BEACTOR TRIP MORNALLY OCCURS
			(000,000)		CONTROL ROD SYSTEM AND SCRAM BREAKERS, RESULTING IN SCRAM BREAKER UNDERVOLTAGE TRIP				POR SIS/SISLOP BYENTS ON LOW PRESSURIZER PRESSURE (RPS OR SEQ) OR RIGH CONTAINMENT PRESSURE (SEQ ONLT)
<u> </u>  -	17:2 TI25VDC   SR LOAD	Ì	(BRBARRS)	CLOSED	BREAKER WILL NOT TRIP IF REQUIRED TO ISOLATE FAULTS	PBBIODIC TESTING	NONE BECOTSED	HORB	SCRAM BERARDERS TO ISOLATE THE CONTROL ROD MECHANISMS
12.7.06:	0171 125VDC 1 NSR LOAD		72-111 72-113	OPEN	LOSS OF 125VDC POWER TO TURBINE CONTROL AND PROTECTION (INCLUDING ALL NON-RECHANICAL	CONTROL ROOM INDICATION	POR SISLOP	LOSS OF TURBING TRIP CAPABILITY FOR SIS EVENTS, RESULTING IN BICESS STEAM	ETURBINE TRIP VALVE IS EMBRGIZE TO ACTUATE. REAMALTSIS OF APPECTED
			(BEBAEBES)		TRIPS), BRHBATER STRAN DUMP. TURBINE MECHANICAL TRIPS (INCLUDING OVERSPEED) ARE UNAFFECTED			BRBAE) CONCURRENT WITH SOLOCA OR SCIE. NOME FOR SISLOP DUE TO	
· · · · · · · · · · · · · · · · · · ·									BB CLOSED LOCALLY IF PERMITTED  BY RADIOLOGICAL CONDITIONS.  DIVERSE TURBINE TRIP TO BE  ADDED BY DCP 1-1407
12.7.06.	01.2 125VDC E NSB LOAD		72-101 72-111 72-113	CLOSED	BREARBR WILL NOT TRIP IF REQUIRED TO ISOLATE COMMON-CAUSE FAULT, RESULTING	PBRIODIC TESTING	NOME FOR CCW FLOW STPASS, ADDITIONAL DG FUEL OR REPAIRS FOR C-IPME RELATED (SIS)LOP	SPOTENTIAL INOP OF TRAIN A WITH	*CONFIGURATION DOBS NOT MEET R.G. 1.75 OR IESE 386 CRITERIA
			(BREAKERS)		IN LOSS OF 125VDC BUS #1			AND INABILITY TO TRANSPRE FROM DG TO OPPSITE SOURCE WITH C-XFH2 BELATED (SISJLOP, LOSS	
						•		OF LO-LO BUST LEVEL TRIP CAPABILITY FOR TRAIN A SI/FW	

### SAN ONOFRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION STSTEM FHRA

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	item 1	DBAICE TO	COMPONENT 10	FAILURB MODE	LOCAL BFFBCTS AND DEPENDENT FAILURES	NETHED OF DETECTION	INHERBUT COMPRUSATING PROVISIONS	BPFBCT ON BCCS	
	12.7.06.02.1	125VDC BUS 41 NSR LOADS	72-108 72-109	OP3N	LOSS OF 125VDC POWER TO MAIN GENERATOR CONTROL AND	CONTROL BOOM INDICATION	NOME REQUIRED FOR SIS, ADDITIONAL DG PUBL OR REPAIRS	*LOSS OF ALTERNATE OFFSITE SOURCE FOR BOTH TRAINS,	USBE ITEM 12.9.8.1.1. VERIF BERD THAT LOSS OF H2 CHTL DOES
			72-115 (BRBARBRS)		PROTECTION, MAIN/A/B-IFHR PROTECTION		POR C-IPMR RELATED (SIS)LOP.	RESULTING IN POTENTIAL	NOT CAUSE LOSS OF NEARBY ECCS
:			(000000)		LEGIECTION		ALT OR DEDICATED SHUTDOWN POR NOW-SIS/SISLOP EVENTS AS PER UPHA	LONG-TERM INOPERABILITY DUE TO INABILITY TO TRANSPER PROM DG: TO OPPRITE SOURCE POR SISLOP	EQUIP AND CABLING (INCL MOV-358/85OC INVERTER, MFM PUMPS) VIA FIRE OR BIPLOSION.
i i								BYBNT INVOLVING C-IPHE RELATED	SEPARATE 220kV BREE AND RCP
<u> </u>	12 2 05 03 4	195450 Dug 41	~	77.7				LOP	O/C TRIPS PREVENT PROPAGATION OF CONHON-CAUSE FAULTS
, <u>-</u>		125VDC BUS \$1 MSR LOADS	72-108 72-109 72-115	CLOSED	(SAMB AS 12.7.6.1.2)	PRRIODIC TESTING	(SAMB AS 12.7.6.1.2)	*(8AMB AS 12.7.6.1.2)	*{SAMB AS 12.7.6.1.2}
.1	57 7 NS N1 1	125VDC BUS #1	(BBBAKBBS)	OPBM	LOCG OR 195URG BOURS TO	CANADAL DAAN AND CANADAN			
.!	12.1.00.03.1	MSR LOADS	VIOLE	UPBN .	LOSS OF 125VDC POWER TO REACTOR PLANT OR TURBINE PLANT	CONTROL BOOM INDICATION	NONE REQUIRED FOR 313, REPAIRS OR ADDITIONAL DG FUEL FOR		88B ITBMS 6.4.8.5.1,
					ANNUNCIATORS (72-104, 102),			SOURCE FOR BOTH TRAINS, RESULTING IN INABILITY TO	12.9.7.3.1. HOTOR OPERATED DISCONNECT SWITCH CAN BE
•					RCP THERMAL BARRIER PUMP		• •	TRANSFER FROM DGs TO OFFSITE	OPERATED MANUALLY VIA LOCAL
	· ·	·			(72-120), MOTOR OPBRATED			FOR C-IPME RELATED (SIS)LOP	HAND-CRANK, BUT INTERLOCK FROM
					DISCONNECT SWITCH (12-132) AND OTHER MISCELLANBOUS LOADS				PAILED RELAYS WILL STILL BLOCK
	12.7.06.03.2	125VDC BUS #1	OTHER	CLOSED	(SAME AS 12.7.6.1.2)	PBRIODIC TESTING	(SAME AS 12.7.6.1.2)	*(SAME AS 12.7.6.1.2)	RECLOSING OP SWYD BRERS *(SAMB AS 12.7.6.1.2)
	·· •• ······ •• ··	NSR LOADS					(10000 00 12.1.0.1.6)	- CARD AS IL.I.G.I.L.	*(3AD A3 12.1.0.1.2)
	19 8 63 61 1	latung ang sa	CULDARD	Lubum annu					
		125VDC BUS #2 BATTERY CHARGER	CHARGER	INPUT OPBN	LOSS OF 1 OF 2 FULL CAPACITY CHARGERS FOR DC BUS 12	CONTROL BOOM AND DG LOCAL PANBL ANNUNCIATION, LOCAL		REDUCED RELIABILITY OF TRAIN B	
		SBT C			CHARGERS FOR DC BOS \$5	INDICATION		125 VDC CONTROL POWER	VOLTAGE WITH CHARGER &C IN SERVICE. REDUNDANT CHARGER
!						Indication .			MUST BE MANUALLY ALIGNED.
•									BATTERY DUTY CTCLE ()90 HIN)
									IS GREATER THAN 30 MIN TO
									PREMIT CREDIT FOR THIS
,									OPERATOR ACTION OUTSIDE THE CONTROL ROOM
·		125VDC 8US #2	CHARGES	INPUT SHORT	480V BRIR 52-12830 TRIPS TO	CONTROL ROOM AND LOCAL	(SAMB AS 12.8.1.1.1)	(SAME AS 12.8.1.1.1)	
		BÁTTBÍR CHÁRGER ' Srt c			PROTECT MCC-2B. BESULTS IN	INDICATION, ANNUNCIATION AT DG			
		381 0			LOSS OF 1 OF 2 FULL CAPACITY CHARGERS FOR DC BUS #2	LOCAL PANEL			
	12.8.01.01.1	125VDC BUS 12	CHARGER	EDIR STLOV TUTTUÖ	RESULTS IN HIGHBR THAN ASSUMBD	LOCAL INDICATION AND ALARM	BEDUNDANT TRAIN	POTENTIAL INOPERABILITY OF	*CONDITION LIMITED BY CHARGER
		BATTERY CHARGER			VOLTAGE FOR TRAIN B 125VDC			TRAIN B 125VDC LOADS DUB TO	HI-VOLTS SHUTDOWN, VERIF REQU
• • • • • • • • • • • • • • • • • • • •		SBT C			LOADS	4.00° - 100.44 - 11- 11 - 11- 11- 11- 11- 11- 11- 11		LOSS OF QUALIFIED LIFE	THAT BQ FOR 125VDC LOADS
									BOUNDS THIS CONDITION (AG.
									BQUALIZING CHARGE FOR BATTERY
				-	t the second of				BANK). PAILURB DORS NOT IMPACT TRAIN B VITAL BUS 5, 6 OR CSAS
i							•		INVERTERS DUE TO VOLTAGE
:					2 18 1.19				REGULATING CAPABILITY

# BMBBGBNCY COBB CO SAN ONOFRE UNIT 1 . TABLE 12-1: POWER DISTRIBUTION SYSTEM PHSA

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1188 1	DEALCH ID	CCMPONENT ID	FAILURB MODS	LOCAL REPECTS AND DEPENDENT FAILURES	MRTHOD OF DBTBCTION	INHERENT COMPENSATING PROVISIONS	BPFBCT ON BCCS	REMARKS
	125VDC BUS \$2 BATTERY CHARGER SET C		OUTPUT VOLTS LÓW	(SAMB AS 12.8.1.1.1)	CONTROL ROOM AND DG LOCAL PANEL ANNUNCIATION, LOCAL INDICATION	(SAME AS 12.8.1.1.1)	(SAME AS 12.8.1.1.1)	{SAMB AS 12.8.1.1.1}
12.8.01.01.5	125VDC BUS \$2 BATTBRY CHARGER SET C	CHARGER	OUTPUT SHORT	BATTERY CHARGER CURRENT-LIMITS, OUTPUT BRER TRIPS TO CLEAR PAULT FROM BUS,	CONTROL ROOM AND DG LOCAL PANBL ANNUNCIATION, LOCAL INDICATION	(SAMB AS 12.8.1.1.1)	(SAMB AS 12.8.1.1.1)	(SAMB AS 12.8.1.1.1)
		··· ———		RESULTING IN LOSS OF 1 OF 2 FULL CAPACITY CHARGERS FOR 125VDC BUS \$2				
	125VDC BUS #2 BATTERY CHARGER SET C	(BREAKER)	(TRIPPED)	(SAMB AS 12.8.1.1.1)	CONTECT ROOM AND DG LOCAL PANEL ANNUNCIATION, LOCAL INDICATION	(SAMB AS 12.0.1.1.1)	(SAME AS 12.0.1.1.1)	(SANE AS 12.8.1.1.1) CHARGER SET C OUTPUT BREE ON 125 VDC BUS \$2
12.8.01.02.2	125VDC BUS \$2 BATTERY CHARGER SET C		CLOSED	BREATER WILL NOT TRIP TO REMOVE CHARGER &C PROM SERVICE OR TO CLEAR FAULT BETWEEN	PRRIODIC TRATING	MOMB BEGAIRED	NONB	THIS FAILURE PLUS CEGR OUTPUT PAULT DURING SIS/SISLOP IS A DOUBLE FAILURE SCENARIO
				CHARGER OUTPUT AND BREAKER				OUTSIDE THE PLANT DESIGN BASIS. BREE TRIP NOT REGD FOR FAULT ON BUS SIDE OF BREE
								SINCE CEGE WILL CURRENT-LIMIT AND BATTERT DORS NOT FEED PAULT TEROUGE THIS PATH
	125VDC BUS \$2 BATTERY CHARGER	CHARGER	INPUT OPEN	LOSS OF 1 OF 2 FULL CAPACITY CHARGERS FOR DC BUS \$2	CONTROL BOOM AND DG LOCAL PANEL ANNUNCIATION, LOCAL	BEDUNDANT CHARGER	REDUCED RELIABILITY OF TRAIN B 125VDC CONTROL POWER	ANNUNCIATION OCCURS ON LOW BUS VOLTAGE WITH CHARGER #D IN
	SET D				INDICATION		-	SBRVICE. REDUNDANT CHARGER HUST BE MANUALLY ALIGNED. BATTERY DUTY CYCLE ()90 MIM)
								IS CREATER THAN 30 MIN TO PERMIT CREDIT FOR THIS OPERATOR ACTION OUTSIDE
	125VDC BUS #2 BATTERY CHARGER	CHARGER	INPUT SHORT	480V BRER 52-12826 TREPS TO PROTECT MCC-28. RESULTS IN	CONTROL BOOM AND LOCAL INDICATION AT D	(SAMB AS 12.8.2.1.1)	{SAMB AS 12.8.2.1.1}	CONTROL ROOM
	SET D	CHARGER	OUTPUT VOLTS BIGH	LOSS OF 1"OF 2 PULL CAPACITY CHARGES FOR DC BUS \$2 RESULTS IN BIGHER THAN ASSUMED			BOSDUSTAL THORPOLOGICASE OF	ACOUNT STORY AT A STORY OF AN A DOCUMENT
	BATTERY CHARCER"	CERTOR	OUTFOI TOUIS BLUB	VOLTAGE POR TRAIN B 125VDC LOADS	LOCAL INVICATION AND ALASH	EBDUNDANT TRAIN	POTENTIAL INOPERABILITY OF TRAIN B 125 FDC LOADS DUB TO LOSS OF QUALIFIED LIFE	*CONDITION LIMITED BY CHARGER HI-VOLTS SHUTDOWN, VRRIF ERAD THAT BY FOR 125 VDC LOADS BOUNDS THIS CONDITION (BG.
			•					BQUALIZING CHARGE FOR BATTERY BANE). FAILURE DORS NOT IMPACT TRAIN B VITAL BUS 5, 6 OR CSAS
					•			INVERTERS DUE TO VOLTAGE REGULATING CAPABILITY
	125VDC BUS #2 BATTERY CHARGER SET D	CHARGER	OUTPUT VOLTS LOW	{SAMB AS 12.8.2.1.1}	CONTROL BOOM AND DG LOCAL PANEL ANNUNCLATION, LOCAL INDICATION	(SAMB AS 12.8.2.1.1)	(SARE AS 12.8.2.1.1)	(SAMB AS 12.8.2.1.1)

### EMESTERMOY CORE CO TO THE TERM SINGLE FAILURE ANALYSIS SAN UNOPRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION SYSTEM FREA

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	LTEN A	DEALCR TO	COMPONENT 1D	FAILURB MODS	LOCAL BFFBCTS AND DBPBNDSNT FAILURBS	MSTHOD OF DBTBCTION	INHERBUT COMPENSATING PROVISIONS	BFFBCT ON BCC3	REMARKS
			*						
12.		125VDC BUS \$2 BATTERF CHARGER SET D	CHÁRGBR.	OUTPUT SHORT	BATTERY CHARGER CURRENT-LIMITS, OUTPUT BREE TRIPS TO CLEAR FAULT FROM BUS, RESULTING IN LOSS OF 1 OF 2	CONTROL ROOM AND DG LOCAL PAMBL ANNUNCIATION, LOCAL INDICATION	(SAMB AS 12.8.2.1.1)	(SANE AS 12.8.2.1.1)	(SAMB AS 12.8.2.1.1)
!		,			PULL CAPACITY CHARGERS FOR 125VDC BUS \$2				
		125VDC BUS #Z BATTERY CHARGER SET D	(BRBARBR)	(TRIPPED)	(SAHB AS 12.0.2.171)	CONTROL ROOM AND DC COCAL PANEL ANNUNCIATION, LOCAL INDICATION	(SANR AS 12.8.2.1.1)	(SAME AS 12.8.Z.1.1)	(SAME AS 12.8.2.1.1) CHARGER SET D OUTPUT BREAKER ON 125VDC BUS 42
12.		125VDC BUS \$2 BATTBRT CHARGER SET D		CLOSBO	REMOVE CHARGER AD PROM SERVICE OR TO CLEAR PAULT BETWEEN	PBRIODIC TESTING	NONE BESTIERD	, NORE	THIS FAILURE PLUS CAGE OUTPUT FAULT DURING BIS/SISLOP IS A DOUBLE FAILURE SCENASIO
					CHARGER OUTPUT AND BREARER				OUTSIDE THE PLANT DESIGN BASIS. BREE TEIP NOT REQD FOR FAULT ON BUS SIDE OF BREE
· · ·									SIRCE CHER WILL CURRENT-LIMIT AND BATTERY WOULD NOT FEED FAULT TEROUGE THIS PATH
12.		125VDC BATTBRY BANE #2		OUTPUT VOLTS LOW	CHARGER IN SERVICE. LOSS OF	PBRIODIC TESTING	NONE REQUIRED FOR SIS, REDUNDANT TRAIN FOR SISLOP	INOPERABILITY OF TRAIN B FOR SISLOP, NOWE FOR SIS	FAILURE WOULD OWLY HAVE INDICATED REPECTS BRIVERN
	***************************************				125VDC BUS \$2 LOADS DURING SISLOP BYBNT OR OTHER INTERRUPTION OF PULL CAPACITY				SISCOP AND DG BREE CLOSURE, SINCE CHARGER WOULD SUPPLY DC BUS \$2 VOLTAGE AT ALL OTHER
12.	.8.03.01.2	125VDC BATTERY		OUTPUT SHORT	CHARGING, INCLUDING DG \$2; TRAIN B BCCS LOADS LOSS OF 125VDC BUS \$2, DUB TO	CONTROL ROOM AND DG LOCAL	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B FOR	TIMES OUTPUT BREE WILL NOT TRIP ON
		DANE \$2	···· ····			PANBL ANNUNCIATION, LOCAL INDICATION		SIS AND SISLOP	OVERCURBENT WITE THIS PAULT, SINCE ONLY BATTERY CHER WOULD SUPPLY PAULT THROUGH THIS
									PATH, AND CHER CURRENT-LINIT IS INSUFFICIENT TO CAUSE BREE TRIP
12.		125VDC BATTERY BANE #2	72-201 (BRBAEER)	OPEN	(SAME AS 12.8.3.1.1)	PEBLODIC TESTING	(SAME AS 12.8.3.1.1)	(SAMB AS 12.8.3.1.1)	(SAME AS 12.8.3.1.1)
12.		125VDC BATTERY BANK #2		CLOSED	BREAKER WILL NOT TRIP IS REQUIRED TO ISOLATE BUS PAULT	PBRIODIC TESTING	NORE REQUIRED	NORE	THIS FAILUBE PLUS FAULT DURING SIS/SIGLOP IS A DOUBLE FAILUBE SCHWARIO WHICH IS OUTSIDE THE PLANT DESIGN BASIS
12.		125VDC BUS #2 SBUNT		OPBN	LOSS OF 125VDC BUS #2	CONTROL ROOM AND DG LOCAL PANEL ANNUNCIATION, LOCAL INDICATION	(SAME AS 12.8.3.1.2)	(SAMB AS 12.0.3.1.2)	THE POSTUR DATES
12.		125VDC BUS #2 SBUNT		SHORT	LOSS OF 125VDC BUS \$2 AMPS INDICATION	LOCAL INDICATION	NONE BEGNIEED	NONB	

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	# M2T1	DBVICE ID	OI THZHOGHOO	FAILURE MODE	LOCAL BFFBCTS AND DBPBNDBNT FAILUBBS	MSTHOD OF Detection	INHERENT COMPENSATING PROVISIONS	BFFBCT ON BCCS	REMARIS
		125 VDC BUS 12 SEUNT	······································	GROUNĎ	125VOC BUS #2 POSITIVE OR NEGATIVE POLE BECOMES GROUNDED	CONTROL ROOM AND DG LOCAL PANBL ANNUNCIATION, LOCAL INDICATION	NOM3 BEQUIRED	NONE	*BOUNDS GROUND OF ANT OTHER 125VDC BUS \$2 DEVICE. T/S ACTION ENTRY REQD FOR THIS
									COMDITION, SINCE A SECOND COMMON-CAUSE GROUND OF NON-EQ LOADS COULD DISABLE 125VDC BUS \$2 SE LOADS IN THIS NORMALLY
		125VDC BUS #2		OPBN	LOSS OF INVERTER FOR VITAL	CONTROL ROOM ANNUNCIATION,	NOME BESCHIEBED	HOMB	UNGROUNDED SYSTEM. VERIF BEQD ON X GROUND FOR T/S ENTRY *TECH SPEC ACTION ENTRY
·		SR LOADS	(BRBARBB)		BUSSES \$5, 6, CAUSING AUTO-TRANSPER TO BACKUP SOURCE (MCC-2)	LOCAL INDICATION			REQUIRED IF VITAL BUS NOT RESERVED FROM INVESTER. MAY ALSO RESULT IN INTERRUPTION OF VITAL BUSSES 5, 6 LOADS
<b>.</b>	" 15 ATOSTOTTS T	125VDC BUS #2	12-211	ÜLOŚ RD	BDD: 9DD WILL WAS SOID TO	Deniante encetue	NOVE DEALLTON		BRIWERN TIME OF SISLOP AND RE-ENERGIZING MCC-2 PROM TRAIN B DG
		SR LOADS	(B3SABSB)		BRBARBR WILL NOT TRIP IF BROUIRED TO ISOLATE INPUT FAULT ON INVERTER \$5	PBRIODIC TESTING	NOMB BEGUISED	NOMB	NORMAL POSITION. THIS PAILURE PLUS PAULT DURING SIS/SISLOP IS A DOUBLE PAILURE SCRARIO
		125VDC BUS #2 59 LOADS	12-221 (BBBARBS)	OPBN	LOSS OF CSAS INVERTRES, INCLUSING TRATH B CONTROL POWER FOR CLR VALVES	CONTROL ROOM ANNUNCTATION.	BEDUNDANT TRAIN FOR CSAS AND CLR PLOW CONTROL	A CHAN LOGIC WILL ACTUATE ON	ACTUATION OF CONTAINMENT SPRAY
		·			FCV-1115D/B/F			SEQ #1 SIS/SISLOP. LOSS OF 1 OF 2 REDUNDANT FLOW CONTROL TRAINS FOR CLR VALVES FCV-1115D/B/F	
 !		125VDC BUS 12 SR LOADS	72-223 (BREARBR)	CLOSBO	BREARRR WILL NOT TRIP IP REQUIRED TO ISOLATE INPUT FAULT ON CSAS INVERTERS	PERIODIC TESTING	MONE BEQUIEED	MONB	SENSING LOOPS WORMAL POSITION. THIS FAILURE PLUS PAULT DURING SIS/SISLOP IS A DOUBLE FAILURE SCENARIO
-	12.8.05.03.1 I	125 VDC BUS #2 SE LOADS	72-204 (BR8ASER)	OPBN	LOSS OF TRAIN B 125VDC CONTROL POWER TO 480V SWGR \$3	CONTROL ROOM INDICATION	REDUNDANT TRAIN	BROUGED REDUNDANCY FOR RE-BNBRGIZING 480V SVGR \$3	WHICH IS OUTSIDE THE PLANT DESIGN BASIS *SEE ITEM 12.6.8.10.1. TECH SPEC ACTION ENTRY REQUIRED
	12.8.05.03.2	125 VDC BUS \$2 SR LOADS	72-204 (BRBAEBR)	CLOSBD	BREARBR WILL NOT TRIP IF REQUIRED TO ISOLATE PAULT	PBRIODIC TESTING	NONE REQUIRED	POST-SIS/SISLOP NOMB	WITH BERE IN THIS POSITION NORMAL POSITION. THIS FAILURE PLUS PAULT DURING SIS/SISLOP LS A DOUBLE PAILURE SCRWARIO
	12.8.05.94.1 I	125VDC BUS #2 SR LOADS	72-205 (BBBASSR)	OPBN	LOSS OF 125VDC CONTROL POWER TO 480V SWGR #2, RESULTING IN	CONTROL ROOM INDICATION	BRDUNDAHT TRAIN	INOPERABILITY OF TRAIN B,	WHICH IS OUTSIDE THE PLANT DESIGN BASIS SEE ITEMS 2.2.3.6.1,
	· · · · · · · · · · · · · · · · · · ·		(334434)		INABILITY TO TRIP OR CLOSS ANY TIE, PEBDER OR LOAD BREAKER, AND LOSS OF TRAIN B 480V SWGR			REDUCED REDUMDANCY FOR RE-EMBRGIZING 4804 SWGR \$3 POST-SIS/SISLOP	2.4.23:3.1, 5.2.3.6.1, 6.2.3.11.1, 7.2.3.12.1, 12.4.1.9.1, 12.4.2.12.1, LOCAL OPBRATOR ACTION REQUIRED
					\$2 UV AND PAULT PROTECTION. MCC'S UNAPPECTED FOR SIS, ENTIRE TRAIN LOST DUE TO BUS/DG OVLD FOR SISLOP	· · · · · · · · · · · · · · · · · · ·	-		TO TEAMSPER SYGE #3 BACE TO TRAIN A FONSE IF PAILURE OCCUBS AFTER TIE BRES 52-1203 IS CLOSED POST-SISLOP



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ITBN #	DBAICB ID	COMPONENT ID	FAILURE MODE	LCCAL BFFECTS AND DBFBNDBNT FAILURBS	METHOD OP Detection	INUBRENT COMPRESATING PROVISIONS	PREPARA AN PAGG	
					VBIBCILON	PROVISIONS	BPPECT ON BCCS	RBMARES
12 8 06 04 1	2 125VDC BUS #2							
12.0.03.04.2	SR LOADS	12-205 (BRBAKER)	CLOSED	BRBARRR WILL NOT TRIP IP	PBRIODIC TBSTING	NCMB BEGAIRED	NONB	NORMAL POSITION. THIS FAILURE
	DE CORDS	(0888888)		REQUIRED TO ISOLATE IMPUT PAULT ON 480V SWGR \$2 CONTROL				PLUS PAULT DURING SIS/SISLOP
1			• • •	BUS				13 A DOUBLE PAILURE SCHWARIO
.: 12.8.05.05.1	125 VDC BUS #2	72-206	OPBN	LOSS OF 125VDC CONTROL POWER	COMBOOL COOM THOSE OF COM			WRICE IS OUTSIDE THE PLANT DESIGN BASIS
ï	SR LOADS	(BRBAKER)		TO 4kV BUS #2C, PREVENTING	CONTROL BOOM INDICATION	REDUNDANT TRAIN FOR ECCS LOADS, REDUNDANT VALVES FOR	BINOP OF TRAIN B. WITH	*SBB [TRUS 1.2.3.10.1,
•				TRIP OR CLOSE OF ANY TIE.		LO-LO BUST LEVEL TRIP	POTENTIAL INOP OF TRAIN A DUB TO LOSS OF LO-LO BWST LEVEL	1.2.6.15.1, 1.2.11.4.1,
				PERDER OR LOAD BREAKER ON THIS		na na sant natan inti	TRIP CAPABILITY POR TRAIN A	1.2.12.5.1, 2.2.6.14.1, 8.3.2.7.1, 10.2.2.5.1,
				BUS. ALSO RESULTS IN BUS \$20			SI/PW PUMPS. TRAIN A SISLOP	12.2.2.4.1, 12.2.7.12.1,
				UNDERVOLTAGE SIGNAL TO TRAIN A		÷	LOGIC BECOMES 1/2 ON BUS FIC UV	12.2.9.2.1. 12.2.10.6.1.
				SBQ I LOP/SISLOP LOGIC				12.2.12.8.1. BOI REV REQD TO
•	•							TRIP PUMP BREES LOCALLY TO
,								ISOL PAULTS DUB TO
12.8.05.05.2	125VDC BUS 12	72-206	CLOSED	BEER WILL NOT TRIP IF REQUIRED	BDD LOD LC SPORT NO	NAME OF ACCOUNTS		LOSS-OF-SUCTION MOTOR PAILURES
	SR LOADS	(BRBAKER)	03044	TO ISOLATE IMPUT PAULT ON 4kV	PRETORIC 18311MG	NONE BEGUIRED	NONB	MORMAL POSITION. THIS PAILURS
<b>.</b>				BUS #2C CONTROL BUS				PLUS PAULT DURING SIS/SISLOP
			•					IS A DOUBLE PAILURE SCENARIO OUTSIDE THE PLANT DESIGN BASIS
12.8.05.06.1	125VDC BUS #2	72-210	OPEN	LOSS OF 125VDC CONTROL POWER	CONTROL ROOM ANNUNCIATION	BEDUNDANT TRAIN FOR SISLOP.	INOPERABILITY OF TRAIN 8 FOR	SEE ITEM 10.2.1.8.1
	SR LOADS	12-222		TO TRAIN B DG #2		NONE REQUIRED FOR SIS	SISLOP, NONE FOR SIS	000 110H 10.6.1.0.1
	•	12-224		BICITER/PIBLD, LOCAL PAREL				
		72-225 (BREAERS)		(BIGHT AND LBPT PBBD), OR PUBL				
12.8.05.06.2	"125VDC"BU3"#2"	72-210	CLOSED	OIL STANDBY PUMP				
	SR LOADS	12-222	000380	BREARBR(S) WILL NOT TRIP IF "BREQUIRED TO ISOLATE FAULT	PRRIODIC TRATING	HONE BEGUIRED	NONE	NORMAL POSITION. THIS FAILURE
:		12-224		PRACEED IN COUNTY PAUL				PLUS INPUT PAULT DURING
		72-225		ستسجيب أخراجه			·	SIS/SISLOP IS A DOUBLE FAILURE
		(BREAEBRS)						SCHARIO WHICH IS OUTSIDE THE PLANT DESIGN BASIS
	125VDC BUS #2	72-211	OPBN	LOSS OF 125VDC CONTROL POWER	CONTROL BOOM INDICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B SI/FW	
Ì	SH LOYDS	(BBBAKBR)	•	TO TRAIN B SI AND MPW	<del></del>		PURPING FOR INJECTION AND	1.2.5.6.1, 1.2.7.5.1,
				ISOLATION VALVES INCLUDING				1.2.8.3.1, 1.2.9.4.1,
<u></u>				HV-851/2/3/4A, NOV-850A,				1.4.9.4.1
				PCV-457/458, CV-142/3/4 TTRAIN				
1				B SV ONLT). VALVES PAIL TO HORMAL OPERATING POSITIONS				
12.8.05.07.2	TESVOC BUS TE	72-211	CLOSED		PERIODIC TESTING	NONE RECOIRED	TIALITE	
	SR LOADS	(BRBAERR)		REQUIRED TO ISOLATE FAULT	PERIODIC 18311MG	HONE RECOIRED	HONE	BORNAL POSITION. THIS PAILURE
								PLUS PAULT DURING SIS/SISLOP
								IS A DOUBLE PAILURE SCRNARIO WHICH IS OUTSIDE THE PLANT
12 0 05 00 1	LACURA AND CO				•			DBSIGN BASIS
	125VDC BUS #2 SR LOADS		OFEN		CONTROL ROOM INDICATION	BEDUNDANT TRAIN FOR INJECTION,	INOPERABILITY OF TRAIN B POR	SBS [TRM 8.2.12.1.1. SBQ
	JE LUANŲ	(BERYKER)		TO SEQ \$2, DISABLING TRAIN B		NONE REQUIRED FOR RECIRC		OUTPUT RELAYS ARE ENERGIZE TO
				BCCS ACTUATION, INCLUDING				ACTUATE. SEQ MORMALLY
				CONTAINMENT SPRAY ACTUATION	** ** ** ** * * * * * * * * * * * * *			BLOCKED/RESET AS PART OF
				AND DC AUTO-START				BECIRC BRIEF. THEREFORE,
								MANUAL ACTUATION OF BREAKLERS
								AND CONTROL OF LOADS CAN BE
								CREDITED FOR RECIRC

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[T8H #	DRATCE ID	COMPONENT ID	FAILURB MODB	LOCAL BPPBCTS AND DBPBHDBNT FAILUBBS	MBTHOD OF DBTECTION	INHERBAT COMPENSATING PROVISIONS	REFERCT ON RCCS	REMARES
[2.9.05.08.2	125VDC BUS #2 SR LOADS	72-212 (888AEB)	CLOSED	BREARBR WILL NOT TRIP IF	PBBCODIC TRSTING	NOME ERONIERO	HONE.	NORMAL POSITION. THIS FAILURE PLUS FAULT DURING SIS/SISLOP IS A DOUBLE FAILURE SCENARIO
	125VDC BUS 82 SR LOADS	72-218 (BRSAKBR)	OPBN	LOSS OF 125VDC CONTROL POWER TO TRAIN B CHARGING PUMP	CONTROL BOOM INDICATION	REDUNDANT TRAIN	TRAIN B INOPERABLE FOR CLR. (MITS TRAIN A PRE-SELECTED) AND	WHICH IS OUTSIDE THE PLANT DESIGN BASIS SEE ITEM 2.2.6.14.1
12.8.05.09.2	125VDC BUS #2 SR LOADS	72-218 (DREARBR)	CLOSBD	BREARSR WILL NOT TRIP IF REQUIRED TO ISOLATE PAULT	PBRIODIC TESTING	NONE REQUIRED	SISLOP NONB	NORMAL POSITION. THIS FAILURE PLUS PAULT DURING SIG/BISCOP
	125VDC BUS \$2 SR LOADS	72-220 (BBBAKER)	OPBN	LOSS OF 125 VDC CONTROL POWER TO TRAIN B HIDBAZINE ADDITION STOTEN ISOLATION VALVE SV-601,		REDUNDANT TRAIN	INOPERABILITY OF TRAIN 8 CONTAINMENT SPRAY NYDRAZINE ADDITION SYSTEM	IS A DOUBLE PAILURE SCENARIO WHICE IS OUTSIDE THE PLANT DESIGN BASIS SEE ITEMS 2.4.12.3.3, 3.1.7.1.3, 5.2.7.4.1. CONTAINMENT ISOL VLV SAFRTY
			<u> </u>	CONTAINMENT ISOLATION VALVES CV-512, CV-514, CV-115, CAUSING VALVES TO PAIL CLOSED				PUNCTION IS PAIL-CLOSED. B/U M2 AVAIL TO INSIDE CONTAINMENT VLVS (EG. BLE PERMARY PATH VALVE CV-305) VIA LOCAL OPS OF CV-532 MANUAL BYPASS OUTSIDE SBIELD VALL
	125VDC BUS #2 SB LOADS	72-220 (BBBAEBE)		BRBATER WILL NOT TRIP IP REQUIERD TO ISOLATE COMMON-CAUSE PAULT	PBRIODIC TBSTING	MOMB BEGRIERD	NONE	NORMAL POSITION. SEPARATE 10CPR\$0.49(b)(2) PUSBS PROVIDED TO ISOLATE NON-QUALIFIED LOADS FROM THIS PBBDRR (BG. SV-601, WHICH IS
	125VDC BUS \$2 SR LOADS	72-221 (BREARSE)	OPBM	LOSS OF 125VDC CONTROL POWER TO TRAID B CONTAINMENT ISOLATION VALVES CV-102, 104,	CONTROL BOOM INDICATION	NOME SEGUISED	MOMB	POST-LOCA)  88B ITEMS 1.4.11.6.1, 1.4.20.5.1. VALVES SAPETT  PUNCTION IS PAIL-CLOSED
12 9 05 11 2	125VDC BUS #2	11 101		106, 146, 147 AND CV-535, SI HEADER VEHT ISOLATION VALVES SV-702A AND C, AND SAMPLE ISOLATION VALVE CV-3302, CADSIEC VALVES TO FAIL CLOSED				
	SR LOADS	72-221 (BB3AEBR)	CLOSED	BERAKER WILL NOT TRIP IP BEQUIRED TO ISOLATE PAULT	PBBIODIC TESTING	NONB BEQUIRED	MONE	MORMAL POSITION. THIS FAILURE PLUS PAULT DURING SIS/SISLOP IS A DOUBLE PAILURE SCENARIO WHICH IS OUTSIDE THE PLANT
	125VDC BUS #2 SR LOADS	72-226 (BBBAESE)	OPBN	LOSS OF 125VDC CONTROL FOWER TO 480V SWGE #2, SWGE #3, AND MCC SISLOP LOCEOUT RELATS, DISABLING SRQ #2 SISLOP	PBRIODIC TESTING	NONE FOR SISLOP, NOWS BEQUIRED FOR SIS, REDUNDANT MAIN IFHR COOLING FOR ALT OFFSITE SOURCE	VOLT DEGRADATION AND/OR DG	SEE TERMS 12.4.9.16.1, SEE TERMS 12.4.9.16.1, ONN-SE TERMS 12.6.7.12.1. SUBB #3.00-SE LOADS CAN BE MANUALLY ISOLATED
				TRIP/LOCKOUT OF MSR LOADS			OVERLOAD, W/ POTENTIAL INOP OF TRAIN A DUE TO: UNISOLABLE CCW FLOW BTPASS, LOSS OF LO-LO RWST LEVEL TRIP OF TRAIN B SI/FY:	PROM TRAIN A OR B. MAIN IPMS HAS 2 TRAINS OF PORCED AIR
							BROUCED BELIABILITY OF ALT OPPSITE SOURCE	

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	ITSH A	DEALCZ ID	COMPONENT ED	FAILURE MODE	LOCAL BFFECTS AND DSPBNDBNT FAILURSS	MBTBOD OP DBTBCTION	INHERBUT COMPRUSATING PROVISIONS	BPFBCT ON BCCS	BEMARKS
:		125VDC BUS #2 SR LOADS	72-226 (BRBARBR)	CLOSED	BREATER WILL NOT TRIP IP BEQUIRED TO ISOLATE PAULT	PBBIODIC TESTING	MONB REQUIRED	NONB	NORMAL POSITION. THIS PAILURB PLUS FAULT DURING SIS/SISLOP IS A DOUBLE FAILURE SCENARIO
	12.8.06.01.2	125VDC BUS #2 NSB LOADS 125VDC BUS #2 NSB LOADS	72-208 (BREARER) 72-208 (BREARER)	OPBN CLOSED	LOSS OF 125VDC POWER TO DG #2 BLDG EMERGENCY LIGHTS BREAKER WILL NOT TRIP IF REQUIRED TO ISOLATE	CONTROL ROOM INDICATION PRESIDE TESTING	NONE REQUIRED FOR SIS/SISLOP	HIN & MIRST TO TONI JAITHSTECTS	
				· · ·	COMMON-CAUSE PAULT, EESULTING IN LOSS OF 125VDC BUS \$2		LO-LO BUST TRIP	TO: UNISOLABLE CCW PLOW BYPASS AND LOSS OF LO-LO RWST LEVEL	R.G. 1.75 OR IBBE 384 CRITERIA DUB TO LACE OF A SIS/SISLOP TRIP OF THE HOW-IB LOADS FROM TRIS BUS
					· · · · · · · · · · · · · · · · · · ·		~		
! !					<del></del>				
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-									
			······································			•			

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TABLE 12-1: AUXILIARY POWER FMEA

PART IV: SWITCHYARD AND COMMON

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1 Kati	DEVICE ID	COMPONENT 1D	FAILURE MODE	LOCAL BPFBCTS AND DBPBNDBNT PAILURBS	MBTHOD OF DRTRCTION	INHERENT COMPENSATING PROVISIONS	BPPBCT ON BCCS	DDMADRO
	DB-108 10	CONTARAL IN	FAILURS HUDS	DECEMBER PRILITERS	VBISCHIVE	LBOA1210M2	BFFBC: UN BCC3	REMARKS
12.9.01.01.1 C	B 4032	BRBARBR	OPBN	BRBARBR TRIPS, CANNOT BB	CONTROL ROOM INDICATION	REDUNDANT BREAKER PROM SWYD NB	REDUCED REDUNDANCY OF MORMAL	220 ky swyd breaere between ne
(	PCB-5)		····	RECLOSED TO PROVIDE POWER PROM SWID WE BUS TO C-IPME. BREE		BUS FOR SIS, DG PLUS ALTERNATE OFFSITE SOURCE FOR C-IFMR	OPPSITE SOURCE TO BUS \$1C/2C	BUS AND LINE SIDE OF C-IPMR
		•		6032 FROM NW BUS UNAPPRICTED UNLESS BREAKER PAIL LOCAL BACKUP (BPLBU) ACTUATES		RELATED (SIS)LOP		
12.9.01.01.2 C	B 4032 PCB-5)	-BBBARB9	CLOSED	BREAKER CANNOT BE TRIPPED FOR ISOLATION OF SWID NB BUS PROM		NOME REQUIRED FOR SIS, DG PLUS ALTERNATE OFFSITE SOURCE VIA		MORMAL POSITION. PAILED BREAKER CAN BE ISOLATED VIA
				C-IFHE BELATED OF OTHER	······································	SWID NO BREE GOLD FOR C-IPHR	OPPLATE SOURCE POR C-IPMR	DISCONNECTS AFTER BPLBU
•				PAULTS. BREAKER PAIL LOCAL		BELATED (SIS)LOP	BELATED (SIS)LOP	ISOLATION OF SWID NB BUS, TO
				BACEUP WILL TRIP REDUNDANT BEBAERE 6032 PROM SWID NW BUS			· · · · · · · · · · · · · · · · · · ·	PREMIT RECLOSING REDUNDANT
				AND ALL SWID ME BUS BREAKERS (INCL MAIN 19MB BREAK 4012) AS				BREE 6032 IF MEEDED. ALTERNATE OPPSITE SOURCE REQUIRED FOR
	· ····	··	a	NEEDED				C-IPME RELATED (SIS)LOP PRIOR TO BEHAUSTION OF DC FUEL SUPPLY
2.9.01.02.1 C	B 4032	BRBARBR PAIL	TRIPPBD	REDUNDANT BRER 6032 AND SWYD	CONTROL ROOM INDICATION	DG AND ALTERNATE OFFSITE	LOSS OF NORMAL OFFSITE SOURCE	BPLBU PROVIDES FAULT ISOLATION
()	PC8-5)	LOCAL BACKUP		NB BUS BREES (INCLUDING HAIN	ANNUNCIATION	SOURCE VIA SWID NW BUS BREE	TO BUS \$1C/2C, SO THAT SIS	IN THE EVENT THAT BREE
		(BPLBU)		IPHE BREE 4012) TRIP TO		6012	BECOMES C-IFHE RELATED SISLOP.	RECEIVES A TRIP SIGNAL BUT
				ISOLATE SWID HE BUS AND C-IFHE			REDUCED RELIABILITY OF	DORS NOT TRIP. SPURIOUS BPLBU
				LINE SIDE, CANNOT BE RECLOSED.  RESULTS IN LOP AND LOVATS			ALTERNATE OFFISTE SOURCE FOR	BOUNDS ACTUATION OF SWID HB
				ACTUATION INCLUDING MAIN GRA			POST-SISLOP TRANSPER OF SWGR \$1C/2C PROM DGs	BUS DIPPERBUTIAL TRIP, WHICH DOES NOT TRIP BREE 6032. 4012
				AND 6012 TRIP DUR TO BUS			SICILO PROB DOS	LOVATS TRIP SIGNAL RESETS WEEN
				#1C/2C UNDBRVOLTAGE				NOTOR OF DISCONNECT OPEN
2.9.01.02.2 CI	B 1032	BERNERR PAIL	UNTRIPPED	C-IPME OR SWID (NE BUS) PAULTS	PERTODIC TESTING	NORMAL BREE TRYPS	REDUCED RELIABILITY FOR PAULT	NORMAL POSITION. BREAKER
(1	PCB-5)	LOCAL BACKUP		WILL NOT BE ISOLATED IN EVENT			ISOLATION IN BURNT OF C-IPMR	PAILURE PLUS BPLBU PAILURE IS
		(BFLBU)		OP BREE PAILURE	•		RELATED (SIS)LOP	A DOUBLE PAILURE SCENARIO
								WHICH IS OUTSIDE SIS/SISLOP
. 9.02.01.1 CE	2 6019	BREAKER	OPEN	DODAFRO BOIDS CANNOR DD	ANUMBAL PANK FURTALISM			DESIGN BASIS
	PCB-61	DECABBE	UP88	BRRAKER TRIPS, CANNOT BE RECCOSED TO PROVIDE POWER PROM	CONTROL BOOM INDICATION	REDUNDANT BREAKER FROM SWYD NW BUS FOR SIS, DC PLUS ALTERNATE	REDUCED REDUNDANCY OF NORMAL	BUS AND LINE SIDE OF C-IPMR
,,				SWID NW BUS TO C-IPMR. BRER		OPPSITE SOURCE POR C-IPHR	OFFSIIS SOURCE TO BUS \$10/20	BO2 WMD FIME 21DB OL C-TEUR
				4032 PROM NW BUS UNAPPRICTED	•	RELATED (8[3]LOP		
		<del></del>		UNLESS BEBARRE PAIL LOCAL				
				BACKUP (BPLBU) ACTUATES				•
1.9.02.01.2 C		BESYRBS	CLOSBO	BREAKER CANNOT BE TRIPPED POR		NONE REQUIRED FOR SIS, DG PLUS	NORE FOR SIS, REDUCED	NORMAL POSITION. PAILED
(1	PCB-6)			ISOLATION OF SAID NA BAS LEON	PBREODIC TRETING	ALTERNATE OFFSITE SOURCE VIA		BRBAKER CAN BB [SOLATED VIA
				C-IPHE BELATED OR OTHER			OPPISTE SOURCE FOR C-IPER	DISCONNECTS AFTER BPLBU
				PAULTS: BREAKBR PAIL LOCAL BACKUP WILL TRIP REDUNDANT		RELATED (319)LOP	RELATED (SIS)LOP	ISOLATION OF SWYD NW BUS, TO
				BREARER 4032 FROM SWYD MR BUS				PERMIT RECLOSING REDUNDANT BREE 4032 IF NEEDED. ALTERNATE
				AND ALL SWYD NO BUS BREARES				OFFSITE SOURCE REQUIRED FOR
				(INCL MAIN IPHE BEER 6012) AS				C-IPMR RELATED (SIS)LOP PRIOR
				MEBDED				TO BIHAUSTION OF DG FUBL
								SUPPLY

# EMSEGRACY CORE CO. STATEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT I TABLE 12-1: POWER DISTRIBUTION SYSTEM PHEA

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ITBM #	DEVICE ID	COMPONENT ID	PAILURB NODB	LOCAL BPPECTS AND Dependent pailures	MBTHOD OF DBTBCTION	INERRRY COMPRESATING PROVISIONS	BFFECT ON BCCS	REMARKS
12.9.02.02.1		BREAKER FAIL	TRIPPBO	REDUNDANT SREE 4032 AND SWID	CONTROL ROOM INDICATION	DG AND ALTERNATE OFFSITE SOURCE VIA SWYD NW BUS BRER	LOSS OF MORMAL OFFSITE SOURCE TO BUS \$1C/2C, SO THAT SIS	BPLBU PROVIDES FAULT ISOLATION IN THE EVENT THAT BREE
	(PCB-6)	LOCAL BACKUP (BPLBU)		NW BUS BREES (INCLUDING MAIN IPME BREE 6012) TRIP TO	ANHUNCIATION	4012	BECOMES C-IPME RELATED SISLOP.	
<u> </u>				ISOLATE SWID NO BUS AND C-IPHR			REDUCED RELIABILITY OF	DORS NOT TRIP. SPURIOUS BPLAU
				LINE SIDE, CANNOT BE RECLOSED. RESULTS IN LOP AND LOVATS			ALTERNATE OFFISTS SOURCE FOR POST-SISLOP TRANSPER OF BUS	BOUNDS ACTUATION OF SWYD WW BUS DIPPERENTIAL TRIP, WHICH
				ACTUATION INCLUDING WAIN CRN		<u> </u>	PIC/ZC PRON DGs	DOES NOT TRIP BREE 4032. 4012
				AND 4012 TRIP DUB TO BUS				LOVATS TRIP SIGNAL RESETS WEEN
				\$1C/2C UNDERVOLTAGE				MOTOR OP DISCONNECT OPEN
2.9.02.02.2	CB 6032	BREAKER PAIL	UNTRIPPED	C-IPHE OR SWID (HW BUS) FAULTS	PERIODIC TESTING	MORMAL BREE TRIPS	REDUCED RELIABILITY FOR PAULT	MORMAL POSITION. BREAKER
	(PCB-6)	LOCAL BACKUP		WILL NOT BE ISOLATED IN BYENT			ISOLATION IN BUBBY OF C-XPHR	PAILURE PLUS BPLBU PAILURE IS
		(BPLBU)		OP BREE PAILURE			RECAYED (SIS)LOP	A DOUBLY FAILURE SCHARIO WHICH IS OUTSIDE SIS/SISLOP
								DRSIGN BASIS
2.9.03.01.T		C-TPHR	CONTACTS OPEN		PERIODIC TESTING	HORR BEGNIERD FOR BIR/BISTOP	HOME FOR BIB/BISLOP	NORMAL POSITION. PAILURE
	CB 6032	PROTECTIVE TRIPS	(OPP)	BRBAKERS WILL NOT TRIP IN BYENT OF IPHE DIPPERENTIAL.			•	ADDRESSES ONE TRIP PUNCTION (CONTACT SET) AT A TIME.
				SUDDEN PRESSURE OR OTHER	<del></del>			BENALDING PROTECTIVE TRIPS
				TROUBLE. REMAINING C-IPMR				PREVENT PAULT PROPAGATION TO 4
···				TRIPS TO BREAKERS UNAPPROTED	· · · · · · · · · · · · · · · · · · ·			DESTRUCTION OF GROUNDS
								PRASE OF PRASES OF C-IPME
2.9.03.01.2	CB 4032	C-IPMR	CONTACTS CLOSED	SWYD BRERS 4032 AND 6032 TRIP,	CONTROL ROOM INDICATION	DG AND ALTERNATE OFFSITE	LOSS OF NORMAL OFFSITE SOURCE	DISCONNECT SWITCHES IN CONTROL
	CE-2035	PROTECTIVE TRIPS	(CB)	CANNOT BE RECLOSED. RESULTS IN		SOURCE AIN SAAD BEKES 4015 VAD	- · · · · · · · · · · · · · · · · · · ·	CABINETS CAN ALSO BE USED TO
				LOP AND LOVATS ACTUATION, INCLUDING MAIN GENERATOR TRIP		6012	BECOMES SISLOP. ALTERNATE OFFSITE SOURCE AVAILABLE AFTER	INTERRUPT THE TRIP SIGNALS
				(BBERS 4012 AND 6012) DUE TO			MOTOR OPERATED DISCONNECT OPEN:	
				BUS \$1C/2C UNDERVOLTAGE			OR AT LEAST ONE OF BUS \$1C/2C	
							RECOVERS VOLTAGE VIA DG, TO	
							88401 041414 414444	
2.9.04.01.1		BRBAEBR	OPBN	BERAERR TRIPS, CANNOT BE	CONTROL ROOM INDICATION	NONE REQUIRED FOR SIS, DG PLUS		220 EV SWID BREAKER BETWEEN ME
	(PCB-1)			"" RECLOSED TO PROVIDE POWER FROM SWID HE BUS TO MAIN IPHE FOR		ALTERNATE OFFSITE SOURCE VIA	ALTERNATE OPPSITE SOURCE TO BUS ALC/2C. NORMAL OPPSITE SOURCE	S BUS AND LINE BIDE OF HAIN  RPMR. DORS NOT CAUSE
				ALTERNATE OPPSITE SOURCE.		FOR C-IPER RELATED (SIS)LOP	UNAPPRETED	LOSS-OF-LOAD UNIT TRIP UNLESS
				BEDUNDANT BREE COIS PRON NA		· ·		REDUNDANT BREE GOLZ OPENS
			*	BUS UNAPPROTED UNLESS BREARER				
				PAIL LOCAL BACKUP (BPLBU) ACTUATES		<del></del>		
2.9.04.01.2		BREATER	CLOSED	BREE CANNOT BE TRIPPED TO	CONTROL BOOM INDICATION,	NOME REQUIRED FOR SIS, DG PLUS		*VBRIFICATION REQUIRED TEAT
	(PCB-1)			" ISOLATE OF SWID NE BUS FROM " NAIN CEN AND MAIN/A/8-IFMRS	PBRIODIC TESTING	REPAIRS (DISCONNECTS, LOCAL RESETS) TO RESTORE ALT OPPSITE	POST-SISLOP OR OTHER CAUSE OF	THIS CONDITION POST-SISLOP
				FOR PAULT PROTECTION OR UNIT		SOURCE VIA REDUNCANT BREE 6012		
		-		TRIP. BREE PAIL LOCAL BACKUP		POE C-IPME RELATED (SIS)LOP		
				WILL TRIP REDUNDANT BRER 6012 FROM SWYD NW BUS AND ALL SWYD			LOCAL RESET OF BFLBU IN SWYD, NONE FOR SIS	
				NE BUS BREES (INCL C-IPME BREE			BAND LAD AIG	
				4032) AS NEBDED				

SAM ONOFER UNIT 1

TABLE 12-1: POWER DISTRIBUTION SYSTEM FMEA

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LTSN &	DRAICE ID	COMPONENT ID	FAILURB MODB	LOCAL BPPBCTS AND DBPBNDBNT PAILURBS	DRIBCTION METHOD OF	INHBERNY COMPENSATING PROVISIONS	BPPECT ON BCCS	REMARES
2.9.04.02.1	19 4012	BRRAEBR FAILURE	†DI DOON	REDUNDANT BRER 6012 AND SWID	COMBOUT DOOM THUTCHE	NOWE REQUIRED FOR SIS, REPAIRS		BPLBU PROVIDES PAULT ISOLATION
	(PCB-1)	LOCAL BACEUP (BPLBU)	IBITTBU	HE BUS BREES (INCLUDING C-IPMR BREE 4032) TRIP TO ISOLATE	•	OR ADDITONAL DG PUBL REQUIRED		IN THE EVENT TRAT BEER RECRIVES A TRIP SIGNAL BUT
				SWYD WE BUS AND MAIN IPME LINE SIDE, CANNOT BE RECLOSED. RESULTS IN UNIT TRIP			100, 013001, 1000 (00 010	DOBS NOT TRIP. SPURIOUS BPLBU BOUNDS ACTUATION OF SWID NB BUS DIFFERENTIAL TRIP, WEICH
2.9.04.02.2	CB 4012 (PCB-1)	BREAKER PAILURE LOCAL BACKUP	UNTRIPPED	HAIN GENERATOR, MAIN/A/B-IPMR OR SWYD (NE BUS) PAULTS WILL	PBRIODIC TRATING	NORMAL BRER TRIPS FOR PAULTS, HONE REQUIRED FOR SIS/SISLOP	REDUCED RELIABILITY FOR PAULT	DOES NOT TRIP BREE 4032 MORMAL POSITION. BREAKER PAILURE PLUS BPLBU PAILURE IS
		(BPLBU)		NOT BE ISOLATED IN BYENT OF BREE FAILURE			GENERATOR OR MAIN/A/B-IPME FAILURE, NOME FOR SIS/SISLOP	A DOUBLE PAILURE SCENARIO WBICE IS OUTSIDE SIS/SISLOP DESIGN BASIS
2.9.05.01.1	CB 6012 (PCB-2)	BREAKER	OPEN	BREAKER TRIPS, CANNOT BE RECLOSED TO PROVIDE POWER FROM SWID NW BUS TO MAIN IPHE FOR	CONTROL ROOM INDICATION		ALTERNATE OFFSETE SOURCE TO BUS	220 EV SWID BREAKER BEIMBEN NW BUS AND LINE SIDE OF MAIN IPME. DOES NOT CAUSE
				ALTERNATE OPPSITE SOURCE.  REDUNDANT SEER 4012 FROM NE BUS UNAFPECTED UNLESS BREAKER FAIL LOCAL BACKUP (BPLBU) ACTUATES		FOR C-IPHE RELATED (SIS)LOP	UNAPPROTED	LOSS-OF-LOAD UNIT TRIP UNLESS REDUNDANT BRIR 4012 OPENS
2:9.05.01.27	CB 6012 (PCB-2)	BENTER	CLOSED		CONTROL BOOM INDICATION, PERIODIC TESTING	NOME REQUIRED FOR SIS, BU PLUS REPAIRS (DISCONNECTS, LOCAL	SOURCE POR BUS \$1C/2C	SUBBIFICATION REQUIRED THAT APPLICABLE PROCEDURES ADDRESS
				MAIN GBW AND MAIN/A/B-TRMES POR FAULT PROTECTION OR UNIT TRIP. BREE FAIL LOCAL BACRUP WILL TRIP REDUNDANT BREE 4012 FROM SWYD WE BUS AND ALL SWYD WM BUS BRES (INCL C-TRME BREE		SOURCE VIA REDUNDANT BREE 4012 FOR C-IPME RELATED (SIS)LOP	POST-SIGLOP OR OTHER CAUSE OF UNIT TRIP, UNTIL BREE IS IGOLATED BY DISCONNECTS AND LOCAL RESET OF BPLBU IN SWID, NOME FOR SIG	THIS CONDITION POST-SISLOP
·	<del>-</del>			4032) AS WEEDED	<del></del>			
2.9.05.02.1 (	C9 6012 (PCB-2)	BREAKER FAILURE LOCAL BACKUP	TRIPPBD	REDUNDANT BREE 4012 AND SWID NW BUS BREES (INCLUDING C-IFME		NOME REQUIRED FOR SIS, REPAIRS OR ADDITOMAL DG FUEL REQUIRED	SOURCE FOR BUS \$1C/2C	BPLBU PROVIDES FAULT ISOLATION IN THE EVENT THAT BEER
		(BFLBU)		BREE 6032) TRIP TO ISOLATE SWID NW BUS AND MAIN IPHR LINB SIDB, CANHOT BE RECLOSED.		FOR C-IPHE RECAYED BISCOP		RECRIVES A TRIP SIGNAL BUT DOES NOT TRIP. SPURIOUS BPLBU BOUNDS ACTUATION OF SWYD NE
				RESULTS IN UNIT TRIP				BUS DIFFERENTIAL TELP, WHICH DORS NOT TRIP BREE 4032
Z. 9.05.0Z.Z	CB 6012 (PCB-2)	BREAKER PAILURE LOCAL BACKUP (BPLBU)	UNTRIPPRO	HAIN GENERATOR, MAIN/A/B-TPME OR SWID (MW BUS) FAULTS WILL NOT BE ISOLATED IN EVENT OF BREE FAILURE	PRETODIC TESTING		ISOLATION IN BYENT OF MAIN GBNBRATOR OR MAIN/A/B-IPMR	WORMAL POSITION. BERAKER PAILURE PLUS BPLBU FAILURE IS A DOUBLE PAILURE SCRWARIO WHICH IS OUTSIDE SISYSISLOP
2.9.06.01.1 (		MAIN GBN,	CONTACTS OPEN	MAIN/A/B-IPHR 220 by AND 4 by	PBRIODIC TESTING		•	DESIGN BASIS NORMAL POSITION. FAILURE
	CB 6012	MAIN/A/B-IFME PROTECTIVE TRIPS	(077)	BREAKERS WILL NOT OPEN IN BYENT OF DIFFERENTIAL, SUDDEN PRESSURE OR OTHER MAIN CONSENTOR OR MAIN/A/B-YPMR				ADDRESSES ONE TRIP PUNCTION (CONTACT SET) AT A TIME. REMAINING PROTECTIVE TRIPS PREVENT PAULT PROPAGATION TO 4
				TROUBLE. BEHAINING PROTECTIVE TRIPS TO BEBASERS UNAPPRECTED				EV BM. PAILURB BOUNDS OPEN, SHORT OR GROUND IN ANY PRASE

BMB9GBKCY CORB (SYSTSM SINGLE FAILURE ANALYSIS
ONOFRE UNIT 1
TABLE 12-1: POWER DISTRIBUTION SYSTEM FHEA

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irem #	DRAICE ID	COMPONENT ID	FAILURR MODR	LOCAL EPPECTS AND DEPENDENT FAILURES	METHOD OF Detection	INHERENT COMPENSATING PROVISIONS	BPFBCT ON BCCS	REMARES
12.9.06.01	2 CB 4012 CB 6012	MAIN GBN, MAIN/A/B-IPMB PROTECTIVE TRIPS	CONTACTS CLOSED (ON)	220 by SWTD BRERS 4012, 6012 AND 4 by BRERS 11A04, 11B04 TRIP, CANNOT BB RBCLOSED. RRSULTS IN UNIT TRIP	CONTROL BOOM INDICATION		SOURCE FOR BOTH TRAINS, RESULTING IN ABILITY TO TRANSPER BUS \$10/20 FROM DGs	DISCONNECT SWITCHES IN CONTROL CABINETS CAN ALSO BE USED TO INTERRUPT THE TRIP SIGNALS
12.9.06.02	1 CB 4012 CB 6012	452AY, 452AYI (RBLAYS)	ON	SWID BREE 1512 OR 6012 CLOSED SIGNAL TO TURBINE/GEMERATOR CONTROLS AND LOVATS,	PERIODIC TESTING			OPERATOR ACTION REQUIRED TO ALIGN ALTERNATE OFFSITE SOURCE EVEN IF LOVATS FUNCTIONS AS
				PREVENTING LOVATS ACTUATION ON BUS \$1C/2C UNDERVOLTAGE (BG. C-IPHR RELATED LOP)				OB\$ I GNED
12.9.06.02	2 CB 4012 CB 6012	452AI, 452AII (BBLAYS)	OFF	SWID SREE 4012 AND 6012 OPEN SIGNAL TO MAIN GEN CONTROLS AND LOVATS. BEPARATE HAIN GEN TRIP ON BUS \$1C/2C UNDERVOLTAGE AND LOVATS INTERLOCE PROM MAIN GEN PREQ	PRRIODIC TRATING	NOME REQUIRED FOR SIS/SISLOP		MORNAL POSTION IMMEDIATELY
				RBLAY 2211 PREVENT PREMATURE OPERATION/FLASHOVER DAMAGE OF MOTOR OP DISCONDECT	-··-			
12.9.06.03.	1 CB 4012 CB 6012	IR-1	CONTACTS CLOSED  (ON)	SWID BEERS 4012 AND 6012 CAN BE RECLOSED DURING WAIM GENERATOR COASTDOWN OR MOTOR OPERATED DISCONNECT OPEN/CLOSE			OPERATOR BEROR DURING 818/S18LOP IS A DOUBLE FAILURE	
				STRORE			SCENARIO WHICH IS OUTSIDE PLANF DESIGN BASIS	PROM MAIN GENERATOR LOW VOLTS RELAY 2277-1 PERMIT BRER CLOSURE POR CONNECTING MAIN
12.9.06.03.	2 CB 4012 CB 601Z	IR-1	CONTACTS OPBN (OPF)	SWYD BREERS 4012 AND 6012 CABNOT BE RECLOSED APTRE UNIT TRIP AND MOTOR OPERATED DISCONNECT OPENING	PBRIODIC TESTING		SOURCE FOR BOTH TRAINS, RESULTING IN INABILITY TO TRANSPER BUS \$10/20 PRON DG.	GENERATOR TO THE GRID
12.9.06.04.	1 CB 4012 CB 6012	[EBUAY]	CONTACTS OPEN	SWID BREES 4012 AND 6012 CARNOT BE CLOSED TO CONNECT MAIN CEMBRATOR TO GRID. NO BFFECT ON BREE RECLOSURE WITH	PERIODIC TESTING		FOR C-MAR BELATED (BIS)LOP, NOME FOR BIS/SIBLOP	INTERLOCE FROM MAIN GENERATOR LOW VOLTS RELAY 227. BELAY EMERGIZES WHEN VOLTS < 40%. PARALLEL CONTACTS FROM HOTOR
12.9.08.04.	2 CB 4012	2217-1	CONTACTS CLOSED	MOTOR OPERATED DISCONNECT OPEN		HONE REGUIRED FOR S18/818FOD	MOSK FOR STRASISTO	OPBRATED DISCONNECT AUXILIARY RELAY IR-1 PERMIT BRIR CLOSURE WITH HOD OPEN THIS PAILURE AND CONCURRENT
	CB 6012	(RBLAY)	(0FP)	BR RECLOSED DURING MAIN GENERATOR COASTDOWN OR MOTOR OPERATED DISCONNECT OPEN/CLOSE STRORE		aver endorsen ton statistics	·	OPPRATOR BEROR DUBING SIS/SISLOP IS A DOUBLE FAILURE SCHARIO CUTSIDE PLANT DESIGN BASIS

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## EMBRGENCY CORE CO SYSTEM SINGLE FAILURE ANALYSIS SAN ÓMOPRE UNIT 1 TABLE 12-1: POWER DISTRIBUTION SYSTEM PREA

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ITBN #	DEVICE ID	COMPONENT ID	FAILURE NODE	LOCAL BFFBCTS AND DRPBNDBNT PAILURBS	MBTHOD OF DBTRCTION	INHERENT COMPENSATING PROVISIONS	BFFECT ON ECCS	REMARES
	MOTOR OPERATED DISCONNECT	SWITCH	OPBN	SOYD BEERS FOLK AND SOLV CAN BE BECLOSED AS MEEDED TO ALIGH ALTERNATE OPPSITE SOURCE. MAIN		NOME REQUIRED FOR \$13/318LOP	NONE FOR SIS/SISLOP	
				GENERATOR CANNOT BE CONNECTED TO GRED				·
IZ.9.07.01.2 HOTOE OPREATED SWITCH CLOS Disconnect		SVITCE	CLOSED	SWYD BREES 4012 AND 5012 CANNOT BE RECLOSED APTER	PRETODIC YESTING	OR ADDITIONAL DG PUBL REQUIRED		NORMAL POSITION
		SIS/SISLOP OR OTHER UNIT TRIP			RESULTING IN INABILITY TO			
				TO ACTOM ACTERNATE OFFSITE			TRANSPER BUS \$1C/2C PROM DGs	
				SOURCE WITHOUT MOTORING MAIN GENERATOR			FOR SISCOP BURNT INVOLVING	
	MOTOR OPERATED DISCONNECT	IR, IR-1 (RBLAYS)	ON	MOTOR OPBRATED DISCOMMECT OPEN SIGNAL TO GENERATOR CONTROLS,	PERIODIC TESTING	NONE REQUIRED FOR SIS/SISLOP	NONE FOR SIS/SISLOP	RELAT IS LATCRING TYPE. THIS PAILURE PLUS OPERATOR BERGE
		· <del>········</del> ·-		LOVATS AND SWYD BREES TOIS AND				DURING SIS/SISLOP IS A DOUBLE
				6012. DISABLES LOVATS TRIP OF BUS \$14/18 AND 4 by BREES				PAILURE SCRWARIO WHICH IS
				TIAO4, TIBO4, AND PERMITS SWYD				OUTSIDE PLANT DESIGN BASIS.  OPERATOR ACTION REQUIRED TO
				BRERS 4012 AND 6012 TO BE			•	ALIGN ALTERNATE OFFSITE SOURCE
				CLOSED DUBING HAIN GEN				BVBN IP LOVATS PUNCTIONS AS
				COASTDOWN				DESIGNED
	MOTOR OPERATED	IR, IR-1	OFF	MOTOR OPERATED DISCONNECT	PBRIODIC TESTING	MONE REQUIRED FOR SIS, REPAIRS	LOSS OF ALTERNATE OFFSITE	RBLAY IS LATCHING TYPE
	DISCORNECT	(RELAYS)		CLOSED SIGNAL TO GENERATOR		OR ADDITIONAL DC FORC REQUIRED		<u> </u>
				CONTROLS, LOVATS AND SWYD BRERS 4012 AND 6012. BNABLES		FOR C-IPMR RELATED (SIS)LOP	RESULTING IN INABILITY TO TRANSPER BUS \$1C/2C PROM DGs	
	·			LOVATS TRIP OF BUSTIA/18 AND			FOR SISCOP BARRY INACTAINS	
				4 EV BREES 11404, 11804, AND			C-IPHE RELATED LOP	
				DISABLES CLOSURE OF SWID BREES				
				GENERATOR TRIP/COASTDOWN				
	NOTOR OPERATED		AOF13 FOA		PERIODIC TESTING	NORR REGUIRED FOR ALR. REPAIRS.		MOTOR OPERATED DISCONNECT CAN
	DISCONNECT	(72-132)		CANNOT BE OPERATED PROM CONTROL ROOM. POSITION SIGNAL		OR ADDITIONAL DG PURL REQUIRED FOR C-IPMR RELATED (SIS)LOP	SOURCE FOR BOTH TRAINS, RESULTING IN INABILITY TO	BE OPBRATED MANUALLY VIA ATTACHED HAND-CRANE, BOWEVER,
<del></del>				BBCATS IN AND IN-1 PAIL AS-IS-		- · · · · · · · · · · · · · · · · · · ·	TRANSPRE BUS FIC/2C PROM DGs	INTERLOCE PRON PAILED RELAYS
				(LATCHING TYPE), POTENTIALLY			POR SISLOP BYBNY INVOLVING	WILL STILL BLOCK RECLOSURE OF
	·			DISABLING BECLOSURE OF SWYD	····		C-IPHR BBLATED LOP	SWYD BRIRS
				BEEES 4012 AND 6012 OF LOVATS		•		
.9.08.01.1		125VDC BUS #1	VOLTS LOW	LOSS OF MAIN GENERATOR,	CONTROL ROOM INDICATION		LOSS OF ALTERNATE OFFSITE	SEPARATE 220 LV BREE AND ECP
	CB 4032 CB 6012	[72-]03]		"MAIN/A/B/C-IFME PROTECTION"		ADDITIONAL DG PURL OR ESPAIRS		OARBCORSENT ARIDS DESARRA
	CB 6032				•	FOR C-XFMR RELATED (SIS)LOP. ALT OR DEDICATED SHUTDOWN FOR	RESULTING IN POTENTIAL LONG-TERM INOPERABLLITY DUE TO	PROPAGATION OF COMMON-CAUSE
			· ·			NOW-SIS/SISLOP EVENTS AS PER		WITE THIS PAILURE
						ABPU	\$1C/2C PROM DGs POR SISLOP	
							BVBNT INVOLVING C-IPMR RELATED	

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	I O D W A	Anuran II			LOCAL BEFFECTS AND	METHOD OF	INHBRENT COMPENSATING		
· <del></del>	ITBN 1	DRAICE ID	CCHPONBUT ID	PAILURB MODE	DEPENDENT FAILURES	DRTECTION	PROVISIONS	RSPECT ON BCCS	REMARKS
l,i									
					•				
	12.9.08.02.1	CB 4012	480V BUS AAOL	VOLTS LOW	LOSS OF AC AUXILIARY POWER TO	ANNUNCIATION IN SONGS 2/3	NOME REQUIRED FOR SIS/SISLOP	HONB POR SIS/SISLOP	
		CB 4032			SAAD ME BAS INCUMING BREES	CONTROL ROOM		news 100 att/810001	
		CB 6012			4012 AND 4032. APPECTED BREES				
1		CB 6032			CAN STILL BE TRIPPED AND		-		
					CLOSED UP TO 5 TIMES USING			-	•
[}-			<del> </del>		INTEGRAL BIGB PRESSURE AIR AND SPE RECRIVERS BEFORE AC POWER				
[]					IS REQUIRED TO RECHARGE				
		•			to endoteno to Bronuada				
	12.9.08.03.1		1804 BUS JAOS	VOLTS LOW	LOSS OF AC AUXILIARY POWER TO	ANNUNCIATION IN SONGS 2/3	MONE REQUIRED FOR 213/313LOP	MOME FOR SIS/SISLOP	
		CB 4032			SAID MA BAR INCLADING BRESS	CONTROL BOOM			
		CB 6012 CB 6032			6012 AND 6032. APPECTED BREES				
Li		CB 9035			CAN STILL BE TRIPPED AND				
					CLOSED UP TO 5 TIMES USING INTEGRAL RIGH PRESSURE AIR AND				
					SP6 RECEIVERS BEFORE AC POWER				
					IS REQUIRED TO RECHARGE				
ï	12.9.08.04.1		480V PANEL 13PI	VOLTS LOW	LOSS OF AC AUXILIARY POWER TO		MONS REQUIRED FOR SIS/SISLOP	NOME FOR SIS/SISLOP	PANEL LOCATED IN SCE SWYD
11 -		CB 4032 CB 6012			SVYD ME AND MV BUS INCLUDING	CONTROL ROOM			RELAY BOUSE. POWER MORNALLY
· -		CB 6032			BREES 4012, 4032, 6012 AND 6032. APPROTED BREES CAR STILL				PROVIDED VIA 4 EV TO 480V IPMR
!					BE TRIPPED AND CLOSED UP TO 5				PROM BONGS & NON-IE BUS \$2ACY, WITH MACRUP PROM SIMILARLY
: •					TIMES USING INTEGRAL HIGH				POWERED BUS IN SDGAR SWID
,					PRESSURE AIR AND SPE RECEIVERS				RELAY HOUSE (PROM SONGS )
H					BEFORE AC POWER IS REQUIRED TO				NON-18 BUS #3AO7). PANEL
·					RECHARGE				SUPPLIES 480V BUSSES AOI, AO2
ļ,	12.9.08.05.1	CR 4012	125VDC PANBL	VOLTS LOW	LOSS OF CONTROL POWER, BACKUP	AMMINGTANTON TH CONCO 9/3	OVERCURRENT TRIP OF 4 by BREES	P +BARDWEILL BAD DIDD AD	RDAS FAUGENCE DO ALEDONADO
١.		CB 4032	#DP2	70214 DOB	POWER AND BREAKER PAIL LOCAL	•	11COZ AND 12COZ PREVENTS PAULT		BRALIGNMENT TO ALTERNATE OPPRITE SOURCE NOT REQUIRED
ļ. <del> </del> -		CB 601Z		· ·	BACKUP POWER TO SWYD DE AND NW			DUE TO INABILITY TO ISOLATE 220	THURNTAFRIA PROMITTING CORNET
ļ. ¦		CB 6032			BUS INCLUDING BRERS 4012,		REPAIRS OR ADDITIONAL DG PUBL		FOR LOCAL OPERATION OF SWID
:\					4032, 6012 AND 6032. BREES CAN		REQUIPOR C-IPME RELATED LOP	C-IPHR CAUSED LOP. POTENTIAL	BREES AND REPAIRS WITHIN 7 DAY
					BE STILL BE OPERATED WANUALLY	,		DANAGE TO ALTERNATE OFFSITE	CAPACITY OF DC FUEL SUPPLY.
					BY LOCAL CONTROL IN CABINET OR			SOURCE FOR BOTH TRAINS DUE TO	C-IPMR SEPARATED FROM
ľ ;					BACH BRBAKER			SUSTAINED MOTORING	ESSENTIAL EQUIPMENT AS PER
									UPBA

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TABLE 12-2: SORT OF AUXILIARY POWER DEPENDENCIES

# EMBEGENCY CORE CORE CONTROL STATEM SINGLE PAILURE ANALYSIS SORT FOR BLECTRICAL/ACTUATION DEPENDENCIES

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TIEM \$ DEAL	CB ID	COMPONENT ED	FAILURE MODE	LOCAL BPFBCTS AND DBPBNDBNT FAILURBS	HETHOD OF DETECTION	INHERRNT COMPENSATING PROVISIONS	BPPBCT ON BCCS	BBHARES
10.1.01.08.1 DG #1	<del>.</del>	125VDC BUS #1 (72-105)	VOLTS LOW	COABURD CONTROL BORRE	CONTROL ROOM ANNUNCIATION	REDUNDANT TRAIN/DG	LOSS OF TRAIN A DG FOR LOB, LOP AND SISLOP	
12.9.08.01.1 CB 4012 CB 4012		125VDC BUS 11	AOTAS FOA	LOSS OF MAIN GRUBBATOR,	CONTROL ROOM INDICATION	NOME REQUIRED FOR SIS,	*LOSS OF ALTERNATE OFFSITE	SEPARATE 220 by BREE AND ECP
CB 6012 CB 6032		(72-108)		MAIN/A/B/C-IPMR PROTECTION		ADDITIONAL DG PUBL OB REPAIRS FOR C-RYMR RELATED (SIS)LOP. ALT OR DEDICATED SHUTDOWN POR	RESULTING IN POTENTIAL LONG-TERM INOPERABILITY DUE TO	
			· <del></del>			HON-STRYSTSCOP EVENTS AS PRE- UPBA	INIBILITY TO TRIBBER BUS SIC/2C FROM DG: FOR SISLOP RVBHT INVOLVING C-IPHR RELATED	BITS PAIS PAILURS
12.6.08.05.1 SWGR #3 CONTROL 1	POWER	125VDC BUS \$1 (72-116)	VOLTS LOW	LOSS OF TRAIN A CONTROL POWER TO SUGE \$3, RESULTING IN LOSS OF FAULT PROTECTION DURING		FROM TRAIN B VIA SUGR \$2-3 TIE		STECH SPEC ACTION ENTRY REQUIRED WITH THIS FAILURE
			···	NORMAL OPERATION (IE, WITH SMCR #2-3 TIE BRER OPEN AND SBLECTOR SWITCH #82 NOT ON)		BREE	TROUGHTON OF BREES PROVIDES  130/7410M OB BREES BY FOTDS BA	
12.5.09.11.1 svgg 41		"\$ \$ EVRA "RUA AS	Not Be Coll				ISOLATION OF COMMON-CAUSE PAULYS FROM REDUNDANT TRAINS A AND B	
• • • • • • • • • • • • • • • • • • • •		125VDC BUS #1 (72-118)	VOLTS LOW	LOCKOUT RELAYS FOR SWEE \$1, HCC-1 WILL NOT TRIP AND LOCKOUT THEIR WSR LOADS	PERIODIC TESTING		SPOYENTIAL INOP OF TRAIN A POR- SISLOP DUB TO 488Y SUGR/MCC VOLT DEGRADATION AND/OR DG	RCPS ALSO UNAVAILABLE POR SCTR. MAIN IPMR MAS 2 TRAINS OF PORCED AIR COOLING
						BOURCE	OVERLOAD, WITH POTRETTAL THOP OF TRAIN B DUB: UNISOLABLE CCU PLOW BIPASS, LOSS OF LO-LO RUST	
			•				LEVEL TRIP OF TRAIN A SI/FW. REDUCED RELIABILITY OF ALT OFFSITE SOURCE	
06.4.08.05.11 G-964		125VDC BUS #1 (72-120)	AOTAS TOR	BHERGENCY THERMAL BARRIER PUMP DISABLED	CONTROL ROOM INDICATION		NONE FOR ECCS	BUBRGBECT TEBRUAL BARRIER POUR TO CREDITED FOR BCCS EVENTS
04.3.07.06.1 CV-100			VOLTS LOW	8V-84 DB-BNBRGIZBS, CLOSING	CONTROL ROOM INDICATION	NOME REQUIRED	MONE	MAI ORBITION FOR DOCA BASEIG
CA-100B CA-100Y		(72-121)		CV-100, 100A, 100B, THRREBY ISOLATING 8/G BLOWDOWN TO PLASS TANK AND OUTPALL				
05.1.07.04.1 <sup>-</sup> 8V-600 <sup></sup>		125VDC BUS #1 ' ' (12-122)		TRAIN A BIDRAZINE ISOLATION VALVE PAILS CLOSED, CANNOT BE REOPENED	CONTROL ROOM INDICATION		INOPPRABILITY OF TRAIS A STORAZING ADDITION	
8V-102D		125VDC BUS \$1 (12-123)	AOF18 FOA	CIS TRAIN A ACTUATED TO SI LOOP B AND C VENT ISOLATION VALVES	CONTROL ROOM INDICATION	NORE BEGNIESD	ROBB	
78.1712.01.1 SEQ 1	,	125VDC BUS #1	VOLTS LOW	SEG 1 DISVETED	CONTROL ROOM INDICATION		TRAIN A LOB/LOP/SIS/SISLOP	SEQ OUTPUT RELATS ARE EMBEGIZE TO ACTUATE
01.1.04.07.1 BV-853B		1254DC BUS \$1 (72-130)	AOLIS FOM	BY-853B PAILS TO OPBN (REMAINS CLOSED) ON SIS/SISLOP, RELAT 83-2 PAILS OPP, DISABLING TRAIR A PW PIND SUFTION VALUE	CONTROL ROOM ENDICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A PUMPING FOR SI AND EBCONDARY RECIEC	IV ROJUAIS
	–			TRAIN A PW PUMP SUCTION VALVE CLOSED PROTECTIVE TRIP			RECIRC	

### EMBEGRACY CORB COO STEM SINGLE FAILURE ANALTSIS SAN OMOPRE UNIT 1 SORT FOR BLECTRICAL/ACTUATION DEPENDENCES

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01.1.05.06.1 BV-854B 125VDC B (72-130)  01.1.07.05.1 BV-851B 125VDC B (72-130)  01.1.08.03.1 BV-852B 125VDC B (72-130)  01.1.09.04.1 BOV-850B 125VDC B	BUS \$1 VOLTS LOW  BUS \$1 VOLTS LOW  O)	RV-854B FAILS TO CLOSE  (REMAINS OPEN) ON SIS/SISLOP  TRAIN A PY PUMP SI PLOY PATE  SI PLOY PROM BOTH TRAINS DIVERTED INTO NON-SEISHIC PORTION OF HAIN PY BEADER UNTIL BACRUP YALVES CLOSED. REQUIRED POSITION FOR INJECTION PATE NOT	CONTROL ROOM INDICATION  CONTROL ROOM INDICATION  CONTROL ROOM INDICATION  PRECODIC TRATING	BEQUIRED FOR SECONDARY RECIEC	INOPERABILITY OF TRAIN A PUMPING FOR SI, NOWE FOR SECONDARY BECIEC 1SI DELIVERY THE INCREASED, SI RELIABILITY REDUCED (VIA NON-SEISHIC PORTION OF FW	VALUE OPEN MORMAL FOR
(12-130) 01.1.08.01.1 BV-852B 125YDC B (12-130)	BUS \$1 VOLTS LOW	SLOCKED  SI PLOW PROM BOTH TRAINS DIVERTED INTO MON-SHISHIC PORTION OF HAIM PM BRADER UNTIL BACKUP VALVES CLOSED. REQUIRED POSITION FOR SECONDARY RECIRCULATION	CONTROL ROOM INDICATION	INJECTION REDUNDANT TRAIN FOR SI, MONE REQUIRED FOR SECONDARY RECIEC  REDUNDANT PW ISOLATION VALVES FCY-456, 451, 456, CY-142, 143, 144, MOY-20, 21, 22 ASSUMED IN LOCA/MSLB ANALTSES.	PUMPING FOR SI, MONR FOR SECONDARY RECIEC *SI DELIVERY TIME INCREASED, SI RELIABILITY REDUCED (VIA MON-SEISHIC PORTION OF PW	
01.1.08.01.1 HV-852B 125VDC 8 {12-130}	BUS \$1 VOLTS LOW	SI PLOW PROM BOTH TRAINS DIVERTED INTO NON-SEISMIC PORTION OP MAIN PW BRADER UNTIL BACRUP VALVES CLOSED. REQUIRED POSITION FOR SECONDARY RECIRCULATION		REDUNDANT PW ISOLATION VALVES FCV-458, 451, 458, CV-142, 143, 144, MOV-20, 21, 22 ASSUMED IN LOCA/MSLB ANALYSES.	SECONDARY RECIEC *SI DELIVERY THE INCREASED, SI RELIABILITY REDUCED (VIA NON-SEISHIC PORTION OF PW	
01.1.09.04.1 MOV-850B 125VDC B		UNTIL BACEUP VALUES CLOSED. REQUIRED POSITION POR SECONDARY RECIRCULATION		ASSUMED IN LOCA/HULB ANALYSES.		•
01.1.09.04.1 MOV-850B 125VDC 8						•
(12-130)		AUTOMATICALLY ALIGNED TO BCS LOOP B ON BIS/SISLOP	CONTROL ROOM INDICATION	DURING SI REDUNDANT PLOW PATHS TO RCS LOOPS A AND C FOR SI, NOWE REQUIRED FOR LO-LO RWST LEVEL	INJECTION REDUCED TO 1/2 LOOPS FOR LOCA (ONE LOOP SPILLING),	
		WOF S OR SIS/SISMY			BLOCERD DUE TO COMMON-CAUSE PAILURE), MONE POR AUTO-TERMINATION OF SI ON LO-LO	
01.4.09.03.1 PCV-456 125VDC B CV-142,143,144 (72-130)	•-	MAIN PW CONTROL VALUE TO S/G A AND BYPASS VALUES TO S/G A, B,		REDUNDANT ISOLATION VALUE FOR FCV (MOV-21), REDUNDANT	RWST LEVEL OR FOR SECONDARY ERGIRC REDUCED REDUNDANCY FOR MAIN PW ISOLATION	VALVES CAN BE MANUALLY CONTROLLED FOR SECONDARY
02.4.09.07.1 PCV-1112 125VDC B	BUS \$1 VOLTS LOW	C WILL NOT CLOSE ON TRAIN A SIS/SISLOP SV-1112 CANNOT BE ENERGIZED TO		SOLEMOIDS FOR BYPASS VALUES (SV-3142, SV-150, SV-151) NOME FOR INJECTION	INOPERABILITY OF CHARGING PUMP	RECIRC CHARGING PLOW NOT CREDITED FOR
[72-130]		PULLY OPEN PCY-[112 AUTOMATICALLY FOR INJECTION. HODULATION UNAPPECTED FOR COLD LBG RECIRC BOUNDIRY AND HOT			INJECTION PARM TO LOOP A	[MJECTION
02.4.28.05.1 BCV-427A	BUS #1 . NOTES FOM	LEG RECIRC BUUNDARY AND HOT LEG RECIRC PRIMARY PATH PUNCTIONS VALVES PAIL CLOSED	CONTROL ROOM INDICATION	NONE REGULARO	KONR -	
BCV-427B (72-130) BCV-427C	· · · · · · · · · · · · · · · · · · ·	SV-1112 CANNOT BE BURRGIZED TO		Bone For Thirtyton, None	INOPERABLETTY OF CHARGING FUMP	CHARGYNG PLOW NOT CRRDITED FOR
(12-130) 04.3.06.03.1 CV-142 125VDC 8	0)	FULLY OPEN PCV-1112 AUTOMATICALLY POR INJECTION HAIN PO BYPASS VALUES TO 8/G		BEQUIRED FOR CLR OR HLR	INJECTION PATH TO LOOP A, NONE REQUIRED FOR CLE OR BLE REDUCED RELYABILITY OF MAIN FO	INJECTION
CY-143 (72-130) CY-144	•-	A/B/C WILL NOT CLOSE ON TRAIN A SIS/SISLOP, VALVE MODULATION UNAPPECTED. AUTOMATIC S/G		BOLENOID VALVES TO CLOSE BIPASS VALVES FOR SI, CONTROL BOOM BARDSWITCH FOR BEHOTE	BYPASS VALVES FOR SI BOUNDARY,	ADDRESSED IN BOI
	•	BLOWDOWN ISOLATION ON APWAS-A AND APWAS-B DISABLED BY DE-BUBRGIZING OF RELAY APWI,		HANNAT COMLEGE OF BEOADOAN	STSTEM UNTIL BLOVDOWN ISOLATION VALVES CLOSED REMOTE-HANUALLY	

## EMBRGENCY CORE CO STATE STEM SINGLE PAILURE ANALYSIS SEM ONOPRE UNIT 1 SORT FOR BLECTRICAL/ACTUATION DEPENDENCIES

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	DBAICS ID	COMPONENT ID	PAILURE HODE	LOCAL BPPECTS AND DEPENDENT PAILURES	MBTHOD OF DBTBCTION	INSERBAT COMPROSATING PROVISIONS	EPPECT ON ECCS	BEMARES
12.9.07.03.1 HOTOR OPERATED DISCONNECT		125VDC BUS \$1 (12-132)	VOLTS LOW	MOTOR OPERATED DISCONNECT CANNOT BE OPERATED FROM CONTROL ROOM. POSITION SIGNAL	PBRIODIC TESTING	NOME REQUIRED FOR SIS, REPAIRS OR ADDITIONAL DG FUEL REQUIRED FOR C-IPME RELATED (SIS)LOP		BOTOR OPERATED DISCONNECT CAN BE OPERATED MANUALLY VIA ATTACEED HAND-CRANE, HOVEVER,
				RBLATS IR AND IR-1 PAIL AS-IS (LATCHING TYPS), POTRNTIALLY DISABLING RECLOSURE OF SUYD BREES 1612 IND 8018 OR LOVATS			TRANSPER BUS \$10/20 FROM DGs FOR SISLOP RVENT INVOLVING C-IPHE RELATED LOP	SAAD BEEES AITT SLITT BFOCK BECTORNER OL ENTERFOCE LEGIT BETTE
12.6.08.10.1 SW	GR #1	125VDC BUS #2	VOLTS LOW	LOSS OF TRAIN B CONTROL POWER	LOCAL INDICATION	SYGR &3 CAN BE RE-EMBRGIZED	REDUCED REGUNDANCY FOR	
	NTROL POWER	(12-204)		TO SYGR \$3			RA-AMERGIZING AVGR (3	
10.2.01.08.1 DG	12	125VDC BU8 #2 [72-210]	VOLTS LOW	LOSS OF DG PIELD FLASH AND GOVERNOR CONTROL POWER	CONTROL ROOM ANNUNCIATION	REDUNDANT TRAIN/DG	LOSS OF TRAIN & DG FOR LOB, LOP	
01.2.04.07.1 HV	-8531	125VDC BUS #2 (72-211)	AOFLE FOR	EV-853A PAILS TO OPEN (REMAINS CLOSED) ON SIS/SISLOP, RELAY	CONTROL ROOM INDICATION	REDUNDANT TRAIN	IMOPERABILITY OF TRAIN B PUMPING FOR SI AND SECONDARY	,
				83-2 PAILS OPP, DISABLING TRAIN B PW PUMP SUCTION VALVE CLOSED PROTECTIVE TRIP			PRCIEC	
01.72.05.06.1 BV	-8541	125 VDC BUS 82 (72-211)	VOLTS LOW		CONTROL BOOM INDICATION	REDUNDENT TRATH FOR PLOW. CONDENSATE, BEATER DRAIN PUMP TRIPS AND DISCRARGE VALUE	INOPRESECTIVE OF TRAIN B PUMPING FOR SI AND SECONDARY RECIRC	
01.2.07.05.1 BV	-#51a	125VDC BUS #2	VOLTS LOW	TRAIN B PW PUMP SI PLOW PATE	CONTROL ROOM INDICATION	INTERLOCE PREVENT CONDENSATE INJECTION REDUNDANT TRAIN FOR SI, MONE	INOPERABILITY OF TRAIN B	
		(72-211)		BLOCKED	CONTROL STATE OF THE STATE OF T	BEQUIRED FOR RECORDIES RECIRC		
01.2.08.03.1 EV	-852A	125VDC BUS #2	VOLTS LOW	SI PLOW PROM BOTH TRAINS DIVERTED INTO NON-SHISHIC	CONTROL BOOM INDICATION PRRIODIC TRSTING	REDUNDANT PW ISOLATION VALVES PCV-456, 457, 458, CV-142,	SSI DELIVERY TIME INCREASED, SI	VALVE OPEN NORMAL FOR
				PORTION OF MAIN PM BRADER UNTIL BACKUP VALVES CLOSED.		143, 144, MOV-20, 21, 22 ASSUMBD IN LOCA/MSLB ANALYSES.	NON-SEISHIC PORTION OF PW	
A1 9 6A A4 1 MA		125VDC BUS #2	VOLEG LOW	REQUIRED POSITION FOR SECONDARY RECIRCULATION	COMPANI DOOM ENDICATION	DURING SI DURING SI	INJECTION REDUCED TO 1/2 LOOPS	
01.2.09.04.1 HO		(72-211)	AOLIS CON	INJECTION PATE NOT AUTOMATICALLY ALIGNED TO RCS LOOP A ON SIS/SISLOP	CONTROL ROOM INDICATION	REDUNDANT PLOW PATHS TO BCS LOOPS IN AND C FOR SI, NOWE REQUIRED FOR LO-LO BWST LEVEL OR FOR SECONDARY RECIRC	FOR LOCA (ONE LOOP SPILLING), 1/1 LOOPS FOR MSLB (LOOP C BLOCERD DUB TO COMMON-CAUSE	
							PAILURE). HOME POE AUTO-TERMINATION OF SI ON LO-LO RWST LEVEL OR FOR SECONDARY RECIRC	
01.4.09.04.1 PC CY	V-457,458 -142,143,144	125VDC BUS #2 (72-211)	VOLTS LOW	MAIN PM CONTROL VALVES TO 8/G B, C AND BYPASS VALVES TO 8/G	CONTROL BOOM INDICATION	BEDUNDANT ISOLATION VALVES FOR PCVS (MOV-20, MOV-22), PEDUNDANT SOLENOIDS FOR BYPASS	REDUCED REDUNDANCY FOR MAIN PW ISOLATION	VALVES CAN BE MANUALLY CONTROLLED FOR SECONDARY ERCIRC
				A, B, C WILL NOT CLOSE ON TRAIN B SIS/SISLOP		ANTARB (SA-143' SA-5143' ANTARB (SA-143' SA-5143'	•	BUILD
08.2:12:01:1 SB	9 2	125VDC BUS #2 (12-212)	AOT13 FOA	SBG 2 DISABLED	CONTROL ROOM INDICATION	REDUNDANT SEQ/TRAIN	TRAIR B LOB/LOP/BIS/SISLOP TO TRAIN BELOP TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TO TRAIN BELOP TRAIN	BEQ OUTPUT BELAYS ARE BUBBCIZE TO ACTUATE

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ITBH #	DRVICE ID	COMPONENT ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INSERBLY COMPRESSIONS PROVISIONS	BPPRCT ON BCCS	REMARES
02.4.12.01.3	CA-304	125VDC BU9 #2 (72-220)	VOLTS LOW	ISOLATES BACKUP MS TO CV-305 INSIDE CONTAINMENT (BLE) BY CLOSING CV-532	CONTROL BOOM INDICATION	LOCAL MANUAL OPERATION OF REDUNDANT STPASS VALVE IN BACKUP M2 SUPPLY	LOSS OF AUTOMATIC NS SACRUP to CV-305	MANUAL BYPASS VALVE LOCATED ON SAPE SIDE OF SEIBLD WALL. ACCESS AND USE BOUNDED BY
03.1.01.03.3	CV-304 CV-305	125VDC BUS #2 (72-220)	VOLTS LOW	ISOLATES BACKUP N2 TO CV-305 INSIDE CONTAINMENT (RLR) BY	CONTROL ROOM ENDICATION	FEGURDANT BYPASS VALUE IN	LOSS OF AUTOMATIC M2 BACKUP TO CV-105	BILBYING DOSE CALCULATIONS MANUAL BYPASS VALVE LOCATED ON SAPE SIDE OF SHIELD WALL.
05.2.07.04.1	SV-601	125VDC BUS #2	VOLTS LOW	CLOSING CV-532 TRAIN B NTDRAZINE ISOLATION	CONTROL BOOM INDICATION	BACKUP NE BUPPLY REDUNDANT TRAIN	INOPERABILITY OF TRAIN B	ACCESS AND USE BOUNDED BY
01.4.11.06.1	99-1024	(72-220) 125VDC BUS 42	VOLTS LOW	VALVE PAILS CLOSED, CANNOT BE TROPENED CIS TRAIN B ACTUATED TO SI	CONTROL ROOM INDICATION	HOME SECULED	NAME ADDITION	
	8V-702C	(12-221)		AVIABS FOOD B VAD C ABRA INOTATION				
01.4.20.05.1	PCV-1115D	125VDC BUS \$2 (72-221) 125VDC BUS \$2	AOTAS FOR	LOSS OF POWER TO TRAIN B CSAS		REDUNDANT TRAIN A CONTROLLERS		
	PCV-1115B	(12-223)		INVESTEES. TRAIN B CONTROLLERS	ANNUNCIATION		CONTROLLERS FOR BACH OF PCV-IIISD/N/P FOR CLE PLOW CONTROL	
12.4.09.16.1	SWGR 82 UNDBRVOETAGR AND CONTROL	125VDC BUS #2 {72-226}	VOLTS LOW	LOCKOUT RBLAYS FOR SWGR \$2, MCC-2, MCC-2A, SWGR \$3, MCC-3 T WILL NOT TRIP AND LOCKOUT THBIR WSR LOADS	PERIODIC TESTING	NOWE FOR SISLOP, MONE REQUIRED FOR SIS, REDUNDANT MAIN TYPE COOLING FOR ALTERNATE OFFSITE SOURCE		BIS/BISLOP INDEPENDENT OF LOCEOUT RELATS. BOI REV BEQD
							TRAIN A BUR YO: UNISOLABLE CCU PLOW BYPASS, LOSS OF LO-LO RUST LEVEL TRIP OF TRAIN A SI/PU.	BON-RESERVITAL SUGE \$5/ACC-3 LOADS PRIOR TO RE-EMBRGIZING SUGE \$3 POST-SIS/SISLOP. RCPs
			•				DEPOYER SOURCE	ALSO LOST, UNIVAILABLE FOR SGTR. MAIN IPHE HAS 2 TRAINS OF COOLING
	SWGR 13 UNDERVOLTAGE AND CONTROL	· · · ·	VOLTS LOW	SWGR \$2," MCC-2," MCC-2A," SWGR " \$3, MCC-3 LOCEOUT BRLATS WILL NOT TRIP AND LOCEOUT TBRIR MSR	PRRIODIC TRATING	NOME FOR SISTOP, NOME FOR ECPS POST-SGTR, NOME OTHERWISE REQUIRED FOR SIS	TRAIN B FOR SISLOP DUE TO 480V SWCE/MCC VOLT DEGRADATION	LOCKOUT RELAYS. BOI REV REQD
		*		LOADS			AND/OR DC OVERLOID, WITH POTBATIAL IMOP OF TRAIN A DUB TO: UNISOLABLE CCW FLOW BYPASS,	RB-BHERGIZING SWGR #3
							LOSS OF LO-LO EVST LEVEL TRIP OF TRAIN A SI/PW. SCPS ALSO UNAVAILABLE FOR SCTE	·
12.1.04.08.1	152-11A04 (BRBAEER)	BUS #14 125VDC CONTROL POWER	AOTI3 FOM	BREE CANNOT BE TRIPPED IF CLOSED OR RECLOSED IF OPEN, RESULTING IN LOSS OF ALTERNATE OPPSITE SOURCE TO BUS \$10	CONTROL ROOM INDICATION	NORMAL OPPSITE SOURCE FOR SIS, REDUNDANT TRAIN POR SISLOP	TRAIN A ALTERNATE OFFSITE SOURCE INOPERABLE, RESULTING IN POTENTIAL LONG-TERM INOPERABLITY OF TRAIN A FOR	
				A. OT IS SOURCE IN DUS \$10 .			SISLOP DUE TO INABILITY TO TRANSPER BUS SIC PROM DG TO OPPSITE BOURCE WITH C-IFNE	
							BELATED LOP	

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		DRÁICE ID	COMPONENT ID	FAILURB MODB	LOCAL RPPECTS AND DRPENDENT PAILURES	DRIBCTION METHOD OF	INUBRENT COMPENSATING PROVISIONS	BPPBCT ON BCCS	BRNARES
	12.1.05.07.1	BUS \$1A MSR LOADS	BUS \$1A 125VDC CONTROL POWER	VOLTS LOW	RCPS A AND C CANNOT BE TRIPPED OR RESTARTED. TIE BRER TRIP UNAFFECTED	CONTROL BOOM INDICATION	BEDUNDANT TRAIN FOR SIS DURING PLANT STARTUP OR FOR SISLOP, NOME REQUIRED FOR SIS DURING NORMAL OPERATION	MARGIN FOR SIS DURING PLANT S/U (W/ TIB BRER 11CO: CLOSED).	OPERITE BOURCE ON TRAIN A.
<u>-</u>									ACCEPTABLE FOR SIS BY VOLTAGE CALCULATION DC-3225 (DC-2225 FOR POST-DCP 3552
. <u> </u> .i	12.2.04.08.1	52-11804 (BREAKER)	BUS \$18 125 VDC CONTROL POWRR	AOT48 FOM	BRIR CANNOT BE TRIPPED IF CLOSED OR RECLOSED IF OPEN,	CONTROL BOOM INDICATION	HORMAL OPPSITE SOURCE FOR SIS,	BUS AIC FROM DG TO OPPRITE W/ C-IPME LOP TRAIN B ALTERNATE OPPRITE SOURCE INOPERABLE, RESULTING IN	COMPIGURATION)  STRUM SPEC ACTION ENTRY REQUIRED FOR THIS COMPITION
					RESULTING IN LOSS OF ALTERNATE OFFSITE SOURCE TO BUS \$20			POTENTIAL LONG-TERM INOPERABILITY OF TRAIN B POR SISLOP DUR TO INABILITY TO TRANSPER BUS \$2C PRON DG TO	
, , , ,	18.2.05.07.1	SE LOADS	BUS \$18 1254DC Contról Pourr	VOLTS LOW	RCP 8 AND BICITER CANNOT 88 TRIPPED OR RESTARTED, SIS/SISLOP TRIP RRLAT 186-SIS	CONTROL BOOM ENDICATION	NONE FOR SIS DURING PLANT	OFFSITE SOURCE WITE C-IPHE RELATED LOP REDUCED ELEC MARGINS ON BOTH TRAINS FOR SIS DURING PLANT S/U (V/ TIR BERES 11061, 12001	STECH SPEC ACTION ENTRY REQUIRED FOR INOP ALTERNATE OPPSITE SOURCE ON TRAIN 3.
.!					CANNOT BE BHERGIZED TO TRIP RCP 4, B AND C. TIE BREE TRIP UNAPPROTED		BRQUIRED FOR SIS DURING NORMAL OPERATION	CLOSED). TRAIN B ALT OPPSITE SOURCE THOP, CAUSING POTENTIAL LONG-TERM INOP OF TRAIN B FOR SISLOP DUR TO INABILITY TO EPER	PAILURE TO TRIP BCP4 SHOWN ACCEPTABLE FOR SIS BY BUS VOLTAGE CALCULATION DC-3325 (DC-3215 FOR POST-DCP 3552
	09.1.04.05.1 B	US \$1C, 2C Ndbrvoltage	BUS PIC	VOLTS LOW	RELATS 127-31 AND 127-91 DE-ENREGIZE. TRÂIN Á CSAS TIME DELAT RELAT APDR, AVDR LOGIC BECOMES 1/2 ON BUS 2C UV	CONTROL BOOM ANNUNCIATION	REDUNDANT INPUTS FOR SIS, EXCONDANT TRAIN FOR SISOP	BUS SEC FROM DG TO OFFSITE W/ C-IPHR LOP REDUCED RELIABILITY OF TRAIN A CSAS FOR SIS AND SISLOP CONDITIONS	
					LAPUTS				PAILURE IS NOT CREDIBLE WITH CONCURRENT BUS 2C LOB, SINCE THAT WOULD BE A DOUBLE PAILURE
; ; : 	09.2.04.05.1 B	US \$1C, 2C HDBRVOLTAGE	809 BIC	VOLTS LOW	DB-BNBRGIZB. TRAIN B CSAS TIMB DBLÁT BBLÁT BPDR, BVDR LOGIC BBCOMBS 1/2 ON BUS 2C UV	CONTROL ROOM ANNUNCIATION	REDUNDANT TRAIN FOR SISLOP	REDUCED RELIABILITY OF TRAIN B COMDITIONS	SCHARGO TRAIN B CRAS LOADING WILL FOLLOW BUS 2C VOLTAGE RECOVERY AND SEQ 2 LOAD GROUP D DELAY
	70171.03.10.1 G	-508	BUS \$1C 125VDC CONTROL POWER	VOLTS LOW	INPUTS TRAIN A SI PUMP CARNOT BE STARTED OR TRIPPED	CONTROL BOOM INDICATION	SECONDARY RECIRC, REDUNDANT BOY-850A/B/C CLOSURE FOR LO-LO	INOPERABLICITY OF TRAIN A PUMPING FOR SI AND SECONDARY RECIRC, REDUCED REDUNDANCY FOR AUTO-TRAINMENTION OF SI ON LO-LO	
)   	01.1.06.15.1 G	- 38	BUS \$1C 125VDC CONTROL POWER	VOLTS LOW	TRIPPED OR RESTARTED, AND ITS TRIPPED TO	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT TRAIN FOR SI AND SECONDARY RECIEC PUMPING, BACEUP MANUAL MINIFLOW	RWST LEVEL *INOPERABILITY OF TRAIN A PUMPING FOR SI AND SECONDARY RECIEC, OR PARTIAL DIVERSION OF	*RVST CALCULATIONS INCLUDE CV-36/37 PATEURE, LOCAL MANUAL
					CONDENSER		•	TRAIN A PLOW TO COMDENSER WIA	MINUTES. LOCATION NOT ACCESSIBLE WITE THE SOURCE

## BHERGENCY CORE COORS TSTEM SINGLE FAILURE ANALTSIS SAN ONOFRE UNIT 1 SORT FOR BLECTRICAL/ACTUATION DEPENDENCIES

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	LTBU \$	DRAICE ID	COMPONENT ID	FAILURE HODE	LOCAL REPECTS AND DEPENDENT FAILURES	MBTHOD OF DBTBCTION	INBERRNT COMPRESATING PROVISIONS	BFFBCT ON BCC8	REMARIS
								. •	
!	0171711.04.1	G-10, G-10	BUS \$1C 125VDC CONTROL POWER	VOLTS LOW	TRAIN A CONDENSATE PUMPS WILL NOT TRIP ON SEQ OR BUS UNDERVOLTAGE SIGNALS	CONTROL ROOM INDICATION	NOME REQUIRED FOR SI PLOY, CLOSURE OF SUCTION VALUE BY-854B PREVENTS COMDENSATE	NOME FOR INJECTION PLON. REDUCED RELIABILITY AGAINST INJECTION OF CONDENSATE BY	
:	01.1.12.95.1	G-368	BUS AIC 1254DC CONTROL POWER	VOLTS LOW	TRAIN A BRATER DRAIN PUMP WILL NOT TRIP ON SEQ OR PW PUMP	CONTROL ROOM INDICATION	INJECTION NOWE REQUIRED FOR SI PLOY. CLOSURE OF SUCTION VALVE	TRAIN A HONE POR INJECTION PLOW. REDUCED REDUNDANCY AGAINST	
	02.1.06.14.1	G-88	BUS \$1C 125VDC	VOLTS LOW	TRIP SIGNALS  TRAIN A CHARGING PUMP CANNOT  BE STARTED IF OFF OR TRIPPED	CONTROL BOOM INDICATION	NY-8548 PREVENTS CONDRUSATE Injection Bedundant train	INJECTION OF CONDENSATE BY TRAIN A INOPERABILITY OF TRAIN A CHARGING FUNP FOR INJECTION,	
•	08.3.01.07.1	BUS #IC	BUS \$1C 125VDC	VOLTS LOW	IP RUNNING AUI RELAYS 127-31, 127-71,	CONTROL BOOM INDICATION	BEDUNDANT SEQ/TRAIN	CLR AND MLR TRAIN A DISABLED FOR BOTH	RELATE ARE DE-ENERGIZE TO
-			CONTROL POWER	7	127-91, 127-111 TRIPPED. 989 1 INITIATES LOB, 889 2 LOP LOGIC			SIS/SISLOP BY LOB TRIP OF LOAD GROUP A. REDUCED REDUNDANCY AGAINST SEQ 2 LOP/SISLOP	ACTUATE. PAILURE PERVENTS START OF LOAD GROUP A LOADS DURING SIS AND BETRIPS DG
',. <u> </u>	10.1.02.05.1	DG #1 BRBAEBR		AOFLE FOR	BECOMES 1/2 ON BUS 2C UV IMPUTS IMABILITY TO TRIP DC BREE IF	PERIODIC TESTING	NONE FOR BEER CLOSED,	SINOPERABILITY OF TRAIN A FOR	BREARER DURING SISLOP *REQUIRES ENTRY TO TRCH SPEC
1	<u> </u>		CONTROL POWER		CLOSED OR TO CLOSE DG BREE IF		REDUNDANT TRAIN/DG FOR BREE OPEN		EBLIEF DURING DG TRETING UNLESS SIELOP LOGIC CHANGED TO
`;	· 			and the second s			. '	UNDERVOLTAGE, IF BRIE INITIALLY CLOSED. YEATH D UNAPPECTED FOR SIS	
	12.1.03.08.1	(BREAKER)	BUS #1C 125VDC CONTROL POWER	VOLTS LOW	BREATER CANNOT BE TRIPPED OR RECLOSED, DEGRADING TRAIN A SISLOP RESPONSE	CONTROL BOOM INDICATION	REDUNDANT TRAIN FOR SISLOP, NORE BEQUIRED FOR SIS	INOPERABILITY OF TRAIN A FOR SISLOP, NORE FOR SIS	PAILURE TO TRIP 11CO2 WOULD  RESULT IN EMBRGIZING C-EPHR  FROM DG \$1 VIA BUS \$1C
·	12.1.07.12.1	152-11CO1 (BREAKER)	BUS #1C 125VDC	VOLTS LOW	BREATER CANNOT BE TRIPPED OR RECLOSED, DEGRADING TRAIN A	CONTROL ROOM INDICATION		*INOPERABILITY OF TRAIN A FOR SISLOP, AND YEARN S POR SISLOP	*SINCE MAIN GENERATOR COASTSONS ON APPROTED BUSSES
ʻ. ——	·		<u>.</u>		SISLOP RESPONSE AND PREVENTING TRAIN B SISLOP IF BREAKER INITIALLY CLOSED TO ALIGN BUS		POR TRAIN A INITIALLY ALIGNED TO ALTERNATE OPPSITE SOURCE	ALTERNATE OFFSITE SOURCE	PREVENTS SISLOP DETECTION, WITH OR WITHOUT A CONCURRENT SINGLE PAILURE, TRCE SPEC
					FIG TO ALTERNATE OFFSITE SOURCE				3.0.3 ACTION BUTRY IS REQUIRED WEENEVER BUS \$1C OR 2C IS
		,				,			ALIGHED TO THE ALTERNATE OPPHIRE SOURCE
	12.1:09.02.1	(BRBAKER)	CONTROL POWER	•	BREAKER CANNOT BE TRIPPED OR BECLOSED	•	NORE ASSOCIATED	HORE	DO LOADING AND DUG HOLGARD
	12.1.10.06.1	(BEBARBE)	BUS \$1C 125VDC CONTROL POWER		BREATER CANNOT BE TRIPPED OR RECLOSED	CONTROL ROOM INDICATION	BEDUNDANT TRAIN FOR SIS, TRAIN B TRIP OF BREE 52-1303 FOR SISLOP, UPS FOR BEQUIRED LOADS	SIS, REDUCED RELIABILITY POR	DC LOADING AND BUS VOLTAGE CALCULATIONS DO NOT INCLUDE SNGR \$3 LOADS, AND ISOLATION
· · · · · · · · · <sub>i</sub> · ·			· 				C 30 MIN, OPERATOR ACTION >30 MINUTES TO CLOSE 480 V TIE ORER	MORMAL POWER TO SWGR \$3 LOADS	OF SUGR #3 IS REQUIRED FOR MSLE OUTSIDE CONTAINHENT DUE TO UNQUALIFIED MCC-3 IN
j	19 1-19 NB 1	AUS AIC	BUS #1C 125YDC	VOLTS LOW	BUS \$1C PERDER AND THE BRERS	CONTROL ROOM TENICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A	TURBING BLDC CONTROL POWER FROM 11C01
		UNDREVOLTAGE AN			(11CO1 AND 11CO2) AND LOADS WILL NOT TRIP ON BUS \$1C UNDERVOLTAGE OR SISLOP	CONTROL BOOK THAINSTEAM			CUBICLE

#### BHERGENCY CORE COO STEM SINGLE PAILURE ANALYSIS OPER UNIT 1 SORT FOR BLECTRICAL/ACTUATION DEPENDENCIES

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ETBH #	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL BPFECTS AND DEPENDENT PAILURES	DETECTION METHOD OF	INHERRAT COMPENSATING PROVISIONS	EFFECT ON ECCS	REMARKS
12.1.02.04.1	152-1RII (BRBAEBR)	BUS PIC 125VDC CONTROL POWER (@11C14)	AOTAS FOR	C-IPHE I-WINDING BEACTANCE BIPASS BERAIBE CANNOT BE REPOSITIONED. IF OPEN, DEGRADES TRAIN I VOLTAGE	CONTROL ROOM INDICATION	BBDUNDANY TRAIN	BYPASS BREAKER MISPOSITIONED	STECH SPEC ACTION ENTRY REQUIRED WITH BYPASS BREAKER MISPOSITIONED
				COMDITION DURING SIS LOADING TRANSIENT. IF CLOSED, RESULTS				
			•	IN POTENTIAL POR RECESSIVE FAULT CURRENTS DURING DG				
10.11.02.0111	DG #1 BREAKER	- BOS 11C	OPEN	TESTING DG CANNOT ENERGIZE BUS \$10 FOR	CONTROL ROOM INDICATION.	BEDUNDANT TRAIN/DG	A 911, GRY A 11 1 11 14 140 110 A	BORNAL POSITION
		(11614)		LOB, LOP AND SISLOP	PERIODIC TRATING		POWER FOR LOS, LOP AND SISLOP	
10.1.02.01.2	DG #1 BRRAERR	8U8 AIC	CLOSED		CONTROL ROOM INDICATION,	HOME	DECRADED TRAIN A RESPONSE AND	
		(11014)		LOB/LOP/818/818LOP, CAUSING	PERIODIC TESTING		PAILURE OF TRAIN B FOR BIS WITE	
				DEGRADED TRAIN A RESPONSE DUE TO SIS BLOCE LOADING AND				RELIEF DURING DG TESTING UNLESS SISLOP LOGIC CRANGED TO
· · · ·				PAILURE OF TRAIN B DUE TO				BIBLOB
				DELATED OR PREVENTED BUS ALC			·	
01-1:06.02.1	A-98	BUS '\$10	ARRU	UNDERVOLTAGE SIGNAL	ADDIANIA #2401UA	WHEN THE REST OF STREET	THAN DO INTY THE APPROXY	
VI.1.V8.U2.1	Q-38	(152-11C04)	OPEN	TRAIN A PW PUMP PAILS TO RESTART FOR SI (ON SIS/SISLOP) OR FOR SECONDARY RECIRC	PERIODIC TESTING	BEDUNDANY YRATH	INOPERABILITY OF TRAIN A PUMPING FOR SI AND SECONDARY RECIRC	
				(MANUALLY) OR TREPS APTER				
01.1.05.02.2	G-1B	BUS #1C	CLOSED	TRAIN A PN PUMP PAILS TO TRIP	PERIODIC TRATING	REDUNDANT TRAIN FOR SI AND	INOPERABILITY OF TRAIN A	MORMAL POSITION. BREAKER
	· ·-	(152-11C04)		DURING SIS/SISLOP STARTING			PUMPING FOR SITAND SECONDARY	
				SEQUENCE OR ON LO-LO RWST			RECIRC, INCREASED RESPONSE TIME	
				LEVEL. MAINTAINS DIFFERENTIAL	The same of the same statement of the same	BAST TRAIT		SIS/SISLOP. PUMP UNAVAILABLE
				PRESSURE ON EV-851B VALVE DISC AND DEGRADES TRAIN A BUS				FOR SECONDARY BECIEC DUE TO
				VOLTAGES DURING LOAD SEQUENCE			• •	PUMP TRIP ON LO-LO RWST LEVEL
							FO-FO-BASA FRASE	
01.1.01.02.1	G-508	BUS #1C (152-11C05)	OPBN .	TRAIN A SI PUMP FAILS TO START OR TRIPS APTER STARTING	PBRIODIC TESTING	REDUNDANT TRAIN		MORMAL POSITION. SI PUNP BREAKER.
01.1.03.02.2	G-50B	BUS \$1C	CLOSED	TRAIN A BI PUMP STARTS, OR	CONTROL ROOM INDICATION	NOME REQUIRED FOR SI.	RECIEC NONE FOR SI, REDUCED REDUNDANCY	PUMP COULD BE UNAVAILABLE FOR
		(152-11C05)		PAILS TO TRIP ON LOW RUST.	<del></del>		FOR AUTO-TREMIMATION OF SI ON	
				CBAST		FOR LO-LO RUST LEVEL,	LO-LO RUST LEVEL, INOPERABILITY	
						REDUNDANT TRAIN FOR SECONDARY		DEPLETION OF RUST BY
01:11:11.01:1	G-10.10-10	BUS BIC	OPBN	1 OF 2 CONDENSATE PUMPS	CONTROL ROOM INDICATION	BECIEC BEQUIESD		CONTAINMENT SPRAY TRAIN A POWERED CONDENSATE
		(152-11C06) (152-11C08)	ur	TRIPPED TO TRAIN A PW PUMP				PUMP WOULD BE TRIPPED ON SIS/SISLOP IF RUNNING
01:1:11:01:2	G-10, G-10	- BOS \$1C	CLOSED	1 OF 2 CONDENSATE PUMPS CANNOT	PERIODIC TESTING	NONE REQUIRED FOR SI FLOW,	NONE FOR INJECTION FLOW.	MORNAL POSITION
		(152-11C06) (152-11C08)		BE TRIPPED TO TRAIN A PW PUMP		CLOSURE OF SUCTION VALVE	BROUCED REDUNDANCY AGAINST	
		(196-11008)		SUCTION		EV-854B PRBVBNTS CONDENSATE	INJECTION OF CONDENSATE BY	
						INCRUITUR	inte w	

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·	1788 4	DBAICB ID	COMPONENT ID	PAILURB NOOB	LOCAL BPPBCTS AND DEPENDENT PAILURES	METHOD OF Detection	INBERENT COMPRHSATING PROVISIONS	BPFBCT ON BCC8	REMARES
·	01.1.12.01.1	-	BUS \$1C {152-11C09} BUS \$1C	OPBN	BRATER DRAIN PUMP TRIPPRD TO TRAIN A PW PUMP SUCTION BRATER DRAIN PUMP CANNOT BR	CONTROL ROOM INDICATION PRRIODIC TRATING	NONE REQUIRED  NONE REQUIRED FOR SI FLOW.		HEATER DRAIN PUMP TRIPPED ON SIS/SISLOP MORNAL POSITION
,	1.1 1.11.11.71.11		(152-11009)	000480	TRIPPED TO TRAIN A PW PUMP SUCTION	100100100100100100	CLOSURE OF SUCTION VALUE BY-854B PREVENTS CONDENSATE INJECTION	BEDUCED REDUNDANCY AGAINST INJECTION OF CONDENSATE BY TRAIN A.	3-5-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-
	02.1.06.02.1		BUS \$10 (152-11001)	OPBN	TRAIN A CHARGING PUMP TRIPS, OR PAILS TO START ON SIS/SISLOP IF SELECTED	CONTROL BOOM INDICATION, PERIODIC TESTING	REDUNDANT PUMP/TRAIN	INOPERABILITY OF TRAIN A PUMPING FOR CLE AND BLE PRIMARY PATH	
	02.1.06.02.2	G-88	BUS \$10 (152-11007)	ČLOŠBO	TRAIN A PUMP STARTS OR FAILS TO TRIP ON SIS/SISLOP IP SELECTED. MOY-1100C UNAPPECTED	CONTROL ROOM INDICATION, PERIODIC TESTING	HOA-1100C CTOSES VS ERÓNIESO	CHARGING PUMPS DURING INJECTION	HOV-1100C POWER TO SAME TRAIN
!									AS CHARGING PURP SELECTED TO START, MITH OTHER TRAIN CHARGING PURP TRIPPED AND
	09.1.04.06.1	BUS \$1C, 2C UNDBRVOLTAGE	BUS \$2C	AOTAS FOR	RELATS 127-41 AND 127-101 DE-BUBEGIZE. TRAIN A CRAS TIRE DELAY BELAY APDE, AVDE LOGIC BECOMES 1/2 ON BUS 1C UV	CONTROL ROOM ANNUNCIATION	REDUNDANT INPUTS FOR SIS, REDUNDANT TRAIN FOR SISLOP	REDUCED RELIABILITY OF TRAIN A CSAS FOR SIS AND SISLOP COMDITIONS	LOCKED OUT ON SIS/SISLOP TRAIN A CSAS LOADING WILL FOLLOW BUS IC (TRAIN A) WOLTAGE RECOVERY AND SEQ 1 LOAD GROUP D DELAY
	- 09:2:04.06:1	BUS 11C, 2C UNDERVOLTAGE	BU9 \$20	VOLTS LOW	IMPUTS RELATS 127-81 AND 127-122 DR-BUBRGIZE. TRAIN 8 CSAS TIME DRLAY RELAY SPOR, BYOR LOGIC	CONTROL BOOM ANNUNCIATION	REDUNDANT INPUTS FOR SIS, REDUNDANT TRAIN FOR SISLOP	CSAS FOR SIS AND SISLOP	TRAIN B CSAS LOADING WILL POLLOG BUS IC (TRAIN A)
			·		BECOMES 1/2 ON BUS 1C UV INPUTS				LOAD GROUP D DELAY. THIS PAILURE IS NOT CREDIBLE WITH CONCURRENT BUS 1C LOB, SINCE THAT WOULD BE A DOUBLE FAILURE
:	01.2.03.10.1	G-50A	BUS \$2C 125VDC	VOLTS LOW	TRAIN B SE PUMP CANNOT BE	CONTROL ROOM INDICATION	REDUNDANT TRAIN FOR SI AND	INOPERABILITY OF TRAIN B	8CBNARIO .
			CONTROL POWER		STARTED OR TRIPPED			PUMPING FOR SI AND SECONDARY ERCIRC, REDUCED REDUNDANCY FOR AUTO-TERMINATION OF SI ON LO-LO ENST LEVEL	
<u></u>	01.2.06.15.1	G-3A	BUS \$2C 125VDC CONTROL POWER	VOLTS LOW	TRAIN B PW PUMP CANNOT BB TRIPPED OR RESTARTED, AND ITS MINIPLOW REMAINS ACTOMED TO	CONTROL ROOM INDICATION, PRRIODIC TESTING	REDUNDANT TRAIN FOR SI AND SECONDARY RECIEC PUMPING, BACKUP MANUAL MINIPLOW	*INOPERABILITY OF TRAIN B	*RWST INVENTORY CALCULATION INCLUDES CV-36/37 PAILURE, LOCAL NAMUAL BACKUP ISOLATION
					CONDENSER		ISOLATION VALVES (PWS-472, 476) POR EWST INVENTORY	TRAIN B PLON TO CONDENSER VIA	APTER 30 HINUTES. LOCATION NOT ACCESSIBLE WITE THE SOURCE TREES
	01.2.11.04.1	G-1A, G-1B	BUS \$2C 125VDC CONTROL POWER	AOT43 FOR	TRAIN B CONDENSATE PUMPS WILL NOT TRIP ON SEQ OR BUS UNDERVOLTAGE SIGNALS	CONTROL ROOM INDICATION	NONE REQUIRED FOR SI PLOY, CLOSURE OF SUCTION VALVE BY-851A PREVENTS CONDENSATE	NONE FOR INJECTION PLOW.  REDUCED RELIABILITY AGAINST  [NJECTION OF CONDENSATE BY	
	01.2.12.05.1	G-36A	BUS \$2C 125VDC CONTROL POWER	AOF12 FOA	TRAIN B HEATER DRAIN PUMP WILL MOT TRIP ON SEQ OR PW PUMP TRIP SIGNALS	CONTROL ROOM INDICATION	INJECTION  NONE ERQUIERD FOR SI PLOW.  CLOSURE OF SUCTION VILUE  EV-8541 PREVENTS CONDENSATE INJECTION	TRAIN B  NONE FOR INJECTION PLOY.  REBUCES RESUNDANCY AGAINST INJECTION OF CONDENSATE BY TRAIN B	

## BHERGENCY CORE CONSTITUTE SINGLE PAILURE ANALTSIS ONOPER UNIT 1 SORT FOR BLECTRICAL/ACTUATION DEPENDENCIES

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	ITBH #	DBAICE ID	COMPONENT ID	PAILURE MODE	LOCAL BPFECTS AND DBPENDENT PAILURES	MBTHOD OF Detection	INHERENT COMPRESATING PROVISIONS	BPPECT ON ECCS	RBHARES
	02.2.06.14.1	G-8A	BUS 12C 125VDC CONTROL POWER	VOLTS ŁOW	TRAIN B CHARGING PUMP CANNOT BR STARTED IP OPP OR TRIPPED IP RUNNING	COMPROL ROOM INDICATION	BEDUNDANT TRAIN	INOPERABILITY OF TRAIN B CHARGING PUMP FOR INJECTION, CLR AND BLR	
· -	08.3.02.07.1	Bus 12c	BUS \$2C 125VDC CONTROL POWER	VOLTS LOW	AUX RBLATS 127-41, 127-81, 127-101, 127-121 TRIPPBO. 8BQ 2 INITIATES LOB, 8BQ 1 LOP	CONTROL ROOM INDICATION	BEDUMDANT SEQ/TRAIN	TRAIN B DISABLED FOR BOTH SIS/SISLOP BY LOB TRIP OF LOAD GROUP A. REDUCED REDUNDANCY	START OF LOAD GROUP A LOADS
	10.2.02.05.1	DG #2 BRBAERR	BUS \$2C 125VDC CONTROL POWER	AOTIS FOR	LOGIC BECOMES 1/2 ON BUS 10 UV INPUTS INABILITY TO TRIP DG BRER IP CLOSED OR CLOSE DG BRER IF		NONE FOR BRIE CLOSED,  BROUNDING FREIN/DO FOR BREE	AGAINST SEQ 1 LOP/SISLOP SINOPERABILITY OF TRAIN 8 FOR SIS AND SISLOP, WITH CONCURRENT	
					OPBN		OPEN	INOPERABILITY OF TRAIN A DUE TO DELAYED OR PREVENTED BUS \$2C UNDERVOLYAGE, IP BEER INITIALLY CLOSED. TRAIN A UNAFFECTED FOR	UNLESS SISLOP LOGIC CHANGED TO
		(BRBAEER)	BUS 12C 125VDC CONTROL POWER		BREATER CANNOT BE TRIPPED OR RECLOSED, DEGRADING TRAIN B	CONTROL ROOM TANDICATION	REDUNDART TRAIN POR BISLOP, NORE REQUIRED FOR BIS	SISTON WORE SOR SIS	PAILURE TO TRIP 12CO2 WOULD RESULT IN EMBEGIZING C-IPHE PROM DG \$2 VIA BUS \$2C
!	12:2:07:12:1	152-12CO1 (BRBAEBR)	BUS 12C 125VDC CONTROL POWER	VOLTS LOW	BREATER CAMBOT BE TRIPPED OR RECLOSED, DEGRADING TRAIN B SISLOP RESPONSE AND PREVENTING TRAIN A SISLOP IF BREATER	CONTROL ROOM INDICATION	REDUNDANT TRAIN FOR SIGLOP, MONE FOR TRAIN B ALIGNED TO ALTERNATE OPPSITE SOURCE	*INOPERABILITY OF TRAIN B FOR SISLOP, AND TRAIN A FOR SISLOP WITH TRAIN B ALIGNED TO ALTREWATE OFFSITE BOURCE	SSINCE MAIN GENERATOR COASTOOM ON APPECTED BUSSES PREVENTS SISLOP DETECTION, WITH OR WITHOUT A CONCURRENT
					INITIALLY CLOSED TO ALIGN BUS 82C TO ALTERNATE OPPSITE SOURCE			automain vridita evosua	SINGLE PAILURE, TECH SPEC 3.0.3 BYTET 19 REQUIRED
				··· · · · · · · · · · · · · · · · · ·					ALIGNED TO THE ALTERNATE OFFSITE SOURCE
; ;	12.2.09.02.1	(BREAEBR)	BUS \$2C 125VDC CONTROL POWER BUS \$2C 125VDC	VOLTS LOW	BREAKER CANNOT BE TRIPPED OR RECLOSED WOME. BREAKER NORMALLY RACKED	CONTROL ROOM INDICATION  CONTROL ROOM INDICATION.	NOME_BEGUIDED	NONE	
	12.2.12.08.1	(BERAEBR) Bus #2c	CONTROL POWER BUS #2C 125VDC	VOLTS LOW	OUT BUS \$2C PREDER AND TIE BREES	PRRIODIC SURVEILLANCE CONTROL ROOM INDICATION	BEDUNDANT TRAIN	INOPERABILITY OF TRAIN B	CONTROL POWER PROM 12CG1
: : : : :	1	UNDBRVOLYAGE AN CONTROL			(12CO1 AND 12CO2) AND LOADS WILL NOT TRIP ON BUS \$2C UNDBRYOLTAGE OR SISLOP				CUBICLE
	12.72.02.704.71	(BRBAESE)	CONTROL POWER (@12C15)	FOLTS LOW	C-IPMR T-BINDING BBACTANCE BTPASS BRBARER CANNOT BB REPOSITIONED. IF OPEN, DEGRADES TRAIN B VOLTAGE	CONTROL BOOM INDICATION	BEDUNDANT TRAIN	HOPERABICITY OF TRAIN B BITE BYPASS BREAKER MISPOSITIONED	TECH SPEC ACTION BATET REQUIRED WITH SPEARER MISPOSITIONED
.! '			<del></del>		CONDITION DURING 813 LOADING TRANSIBNT. IP CLOSED, RESULTS IN POTENTIAL FOR BICESSIVE				
· <u>l</u>	— 10. <b>2</b> :02:01:11	DG`#2 BRBAKBR '-	- BOS \$20 - (12C15)	OPBN · · ·	TESTING DG CARROT EMERGIZE BUS \$2C FOR LOB, LOP AND SISLOP	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDARY TRAIN/DG	LOSS OF TRAIN B 444 AND 480 V	NORMAL POSITION

## BHERGENCY CORE CO SAN ONOFRE UNIT 1 SORT FOR BLECTRICAL/ACTUATION DEPENDENCIES

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ITEM #	DEAICE ID	COMPONENT ID	PAILURE MODE	LOCAL EPPECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERBUT COMPENSATING PROVISIONS	RFFECT ON BCCS	REMARES
"10.2.02.01.2 DG	\$2.BEBYRE	BUS #2C (12C15)	CLOSED	DG BREARBE WILL NOT TRIP ON TOBORD CAUSING DEGRADED TRAIN B RESPONSE DUE	CONTEOL ROOM INDICATION, PREIODIC TESTING	HORE	*DEGRADED TRAIN & RESPONSE AND FAILURE OF TRAIN A FOR SIS WITE LOSS OF OPPSITE POWER	-
				TO SIS BLOCK LOIDING IND FAILURE OF TRAIN A DUE TO DELATED OR PREVENTED BUS \$2C UNDERVOLTICE SIGNAL				UNITERS RESEASE FOR COURSE TO
01.2.06.02.1 G-3	) <b>.</b>	BUS #2C (152-12CO4)	OPBN	TRAIN B PW PUMP PAILS TO RESTART FOR SI (OM SIS/SISLOP) OR FOR SECONDARY RECIRC	PERIODIC TESTING	BEDUNDANT TRAIN	INOPERABILITY OF TRAIN B PUNPING FOR SI AND SECONDARY RECIEC	
**************************************	F +	Brito 840 · · ·	MAGED	(MANUALLY) OR TRIPS APTER STARTING				
	·	BUS #2C (152-12C04)	CLOSED	TRAIN B PU PONP PAILS TO TRIP OURING SIS/SISLOP STARTING SEQUENCE OR ON LO-LO RUST	PERIODIC TESTING	SECONDARY RECIRC, REDUNDANT NOV-850A/B/C CLOSURE FOR LO-LO	INOPERABLETY OF TRAIN B PUMPING FOR SE AND SECONDARY RECIRC, INCREASED RESPONSE TIME	MORMAL POSITION. BREAKER TRIPPED AND RECLOSED ON 11 SEC TIME DELAY POLLOWING
				LEVEL, MAINTAINE DIFFERENTIAL PRESSURE ON EV-851A VALVE DISC AND DEGRADES TRAIN B BUS		SASA TRAST	FOR TRAIN B MOTOR-OPERATED VALVES (MOV-850A, MOV-21), REDUCED RELIABILITY FOR	BIS/SISLOP. PUMP UNAVAILABLE FOR SECONDARY BECIEC DUE TO CAVITATION PAILURE AFTER SI
01.2.03.02.1 G-5	0 A	BUS #2C (152-12COS)	OPBN	TRAIN B SI PURP PAILS TO START	PBRIODIC TESTING	REDUNDANT TRAIN	AUTO-TRRHINATION OF BI ON LO-LO RWST LEVEL INOPERABILITY OF TRAIN B	NORMAL POSITION. SI PUMP
01.2.03.02.2 G-5	OA	BUS #2C	CLOSED	OR TRIPS APTER STARTING TRAIN B SI PUMP STARTS, OR	CONTROL ROOM INDICATION	NONE REQUIRED FOR SI,	RECIRC MONE POR SI, REDUCED REDUNDANCE	BREAKER.  PUMP COULD BE UNAVAILABLE FOR
		(152-12005)	_	PAILS TO TRIP ON LOW RAST		FOR LO-LO BUST LEVEL, REDUNDANT TRAIN FOR SECONDARY		
01.2.11.01.1 G-1	A, G-1B	BUS #2C (152-12C06) [152-12C08]	OPBN	1 OF 2 CONDENSATE PUMPS TRIPPED TO TRAIN B PW PUMP	CONTROL ROOM INDICATION	NORE SEGUISED SECISC	MONB	CONTAINMENT SPRAY TRAIN & POWERED CONDENSATE PUMP MOULD BE TRIPPED ON
01.2.11.01.2 G-1	A, G-18	BUS #2C (152-12C06) (152-12C08)	CLOSED	1 OF 2 CONDRUSATE PUMPS CANNOT BE TRIPPED TO TRAIN B PW PUMP SUCTION	PERIODIC TESTING	NOWE REQUIRED FOR SI FLOW, CLOSURE OF SUCTION VALVE	NONE FOR INJECTION FLOW. REDUCED REDUNDANCY AGAINST	BIS/SISLOP IF RUNNING MORMAL POSITION
01.2.12.01.1 G-3	61	BUS #2C (152-12C09) -	OPBN	BRATER DRAIN PUMP TRIPPED TO	CONTROL ROOM INDICATION	NA-8247 BESASALE CONDENSATE INJECTION NONE SEGUIESD		HEATRE DRAIN PUMP TRIPPED ON SIS/SISLOP
01.2.12.01.2 G-3	6A .	BUS #2C (152-12C09)	CLOSED	BRATER DRAIN PUMP CANNOT BE TRIPPED TO TRAIN B PW PUMP SUCTION	PBRIODIC TRSTING	NOME ERQUIRED FOR SI PLOW. CLOSURE OF SUCTION VALVE	NONE FOR INJECTION PLOW. REDUCED REDUNDANCY AGAINST	MORMAL POSITION
02.2.06.02.1 G-8	A	BUS #2C (152-12C07)	OPBN		CONTROL BOOM INDICATION, PERIODIC TESTING	EV-854A-PREVENTS CONDENSATE INJECTION BEDUNDANT PUMP/TRAIN	INJECTION OF CONDENSATE BY TRAIN B. INOPERABILITY OF TRAIN B	
02.2.06.02.2 G-8	<b>A</b>	BUS #2C (152-12CO7)	CLOSED	SIS/SISLOP IP SELECTED TRAIN B PUMP STARTS OR PAILS	CONTROL ROOM INDICATION,	HOV-1100C CLOSES AS REQUIRED	PUMPING FOR CLR AND BLR PRIMARY PATH POTENTIAL OPERATION OF 2	ADMINISTRATIVELY CONTROLLED
		1195-15001)		TO TRIP ON SIS/SISLOP IF SELECTED. MOV-1100C UNAPPECTED	PERIODIC TESTING			MOV-1100C POWER TO SAME TRAIN AS CHARGING PUMP BELECTED TO
				•	,			START, WITH OTHER TRAIN CHARGING PUMP TRIPPED AND LOCKED OUT ON \$19/\$18LOP

# SHERGENCY CORE CO STATE SINGLE FAILURE ANALYSIS SAN UNOPER UNIT 1 SORT FOR ELECTRICAL/ACTUATION DEPENDENCIES

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ITEM & DEVICE ID	COMPONENT ID	FAILURE MODE	LOCAL RPPECTS AND DEPENDENT PAILURES	METHOD OF DRIECTION	INSERBUT COMPRUSATING PROVISIONS	EPPECT ON ECCS	PRHADES
01.4.[0.04.1 MOV-1204	MCC-1 (42-1127)	VOLTS LÓN	POTENTIAL PARTIAL DIVERISON OF BOTH TRAINS OF SI PLOW TO APW STSTEM (G-108 OPF) OR		APU LOGIC, VALVES AFU-304 AND HOV-1202 PREVENT SI DIVERSION. HV-852A/B PREVENT INJECTION OF	FLOW DIVERSION AND INJECTION OF	*CROSS-TIE PROM APW PUMP G-103 TO MAIN PW BEADER. ACCEPTABILITY REQUIRES: 1} APW
			INJECTION OF APP INTO MAIN PU BRADER (G-103 ON)		CONDENSATE TO ECS		LOGIC TO PREVENT TRAIN A START UNLESS TRAIN B FAILED AND 2) DUAL FAILURE OF MOV-1204 OPEN
AL "THE IS TO SEE THE SECOND							PLUS APW TRAIN B IS OUTSIDE DESIGN BASIS. APW CHE VALVE NOT SEAT LEAK TESTED
02.1.06.12.1 G-88	MCC-1 (42-1129)	VOLTS LOW	TRAIN A MOTOB-DRIVEN LUBE OIL PUMP WILL NOT START ON LOW BRARING PRESURE WITE PUMP	CONTROL ROOM INDICATION	NOME BEONIES		BOUNDS BY PAILURE OF LUBB OIL PUMP MOTOR. MOTOR-DRIVEN LUBB OIL PUMP MOT CREDITED IN LIBU
02.1.06.13.1 G-88	MCC-1 (42-1135)	VOLTS LOW	WILL NOT START ON SISLOP WITE	PERIODIC TESTING	NONE BEGAIRED		OF SHAPT-DRIVEN PUMP BOUNDS BQ FAILURE OF PAN MOTOR. LUBE OIL FAN COOLER NOT
02.1.07.02.1 MOV-19	MCC-1	VOLTS LOW	POWP RUNNING NOV-19 FAILS AS-IS	CONTROL ROOM INDICATION	SEDUNDANT ANTAS (NOA-18)	REDUCED REDUNDANCY FOR CLR	CREDITED IN LIBU OF STAFT-DRIVEN PUMP
02.1.05.10.1 HOV-1100B	(42-1146) HCC-1	VOLTS LOW	ROA-51008 CVMOL BE OBBARD	CONTROL ROOM ENDICATION	ERDUNDANT VALVE/TRAIN	DISCRARGE FLOW PATH IF FAILURE PRIOR TO REALIGNMENT REDUCED REDUNDANCY FOR CHARGING	
	(42-1147)		REMOTE-MANUALLY OR VIA SIS/SISLOP FOR INJECTION, CLR AND BLR, OR CANNOT BE			PUMP AUCTION BRALIGHBRAS	
05.1.06.02.1 G-200A	MCC-1	OPBN	RB-CLOSED REMOTE-MANUALLY FOR SECONDARY BECIEC TRAIN A SYDRAZINE PUMP FAILS		BEDUNDANT PUMP	INOPERABILITY OF TRAIN A	
95.1.06.02.2 G-2004	(42-1153) MCC-1 (42-1153)	CLOSED	TO START OR TRIPS IF RUNNING TRAIN A SYDRAZINE PUMP STARTS OR PAILS TO TRIP, RESULITING IN	CONTROL ROOM INDICATION	PRESENT FLOW UNTIL REQUIRED.		TO RESULT IN ACTUAL LOSS OF
D1.4.13.02.1 MOV-356	HCC-1	VOLTS LOW	NO SPEECT ON INJECTION  NO SPEECT ON INJECTION	CONTROL BOOM INDICATION	PEDUMPANT TEATH TO PROVIDE NOW REQUIRED	NABUSTAN SASLEM ISOUTATION LOS	TRAIN A BUS DURING STALOP  IMPACT ON COLD LEG RECIRC
92.1.08.02.1 HOV-356	(42-1158) MCC-1 (42-1158)	AOTAS TOR	MOV-356 CANNOT BE REPOSITIONED, RESULTING IN	CONTROL ROOM INDICATION	REDUNDANT PLOW PATES TO RCE LOOPS B AND C FOR CLE	POTENTIAL LOSS OF CLR PLOW PATE TO RCS LOOP A	ADDRESSED IN SECTION 2
			POTRUTTAL TOSS OF 1 OF 3 CLR PATES (IF CLOSED) OR IMABILITY TO ISOLATE PCV-1115A/D (IF				
1.2.03.02.1 NOV-822A	NCC-1 (42-1164)	VOLTS LOW	OPEN) VALVE PAILS AS-IS. IP CLOSED, CANNOT BE ALIGNED POR	CONTROL BOOM INDICATION	REDUNDANT VALVE NOV-8228, REDUNDANT PRIMARY BLR PATH	REDUCED RELIABILITY OF ALTERNATE BLE PATE	
3.2.05.03.1 HOY-813	MCC-1	VOLTS LOW	ALTERNATE BLR PATH TO LOOP C THOT LBG VALVE PAILS AS-IS. IF CLOSED,	CONTROL BOOM INDICATION	BEDUNDANT PRIMARY BLE PATH	LOSS OF ALTERNATE BLR PATH	
	(42-1169)	• -	ALTERNATE BLE PATE CANNOT BE ALIGNED TO LOOP C BOT LEG				

## EMBEGENCY CORE CO TSTEM SINGLE PAILURE ANALYSIS SORT FOR BLECTRICAL/ACTUATION DEPENDENCES

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`.	item #	DRVICE ID	COMPONENT ID	FAILURE MODE	LOCAL BPPECTS AND DBPENDENT PAILURES	METHOD OF Detection	beoatrions Inhrema Combensaling	BPPRCT ON ECCS	REMARES
		MEN RES						William -	
1	61.4.17.02.1	#0A-R17	MCC-1 (42-1170)	VOLTS LOW	NO BPPBCT	CONTROL ROOM INDICATION	NOME ERGOIRED	NOME	
-	03.2.01.02.1	HOV-833	MCC-1 (42-1170)	VOLTS LOW	VALVE PAILS AS-IS	CONTROL ROOM INDICATION	NONE BEGULEED	NORE	
Ĺ	01.1.09.05.1	MOV-850B	NCC-1 (42-1180)	VOLTS LOW	ATTAR AILT NOT OBEN ON TON	CONTROL BOOM INDICATION	LOOPS A AND C FOR SI,	SI PLON REDUCED TO 1/2 LOOPS FOR LOCA (ONE LOOP SPILLING),	
				,	RWST CRURL		ERDUNDANT PUMP TRIPS FOR LO-LO RWST LEVEL, REDUNDANT VALVES (HV-8514/B) FOR SECONDRY	1/1 LOOPS FOR MSLB (LOOP C BLOCKED DUE TO COMMON-CAUSE PAILURE). REDUCED REDUNDANCY	
<u></u>	60 - AAC-1000-78040 (1970-1970-1970-1970-1970-1970-1970-1970-						BECIEC BOURDIES	FOR AUTO-PERSINATION OF ST ON LO-LO RWST LEVEL AND FOR SECONDARY RECIEC	
1	02.1701.02.1		HCC-1 (42-1182)	VOLTS LOW	TRAIN A RECIRC PUMP CANNOT BE	CONTROL ROOM INSIGATION	REDUNDANT TRATH	INOPRRASILITY OF YRAIN A BRCIRC PURPING CAPABILITY	
!	01.4.05.03.1	NOV-22	MCC-1 (42-1183)	VOLTS LOW	PM BLOCK VALVE TO 8/G C CANNOT BR CLOSED BICEPT LOCAL-HANVALLY	CONTROL ROOM INDICATION	(PCV-456 OR NV-852A/8)	REDUCED REDUNDANCY FOR MAIN PW 180LATION TO 8/G C FOR SI AND BECONDARY RECIRC	SECONDARY BECIEC TO PERMIT PLOW CONTROL WIA STPASS VALVE
 									CV-143. VALVE LOCATED IN TURBINE SUILDING AND ACCESSIBLE FOR LOCAL HANUAL CONTROL DURING MSLB INSIDE CONTATMENT
:	06.1.04.03.1	HOV-720B	MCC-1 (42-1107)	VOLTS LOW	VALVE PAILS AS-IS, WILL NOT ALIGN TRAIN A SUC/CCM BY IF	CONTROL BOOM INDICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN A	CONTAINMENT
`i .] .					CLOSED, CARNOT BE CLOSED  RICEPT LOCALLY IF OPEN (EG. FOR SWC. PUMP FAILURE)				
	01:4:03.03:1	HOV-20	HCC-1 (42-1197)	VOLTS LOW	PW BLOCK VALVE TO S/G B CANNOT BE CLOSED BICEPT LOCAL-MANUALLY	CONTROL ROOM INDICATION	REDUNDANT INCLATION VALUES (FCV-457 OR BV-852A/B)	REDUCED REDUMDANCY FOR MAIN PU- ISOLATION TO S/G B FOR SI AND SECONDARY RECIRC	SECONDARY RECIRC TO PERMIT PLOW CONTROL WIA STPASS VALVE
		•							CV-144. VALVE LOCATED IN TURBINE BUILDING AND ACCESSIBLE FOR LOCAL-HANUAL
-									CONTROL IF BREDEC DURING MALE INSIDE CONTAINERNY
-	11.5.01.03.1	UTILITY BUS	MCC-1 (8-1181)	AOTTS FOR	LOSS OF BACKUP SOURCE FROM  BCC-1 TO UTILITY BUS AND VITAL BUSSES 1, 2, 3/34 AND 4	LOCAL INDICATION, PERIODIC TESTING	TRAIN B POWER TO HER PRIMARY AND ALTERNATE PATH VALVES	BEDUCED RELIABILITY OF BLR SWING ALIGNED TO SAPETY RELATED POWER)	•
·	02:4.03:12:1	HOA-1100C	HCC-1 (8-1198)	VOLTS LOW	LOSS OF TRAIN A POWER TO MOV-1100C, RESULTING IN FAILURE TO CLOSE AND LOSS OF	CONTROL ROOM INDICATION	NORE FOR INJECTION. REDUNDANT CRECK VALVE AND CRARGING PUMP FOR CLR AND BLR	LOSS OF CEARGING CAPABILITY DURING INJECTION AND ONE CHARGING PURP DURING CLR AND	REPPECT OF GAS BINDING IN PORTION OF COMMON SUCTION LINE TO REDUNDANT CRARGING PUMP HAS
					TRAIN'A CHARGING PUMP IF PRESELECTED	•		ALE	NOT BERN VERIFIED FOR SUBSEQUENT RECIRC BY TEST OR ANALYSIS
· -	01:1:06.16:11	G-18	MCC-14 (42-11A15)	AOTIS FOR.	COSS OF TRAIN A PW PUMP LUBB	CONTROL ROOM INDICATION	REDURDANT TRAIN	INOPERABILITY OF TRAIN A PUMPING FOR SI AND SECONDARY RECIRC	LUBE OIL PAN COOLER E-118 REQUIRED FOR EITENDED FW PUMP OPERATION DURING SBLOCA OR
					•				Marb inaide containment

### EMBEGENCY CORE CO STATEM SINGLE PAILURE ANALYSIS SIN ONOFRE UNIT 1 SORT FOR BLECTRICAL/ACTUATION DEPRNDENCIES

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 LTBM #	DBAICE ID	COMPONENT ED	FAILURE NODE	LOCAL RPPECTS AND DEPENDENT PAILURES	HETEOD OP Detection	INTERBUT COMPENSATING PROVISIONS	RPPRCY ON RCCS	REMARES
TT. 16.17071.01		icc-le	VOLTS LOV	LOSS OF RESERVIAL REGINE/GENERATOR AUTILIARIES CAUSING DRIATED DG TRIP	CONTROL ROOM ANNUNCTATION	REDUNDANY TRAIN/DG	DELAYED LOSS OF TRAIN A DC POR LOB, LOP AND SISLOP	
 01.4704.03.7	10V-21	HCC-2 (42-1242)	VOLTS LOW	PW BLOCE VALUE TO 8/G A CANNOT LOCAL-MANUALLY	CONTROL BOOM INDICATION	BEDUNDANT ISOLATION VALUES (PCV-456 OR MV-852A/B)	REDUCED REDUNDANCY FOR MAIN FW ISOLATION TO 8/G A FOR SI AND SECONDARY RECIRC	MOV-21 OR PCV-456 CLOSED FOR SECONDARY RECIRC TO PSEMIT PLOW CONTROL VIA BYPASS VALVE
 								CV-141. VALVE LOCATED IN TURBINE BUILDING AND ACCESSIBLE FOR LOCAL-MANUAL
 01.4.14.02.1 1	107-357	MCC-2 - {42-1143}	AOTIS TOA	NO BPPRET ON INJECTION	CONTROL ROOM INDICATION	RORE SECULED	NOMB	CONTROL DURING MELS INSIDE CONTAINMENT IMPACT ON COLD LEG RECIRCULATION ADDRESSES IN
 02.2.08.02.1 H	10V-357	HCC-2 T(2-12(3)	VOLTS LOW	MOV-357 CANNOT BE	CONTROL BOOM INDICATION	REDUNDANT PLOW PATES TO BCS	POTENTIAL LOSS OF CLE PLOW PATE TO RCS LOOP B	SECTION 1
 				POTENTIAL LOSS OF 1 OF 3 CLR PATES (IF CLOSED) OR INABILITY TO ISOLATE PCV-11158/B (IF				
 05.3.04.02.1 1	10V-880	MCC-2 (42=1262)	VOLTS LOW	OPRE)	CONTROL BOOM INDICATION	NOME BEGUIESD	NONE	
 03.2.04.02.1 1	IOV-822B	MCC-2 (42-1266)	VOLTS LOW	VALVE FAILS AS-IS. IF CLOSED, CANNOT BE ALIGNED FOR "ALTERNATE BUR PATH TO LOOP C."	CONTROL ROOM INDICATION	REDUNDANT VALVE MOV-822A, REDUNDANT PRIMARY BLR PATH	REDUCED RELIABILITY OF ALTERNATE BLE PATE	
 03.2.06.02.1 M	IOV-814	MCC-2 (42-1271)	VOLTS LOW	HOT LBG VALVE FAILS AS-IS. IF CLOSED, ALTERNATE BLE PATH CANNOT BE	CONTROL ROOM INDICATION	BEDUNDANT PRIMARY SER PATH	LOSS OF ALTERNATE BLR PATE	
 01.4.18.03.1 1	10 <b>V-834</b>	MCC-2 (42-1272)	VOLTS LOW	ALIGNED TO LOOP C NOT LEG NO REPECT	CONTROL ROOM INDICATION	HOMB BRÖNIBED	NONE	
03.2.08.03.1 H		HCC-2 (42-1272)	VOLTS LOW	VALVE PAILS AS-IS	CONTROL ROOM INDICATION	ROME BEGAISED	ROME	
01.2.09.05.1 2	IOA-820V	HCC-2 (42-1274)	VOLTS LOW	SISASISTOD OF SECTORS ON TOR ATAR AITT NOT OBSE ON TOR	CONTROL BOOM INDICATION	REDUNDANT FLOW PATES TO BCS LOOPS B AND C FOR SI, BEDUNDANT PUMP TRIPS FOR LO-LO	POR LOCA (ONE LOOP SPILLING), 1/1 LOOPS FOR MSLB (LOOP C	
 	······					EUST LEVEL, REDUNDANT VALVES : (EV-851A/B) POR BECONDRY RECIRC BOUNDARY	FAILURE). REDUCED REDUNDANCY FOR AUTO-TERMINATION OF SI ON	
 02.2.04.02.1 M	10V-866B	BCC-2 -(42-1278)	VOLTS LOW	TRAIN B RECIRC PUMP CANNOT BE	CONTROL ROOM INDICATION	REDUNDANT TRAIN	LO-LO RUST LEVEL AND FOR SECONDARY RECIEC INOPERABILITY OF TRAIN S RECIEC PUNPING CAPABILITY	
 02.2.05.10.1 M	IOY-1100D	MCC-2 (42-1280)	VOLTS LOW	MOV-1100D CANNOT BE OPENED BEHOTE-HANUALLY OR VIA SIS/SISLOP FOR INJECTION, CLR	CONTROL ROOM INDICATION	REDUNDANT VALVE/TRAIN	REDUCED REDUNDANCY FOR CHARGING PUMP SUCTION REALIGNMENT	
				AND ELE, OR CANNOT BE RE-CLOSED REMOTE-MANUALLY FOR SECONDARY RECIRC				

### SHERGENCY CORE CO STEM SINGLE PAILURE ANALYSIS OPEN UNIT I SORT FOR RECTRICAL/ACTUATION DEPREDENCIES

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TERM \$ DEVICE ID	COMPONENT ID	PAILURE MODE	LOCAL BPPECTS AND DEPENDENT PAILURES	MBTBOD OF DBTBCTION	INSERSMY COMPRESATING PROVISIONS	RPPRCT ON ECCS	REMARES
01.12.06.116.71 G-31	MCC-2 (42-1282)	VOLTS LOW	LOGS OF TRAIN B PW PUMP LUBE	CONTROL ROOM INDICATION	BEDUNDANT TRAIB	INOPERABILITY OF TRAIN B PUMPING FOR SI AND SECONDARY RECIEC	LUBB OIL FAN COOLER B-17A REQUIRED FOR BITENDED FW PUMP OPERATION DURING SBLOCA OR
06.2.04.03.1 MOV-720A	MCC-2 (42-1288)	AOF13 FOR	VALVE PAILS AS-IS, WILL MOT ALIGN TRAIN B SWC/CCW MX IF	CONTROL BOOM INDICATION	REDUNDANT TRAIN	INOPERABILITY OF TRAIN B	MSLB INSIDE CONTAINMENT
62.78.67.702.1 BoV-18	HCC-2 (42-1294)	VOLTS LOW	CLOSED, CANNOT BE CLOSED BICEPT LOCALLY IF OPEN (EG. POR SWC PUMP PAILURE) MOV-18 FAILS AS-IS	CONTROL BOOM INDECITION	EBDUNDANT VALVE (NOV-19)	BRDUCED REDUEDANCY FOR COLD LEG RECIRCULATION DISCHARGE FLOW PATE IF FAILURE PRIOR TO	
11.5.01.03.2 UTILITY BUS	HCC-2 (8-1238)	VOLTS LOW	LOSS OF POWER TO UTILITY BUS AND BACEUP SOURCE FOR VITAL BUBSES \$1, 2, 3/34 AND 4 PROM	LOCAL INDICATION, PREIODIC TRESTING	NOME FOR SI/RCS INVENTORY DIVERSION OR FOR CLE PUMPING FOR SELOCA. ALTERNATS FEED	BRALIGHBERT  *POTENTIAL UNISOLABLE DIVERSION OF SI/ECS INVENTORY TO ECDT, LOSS OF CLE PURPING CAPABILITY	SPECIFY LOCAL OPERATOR ACTION
			HCC-2		PRON NCC-1 AVAILABLE FOR BLE PRIMARY PAYS	FOR SELECT. REDUCED RELIABILITY OF ELR PRIMARY PAYS	RELATED POWER PROM REDUNDANT
11.6.01.04.1 VITAL BUS \$5/6	MCC-2 (8-1268A)	AOLLA FOR	LOSS OF BACRUP SOURCE PROM	LOCAL INDICATION, PERIODIC	REDUNDANT TRAIN FOR APPROTED	REDUCED RELIABILITY OF VITAL	SUPPORT OF MLR PRIMARY PATH
02.2.06.11.1 G-8A	MCC-2A (42-12A14)	VOLTS LOW	TRAIN B LUBE OIL FAN COOLER WILL NOT START ON SISLOP WITE	TROTING PRRIODIC TRSTING	NONE BEGGIEED	NORS	BOUNDS BY PAILURE OF FAM BOTOR. LUBE OIL FAM COOLER NOT
02.2.06.12.1 G-8A	MCC-2A	VOLTS LOW	PUMP RUMNING TRAIN B MOTOR-DRIVEN LUBE OIL	CONTROL ROOM INDICATION	NOME REQUIRED	NONE	CREDITED IN LIBU OF SHAPT-DRIVEN PUMP BOUNDS BQ PAILURE OF LUBE OIL
	(42-12A16)·	Verification	PUMP WILL NOT START ON LOW BRARING PRESSURE WITH PUMP RUNNING				PUMP NOTOR. NOTOR-DRIVAN LUBR OIL PUMP NOT CREDITED IS LIEU OF SHAPT-DRIVEN PUMP
02.4.03.13.1 Nov-1100C	MCC-2A (42-12A76)	VOLTS LOW	LOSS OF TRAIN B POWER TO MOV-1100C, RESULTING IN PAILURE TO CLOSE AND LOSS OF	CONTROL ROOM INDICATION	NOME FOR INJECTION. BEDUNDANT CHECK VALVE AND CHARGING PUMP FOR CLR AND MER	DURING INJECTION AND ONE	ERPPECT OF GAS BINDING IN PORTION OF COMMON SUCTION LINE TO REDUNDANT CHARGING PUMP BAS
		-	TRAIN B CHARGING PUMP IF			1.0	NOT BREN VERIFIED FOR Subsequent recirc by test or Analysis
05.2.06.02.1°G-2008	HCC-24 (42-12479)	OPBN	TRAIN B BYDRAZING PUMP PAILS TO START OR TRIPS IF RUNNING	CONTROL BOOM INDICATION, PRRIODIC TESTING	REGUNDANY PUMP	INOPERABILITY OF TRAIN 8  STORAZINE PUMPING	
05.2.06.02.2 G-2008	MCC-2A (42-12A79)	CLOSED	TRAIN B HYDRAZIME PUMP STARTS OR PAILS TO TRIP, RESULITING IS OUT OF SEQUENCE BUS LOADING		REDUNDANT VALVE CONTROLS TO PREVENT PLOW DIVIL REQUIRED, REDUNDANT TRAIN TO PROVIDE PLOW FOR SISLOP	BEDUCED RELIABILITY OF TRAIN B BLECTRICAL FOWER FOR SISLOP, BYDRAZINE STREEM ISOLATION FOR SIS AND SISLOP	TO RESULT IN ACTUAL LOSS OF
04.3.06.02.1 CV-142 CV-143 CV-144	HCC-ZA (8-2A29)	AOLLS FOR	MAIN PU BYPASS VALVES REMOTE MANUAL CONTROL DISABLED FOR S/G A/B/C	CONTROL ROOM ENDICATION		RECIRC PLOW CONTROL  RECIRC PLOW CONTROL	SBOI DOES NOT ADDRESS REQUIREMENTS FOR LOCAL CONTROL
1012.01707.1 DG #2	MCC-2B	VOLTS LOW	LOSS OF BSSBNTIAL BNGIMB/GENERATOR AUXILIARIES CAUSING DELAYED DG TRIP	CONTROL ROOM ANNUNCEATION	RAGUNDANT TRAIN/DC	LOSS OF TRAIN S DC FOR LOS, LOP AND SISLOP	

# EMBRGENCY CORE CO. TSTEM SINGLE PAILURE AMALTSIS SAN ONOPRE UNIT 1 SORT FOR ELECTRICAL/ACTUATION DEPENDENCIES

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ITEM 1	DRAICE ID	COMPONENT ID	PAILURE MODE	LOCAL EPPECTS AND DEPENDENT FAILURES	METHOD OF Detection	INHERRY COMPRESSIONS PROVISIONS	BEFRET ON RCCA	BBUARTS
07.4.03.03.1 BG	)V-9	HCC-3 (42-1367)	VOLTS LOW	GATE PAILS AS-IS	LOCAL INDICATION	NOMB BEGALESED	NONE	
07.4.04.04.1 MC	)V-10	HCC-1	VOLTS LOW	GATE FAILS AS-IS	LOCAL INDICATION	NONE BEGUIRED	NONE	
07.4.05.03.1 MC	)V-11	(42-1370) MCC-3 (42-1373)	WOLTS LOW	GATE FAILS AS-IS	FOCAL INDICATION	NOME REQUIRED	HOME	
)7.T.CO.30.T.T.C	)A-17	HCC-3 (42-1376)	AOF13 FOR	GAYA PATLO AS-TS	LOCAL INDICATION	NONE REQUIRED	HOME	
)1.4.15.03.1 BC	)V-358	MCC-3	VOLTS LOW	CAUSES LOSS OF UPS AFTER >30	CONTROL BOOM INDICATION	MONE BEGUIRED	NORE	IMPACT ON COLD LEG
		(42-1385)		HINUTES				RECIRCULATION ADDRESSED IN
5.3.03.05.1 BC	V-113	HCC-3	VOLTS LOW	VALVE CANNOT BE	CONTROL BOOM INDICATION	REDUNDANT CRECE VALVE	REDUCED REDUNDANCY FOR	*CERCE VALVE NOT LEAR TRETED
		(42-1390)		REMOTE-MANUALLY CLOSED FOR THE RECIRCULATION		(CB9-301)	ISOLATION OF ENSY PROM RECIRCULATED SUMP WATER	AS PART OF BECIEC SYSTEM LEARAGE MONITORING PROGRAM
2.4.02.05.1 BC	V-103	HCC-3	VOLTS LOW	VALVE CANNOT BE	CONTROL BOOM INDICATION	REDUNDANT CHRCE VALVE	REDUCED REDUNDANCY POR	SCHECE VALVE BOT LEAR TRATED
		(42-1196)		REMOTE-HANDALLY CLOSED FOR		(CR\$-101)	INOLATION OF RWST FROM RECIECULATED SUMP WATER	AS PART OF RECIEC STSTEM LEARAGE MONITORING PROGRAM
1.3.03.06.1 HO	V-850C	MCC-3 {8-1391}	VOLTS LOW	CAUSES LOSS OF UPS AFTER >30	CONTROL BOOM INDICATION	REDUNDANT PATHS TO LOOPS A AND B POR BY PLOW, REDUNDANT PUMP	INJECTION REDUCED TO 1/2 LOOPS	
		(0-1121)		# I BUT E3		TRIPS FOR LO-LO RWST LEVEL,	AND 2/2 FOR MALB. REDUCED REDUNDANCY FOR AUTO-TERMINATION	PRIOR TO SIS/SISLOP
- ······ · · · · · · · · · · · · · · ·						POR BECOMDING BRCING BOUNDING	OF SI ON LO-LO REST LEVEL AND FOR SECONDARY RECIEC BOUNDARY	
2.3.01.03.1 HC	)Y-358	MCC-3	VOLTS LOW	CAUSES LOSS OF UPS APTER >30	CONTROL ROOM INDICATION		POTENTIAL LOSS OF CLE FLOW PATE	
		— (8-1391) —		MIM. MOV-358 CAMBOT BE REPOSITIONED, RESULTING IM POTENTIAL LOSS OF 1 OF 3 CLR PATHS (IF CLOSED) OR INABILITY TO ISOLATE FCV-1115C/F (IF	·	LOOPS A AND B POR CLR	AO BCR TOOL C	
277703.0671703	454	SWGR #1 125VDC CONTROL POWSR	VOLTS LOW	OPEN) TRAIN A RECIEC PUMP CANNOT BE STARTED IP OFF OR TRIPPED IF RUWNING		BEDUNDARY TRAILS	POTRNTIAL LOSS OF TRAIN A RECIRC PUMPING	
5.1.03706.1°G-	21N	CONTROL POWER	AOT ELTOA	PUMP CANNOT BE STARTED IF OFF OR TRIPPED IF RUNNING	CONTROL BOOM IMPICATION, ANNUNCIATION	BE TRIPPED FOR RECIRC IF	POTENTIAL LOSS OF TRAIN A CONTAINMENT SPRAY AND MYDRAZINE PUMPING OR INABILITY TO TRIP	
6.1.03.11.1 G-	-15A	SWGR \$1 125VDC CONTROL POWER	VOLTS LOW	TRAIN A CCW PUMP CANNOT BE STARTED OR TRIPPED	CONTROL BOOM INDICATION	APPECTED TRAIN FAILS ON) REDUNDANT TRAIN	EPRAY PUMP FOR ERCIRCULATION INOPERABILITY OF TRAIN A CCW PUMP	SRE WIRING DIAGRAM 112790 AND ONE LINE DIAGRAM 5102169 FOR POWER SUPPLY
97.1.03.12.1 G-	-134	SWGR \$1 125VDC CONTROL POWER	VOLTS LOW	TRAIN A SUC PUMP CANNOT BE STARTED OR TRIPPED, TRAIN A LOW DISCEARGE PERSOUR, OVERLOAD AND BUS UNDERVOLTAGE AUTO-START SIGNALS TO G-13B	CONTROL ROOM INDICATION	HON-SIS/SISTOD SARMAS) SAVA CAVABITIAL LOS SAVA CAVABILIA LOS SAVAS CAVABANAS	INOPERABILITY OF TRAIN A SUC, BEDUCED RELIABILITY OF TRAIN B SUC FOR BOH-SIS/SISLOP EVENTS	CORDS CALL

### EMERGENCY CORE CO TOTAL TOTAL SINGLE FAILURE ANALYSIS SORT FOR BLECTRICAL/ACTUATION DEPENDENCIES

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ITEM #	DRAICE ID	COMPONENT LD	PAILURE MODE	LOCAL BPPBCTS AND DBPBNDBHT PAILURES	DETECTION METEOD OF	INTERRUT COMPANSATING PROVISIONS	BPPBCT ON BCCS	REMARKS
12:3:01:07:11	52-1102 (BRBAEER)	SYGR #1 125 VDC CONTROL POWER	AOTIS FOR	BREE CAMOT BE TRIPPED OR RECLOSED	CONTROL ROOM INDICATION	NONE BRÉGIESE	BONB	BRER NORMACLY CLOSED, NOT REQUIRED TO TRIP OPEN RICEPT FOR PAULY PROTECTION OR
				,	·			RE-SMERCIZING ANGE ET PROM SNGR \$3/88T \$3. CAN BE TRIPPED LOCALLY IP MERDED FOR TIE BREE CLOSURE
2.3.02.10.1	52-1103 (BRBAKBR)	SWGR #1 125VDC CONTROL POWER	VOLTS LOW	BREE CANNOT BE TRIPPED OR	CONTROL ROOM INDICATION	INITIALLY OPEN NONE SEGUIDED IN DEED	NOME IF BREER INITIALLY OPEN. SUGR #3 CAN BE RE-EMBRGIZED	STRUE SPEC ACTION BUTSY REQUIRED IF SWGR \$1-3 TIR BRER
2.1.03.02.1 (	G-451	SWGR #1	OPEN		PBRIODIC TESTING	(SAMB AS 2.1.3.1.1)	PRON TRAIN A VIA 52-1303 OR TRAIN B VIA 52-1203 (SAMB AS 2.1.3.1.1)	CLOSED DURING MORMAL OPERATION TO THE PROPERTION TO THE PROPERTION TO THE PROPERTY OF THE PROP
2.1.03.02.2	G-45A	(52-1197) 84GR #1 (52-1107)	CLOSED	START OR TRIPS APTRE STARTING TRAIN A RECIRC PUMP STARTS OR PAILS TO TRIP, RESULTING IN		BEDUNDANT TRAIN	POTENTIAL LOSS OF TRAIN A RECIRC PUMP OR BLECTRICAL POWER	PUMP NORMALLY DRY
				OUT OF SEQUENCE BUS LOADING OR (IF PRIOR TO SUBMBRGENCE) PUMP DAMAGE				
7.7.03.02.7170		SWGR #1 (52-1114)	OPBR	TRAIN A SUC PUMP PAILS TO START OR TRIPS APTER STARTING	PERIODIC TESTING	REDUNDANY YRAIN	INOBBRIBICITY OF ASYLM F ANC.	NORMAL POSITION FOR STANDBY
7.1.03.02.2 (	j-13 <u>4</u>	SVGR #1 (52=1114)	CLOSED	TRAIN A SUC PUMP STARTS OR  PAILS TO TRIP, RESULTING IN  OUT OF SEQUENCE BUS LOADING FOR SISLOP	CONTROL ROOM INDICATION	REDUNDANT TRAIN FOR SISLOP, NONE REQUIRED FOR SIS	POTENTIAL LOSS OF TRAIN A "ELECTRICAL POWER DUE TO OUT OF SEQUENCE BUS LOADING DURING SISLOP, NOME FOR SIS	NORMAL POSITION WITH TRAIN A
571703102.1°C		(52-1119)		TRAIN A SPRAY PUMP PAILS TO "" START OR TRIPS IF RUNNING	PERIODIC TESTING	BEDUNDANY YEATH	THOPERABILITY OF TRATE A PUNPING FOR CONTAINMENT SPRAY AND ALTERNATE BOT LEG RECIRC	
571.03.02.2.0	<b>;-27</b>	SVGR #1 (52-1119)	CLOSED	TRAIN A SPRAY PUMP STARTS OR PAILS TO TRIP, RESULTING IN OUT OF SEQUENCE BUS LOADING	CONTROL ROOM INDICATION	BE TRIPPED FOR RECIRC IF	BLECTRICAL POWER FOR SISLOP, OR INABILITY TO TRIP FOR	BOIS SPECIFY AT MOST I SPRAY PUMP RUNNING IN RECIRC, DUE TO RECIRC PUMP PLOY LIBITATIONS
6.1.03.02.1 G		SVGR #1 (52-1121)	OPBN	POR SISLOP TRAIN A CCW PUMP PAILS TO START OR TRIPS APTER STARTING	PBRIODIC TESTING	(SAME AS 6.1.3.1.1)	RECIRCULATION  (SAME AS 6.1.3.1.1)	NORMAL POSITION FOR STANDBY SERVICE
5.1.03:02:2 G	-151	8VGR #1 (52-1121)	CLOSED	TRAIN A CCM PUMP STARTS OR FAILS TO TRIP, RESULTING IN OUT OF SEQUENCE BUS LOADING	CONTROL ROOM INDICATION	REDUNDANT TRAIN FOR SISLOP, NONE REQUIRED FOR SIS	BLECTRICAL POWER DUE TO OUT OF SEQUENCE BUS LOADING DURING	BORNAL POSITION WITH PURP
2.2.03.06.1 G	i-45B	SWGR #2 125VDC CONTROL POWER	VOLTS LOW	FOR SISLOP TRAIN B RECIRC PUMP CANNOT BE STARTED IF OFF OR TRIPPED IF RUNNING	CONTROL ROOM INDICATION, ANNUNCIATION	REDUMDANT TRAIN	PISTOP, NORE FOR SIS POTRETIAL LOSS OF TRAIN B RECIRC PUMPING	
i.2.03.06.1 G	- 219	SWGR #2 125VDC CONTROL POWER	VOLTS LOW	PUMP CANNOT BE STARTED IF OFF OR TRIPPED IF RUNNING	CONTROL BOOM INDICATION, ANNUNCIATION	BEDUNDANT TRAIN (RUNS IF APPECTED TRAIN PAILS OPP, CAN BE TRIPPED FOR RECIRC IF	POTENTIAL LOSS OF TRAIN B CONTAINMENT SPRAY AND STORAZINE	
.2.03.11.1 G	-158		WOJ ETJOV	TRAIN B CCW PUMP CANNOT BB	CONTROL ROOM INDICATION	APPECTED TRAIN PAILS ON) REDUNDANT TRAIN	PUMPING OR INABILITY TO TRIP  SPRAY PUMP FOR RECIRCULATION  INOPERABILITY OF TRAIN B CCY	

## BMBRGENCY CORE CO. ASTEM SINGLE FAILURE ANALYSIS SAN UNOPER UNIT I SORT FOR ELECTRICAL/ACTUATION DEPENDENCIES

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· `	A MBTI	DEAICE ID	COMPONENT 1D	FAILURB HODE	LOCAL EFFECTS AND DEPENDENT PAILURES	METHOD OF DETECTION	INSERBUT COMPENSATING PROVISIONS	EPFECT ON ECCS	REMARES
<u> </u>	07.2.03.12.1	G-13B	SWCR #2 125VDC CONTROL POWER	VOLTS LOW	TRAIN B SWC PUMP CANNOT BB STARTED OR TRIPPED, TRAIN B LOW DISCHARGE PRESSURE.	CONTROL BOOM INDICATION	REDUNDANT TRAIN (WITH MANUAL START CAPABILITY FOR NON-SIS/SISLOP RVENTS)	INOPERABILITY OF TRAIN B SWC, ARBUCED RELIGIOUS OF TRAIN A	
				., .	OVERLOAD AND BUS UNDERVOLTAGE AUTO-START SIGNALS TO G-13A DISABLED	,	MAN-GISTSTOL SASSIST	SHC FOR NOW-SIS/SISLOP BYENTS	
	12.(.01.09.1	52-1202 (BRBAERR)	SUGR #2 125VDC CONTROL POWER	VOLTS LOW	BREE CANNOT BE TREPPED OR BRCLOSED	CONTROL ROOM INDICATION	NONE BEGNIESD	NONS	BRER WORMALLY CLOSED, MOT REQUIRED TO TRIP OPER BICEPT FOR FAULT PROTECTION OR
; ;		<del></del>							RE-ENERGIZING SWGR \$2 PROM SWGR \$1/83T \$1. CAN BE TRIPPED LOCALLT IF MEEDED FOR TIE BREE
<u> </u>	12.4.02.12.1	52-1203 (BRBAEBE)	SWGR #2 125VDC CONTROL POWER	VOLTS LOW	BREE CANNOT BE TRIPPED OR RECLOSED	CONTROL ROOM INDICATION	NONE REQUIRED IF BREE INITIALLY OPEN	NONE IP BREE INITIALLY OPEN. SUGE \$3 CAN DE RE-ENERGIZED	STECH SPEC ACTION BUTRY CLOSURE CLOSURE
	02.4.23.03.1	PCV-1115D PCV-1115B	SUGR #2 125VDC CONTROL POWER	VOLTS LOW	CONTROLLER SELECTOR VALVES FOR PDV-11150/B/F PAIL IN TRAIN A	CONTROL ROOM INDICATION	REDUNDANT TRAIN A CONTROLLERS		CLOSED DURING MORHAL OPERATION
	02:2:03:02.1	PCV-1115P	(052-1226)	OPBN	POSITIONS, TRAIN B CONTROLLERS CANNOT BE ALIGNED	BRATANTA BRASTUN	DARROW IVA	CONTROLLERS FOR BACE OF PCV-1115D/B/F FOR CLR PLOW CONTROL	
	02.2.03.02.2		(\$2-1207) 8WGR #2 	CLOSED	TRAIN B RECIRC PUMP PAILS TO START OR TRIPS AFTER STARTING TRAIN B RECIRC PUMP STARTS OR		BEDUNDANY TRAIN	INOPERABILITY OF TRAIN B EXCISE PUMPING POTRUTIAL LOSS OF TRAIN B	PUMP NORMALLY DRY
.: 		· ·			PAILS TO TRIP, RESULTING IN OUT OF SEQUENCE BUS LOADING OR (IP PRIOR TO SUBMERGENCE) PUMP			RECYEC PURP OR ALECTRICAL POWER	
	07.2.03.02.1		SVGR #2 (52-1214)	OPEN	START OR TRIPS APTER STARTING	PBRIODIC TESTING	REQUINDANT TRAIN	INOPERABILITY OF TRAIN & SUC	NORMAL POSITION FOR STANDBY SERVICE
		n-110	SWGR #2 (52-1214)	CLOSED	PAILS TO TRIP, RESULTING IN OUT OF SEQUENCE BUS LOADING	CONTROL BOOM INDICATION	REDUNDART TRAIN FOR SISLOP, NOWE REQUIRED FOR SIS	POTENTIAL LOSS OF TRAIN 8 BLECTRICAL POWER DUE TO OUT OF SEQUENCE BUS LOADING DURING	SAC IN OBSESTION ALLS ASSESSED S
; ; ;	05.2.03.02.1	G-278	SWGR #2 (52-1219)	OPBN	POR SISLOP TRAIN 8 SPRAY PUMP PAILS TO START OR TRIPS IF RUNNING	PBRIODIC TRATING	REDUNDANT TRAIN	SISLOP, NOW FOR SIS INOPERABILITY OF TRAIN B PUMPING FOR CONTAINMENT SPRAY	
	05.2.03.02.2	G-273	SWGR #2 (52-1219)	CLOSED	PAILS TO TRIP, RESULTING IN	CONTROL ROOM INDICATION		AND ALTREMATE HOY LEG RECIEC POTENTIAL LOSS OF TRAIN B RLECTRICAL POWER FOR SISLOP OR	
:	06.2.03.02.1	G-15B	SWGR #2 (52-1221)	OPEN		PBRIODIC TESTING	BN TRIPPED FOR RECIRC IF APPROTED TRAIN PAILS ON) (SAME AS 6.2.3.1.1)	INABILITY TO TRIP FOR RECIRCULATION (SAME AS 6.2.3.1.1)	RECIRC POMP PLOW CIMITATIONS  MORNAL POSITION FOR STANDET
<u>.</u>	06.2.03.02.2	G-158	SVGR #2 (52-1221)	CLOSED	PAILS TO TRIP, RESULTING IN	CONTROL BOOM INDICATION	REDUNDANT TRAIN FOR SISLOP, NOME REQUIRED FOR SIS	POTENTIAL LOSS OF TRAIN B BLECTRICAL POWER DUB TO OUT OF	ENMING NORMAT BOSITION ALLA BAND SBRAICE
.'					OUT OF BEQUENCE BUS LOADING			SISLOP, NONE FOR SIS	!



# EMERGENCE CORE COORS TO STRM SINGLE FAILURE ANALYSIS SAN DROPRE UNIT 1 SORT FOR BLECTRICAL/ACTUATION DEPENDENCES

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· 	ITEN \$	DBAICB ID	COMPONENT ID	PAILURS MODS	LOCAL BPPECTS AND DEPENDENT FAILURES	DRIECTION MBTHOD OF	INERBRUT COMPRESATING PROVISIONS	BPPRCT ON BCCS	BEHARRS
	06.5.03.11.1 ( 07.3.03.07.1 (		SWGR #3 125VDC CONTROL POWER SWGR #3 125VDC CONTROL POWER	AOTIS FOR	SOUTH CCW PUMP CANNOT BE STARTED OR TRIPPED AUI SWC PUMP CANNOT BE STARTED OR TRIPPED	CONTROL ROOM INDICATION	TRAIN A OR B TO SERVE ALL BEQUIRED LOADS REQUINDANT SAPETT RELATED TRAINS	INOPBRABILITY OF SOUTH CCW PUMP IF NOT INITIALLY RUNNING INOPBRABILITY OF AUX SWC	SWCR \$3 IS ISOLATED ON \$18/818LOP IRRESPECTIVE OF
:	12.6.01.08.1 9	2-1303 (BRBAEBR)	SUGR #3 125VDC CONTROL POWER	VOLTS LOW		CONTROL ROOM INDICATION	NOME REQUIRED FOR SHORT TERM, OPERATOR ACTIONS FOR LONG TREM	TERM, SUGR #3 CAN BE	TRIP STATUS OF ITS INDIVIDUAL LOADS  BOY-158/850C UPS DUTY CYCLE > 10 MINUTES TO PERMIT CREDIT FOR OPERATOR ACTION LOCALLY IN
	N							TRAIN A AND TRAIN B BY CLOSING BUGR \$1-3 OR BUGR \$2-3 TIR BRERS, RESPECTIVELY APTER 52-1303 TRIP	ANTICERS AS MERBED CONTROL  STATEMENT OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF T
!	06.3.03.02.1 ( 06.3.03.02.2 (		SWGR #3 (52-1305) SWGR #3 (52-1305)	CLOSED	SOUTH CCW PUMP PAILS TO START OR TRIPS APPER STARTING SOUTH CCW PUMP STARTS OF VAILS TO TRIP		(SAHE &S. 3.3.1.1)  MORE REQUIRED	(SAMB AS 6.3.3.1.1)  NONE. TRAIN A/B BUS LOADING IMPACT PRECLUDED BY AUTOMATIC ISOLATION OF SUGR \$3	MORMAL POSITION FOR STANDSY SERVICE MORMAL POSITION WITH PUMP RUNNING
	97.73.63.762.71116	1-13c	9VGR #3 (52-1313)	OPEN "	AUI PUMP FAILS TO START OR TRIPS APTER STARTING	PRRIODIC TRSTING	(SAME AS 7.3.3.[.1]	(SANS AS 7.3.3.1.1)	NORMAL POSITION. PUMP MUST BE STARTED MANUALLY TO MEST TECH SPEC 3.3.1 ACTION STATEMENT EBQUIREMENTS POR G-13A OR B
	07.1.03.02.2 G	i-13C	SWGR #3 -{52-13[3]	CLOSED	AUX SUC PUMP STARTS OR FAILS	CONTROL BOOM INDICATION	MOMB BEGNIESED	NOME FOR SIS/SISLOP	INOPERABLE SUCE \$3 ISOLATED ON SIS/SISLOP
<del></del> .	·								
	<del></del>		<u></u>						
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SORT FOR COMMON-CAUSE FAILURES

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#### NOTES FOR COMMON-CAUSE FAILURE SORT

1. This table is a sort of FMEA Tables 1-1 through 12-1 for common-cause failures, provided as an aid to the reviewer.

2. The table is sorted by failure mode, and identifies those items with FAIL\_MODE = 'EQ' or 'SEISMIC', or with dependencies on the non-safety related Instrument and Service Air (ISA) system not permitted by Standard Review Plan 15.1.5. The non-safety related Switchyard system and the Main/Auxiliary transformers addressed in Section 12.9 of Table 12-1 are not specifically included in this sort. The COM\_SORT program included in Appendix A to this report was used.

# SHERGENCY CORE CONTROL SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT 1 SORT FOR POTENTIAL COMMON CAUSE PAILURES

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								•••	
ITBH #	DBATCB ID	COMPONENT ID		PAILURB MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	PROVISIONS [INTERBUT COMPRESATING	EPPECT ON ECCS	REMARES
01.4.06.05.5 PCV- CV-1		LT-453 LOOP	80		S/G A OVERFILL PROTECTION SIGNAL CLOSES FCV-456 AND	PRRIODIC TRETING		RECIRC TO S/G A/B/C WITE	ASSUMED COMMON-CAUSE PAILURES
					CV-142		CONCURRENT COMMON-CAUSE PAILURE OF LT-454 AND LT-455 LOOPS		CONTAINMENT. UPSCALE PAILURE NOULD ENERGIZE RELATS LC-4538-12, LC-4548-12G AND
									LC-4558-12G, MOVEVER CIRCUIT TO BE DISCONNECTED PRODING CYCLE 12 OVERFILL PROTECTION MODIFICATIONS
01.4.07.05.5 PCV- CV-1		LT-454 LOOP	BQ		S/G B OVERPILL PROTECTION SIGNAL CLOSES PCV-457 AND	PERIODIC TESTING		BECIRC TO S/G A/B/C WITH	*NON-EQ B/G NR LEVEL INTES ASSUMED COMMON-CAUSE FAILURES
					CV-144		CONCURRENT COMMON-CAUDE PAILURE OF LT-453 AND LT-455 LOOPS	CONCURRENT COMMON-CAUSE PAILURE OF LT-453 AND LT-455	DURING MBLB INSIDE CONTAINMENT. UPSCALE FAILURE WOULD EMERGIZE RELATE
	,	· · · · · · · · · · · · · · · · · · ·			NO MARK				LC-4538-12, LC-4548-12G AND LC-4558-12G, NOWEYER CIRCUIT TO BE DISCONNECTED PROBING
01.4.08.05.5 PCV-		LT-455 LOOP	BQ		SIC C OURGETT! DOGERCTION	DOCIONIA PROPINA	NAME BROWERDS DAR OF MANS BAD	ANAUR POR SI LOGG OR ARCANDARY	CACUB IS CARRAITE DEGLECTION
CV-1		E1-133 LOUP	24	4. 4.	S/G C OVERFILL PROTECTION SIGNAL CLOSES PCV-458 AND CV-143	PRRIODIC TRSTING	SECONDARY RECIRC WITE CONCURRENT COMMON-CAUSE	NONE FOR SI, LOSS OF SECONDARY BECIEC TO S/G A/B/C WITE CONCURRENT COMMON-CAUSE FAILURE	ASSUMED COMMON-CAUSE FAILURES DURING MSLB INSIDE
							PAILURE OF LT-453 AND LT-454 LOOPS		CONTAINMENT. UPSCALE FAILURE WOULD ENERGIZE RELATS LC-4538-12, LC-4548-12G AND LC-4558-12G, HONRYBE CIRCUIT
									TO BE DISCONNECTED PRODUCT CYCLE 12 OVERPILL PROTECTION HODIFICATIONS
TT02.711.03./057.1 'G-45.		PV-2011	BQ	•	LOSS OF SERVICE WATER COOLING TO TRAIN A RECIRC PUMP, PUSES BLOW TO PROTECT PUMP CONTROLS	PRRIODIC TRAYING	INTERACTION WITE PUMP CONTROLS		
02:2.03:05:1 G-45	J	PV-3071 "	EQ		LOSS OF BERVICE WATER COOLING TO TRAIN 8 RECIRC PUMP, PUSES BLOW TO PROTECT PUMP CONTROLS	"PBRIODIC TESTING	INTERFCTION ALLE DAME CONTROLS  INCREMENTAL AND AND CONTROLS		
02:2.06705:3 G-8A		FC-1100BI	BQ		TO-LO-LO VCT LEVEL TRIP OF	CONTROL ROOM INDICATION		INOPERIBILITY OF TRAIN B CHARGING PUMP DURING INJECTION, NONE FOR RECIEC WITH CREDIT FOR MANUAL OPERATION OF OVERBIDE	
02.4.08.01.3 PIC-	1111 LOOP	PIC-1111	BQ		LOW DISCHARGE PRESSURE AUTO-START SIGNAL MAT OCCUR TO	CONTROL BOOM INDICATION, ANNUNCIATION	PCV-1115A/B/C/D/R/P AND PCV-1112 MANUAL CONTROL LIMITS	POTENTIAL OPERATION OF 2 Charging pumps during CLR and	CHARGING PUMPS AND PIC-1111 BNVIRONMENT NOT BARSE UNTIL
					BOTE CHARGING PUMPS, CAUSING T START OF DE-SELECTED PUMP APTER SEQ BLOCK/RESET		CHARGING PLOW TO WITHIN  CAPABILITY OF OPBRATING  RECIRCULATION PUMP(8)	are	POST-LOCA RECIRCULATION IS UNITIATED
02.4.27;01:3°CV-4	)61	VALVE/ACTUATOR	BQ		"VALVE PAILS OPEN." NO EPPECT ON CLR OR BLR SINCE BARSE BNVIRONNENT IN VALVE AREA DORS		NORE BEGUIEED	MOBB	(b)(2) PUSB PROTECTS OTHER Utility Bus Loads
					NOT OCCUR UNTIL RECIEC IS INITIATED, WHICH SEATS YOT CHECK VALVE TO PREVENT GAS		· · · · · · · · · · · · · · · · · · ·		
					BINDING				

# SHERGERCY CORE COORSTEN SINGLE PAILURE ANALTSIS STOPPE UNIT 1 SORT POR POTENTIAL COMMON CAUSE PAILURES

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ÎTBN #	DBATCR ID	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT PAILURES	MBTHOD OF DBTECTION	INHERBUT COMPRHAATING PROVISIONS	BPFRCT ON BCC8	REMARES
02.4.21.02.3	ĊV-4068	VALVB/ACTUATOR	BQ	VALVE PAILS OPEN. NO RPPECT ON CLR OR BLR SINCE BARSE BNVIRONMENT DOES NOT OCCUR	NORE	NOMB BEQUIRED	NONE	(b)(2) PUSE PROTECTS OTERR UTILITY BUS LOADS
			·	UNTIL RECIEC IS INITIATED, WHICH SEATS VCT CHECK VALVE TO PREVENT GAS BINDING				1
02.47.88.0173		VALVE/ACTUATOR		VALUE PAILS CLOSED DUE TO POWER ISOLATION BY (b)(2) PUSE	CONTROL ROOM INDICATION  CONTROL ROOM INDICATION	NONE BEGNIEED NONE BEGNIEED	NOMB	(b)(2) PUSE PROTECTS OTHER 125 VDC BUS \$1 LOADS (b)(2) PUSE PROTECTS OTHER 125
02.4.28.02.3		VALVE/ACTUATOR  VALVE/ACTUATOR			CONTROL BOOM INDICATION	NORE SEGUISED	NOME	VDC 8US \$1 LOADS (b)(2) PUSE PROTECTS OTHER 125
	PIT-1112 LOOP-		BQ	POWER ISOLATION BY (b)(2) PUSE PRIMARY PATE BLE PLOW CANNOY BE MEASURED		ALTERNATE PATE	POTENTIAL INDALANCE IN CLE/BLR FLOW OR LOSS OF BLR PRIMARY PATE	VDC BUB \$1 LOADS *(SAME AS 3.1.3.1.1)
	PCV-430B	PC-430C/H LOOP	. BG	DIVERSION OF PRIMARY PATH ALR. PLOW TO LOOP A AND B COLD LEGS		NOME IF ALTERATE PATH BQ OR SINGLE FAILURE OCCURS	LOSS OF BLR PRIMARY PLOY PATH	PATES REQUIRED
03.2.03.01.3	HOV-822A	VALVE/ACTUATOR	BQ	VALVE PAILS AS-IS, WITH LOSS OF POSITION INDICATION, CAUSING LOSS OF ALTERNATE BLE PATE 1F ONE OF NOV-\$221/B IS	CONTROL ROOM INDICATION	NOME IF PRIMARY PAYN IS SINGLE PAILURE	SPOTENTIAL COMMON-CAUSE LOSS OF	PROVIDE (b)(2) PROTECTION OF
01.2.04.01.3	HOV-822B	VALVB/ACTUATOR	BQ	NOT INITIALLY OPEN VALVE FAILS AS-19, WITH LOSS OF POSITION INDICATION,	CONTROL BOOM INDICATION	NONE IF PRIMARY PATE IS SINGLE PAILURE	*POTENTIAL COMMON-CAUSE LOSS OF ALTERNATE BLE PATE	PROVIDE (b)(2) PROTECTION OF
				CAUSING LOSS OF ALTBRNATE BLR PATH IF ONE OF MOV-822A/B IS NOT INITIALLY OPEN			TERMINING TO MINING TANA AND TANA	ECC
03.72.05.01.3	MOA-813	VALVE/ACTUATOR		VALVE PAILS AS-IS, WITH LOSS OF POSITION INDICATION. IF CLOSED, PREVENTS ALIGNMENT OF	CONTROL BOOM INDICATION	PAILURB	PROTENTIAL COMMON-CAUSE LOSS OF ALTERNATE BLE PATE	PROVIDE (b)(2) PROTECTION OF HCC. ACTUATOR WILL BE REPLACED WITH BO HODRE BY DCP 3548.80
03.2.06.01.3	MOV-814	VALVE/ACTUATOR	RQ	ALTERNATE BLE PATH VALVE FAILS AS-IS, WITH LOSS OF POSITION INDICATION. IF	CONTROL ROOM INDICATION	NOME IF PRIMARY PATE IS SINGLE PAILURE	*POTENTIAL COMMON-CAUSE LOSS OF ALTERNATE BLR PATE	BRRAKER AND CONTROL POWER PUBE PROVIDE (b)(2) PROTECTION OF MCC. ACTUATOR WILL BE REPLACED
03.2.07.01.3	ROA-833	WALVE/ACTUATOR	BQ	CLOSED, PREVENTS ALTGUMENT OF ALTBEWATE BLR PATE VALVES PAILS AS-IS, WITE LOSS	CONTROL ROOM INDICATION	NOME REQUIRED	NONE	WITH BQ HODEL BY DCP 3548.00 BREAKER AND CONTROL POWER PUBE
03.2.08.01.3	HOA-834	VALVE/ACTUATOR	BQ	OF POSITION INDICATION  VALVES PAILS AS-18, WITE LOSS  OF POSITION INDICATION	CONTROL ROOM INDICATION	NORE BEGREED	NORE	PROVIDE (5)(2) PROTECTION PROVIDE (5)(2) PROTECTION
03.2:13:01:3	CV-413	VALVE/ACTUATOR	B0	PATH PLOW TO BCP SEAL WATER BRIURN OR BCDT	HONB	NOBE, IF BLE PRIMARY PAYN IS SINGLE PAILURE	PPOTENTIAL COMMON-CAUSE LOSS OF ALTERNATE BLE PATH TO BCDT WITE CV-288 BQ PAILURE	PUSE PROVIDES (5)(2) PROTECTION OF OTHER WITAL BUS LOADS. CHECK VALVE TO BE INSTALLED BY DCP 3548 WILL
				ATURDATION OR ATTENDED	· ·		- *POTENTIAL COMMON-CAUSE LOSS OF	PREVENT FLOW DIVERSION WITH THIS PAILURE
03:2:14.01:3	CV-412	VALVB/ACTUATOR	EQ	DIVERSION OF ALTERNATE HLE	HONE	SINGLE PAILURE	ALTERNATE BLR PLOW TO BCP SBAL WATER RETURN	PROTECTION OF OTHER VITAL BUB LOADS. DCP 3548 WILL INSTALL
								CHECK VALVE TO PREVENT PLOW

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TER \$	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL BPFECTS AND DEPENDENT FAILURES	MBTBOD OF DBTECTION	INHERRNT COMPRESSATING PROVISIONS	BPFRCT ON ECCS	REMARKS
03.2.15.0173 Ct	V-208	VALVB/ACTUATOR	10	DIVERSION OF ALTERNATE BLE PLOW TO BCP SEAL WATER RETURN OR RCDT	NONS.	NONE TO PRIMARY MLE PAYO IS		PROTECTION OF OTHER UTILITY BUS LOADS. CHECK VALVE TO BE
								INSTALLED BY DCP 3548 WILL Prevent Plow Diversion With This Pailure
65.1.06.01.2 G	-1001	PUMP/HOTOR	.RQ	TRAIN A STORAZINE PUMP MOTOR PAILS (OPEN, SHORT OR GROUND) 2 BRS APTER RECIRCULATION INITIATED	CONTROL ROOM ANNUNCIATION	ROME ENGOLESID		
						•		PRECLUDES (b)(2) IMPACT ON OTHER MCC LOADS
05.17.06.05.15 G	-2004	LIS-500A LOOP	80	MAY CAUSE APURIOUS LOW LEVEL SIGNAL TO TRAIN A HYDRAZINE PUMP 2 BRS APTER RECIRCULATION	ANNUNCIATION	NONE BEGOTEED		FOLLOWING CRAS BUSURES ADEQUATE STORAZINE DELIVERY.
				INITIATED			•	LIS-500A DEVICE PROVIDES ISOLATION OF NON-EQ INTE PRON OTHER LOADS ON SAME POWER SUPPLY
05.1.07.01.3 81	V-600	VALVE/ACTUATOR	BQ	TRAIN A STORAZINE ISOLATION VALVE FAILS (OPEN, SHORT OR GROUND) 2 BRS APTER	CONTROL ROOM INDICATION, ANNUNCIATION	HOMB BEGOIBED	POTENTIAL COMMON-CAUSE LOSS OF ETDRAZINE FLOW AFTER 2 BES	
· · · · · · · · · · ·				RECIRCULATION INITIATED				PUST PROVIDES (b)(2) PROTECTION OF OTHER DC BUS LOADS
05.2.06.01.2 G	-200B	PUMP/MOTOR	BQ	TRAIN B STORAZINE PUMP MOTOR PAILS (OPEN, SHORT OR GROUND) 2 BRS APTER RECIECULATION	CONTROL ROOM ANNUNCIATION	NORE BEGNIESD	POTENTIAL COMMON-CAUSE LOSS OF BYDRAZINE PUMPING AFTER 2 BOURS	MINIMUM 2 BR OPERATION
•	<del></del>			INITIATED				HOTOR CONTROLLER BERAIER PERCLUDES (b)(2) IMPACT ON OTHER MCC LOADS
05.2.06.05.5 G	-200B	LIS-500B LOOP	BQ	MAY CAUSE SPURIOUS LOW LEVEL SIGNAL TO TRAIN B BYDRAZINE "PUMP 2 BES APTER RECIRCULATION	ANNUNCIATION	NONE BEQUIRED	POTENTIAL COMMON-CAUSE LOSS OF ETDRAZINE PUMPING AFTER 2 HOURS	MINIMUM 2 MRS OPERATION
····				INITIATED				LIS-SOOR DRVICE PROVIDES ISOLATION OF NON-EQ ENTE FROM OTHER LOADS ON SAME POWER
05.2.07.01.3 8	V-601	VALVB/ACTUATOR	BQ	TRAIN B STORAZING ISOLATION VALVE FAILS (OPEN, SHORT OR	CONTROL ROOM INDICATION,	NONE ERQUIRED	POTENTIAL COMMON-CAUSE LOSS OF	SUPPLY
		+·· · · · · · · ·	<del>-</del>	GROUND) 2 HRS APTER RECIRCULATION INITIATED				ADEQUATE SYDEAZINE DELIVERY. PUST PROVIDES (b)(2) PROTECTION OF OTHER DC BUS
96.4.03.02.3 TO	CV-601A	TC-601A LOOP	BQ	TCV-601A OPENS, CAUSING BICBSS				LOADS FONE OF TCV-601A/B [SOLATED BY
				DIVERTING PLOW FOR ECCS LOADS	LDDIANTO GANTABILITAMOR	AS LONG BURLISH BY SIRE COUPER	PUMP AND REDUCED SPENT FUEL PIT HEAT LOAD	LIMITED BY STEM TRAVEL COLLAR. CONFIGURATION NOT ACCEPTABLE
								APTER CYCLE 11 REPUBLING DUE TO INCREASED SPENT PUBL PIT HEAT LOAD

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TIBN \$	DEAICE ID	COMPONENT ID	FAILURS MODE	LOCAL REPECTS AND DEPENDENT FAILURES	MBTHOD OF DRTECTION	INUBBRINT COMPRISATING PROVISIONS	BPFBCT ON BCCS	REMARES
06.4.04.02.3 TCV-	€01B	TC-6018 LOOP	199	TCV-6018 OPEMS, CAUSING BICESS CCW PLOW TO RER BI B-218 AND DIVERTING PLOW FOM BCCS LOADS		OF STOR THILLSD BA SIER COTTER ATAR ISOTUTED BA STOCE ATTAR	FLOW TO ECCS LOADS REDUCED TO PLOW TO ECCS LOADS REDUCED TO	
			· · · · · ·					COMPIGURATION NOT ACCEPTABLE APTER CYCLE 11 REPUBLING DUE TO INCREASED SPENT PURL PIT HEAT LOAD
06.4.06.01.3 PC-6	05 LOOP	PC-605	89	AUTO-START SIGNAL TO CCW AND EMERGENCY TERMAL BARRIER	CONTROL BOOM ANNUNCIATION, PREIODIC TESTING		STREET TO SECUL LATER A AND	
				PUMPS, CAUSING PUMPS TO START AS SOOM AS RESPECTIVE BUS			OP SEQUENCE BUS LOADING DURING SISLOP, NOWE FOR SIS	NORMAL RESPONSE FOLLOWING BUS UNDERVOLTAGE TRIPS FOR BISLOP EVENT
0674.01.0173 CV-7 CV-7 CV-7	228	VALVB/ACTUATOR T	BQ	VOLTAGE AVAILABLE CCW PLOW ALIGNED TEROUGH TERRHAL BARRIER COILS FOR ECP-A, B OR C	CONTROL ROOM INDICATION	NONE REQUIRED	NOMB	SOLEMOID VALVES BY-1722A, 1722B, 1722C NOT EQ. PUSES PROVIDED FOR (b)(2) PROTECTION
06.4.08.01.2 G-96	il	PUMP/HOTOR		HOTOR MAT PAULT, RESULTING IN UP TO SOA DRAIN ON 125VDC BUS		KORB	SPOTENTIAL COMMON-CAUSE LOSS OF TRAIN A 128 VDC CONTROL POWER FOR LOCA, MALE OR PALE. MITH	OF OTHER CIRCUITS *PUMP/MOTOR AND CABLING NOT QUALIFIED FOR IN-CONTAINMENT ENVIRONMENT, CIRCUIT NOT
				AT BEFORE OVERCUREBUT TRIP OF			CONCURRENT SINGLE PAILURE OF TRAIN B. RESULTS IN LOSS OF ALL	ISOLATED ON SIS/SISLOP, EFFECT
12.3.03.02.3 MCC-	·1	NSR LOADS	BQ/SBISHIC	POTENTIAL COMMON-CAUSE FAULT OF MSE LOADS, CHALLENGING	NONE	COORDINATION TO PREVENT PREDER LOAD BREES AND BREES	INOPERABILITY OF TRAIN A DUE TO	SMON-SB LOADS NOT ALL
				BCC-1 LOAD AND PREDER BREES		O/C PAILURE OF LOADS SELOW	RESULTING PROM FAILURE TO ISOLATE ALL UNQUALIFIED LOADS	1.75 OR IRBE 384 CRITERIA WRICE REQUIRE TRIP OF ALL
12.3.04.02.3 MCC-	-14	NSR LOADS	BQ/SRISHIC	POTENTIAL COMMON-CAUSE FAULT	MONE	SETPOINTS NOWE REQUIRED. MPW LUBE OIL	ON BIS AND BISLOP  LOSS OF TRAIN A MPW PP LUBB OIL	NOW-IR COADS ON A SAPETS SIGNAL (IR, SIS AND SISLOP) CCALCULATION REQUIRED TO
		<u> </u>	· · · · · · · · · · · · · · · · · · ·	OF MSR LOADS, CHALLENGING MCC-1A LOAD AND PREDER BRERS. SINCE ALL LOADS RICEPT NEW PP		TEMPERATURE SHOWN BY CALC TO REMAIN ACCEPTABLE WITHOUT COOLING DURING INJECTION PRASE	PAN COOLER POR MELS OUTSIDE	DEMONSTRATE THAT OPERATION OF PAN COOLER MOULD NOT ADVERSELY APPROT MPN PUMP PUNCTION FOR
			. ,	LUBE OIL FAN CLE ARE BSE, AND ALL LOCATED IN TURBINE BUILDING, FEEDER BRIE MAY TRIF		OF MILE		HOLD VIA BECRESIVE LUBB OIL TEMPERATURE IN THIS EVENT, CAUSED BY INDUCTION OP STRAM
12.3.05.02.3 MCC	.10	NSR LOADS	BQ/SBISMIC	PROH CONCURRENT PAULT IN HALB OUTSIDE CONTAINMENT POTENTIAL COHNON-CAUSE FAULT	MONB	OVERCURRENT TRIP OF INDIVIDUAL	. APOTRUTIAL COMMON-CAUSE	THROUGH FAN/COLL UNIT
12.3.03.02.3 800		MSE FONDS	PA\3913UIC	OF MSR LOADS, CHALLENGING MCC-1B LOAD AND PREDER BREES	. 5040	LOAD BRIES AND BREE COORDINATION TO PREVENT FREDRE BREE TRIP FOR PAULTS, NOWE POR	THOPERABLLITY OF YRAID A DUB TO 480Y SUGR/ECC DEGRADATION BESULTING FROM FAILURE TO	TRIPPED/LOCKED OUT ON SISLOP. COMPIGURATION DOES NOT HERT EG 1.75 OR IRER 384 CRITERIA
				The second secon		SETPOINTS	ON SIS WND SISTOD	WHICH REQUIRE TRIP OF ALL NON-18 LOADS ON A SAPETY SIGNAL (IB, SIS AND SISLOP)
12,3.08.01.3 SWGI LOAI		BREAKER(3)	BQ/SBISHIC	POTENTIAL COMMON-CAUSE FAULT OF TRAIN A 480V MSR LOAD(S), CHALLENGING SWGR #1 LOAD AND	BORB	PAULTS, MONE FOR OVERCURRENT	INOPERABLLITY OF TRAIN A DUB TO 480V SWGB/NCC DEGRADATION	WHICH REQUIRE TRIP OF ALL
				PREDER BREES	-	PROTECTION SETPOINTS	RESULTING PROM PAILURE TO THE SOLUTION OF STREET ST	NOW-1B LOADS ON A SAPETY SIGNAL (IB, SIS AND SISLOP)

# SAM ONOFRE UNIT 1 SORT FOR POTENTIAL COMMON CAUSE FAILURES

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 	ITEM # DBVICB ID	COMPONENT ID	PAILURE MODE	LOCAL REPRECTS AND DRPRNDRNT FAILURES	MBTHOD OF DBTBCTION	INHERENT COMPRESATING PROVISIONS	BPFECT ON BCCS	BEWARES
1							ANABARTAI AARRAY GUISD	2000 20 7000 000 001
	12.4.01.02.3 BCC-2	MSE LOADS	BO/SB[SM[C	POTENTIAL COMMON-CAUSE FAULT OF MSR LOADS, CHALLENGING MCC-2 LOAD AND FREDRE BRERS	RONB	COORDINATION TO PREVENT PREDER	INOPERABILITY OF TRAIN B DUE TO	SNOW-SE LOADS NOT ALL TRIPPED/LOCEED-OUT ON SISLOP. COMPIGURATION DOES NOT MEET RG
						BRIE TRIP FOR FAULTS, NORS FOR O/C FAILURE OF LOADS BELOW SETPOINTS	INOUATE ALL UNQUALIFIED LOADS	1.75 OR IRRE 304 CRITERIA WHICH REQUIRE TRIP OF ALL MON-IR LOADS ON A SAFETY
	12.4.04.02.3 HCC-2A	EDAOJ SEN	BQ/BBIBMIC	POTENTIAL COMMON-CAUSE FAULT OF MSR LOADS, CHALLENGING	NONE	REDUNDANT TRAIN FOR INJECTION, NOWE FOR RECIRC	*LOSS OF TRAIN A MYDRAZINE PUMP, AND POTRNYIAL	SIGNAL (IS, SIS AND SISLOP) *(SAMB AS 12.4.4.2.2)
				MCC-2A LOAD AND PREDER BRERS." SINCE ALL LOADS BICEPT ATDRAZINE PUMP AND MOV-1100C			INOPRESELLITY OF BOTH YEARING COOLING FOR CRARGING PURP BOOM	
				ARE MSR AND ALL LOCATED IN RI AUX BLDG, FEEDER BREE MAY TRIP PROM CONCURRENT FAULT DUE TO		-		
:	12.4.05.02.3 MCC-2B	NSR LOADS	B6/8BISHIC	POST-LOCA DOSES IN ARRA POTENTIAL COMMON-CAUSE FAULT OF MSR LOADS, CHALLENGING	NOME	OVERCUREBUT TRIP OF INDIVIDUAL	INOPERABILITY OF TRAIN B DUE TO	
				MCC-2B LÓĀD ĀNO PBRDRE BRERS "		COORDINATION TO PREVENT PERDER BREE TRIP FOR PAULTS, MONE FOR O/C PAILURE OF LOADS BRLOW	RESULTING PROM PAILURE TO	COMPIGURATION DOES NOT HEST EG 1.75 OR ISEB 384 CRITERIA WHICH REQUIRE TRIP OF ALL
	12.4.08.01.3 SWGR #2 WSR	BREALER(S)	BQ/SBISMIC	POTENTIAL COMMON-CAUSE FAULT	MONE	BEEF COORDINATION TO PREVENT	ON BIS AND BISLOP  *POTENTIAL COMMON-CAUSE	HON-IR LOADS ON A SAPRTT SIGNAL (IR, SIS AND SISLOP) CONFIGURATION DOBS NOT MEET
; ;	LOADS			OF TRAIN B 480V MSR LOAD(S), CHALLENGING SWGR #2 LOAD AND FREDER BREES		PAULTS, NONE FOR OVERCURRENT	INOPPRESELLITY OF TRAIN B DUE TO 480V SWGP/NCC DEGRADATION RESULTING FROM FAILORS TO	RG 1.75 OR IRRE 384 CRITERIA WHICH REQUIRE TRIP OF ALL NON-1E LOADS ON A SAPRTY
	12.6.02.02.3 MCC-3	MSR LOADS	BQ/SBISHIC	POTENTIAL COMMON-CAUSE FAULT	NOME		ISOLATE ALL UNQUALIPIED LOADS ON SIS AND SISLOP *POTENTIAL COMMON-CAUSE	SIGNAL (18, SIS AND SISLOP) *NON-SR LOADS NOT ALL
				OF MSR LOADS, CHALLENGING MCC-3 LOAD AND PERDER BREES	······································	#1, BREE COORDINATION TO PREVENT PREDER TRIP FOR PAULTS, NOWE FOR OVERCURRENT	INOPREMETELITY OF BOTH TRAINS DUE TO LOSS OF SUGR RM EVAC	TRIPPED/COCKED-OUT ON BISCOP. COMPIGURATION DORS NOT MERT RG 1.75 OR LERE 184 CRITERIA
<del>.</del>						PAILURE OF LOADS BELOW		WHICH REQUIRE TRIP OF ALL NOW-IE LOADS ON A SAPETY SIGNAL (IE, SIS AND SISLOP)
	12.8.03.02.3 HCC-3A	NSR LOADS	BG/SBISHIC	POTENTIAL COMMON-CAUSE FAULT OF MSR LOADS, CHALLENGING MCC-3A LOAD AND FREDER BREES.	HOMB	NOME SEGUISED	NOME	PASS NOT BEQUIESD FOR SIS/SISLOP DESIGN BASIS BYENT MITIGATION
:				SINCE ALL LOADS ARE WER AND LOCATED IN HARSH POST-ACCIDENT BEVIRONMENTS, FREDER BERR MAY				
		BRBARBR(S)	BQ/3BISHIC	TRIP PROM CONCURRENT FAULTS POST-ACCIDENT POTENTIAL COMMON-CAUSE FAULT	NONB		*POTENTIAL COMMON-CAUSE	*CONFIGURATION DOES NOT MRET
	LOADS			OF SWCR #3 480V WSR LOAD(8), CHALLENGING SWGR #3 LOAD AND PSEDRE BRERS		BREES AND BREE COORDINATION TO PREVENT PREDER (OR TIE) BREE TRIP FOR COMPLETE PAULTS, NOME	BB-BMBRGIZED POST-SIS/SISLOP, DUB TO 480V SWGR/MCC	RG 1.75 OR IRBE 384 CRITERIA WHICH REQUIRE TRIP OF ALL NOW-18 LOADS ON SAPETY SIGNAL
 	· · · · · · · · · · · · · · · · · · ·				• • • • • • • • • • • • • • • • • • • •	POR O/C PAILURE OF LOAD BREES	DEGRADATION RESULTING PRON PAILURE TO ISOLATE ALL UNQUALIPIED LOADS ON SIS AND	(IE, SIS AND SISLOP). BOT REV BEQD TO ISOLATE ALL NON-BESSENTIAL LOADS PRIOR TO
•							SISLOP	RB-BHBBGIŽING SWÖR #1. BŘYŘ COORD ALSO BBQD FOR TIB BER ALIGN

# EMBEGBNCY CORB CO STSTEM SINGLE PAILURE ANALYSIS SAN ONOPER UNIT 1 SORT FOR POTENTIAL COMMON CAUSE PAILURES

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	ITBN #	DBVICE ID	COMPONENT ID	PAILURE MODE	LOCAL BPPECTS AND DEPRHDENT PAILURES	NETHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	BPPBC? ON BCCS	REMARKS
-	01.1.04.00.1	BV-8\$3B	ISA	PRESSURE LOW	ISA UNAVAILABLE TO REPOSITION VALVE CLOSED FOR SYSTEM RESET AFTER INJECTION TERHINATED	CONTROL BOOM ANNUNCIATION	NOME REQUIRED	NOME	AIR OPERATED BYDRAULIC PUMP IN ACTUATOR ISOLATED BY 8Y-530. VALVE REQUIRED TO REMAIN OPEN
; 	01.1.05.07.1	HV-854B	ISA	PRESSURE LOW	ISA UNAVAILABLE TO REPOSITION VALVE OPEN POR STSTEM RESET	CONTROL BOOM ANNUNCIATION	NONE EBÓNIERD	NONE	POR SI AND SECONDARY RECIEC AIR OPERATED STORMALIC PUMP IN ACTUATOR ISOLATED BY SV-531.
	01.1.06.17.1	C 10	ISA	PRESSURE LOW	APTER INJECTION TERMINATED  ISA UNAVAILABLE TO REPOSITION	CONDUCT DOOR SMIRING FACTOR	BACKUP MITROGRM	MONE. TRAIN A PW PUMP MINIFLOW	VALVE REQUIRED TO CLOSE FOR SI AND SECONDARY RECIEC
	01.1.00.11.1		134	LEB330EB TOA	SA BARA BINIBION ATTARS CA-21.	CONTROL BOOK ANNUACTATION	BELLOY MILEULES		NON-BRISHIC STRIBH
	01.1.07.06.1	AV-8518	[84	PRESSURE LOW	ISA UNAVAILABLE TO BEPOSITION VALVE CLOSED FOR CONTAINMENT ISOLATION OR SECONDARY	CONTROL ROOM ANNUNCIATION	BACKUP MITROGRA		AIR OPERATED BYDRAULIC PURP IN ACTUATOR ISOLATED BY SV-528
	01.1.08.04.1	EV-8520	18A	PRESSURE LOW	RECIRCULATION AFTER INJECTION TERMINATED IS A UNAVAILABLE TO REPOSITION	CONTROL ROOM ANNUNCIATION	NONE BEQUIRED FOR SI,	MONE FOR SI, INOPERABLLITY OF	NON-SAFETY RELATED ISA SYSTEM
					VALVE OPEN FOR SECONDARY RECIRCULATION APTER INJECTION TERMINATED		REDUNDANT TRAIN FOR SECONDART RECIEC	BECIEC SECONDARY	CAN BE CREDITED FOR HILE IN CONTAINMENT PER SEP SECTION 15.1.5. AIR-OPERATED HYDRAULIC
	01.2.04.08.1	BV-853A	ISA	PRESSURE LOW	ISA UNAVAILABLE TO REPOSITION	CONTROL BOOM ANNUNCIATION	NORE BEGNIESD	NONB	PUMP IN VALVE ACTUATOR ISOLATED BY 8V-529 AIR OPERATED HYDRAULIC PUMP IN
1	180000 0 0 0 0 0 0 0 0 0	mu .apg			VALVE CLOSED FOR STREEM RESET APTER INJECTION TERMINATED	Called A T. Market Tollier of the Fil	ACTIVE AC	DANA	ACTUATOR ISOLATED BY SV-526. VALUE REQUIRED TO REMAIN OPEN FOR SI AND SECONDARY RECIRC
	01.72.05.07.1	HA-994Y	194	PRESSURE LOW	ISA UNAVAILABLE TO REPOSITION VALVE OPEN FOR SYSTEM RESET AFTER INJECTION TERMINATED	CONTROL ROOM ANNUNCIATION	NOME SEGULBED	NOVE	AIR OPBRATED BIDRAULIC PUMP IN ACTUATOR ISOLATED BY 8Y-527. VALVE REQUIRED TO CLOSE FOR SI
	01.2.06.17.1	G-JA	ISA -	PRESSURE LOW	ISA UNAVAILABLE TO REPOSITION PAINTS CV-36	CONTROL ROOM ANNUNCIATION	BACEUP MITROGRM		AND SECONDARY RECIRC ISA IS A NOW-SAPETY RELATED, NOW-SELENIC SYSTEM
	01.2.07.06.1	BV-851A	184	PRESSURE LOW	AND CV-8754 ISA UNAVAILABLE TO REPOSITION	CONTROL ROOM ANNUNCIATION	BACEUP MITROGRM		AIR OPERATED MYDRAULIC PUMP IN
					VALUE CLOSED FOR CONTAINMENT ISOLATION OR SECONDARY RECIRCULATION APTER INJECTION			REQUIRED USING SAPEYY-RELATED BACRUP NITROGEN	ACTUATOR ISOLATED BY SV-524
	01.2.08.04.1	BV-852A	ISA	PRESSURB LOW	TERMINATED  ISA UNAVAILABLE TO ERPOSITION VALVE OPEN FOR SECONDARY	CONTROL ROOM ANNUNCIATION	NOME REQUIRED FOR \$1, REDUNDANT TRAIN FOR SECONDART		NON-SAFETY RELATED ISA SYSTEM CAN BE CREDITED FOR MSLB IN
i i					RECIRCULATION APTER INJECTION TERMINATED		RECIRC	RECIRC	CONTAINMENT PER SEP SECTION 15.1.5. AIR-OPERATED HYDRAULIC PUMP IN VALVE ACTUATOR
1					THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON OF THE PE				ISOLATED BY SV-525

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ITBN #	DEVICE ID	COMPONENT ID	FAILURE MODE	LOCAL EPPECTS AND DEPENDENT PAILURES	METHOD OF Detection	INBERBUT COMPRUSATING PROVISIONS	BPFRCT ON BCCS	REMARES
01.4.09.12.	T PCV-456,451,458 CV-142,143,144	[SA	PRESSURB LOW	MAIN PW CONTROL VALVES PAIL OPEN, STPASS VALVES PAIL CLOSED TO S/G A, B, C	CONTROL ROOM ANNUNCTATION	CONTROL VALVES FOR SI. HONE	NOME FOR SI (ISA NOT CREDITED FOR FCY CLOSURE), LOSS OF SECONDARY RECIEC TO 8/G A/8/C	M2 (GMI) SUPPLY FOR CLOSURE. COMMON-CAUSE PAILURE NOT
						FOR SECONDARY ERCIRC		POSTULATED DURING SECONDARY RECIEC, BUT SINGLE FAILURE OF ISA-960 COULD ISOLATE ISA TO
	1							CVE. BYALM OF MAMUAL BYPASS PATES BEQD FOR MITIGATING RPPECTS ON SECONDARY BEGIEC
02.4.09.08.	1 PCV-1112		PRESSURE LOW	ISA UNAVAILABLE POR PCY-71112 OPBNING (INJECTION) OR HODULATION (BLR)	CONTROL BOOM INDICATION, ANNUNCIATION	HICKUP MITROGRA	SEQUIERD ON BACKUP MITROGRA	
02.4.12.02.	1 CV-30{ CV-305	194	PRESSURE LOW	ISA UNAVAILABLE TO CV-304 AND CV-305. CV-304 CLOSES, ISOLATING CHARGING PUMP INJECTION TO RCS LOOP A	CONTROL BOOM ANNUNCIATION	HOR BLE HOR BLE	LOSS OF CHIRCING FURP INJECTION PATE TO RCS LOOP A. CV-305 REPOSITIONS AS REQUIRED FOR CLR LED BLE USING BACKUP WE	CHARGING NOT CREDITED FOR INJECTION
92.4.22.02.	1 FCV-1115A/D FCV-1115B/B FCV-1115C/F	184	PERSONER FOR	PC9-1115A/B/C PAIL OPEN AND CLE PLOW CANNOT BE THROTTLED BELOW ABOUT 80 GPM PER RC9	CONTROL ROOM INDICATION, ANNUNCIATION	BACRUP M2 FOR PCV-1115D/B/F PLOW CONTROL	OR 187 OF JEBOLIFE CFE BYON INVESTIGATE LOS	*HYDRAULIC CALC REQUIRED TO PREIFY PLOW THROUGH WIDE OPEN PCV-1115A/B/C, AND UPPER LIMIT
			_	LOOP. PCY-1115D/E/F MODULATE ON BACKUP M2 AS REQUIRED			COMBINED CLE/BLR	POR PRIMARY PATE BLR FLOW TO REMAIN WITHIN THE CAPABILITIES OF A BINGLE ENCIRC FUNP FOR
· 80· £ 44· 82·	1 AD :1061		· Boncount Lou	ALL AREA THRO THE TAREN ORDER	COMMENTS DAME THRESTON		TPOTENTIAL LOSS OF CLR PUMPING	THIS POTENTIAL COMMON-CAUSE PAILURE
92.4.21.U3.	CV-406B		PRESSURE LOW	CV-4064 AND CV-406B OPEN, BYPASSING MOV-1100C, POTRNTIALLY GAS-BINDING BOTH CHARGING PUMPS DURING VCT	CONTROL BOOM INDICATION	HOME FOR BELOCA, REDUNDANT CHECK VALVE AND CRARGING PUMP FOR RECIRC IN OTHER EVENTS	CAPABILITY FOR SBLOCA, PRE-SELECTED CHARGING PUMP FOR OTHER EVENTS	MUST BE FAIL-CLOSED AND/OR
	· · ·			LEVEL TRANSIENT PRECEDING SIS/SISLOP IN SELOCA, AND PRESELECTED PUMP DURING	Market Market Street Control		VIDIA GYDAIO	CLOSED AND PRECLUDE START OF LOCEED-OUT PUMP SIMILAR TO MOV-TIOOC PAILURE TO CLOSE
				LBLOCA, MSLB, SGTR INJECTION. NO SPPECT IP DURING RECIEC	·			
03:1:04:08.	1 PCV-1112	TISA TO TO TO	PRESSURE LOW	HODULATION (BLB)  HODULATION (BLB)  HODULATION (BLB)	CONTROL ROOM INDICATION, ANNUNCIATION	BACKUP BITROGEN	BEGUIESD ON BACKUP NITROGER  SCA-1115_ODENS_YSQ_NODOFTARS_YS	
03.1.07.02.	CV-305	194	BEESSURE LOW	ISA UBAYAILABLE TO CY-304 AND CY-305. CY-304 CLOSES, ISOLATING CEARGING PUMP	CONTROL ROOM ANNUNCIATION	FOR ALR	LOSS OF CHARGING PURP INJECTION PATE TO RCS LOOP A. CV-305 REPOSITIONS AS REQUIRED FOR CLR AND BLE USING BACKUP M2	INJECTION
03.1.10.03.	PCA-130R	ISA	PRESSURE LOW	NONE, NORMAL POR BLR	CONTROL ROOM INDICATION	NONE SEGUISED	NOMB	•
03.2.10.03:	1 CV-525		PRESSURE LOW	VALVE DRIPTS CLOSED IF INTERNAL STDRAULIC LEAKAGE PRESENT	CONTROL ROOM THDICATION	BOME ERGAIRED	ROBE	
03.2.11.03.	1 CV-526	ISA	PRESSURE LOW	VALVE DRIFTS CLOSED IF INTERNAL SYDRAULIC LEARAGE PRESENT	CONTROL BOOM INDICATION	NOME BEGALERD	NOME	

BMSRGBNCY CORB CO TIPTEM SINGLE FAILURE ANALYSIS
SORT FOR POTENTIAL COMMON CAUSE FAILURES

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178H #	DRAICE ID	COMPONENT ID	FAILURE MODE	LOCAL BPPECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	IMBERENT COMPRESATING PROVISIONS	BPPECT ON BCCS	REMARES
							******************************	
03.2713.0371°C		TSA	PRESSURE LOW	VALVE PAILS CLOSED VALVE FAILS CLOSED	CONTROL BOOM INDICATION	NONE BEGNIESD MONE BEGNIESD	NONE BONS	
03.2.15.03.1 C		184	PRESSURE LOW	VALVE PAILS TO MORNAL POSITION		BROUNDANT VALVES CV-287 AND ECV-11TY PREVENT DIVERSION OF	NOME	
						ALTERNATE BLR PLOW TO LOOP B		
03.2.18.03.1 CT 03.2.17.04.1 CT		ISA ISA	PRESSURE LOW	VALVE PAILS CLOSED	CONTROL BOOM INDICATION	HONE REQUIRED	NONE	
05.1.04.06.1 C		lsa Lsa	PRESSURE LOW	CV-517 DRIFTS CLOSED IF	CONTROL BOOM INDICATION,	HOME FOR INJECTION, NOME	*POTENTIAL COMMON-CAUSE LOSS OF	
				INTERNAL BYDRAULIC LEARAGE, CANNOT BE REOPENED	ANNUNCIATION	REQUIRED FOR RECIRCULATION	· · ·	APPECTED. ADMIN CONTROLS REQUIRE VALVES TO BE OPEN DURING NORMAL OPS OR DECLARED
								THOP IF CLOSED, BUT TECH SPEC CHANGE REQD. VALVES HUST REMAIN FULLT OPEN FOR AT LEAST
								S MOURS (SMALLEST SBLOCA) TO REMAIN BOUNDED BY ANALYSIS
05.1.05.05.1 C	1-82	ISA	PRESSURE LOW	CV-82 PAILS OPEN, CANNOT BE RECLOSED	CONTROL ROOM INDICATION	NONE REQUIRED FOR CONTAINMENT SPEAY, RECIEC PUMP BEAD TO		SECT PREMITS SPRAY PUMP TRIP
					•	MAINTAIN LOOP SEAL FOR CONTAINMENT ISOLATION	VALVING FOR SPRAY PRINTIPATION	CONSISTENT WITH SEP TOPIC VI-4 BASIS FOR ACCEPTABILITY OF THE
				The state of the s	-			ISOLATION CONFIGURATION FOR THIS PRINTRATION
05.2.04.06.1 C	/-518	ISA	PRESSURE LOW	CV-518 DRIPTS CLOSED IF	CONTROL BOOM INDICATION,	NONE FOR INJECTION, NONE	*POTRNTIAL COMMON-CAUSE LOSS OF	*REDUNDANT VALVE CV-517 ALSO
				INTERNAL BYDRAULIC LBAKAGE, CANNOT BE REOPENED	ANNUNCIATION	BEGGIERD FOR BECIRCULATION	BOTH MI-PLOW SPEAY PATHS DURING INJECTION, NO SPEECT ON RECIRCULATION	REQUIRE VALVES TO BE OPEN
								DURING MORNAL OPS OR DECLARED THOP IF CLOSED: VALVES HUST
	•	•						REMAIN FULLY OPEN FOR AT LEAST 5 HOURS (SMALLEST SBLOCA) TO
				The state of the s	1			REMAIR BOUNDED BY ANALYSES.
05.2.05.05.1 Ct	1-114	ISA	PRESSURE LOW	CV-114 PAILS OPBN, CANNOT BB	CONTROL ROOM INDICATION	MONE REQUIRED FOR CONTAINMENT		TECH SPEC CHANGE REQUIRED *ROI PERMITS SPEAT PUMP TRIP
				BECLOSED		SPRAY, ERCIEC PURP BRAD TO MAINTAIN LOOP SEAL POR	FORE OF CONTAINMENT INCLUTION	APTER PRESSURE REDUCTION. NOT CONSISTENT WITH SEP TOPIC VI-4
		**************************************	· · - · · · · · · · · · · · · · · · · ·			CONTAINMENT ISOLATION		BASIS FOR ACCEPTABILITY OF THE ISOLATION CONFIGURATION FOR
06 1 05 05 1 O		101	PDD0011D9 IVA	MILLS DILLS IN SIVER	COMBOUT BOOM INVIOLATION	NAME SEALITORS		THE PRINCIPATION
05.3.05.05.1 C	· · · · · · · · · · · · · · · · · · ·	ISA	PRESSURE LOW	VALVE PAILS IN CLOSED  POSITION, CANNOT BE OPENED	CONTROL BOOM INDICATION, ANNUNCIATION	NONE REQUIRED	NONE	
06.1.05.03.1 C	V-137A	184	PRESSURE LOW	VALVE DRIPTS OPEN IP INTERNAL Hydraulic Leakage present,	CONTROL ROOM INDICATION	HONB BEGAIERD	NORB	VALVE ACTUATOR USES AIR-OPERATED HYDRAULIC PUMP TO
06.2.05.03.1 C	V-737B	<b>ISA</b>	PRESSURE LOW	ALIGNING CCW PLOW TO RECIRC MY VALVE DRIFTS OPEN IF INTERNAL BYDRAULIC LEAKAGE PRESENT.		NONB BEGUIEED	NONE	MAINTAIN ACCUMULATOR PRESSURE VALVE ACTUATOR USES AIR-OPERATED REDEAULIC PUMP TO
				ALIGNING COW PLOW TO RECIRC BY				MAINTAIN ACCUMULATOR PRESSURE

# BHERGENCT CORE COO STEM SINGLE FAILURE ANALTSIS SORT FOR POTENTIAL COMMON CAUSE FAILURES

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ITEM & DRAICE ID	CONDONERL ÍD	PAILURE MODE	DEPENDENT PAILURES	METHOD OF DETECTION	FEOAISIONS [MHBERNT COMPRESSATING	BPPBCT ON BCCS	BENARES
06.4.03.03.1 TCV-601A	ISA	BERRANE FOR	TCV-601A FAILS OPEN, CAUSING BICESS CCW PLOW TO RER BI 8-21A AND DIVERTING PLOW PROM	CONTROL BOOM INDICATION, PERIODIC SURVEILLANCE		PLOW TO ECCS LOADS REDUCED TO MINIMUM ACCEPTABLE WITH ONE CCW PUMP AND REDUCED SPENT FUEL PIT	OF TCV-601A/B ISOLATED BY
			BCC8 LOADS				LIMITED BY STEM TRAVEL COLLAR. CONFIGURATION NOT ACCEPTABLE APTER CYCLE 11 REPUBLING DUE TO INCREASED SPENT FUEL PIT
06.4.04.03.1 TCV-601B	ISA	PRESSURE LOW	TCV-601B PAILS OPEN, CAUSING	CONTROL ROOM ENDICATION.	VALVE ISOLATED BY BLOCK VALVE		HEAT LOAD
			SICESS CCW PLOW TO RHE MI 8-218 AND DIVERTING PLOW PROM 8CCS LOADS	PRRIODIC SURVRILLANCE		MINIMUM ACCEPTABLE WITH ONE CCU PUMP AND REDUCED SPENT PURL PIT BEAT LOAD	OF TCV-COLA/B ISOLATED BY BLOCK VALVE, OTHER PLOW LINITED BY STRM TRAVEL COLLAR.
						•	COMPIGURATION NOT ACCEPTABLE APTER CTCLE 11 REPUBLING DUB TO INCREASED SPENT FUEL PIT EBAT LOAD
06.4.07.03.1 CV-722A CV-722B CV-722C		PRESSURE LOW	CY-722A, 8 AND C PAIL OPEN, ALIGNING CW PLOW TEROUGH TERRHAL BARRIER COILS POR	CONTROL ROOM INDICATION	HONE BEGUIRED	HOMB	SVALVES MORNALLY OPEN. TSIS PAILURE WOULD PREVENT REMOTE-HANUALLY CLOSING FOR
			RCP-A, B AND C				THERMAL BARRIER COIL PAILURE. VERIFICATION REQUIRED THAT FLOW RATE INTO CCW STRIEN FOR
			•				THIS EVENT IS LESS THAN LOCA THRESHHOLD
07.5703.11111'G-13A		PRESSURE LOW	POTENTIAL LONG-TREM DEGRADATION OF TRAIN A SUC PUMP BEARINGS, POTENTIAL	CONTROL ROOM INDICATION	NOME. MACKUP BRARING COOLING BEQUIRED FOR LONG-TERM POST-SIS/SIBLOP OPERATION	OPERATION	OCCUR DUB TO POSTULATED CONCURRENT SEISNIC EVENT.
			NON-8BISHIC CINBS BOST-8BISHIC CINBS				BACEUP BRARING COOLING STRPS REQUIRED IN BOIS. ALSO, PAILURE REDUCES PUMP OUTPUT UNTIL BOUNDARY VALVES LOCALLY
		, , , , , , , , , , , , , , , , , , , ,	···				CLOSED, SO THAT PUMP EST REQUIRED WITH BACEPLOW CONDITIONS
07.2.03.11.1 G-13B	SERVICE WATER	PRESSURE LOW	POTENTIAL LONG-TERM DEGRADATION OF TRAIN 8 SVC	CONTROL ROOM INDICATION	NOME. BACKUP BEARING COOLING BEQUIERD FOR LONG-TERM POST-SIS/SISLOP OPERATION	*POTENTIAL INOPERABILITY OF SWC	
			SALTWATER BACEPLOW THROUGH NOW-SEISHIC LINES POST-SIS/SISLOP			· · ·	BACRUP BEARING COOLING STEPS REQUIRED IN 801s. ALSO, PAILURE REDUCES PURP OUTPUT
							UNTIL BOUNDARY VALVES LOCALLY CLOSED, SO THAT PUMP 187 REQUIRED WITH BACEPLOW
01.3.03.05.1 G-13C	SERVICE VATER	PRESSURE LOW	POTENTIAL LONG-TERM DEGRADATION OF AUX SWC PUNP	CONTROL ROOM INDICATION	REDUNDANT SAPETY RELATED	POTENTIAL INOPERABILITY OF AUX SEC PUMP	CONDITIONS
	·	,	BRARINGS				NON-SBISNIC), NOR IS IT SUITABLE FOR LONG-TERM OPERATION FOR NON-SIS/SISLOP
							BYENTS DUB TO THE POTENTIAL FOR SUCTION STRAINER CLOGGING

# BHBEGENCY CORE CO TSTEM SINGLE PAILURE ANALYSIS APRE UNIT 1 SORT FOR POTENTIAL COMMON CAUSE FAILURES

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ITEM #	DEALCR ID	COMPONENT ID	PASSUDD MOND	LOCAL BPPECTS AND	MBTHCD OF	INEERBRY COMPENSATING	EFFECT ON ECCS	· REMARES
	DEALCR ID	CORPORAL IV	PAILURB MODB	DEPENDENT FAILURES	DETECTION	PROVESTORS	BPPECE UN ECCS	· X8RAKE3
7.3.03.06.7	G-Tic	(SA	PRESSURE LOW	AUX SMC PUMP DISABLED DUE TO LOSS OF SUCTION/PRIME CONTROL	CONTROL BOOM INDICATION	REDUNDANT SAPETY RELATED TRAINS	INOPERABILITY OF AUX SUC PUEP	AUI SWC PUMP IS NOT CREDITED POR SIS/SISLOP EVENTS (IR, IS NOW-SRISMIC), NOR IS IT SUITABLE FOR LONG-TERM
	MOA-10	VALVE ACTUATOR	SEISHIC	GATES MOV-10, 11, 12 FAIL CLOSED, GATE MOV-9 FAILS TO 61	CONTROL BOOM ANNUNCIATION, LOCAL INDICATION	NOME FOR INJECTION OR RECIRC (NON-REISHIC AUX SWC PUMP ALSO LOST)	*LOSS OF SUCTION READ TO SOTE TRAINS OF SUC PUMPS, POTENTIALLY CAUSING LOSS OF	OPERATION FOR MON-SIS/SISLOP EVENTS DUE TO THE POTENTIAL POR SUCTION STRAINER CLOGGING SGATE ACTUATORS ARE MON-SEISMIC. CIRC WATER PUMP EUCTION NOT LOCATED
	MOV-12	<u></u>					BOTH PURPS FOR SIS EVENTS (NO CIRC WATER PURP TRIP) OR IF PRIOR TO SISLOP	SUPPLICIBILLY ABOVE SUC PURP SUCTION TO PREVENT LOSS OF SUC PURP MPSH
							FRICE IO SISCOP	FORF BESS
	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·					
				<u></u>				
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				in a second standard standard con-				
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VII. APPENDICES

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APPENDIX A: DBASE III PROGRAMS USED

IPROGRAM: VLV_PLAG.PRG	
SPUNCTION: SETS "OE" PERLO IN BOUND VL.DBP	
CLOSE DATABASES USE SOUND VL SEP INDEI SOUND VL	
THE POLLOWING STEPS STANDARDIZE THE TERMINOLOGY FOR PLANCES	
BEPLACE SE DICEMB MICH APTIND BYTHER, SOU BE DICEMB: LYNNER,	
GOTO TOP  BEPLACE MSE PACEUP MITH 'BLIND PLANGE' POR MSE BACEUP: PLANGE'	
† strong system and and the system of the sy	
THE POLLOWING STRPS BET THE PLAC TO "UNACCEPTABLE" IN ALL RECORDS	
GOTO TOP	
RIPLACE OE WITS '3' POR 1788 NO('12'	
STRE POLICIMING STRPS RESET THE FLAG TO "CONDITIONALLY OF" FOR APPLICABLE RECORDS WITH A MON-SAPRTY RELATED RACEUP	
GO TOP	
REPLACE OF WITE 'S' FOR (VIEUT_AUTO: AUTO:	
THE POLICYING STEPS RESET THE PLAG TO "OR" FOR APPLICABLE RECORDS WITH A SAPETT RELATED BACKUP	
6070 TOP	
APPLACE OF WITE ' ' FOR (VERUT_AUTO:'AUTO' .OR. VERUT_AUTO:'CLOSED') .AND. (BERUT_AUTO:'AUTO' .OR. BERUT_AUTO:'CLOSED' .OR. BERUT_AUTO:'CRECE' .OR. SE BACEUP:'CAP' .OR. BE BACEUP:'BLEND')	
THE POLICIANT STAPS BESST THE PLAG TO "OF" FOR RECORDS WITH A LOCALD CLOSED SEPTIT RELATED SOUNDERY VILVE	
BEPLACE OF MITH ' ' FOR MEINT AUTO: 'CLOSED' .AND. LOCEED: 'TES'	
THE POLICIAING SIEDS BESEL LIE LIVE LO .OE. LOE SECONDS MILH T DYSHIAE (CHICK ON UNITED) BOOMDISA ATTAR	
GOTO TOP  BRPLACE OF WITE '' FOR VERUT_EUTO='CARCE' .OR. VERUT_AUTO='RELIEF' .	
BATCACH DE BITS POR VARUE_AUTU- CARCH .UE. VARUE_AUTU- ESCIEP	
*THE POLLOWING STEPS RESET THE PLAG TO "OR" FOR RECORDS IN BACK TRAIN OF INVENTORY-INSENSITIVE, TRAIN-ALIGNED STSTEMS (IR, SNC)	
00 to 1	
REPLACE OF WITH ' ' FOR ITEM_MO>='07.1' .AND. ITEM_MO(='07.3'	
THE POLICHING STEPS TEST THE PLAC TO "UNICCEPTABLE" FOR RECORDS MIRERD IN THE BEHARES COLUMN (SC. RELIEF VALVES WITH TOO LOW A SETPOINT)	
COTO TOP	
FIFTING OF ALLS .s. LOB BINTERS:,s,	
APPORT	
	Pa RCD
	94 4 33
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	1
PROGRAM: VIT_SORT.PRG	:
FPUNCTION: PRINTS THE TABLE OF VITAL/REGULATED POWER DEPENDENCIES, SORTED AT COMPONENT ID	
CLOSE DATABASES	:
USE ECCS SPA INDEL ECCSCOMP, ECCS SPA, ECCSPAIL	
SET DEVICE TO PETET	
0 0,0 847 CBR(15) + CHR(15)	
SET DEVICE TO SCREAM	
BEFORT FORM C: ECCECORP FOR [COMPON_ID='CRAS LNV' .OR. COMPON_ID='REG BUS' .OR. COMPON_ID='VITAL BUS' .OR. COMPON_ID='VITAL BUS') .AND. (ITEM_MOC)'LI' .AND. FAIL_MODE='VOLTS LOW') MORJECT TO PRINT	
ARTURE CONTROL OF THE	
	·
	·
*PEOGRAM: BUS_SORT.PEG	!
PFUNCTION: PRINTS THE TABLE OF AUTILIARY POWER DEPENDENCISS, BORTED BY COMPONENT ID	i
CLOSE DATABASSS	ļ
USB SCCS_SPA INDRI BCCSCOMP, BCCS_SPA, BCCSFAIL	
DET DEFICE TO PRINT	•
0 0,0 847 CB2(27) + CB2(15)	
SET DEVICE TO SCREW	
ERPORT FORE C: ECCSCOMP FOR (COMPON_ID='AUR' TOR. COMPON_ID='AUR' TOR. COMPON_ID='ALSVOC BUS') MORJECT TO PRINT	
ARTURN .	ļ
Company of the compan	
*PROGRAM: COM_SORT.PRG	
PRINTS TABLE OF COMMON-CAUSE FAILURES (EQ. SEISHIC, INSTRUMENT AIR), SORTED BY FAILURE MODE	
. CLOSE DATABASES	
USE ECCE TA LIBER ECCEPALL, ECCE TA, ECCECONA	
PRT DIVICE TO PRINT	•
# 0,8 SAT CRE(15) + CRE(15)	
BEFORT FORM C: SCCSFAIL FOR FAIL HODE: 'SQ' TOR. TITEM HOC'OL'OL. AND. TAIL HODE: 'SBISHIC' .OR. TAIL HODE: 'PRESSURE LON' TAND. COMPONITO()'GHI'))} HORIECT TO PRINT	
ERFORT FORM C: SCCSFALL FOR FAIL BODE: SV. OR. (1188 BOO) OV. AREA. (FAIL BODE: SEASOLD LOW .AND. CONTOR LOV. ON )   FORMAL CONTOR LOV. ON )   FORMA	
- Boilver	្ស ង ប
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APPENDIX B: REVISION 0 ERRATA

#### REVISION O ERRATA

- 1. Items 01.4.16.05.1 through 01.4.16.06.2: SEQ actuated relay contacts do not exist in the control circuit for CV-287. The scheme shown on the applicable elementary diagram was misinterpreted. This error was identified during resolution of Action Item 04.3.
- 2. <u>HCV-1117</u>: This backup isolation valve for excess letdown was not addressed as a separate FMEA line item. The omission was identified during resolution of Action Item 04.3. The valve control circuit is not EQ, so that a potential common-cause failure could occur.
- 3. Breakers 1RX1 and 1RY1: The potential common-cause seismic failure of these current-limiting reactor bypass breakers was not addressed in the FMEA (eg. item numbers 12.1.02.01.3 and 12.2.02.01.3 were not included). This omission was identified during resolution of Action Item 21.
- 4. <u>FCV-1115A through -1115F</u>: The potential common-cause effects of seal injection controller input failures, during a LOCA or MSLB inside containment, and common-mode effects of seal injection controller power failure (Regulated Bus #4), were not addressed. This omission was identified during resolution of Action Item 09.1.
- 5. <u>Item 01.4.22.01.1</u>: FCV-1115A/B/C will fail closed on loss of control power (to the associated I/Ps) rather than open, if instrument air pressure is still available. This error was identified during resolution of Action Item 09.1.
- 6. <u>Item 04.3.07.03.1</u>: The tag number for the associated instrument air valve is FWS-581 rather than FWS-381. (Typo.)
- 7. RV-787, PSV-M109, VCC-385: These CCW relief and CLR drain valves should have been included in the respective boundary valve analyses. This omission was identified during independent review of Revision 0 by the Nuclear Safety Group.
- 8. <u>Items 06.4.21, 06.4.71</u>: The boundary valve tag numbers should be CCW-428 instead of CCW-426, and CCW-492 instead of CCW-493. The backup isolation for CCW-492 is non-safety related valve CCW-493. (Typo.)
- 9. <u>Safety Injection Actuation</u>: The effect of specific groups of output relays failing to actuate (eg. due to subchannel Load Group or driver card failures) was not explicitly addressed. This simplification was made during Revision 0 development to accomodate time and manpower constraints, and has been carried as an open item for Revision 2.

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APPENDIX C: RESOLUTION OF OPEN ITEMS FROM REVISION O

#### NOTES FOR LIST OF OPEN ITEMS

- 1. Action items were developed to address the 26 categories of findings (see Section V.A) identified by Revision 0 of this analysis.
- 2. The action item numbering corresponds to the 26 categories of Revision 0 findings, with the exception of "Miscellaneous" Category 26. Subitems are identified by decimals (for example, 02.1, 02.2, etc).
- 3. The action items for "Miscellaneous" Category 26 are numbered from 26 to 37 to facilitate tracking of their status prior to SONGS 1 restart. Item numbers 28, 30 and 33 are not used.
- 4. The list includes all action items other than 'NO FURTHER ACTION REQUIRED' and 'SAME AS'.
- 5. Action item 24.2 is not associated with specific FMEA line items since, as discussed in Section II of this analysis, the RHR, PORV and Steam Dump functions were not included in the FMEA tables.

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## EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1

ACTION ITEM LIST

ITEM #	REVISION 1 ACTION ITEM	SCHEDULE
01.1	VERIFY: A) VALVE LOCKING PROGRAM CRITERIA DO NOT	RESTART
	EXCLUDE CRITICAL MANUAL VALVES, AND B) OTHER	
	ADMINISTRATIVE CONTROLS ARE SUFFICIENT TO PREVENT	
	MISPOSITIONING OF MANUAL VALVES WHICH ARE NOT	
2.	COVERED BY THE VALVE LOCKING PROGRAM	
01.2		RESTART
	AND ADD TO VALVE LOCKING PROGRAM AS NEEDED	
01.3	PREPARE FCNs TO ADD LOCKING DEVICES TO PZR-020,	RESTART
	021 AND OTHER VALVES AS NEEDED	
01.4	DETERMINE ALLOWABLE CCW SYSTEM LEAKAGE VIA	RESTART
24 4	CALCULATION	
01.5	DETERMINE ACTUAL CCW SYSTEM LEAKAGE VIA OPERATIONS	RESTART
21.2	LOGS OF SYSTEM MAKEUP	
01.6	EVALUATE ACTUAL VS. ALLOWABLE CCW SYSTEM LEAKAGE	RESTART
	AND DETERMINE NEED FOR POST-ACCIDENT MAKEUP	
00 1	MODIFICATIONS	
02.1	DETERMINE APPLICABLE LEAK TEST REQUIREMENTS FOR	RESTART
•	CONTAINMENT ISOLATION FUNCTION OF SI VALVES AND	
02.0	INCLUDE ALLOWANCE IN DOSE CALCULATIONS	
02.2	REVISE IST AND OTHER PROCEDURES AS NEEDED FOR	RESTART
00 0	SI/RECIRC LEAKAGE TESTING	
02.3	DETERMINE APPLICABLE LEAK TEST REQUIREMENTS FOR	RESTART
	RECIRC SYSTEM AND INCLUDE ALLOWANCE IN DOSE	
02 1	CALCULATIONS	
03.1	DETERMINE TMI-SOURCE TERM DOSE RATES FOR	RESTART
	APPLICABLE MANUAL ACTION LOCATIONS, INCLUDING	<del></del>
02.2	ACCESS/EGRESS ROUTES	
03.2	EVALUATE SHIELDING OR BEST-ESTIMATE SOURCE TERM TO	RESTART
	RESOLVE MANUAL ACTION LOCATIONS AND ACCESS/EGRESS	<del></del>
	ROUTES WITH UNACCEPTABLE TMI-SOURCE TERM DOSE RATES	
03.3		222
00.0	OBTAIN REGULATORY RELIEF FROM TMI SOURCE TERMS FOR SINGLE FAILURE EVENTS IF NEEDED BASED ON DOSE	RESTART
•	CALCULATION RESULTS	
04.1	REVISE RWST AND SI/FW LO-LO SETPOINT CALCULATIONS	DECM : DM
<b>41.1</b>	TO ADDRESS INVENTORY DIVERSIONS	RESTART
04.2	MODIFY LETDOWN ISOLATION VALVES (INCLUDING	
	LCV-1112) AS REQUIRED BY RWST INVENTORY, RECIRC	RESTART
	FLOW RATE OR DOSE LIMITATIONS	
04.3	MODIFY EXCESS LETDOWN ISOLATION VALVES AS REQUIRED	DECTABT
	BY RWST INVENTORY, RECIRC FLOW RATE OR DOSE	RESTART
	LIMITATIONS	
	VERIFY CURRENT EOI FLOATING STEPS ADEQUATELY	DEGE + 2=
04.4	VVANAMA AVI EDVALINU SIRPS ADBUNIATRIV	RESTART
04.4	ADDRESS SI/FW TERMINATION WITH 1954DO DUG TIVE	
04.4	ADDRESS SI/FW TERMINATION WITH 125VDC BUS FAILURE RE-EVALUATE MSLB FOR 2 TRAIN SI WITH RWST DILUTION	

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## EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1

ACTION ITEM LIST

ACTION		
ITEM #	REVISION 1 ACTION ITEM	SCHEDULE
06	IMPLEMENT MMP 1-3619 (INSTALL ICSB-18 POWER	RESTART
	LOCK-OUT ON MOV-866A/B)	
07.1	IMPLEMENT MMP 1-3625 (INSTALL TRIP OF CHARGING	RESTART
	PUMP G-8B ON REDUNDANT LOW-LOW-LOW VCT LEVEL	
	SIGNAL)	
07.2	IMPLEMENT MMP 1-3659 (INSTALL REDUNDANT	RESTART
······································	AUTO-CLOSED VCT ISOLATION VALVE) TO PREVENT GAS	<u> </u>
	BINDING IN COMMON PORTION OF CHARGING PUMP SUCTION	
	HEADER	
07.3	IMPLEMENT MMP 1-3639 (UPGRADE FCV-5051 ACTUATION	RESTART
	TO SAFETY RELATED)	
07.4	LOCK CV-406A OR B CLOSED AS PER RESOLUTION OF NCR	RESTART
	1-P-7467 AND LER 1-90-06 TO PREVENT CHARGING PUMP	
	GAS BINDING DUE TO LOSS OF UTILITY BUS	
08.1	PERFORM EVENT-SPECIFIC ANALYSIS OF CLR/HLR FLOW	RESTART
	BALANCING	
08.2	REVISE EOIS AS NEEDED BASED ON ANALYSIS RESULTS	RESTART
09.1	PERFORM HYDRAULIC CALCULATION TO VERIFY MAXIMUM	RESTART
	CHARGING PUMP FLOW POST-SIS/SISLOP	DECE: 0
09.2	MODIFY CHARGING AND/OR SEAL INJECTION VALVES TO	RESTART
	LIMIT CHARGING PUMP FLOW AS NEEDED	D. T. C. T. A. D. T.
10.1	REVISE DCP 1-3548 TO SPECIFY APPROPRIATE	RESTART
10.0	ADMINISTRATIVE CONTROLS ON MOV-822A/B	DECTADE
10.2	REVISE PROCEDURES (INCLUDING EOIS) AS NEEDED TO	RESTART
10.3	INCLUDE DCP 1-3548 REQUIREMENTS IMPLEMENT DCP 1-3548 HLR MODIFICATIONS	RESTART
	VERIFY THAT QUALIFIED I/Ps ARE NOT REQUIRED FOR	RESTART
10.4	PY-1430C/H TO PRECLUDE FUNCTIONAL (b)(2)	RESIARI
	INTERACTION WITH PRIMARY PATH HLR	
11.1	IMPLEMENT CYCLE 12 RECIRC MODS	CYCLE 12
11.1	INCLUDE TECH SPEC CHANGE FOR OPERABILITY OF BOTH	RESTART
	RECIRC PUMPS IN PCN 151	
11.3		RESTART
	PUMPS UNTIL SPRAY SECURED (BOTH REF WTR PP	
<del></del>	TRIPPED), B) ENSURE THAT TRIPPED PUMPS ARE ON SAME	
•	TRAIN, AND C) DO NOT RESET THE CHARGING PUMP	
	LOCKOUT RELAY AFTER MANUAL TRIP (IN ORDER TO	
	PREVENT AUTO-RESTART)	
12.1	REVISE SECONDARY RECIRC EOI TO POSITION	RESTART
	CV-142/143/144 LOCALLY IF UNSUCCESSFUL FROM	
	CONTROL ROOM	
	EXTEND TEMPORARY MODIFICATION TFM-1-90-FWS-001	RESTART
	(DISCONNECTION OF S/G OVERFILL SIGNALS FROM	
	FCVs/CVs) UNTIL PERMANENT OVERFILL MODIFICATIONS	
•	ARE INSTALLED IN CYCLE 12	
12.3	EVALUATE ALTERNATE SECONDARY RECIRC FLOW PATH	RESTART
	CAPABILITY FROM REFUELING WATER PUMP DISCHARGE TO	

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ACTION ITEM LIST

ACTION ITEM #	REVISION 1 ACTION ITEM	SCHEDULE
		-
12.4	REVISE EOI TO INCLUDE SECONDARY RECIRCULATION	RESTART
12.5	ALIGNMENT VERIFICATION, AS NEEDED EVALUATE STEPS TO COMPENSATE FOR FCV-5051 INADVERTANT OPENING DURING SECONDARY RECIRC AND	RESTART
12.6	REVISE EOI AS NEEDED INSTALL MMP 1-3623 TO PROVIDE ISOLATION BETWEEN REDUNDANT SEQ BLOCK CIRCUITS	RESTART
13	REVISE EOI AS REQUIRED TO RUN BOTH RECIRC PUMPS UNTIL CONTAINMENT SPRAY FLOW IS SECURED (IE, BOTH REFUELING WATER PUMPS TRIPPED)	RESTART
14.1	PROVIDE LIST OF CCW FLOW PATH VALVES TO BE LOCKED TO ENSURE SAFETY RELATED FLOW PATHS ARE NOT DEGRADED (INCLUDING DIVERSION DUE TO EXCESSIVE	RESTART
14.2	FLOW THROUGH OTHER FLOW PATHS) ADD APPROPRIATE CCW VALVES TO THE VALVE LOCKING PROCEDURE	RESTART
	VERIFY LOW FLOW ALARM SETPOINT PROVIDES ADEQUATE CHARGING PUMP LUBE OIL COOLING POST-ACCIDENT	RESTART
	DETERMINE FUNCTIONAL REQUIREMENTS AND APPROPRIATE SURVEILLANCES FOR CCW CHECK VALVES, AND IMPLEMENT	RESTART
	MODIFICATIONS AS NEEDED REVISE IST PROGRAM TO INCLUDE CCW CHECK VALVES AS	RESTART
14.6	NEEDED IMPLEMENT DCP 1-3553	RESTART
	VERIFY BY EXISTING OR NEW CALCULATION THAT RCS FLOW INTO FAILED THERMAL BARRIER COIL IS LESS THAN	RESTART
15	300 GPM LOCA THRESHHOLD COMPLETE CALCULATION (DC-3410) TO DETERMINE	RESTART
16.1 16.2	ACCEPTABILITY OF SWC/CCWHX BYPASSED CONFIGURATION PROVIDE ADMINISTRATIVE POWER LOCKOUT TO MOV-9, 11 REQUALIFY MOV-9 AND 11 ACTUATORS AND GATES TO	RESTART RESTART
17	SEISMIC CATEGORY A REVISE SISLOP LOADING CALCULATION TO ACCOUNT FOR OUT OF SEQUENCE CCW/SWC PUMP LOADING	RESTART
18.1	DETERMINE LICENSING BASIS FOR HVAC RE: POST-ACCIDENT FUNCTION, AND RE: SINGLE FAILURE	RESTART
18.2	VALIDATE OR REVISE APPLICABLE POST-ACCIDENT TEMPERATURE CALCS FOR: CONTROL ROOM, CHG PP ROOM,	RESTART
	4kV AND 480V SWGR ROOMS, AND DETERMINE DURATION, IF ANY, THAT CONTROL ROOM TEMP WOULD EXCEED SEQ OR CSAS INST/LOGIC LIMITS AFTER FAILURE OF NORMAL HVAC	· · · · · · · · · · · · · · · · · · ·
18.3	OBTAIN REGULATORY RELIEF TO DEFER HVAC MODIFICATIONS, IF ANY, DETERMINED TO BE NEEDED BY	RESTART
ì	MECHANICAL CALCULATIONS	DECM. D.
. I	REVISE PROCEDURES (INCLUDING TECH SPEC ACTION ENTRY CRITERIA) AS NEEDED TO JUSTIFY OPERATION UNTIL COMPLETION OF ANY REQUIRED HVAC MODIFICATIONS	RESTART

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SAN ONOFRE UNIT 1 ACTION ITEM LIST

ACTION ITEM #		SCHEDULE
 18.5	DETERMINE IF CONTROL ROOM DOSE CALCULATIONS ARE CONSISTENT WITH SINGLE FAILURE BASIS (EG. 10 MIN	RESTART
 10.6	INJECTION MODE SPRAY, 1 REF WTR PUMP AND NO CREDIT FOR HVAC FILTER UNIT)	CYCLE 12
18.6	CONSISTENT WITH SINGLE FAILURE AND CONTROL ROOM HABITABILITY UPGRADE CRITERIA AS PART OF UFSAR	
19.1	CHAPTER 15 REANALYSIS, AS NEEDED EVALUATE ISOLATION ADEQUACY FOR UNQUALIFIED LOADS ON 125VDC BUS AS PART OF INTEGRATED RESOLUTION OF	CYCLE 12
19.2	SEP TOPIC VI-7.C.2 REVISE BATTERY LOADING CALCULATION TO ACCOUNT FOR HIGH IMPEDANCE FAULTS OF UNQUALIFIED EQUIPMENT AS	CYCLE 12
19.3	NEEDED SUBMIT LICENSE AMENDMENT REQUEST TO DEFER MODIFICATIONS ADDRESSING SPURIOUS AUTO-TRANSFER OF	RESTART
20.1	VITAL BUSSES UNTIL INTEGRATED RESOLUTION OF SEP TOPIC VI-7.C.2 IMPLEMENT MMP 1-3633 TO PROVIDE BACKUP OVERCURRENT	RESTART
20.2	PROTECTION FOR RCP PENETRATIONS EVALUATE POTENTIAL FAULT PROPAGATION DUE TO COMMON-CAUSE FAULTS WITH CONCURRENT 125VDC FAILURE	
 0.1 1	(EG. EXCITER DURING MSLB) AS PART OF INTEGRATED RESOLUTION OF SEP TOPIC VI-7.C.2 IMPLEMENT MMP 1-3634 TO CHANGE DG LOADING LOGIC	DESTIDT
21.1	FROM SISLOP TO SISLOB PERFORM CALCULATION TO DETERMINE CONDITIONS (EG.	
 	GRID VOLTAGE) UNDER WHICH SIS LOADING IS ACCEPTABLE WITH CURRENT-LIMITING REACTOR BYPASS BREAKER OPEN	
 21.3	ISSUE TECH SPEC CLARIFICATION ON CURRENT-LIMITING REACTOR BYPASS BREAKER REQUIREMENTS VERIFY THAT PROCEDURES EXIST TO BRING ADDITIONAL	
 23.1	DG FUEL ONSITE BEFORE 7 DAY ONSITE SUPPLY COULD BE EXHAUSTED POST-ACCIDENT VERIFY WHETHER NRC BTP 9.5-1 AND APPENDIX R	
 	EXCLUDE BOTH FIRES AND EXPLOSIONS MECHANISTICALLY CAUSED BY AN ACCIDENT (EG. OF HYDROGEN DUE TO LUBE OIL/SEAL OIL FAILURE OR XFMR DUE TO FAULT WITH PROTECTION FAILURE, POST-SIS/SISLOP)	
 23.2	ADDRESS MECHANISTICALLY CAUSED FIRES AND EXPLOSIONS NOT EXCLUDED BY NRC BTP 9.5-1 OR APPENDIX R AS PART OF INTEGRATED RESOLUTION OF SEP	
24.1	TOPIC VI-7.C.2, IF NEEDED  REVISE SGTR DOSE CALCULATIONS (AS NEEDED TO  PRECLUDE CREDIT FOR RCPs) AS PART OF UFSAR CHAPTER	
	15 REANALYSIS	

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SAN ONOFRE UNIT 1 ACTION ITEM LIST

	ACTION		
	ITEM #	REVISION 1 ACTION ITEM	SCHEDULE
			SCHEDCLE
	24.2	ESTABLISH SCE POSITION ON SINGLE FAILURE	RESTART
		APPLICABILITY TO RHR, PORV AND STEAM DUMP	!
		FUNCTIONS AND OBTAIN RELIEF FROM NRC AS NEEDED	
	25.1	IDENTIFY EXISTING BASIS OF UFSAR SECTION 6.2.5 FOR	RESTART
		ADEQUACY OF POST-ACCIDENT CONTAINMENT HYDROGEN	
		MIXING VIA CONTAINMENT SPRAY	
	25.2	TO THE PARTY OF TH	CYCLE 12
	0.0	PART OF DBD	
	26	VERIFY SEQ/CSAS SURVEILLANCE PROCEDURES DETECT	RESTART
		INDIVIDUAL RELAY (CONTACT) FAILURES	
	27	REVIEW EOIS AND REVISE TO CLOSE SAMPLE VALVES IF	RESTART
	0.0	NEEDED POST-ACCIDENT	
	29	INCLUDE CONTACTOR STATUS INDICATING LIGHTS AND	RESTART
		SURVEILLANCE REQUIREMENTS FOR MOV-883 IN MMP	
		1-3619 TO PREVENT AN UNDETECTED LOSS OF CONTACTOR	
	31	REDUNDANCY	
	31	IMPLEMENT MMP 1-3636 TO MODIFY CCW PUMP CONTROL	RESTART
		LOGIC SO THAT SIS/SISLOP WILL START THE PUMP	!
	<del></del>	IRRESPECTIVE OF WHETHER THE CONTROL SWITCH IS IN	
	32.1	AUTO	
	32.2	SUBMIT PCN 151 INCLUDING CV-517/518 REQUIREMENTS	RESTART
	32.2	REVISE MMP 1-3582 TO INCLUDE APPROPRIATE VALVE	RESTART
	32.3	DRIFT SURVEILLANCE REQUIREMENTS FOR CV-517/518	
	J2.J	REVISE IST PROGRAM AS NEEDED TO INCLUDE VALVE DRIFT CRITERIA FOR CV-517/518	RESTART
	32.4	MODIFY CONTAINMENT SPRAY PENETRATION ISOLATION	
	<b>52.</b> 1	CONFIGURATION TO COMPLY WITH SEP TOPIC VI-4	RESTART
		ISOLATION COUNTY OF PROVIDE OFFICE VI-4	
		ISOLATION CRITERIA OR PROVIDE OTHER JUSTIFICATION (EG. FORMAL CALC TO DEMONSTRATE RECIRC PP LOOP	
		SEAL AT PENETRATION), AND FORWARD ANY UFSAR	i
• .		CHANGES TO LICENSING	;
	32.5	OBTAIN NRC CONCURRENCE WITH DEVIATIONS OF	DECTARM.
	-	CONTAINMENT SPRAY PENETRATION ISOLATION	RESTART
		CONFIGURATION FROM SEP TOPIC VI-4 CRITERIA AS	
		NEEDED	
	34.1	DEVICE PROGRAMME AS VETTER	RESTART
		RE-ENERGIZING THE UTILITY BUS FROM MCC-1 VIA MTS-7	TARICAN :
	34.2	IDENTITY VITAL AND UNITED TO THE TOTAL TOTAL	RESTART
		SURVEILLANCE REQUIREMENTS	MEDIANI
	34.3	PROVIDE TECH SPEC CLARIFICATION TO IMPLEMENT	RESTART
		VITAL/UTILITY BUS AND TRANSFER SWITCH LCO AND	THE TART
•		SURVEILLANCE REQUIREMENTS UNTIL TECH SPEC CHANGE	
		IS PROCESSED	
	34.4	IMPLEMENT VITAL/UTILITY BUS AND TRANSFER SWITCH	RESTART
		REQUIREMENTS IN APPLICABLE PROCEDURES (INCLUDING	INECIMAL
		EOIs) (INOLUBING	
			<del></del>

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SAN ONOFRE UNIT 1 ACTION ITEM LIST

<u>-</u>	ACTION ITEM #	REVISION 1 ACTION ITEM	SCHEDULE
	35.1	VERIFY LICENSING BASIS REQUIREMENTS FOR ALTERNATE OFFSITE SOURCE RE: CAPABILITY TO START/POWER ECCS	RESTART
	35.2	LOADS, AND OBTAIN TECH SPEC RELIEF IF REQUIRED ISSUE TECH SPEC CLARIFICATION TO REQUIRE ACTION STATEMENT ENTRY FOR BUS 1C OR 2C INOPERABLE	RESTART
	35.3	WHENEVER ENERGIZED FROM A/B XFMR PERFORM CALCULATION TO DETERMINE CONDITIONS (EG.	RESTART
		GRID VOLTAGE AND BUS LOAD) UNDER WHICH RCPs MAY BE RESTARTED FROM BUS 1C/2C WITH ECCS LOADS ALREADY RUNNING	
	35.4	REVISE EOIS AS NEEDED TO REFLECT ELECTRICAL CALCULATION RESULTS FOR RCP RESTART LIMITATIONS	RESTART
	35.5	EVALUATE EOI CHANGES TO PRECLUDE DG DROOP IN	RESTART
	35.6	ISOLATED MODE EVALUATE CONTINUED ACCEPTABILITY OF NO MAINTAINED LOCKOUT ON SIS AND SISLOP FOR NSR LOADS AS PART OF	CYCLE 12
		INTEGRATED RESOLUTION OF SEP TOPIC VI-7.C.2. (CONFIGURATION ACCEPTABLE UNTIL THEN BASED ON AMENDMENT 38 SECTION 1.3.7.1)	
	36.1	IDENTIFY CALCULATION WHICH DEMONSTRATES 480V BREAKER COORDINATION	RESTART
	36.2	IDENTIFY CALCULATION WHICH JUSTIFIES MAIN FW PUMP FAN COOLER OPERATION IN A STEAM ENVIRONMENT (EG.	RESTART
	36.3	POST-MSLB) ISSUE CLARIFICATION TO IDENTIFY 52-1200 AS A TIE	RESTART
	37.1	BRKR WITHIN DEFINITION OF TECH SPEC 3.7 LCO EVALUATE: 125VDC BUS % GROUND CRITERIA FOR TECH SPEC ACTION ENTRY AND/OR MODIFICATIONS TO	CYCLE 12
	37.2	ELIMINATE TRAIN-COMMON 125VDC DEVICES AS PART OF INTEGRATED RESOLUTION OF SEP TOPIC VI-7.C.2 VERIFY EQDPs FOR 125VDC LOADS BOUND CONDITIONS OF	RESTART
	37.3	EQUALIZING CHARGE IDENTIFY SR/NSR ISOLATION DEVICE SURVEILLANCE	RESTART
	37.4	REQUIREMENTS FOR MCCs, 125VDC AND 120VAC BUSSES  VERIFY RMOS EXIST WHICH IMPLEMENT SR/NSR ISOLATION  DEVICE SURVEILLANCE REQUIREMENTS IDENTIFIED BY  ELECTRICAL	RESTART
	37.5	VERIFY LCOAR PROCESS AND RELATED PROCEDURES REQUIRE TECH SPEC ACTION ENTRY WITH FAILURE OF BUS/MCC SR/NSR ISOLATION DEVICE (EG. UNTIL	RESTART
		AFFECTED LOAD IS ISOLATED)	etroprografice de para l'emple se delle e e estre l'empede paradoni

#### NOTES FOR TABLE OF ACTION ITEMS FOR SIGNIFICANT FINDINGS

- 1. The table of Action Items for significant findings tabulates which action item(s) address specific line item findings from the Revision 0 FMEA.
- 2. The table is a composite of two DBASE III databases: that for the Revision 0 FMEA, and another for Action Items. The databases are related using the DBASE III View function so that 1 or more Action Item records are related to each of the 472 Revision 0 FMEA records flagged as a finding. The first 6 fields of each line item in the composite table are printed from the Revision 0 FMEA, and the last 3 fields from the related Action Item records. The FMEA line item is repeated where there is more than applicable Action Item.
- 3. To limit the Action Item database to a manageable size, "(SAME AS XX.X.XX.XX.X)" notation is used. With this notation, the Action Items are fully spelled out for the first FMEA line item to which they apply in each section. For subsequent FMEA line items in that section, the Report Item number is used but the description is condensed to refer to the first FMEA line item number. This permits subsequent reference to a specific group of related Action Items (YY.1, YY.2, etc) with a single record using the group Action Item number (YY).

For example: In Section 12.1/12.2 (4kV Auxiliary Power), Action Item 21.1 is identified for FMEA line item 12.1.01.01.1, and Action Items 21.2 and 21.3 (but not 21.1) for FMEA line item 12.1.02.01.1. Subsequent FMEA line item 12.1.02.02.1 references (group) Action Item 21 and "(SAME AS 12.1.2.1.1) to invoke Action Items 21.2 and 21.3.

4. As identified in the Appendix B Errata, line items for common-cause failures of HCV-1117 (EQ) and breakers 1RX1 and 1RY1 (seismic) were inadvertently omitted from the Revision 0 FMEA database. These errata items are addressed by Action items 04.3 and 21.2/21.3, respectively.

NOTE: The common-cause seismic failure of 1RX1 and 1RY1 requires that the Technical Specification Action for an inoperable offsite source be entered WHENEVER the grid voltage and other applicable conditions would not support SIS loading with the breakers open, IRRESPECTIVE of initial breaker position. This restriction applies until the breakers are upgraded to Seismic Interaction B/A criteria or other modifications are implemented to eliminate this susceptibility.

734: 31. 12.25/90

## SHREGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OMOFRE UNIT I ACTION ITEMS FOR SIGNIFICANT FINDINGS

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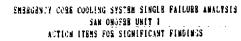
1739 #	OBVICE 19	COMPONENT ID	PAILURE MODE	BFFBCT ON ECCS	REMARES	TEOGES HETI	ACTION LIBH	RESP DISCIPLINE
			***					
	TATE ATTARS		OPBN	HINDERBARILITY OF TRAIN A PUMPING FOR SI AND SECONDARY RECIRC, DIVERSION OF RUST INVENTORY	VALVE AMALTSIS. DIVERSION BOUNDED BY CV-36/37 PAILURE WITH LOCAL MANUAL		YERIFY: AL YALYE LOCKIW: PROGRAM CRITHRIA DO MOT BICLUDE CRITICAL HANUAL YALYES, AND B) OTHER ADMINISTRATIVE CONTROLS ARE SUFFICIENT TO PREVENT	OPERATIONS
			<del></del>	·· ·· · · · · · · · · · · · · · · · ·	BACRUP ISOLATION APTRE 30 MINUTES. LOCATION INACCESSIBLE WITH THE SOURCE TREMS		MISPOSITIONING OF MANUAL VALVES WEICH ARE NOT	
01.1.04.01.1 BY	- 8538	VALVE/ACTUATOR	OPBN	**************************************	INCLUDES SV-1, 8V-2, SV-510. TECHNICAL SPECIFICATIONS 3.3.3 AND 4.1.1 GOVERN	05	RB-EVALUATE MSLB FOR 2 TRAIN SE AND THIS DILUTION FAILURE	NUCLEAR
01.1.04.05.1 BV	-851R	83-5 (RRLAT)	ΩM	APTER *(SAME AS 1.1.4.1.1)	TRE RUST RELAT EMBRG[ZED BY EV-8538 NOT CLOSED	05	(SAME AS 1.1.4.1.1)	
					LIMIT SWITCHES			
01.1.04.05.2 HV		83-5 (RBLAY)	OPP .	*PARTIAL DIVERSION OF SI PLOW FROM TRAIN A APTER SEQ BLOCK/RESET VIA HIMIPLOW	CALCULATION INCLUDES CV-36/37 PAILURE.	03.1	APPLICABLE MANUAL ACTION LOCATIONS, INCLUDING	MUCLBAS
				AUTAR CA-34 to CONDENSES	LOCAL MANUAL BACEUP ISOLATION AFTER 30 HINUTES. LOCATION NOT ACCESSIBLE WITH		ACCESS/BGRESS ROUTES	
01.1.04.05.2 HV	-853B	83-5 (RBLAY)	CFF	*PARTIAL DIVERSION OF SI PLOW PROM TRAIN		03.2	BVALUATE SHIBLDING OR BEST-ESTIMATE SOURCE TREM TO	NUCLBAR
		·		A APTER SEQ BLOCK/RESET VIA MINIPLOM VALVE CV-37 TO CONDENSEE	CALCULATION INCLUDES CV-36/37 FAILURE, LOCAL MANUAL BACRUP ISOLATION APTER 30		RESOLVE MANUAL ACTION LOCATIONS AND ACCESS/EGRESS ROUTES WITH UNACCEPTABLE THI-SOURCE TERM DOSE	
6) ) 63 AE 9 HI	45.30	63 £ 1001.44	ADD	ALLERIAL BLUDDELON OF ST. DLOW SDOW CO. LAND	MINUTES. LOCATION NOT ACCESSIBLE WITH THE SOURCE TERMS		DATES	
_A1:1:∏4:A3:4 HA	:0311	83-5.1RBLAY) .	OPP	*PARTIAL DIVERSION OF SI PLOY PROMITRAIN A ARTER SEG BLOCK/RESET VIA MINIPLON VALVE CV-37 TO CONDENSES	CALCULATION INCLUDES CV-36/37 PAILURE, LOCAL MANUAL BACRUP (SOLATION APTER 30	. ña•4—	.QOTAIN REGULATORY RELIEF FROM THI SQUECE TERMS FOR SINGLE PAILURE EVENTS IF MESDED BASED ON DOSE CALCULATION RESULTS	F17993T97
				TALTS CT-11 TO COMPSAGE	BINUTES. LOCATION NOT ACCESSIBLE WITH		CELOUDITOR BESCH	
01.1.04.05.2 HV	-8538	83-5 (RBLAT)	OFF	*PARTIAL DIVERSION OF SI FLOW PROM TRAIN A AFTER SEQ BLOCK/RESET VIA MINIFLOW		04.1	RRVISE RWST AND SI/PW LO-LO SETPOINT CALCULATIONS TO ADDRESS INVENTORY DIVERSIONS	NUCLBAR
	·		-	VALVE CV-37 TO CONDENSEE	LOCAL MANUAL BACEUP ISOLATION APTER 30 MINUTES. LOCATION NOT ACCESSIBLE WITH		· ·	
01.1.04.06.2 BV	-851R	SEQ 1	CONTACTS CLOSED	*(SAMB AS 1.1.4.1.1)	THE SOURCE TREMS	05	(SAMB AS 1.1.4.1.1)	
01.1.05.03.2 BV		(19-1, 3) SV-1900	(ON) ON (OPBN)	MONE	*CONTAINMENT ISOLATION PUNCTION		•	NUCLEAR
01.1.03.03.6		31-3300	UN LUTENI	NUIS	BVALUATED IN BSP_SPA. MOV-850A/B/C ARB BEDUNDANT CONTAINMENT ISOLATION VALVES	<u> </u>	CONTAINMENT ISOLATION FUNCTION OF SI VALVES AND INCLUDE ALLOWANCE IN DOSS CALCULATIONS	BOOLDAR
					TO MY-851A/B AND SY-2900/3900, BUT PENSTRATIONS AND VALVES NOT TIPE C LEAF			
01.1.05.03.2 #7	-354B	37-3900	ON (OPBH)	HON3	TESTED PER 10CFB50 APPENDIT J -CONTAINMENT ISOLATION FUNCTION	02.2		STATION TECH
					BVALUATED IN BSP_SPA. HOV-850A/B/C ARB BBDUNDANT CONTAINMENT ISOLATION VALVES TO HV-851A/B AND SV-2900/3900, BUT		SI/RBCIRC LBARAGE TRSTING	
					PRINTERATIONS AND VALVES MOT TYPE C LEAR TESTED PER 10CPRSO APPRIDIT J			·
\$1,71,06.91.1 G-	18	83-2 (B8FVA)	099	PARTIAL DIVERSION OF TRAIN A SI FLOW AFTER SEG BLOCE/RESET VIA MINIFLOW VALVE	*NORMAL POSITION. RUST INVENTORY	.04	(SAME AS 1.1.4.5.2)	=
				CV-17 Ty CONDENSIES	LOCAL MANUAL BACRUP ISOLATION AFTER 30 MINUTES. LOCATION NOT ACCESSIBLE WITH			
					THE SOURCE TERMS		•	



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						REFORT			1
LTBN #	DEVICE . ID	COMPONENT 10	PAILURE MODE	EFFRCT ON BUCS	REMARES	ETEM	ACTION ITSH	RESP DISCIPLINE	İ
						· <del></del>			<b>†</b> {
01 1 06 08 2	r 13	97 6 1001491	ON.	TOTAL CRUMPNIA COURS BLOOM COURS IN THE STATE OF THE STAT	PRODUCTS SERVICE STREET	05	[SAME AS 1.1.4.1.1]		
01.1.06.08.2	ñ.15 ' '''' '''	03-5 IRBLAYI	ой <u>-</u> .	IF PRIOR TO SIS/SISLOP. NO REPRET IF	COABBN 188 BASL	74	. 13403. 63. 1.1.1.1.11		<b>†</b> i
				APTER.					
01.1.06.10.1	G-18	CV-8758	OPRN	STARE AS 1.1.6.8.2) SPARTIAL DIVERSION OF TRAIN A FM PUMP	INCLUDES SV-875B. L9-2 (ZSC-1875B) INCLUDES SV-16. 18A. RWST INVENTORY	. <u>0</u> 5 _ 03	(SAME AS 1.1.4.1.1)(SAME AS 1.1.4.5.2)		1-1
01.1.00.10.1	U-18	C1-31	UPAN	FLOW TO CONDRUSES ALY NUMBERS AND ANTAR	CALCULATION INCLUDES LOCAL MANUAL BACKUP		(Jane a. 1.1. t. J. 6.		
				CY-37	[SOLATION AFTER 30 MINUTES. LOCATION NOT				1
	0.30	au 11	OPEN		ACCESSIBLE WITH THE SOURCE TERMS	0.4	(SAMS A3 1.1.4.5.2)		
01.1.06.10.1	G-18	CV-37	UPSE	*PARTIAL DIVERSION OF TRAIN A PW PUMP PLOW TO COMDENSER VIA MINIPLOW VALVE	*INCLUDES SV-18, 18A. RWST INVENTORY CALCULATION INCLUDES LOCAL MANUAL BACKUP	04	(3306 #3 1.1.4.3.2)		
			- m	CV-31	ISOLATION APTER 30 MINUTES. LOCATION NOT	-			1
H					ACCESSIBLE WITH THE SOURCE TERMS		434MP 40 1 1 4 5 91		1
01.1.06.13.1	G-3B	<u> </u>	CONTACTS OPEN (OFF)	*(SAMB AS 1.1.6.10.1)	NORMAL POSITION	¢3	(SAMB AS 1.1.4.5.2)		1
01.1.06.13.1	G-18	SEQ I	CONTACTS OPEN	#(9AMB AS 1.1.6.10.1)	NORMAL POSITION	04	(SAMB AS 1.1.4.5.2)		
		(51-1, 1)	(OPP)			46			┨
01.1.06.14.2	G-38	SBQ 1 (38-9, 11)	CONTACTS CLOSED (ON)	*REDUCTION IN RWST SOZON CONCENTRATION IP PRIOR TO \$13/31SLOP, NO REPECT IP	TECHNICAL SPECIFICATIONS 3.3.3 AND 4.1.1 GOVERN THE RWST	0.5	(SAM3 AS 1.1.4.1.1)		
		(30-3, 11)	font	AFTER					
01.1.06.15.1	G-38		VOLTS LOW	*INOPERABILITY OF TRAIN A PUMPING FOR SI		03	(SANE AS 1.1.4.5.2)		
İ		CONTROL POWER		AND SECONDARY RECIEC, OR PARTIAL DIVERSION OF TRAIN A PLOW TO CONDENSER	FAILURB, LOCAL MANUAL BACKUP ISOLATION APTER 30 MINUTES. LOCATION NOT				
1.				AIV CA-71	ACCESSIBLE WITH THE SOURCE TREMS	•	, company of the contract of t		1
01.1.06.15.1	G-39	BUS DIC 125VDC	VOLTS LOW	*INOPERABLLITY OF TRAIN A PUMPING FOR SI		01	(SAM2 A3 1.1.4.5.2)		1
·		CONTROL POWER		AND SECONDARY RECIRC, OR PARTIAL DIVERSION OF TRAIN A FLOW TO CONDENSER	FAILURB, LOCAL MANUAL BACEUP ISOLATION	-			
				AIT CA-31	ACCESSIBLE WITH THE SOURCE TERMS		•	•	1
01.1.06.18.1	G-38	CMI	PRESSURE LOW		STRAIN A PW PUMP MAY PAIL DURING SBLOCA	03	(SAME AS 1.1.4.5.2)		ļi
1				AND SECONDARY RECIEC, OR PARTIAL DIVERSION OF TRAIN A FLOW TO COMBRISER	OR MALB IP CV-875B CLOSED. RWAT INVENTORY CALCULATIONS INCLUDE CV-36/37				-
. ·				Diagraphs of 1271s a bros to comparing	PAILURB OPEN, LOCAL MANUAL BACKUP				
			•		ISOLATION APTER 30 MINUTES. LOCATION				
01.1.06.18.1	C 19	CNI	PRESSURE LOW	STHOOPDARTIES OF TOATH & DHMDING PAD SI	INACCESSIBLE WITH THE SOURCE TREAS STRAIN A PY PUMP MAY PAIL DURING SOLOCA	84	(SAME AS 1.1.4.5.2)		
VI.1.00.10.1	4-10	UMI	LBB330B2 FAM	AND SECONDARY RECIEC, OR PASTIAL	OR HILE (P CV-875B CLOSE). BUST		4		1
[.]				DIVERSION OF TRAIN A PLOW TO COMDENSEE	INVENTORY CALCULATIONS INCLUDE CV-36/37				
×			• •		PAILURE OPEN, LOCAL MANUAL BACKUP ISOLATION APTER 30 MINUTES. LOCATION				
					[MACCESSIBLE WITH THE SOURCE TERMS				1
01.1.08.01.1	HV-8528	VALVB/ACTUATOR	OPBN	SI DELIVERY TIME INCREASED, SI	NORNAL POSITION. INCLUDES SV-1, SV-2,		NO PURTHER ACTION REQUIRED. THIS CONFIGURATO		L
				RECTABLISTY REDUCED (VIA NON-SELENT) PORTION OF FW HEADER).	SV-529. BACKUP VALVES ARE SAPETY RELATED. SEISHIC CATEGORY A. VALVE OPEN	ı	APPROVED AS PART OF SEP TOPIC III; 6 LONG TRR SEISMIC SCOPE	1	
[]				COLUMN OF THE BENEVAL.	NORMAL FOR SECONDARY RECIRC				
01.1.00.02.1	HV-852B	SEQ I	CONTACTS OPEN	*(SAMB AS 1.1.8.1.1)	NORMAL POSITION		(SAMB AS 1.1.8.1.1)		
	מיישב עום	(17-5, 7) 125VDC BUS AL	(OFE) VOLTS LOW	*SI DELIVERY TIME INCREASED, SI	VALVE OPEN NORMAL POR SECONDARY RECISC		(SAH2 AS 1.1.8.1.1)		
01.1.04.03.1	01-00-0	(12-132)	40513 TOR	RELIABILITÝ REDUCED (VIA HON-SEISMIC	AND A CLAN MARKING TAX REPORTED SERVICE		(		1 .
1 - 1		•		PORTION OF FW HEARER)					

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	ITEM, I	DEALCR ID	COMPONENT ID	FAILURE MODE	BFFBCT ON BCCS	REMARES	REPOST ITSM	ACTION ITEM	BBSP DISCIPLINE	
	01.2.02.01.1	MARUAL VALVES TRAIN 8 BOUNDARY		<u>opbu</u> .	INSPERABILITY OF TRAIN B SE PUNPING, DIVERSION OF RUST INVENTORY	*SEE TABLE 1-2 FOR DETAILED BOUNDARY VALVE ANALYSIS. DIVERSION BOUNDED BY CV-36/37 PAILURE WITE LOCAL MANUAL BACKUP [SOLATION APTER 30 MINUTES. LOCATION INACCESSIBLE WITH THI SOURCE	01	(SANE AS 1.1.2.1.1)		~ <del></del>
	01.2.04.01.1	BV-853A	VALVE/ACTUATOR	OPBN	*ERDUCTION IN EWST BORON CONCENTRATION IF PRIOR TO SIS/SISLOP. NO REPRET IF AFTER	TREMS INCLUDES SV-1, SV-2, SV-526. TECHNICAL SPECIFICATIONS 3.3.3 AND 4.1.1 GOVERN THE RUST	05	(SAMS AS 1.1.4.1.1)		<del></del>
:	01.2.04.05.1	BV-853A	83-5 (RELAT)	ON	#(SAHR AS 1.2.4.1.1)	RELAT ENERGIZED BY RV-853A NOT CLOSED	05	(SAM2 AS 1.1.4.1.1)		L
	01.2.04.05.2	HA-8237	03-5 (RBLAY)	OPP	AVEAR CA-34 40 COMBRASSE 8 VALRE 380 STOCE/SESSE AIV HINIBFOR 8 VALRE 380 STOCE/SESSE AIV HINIBFOR	CALCULATION (NCLUDES CY-36/37 PAILURE, LOCAL MANUAL BACKUP ISOLATION APTRE 30 MINUTES. LOCATION NOT ACCESSIBLE WITH	03	(SAHE AS 1.1.4.5.2)		
	01.2.01.05.2	HV-853A	83-5 (ABLAY)	OFP	PRETIAL DIVERSION OF SI FLOW PROM TRAIN B AFTER SEQ BLOCE/RESET VIA MINIFLOW VALVE CV-37 TO CONDENSER	THE SOURCE TREMS **WORMAL POSITION. BUST INVENTORY CALCULATION INCLUDES CV-36/37 FAILURS, LOCAL MANUAL BACEUP ISOLATION AFTER 30 HINDTES. LOCATION NOT ACCESSIBLE WITH THE SOURCE TREMS	01	(SAMB AS 01.1.4.5.2)		
	01.2.01.06.2	8V-853A	SEQ 2	CONTACTS CLOSED	*(SAMB AS 1.2.4.1.1)		05	(SAM3 AS 1.1.4.1.1)		ļ
: 	01.2.05.03.2	BV-854A	(19-6, 8) SV-2900	ON (OPEN)	NONE	PCONTAINMENT ISOLATION FUNCTION EVALUATED IN ESP 3PA. HOV-850A/B/C ARE REDUNDANT CONTAINMENT ISOLATION VALVES TO NV-851A/B AND SV-2300/3900, BUT PENETRATIONS AND VALVES NOT TYPE C LEAR	02	(SAMB AS 1.1.5.3.2)		
	01.2.06.08.1	C-JA	83-5 (RBLAT)	OPP	PARTIAL DIVERSION OF TRAIN B SI FLOW AFTER SEQ BLOCE/RESET VIA MINIFLOW VALVE CV-36 TO CONDENSER	TESTED PER LOCPESO APPENDIX J *MORNAL POSITION. RWST INVENTORY CALCULATION INCLUDES CV-36/37 PAILURE, LOCAL MANUAL BACEUP ISOLATION APTER 30 MINUTES. LOCATION NOT ACCESSIBLE WITH THI SOURCE TREAS	04	(SAH3 AS 1.1.4.5.2)		
	€1.2.06.08.2	G-3A	83-5 (BBLAY)	ON	*REDUCTION IN BUST BOROW CONCENTRATION IF PRIOR TO \$13/319LOP. NO REFECT IF AFTER.	TROUBLE SPROTFICATIONS 3.3.3 AND 4.1. COVERN THE RMST	1 05	(SAMS AS 1.1.4.1.1)		
: : :	01.2.06.09.1		CV-875A CV-36	OPBM	S(SAMB AS 1.2.6.8.2)  PARTIAL DIVERSION OF TRAIN B PW PUMP FLOW TO CONDRISSE VIA MINIFLOW VALVE	INCLUDES SV-875A, LS-2 (ZSC-1875A)  FINCLUDES SV-87, 17A, BYST INVENTORY  CALCULATION INCLUDES CV-36/37 PAILURE,	05 03	(SAMB AS 1.1.4.5.2)		
	01.3.06.10.1	G-3A	Ċv-36	OPBN	CY-16  *PARTIAL DIVERSION OF TRAIN 8 FW PUMP FLOW TO CONDENSES VIA MINIFLOW VALVE CY-36	LOCAL MANUAL BACRUP ISOLATION APTRE 30 MINUTES. LOCATION NOT ACCESSIBLE WITH THI SOURCE TERMS *THICLUBES SV-17, 17A. ENST INVENTORY CALCULATION INCLUDES CV-36/37 FAILURE, LOCAL MANUAL BACRUP ISOLATION APTRE 30 MINUTES. LOCATION NOT ACCESSIBLE WITH THI SOURCE TERMS		(SAMB AS 1.1.4.5.2)		

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## BUSEGENCY CORE COOLING STATEM SINGLE FAILURE ANALTSIS SAN OMOFRE UNIT I ACTION ITEMS FOR SIGNIFICANT FINGLES

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<u>.</u>		-							•	
1 MBT1	DEVICE ID	COMPONENT ID	PAILURE MODE	BFFBCT ON BCCS	REMARES	EPPORT		ACTION ITEM	RESP DISCIPLINE	ļ
01.2.06.13.1 G	-14	_SBQ.2	CONTACTS.OPBN		MORMAL POSITION	.03	_(SAHB AS .1.1.4.5.2)			
01.2.06.11.1 G	-31	(53-1, 3) 88Q 2 _(51-1, 1)	(OFF) CONTACTS OPEN (OFF)	*(SAME AS 1.2.6.10.1)	NORMAL POSITION	04	(SAMS AS 1.1.4.5.2)			
01.2.06.14.2 G	-3A	88Q 2 (38-9, 11)	CONTACTS CLOSED (ON)	*REDUCTION IN RWST BORON CONCENTRATION IF PRIOR TO SIS/SISLOP. NO RFFRCT IF AFTER	TECHNICAL SPECIFICATIONS 3.3.3 AND 4.1.1 GOVERN THE RUST	05	(SAMB AS 1.1.4.1.1)			
01.2.06.15.1.0	-34	BUS AZC 125VDC CONTROL POWER	VOLTS LOW	DIASESTON OS LEVIN S STOM LO CONDENSES THO SECONDYES ESCISC OS STELLY SINOSESPECITA OS LEVIN E DINBING BOS SI	CV-36/37 FAILURE, LOCAL MANUAL BACKUP		(S.2.1.1.5.2)			
01.2.06.15.1 0		BUS AZC 125VDC CONTROL POWER		VIA CV-36 SINOPERABILITY OF TRAIN B PUMPING FOR SI AND SECONDARY BECIEC, OR PARTIAL	ACCESSIBLE WITH THE SOURCE TREMS *SMST ENVENTORY CALCULATION INCLUDES CV-36/37 FAILURE, LOCAL MANUAL BACKUP	01	(SAME AS 1.1.4.5.2)			
01.2.06.10.1.0			SBB22nBB fom -	DIVERSION OF TRAIN B PLOW TO CONDENSER VIA CV-36 AINOPERABILITY OF TRAIN B PUMPING FOR SE AND SECONDARY RECIRC, OR PARTIAL	ISOLATION AFTER TO MINUTES. LOCATION NOT ACCESSIBLE WITE THI SOURCE TERMS  TRAIN B PY PUMP MAT PAIL DURING SELOCA OR MSLB IP CV-875A CLOSED. RWST		_19AHB_AS_1.1.4.5.3)			<u> </u>
			PRESSURB LOW	DIVERSION OF TRAIN & SI FLOW TO COMPRISER	INVESTORY CALCULATION INCLUDES CV-36/37 PAILURE OPEN, LOCAL MANUAL BACEUP ISOLATION APTER 30 MINUTES. LOCATION INACCESSIBLE WITE THE SOURCE TREMS *TRAIN B PY PURP MAY PAIL DURING SBLOCA		(SANR 43 ).1.4.5.21			
<u>01.2.05.18.1 G</u>			LEBŽŽŮĖR ČOS	AND SECONDARY RECIRC, OR PARTIAL DIVERSION OF TRAIN B SI FLOW TO CONDENSES	OR MSLB IF CV-815A CLOSED. RWST INVENTORY CALCULATION INCLUDES CV-36/37 FAILURE OPEN, LOCAL MANUAL BACKUP ISOLATION AFTER 30 MINUTES. LOCATION					
 01.2.08.01.1	V-852A	<u>VALVB/ACTUATOR</u>	OPBN	ASI DELIVERY TIME INCREASED, SI RELIABILITY REDUCED (VIA NOW-SEISMIC PORTION OF PW SEADER).	INACCESSIBLE WITH THI SOURCE TERMS  MORMAL POSITION. INCLUDES SY-1, SY-2,  SY-525. BACEUP VALVES ARE SAFETT  RELATED, SEISMIC CATEGORY A. VALVE OPEN		(SANK AS 1.1.8.1.1)			
01.2.08.02.1 8	IV-852A	SEQ 2 (18-2, 4)	CONTACTS OPEN (OFF)	*(SAHB AS 1.2.8.1.1)	MORMAL POR SECONDARY ERCIEC MORMAL POSITION		(SAME AS 1.1.8.1.1)			
01.2.08.03.1	IV-852A	125VDC BUS #2 (12-211)	VOLTS LOW	*SI DRLIVERT TIME INCREASED, SI RELIABILITY REDICED (VIA MON-SEISHIC PORTION OF PW BEADER)	VALVE OPEN MORMAL FOR SECONDARY RECIEC			<u> </u>		-
01.4. <u>02</u> .01.1 (	CEMMON BOUNDARY		OPBN	*PARTIAL DIVERSION OF 2 TRAIN 31 PLOW, BOUNDED BY SINCLE TRAIN INJECTION FOR PLOW, CV-16/37 PAILURE FOR RWST INVENTORY	SBB TABLE 1-2 FOR DETAILED BOUNDARY VALVE ANALYSIS	01	(SAMB AS 1.1.2.1.1)			
1	CHECK AND BELIE VALVES, COMMON SCUNDARY	<del>-</del> <del>-</del>	BCRMAL (PASSIVB)	NONS FOR ST PLOW RATE. HOWEVER, LOSS OF INVENTORY NOT INCLUDED IN BUST CALCULATION	' SER TABLE 1-2 FOR DETAILED BOUNDART VALVE ANALYSIS. INCLUDES SIS-385 AND RV-868. SIS-385 IS A SPRING CHECK VALVE	04	(S.2.1.1.1 EA EMAE)			
01.4.05.05.5		£T-453 LOOP	BQ		THOR-BO S/G ME LEVEL THES ASSUMED COMMON-CAUSE PAILURES DURING MSLE INSIDE CONTAINMENT. UPSCALE PAILURE MOULD ENERGIZE BELAYS LC-4538-T2, LC-4548-T2G AND LC-4558-T2G, NOVEYSE CIRCUIT TO BE DISCONNECTED PRODING CYCLE 12 OVERFILL PROTECTION MODIFICATIONS		RSVISE SECONDART RI CV-142/143/144 LOCA CONTROL BJON	BOLEC BOL TO POSITION ALLY IF UNSUCCESSFUL FROM	OPERATIONS	

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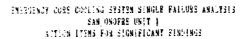
EMBLUSHEY CORR COOLING SYSTEM SINGLE FAILURE AMALYSIS
SAN CHOFRE UNIT 1
ACTION ITEM: POR SIGNIFICANT FINDINGS

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	ITEM #	DAVICE 1D	COMPONENT ID	PAILURE MODE	BFFBCT ON BCCS	esáres	BEPOET	ACTION ITEM .	RESP DISCIPLINE	
1	01.4.06.05.5	PCV-156	LT-151, LOOP	_19	ANOME FOR SI, LOSS OF SECONDARY BECISC TO SIG AIRIC WITH CONCURRENT COMMON-CAUSE FAILURE OF LT-454 AND LT-455	COMMON-CAUSE PAILURES DURING MSL8 1931D8 CONTAINMENT. UPSCALE FAILURE WOULD 8NBRGIZE RELATS LC-1538-12. LC-1518-12G		BITEND TEMPORARI MODIFICATION TFM-1-90-FVS-001 (DISCONDECTION OF 8/G OVERFILL SIGNALS FROM PCV-/CV-) UNTIL PERMANENT OVERFILL HODIFICATIONS ARE INSTALLED IN CYCLE 12	MBCHAHICAL	
	01.4.07.05.5	PCV-457 CV-144	LT-454 LOOP	89	*NOME FOR SI, LOSS OF SECONDARY RECIEC TO S/G A/B/C MITH CONCURRENT COMMON-CAUSE FAILURE OF LT-453 AND	COMMON-CAUSE PAILURES DURING MILE INSIDE CONTAINMENT. UPSCALE PAILURE NOULD	12	(SAMB AS 1.4.6.5.5)		
	01.4.08.05.5		LT-455 LOOP	RQ	LT-455  *NONE FOR SI, LOSS OF SECONDARY RECIRC	BNBRGIZE RELAYS LC-453B-12, LC-454B-12C AND LC-455B-12C, HOWBYBE CIRCUIT TO B3 DISCONNECTED PENDING CYCLE 12 OVERFILL PROTECTION HODIFICATIONS *NOW-EQ S/G NE LEVEL INTES ASSUMED	12	(SAMB AS 1.4.6.5.5)		
		.CY-193			TO SIG A/B/C WITH CONCURRENT COMMON-CAUSE PAILURE OF LT-453 AND LT-454	COMMON-CAUSE PAILURES DURING MSLE INSIDE CONTAINMENT. UPSCALE FAILURE WOULD REGIZE RELAYS LC-453B-12, LC-454B-12G AND LC-455B-12G, HOWEVER CIRCUIT TO BS DISCONDECTED PENDING CYCLE 12 OVERPILL PROTECTION MODIFICATIONS		•		
	01.4.09.01.2	PCY-456 CV-142,143,144 PCY-457,458	SBQ 1 (16-9, 11)	CONTACTS CLOSED  CONTACTS CLOSED	*NONE FOR SI, LOSS OF SECONDARY RECIRC TO S/G A/B/C  *NONE FOR SI, LOSS OF SECONDARY RECIRC	*LOW PERD PLOW WILL BE INDICATED.  BYALUATION OF MANUAL BYAS PATH OR LEAD LIFTING REQUIRED TO MITIGATE REFECTS ON SECONDARY RECIRCULATION  LOW PERD FLOW WILL BE INDICATED.	12	(SAMB AS 1.4.6.5.5)		
		CV-142,143,144 PCV-456,457,458 CV-142,143,144	(17-1, 3)	TRIPPED (CONTACTS CLOSED)	TO S/G A/B/C  *NONS FOR SI, LG3S OF SECONDARY RECIRC TO 3/G A/B/C APTER MPW PUMPS TRIPPED	BVALUATION OF MANUAL BIPASS PATH OR LBAD LIFTING REQUIRED TO MITIGATE REFECTS ON SECONDARY RECIRCULATION REVALUATION REQUIRED FOR LBAD LIFTING, USE OF MANUAL BIPASS VALVES OR MEN PUMP	12	{SAMB AS 1.4.6.5.5}		
	01.4.09.06.1	FCV-456,457,458 CV-142,143,144	B-EAVSA	TRIPPED (CONTACTS CLOSED)	*WONE FOR SI, LOSS OF SECONDARY RECIEC TO S/G A/8/C AFTER MPW PUMPS TRIPPED	BREATER RACEOUT/RECLOSE TO MITIGATE THIS FAILURE FOR SECONDARY RECIRC BEVALUATION REQUIRED FOR LEAD LIFTING, USE OF MANUAL BYPASS VALVES OR MYR PUMP BREATER RACEOUT/RECLOSE TO MITIGATE THIS	12	[SAMB AS 1.4.6.5.5]		
	01.4.09.01.1	PCV-456,457,458 CV-142,143,144		CONTACT CLOSED	MONE FOR SI AND SECONDARY RECIRC	FAILURE POR SECONDARY RECIEC *SECONDARY RECIEC UNAFFECTED RECAUSE 3/G LEVEL RESTORED TO TOX BY AFM PLOW PRE BOI, PRIOR TO INITIATING SECONDARY SECIEC PLOW. BESET OF AFMAS (WITH LEVEL > 51) DISARMS CHECK VALVE BACRUP HODE		NO FURTHER ACTION REQUIRED. BRV 5 OF SUI-1.0-32 ALREADY INCLUDES THIS REQUIREMENT		
 	e1.4.03.08.2	PCV-456,457,458 CV-142,143,144	TTEZ, TTIZ-[90 TTII-[90 (k3LAYS)	CONTACTS CLOSED	MONE FOR SI AND SECONDARY RECIRC	FOR PCVS AND CV4. BOL VERIFICATION  REQUIRED  ***SECONDARY RECIRC UNAPPRECIBE BECAUSE S/G LEVEL RESTORED TO TOX BY APM FLOW PSR SOL, PRIOR TO INITIATING SECONDARY  RESTRUCTON, RESECUTATIVE RACEUP MIDS TOX FOVE ARE CVS. EST VERSECUTOR.		(SAME AS 1.4.9.7.1)		

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						REPORT			
(TRH )	DEVICE ID	COMPONENT ID	PATLURB HODE	BFFBCT ON ECCS	REMARKS	ETBS		DISCIPLINE	
01.4.09.10.1	<u>707-456,457,458</u> CV-142,143,144		VOLTS LOW	NOME FOR SI, LOSS OF SECONDARY ESCIECTO SIGNATURE OF SECONDARY ESCIECTO	*EVALUATION REQUIRED FOR LEAD LIFTING, USE OF MANUAL BYPASS VALVES OR MEW PUMP BREARER RACKOUT/RECLOSE TO MITIGATE THIS	12	(SAMB AS 1.4.5.5.5)	_	
01.4.09.11.1	PCV-456,457,458 CV-142,143,144	VITAL BUS \$5 (8-2901V)	VOLTS LOW	NOMS FOR SI, LOSS OF SECONDARY RECIEC TO S/G A/B/C APTER NEW PUMPS TRIPPED	PAILURE FOR SECONDARY RECIRC. ANNUMCIATION OCCURS FROM AFMAS-A ACTUATION OR BROUBER FEVALUATION REQUIRED FOR LEAD LIFTING, USE OF NAMUAL ETPASS VALVES OR MFW PUMP BREAKER RACEOUT/RECLOSE TO MITIGATE THIS FAILURE FOR SECONDARY RECIRC.	12	(SAMB AS 1.4.6.5.5)		
01.4.09.12.1	FCV-456,457,458 CV-142,143,144	LSA	BERZZINER FOR	MONE FOR SI (ISA NOT CREDITED FOR FCV CLOSURE), LOSS OF SECONDARY RECIRC TO S/G A/B/C	ANNUNCIATION OCCURS ON APPAS-B ACTUATION OR TROUBLE  BRACH FCV HAS SEPARATE BACEUP M2 (GMI) SUPPLY FOR CLOSURE. COMMON-CAUSE FAILURE NOT POSTULATED DURING SECONDARY RECIRC, BUT SINGLE FAILURE OF [SA-950 COULD	12	(SAME AS 1.4.6.5.5)		
01.4.10.01.1	MOA-1504	VALVE/ACTUATOR	OPBN	REDUCED REDUNDANCY AGAINST SI FLOW DIVERSION AND INJECTION OF CONDENSATE	ISOLATE ISA TO CVS. BYALN OF MANUAL BYPASS PATHS REQD FOR MITIGATING BPPECTS ON SECONDARY RECIRC CROSS-TIR VALVE FROM APW PUMP G-10S TO MAIN PW MEADER. ACCEPTABILITY REQUIRES:		NO PUETHER ACTION REQUIRED. DIVERSION/CONDENSATE INJECTION REQUIRES DOUBLE FAILURES WHICH ARE		
					1) APW LOGIC TO PREVENT TRAIN A START UNLESS TRAIN & FAILED, 2) DUAL FAILURE OP NOV-1204 OPEN PLUS APM TRAIN B IS OUTSIDE DESIGN BASIS. AFM CHE VALVE NOT SRIFT LEAR TESTED		OUTSIDE SIS/SISLOP DESIGN BASIS		
01.4.19.02.1	HOV-1204	SBQ 1 (49-1,3)	CONTACTS OPEN (OFF)	(SAMB AS 1.4.10.1.1)	*(SANE AS 1.4.10.1.1). NORMAL POSITION		(SAHE AS 1.4.10.1.1)	l	
01.4.10.04.1	MOV-1204	BCC-1 (42-1127)	VOLTS LOW	REDUCED REDUNDANCY AGAINST SI FLOW Diverison and imjection of condensate to ECS	APW LOGIC TO PREVENT TRAIN A START UNLESS TRAIN B PAILED AND 21 DUAL PAILURE OF MOV-1204 OPEN PLUS APW TRAIN		(SAMB AS T. 4.10.1.1)		
01.4.16.01.1	CV-2:)Z	VALVE/ACTUATOR	OPBN	PARTIAL DIVERSION OF 2 TRAIN SE FLOW, BOUNDED BY SINGLE TRAIN INJECTION FOR	B 13 OUTSION DESIGN BASIS. APM CHE VALVE NOT SHAT LEAK TESTED FINCLUDES BT-1202. BOI REV REQUIRED TO SPECIFY CLOSING CV-525 AND CV-525		(SANS AS 1.1.4.5.2)		
				PLOW, CV/36/37 PAILURE FOR RWST	INHEDIATELY UPON SIS/SISLOP. RWST INVENTORY CALC REV REQUIRED TO ADDRESS UNISOLABLE PLOW PROM RCS TO PRT VIA RY-206				
01.4.15.01.1	CV-292	VALVE/ACTUATOR	OPBN	IFARTIAL DIVERSION OF 2 TRAIN SI FLOW, BOUNDED BY SINGLE TRAIN INJECTION FOR PLOW, CV/36/37 PAILURE FOR RWST INVENTORY		04.2	MODIFY LETDOWN ISOLATION VALVES (INCLUDING NUCLI LCV-1112) AS REQUIRED BY RWST INVENTURY, RECIRC FLOW RATE OR DOSE LIMITATIONS	BA9	

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ITEM # DEVICE ID COMPONENT ID PAILURE M	ODB REFECT ON BCCS	REMARES	BBPORT ITBM	ACTION ITEM	B326 DIRCIBLIMB
		HORMAL POSITION, INCLUDES HT-1201 BOT BBV REQUIRED TO SPECIFF CLOSING CV-525 AND CV-526 IMMEDIATELY UPON 818/818LOP. RWST INVENTORY CALC REV REQUIRED TO		MR AS 1.4.16.1.1 <u>1</u>	
N1_4.16.03.1 CV-204 VALVB/ACTUATOR OPPM	* [SAMB AS ] . 4 . 16 . 1 . 1]	ADDRESS UNISOLABLE PLOW PROM RCS TO PRI VIA RV-206 *INCLUDES NT-1204. BOI REV REQUIRED TO SPECIPT CLOSING CV-525 AND CV-526 [MHEDIATELT UPON SIS/SISLOP. RWST INVENTORY CALC REV REQUIRED TO ADDRESS	04 (S <i>i</i>	NB AS 1.4.16.1.11	
\$1.4.15.04.1 CY:287 YALVE/ACTUATOR OPEN	PRETIAL DIVERSION OF 2 TRAIN SI PLON BOUNDED BY SINGLE TRAIN INJECTION FOR PLON RATE, CV-36/37 PAILURE FOR RUST INVENTORY	UNISOLABLE PLOW PROM BCS TO PRT VIA BV-206 INCLUDES BY-1287. MAY BE OPEN DUBING STARTUP. BOI REV BEQUIRED TO SPECIFY CLOSING BCV-1117 UPON SIS/BISLOP IP BICESS LETDONN IS IN SERVICE	BY LI	HIPT BICESS LETDOWN ISOLATION VALUES AS REQUIRE RUST INVENTORY, RECIRC PLOW RATE OR DOSE HITATIONS	ED NUCLBAR
					<u> </u>
	<u> </u>				
					- 10 N ALL ME SAME

### EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS Page 432 of 510

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ITEN #	DEALCR ID	COMPONENT ID	PAILURE MODE	EFFECT ON ECCS	BRATELS	ITRH	ACTION ITEM	RESP DISCIPLINE
	MANUA <u>l Valves</u> , Train a Boundart		OPBU	PROTENTIAL LOSS OF BOTH TRAINS OF CLR. BLE AND SPEAT DUE TO UNISOLABLE LOSS OF INVENTORY THROUGH OUTSIDE CONTAILMENT VALVES MAICE ARE NOT LOCKED CLOSED OR	SEE TABLE 2-2 FOR DETAILED BOUNDARY VALVE AMALYSIS	01.1	VRRIFT: A) VALUE LOCKING PROCEAM CRITERIA DO MOT BICCUDE CRITICAL MANUAL VALUES, AND B) OTHER ADMINISTRATIVE CONTROLS ARE SUPPICIENT TO PREVENT MISPOSITIONING OF MANUAL VALUES MRICH ARE MOT	OPERATIONS.
02.1.03.01.1 G-45a	G-451	PUMP/HOTOR	LOW PLOW	PROVIDED WITH SE BACKUPS INOPERABILITY OF TRAIN A RECIEC PUMPING	PUMP IST DRY BUMP AND REPUBLIING INTERVAL MINIPLOW TESTS INADEQUATE TO VERIFF PREPORTANCE RELATIVE TO MINIMAL SYSTEM MARGINE. TECH SPEC MUST ALSO BE	11.1	COVERED BY THE VALVE LOCKING PROCESH IMPLEMENT CYCLE 12 RECIRC MODS	MUCLRAR
02.1.03.01.1 G-45A	G-45A	PUNP/NOTOR	FOR STOR	INOPERABILITY OF TRAIN A RECIRC PUMPING	REVISED TO REQUIRE OPERABILITY OF BOTE	11.2	INCLUDE TECE SPEC CHANGE FOR OPERABILITY OF BOTH RECIRC PUMPS IN PCM 151	LICENSING
02.1.04.01.1	122 VOI	WALLED A GRUNDON			VERIFF PERFORMANCE ERLATIVE TO MINIMAL STSTEM MARGINS. TECH SPEC MUST ALSO BE REVISED TO REQUIRE OPERABILITY OF BOYS BECIEC PUMPS			
		VALVE/ACTUATOR		PLOSS OF INJECTION HODE CONTAINMENT SPRAY AND CHARGING AND POTENTIAL LOSS OF RECIRC HODE CHARGING DUE TO GAS BINDING OF COMMON SUCTION PIPING	POWER LOCE OUT OF MOV-866A AND MGV-866B REQUIRED PER MEC BRANCH TECHNICAL POSITION ICSB-18	30	IMPLEMENT MMP 1-3619 (INSTALL ICSB-18 POWER LOCE-OUT ON MOV-866A/B)	NUCLEAR
02.1.08.01.1 HOV-356	OV-356	VALVE/ACTUATOR	OPEN .	NORE FOR CLE ALIGNMENT	NOT ACCEPTABLE FOR INJECTION WITH CONCURRENT FAILURE OF CHARGING (EG. DUE TO HOV-1100C). TECH SPEC ACTION ENTET ERQUIRED WITH VALVE OPEN DURING NORMAL	<del></del> -	NO PURTEER ACTION REQUIRED. NOV-356/1/8 MAINTAINED CLOSED PER EXISTING PROCEDURES	
	ANUAL BOUNDART ALVRS, TRAIN B	<del></del>	OPEN	HER AND SPEAT DUE TO UNISOLABLE LOSS OF INVENTORY TREOUGH OUTSIDE CONTAINMENT VALVES WHICH ARE NOT LOCKED CLOSED OR	OPERATION SEE TABLE 2-2 FOR DETAILED BOUNDARY VALVE ANALYSIS	01	(SAHR AS 2.1.2.1.1)	
2.2.03.01.1 G	- 45B	PUMP/NOTOR	LOW PLOW	INOPERABILITY OF TRAIN B RECIEC PUMPING	INTERVAL MINIPLOW TESTS INADEQUATE TO VERIFF PERFORMANCE RELATIVE TO MINIMAL STOTEM MIRCIUS. THEM SPEC MUST ALSO BE	11	(SAMB AS 2.1.3.1.1)	17 4 7 - 1
E72.04.01.1 H	DY-866B	VALVE/ACTUATOR	OPBN	SPRIE AND CHARGING AND POTRNTIAL LOSS OF		06	(SABB AS 2017.4.17.1)	
<b>2.2</b> .08.01.1 H	OV-357	VALVE/ACTUATOR	OFEN		INOT ACCEPTABLE FOR INJECTION WITE CONCURRENT FAILURE OF CHARGING (RG. DUB TO NOV-1100C). TRCE SPRC ACTION ENTRY REQUIRED WITE VALVE OPEN DURING MORNAL OPERATION		(SAMB AS 2.1.8.1.1)	

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ITBM #	DRVICE 1D	COMPONENT ID	PAILURE MODE	RPPRCT ON RCCS	RRMARES	REPORT I TRM		ODOR ATOMENIA
	~ <u></u>			BITBUI UN BLUJ	BDGARES	1186	ACTION 1788	RESP DISCIPLINE
02.3.01.01.1	. HOV: 358	YALYR/ACTUATOR		NOVE POR CLE ALIGHBRY	INOT ACCEPTABLE FOR INJECTION WITE		(SAMB AS 2.1.0.1.1)	
					CONCURRENT FAILURE OF CHARGING (EG. DUE			
					TO MOV-1109C). TRCE SPRC ACTION BUTST			
					REQUIRED MITH VALVE OPEN DURING MORNAL OPERATION			
	MARUAL VALVES,		CLOSED	*LOSS OF CHARGING PUMP CAPABILITY FOR		01.2	EVALUATE MAIN FLOW PATH VALVES VCC-343 AND -344	OPERATIONS
	COMMON PLON MANUAL VALVES.		OPEN	CLE AND BLE			AND ADD TO VALVE LOCKING PROGRAM AS MESDED	
	COMMON BOUNDARY		V/13	POTENTIAL LOSS OF BOTH TRAINS OF CLR. BLE AND SPRAT DUE TO UNISOLABLE LOSS OF		01	(SAME AS 2.1.2.1.1)	
				INVENTORY TRROUGH OUTSIDS CONTAINMENT	NOT SEAT LEAR TESTED AS PART OF RECIRC			
				VALUES NUICE ARE NOT LOCKED CLOSED OR	SISTEM LEAGUE MONITORING PROGRAM			
02 4 03 02 1	MANIÍAI VALUPO		ADDN.	PROVIDED WITH BE DACKUPS				
	PANUAL VALVES.  CORNON BOUNDARY		OPBN	POTENTIAL LOSS OF BOTH TRAINS OF CLR. HLB AND SPRAY DUR TO UNISOLABLE LOSS OF	SER TABLE 2-2 FOR DETAILED BOUNDARY	92.2	BEVISE IST AND OTHER PROCEDURES AS NEEDED FOR SI/RECIRC LEARAGE TRETING	STATION TRCH
				INVENTORY THROUGH OUTSIDE CONTAINMENT	NOT SEAT LEAR TESTED AS PART OF RECIEC		SI/EDVIKE DESERVE INSTINCT	
				VALVES WEIGH ARE NOT LOCKED CLOSED OR	STETEN LEAGUE BONITORING PROGRAM			
02 4 01 01 1	MANIIAI VALUEO		ABOU	PROVIDED WITH SR BACKUPS				THE THE PERSON NAMED ASSESSMENTS
	MANUAL VALVES, COMMON BOUNDARY		OPEN	POTENTIAL LOSS OF BOTE TRAINS OF CLE,		02.3	DETERMINE APPLICABLE LEAR TEST REQUIREMENTS FOR	MUCLEAR
				BLE AND SPRAY DUE TO UNISOLABLE LOSS OF INVENTORY TREGUCE OUTSIDE CONTAINMENT	NOT SEAT LEAR TESTED AS PART OF RECIEC		RECIRC STSTEM AND INCLUDE ALLOWANCE IN DOSE CALCULATIONS	
				VALVES WRICH ARE NOT LOCEED CLOSED OR	STRIBM LRAEAGE MONITORING PROGRAM		v=====================================	
02 4 01 04 1	CHBCE AND RELIEF		HODBIT (D. CO. CO.	PROVIDED NITH BE BACKUPS				
	CHECK AND RELIEP VALVES, COMMON	•	MORMAL (PASSIVE)	ALOSS OF INVENTORY NOT INCLUDED IN SWST	*SBE TABLE 2-2 POR DETAILED BOUNDARY VALVE ANALYSIS. RECIRC BOUNDARY VALVES	02	(SAMB AS 2.4.1.3.1)	
	BOUNDARY	·		081000# 1 10#	NOT SEAT LEAR TESTED AS PART OF RECIRC			
					SISTEM LEARAGE MONITORING PROGRAM			
	CHECK AND RELIEP	•	NORMAL (PASSIVE)	SLOSS OF INVENTORY NOT INCLUDED IN REST		04.1	REVISE BUST AND SI/FW LO-LO SETPOINT CALCULATIONS	NUCLEAR
	VALVES, COMMON BOUNDART			CALCULATION	VALVE ANALYSIS. RECIBE BOUNDARY VALVES NOT SEAT LEAR TESTED AS PART OF RECIRE		TO ADDRESS INVENTORY DIVERSIONS	<del></del>
•					STSTEM LEARAGE MONITORING PROGRAM			
02.4.02.01.1	HOV-883	VALVE/ACTUATOR	OPEN	REDUCED REDUNDANCE FOR ISOLATION OF BUST	REDUNDANT CHRCE VALVE NOT LEAS TESTED	02	(SAMB AS 2.4.1.3.1)	
				PROM RECIECULATED SUMP WATER	AS PART OF RECIEC SYSTEM LEAGAGE	_		
02.4.02.02.1 2	MOV-883	ENS-2054	CONTACTS OPEN	(SAME AS 2.4.2.1.1)	HOWITORING PROGRAM 4{SAHB AS 2.4.2.1.1}	02	(SAMB AS 2.4.1.3.1)	
02.4.02.03.1		RMS-2017	OPEN	(SAME AS 2.4.2.1.1)		02	12408 43 7.4.1.3.1)	
			(CONTACTS B/C	-		-		
02.4.02.04.1 8	10V-003	42CC OD 42CC+	CLOSED)	DRAWGER BRANDAMOT ROD FOOL ASSOCIATION				
vs. 1. vs. v1. [ 8	nu = 00 J	(CONTACTORS)	OFF (CONTACTOR OPEN)	PROMERCIACULATED SUMP WATER	OCHECE VALVE NOT LEAR TESTED AS PART OF EBCIRC STSTRM LEAGAGE MONITORING PROGRAM	02	(SAMB AS 2.4.1.3.1)	
02.4.02.04.2 M	10V-883	12CC OR 12CCA	ON (CONTACTOR	REDUCED REDUNDANCY AGAINST SPURIOUS		29	INCLUDE CONTACTOR STATUS INDICATING LIGHTS AND	BLECTRICAL
		(CONTACTORS)	CLOSED)	VALVE CLOSURE	SURVEILLANCES WOULD DETECT THIS PAILURE		SURVEILLANCE REQUIREMENTS FOR MOV-883 IN MMP	
					÷		1-3619 TO PREVENT AN UNDETECTED LOSS OF CONTACTOR	
02.4.02.05.1 H	10V-883	MCC-3	VOLTS LOW	REDUICED REDUINDANCE POR 1501 ATTOM OR DUCK	*CHECE VALVE NOT LEAR TESTED AS PART OF		REDUNDANCY (SAME AS 2.4.1.3.1)	
		(42-1396)	TOLIG LUB	FROM RECIECULATED SUMP WATER	BECIEC STSTEM LEARAGE MONITORING PROGRAM	V.	gane as 4.9.1.J.[]	
02.4.63.01.1 R	UV-1100C	•	OPEN			07.1	IMPLEMENT MMP 1-3625 (INSTALL TRIP OF CHARGING	MUÇLEAS
					COMMON SUCTION LINE TO REDUNDANT		PUMP G-EB ON REPUNDANT LON-LOW-LOW VCT LEVEL	
				CHARGING PUMP AUTO-STARTS BEFORB	CHARGING PUMP HAS NOT BEEN VERIFIED FOR		SIGNAL)	
				SIS/SISLOP. LOSS OF CHARGING CAPABILITY	ZOBZRÁDENI BRCÍRC BI IRZÍ ÖB VNÝTAŽIZ			

DURING INJECTION AND ONE CHARGING PUMP DURING EFCIECULATION FOR LPIOCA, MSLB,

#### EMBRGENCY CORB COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

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									-
itru j Di	VICE ID CO	ONFONBNT ID	PAILURE MODE	BFFBCT ON BCCS	DOMARES	REPORT ITEM	ACTION LIBR	BRSP DISCIPLINE	
02-4-03-01-1 HQY-11	QQC YAL	VB/ACTUATOR	OPEN	FOR RECIRCULATION IN SELOCA IF SECOND CHARGING PUMP AUTO-STARTS SEFORE  418/41510p. Loss of Charging Capability	PEFFECT OF GAS BINDING IN PORTION OF COMMON SUCTION LINE TO REDUNDANT CHARGING PUMP BAS NOT BEEN VERIFIED FOR SUBSEQUENT RECIRC BY TRST OR ANALYSIS	91.2	IMPLEMENT MMP 1-3659 (INSTALL REDUNDANT AUTO-CLOSED VCT ISOLATION VALVE) TO PREVENT GAS BINDING IN COMMON PORTION OF CHARGING PUMP SUCTION HRADER	NUCLEAR	
				DURING INJECTION AND ONE CHARGING PUMP DURING RECIRCULATION FOR LBLOCA, MSLB, SGTR					
02.4.03.01.2 MOV-11		VE/ACTUATOR		LOSS OF SEISMIC CATEGORY A SUCTION TO BOTE CRARGING PUMPS PRIOR TO SIS/SISLOP	SUPPLY ARE MSRPP	07.3	IMPLEMENT MMP 1-3639 (UPGRADE PCV-505) ACTUATION TO SAFETY RELATED)	BUCLEAR	
02.4.03.02.1 HOV-11	(BBI	1100BI	Bica Fānār	LOSS OF CHARGING CAPABILITY DURING INJECTION AND ONE CHARGING PUMP DURING BECIRCULATION	FTC-1100BE FO-FO-FO LEIL 12 NO. E8,0		NO PURTRER ACTION REQUIRED. LEVEL CONTROLLER FUNCTION COMPLETED PRIOR TO BEGINNING OF SIS(LOP)/RARSE ENVIRONMENT		
62.4.63.09.3 MOV-11		/BR SRL. SV.)	CONTACTS OPEN (OR OPP)	LOSS OF CRARGING CAPABILITY DURING INJECTION AND ONE CRARGING PUMP DURING RECIRC	REFFECT OF CAS-BINDING IN PORTION OF COMMON SUCTION PIPING ON BECIEC OPERATION OF REDUNDANT CHARGING PUMP HAS NOT BEEN VERIFIED	<u>07</u>	(SAMB AS 2.4.1.1.1)	· · · · · · · · · · · · · · · · · · ·	-
02.4.03.69.5 HOV-11	(PO)	IBR SBL. SW.)		(SABR AS 2.4.3.9.3)	*(SAMB AS 2.4.3.9.3) BOUNDS SHORT IN RELATS 83-1 OR 83-2	07	(SARB AS 2.4.3.1.1)		-
62.4.03.12.1 HOV-11		1198)	VOLTS LOW	LOSS OF CRARGING CAPABILITY DURING INJECTION AND ONE CRARGING PUMP DURING CLE AND BLE	PREPECT OF CAS BINDING IN PORTION OF COMMON SUCTION LINE TO REDUNDANT CHARGING PUMP BAS NOT BERN VERIFIED FOR SUBSEQUENT RECIRC BY TEST OR ANALYSIS	07	(SAMB AS 2.4.3.1.1)		
02.4.03.13.1 MOV-11		24 12476)	VOLTS LOW	LOSS OF CHARGING CAPABILITY DURING INJECTION AND ONE CRARGING PUMP DURING CLE AND NILE	PREPRET OF GAS BINDING IN PORTION OF COMMON SUCTION LINE TO REDUNDANT CHARGING PUMP HAS NOT BEEN VERIFIED FOR	07	(SABE AS Z.4.3.1.1)		
02.4.04.01.1 LC-110	DB LOOP LC-1	100BI	BICE LEVEL	*POTENTIAL LOSS OF BOTH CHARGING PUMPS FOR SBLOCA IF SECOND CHARGING PUMP	SUBSEQUENT RECIRC BY TEST OR ANALYSIS SINCLUDES LT-1100, POWER SUPPLY. MORNAL POSITION OF CONTROLLER OUTPUT. PRA		(SAME AS 2.4.3.1.1) PER NOT REQUIRED WITH ACTION 07.2 HODIFICATIONS		
		·		AUTO-STARTS PRIOR TO SIS/SISLOP. NOWB FOR LBLOCA, MSLB OR SGTR IF MOV-1100B/C/D PLACED IN MANUAL PRIOR TO SEQ BLOCE/RESET	REQUIERD TO JUSTIFF THIS CONDITION UNTIL CYCLE 12 ECCS UPGRADES				
02.4.09.03.1 PCV-11	12 97-1	112	ON (OPEN)	(SAMB AS 2.4.9.1.1)	*SV-5112 POWER MUST BE LOCKED OUT AT C-38 PANEL AND DSD SWGE TO PRECLUDE		NO FURTHER ACTION REQUIRED. SV-5112 POWER ALBRADY LOCARD OUT PER PROCEDURE SOI-10-7	·	
02.4.14.01.1 FCV-11	5D VALV	B/ACTUATOR	OPEN	LOSS OF CLR FLOW BALANCE AND REDUCED FRIMARY PATH HLR UNTIL FAILED FCV ISOLATED	SIMILAR FAILURE DUR TO BQ  *BOTH RECIRC PUMPS MUST BE RUM DURING  RECIRC IF AVAILABLE, AS CONSEQUENCES OF  THIS SINGLE FAILURE ARE UNACCEPTABLE	09.1	PERFORM HIDRAULIC CALCULATION TO VERIFY MATIMUM CHARGING PUMP FLOW POST-SIS/SISLOP	NUCLEAR	
02.4.14.01.1 FCV-111	5D VALV	B/ACTUATOR	OPEN	LOSS OF CLR FLOW BALANCE AND REDUCED PRIMARY PATH HLR UNTIL FAILED FCV ISOLATED	WITE LESS THAN 2 RECIEC PUMPS RUWNING  *BOTH RECIEC PUMPS MUST BE RUM DURING  REC!RC IP AVAILABLE, AS CONSEQUENCES OF THIS SINGLE PAILURE ARE UNACCEPTABLE	09.2	MODIFY CHARGING AND/OR SEAL INJECTION VALVES TO LIMIT CHARGING PUMP FLOW AS NEEDED	MUCLBAR	-
02.4.14.01.1 FCV-111	5D VALV	B/ACTUATOR	OFEN	LOSS OF CLR PLOW BALANCE AND REDUCED PRIMARY PATH HLR UNTIL FAILED FCV ISOLATED	WITH LESS THAM 2 RECIRC PUMPS RUNNING  BOTH RECIRC PUMPS MUST BE RUN DURING  RECIRC 1P AVAILABLE, AS CONSEQUENCES OF THIS SINGLE FAILURE ARE UNACCEPTABLE WITH LESS THAM 2 RECIEC PUMPS RUNNING	11.1	EBVISE BOLE AS BEQUIRED TO: A] RUM BOTH RECIRC PUBLS UNTIL SPRAY SECURED (BOTH REP MTZ PP TRIPPED), B) BUSURE THAT TRIPPED PUBLS ARE ON SAME TRAIN, AND C) DO NOT RESET THE CHARGING PUBL LOCKOUT RELLY AFTER MANUAL TRIP (IN CROSE TO	OPBRATIONS	

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#### EMPROFERCY CORR COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPER UNIT ! ACTION ITEMS FOR SIGNIFICANT FINDINGS

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ITEN A	DEAICE ID	COMPONENT ID	PAILURE HODE	EFFECT ON BCC9	REMARES	REPORT ITEM	ACTION ITEM	RBSP DISCIPLINE
2.4.15.01.1	.PCV-1115A	PT-11154 FT-11150 LOOP	SIGNAL HIGH	(SAMB AS 2.4-14.1-1)	1(SAMB AS 2.4.14.1.1) COMMON SPLIT-		(SAMB AS 2.4.14.1.1)	
					(TRAIN A)			
3.4.11.01.L	_PCY:1115B	YALYB/ACTUATOR	_QPRM	ISOTUED  180TUED  TOSE OF CIE LION BITMER VAILED  TOSE OF CIE	SOTE RECIEC PUMPS MUST BE RUM DURIL RECIEC IP AVAILABLE, AS CONSEQUENCES TRIS SINGLE PAILURE ARE UNACCEPTABLE WITH LESS TRAM 2 RECIEC PUMPS RUMBII	S OF	(SAHB AS 2.4.14.1.1)	
	PCV-1115R	PT-11158 PT-11158 LOOP	SIGNAL BICE	(SAME AS 2.4.17.1.1)	*(SANB AS 2.4.19.1.1) COMMON SPLIT- CONTROL LOOP FOR FCV-1115B AND FCV- (TRAIN A)	BANGE 11	(SAME AS 2.4.14.5.1)	
2.4.20.01.1	PCV-1115P	VALVB/ACTUATOR	OPEN	LOSS OF CLE PLOW BALANCE AND REDUCED PRIMARY PAYM BLE UNTIL PAILED FCV ISOLATED	BOTE RECIEC PUMPS HUST BE RUM DURING RECIEC IF AVAILABLE, AS CONSEQUENCES THIS SINGLE FAILURE ARE UNACCEPTABLE	S OF B	(SAME AS 2.4.14.1.1)	
2.4.21.01.1	PCV-1115C PCV-1115P	PT-1115C FT-1115F LOOP	SIGNAL HIGH	(SAMB 48 2.4.20.1.1)	WITH LESS THAN E BRCIEC PUMPS RUBNIT 1 (SAMB AS 2.4.28.1.1) COMMON SPLIT-I CONTROL LOOP FOR FCV-1115C AND FCV-	BANCE 11	(SANE AS 2.4.14.1.1)	
	PCV-1115A/D PCV-1115B/E PCV-1115C/F	VITAL BUS \$4 (8-1416V)	VOLTS LOW	LOSS OF TRAIN A CLE PLOW CONTROL TO ECS LOOPS A. B AND C. AND INABILITY TO TREOTTLE CLE PLOW BELOW ABOUT AS GPH PER	THROUGH WIDE OPEN PCV-1115A/B/C AND		(SANB AS 2.4.14.1.1)	
	·			LOOP FOR COMBINED CLR/BLR	BRHAIN WITHIN BECIEC PUMP PLON CAPABILITIES			
	PCV-1115A/B PCV-1115B/B PCV-1115C/P	ISA	PRESSURE LOW-	INDILITY TO CONTROL CLE PLOW ON ISA OR THROTTLE CLE PLOW BBLOW 88 GPM PRE RCS LOOP FOR COMBINED CLE/HLR	TRROUGH WIDE OPEN PCV-1115A/B/C, AND UPPER LIMIT FOR PRIMARY PATE BLE PLO	D OW TO	(SAHR AS 2.4.14.1.1)	
	PT-3114A LOOP		OLONIA BLOR	Tana Tanah and Danah Tumungan an Tanah tan	BRHAIN WITHIN THE CAPABILITIES OF A SINGLE RECIEC PUMP FOR THIS POTENTIA COMMON -CAUSE FAILURE	AL .		
	P1-31144 LOOP	PI-3114A	SICNAL BIGB	CLE PLOW TO LOOP A MUST BE ISOLATED PER PROCEDURE BY CLOSING NOV-356TO PERVENT BICERDING RECIRC PUMP AND CHARGING PUMP PLOW LINITS	CLOSURE. CLOSURE REQUIRED SINCE FCV-1115D PAILURE AND FE-3114A PAILU	URBS	PERFORM EVENT-SPECIFIC AVALYSIS OF CLE/BLE I	PLOW NUCLEAR
4 24 01 1	PT-3114A LOOP	PI-3114A	SIGNAL HIGH	CLE FLOW TO LOOP A BUST BE ISOLATED PER	CLEVALE WITHOUT BY FIT-1112 LOOP		PRVISE ROLE AS MERDED BASED ON ANALYSIS RESI	JLTS OPERATIONS
	77-37114 1000	F1-31118	STURED BIOS	PROCEDURE BY CLOSING HOV-35610 PREVENT	CLOSORR. CLOSURE REQUIRED SINCE PCV-1115D PAILURE AND PI-3114A FAILX CANNOT BE DISTINGUISHED DURING COMBI	URES	EBILDS BUIL AS RESURE CROSS OF APACISTS AND	· ·
.4.24.01.2	PT-3114A LOOP	PI-3114A	SIGNAL LON	**CLE PLOW TO BCS LOOP A WOULD BE INCREASED PER PROCEDURE, RESULTING IN	CLR/BLE SITROOF BE FIT-1112 LOOP SPCV-1115D PAILURE AND FI-3114A PAIL CANNOT BE DISTINGUISHED DURING COMBI		(SANR AS 2.4.24.1.1)	
	O <b>n</b> 4114 <i>č</i> 1005	OSA UROM	OHRDING HOLES AND	CLE AND CLE/HLE PLOW IMBALANCE, AND POTENTIALLY BECEBOING RECIRC PUMP LIMITATIONS	CLB/BLE WITHOUT BY PIT-ITIZ LOOP. CHARGING PUMP ANNETER USED TO DETERM TOTAL CHARGING PUMP FLOW			
	PT-31144 LOOP	CTO WEST 4" 15VDC SUPPLY	OUTPUT VOLTS LOW	*(SAMB A8 2.4.24.1.2)	*(SAME AS 2.4.24.1.2)	08	(SAME AS 2.4.24.1.1)	
4.24.03.1 1	PT-3114A LOOP _	VITAL BUS 15 (8-2903V)	VOLTS LOW	*CLR PLOW TO BCS LOOP A WOULD BB INCREASED FER PROCEDURE, RESULTING IN CLR AND CLR/HLR PLOW IMBALANCE, AND POTENTIALLY BICEYDING RECIRC PUMP	*PCV-1115D FAILURE AND PI-3114A PAIL CANNOT BE DISTINGUISEED DURING COMBI CLE/HLE WITHOUT EQ FIT-1112 LOOP. CHARGING PUMP ANNETER USED TO DETERM	INBD	(SAME AS 2.4.24.1.1)	- -

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#### EMBRGBUCT CORB COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

						REPORT	en en en en en en en en en en en en en e	-
	DEVICE ID	COMPONENT ID	PAILURE HODE	BFFRCT ON BCCS	PBHARES	1788		NB
Q2.4.25.Q1.1.E	T-2114B LOOP	PE-2114B	SIGNAL BIGB	CIR PLON TO LOOP B MUST BE ISOLATED PRO	TARGINA BOUCEDING BEGINDES NUA-343	ne .	(SAHR AS 2.4.24.1.1)	
				PROCEDURE BY CLOSING MOV-357TO PREVENT BICERDING RECIEC PUMP AND CHARGING PUMP	CLOSURE. CLOSURE REQUIRED SINCE		COMME AND BELLEVILLE	
					CANNOT BE DISTINGUISEED DUBING CONSINES			1
					CLR/HLR WITHOUT BQ FIT-1112 LOOP.			
				·	CHARGING PUMP AMERIER USED TO DETERMINE TOTAL CRARGING PUMP PLON			- 1
2.4.25.01.2 P	T-2114B LOOP	P1-21148	SIGNAL LOW	*CLE PLOW TO BCS LOOP B WOULD BE	SPCV-1915B PAILURE AND PI-2114B PAILURE	08	(SAME AS 2.4.24.1.1)	_
				INCREASED PER PROCEDURE, RESULTING IN CLE AND CLE/BLE PLOY INSALANCE, AND	CANNOT SE DISTINGUISEED DUBING COMBINED CLEVELS WITHOUT RO FIT-1112 LOOP.			
				POTENTIALLY BECEEDING BECIEC PUMP	CHARGING PUMP ANNETER USED TO DETERMINE		,	
2.4.25.02.1 P	T-2114C LOOP	PI-2114C	SIGNAL RICA	LIMITATIONS CLE FLOW TO LOOP C MUST BE ISOLATED PRE	TOTAL CHARGING PUMP PLON	04		
			- **	PROCEDURE BY CLOSING NOV-358TO PREVENT	CLOSURE. CLOSURE REQUIRED SINCE		TEMP. PV. FITTIFICATION	
				RICERDING RECIBE PUMP AND CHARGING PUMP PLON LINITS	PCV-1115P PAILURE AND PI-2114C PAILURE CANNOT BE DISTINGUISHED DURING CONBINED			
				that highlight	CLR/HLR WITHOUT BQ PIT-1112 LOOP.			
					CHARGING PUMP ANNETER USED TO DETERMINE TOTAL CHARGING PUMP FLOW			
1.4.25.02.2 P	T-2114C LOOP	PI-2114C	SIGNAL LOW	*CLR PLOW TO BCS LOOP C WOULD BE	*PCV-1115P PAILURE AND PI-2114C PAILURE	08	(SAMB AS 2.4.24.1.1)	
				INCREASED PER PROCEDURE, RESULTING IN	CANNOT BE DISTINGUISEED DURING COMBINED			
				CLB AND CLB/HLR PLOW INSALANCE, AND POTENTIALLY BICHBOING BECIEC PUMP	CLR/NLR WITHOUT BQ PIT-1112 LOOP. CHARGING PUMP ANNETER USED TO DETERMINE			
4 4 4 5 A 3 1 P	• • • • • • • • • • • • • • • • • • •	OSA NECE A	ADDROG NALES CAN	LIMITATIONS	TOTAL CHARGING PUMP PLON			
2.4.25.03.1 P	1-2114C LOOP	C69 MEST 4 15VDC SUPPLY	OUTPUT VOLTS COM	INCREASED PER PROCEDURE, RESULTING IN	PATEURRS CANNOT AR DISTINGUISHED DURING	00	(SAHB AS 2.4.24.1.1)	
				CLE AND CLE/BLE PLOW IMBALANCE, AND	COMBINED CLE/BLE WITHOUT BQ FIT-1112			
	<u>_</u>			POTENTIALLY BICEBOING BECIRC PUMP LINITATIONS	LOOP. CHARGING PUMP ANNETER USED TO DETERMINE TOTAL CHARGING PUMP PLON			
2.4.25.04.1 P1		VITAL BUS #3A	VOLTS LOW	CLE PLOW TO RCS LOOPS B AND C WOULD BE	*PCV-1115B/F FAILURE AND PI-2114B/C	08	(SAMB AS 2.4.24.1.1)	
<u>!</u>	1-2114C LOOP	(8-3313A)		INCREASED PER PROCEDURE, RESULTING IN CLE AND CLE/HLE PLOW IMBALANCE, AND	PAILURES CANNOT BE DISTINGUISEED DURING COMBINED CLE/ALR WITHOUT BQ PIT-1112			
				POTENTIALLY BECKEDING RECIRC PUMP	LOOP. CHARGING PUNP ANNETER DEED TO			
2.4.26.01.1 CV	1-2145	VALVE/ACTUATOR	OPEN (OR NORMAL)	LIMITATIONS DIVERSION OF CLE AND HER FLOW/INVENTORY	DETERMINE TOTAL CHARGING PUMP FLOW	03 1	DETERMINE THI-SOURCE TERM DOSE RATES POR NUCLEAR	
		,	(00 000	TO NON-SAPETY BELATED SAMPLE SYSTEM	DURING RECIRCULATION WITH THE SOURCE	****	APPLICABLE NAMUAL ACTION LOCATIONS, INCLUDING	
2.4.26.01.1 CV	7-2145	VALUE /ACTUATOR	OPEN (OR NORMAL)	DIVERSION OF CLE AND HIR PLOW/INVENTORY	TREE	A1 9	ACCESS/EGRESS ROUTES  EVALUATE SHIELDING OR BEST-ESTIMATE SOURCE TERM TO MUCLEAR	
• • • • • • • • • • • • • • • • • • • •		12218/20102102	oran (or nonner)	TO NON-SAFETY RELATED SAMPLE STREET	DURING RECIRCULATION WITH THE SOURCE	44.2	RESOLVE MANUAL ACTION LOCATIONS AND ACCESS/BGRESS	
			-		TRRH		ROUTES WITH UNACCEPTABLE THI-SOURCE TERM DOSE	_
2.4.26,01.1 CV	1-2145	VALVE/ACTUATOR	OPEN (OR NORMAL)	DIVERSION OF CLR AND BLE FLOW/INVENTORE	BACEUP ISOLATION VALVE NOT ACCESSIBLE	03.3	OBTAIN REGULATORY RELIEF FROM THE SOURCE TERMS FOR LICENSING	
				TO NON-SAFBTY BBLATBD SAMPLE SYSTEM	DURING RECIRCULATION WITH THE SOURCE		SINGLE PAILURE EVENTS IF NERDED BASED ON DOSE	
2.4.26.01.1 CV	-2145	VALVB/ACTUATOR	OPEN (OR NORMAL)	DIVERSION OF CLE AND HIE FLOW/INVENTORY	TERM BACRUP ISOLATION VALVE NOT ACCESSIBLE	27	CALCULATION RESULTS REVIEW BOL: AND REVISE TO CLOSE SAMPLE VALUE IF OPERATIONS	
				TO NON-SAFETY RELATED SAMPLE SYSTEM	DURING RECIRCULATION WITH THE SOURCE		NBBDED POST-ACCIDENT	- 1

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#### EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONORPH UNIT 1 ACTION ITEMS FOR SIGNIFICANT PINDINGS

iten 4	BAICE ID	COMPONENT ID	FAILURE MODE	BFFECT ON BCCS	REMARES	REPORT ITEM	ACTION ITEM	RESP DISCIPLINE	
02.4.27.01.1. CV=41	164	YALYE/ACTUATOR	OPBM			07.4	LOCE CY-4064 OR B CLOSED AS PER RESOLUTION OF MCR	OPBRATIONS	
				CHARGING PUMP FOR OTHER EVENTS	CV-406B NORMALLY OPRN, DOBS NOT AUTO-CLOSE ON SIS/SISLOP OR LOW VCT LBVBL. RPPRCT OF GAS BINDING IN CONHON		1-P-7461 AND LRR 1-90-06 TO PREVENT CHARGING PUMP GAS SINDING DUE TO LOSS OF UTILITY BUS		
<del></del>		<del></del>			PART OF SUCTION LINE TO REDUNDANT PUMP HAE NOT BERN VERIFIED FOR SUBSEQUENT RECIRC ST TEST OR ANALYSIS			-	
02.4.21.02.1 CV-40	68	VALVE/ACTUATOR	OPSN	POST-818/818LOP	*NORMAL POSITION. INCLUDES SV-4068. DORS NOT AUTO-CLOSE ON SIS/SISLOP OR LOW VCT	01	(SAMB AS 2.4.27.1.1)		
					LEVEL. UPGRADE TO SE AND ADD TO 18T PECH REQD FOR VCT ISOL PUNCTION. BOIS MUST BE REVISED TO REQUIRE VALVE CLOSED AND PERCLUDE START OF LOCKED-OUT PUMP				
02.4.27.03.3 CV-40 CV-40		CONTROL SWITCH	CONTACTS OPEN		SINILAR TO HOV-1100C *[SAMB AB 2.4.27.1.1]	01	(SABR AS 2.4.27.1.1)		
02.4.27.03.5 CV-40 CV-40	61	CONTROL SWITCH	CONTACTS GROUNDED	*(SAMB AS 2.4.27.1.1)	*(SAHR AS 2.4.27.1.1)	07	(SAMB AS 2.4.27.1.1)	· · ·	
02.4.27.04.1 CV-40 CV-40	61	UTILITY BUS (8-1518)	VOLTS LOW	POR SBLOCA, PRE-SELECTED CHARGING PUMP FOR OTHER EVENTS	TAT LEAST ONE OF CV-106A/B MUST BE PAIL CLOSED AND/OR LOCEED CLOSED. BOIL MUST BE REVISED TO REQUIRE VALVE CLOSED AND PERCLUDE START OF LOCEED-OUT PUMP	01	(SAMB AS 2.4.27.1.1)		-
02.4.27.05.1 CV-40 CV-40		ISA	PRESSURE LOW	POTENTIAL LOSS OF CLE PUMPING CAPABILITY FOR SBLOCA, PRE-SBLECTED	SINILAR TO MOV-1180C PAILURE TO CLOSE *AT LEAST ONE OF CV-406A/B MUST BE PAIL-CLOSED AND/OR LOCKED CLOSED. BOIS	07	(SAME AS 2.4.27.1.1)		
					SINILAR TO MON-1100C PAILURE TO CLOSE MUST BE REVISED TO REQUIRE VALUE CLOSED				
02.4.28.01.1 BCV-4	214	VALVE/ACTUATOR	OPEN	INVENTORY TO ROOT. NOWE ON SI OR CLE PLOW DUE TO CONTINUED RCP SEAL	LEVEL TRIP SETPOINT CALCS MUST BE REVISED TO INCLUDE POTENTIAL INVENTORY	04	(SABB AS 2.4.1.4.1)		
02.4.28.02.1 HCV-4	218	VALVE/ACTUATOB	. OPBN	*UNISOLABLE DIVERSION OF SI/RCS INVENTORY TO REDT. NOWE ON SI OR CLR	DIVERSIONS TO REST *RUST INVENTORY AND SI/FU LO-LO EVST LEVEL TRIP SETPOINT CALCS MUST SE REVISED TO INCLUDE POTENTIAL INVENTORY	04	(SAMB AS 2.4.1.4.1)		.  -
. 02.4.28.03.1 BCV-4	210 .	VALVE/ACTUATOR	OPBN	PUNCTIONING *UNISOLABLE DIVERSION OF \$1/8C8	DIVERSIONS TO RCDT	04	(SAMB AS 2.4.1.4.1)	The second second second	
02.4.28.04.1 BCV-4	771	UTILITY BUS	VOLTS LOW	PLOW DUE TO CONTINUED BCP SEAL Punctioning	REVISED TO INCLUDE POTENTIAL INVENTORY DIVERSIONS TO RECUT	04	(SAME AS 2.4.1.4.1)		
BCV-4:	218	(8-1502)	AOUIS TOM	SI/ECS INVENTORY TO ECDT, NONE FOR	LEVEL TRIP SETPOINT CALCE HUST BE REVISED TO INCLUDE POTRHTIAL INVENTORT	V1	(SADB AS 6.1.1.1.1)		

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	t HBT1	DRAICE ID	COMPONENT LD	PAILURB MODE	BFFBCT ON BCCS	REMARES	BEPORT	ACTION ITEM	R33P DISCIPLINE
	03.1.02.01.1	MANUAL VALVES, PRIMART PATH BOUNDART		_ OPBN	DBJBABT PATH DISABLBO	FIRE TABLE 3-2. NORMAL THROTTLED POSITION OF PZE-020, -021 CONSIDERED IN ANALYSIS OF HLE FLOW REQUIREMENTS. ADMINISTRATIVE CONTROLS OR VALVE LOCKING		_YBRIFY: A) YALVE LOCKING PERGRAM CRITERIA DO MOT BICLUDE CRITICAL HANUAL VALVES, AND BY OTHER ADMINISTRATIVE CONTROLS ARS SUPFICIENT TO PREVENT HISPOSITIONING OF NAMUAL VALVES WHICH ARE NOT	PROITAEBEO
		NABUAL VALVES, PRIMART PATE BOUNDART		QPRI	MIR PRIMARY PATH DISABLED	REQUIRED, SINCE MISPOSITIONING IS NOT DETECTABLE DURING MORMAL OPERATION 1588 TABLE 3-2. MORMAL THROTTLED POSITION OF PZE-020, -021 CONSIDERED IN AMALTSIS OF BLE FLOW REQUIREMENTS.	_01.1_	COVERED BY THE VALUE LOCKING PROGRAM PREPARE FOR TO ADD LOCKING DEVICES TO PER-020. 021 AND OTHER VALUES AS MREDED	KUCLBAB
		. F\$T-1112_L00P_		SIGNAL HIGH	POTRATIAL LOSS OF BLR PRIMARY PATE	APHINISTRATIVE CONTROLS OR VALVE LOCKING REQUIRED, SINCE HISPOSITIONING IS NOT DETECTABLE DURING MORHAL OPERATION OF FOR-1112 POSITION DEMAND, PIT-1112 PLOW INDICATION, CRARGING PUMP MOTOR AMPS,	. 00.1	PREPORT RYSHT-SPECIFIC ANALYSIS OF CLR/BLR FLOW BALANCING	NUCLEAS
	03.1.03.01.1	P17-1112 LOOP	<b>FT-1112</b>	SIGNAL HIGH	POTENTIAL LOSS OF HLE PRIMARY PATH	FI-3114A/2114B/2314C PLOW INDICATION AND PCV-1115D/B/P POSITION DENAND; CANNOT DISTINGUISH BETWEEN PCV AND INDICATION FAILURES *METHOD OP DETECTION (COMPARISION OP PCV-111Z POSITION DENAND, P1T-1112 PLOW	08.2	REVISE ROIS AS MESDED BASED ON AMALTSIS RESULTS	CPERATIONS
·	03.1.03.01.2	P[T-1112 LOOP	PT-1112	SIGNAL LOW	POTBUTIAL INBALANCE IN CLE/HLR PLOW	INDICATION, CHARGING PUMP MOTOR AMPS, PI-3114A/2114B/2114C FLOW INDICATION AND PCV-1115D/B/P POSITION DHAND) CANNOT DISTINGUISH BRUBEN PCV AND INDICATION PAICURES  *{SAMB AS 3.1.3.1.1}	08	(SAME AS 3.1.3.1.1)	
		F17-1112 LOOP F17-1112 LOOP	PT-1112 REG BUS \$1 (8-14R9)	AOF13 FOR	POTBUTIAL INBALANCE IN CLEVELE PLOY OR LOSS OF HER PRIMARY PATH LOSS OF HER PRIMARY PATH	*(SAME AS 3.1.3.1.1)  *RANGE INADEQUATE FOR BLE PRIMARY PATH PUNCTION, BACEUP PLOW DETERMINATION HETHOD REQUIRED IN BOIL TRESPECTIVE OF	04	(SAME AS 3.1.3.1.1)	
	03.1.04.03.1	PCV-1112	\$4-1112	ON (OPBN)	(SAMB AS 3.1.4.1.1)	PIT-1112 PAILURE  *34-5112 POWER HUST BE LOCEED OUT AT  C-38 PANEL AND DSD SWCR TO PRECLUDE SIMILAR PAILURE DUB TO EQ		NO PURTHER ACTION REQUIRED. SV-5112 POWER ALREADY LOCKED OUT PER PROCEDURS SOI-10-7	
-	03.1.01.01.1	CV-104 CV-105	UTILITY BUS (8-1508)	ÄÕLLS TOÅ	LOSE OF CHARGING PUMP INJECTION PATH TO RCS LOOP A AND BLE PRIMARY PATH, MONE FOR CLR	REALIGNMENT OF UTILITY BUS VIA TRANSFER SW AT REQUIRED TO PRECLUDE COMMON-MODE PAILURE OF BLR (DUB TO LOSS OF TRAIN B		REVISE PROCEDURES AS MERDED TO ADDRESS  RE-EMERGIZING THE UTILITY BUS FROM MCC-1 VIA MTS-7	OPBRATIONS
	63.1.08.01.1	<u>PC</u> V-430C	VALVB/ACTUATOR	орви	LOSS OF BLR PRIMARY PATH	POWER) BY RESTORING SAPETY-RELATED POWER TO UTILITY BUS *!NCLUDES HY-1430C. PCV-1112 SETTING HUST INCLUDE HARGIN FOR UNDETECTABLE PARTIAL OPENING OF VALVE WITHIN LINIT SWITCH HYSTERISIS	· · ·	MO FURTHER ACTION BEQUIRED. MARGIN ALBRADY INCLUDED PER BOI SOI-1.0-24	

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# EMERGENCY CORR COCLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONORRE UNIT | ACTION ITEMS FOR SIGNIFICANT FINDINGS

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 Itan i	DBVICE ID	COMPONENT ID	PAILURE MODE	EPPECT ON BCCS	BEÖNRES	REPORT ITBM	ACTION LIBH	BBSP DISCIPLINE
	****		• • • • • • • • • • • • • • • • • • • •					
A3 1 A9 A1 1	PCV-4304	VALVE / ACTUATOR	OPZN	LOSS OF HIR PRIMARY PATH	*[MCLUD98 HT-1430H. PCV-1112 SBTTING		{SAMB AS 3.1.8.1.1}	
23.1.73.41.1		ingiblas (Eriya	¥1 #6	AND THE THE STEP STATE OF THE S	MUST INCLUDE MARGIN FOR UNDETECTABLE PARTIAL OPENING OF VALVE WITHIN LIMIT			
03.1.10.01.3	PCV-430C	PC-430C/H LOOP		SLOSS OF BLR PRIMARY PLOW PATH	SWITCH MYSTRESSIS BO UPGRADE OF BOTH MLR FLOW PATHS	10.4	VERIFY THAT QUALIFIED I/Ps ARE NOT BEQUIRED FOR	BLECTRICAL (EQ)
	PCV-430H				BBGnibBD		PT-1430C/H TO PRECLUDE FUNCTIONAL (b)(2) INTEGATION WITH PRIMARY PATH HLS	
03.1.11.01.1	PT-3114A LOOP	PI-3114A	BIGNAL BIGN	CLE PLOW TO LOOP A MUST BE ISOLATED PRE	*VERIFY PROCEDURE REQUIRES HOV-356 CLOSURE. CLOSURE REQUIRED SINCE	08	(SAHB AS 3.1.1.1.1)	
				PROCEDURE BY CLOSING HOV-356TO PREVENT BICEBDING RECIEC PUMP AND CHARGING PUMP				
				PLOW LIMITS	CANNOT BE DISTINGUISHED DURING CONSINED CLEVELE WITHOUT BQ FIT-1112 LOOP			
03.1.11.01.2	PT-3114A LGOP	PE-3114A	SEGNAL LOW	ECLE PLOW TO RCS LOOP A WOULD BE	*PCV-1115D FAILURE AND FI-3114A PAILURE	08	(SAME AS 3.1.3.1.1)	
				INCREASED PER PROCEDURE, RESULTING IN CLE AND CLE/NLE PLOW IMBALANCE, AND	CANNOT BE DISTINGUISHED DURING CONBINED CLE/BLR WITHOUT BQ FIT-1112 LOOP.			ł
				POTENTIALLY BECEBOING RECIEC PUMP	CHARGING PUMP ANNETER USED TO DETERMINE			
	00 31144 120B	010 4038 4	AURNIE VALES LAN	LIBITATIONS  *(SAME AS 2.4.24.1.2)	TOTAL CHARGING PUMP PLOW #(SAMB AS 2.4.24.1.2)	0 S	(SAME AS 3.1.3.1.1)	ł
03.1.11.02.1	PT-3114A LOOP	C10 MRST 4 15VDC SUPPLY	OUTPUT VOLTS LOW	-(Jank #2 E.4.54.1.5)			·	
01.1.11.01.1	PT-31144 LOOP	VITAL BUS 45	VOLTS LOW	ACLE PLOW TO BCS LOOP A WOULD BE	*FCV-1115D PAILURE AND PI-3114A PAILURE CANNOT BE DISTINGUISHED DURING COMBINED	0 8	(SANE AS 3.1.1.1.1)	
		(8-2903V)		INCREASED PER PROCEDURE, RESULTING IN CLR AND CLR/RES PLOW INSALANCE, AND	CLR/BLR WITHOUT BQ PIT-1112 LOOP.			
			· <del>-</del> ·	POTENTIALLY BECREDING BECIEC PUMP FLOW	CHARGING PUMP AMERIER USED TO DETERMINE TOTAL CHARGING PUMP FLOW			į
03.1.12.01.1	PT-2114B LOOP	21-2114B	SIGNAL HIGH	CLE PLOW TO LOOP B MUST BE ISOLATED PER	*VERIFT PROCEDURE REQUIRES MOV-357	08	(SAMB AS 3.1.3.1.1)	
				PROCEDURE BY CLOSING HOV-357TO PREVENT BICERDING RECIEC PUMP AND CHARGING PUMP	CLOSURB, CLOSURB REQUIERD SINCE PCV-11158 PAILURB AND PI-21148 PAILURB		•	
		•		PLOW LIMITS	CANNOT BE DISTINGUISHED DURING CONBINED			
					CLR/BLR WITHOUT BQ PIT-1112 LOOP. CHARGING PUMP AMMETER USED TO DETERMINE			
					TOTAL CHARGING PUMP PLOW			
03.1.12.01.2	PT-21148 LOOP	P1-21148	SIGNAL LOW	OCLE PLOW TO BCS LOOP B WOULD BE INCREASED PER PROCEDURE, RESULTING IN	SPCV-11158 PAILURE AND PI-2114B PAILURE CANNOT BE DISTINGUISHED DURING CONBINED	0.0	(SAHE AS 3.1.1.1.1)	ĺ
				CLE AND CLE/BLE PLOW INSALANCE, AND	CLR/HLR MITHOUT BQ PIT-1112 LOOP.			
				POTENTIALLY BECEBDING RECIEC PUMP LINITATIONS	CHARGING PUMP ANNETER USED TO DETERMINE TOTAL CHARGING PUMP FLOW			
01.1.12.92.1	FT-21140 LOOP	P1-2114C	SIGNAL HIGH	CLE FLOW TO LOOP C MUST BE INCLATED PER	*/BRIFY PROCEDURE REQUIRES MOV-358	80	(SAMS AS 3.1.3.1.1)	
				PROCEDURE BY CLOSING NOV-358TO PREVENT BICERDING RECIRC PUMP AND CHARGING PUMP	CLOSURB, CLOSURB REQUIRED SINCE PCV-1115P FAILURE AND FI-2114C PAILURE			ì
				FLOW LIMITS	CANNOT BE DISTINGUISHED DURING CONBINED			
# 1 # 1 W 1 # 1 # 1 # 1 # 1 # 1 # 1 # 1					CLEFELR WITHOUT BY PIT-1112 LCOP. CHARGING PUMP ANNETER USED TO DETERMINE			ļ
	=			THE STATE OF THE S	TOTAL CHARGING PUMP FLOW  *PCV-1115P PAILURE AND PT-2114C PAILURE		(Same as 3.1.3.1.1.)	
03.1.12.02.2	PT-21140 LOOP	PI-2114C	SIGNAL LOW	*CLR PLGW TO BCS LOOP C WOULD BE INCREASED PER PROCEDURE, RESULTING IN	CANNOT BE DISTINGUISHED DURING COMBINED		frame un gereitet	1
				CLE AND CLE/BLE PLOW IMBALANCE, AND	CLE/HLE WITHOUT BO PIT-1112 LOOP.		•	
				POTBNICALLY BIOBESING RBCISC PUMP LIMITATIONS	CHARGING PUMP AMMRTER USBO TO DETERMINE TOTAL CHARGING PUMP PLOW			

Fage No. 12725790



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### EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT I ACTION ITEMS FOR SIGNIFICANT FINDINGS

D FAILURE MODE  OUTPUT VOLTS LOW  VOLTS LOW	BPPECT ON ECCS  SCLE FLOW TO ECS LOOPS B AND C MOULD BE INCREASED PER PROCEDURE, RESULTING IN CLE AND CLE/BLE FLOW INBALANCE, AND POTENTIALLY RECERDING RECIEC PUMP LIMITATIONS SCLE PLOW TO ECS LOOPS B AND C WOULD BE INCREASED PER PROCEDURE, RESULTING IN CLE AND CLE/BLE FLOW INBALANCE, AND POTENTIALLY RECERDING RECISC PUMP	FAILURES CANNOT BE DISTINGUISHED DURING COMBINED CLE/HIR WITHOUT BY FIT-1112 LOOP, CHARGING PUMP AMMETER USED TO DETERMINE TOTAL CHARGING PUMP PLOW		ACTION ITEM	883P DISCIPLINA
VOLTS LOV	INCREASED PRE PROCEDURE, RESULTING IN CLE AND CLE/BLE FLOW IMBALANCE, AND POTENTIALLY RICERDING RECIEC PUMP LIMITATIONS SCLE PLOW TO RCS LOOPS B AND C WOULD BE INCREASED FRE PROCEDURE, RESULTING IN CLE AND CLE/BLE FLOW IMBALANCE, AND POTENTIALLY RICERDING RECIEC PUMP	FAILURES CANNOT BE DISTINGUISHED DURING COMBINED CLE/HLE WITROUT BE PIT-1112 LOOP. CHARGING PUMP ANNETER USEN TO DETERMINE TOTAL CHARGING PUMP PLOW FSCV-11158/P FAILURE AND PI-21148/C FAILURES CANNOT BE DISTINGUISHED DURING COMBINED CLE/HLE WITHOUT BE PIT-1112 LOOP. CHARGING PUMP ANNETER USED TO			
VOLTS LOV	INCREASED PRE PROCEDURE, RESULTING IN CLE AND CLE/BLE FLOW IMBALANCE, AND POTENTIALLY RICERDING RECIEC PUMP LIMITATIONS SCLE PLOW TO RCS LOOPS B AND C WOULD BE INCREASED FRE PROCEDURE, RESULTING IN CLE AND CLE/BLE FLOW IMBALANCE, AND POTENTIALLY RICERDING RECIEC PUMP	FAILURES CANNOT BE DISTINGUISHED DURING COMBINED CLE/HLE WITROUT BE PIT-1112 LOOP. CHARGING PUMP ANNETER USEN TO DETERMINE TOTAL CHARGING PUMP PLOW FSCV-11158/P FAILURE AND PI-21148/C FAILURES CANNOT BE DISTINGUISHED DURING COMBINED CLE/HLE WITHOUT BE PIT-1112 LOOP. CHARGING PUMP ANNETER USED TO			
<u></u>	CLE AND CLE/BLE FLOW IMPALANCE, AND POTRNTIALLY BECREDING RECIEC PUMP LIMITATIONS FICE PLOW TO RCS LOOPS B AND C WOULD BE INCREASED PER PROCEDURE, RESULTING IN CLE AND CLE/BLE FLOW IMPALANCE, AND POTRNTIALLY BECREDING RECIEC PUMP	COMBIND CLE/BLE WITHOUT BY PIT-1112 LOOP, CHARGING PUMP AMMETER USED TO DETERMINE TOTAL CHARGING PUMP PLOW ESCV-11158/P PAILURE AND PI-2114B/C PAILURES CANNOT BE DISTINGUISHED DURING COMBINED CLE/BLE WITHOUT BY PIT-1112 LOOP, CHARGING PUMP AMMETER USED TO	98	(SAMB AS 1.1.3.1.1)	
<u></u>	POTRNITIALLY RICERDING RRCIRC PUMP LIMITATIONS FICER PLOW TO RCS LOOPS B AND C WOULD BE INCREASED PER PROCEDURE, RESULTING IN CLE AND CLE/RLE PLOW [MRALANCE, AND POTRNITIALLY RICERDING RECIRC PUMP	LOOP, CHARGING PUMP AMMETER USED TO DETERMINE TOTAL CHARGING PUMP PLOW #SCV-11158/P PAILURE AND PI-2114B/C PAILURES CANNOT BE DISTINGUISHED DURING COMBINED CLE/HER WITHOUT BQ PIT-1112 LOOP, CHARGING PUMP AMMETER USED TO	08	(SAMB AS 1.1.3.1.1)	
<u></u>	LIMITATIONS FICER PROW TO BES LOOPS B AND C WOULD BE INCREASED PER PROCEDURE, BESULTING IN CLE AND CLE/BLE PROW IMPARANCE, AND POTENTIALLY BICERDING RECISE PUMP	DETERMINE TOTAL CHARGING PUMP PLON *SCV-1115E/P PAILURE AND PI-2114B/C PAILURES CANNOT BS DISTINGUISHED DURING COMBINED CLE/HER WITHOUT BQ PIT-1112 LOOP. CHARGING PUMP ANNETER USED TO	08	(SAMB AS 3.1.3.1.1)	
<u></u>	FOR PLOW TO RCS LOOPS B AND C WOULD BE INCREASED PER PROCEDURE, DESULTING IN CLE AND CLE/BLE PLOW IMBALANCE, AND POTENTIALLY BIOSEDING RECISC PUMP	SECV-1115E/P PAILURE AND PI-2114B/C PAILURES CANNOT BE DISTINGUISHED DURING COMBINED CLE/HER WITHOUT BQ PET-1112 LOOP. CHARGING PUMP AMMETER USED TO	08	(SAMB AS 1.1.1.1.1)	
<u></u>	INCREASED PER PROCEDURE, RESULTING IN CLE AND CLE/BLE FLOW IMBALANCE, AND POTENTIALLY RICERDING RECIPC PUMP	PAILURES CANNOT BE DISTINGUISHED DURING COMBINED CLE/HER WITHOUT BY PET-1112 LOOP. CHARGING PUMP AMMETER USED TO			
	CLE AND CLE/BLE FLOW IMBALANCE, AND POTENTIALLY BICEBDING RECIEC PUMP	COMBINED CLR/MLR WITHOUT BQ PIT-1112 LOOP. CHARGING PUMP AMMETER USED TO			
SP CLOSEN	POTENTIALLY RICERDING RECISC PUMP				
ID CLOSED	1 IMT PLOTONO	PETERNING TOTAL CHARGING DIMP BLOW			
AD CLOSED	LIMITATIONS	ABINERIES INTER ABENALEM LAND LAND			
P 0543Bh	REDUCED RELIABILITY OF ALTERNATE HER	MOV-822A OR B MUST BE OPEN WITH	10.1	EBVISE DCP 1-3544 TO SPECIFY APPROPRIATE	NUCLEAR
	PATH	POWER-LOCKOUT DURING NORMAL OPERATION		ADMINISTRATIVE CONTROLS ON MOV-821A/B	
ND C10096	DDN:://DD		10. 4	DOUGO BOACONIONS (INC. INC. NO. NO. 1 AC HODADA TA	OPERATIONS
IR CTOSED			10.6	•	OFBERTIONS
	. FALR			Tacrobs not 1.3548 endoteputation	
		· ·			
)R BQ .	OP SECT REAL COMMON-CARE POSS OF	BREAKER AND CONTROL POWER PUSE PROVIDE	10	(SAME AS 3.2.3.1.2)	
	ALTERNATE ULR PATH	(b)(2) PROTECTION OF MCC		and the state of t	
R CLOSED	REDUCED RELIABILITY OF ALTERNATE BLR	MOV-822A OR B MUST BE OPEN WITH	10	(SANE AS 3.2.3.1.2)	
		POWER-LOCKOUT DURING MORNAL OPERATION			
		•			
	AND THE CONTRACT OF THE PART OF		١.	(C.MC 13 3 5 5 1 5)	
N RO	and the second s			(2AR5 A3 3.6.3.1.6)	
ID PO		• • • •	10 1	IMPLEMENT DOD 1-3542 HIS MODIFICATIONS	NUCLEAS
				THE DESIGNATION OF THE PROPERTY OF THE PROPERT	
			)		
R BY	*POTENTIAL COMMON-CAUSE LOSS OF			(SAME AS 3.2.5.1.3)	
	ALTERNATE HER PATH	(b)(2) PROTECTION OF MCC. ACTUATOR WILL			
				101MB 10 \$ \$ 5 1 31	
)B 8Q			10	(ZAHE AZ J.C.J.[.]	
	DA LUITARD			•	
SR RO	APOTRATIAL COMMON-CAUSE LOSS OF		10	(SAMB AS 3.2.5.1.3)	•
	ALTERNATE BLE FLOW TO BCP SEAL WATER	VITAL BUS LOADS. DCP. 3548 WILL INSTALL			4 1 1 1 1
	RETURN	CHECK VALUE TO PREVENT PLOW DIVERSION			
		VIA THIS PATH			
B BQ	*POTENTIAL COMMON-CAUSE LOSS OF	* ** *	10	(SAMB AS 3.2.5.1.3)	
	ALTERNATS HER FLOW TO BODT	UTILITY BUS LOADS. CHECK VALVE TO BE			
				. The second second second second second second second second second second second second second second second	
	OR CLOSED  OR CLOSED  OR CLOSED  OR EQ  OR EQ  OR EQ  OR EQ	OR CLOSED  BROUCED BRLIABILITY OF ALTERNATE BUR  PATH  OR CLOSED  CLOSED  DR BQ  POTENTIAL COMMON-CAUSE LOSS OF  ALTERNATE BUR PATH  OR BQ  POTENTIAL COMMON-CAUSE LOSS OF  ALTERNATE BUR PATH  OR BQ  POTENTIAL COMMON-CAUSE LOSS OF  ALTERNATE HUR PATH  OR BQ  POTENTIAL COMMON-CAUSE LOSS OF  ALTERNATE HUR PATH  OR BQ  POTENTIAL COMMON-CAUSE LOSS OF  ALTERNATE HUR PATH  OR BQ  POTENTIAL COMMON-CAUSE LOSS OF  ALTERNATE HUR PATH TO BCDT WITH CV-288  BQ PAILURE  OR BQ  POTENTIAL COMMON-CAUSE LOSS OF  ALTERNATE BUR PLOW TO BCD SEAL WATER  BETURN  OR BQ  POTENTIAL COMMON-CAUSE LOSS OF	DUE TO POST-LOCA PLOODING OF ACTUATOR.  WHICH IS NOT QUALIFIED FOR SUBBREGINCE  PATH POWER-LOCGOUT DURING GORAL OPRRATION  DUE TO POST-LOCA PLOODING OF ACTUATOR,  DUE TO POST-LOCA PLOODING OF ACTUATOR,  WHICH IS NOT QUALIFIED FOR SUBBREGINCE  DUE TO POST-LOCA PLOODING OF ACTUATOR,  WHICH IS NOT QUALIFIED FOR SUBBREGINCE  WHICH IS NOT QUALIFIED FOR SUBBREGINCE  REQUERN RELEASE HER PATH (5)[1] PROTECTION OF ECC  PATH POWER-LOCGOUT DURING SORMAL OPRRATION  DUE TO POST-LOCA PLOODING OF ACTUATOR,  WHICH IS NOT QUALIFIED FOR SUBBREGINCE  POWER-LOCGOUT DURING SORMAL OPRRATION  DUE TO POST-LOCA PLOODING OF ACTUATOR,  WHICH IS NOT QUALIFIED FOR SUBBREGINCE  WHICH IS NOT QUALIFIED FOR SUBBREGINCE  POWER-LOCGOUT DURING SORMAL OPRRATION  DUE TO POST-LOCA PLOODING OF ACTUATOR,  WHICH IS NOT QUALIFIED FOR SUBBREGINCE  WHICH IS NOT QUALIFIED FOR SUB	DUE TO POST-LOCA PLOODING OF ACTUATOR.  WHICH IS NOT QUALIFIED FOR SUBBRECRACE  PATE  PATE  PATE  PATE  PATE  PATE  POWER-LOCQUIT DURING MORAL OFFRATION  DUE TO POST-LOCA PLOODING OF ACTUATOR.  WHICH IS NOT QUALIFIED FOR SUBBRECRACE  OR CLOSED  REQ.  ALTERNATE BLE PATE  OR CLOSED  REDUCED RELIABILITY OF ALTERNATE BLE  ALTERNATE BLE PATE  OR CLOSED  REDUCED RELIABILITY OF ALTERNATE BLE  PATE  POWER-LOCQUIT DURING MORAL OFFRATION  WHICH IS NOT QUALIFIED FOR SUBBRECRACE  OR CLOSED  REDUCED RELIABILITY OF ALTERNATE BLE  PATE  DUE TO POST-LOCA PLOODING OF ACTUATOR.  WHICH IS NOT QUALIFIED FOR SUBBRECRACE  POWER-LOCGOUT DURING MORAL OFFRATION  POWER-LOCGOUT DURING MORAL OFFRATION  WHICH IS NOT QUALIFIED FOR SUBBRECRACE  OR SQ.  POTENTIAL COMMON-CAUSE LOSS OF  BEBLER AND CONTROL PROWER PUSE PROVIDE 10  ALTERNATE BLE PATE  (b)[2] PROTECTION OF MCC.  ALTERNATE BLE PATE  (b)[2] PROTECTION OF MCC.  ACTUATOR WILL  BE REPLACED WITH BQ MOREL BT DCP 3544.00  ALTERNATE BLE PATE 10 RCDT MITH CA-288  POST BYTHEM BLE PATE 10 RCDT MITH CA-288  POST BYTHEM BLE PATE 10 RCDT MITH CA-288  POST BYTHEM BLE PATE 10 RCDT MITH CA-288  POST BYTHEM BLE PATE 10 RCDT MITH CA-288  POST BYTHEM BLE PATE 10 RCDT MITH CA-288  POST BYTHEM BLE PATE 10 RCDT MITH CA-288  POST BYTHEM COMMON-CAUSE LOSS OF POST POWER POST BYTHEM TO BEE  ALTERNATE BLE PATE 10 RCDT MITH CA-288  POST BYTHEM COMMON-CAUSE LOSS OF POST POWER POST BYTHEM TO BEE  ALTERNATE BLE PATE 10 RCDT WITH BUS DOCD 3548 WILL PESVENT PLOW  WILL BY PATE  OR CLOSED  ALTERNATE BLE PATE 10 RCDT WILL BUS LOADS. CRECK VALVE TO BEE  WILL BY PATE  CRECK VALVE TO PREVENT PLOW DIVERSION  WILL BLE PATE  POST PROVIDES [b)[2] PROTECTION OF OTHER 10  ALTERNATE BLE PLOW TO RCD SEAL WATER  CRECK VALVE TO PREVENT PLOW DIVERSION  WILL BLE PATE  POST PROVIDES [b)[2] PROTECTION OF OTHER 10  ALTERNATE BLE PLOW TO RCD SEAL WATER  POST PROVIDES [b)[2] PROTECTION OF OTHER 10  ALTERNATE BLE PLOW TO RCD SEAL WATER  POST PROVIDES [b)[2] PROTECTION OF OTHER 10  POST PROVIDES [b)[2] PROTECTION OF OTHER 10  POST PROVIDES	DUS TO POST-LOCA FLOODING OF ACTUATOR

2322 NO. 11/26/30



#### ENSESSION CORS COOLING SYSTEM SINGLE FAILURS ANALYSIS SAN OMOFRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

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İ							BBPCS!			
	1758 #	DEVICE ID	COMPONENT ID	RASLURE MODE	BFFBCT ON BCCS	BRMARES	ITEM	RETI WOITSA	BESP DISCIPLING	ĺ
										<del> </del>
:										i
	04.1.01.01.1	MANUAL VALVES,		OPBM	POTENTIAL DIVERSICE OF CONTAINMENT	#[MCLUD88 CRS-319, FWS-455 OR 412.	12.3	BVALUATE ALTERNATE BECONDARY BRICIEC FLOY PATH	NUCLBAR	1
		COMMON PLOW PATE				PMS-317 AND 381 (S/G A), PMS-312 AND 316		CAPABILITY PROM REFUELING WATER PUMP DISCHARGE TO		
]					SUMP INVENTORY TO RUST	(S/G B), PWS-415 AND 419 (S/G C). BOL		RVST		
		·				DORS NOT INCLUDE ALIGHNERY VERIFICATION				l
1.1						POR APPLICABLE VALVES. REDUNDANT				1
	04 2 01 01 1	MANUAL WALUES		ARRI	A BORDING ALL DE HADDOLON OR COURT FAIRDUR	ISOLATION VALVE AND PLOW PATH REQUIRED				ŀ
`L		COMMON PLOW PATE		OPBM	POTENTIAL DIVERSION OF CONTAINMENT	*INCLUDES CRS-338, PWS-455 OR 492,	17.1	REVISE SOL TO INCLUDE SECONDARY RECIRCULATION	OPERATIONS	<b>[</b>
	•	COMMON PLUM PAID			SPEAR PLOW AND LOSS OF SECONDARY RECERC	PMS-377 AND 381 (S/G A), PMS-372 AND 376		ALIGNMENT VERIFICATION, AS NEEDED		ł
Ĺi					Sout Institute to Balt	(S/G B), PWS-415 AND 419 (S/G C). BOI				ł
					· · · · · · · · · · · · · · · · · · ·	DOBS NOT INCLUDE ALIGNMENT VERIFICATION FOR APPLICABLE VALVES. REDUNDANT		en a la company de la company		<b>.</b>
				4		ISOLATION VALVE AND FLOW PATH REQUISED				
: 1	04.3.01.01 2	MANUAL YALVES.		CLOSED	#LOSS OF SECONDARY BECIEC FOR CES-138	*BOI DOBS NOT INCLUDE ALIGNMENT	12	(SAM3 AS 4.3.1.1.1)		
		COMMON PLOW PATH		- bà <b>din</b>	CLOSURE, LOSS OF SECONDARY RECIRC PATH	VBRIFICATION FOR ALL APPLICABLE VALVES.	15 .	Teams by 1-4-1-1:11		ł
					TO ONE OR MORE S/G FOR PMS VALVE CLOSURE					
					The second of the test said of the second of	HIDBAULEC CALCULATION TO VERIFY ADROVACE				
				• •		OP BILISTING 2 INCH REPUBLING WATER	•			<b>†</b>
						PILTER PUMP LIMES				
.'	04.3.02.01.1	MANUAL VALVES,		OPBN	*LOSS OF SECONDARY RECIRC PLOY/INVENTORY	*SEE TABLE 4-2. BO! DOES NOT INCLUDE	11.5	EVALUATE STEPS TO COMPENSATE FOR PCV-5051	OPERATIONS	•
:		COMMON BOUNDARY			A COMMINE OF THE ACT O	ALIGNMENT VERIFICATION OF ALL APPLICABLE		INADVERTANT OPENING DURING SECONDARY RECIPC AND		
						VALVES. HUST SPECIFY LOCAL CLOSURE OF		REVISE BOL AS MESDED		l i
						VCC-126 ITO PROTECT AGAINST FCV-5051				1
					•	ACTION; AND PROVIDE				
~				. •	•	RESPONSE-NOT-OBTAINED OPTIONS IF				1
4						MOV-1100B/D DORS NOT CLCSE (BG. CLOSE	<u>-</u>			I
- :						CRS-425)				
i.		MANUAL VALVES,		CLOSED	MONE		01.1	VBRIFY: A) VALVE LOCKING PROGRAM CRITERIA DO NOT	OPERATIONS	!
<i></i>	<del></del>	COMMON BOUNDARY				SECONDARY RECIRC PUNCTION		BICLUDE CRITICAL MANUAL VALVES, AND BI OTHER		
Ì								ADMINISTRATIVE CONTROLS ARE SUFFICIENT TO PREVENT		1 1
.1								MISPOSITIONING OF MANUAL VALVES WHICH ARE NOT		
<u> </u>	A4 2 02 04 1	CHE 00 BDI 100		MARMAL (DARRIUR)	· · · · · · · · · · · · · · · · · · ·	PODD WARTE & S DOD BOWATI DO BOUNDAME		COVERSO BY THE VALVE LOCKING PROGRAM		
<u>.</u>		CHE OR RELIEF		MORMAL (PASSIVE)	·	SBR TABLE 4-2 FOR DETAILED BOUNDARY		NO PURTRER ACTION REQUIRED. SOI-12.4-2 ALREADY		
•		BOUNDARY				VALUE ANALYSIS. IST PROGRAM DOBS NOT		INCLUDES STROTE TEST OF THESE VALVES AND		
	04.3.06.02.1		HCC-2A	VOLTS LOW	REDUCED RELIABILITY OF MAIN PM BYPASS	INCLUDE SCP-358, 359, 398 *BOI DOBS NOT ADDRESS REQUIREMENTS FOR	12 1	SOI-12.4-11 DORS SEAT LEAR TEST BEVISE SECONDARY RECIRC FOI TO POSITION	ODD LTE ME	-
		CV-143	(8-2429)	AATI3 TAN	VALVES FOR SECONDARY RECIRC PLOW CONTROL		14.1	CV-142/143/144 LOCALLY 1P UNSUCCESSPUL FROM	SMCITABBOO	
		CV-144	(a purs)		AUTHOR TON SECONDURE RECEDO LEAR CONTROL	LOURD CORTBOD		CONTROL ROOM		l
	04.3.06.03.1		125 VDC BUS #1	VOLTS LOW	REDUCED RELIABILITY OF MAIN PW BYPASS	BLOWDOWN ISOLATION NOT ADDRESSED IN BOL		NO FURTHER ACTION REQUIRED. BILISTING BOI		
년 2년		CV-143	[72-130]		VALVES FOR SI BOUNDARY, POTENTIAL			[SOI-1.0-JO] ALBBADY ADDRESSES BLOWDOWN ISOLATION		
i		CV-144	(		DIVERSION OF SECONDARY RECIRC INVENTORY			face the eat moneyer management and the training		
		:: · <u>·</u>			FROM SYSTEM UNTIL BLOWDOWN ISOLATION					!
1					YALAND CARDON CANDA					
ام	04.3.06.04.1	CV-142	183	PARSSURS LOW	NONE FOR SI, LOSS OF SECONDARY RECIRC	*COMMON-CAUSE PAILURE NOT POSTULATED	12	(SAMB AS 4.3.6.2.4)	ENGITAR 290	
,		CY-143		·· · · ·	TO S/G A/B/C	DURING SECONDARY RECIEC, BUT SINGLE		d		
. '		CV-144				PAILURE OF ISA-950 COULD ISOLATE ISA TO				
						CVs. BVALUATION OF MANUAL BYPASS PATHS				!
	•		•			ESQUIRED FOR MITIGATING BESECTS ON				
						SPECONDARY RECIRC			ļ	
									i	

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#### EMBRUSHUY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM ONOFRE UNIT I ACTION ITEMS FOR SIGNIFICANT FINDINGS

							885091		
:	# M811	DEVICE ID	COMPONENT 19	PAILURE MODE	BFFBCT ON BCCS	BEMARES	ITBM	ACTION ITEM	833P DISCIPLINE
	04.2.07.01.1	CÁ-190	V <u>alv</u> 8/actuator	QPBN	POTENTIAL DIVERISON OF SECONDARY RECIEC INVENTORY FROM STOTEM UNTIL REDUNDANT VALVE(S) CLOSED LOCALLY	FINCLUDES FWS-530, 230/C-2132. REDUNDANT VALVE FWS-526 NORMALLY CLOSED. BLONDOWN ISOLATION NOT ADDRESSED IN ROI OR VALVE		[SAMB AS 4.3.6.3.1]	
	04.3.07.02.1	CV-100A	VALVE/ACTUATOR		REDUCED REDUMBANCY FOR BLOWDOWN ISOLATION (SECONDARY RECIRC BOUNDARY)	LOCKING PROGRAM *MORMAL POSITION. VALUE IS NON-SAPRTY -RELATED BACKUP TO CV-100B. BLOYDOWN ISOLATION NOT ADDRESSED IN BOI	<del></del>	(SAMB AS 4.3.6.3.1)	
	04.3.07.03.1	CV-100B	VALVE/ACTUATOR	OPRI	REDUCED REDUNDANCY FOR BLOWDOWN	*MORBAL POSITION. INCLUDES PMS-381 AND 250/C-2183. BLOWDOWN ISCLATION NOT ADDRESSED IN BOI		(SAHE AS 4.3.6.3.1)	
		CV-100 CV-100A CV-100B	SV-84	OM (OPBN)	POTENTIAL DIVERSION OF SECONDARY BEGIRC INVENTORY PROM SYSTEM UNTIL RESUNDANT VALVE(S) CLOSED LOCALLY	*MORNAL POSITION. BLOWDOWN ISOLATION NOT ADDRESSED IN BOI		(SAMS AS 4.3.6.3.1)	
i i		CA-100B CA-1007 CA-100	APVI (RBLAT)	CONTACTS CLOSED (OPP)	POTENTIAL DIVERSION OF SECONDARY RECIEC INVENTORY FROM STRIBE UNTIL VALVES CLOSED REMOTE-MANUALLY	TOW MOITAGET WWO. BLOWDOWN TROLATION NOT ADDRESSED IN BOI		(SANB AS (.3.6.3.1)	
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### EMBERGEROY GUES CONCING STRONG PAIGURE ARADISIS SAN ONOFRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT PINCINGS

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ITEM 8 LEVICE 1	D COMPONENT ID	FAITHER NOTE	EFFECT ON BCCS		EEPOET ITEM	ACTION ITER	RBSP-DISCIPLINE
15.1.02.01.1 MANUAL VALVE TRAIN A BOUN	•	OPEN	PLESS OF TRAIN A HYDRAZINE PLOW OR REDUCTION IN DURATION OF HYDRAZINE FLOW FOR ROTH TRAINS DUR TO INVENTORY LOSS THROUGH UNLOCKED VALVES	VALVE ANALYSIS	01.1	VERIFF: A) VALUE LOCKING FROGRAM CRITERIA DO MOT RICLUDE CRITICAL MANUAL VALUES, AND 8) OTHER ADMINISTRATIVE CONTROLS ARE SUFFICIENT TO PREVENT MISPORITIONING OF MANUAL VALUES WHICE ARE MOT	OPERATIONS
05.1.04.01.1 CV-517	VALVE/ACTUATOR	OPBN		LINCLUDBS PT-2517: NORMAL POSITION, BOLDOBS NOT CURRENTLY REQUIRE RUNNING BOTH RECIRC PUMPS AS ASSUMED BY STORAULIC CALC MC734-012 SUPPL D	13	COVERED BY THE VALVE LOCKING PROGRAM REVISE ROL AS REQUIRED TO RUN BOTH RECIRC PUMPS UNTIL CONTAINERN' SPRAY FLOW IS SECURED (IR, BOTH REFUBLING WATER PUMPS TRIFFED)	OPBRATIONS.
05.1.04.02.2 CV-517	AVST (EBLAT)	CONTACTS OPEN (OFF)	1 OP 2 BEDUNDANT BI-PLOW SPEAY PATES POTENTIALLY INOPERABLE FOR INJECTION, POTENTIAL INABILITY TO BEDUCE SPEAY PLOW TO WITHIN CAPACITY OF ONE RECIRC PURP, APPROTING PUMP HEAD FOR ALTERNATE HLE PATE	*NORMAL POSITION. BOI DORS NOT CURRENTLY REQUIRE RUNNING BOTH RECIRC PUMPS AS	13	(SAHB AS 5.1.4.1.1)	
05.1.04.06.1 CV-517	ISA	PRESSURB LOW	*POTENTIAL COMMON-CAUSE LOSS OF BOTH	PROUNDANT VALVE CV-518 ALSO APPROTED. ADMIN CONTROLS REQUIRE VALVES TO BE OPEN DUBING NORMAL OPS OR DECLARED INOP IF CLOSED, BUT TECH SPEC CHANGE REQD. VALVES MUST REMAIN FULLY OPEN FOR AT		NO PURTHER ACTION REQUIRED. SOI-4-41 ALREADY INCLUDES NORMALLY OPEN REQUIREMENT FOR VALVES	•
05.1.04.06.1 CV-517	ISA	PRESSURE LOW	PPOTENTIAL COMMON-CAUSE LOSS OF BOTH BI-PLON SPRAT PATES DURING INJECTION, NO BPPECT ON RECIRCULATION	LEAST 5 HOURS (SMALLEST EBLOCA) TO REMAIN BOUNDED BY AMALTSIS *REDUNDANT VALVE CV-518 ALSO AFFECTED. ADMIN CONTROLS REQUIRE VALVES TO BE OPEN DUBING NORMAL OPS OR DECLARED INOP IF CLOSED, BUT TECH SPEC CHANGE REQD. VALVES MUST REMAIN FULLY OPEN FOR AT		SUBMIT PCM 151 INCLUDING CV-517/518 REQUIREMENTS	FICENZING
5.1.04.06.1 CY-517	ISA	PERSTURB LOW	POTENTIAL COMMON-CAUSE LOSS OF BOTH BI-FLOW SPEAT PATES DURING INJECTION, NO REFECT ON RECIECULATION	LEAST 5 NOURS (SMALLEST SBLOCA) TO REMAIN BOUNDED BY ANALYSIS REBUNDANT VALVE CV-518 ALSO APPECTED. ADMIN CONTROLS REQUIRE VALVES TO BE OPEN DURING NORTHAL OPS OR DECLARED INOP IF CLOSED, BUT TECH SPEC CHANGE REQD. VALVES MUST REMAIN PULLY OPEN FOR AT LEAST 5 HOURS (SMALLEST SBLOCA) TO		REVISE MMP 1-3582 TO INCLUDE APPROPRIATE VALVE DRIFT SURVEILLANCE REQUIREMENTS FOR CV-517/518	MUCLBAR
5.1.04.06.1 CV-517	ISA	FERSSURE LOW	*POTENTIAL COMMON-CAUSE LOSS OF BOTE HI-FLOW SPRAT PATHS DURING INJECTION, NO RPFECT ON RECIRCULATION	ADMIN CONTROLS REQUIRE VALVES TO BE OPEN DUBING MORMAL OPS OR DECLARED INOP IF CLOSED, BUT TROM SPEC CHANGE REQD. VALVES MUST REMAIN FULLT OPEN FOR AT LEAST 5 HOURS (SMALLEST SBLOCA) TO	32.3	REVISE IST PROGRAM AS NEEDED TO INCLUDE VALVE DRIFT CRITERIA FOR CV-517/518	STATION TRCH
5.1.05.01.1 CV-82	VALVE/ACTUATOR	OPBN	NOVE FOR CONTAINMENT SPRAY, LOSS OF CONTAINMENT ISOLATION VALVING FOR SPRAY PENETRATION	1202022 01 100, 200,0 11001 2000	32.4	HODIFY CONTAINMENT SPRAY FEMBRATION ISOLATION COMPIGURATION TO COMPLY WITH SEP TOPIC VI-4 ISOLATION CRITERIA OR PROVIDE OTHER JUSTIFICATION (RG. FORMAL CALC TO DEMONSTRATE RECIRC PP LOOP SEAL AT PENETRATION), AND FORWARD ANY UFSAR CHANGES TO LICENSING	NUCLEAR

·	. LTEM #	DEVICE ID	COMPONENT ID	PAILURE MODE	EFFECT ON BCCS		REPORT	ACTION ITEM	RESP DISCIPLINE	
						•				
05	.1.05.01.1	CV-62	VALVB/ACTUATOR		NOME FOR CONTAINMENT SPRAY, LOSS OF CONTAINMENT ISOLATION VALVING FOR SPRAY PRESTRATION	FINCLUDES SV-128, ZSO/C-1082. BOIS PERMIT SPRAT PUMPS TO BE TEIPPED AFTER PRESSURE REDUCTION POST-LOCA. VALVE	32.5	OBTAIN MEC CONCURRENCE WITH DEVIATIONS OF CONTAINMENT SPRAT PRINTATION ISOLATION CONFIGURATION FROM SRP TOPIC VI-4 CRITERIA AS	LICENSING	
						PAILURE ON LOSS OF AIR NOT CONSISTENT WITH BASIS FOR ACCEPTANCE OF PRHETRATION CONFIGURATION UNDER ARP TOPIC WI-A.	i	REBORD		
	.1.05.04.1 (		VITAL BUS \$1 (8-1111V)	VOLTS LOW	NOWE FOR CONTAINMENT SPRAT, LOSS OF CONTAINMENT ISOLATION VALVING FOR SPRAT PRINTRATION	BOI PERMITS SPRAY PUMP TRIP APTER	32	(SAMB A8 5.1.5.1.1)		
1			ISA			ACCEPTIBILITY OF CONTAINMENT ISOLATION CONFIGURATION FOR THE SPEAT PENETRATION				
				. LKR22ARE FAR	PRINCIPATION	PRESSUEB BROUCTION. NOT CONSISTENT WITH SEP TOPIC VI-4 BASIS FOR ACCEPTABILITY OF THE ISOLATION CONFIGURATION FOR THIS		(SAME AS. 5.1.5.1.1)		
		IANUAL VALVES, PRAIN R BOUNDAM		OPBM	LOSS OF TRAIN S NYDRAZINE FLOW OR REDUCTION IN DURATION OF REDRAZINE FLOW FOR BOTH TRAINS DUR TO INVENTORY LOSS	PRINTERATION SEE TABLE 5-2 FOR DETAILED BOUNDARY VALVE ANALYSIS	01	(SAME AS 5.1.2.1.1)		
£5.	.2.04.01.1_6	Y-518		OPEN	THROUGH UNLOCKED VALVES NOWE FOR INJECTION, INABILITY TO REDUCE. SPRAY PLOW TO WITHIN CAPACITY OF SINGLE RECIRC PUMP PER BOI	DORS NOT CURRENTLY REQUIRE RUNNING BOTE RECIRC PUMPS AS ASSUMED BY STORAULIC		(SANR 45.5.1.4.1.1)		
05.	.2.04.02.2	V-518	BVS7 (RELAT)	CONTACTS OPEN (OPP)	1 OF 2 REDUNDANT HI-PLOW SPRAY PATES POTENTIALLY INOPERABLE FOR INJECTION, POTENTIAL INABILITY TO REDUCE EPRAY PLOW TO WITHIN CAPACITY OF ONE RECIEC PUMP, APPECTING PUMP BEAD FOR ALTERNATE HER	*MORNAL POSITION. BOI DORS NOT CURRENTLI REQUIRE RUNNING BOTH RECIEC PUMPS AS ASSUMED IN MTDRAULIC CALC MCT34-012	1 13	(SAME AS 5.1.4.1.1)		
05.	.2.04.06.1 C	V-518	ISA	PRESSURE LOW	BPFRCT ON BRCIBCULATION	CLOSED. VALVES MUST BEMAIN PULLY OPEN POR AT LEAST 5 HOURS (SHALLEST SELOCA)	·	(SAME AS 5.1.4.6.1)	~	
05.	.2.05.01.1 C	V-114	VALVE/ACTUATOR	OPEN	NONE FOR CONTAINMENT SPEAT, LOSS OF	CHANGE REQUIRED *INCLUDES SV-118, ZSO/C-1114. BOIS *ERRHIT SPRAY PUMPS TO BE TRIPPED AFTES PRESSURS REDUCTION POST-LOCA. VALVE FAILURE ON LOSS OF AIR NOT CONSISTENT	32	(SAMB AS 5.1.5.1.1)		
(15.	2.05.04.1 C	 V-114 	- VITAL BUS #2 {8-J214V}	VOLIS LOW	NOWE FOR CONTAINMENT SPRAY, LOSS OF CONTAINMENT ISOLATION VALVING FOR SPRAY PRIBERATION	VITH BASIS FOR ACCRPTANCE OF PRINTRATION CONFIGURATION UNDER SEP TOPIC VI-4.  1801 PERHITS SPRAT PUMP TRIP APTRE PRESSURB REDUCTION POST-LOCA, NOT.  CONSISTENT WITH SEP TOPIC VI-4 BASIS FOR ACCRPTIBILITY OF CONTAINMENT ISOLATION CONFIGURATION FOR THE SPRAT PRINTERATION	32	(SAMB AS 5.1.5.1.1)		

#### EMERCENCY COER COOLING SYSTEM SINGLE FAILURE AWALTSIS . SAN ONOPRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

I TRM #	DEATCR ID	COMPONENT ID	FAILURE MODE		PPHARES		ACTION LIEM BESP (	OISCIPLINE -
05.2.05.05.1 C		ISA	PRESSURE LOW	NOVE FOR CONTAINMENT SPRAY, LOSS OF CONTAINMENT ISOLATION VALVING FOR SPRAY PRINTERATION	ROI PERMITS SPRAY PUMP TRIP APTER PRESSURE REDUCTION. NOT CONSISTENT WITH SEP TOPIC WI-4 BASIS FOR ACCEPTABILITY		(SAMB AS 5.1.5.1.1)	
					OF THE ISOLATION COMPIGURATION FOR THIS PRINTED TO THE PRINTED AT	02.2	REVISE .IST AND OTHER PROCEDURES AS MEEDED FOR STATIC	W TRC2
·	OREOR FLOR				LEAR TRUTED FOR RECIRC BOUNDARY PUNCTION IN IST PROGRAM		SI/RECIEC LEARAGE TESTING	
С	OMNON FLOR		•		LEAR TESTED FOR RECIRC BOUNDARY PUNCTION IN 187 PROGRAM		DETERMINE APPLICABLE LEAR TEST REQUIREMENTS FOR HUCLEA RECIRC SYSTEM. (CRS-301 CURRENTLY TESTED ONLY FOR GROSS LEARAGE PRE SO1-12.4-15)	
C	ONNON BOUNDARY			SPRAT DUE TO UNISOLABLE LOSS OF INVENTORY THROUGH OUTSIDE CONTAINMENT	SEE TABLE 3-2 FOR DETAILED BOUNDARY	.01	_(SAMB AS 5.1.2.1.1)	
5.3.03.01.1 B	0V-883	VALVE/ACTUATOR		PROVIDED WITH SUITABLE BACKUP DRVICES REDUCED REDUNDANCE FOR ISOLATION OF EVET	SCHECK VALUE NOT LEAR TESTED AS PART OF RECIEC STATEM LEARAGE MONITORING PROGRAM			
5.3.03.02.1 M 5.3.03.03.1 M	OV-883	RMS-2054 RMS-2047	CONTACTS OPEN OPEN POSITION	(SAHE AS \$.3.3.1.1) (SAHE AS 5.3.3.1.1)	*(SAMB AS 5.3.3.1.1)	02	[SAME AS 5.3.1.2.1] [SAME AS 5.3.1.2.1]	
.3.03.04.1 H		42-CC OR 42A-CC _(CONTACTORS)	CLOSED) OPP(CONTACTOR_OPEN)		SCHECK VALUE NOT LEAK TRETED AS PART OF RECIRC STREEK LEAKAGE MONITORING PROGRAM		[SANB 48 5.3.1.2.1]	
.3.03.04.2 M	DV-883	12-CC OR 42A-CC (CONTACTORS)		REDUCED REDUNDANCY AGAINST SPURIOUS	SURVELLLANCES WOULD DETECT THIS PAILURE	29	INCLUDE CONTACTOR STATUS INDICATING LIGHTS AND RESCTE SURVEILLANCE REQUIREMENTS FOR HOV-883 IN HMP 1-3619 TO PRRYENT AN UNDETRCTED LOSS OF CONTACTOR	ICAL
.3.03.05.1 MG	OV-881	HCC-3 _(42-1390)	VOLTE LON	REDUCED REDUNDANCY FOR ISOLATION OF RUST FROM RECIRCULATED SUMP WATER	*CHECE VALVE NOT LEAR TESTED AS PART OF BECIRC STRIKE LEARAGE MONITORING PROGRAM		REDUNDANCY (SAME AS 5.3.1.2.1)	
.3.04.01.1 MC	OV-880	VALVB/ACTUATOR		REDUCED RELIABILITY OF CONTAINMENT SPEAT BOUNDARY		04.1	BRVISE RWST AND SI/PW LO-LO SETPOINT CALCULATIONS NUCLEA TO ADDRESS INVENTORY DIVERSIONS	B
					ADBQUACT		-	

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#### EMBLUENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT PINDINGS

TEM A DEVICE ID COMPONE	AT ID FAILULE HODE	RPFRCT ON BCCS	- REMARES	REPORT		RESP DISCIPLINE
06.1.02.01.1 NAMUAL VALVES, TRAIN A BOUNDAKY	OPEN		SEB TABLE 6-2 FOR DETAILED BOUNDARY VALVE ANALYSIS. MARE-UP SYSTEM IS		VERIFY: A) VALVE LOCEING PROGRAM CRITERIA DO NOT BICLUDE CRITICAL MANUAL VALVES, AND B) OTHER	1
OS.1.02.01.1 MANUAL VALVES	OPRN	VALVES WHICH ARE NOT LOCED CLOSED OR PROVIDED WITH SE BACKUPS POTENTIAL LOSS OF BOTH TRAINS OF CCW	THAT IT CANNOT BE CREDITED POST-ACCIDENT		ADMINISTRATIVE CONTROLS ARE SUFFICIENT TO PREVENT MISPOSITIONING OF MANUAL VALVES WHICH ARE NOT COVERED BY THE VALVE LOCKING PROGRAM	
The a source	- · · - · · · · · · · · · · · · · · · ·	UNISOLABLE LOSS OF INVENTORY THROUGH	NON-SAFETY RELATED AND NON-SEISMIC, SO THAT IT CANNOT BE CREDITED POST-ACCIDENT		CALCULATION	
O6.1.02.01.1 MANUAL VALVES,	OPEN	*POTENTIAL LOSS OF BOTE TRAINS OF CCU POR INJECTION AND RECIRCULATION DUE TO UNISOLABLE LOSS OF INVENTORY THROUGH	SER TABLE 6-2 FOR DETAILED BOUNDARY VALVE ANALYSIS. MARE-UP STRYRM IS		DETERMINE ACTUAL CCW SYSTEM LEARAGE VIA OPERATIONS.	
06.1.02.01.1 MANUAL VALVES,	OPRN	PROVIDED WITH SE BACEUPS PROVIDED WITH SE BACEUPS POTINTIAL LOSS OF BOTH TRAINS OF CCW	THAT IT CANNOT BE CERDITED POST-ACCIDENT SEE TABLE 6-2 FOR DETAILED BOUNDART		BVALUATB ACTUAL VS. ALLOWABLE CCW SYSTEM LEARAGE	MECHANICAL
TRAIN A BOUNDARY		FOR INJECTION AND RECIECULATION DUE TO UNISOLABLE LOSE OF INVENTORI TERQUER VALVES WHICH ARE NOT LOCEED CLOSED OR PROVIDED WITE SE BACEUPS	VALVE ANALYSIS. MARE-UP SYSTEM IS NOW-SAPRTY RELATED AND MOM-SRISHIC, SO THAT IT CANNOT BE CREDITED POST-ACCIDENT		AND DETREMENE MEED FOR POST-ACCIDENT MARRUP  BODIFICATIONS	
06.1.03.03.3 <u>C-15A</u> <u>CS:</u> 52-112 (CONTROL S	MITCH) (OUT OF AUTO)	INOPERABLLITE OF TRAIN A CCM PUMP FOR INJECTION, INITIAL BECIEC	PRESENTATION STATE REQUIRED IP PUMP IS NOT IN AUTO HODB	11	INPLEMENT MMP 1-3636 TO MODIFY CON PUMP CONTROL LOGIC SO THAT SIB/SIBLOP WILL START THE PUMP IRRESPECTIVE OF WHETHER THE CONTROL SWITCH IS IN	HBCHANICAL
06.1.03.03.5 G-15A CS: 52-112 (CONTROL S	SHORT/CROUND WITCH) (ALL CONTACTS)		1125VDC STSTEMS NORMALLT UNGROUNDED. TRUE SPEC ACTION BUTBY REQUIRED IP BITHER STRIEM REGATLYS POLE GROUNDED TO	37.1	SPEC ACTION BUTRY AND/OR MODIFICATIONS TO BLININATE TRAIN-CONNON 1254DC DRVICES AS PART OF	BLECTRICAL
		POR SISLOP	PRECLUDE COMMON-MODE LOSS OF CONTROL POWER TO TRAIN A/B DUE TO THIS SINGLE FAILURE		INTEGRATED RESOLUTION OF SEP TOPIC VI-1.C.2	
06.1.03.06.2 G-15A CS: 52-122 (CONTROL S		*POTENTIAL COMMON-MODE LOSS OF TRAIN A RECTRICAL POWER, DUE TO OUT OF SEQUENCE SUB LOADING AND TRAIN B CCW PUMP OVERLOAD OR BUS UNDERVOLTAGE DURING SISLOP. NOME POR 212		17	REVISE SISLOP LOADING CALCULATION TO ACCOUNT FOR OUT OF SEQUENCE CCM/SMC PUMP LOADING	BLECTRICAL
06.1.03.07.2 G-154 27-2 (SWGR BBLAT) 86 (52-122 BBLAT)	(UV OFF, OVLD ON)			.11	[SAME AS 6.1.3.6.2]	
06.1.03.08.2 G-15A CB: 52-130		POTENTIAL COMMON-MODE LOSS OF TRAIN A RESCRICAL POWER, DUE TO OUT OF SEQUENCE BUS LOADING AND SWING BUS UNDERVOLTAGE POLLOWING SIS/SISLOP TRIP OF SWCR 43		11	(SARE AS 6.1.3.6.2)	
06.1.03.09.2 G-15A 27-2 (SWGK RBLAY) 86 (52-130 RPLAY)	(UV OPP, OVED ON)	*(SARE AS 6.1.3.8.2)		17	(SAMB AS 6.1.3.6.2)	

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#### EMERGENCY CORR COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPER UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

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	COMBUT ID FAILURE MGDR	BEFFECT ON BCCS	REBAKES	SEPORT			PBSP_DISCIPLINE	
06.2.02.01.1 MANUAL VALVES, TRAIN B BOUNDART	OFEN	POTENTIAL LOSS OF BOTH TRAINS OF CCW FOR INJECTION AND RECIRCULATION DUR TO UNISOLABLE LOSS OF INVENTORY THROUGH	SEE TABLE 6-2 FOR DETAILED BOUNDART VALVE ANALYSIS. MAEE-UP STSTEM IS NOW-SAFETT RELATED AND NOW-SEISMIC, SO		(SAMB AS 6.1.2.1.1)			
06.2.03.03.1 G-15B CS: 52	2-1221 MANUAL		THAT IT CANNOT BE CREDITED POST-ACCIDENT  STRCE SPEC 3.1.1 ACTION RUTER REQUIRED					
06.2.03.01.5 G-15B CS: \$2		INJECTION, INITIAL RECIRC INOPREABILITY OF TRAIN B CCW PUMP, POTENTIAL LOSS OF TRAIN B BLECTRICAL POWER DUE TO OUT OF SEQUENCE RUS LOADING	IP PUMP IS NOT IN AUTO HODE  125VDC STSTEMS WORMALLY UNGROUNDED.  TRCE SPEC ACTION ENTET REQUIRED IF  RITERS STSTEM NEGATIVE POLE GROUNDED TO	31	(SAME AS 6.1.3.3.5)			
	· · · · · · · · · · · · · · · · · · ·	LOB 313F0b	PRECLUDE COMMON-MODE LOSS OF CONTROL POWER TO TRAIN A/R DUE TO TRIE SINGLE PAILURE	* / makes * ma				
06.2.03.06.2 G-15B CS: 52		*POTENTIAL COMMON-MODE LOSS OF TRAIN B  1) ELECTRICAL POWER, DUB TO OUT OF SEQUENCY BUS LOADING AND TRAIN A CCM PUMP OVERLOAD OR BUS UNDERVOLTAGE BURING			(SAHB AS 6.1.3.6.2)			
BBLAY) 06 (52	-1121 OVLD	81810P. NOME FOR 818 1(SAME AS 6.2.3.6.2)		17	(SAHB AS 6.1.3.6.2)			
06.2.03.08.2 G-15B CS: 52 1CONTR	-1305 CONTACTS CLOSED	3POTENTIAL COMMON-MODE LOSS OF TRAIN S 1_ SLECTRICAL POWER, DUE TO OUT OF SEQUENCE BUS LOADING AND SWING BUS UNDERVOLTAGE		11 	(SAHE AS 6.1.3.6.2)			_
RBLAT) 86 (52	-130\$ OVLD	FOLLOWING SIS/SISLOP TRIP OF SWGR \$3 1(SAME AS 6.2.3.8.2)		11	(SANR AS 6.1.3.6.2)			
O6.3.02.01.1 MANUAL VALVES, SOUTH PUMP BOUMDARY	OPRM	*POTENTIAL LOSS OF TRAIN A AND B CCW POR INJECTION AND RECIRCULATION DUB TO UNISOLABLE LOSS OF INVENTORY TREQUER VALVES WHICH ARE NOT LOCKED CLOSED OR	I SBE TABLE 6-2 FOR DETAILED BOUNDARY VALVE ANALYSIS. MARE-UP SYSTEM IS MON-SAPETY BELATED AND NON-SEISMIC, SO THAT IT CANNOT AR CERDITED POST-ACCIDENT		(SAME AS 6.1.2.1.1)			
	-1105 SHORT/GROUND OL SWITCH) (ALL CONTACTS)	PROVIDED WITH SE BACEUPS	1125 VDC STREMS MORMALLY UNGROUNDED. TRUE SPEC ACTION ENTEY REQUIRED IF RITHER SYSTEM MEGATIVE POLE GROUNDED TO PRECLUDE COMMON-MODE LOSS OF CONTROL	31	[SAMB 43 6.1.3.3.5]			
08.4.01.03.1 MANUAL VALVES, CCM-30 COMMON FLOW-PATH 351, 3		POTENTIAL REDUCTION OF CCM FLOW TO BCCS	POWER TO TRAIN A/B DUB TO THIS SINGLE PAILURE *SURGE TAME/RAD MONITOR LINE. CCV-350, 352, 353 NOT IN LOCKING PROGRAM	_14.1	PROVIDE LIST OF CCM FLOW PATH VALVES TO ENSURE SAFETY RELATED FLOW FATHS A DEGRADED (INCLUDING DIVERSION DUE TO	RE NOT	MBCHANICAL	
08.4.61.03.1 MANUAL VALVES, CCM-30 COMMON PLOW PATH 351, 3	•	POTENTIAL REDUCTION OF CCW FLOW TO BCCS LOADS	*SUEGE TANE/RAD MONITOR LINE. CCM-350, 352, 353 NOT IN LOCKING PROGRAM	14.2	PLOW TRROUGH OTHER FLOW PATES) ADD APPROPRIATE CCW VALVES TO THE VAL PROCEDURE		OPERATIONS	

#### EMBAGENCY CURE COOLING STETRM SINGLE FAILURE ADALYSIS SAM OMORRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

64.4.0.4.1 AURINE VALUES, CCC-401, 433, CASSS 10. 100 CASSS 10. 100 CA	ITEM	DEVICE 10	_ COMPONENT LD	PAILURE MODE	BPFBCT ON BCCS	ERMARES	REPORT		 RRSP DISCIPLINS	
04.4.1.0.1.		CORNON PLOW PATH	406, 407, 408,		LOADS	409, 410 TRROTTER PLOW BUT NOT IN				
COMMON PATE 413, 414   OTHER ECCS LOADS   INDICATION OF PROPERS AND MURSE NOT   CARE ALL ALL ALL ALL ALL ALL ALL ALL ALL AL	06.4.01.05.	1 MANIJAS, VALVRS	CCN-421 422	OPRN	EDUADNALT BENTILATUR UB COM BIUM AU	BALANCE REQUIRED WITH VALVES PULLY OPEN	14	SCAMP AC S A 1 1 11		
COMMON FLOW PATE 423, 424  44-4.0.05.2 RABBUL VALVES, CCT-411, 422, CLOSED  45-4.0.10.5.2 RABBUL VALVES, CCT-411, 422, CLOSED  46-4.0.10.5.2 RABBUL VALVES, CCT-411, 422, CLOSED  46-4.0.10.5.2 RABBUL VALVES, CCT-411, 422, CLOSED  46-4.0.10.5.2 RABBUL VALVES, CCT-411, 422, CLOSED  46-4.0.10.5.2 RABBUL VALVES, CCT-411, 422, CLOSED  46-4.0.10.5.2 RABBUL VALVES, CCT-411, 422, CLOSED  46-4.0.10.5.2 RABBUL VALVES, CCT-412, 413, CLOSED  46-4.0.10.10.2 RABBUL VALVES, CCT-412, 413, CLOSED  46-4.0.10.2 RABBUL VALVES, CCT-412, 413, CLOSED  46-4.0.10.2 RABBUL VALVES, CCT-412, 413, CLOSED  46-4.0.10.2 RABBUL VALVES, CCT-412, 413, CLOSED  46-4.0.10.2 RABBUL VALVES, CCT-412, 413, CLOSED  46-4.0.10.2 RABBUL VALVES, CCT-412, 413, CLOSED  46-4.0.10.2 RABBUL VALVES, CCT-412, 413, CLOSED  46-4.0.10.2 RABBUL VALVES, CCT-412, 413, CLOSED  46-4.0.10.2 RABBUL VALVES, CCT-412, 413, CLOSED  46-4.0.10.2 RABBUL VALVES, CCT-412, 413, CLOSED  46-4.0.10.2 RABBUL VALVES, CCT-412, 413, CLOSED		CONNON PLON PATE	423, 424		OTERR ECCS LOADS	INDICATION NOT PROVIDED AND VALVES NOT		. (3848 84-4-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	 	
### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  #### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOADS  ### OFFI-ACCIDENT CARRESTOR PURP NATH LOAD	 06.4.01.05.				LOSS OF CRARGING PUMP G-SS FOR SISLOP	OF VALUE LOCKING, BECAUSE COOLING DUTY FOR HORMAL OPERATION (VERIFIED BY LUBE	.14	(SAMB AS 5.4.1.)		
POST-ACCIDENT CRASCILE PROF PROF \$100 DB.  66.4.01.06.1 HANUAL VALVES, CCV-412, 415, OPEN \$100 DBB CCW FLOW TO SEAL MATE BET AVENUE CCV-415 PRESENT TO 14 (SAME AS 6.4.1.3.1)  66.4.01.06.2 HANUAL VALVES, CCV-412, 415, CLOSED \$100 DBB CCW FLOW TO SEAL MATER STUTUM LINE ISOLATION VALVES IN (SAME AS 6.4.1.3.1)  66.4.01.06.2 HANUAL VALVES, CCV 423-427, OPEN \$100 DBB CCM FLOW TO BEDOTT-ANNUAL BOT AUTOMATICALART ISOLATION VALVES OF BEDOTT-ANNUAL SOFT AVENUE AND STATE OF BEDOTT-ANNUAL SOFT AVENUE AND STATE OF BEDOTT-ANNUAL SOFT AVENUE AND STATE STATE STATE AND STATE STATE STATE AND STATE STATE STATE AND STATE STATE STATE AND STATE STATE STATE AND STATE STATE STATE AND STATE STATE STATE AND STATE	 06.4.01.05.				*LOSS OF BOTH CHARGING PUMPS FOR \$13,	POST-ACCIDENT CRARGING PUMP HEAT LOADS PASSUMED PER-BIISTING FAILURE IN ABSENCE OF VALVE LOCKING, RECAUSE COOLING DUTY	14.3		 	
POGRAM  66.4.01.04.2 RANULL VALVES, CCV-412, 415, CLOSED  FOOTENTIAL LOSS OF CRARCING PUMP DUCTION BALL WATER EXTURE LIBE STORE TO TREAT CLASS OF CRARCING PUMP DUCTION BALL WATER EXTURE LIBE STORE TO TREAT CLASS OF CRARCING PUMP DUCTION BALL WATER EXTURE LIBE STORE THE WATER COLORS, SAMPLE COLORS, STOL. 1.0.1.)  66.4.01.01. RANULL VALVES, CCV 425-427, OPEN  105.410. 412, 1005  105.410. 412, 1005  105.410. 412, 1005  105.410. 412, 1005  105.410. 412, 1005  105.410. 412, 1005  105.410. 412, 412, 412, 412, 412, 412, 412, 412,	 06.4.01.06.	I MANUAL VALVES,	CCW-412, 415,	OPEN	*POTENTIAL REDUCTION IN CCM PLOW TO	POST-ACCIDENT CHARGING PUMP BEAT LOADS	 14	(SAMB AS 6.4.].3.1)	 	
CORRON FLOW PATE 416  SUBCOOLING PRIOR TO REMOTE HANGLE NOT AUTOMATICALLY ISOLATED ON BIS/SISLOP  150.4710 NO PERSON BADDETION OF SEAL MATER RETURN LINE  06.4.01.07.1 MANUAL VALVES, CCC 425-427, OPEN  416-410.412, 10.015  10.015  10.015  10.015  10.015  10.015  10.015  10.015  10.015  10.015  10.016						PROGRAM	:		 ·····	
CORROW PLOW FATH 428-434, CAPTROCOLERS, SARPLE COOLERS, SETC). FLOW  435-440, 442, INDICATION NOT PROVIDED AND VALVES NOT.  455, 457  101 LOCATION FOR PROVIDED AND VALVES NOT.  102-440, 455, 457  103-440, 455, 457  103-440, 455, 457  104-450, 451, 452, 452, 452, 452, 452, 452, 452, 452		COMMON PLON PATE	416		SUBCOOLING PRIOR TO REMOTE-MANUAL	NOT AUTOMATICALLY ISOLATED ON SIS/SISLOP			 	
### STORAULIC BALANCE REQUIRED WITH VALVES    STORAULIC BALANCE REQUIRED WITH VALVES   PULL OPEN	 06.4.01.01.1	CONHON PLOW FATH	429-434, 436-440, 442,	OPRM	LOADS	APTRECOOLERS, SAMPLE COOLERS, ETC). FLOW INDICATION NOT PROVIDED AND VALVES NOT		(SAME AS 6.4.1.3.1)	 	
CONHOW PLOW PATH 019, 619, 453, OTHER ECCS LOADS COOLING. VALVES NOT IN LOCKING PROGRAM  176, 477  06.4.01.09.1 HANUAL VALVES, CCH-086, 090, OPRN *POTENTIAL REDUCTION OF CCY FLOW TO *RCP-B HOTOR AND TREBHAL BARBIER 14 (SAHR AS 6.4.1.3.1)  COHROW PLOW PATH 036, 098, 457, OTHER ECCS LOADS COOLING. VALVES NOT IN LOCKING PROGRAM  186, 487  06.4.01.10.1 HANUAL VALVES, CCH-086, 010, OPRN *POTENTIAL REDUCTION OF CCY FLOW TO *RCP-C HOTOR AND TREBHAL BARBIER 14 (SAHR AS 6.4.1.3.1)  COHROW PLOW PATH 016, 018, 455, OTHER ECCS LOADS COOLING. VALVES NOT IN LOCKING PROGRAM  481, 482  06.4.01.12.1 HANUAL VALVES, CCH-450, 469, OPRN *POTENTIAL REDUCTION IN CCW FLOW TO BCCS *RECESS LETDOWN HI, NOT MORNALLY IN 14 (SAHR AS 6.4.1.3.1)  COHROW FLOW PATH 470 LOADS SERVICE. CCH-469 PREBRIT TO THROTTLE  100.4.01.13.1 HANUAL VALVES, CCM 041-046, OPRN *POTENTIAL REDUCTION IN CCW FLOW TO BCCS *RER HIS AND RHE FURP COOLING. RER BIT 14 (SAHR AS 6.4.1.3.1)  COHROW FLOW PATH 070, 073, 443, LOADS CCW FLOW TO BCCS *RER HIS AND RHE FURP COOLING. RER BIT 14 (SAHR AS 6.4.1.3.1)			495, 491			HYDRAULIC BALANCE REQUIRED WITH VALVES			 	
06.4.01.09.1 HANUAL VALVES, CCW-086, 090, OPEN POTENTIAL REDUCTION OF CCW FLOW TO RCP-B HOTOR AND THERMAL BARRIER 14 (SAHE AS 6.4.1.3.1)  COMHON PLOW PATH 096, 098, 457, OTBER ECCS LOADS COOLING. VALVES NOT IN LOCKING PROGRAM  485.487  06.4.01.10.1 HANUAL VALVES, CCW-006, 010, OPEN POTENTIAL REDUCTION OF CCW FLOW TO RCP-C MOTOR AND THERMAL BARRIER 14 (SAHE AS 6.4.1.3.1)  COMMON FLOW PATR 016, 018, 455, OTBER ECCS LOADS COOLING. VALVES NOT IN LOCKING PROGRAM  481, 482  06.4.01.12.1 HANUAL VALVES, CCW-450, 469, OPEN POTENTIAL REDUCTION IN CCW FLOW TO RCCS RECESS LETDOWN HI, NOT NORMALLY IN 14 (SAHE AS 6.4.1.3.1)  COMMON FLOW PATR 470 LOADS SERVICE. CCW-469 PREBET TO THROTTLE  FLOW. YALVES HOT IN LOCKING PROGRAM  06.4.01.13.1 HANUAL VALVES, CCW 041-046, OPEN POTENTIAL REDUCTION IN CCW FLOW TO RCCS RENE HER AND REE PURP COOLING. RER BY 14 (SAHE AS 6.4.1.3.1)  COMMON FLOW PATH 070, 073, 443, LOADS CCW FLOW CONTROLLED BY TCV-601A/B.	06.4.01.08.1	COMMON PLOW PATH	017, 019, 453,	OPEM			14	(SAME AS 6.4.1.3.1)		
06.4.01.10.1 HANUAL VALVES, CCW-086, 010, OPEN *POTENTIAL REDUCTION OF CCW FLOW TO *RCP-C MOTOR AND THERMAL BARRIER 14 (SAME AS 6.4.1.3.1)  COMMON PLOW PATR 016, 018, 455, OTBER ECCS LOADS COOLING. VALVES NOT IN LOCKING PROGRAM  481, 482  06.4.01.12.1 HANUAL VALVES, CCW-450, 469, OPEN *POTENTIAL REDUCTION IN CCW FLOW TO ECCS *RECESS LETDOWN HI, NOT MORHALLT IN 14 (SAME AS 6.4.1.3.1)  COMMON FLOW PATR 470 LOADS SERVICE. CCW-469 PRESET TO TRROTTLE  FLOW. YALVES HOT IN LOCKING PROGRAM  06.4.01.13.1 HANUAL VALVES, CCW 041-046, OPEN *POTENTIAL REDUCTION IN CCW FLOW TO ECCS *REHE HIZ AND REW PUMP COOLING. REW BY 14 (SAME AS 6.4.1.3.1)  COMMON FLOW PATR 070, 073, 443, LOADS CCW FLOW TO ECCS *REHE HIZ AND REW PUMP COOLING. REW BY 14 (SAME AS 6.4.1.3.1)	06.4.01.09.1	CORNON PLON PATH	CCM-086, 090, 096, 098, 457,	OPEN			14	(SAME AS 6.4.1.J.1)		
OS.4.01.12.1 HANUAL VALVES, CCM-450, 469, OPEN POTENTIAL REDUCTION IN CCM PLOW TO ECCS PERCESS LETDONN HI, NOT MORHALLY IN 14 (SAHE AS 6.4.1.3.1)  COMMON PLOW PATH 470 LOADS SERVICE. CCM-469 PRESET TO THROTTLE  PLOW. VALVES NOT IN LOCATED PROGRAM  06.4.01.13.1 HANUAL VALVES, CCM 041-046, OPEN POTENTIAL REDUCTION IN CCM PLOW TO ECCS PRES HE HE AND RHE PUMP COOLING. RER HE 14 (SAHE AS 6.4.1.3.1)  COMMON PLOW PATH 070, 073, 443, LOADS CCM FLOW CONTROLLED BY TCM-501A/B.	06.4.01.10.1	HANNAL VALVBS, COMMON PLOW PATR	CCW-006, 010, 016, 018, 455,	OPBN			14	(SAME AS 6.4.1.3.1)		
06.4.01.13.1 HANDAL VALVES, CCW 041-046, OPEN POTENTIAL REDUCTION IN CCW PLOW TO ECCS PRIR HE AND RHE PUMP COOLING. RHE HE 14 (SAME AS 6.4.1.3.1)  COMMON PLOW PATH 070, 073, 443, LOADS CCW FLOW CONTROLLED BY TCV-601A/B.	06.4.01.12.1	MANUAL VALVES,	CCW-450, 469,	OPEN	LOADS	SERVICE. CCV-469 PRESET TO TEROTTLE	14	(SAMB AS 6.4.1.3.1)		
	 06.4.01.13.1	COMMON PLOW PATH	070, 013, 443,	OPEN	*POTENTIAL REDUCTION IN CCW PLOW TO BCCS	FRHR HIS AND RHE PUMP COOLING. RHE HI CCW FLOW CONTROLLED BY TCV-601A/B.		•		

	LDCOMPONENT ID	. FAILURE MODE.	BEFFECT ON BCCS	- PREARIS	REPORT	ACTION ITEM	
.4.01.14.1 MANUAL VALVE COMMON PLOW	PATH 058.	•	LOADA	REBACTOR SHIBLD COOLING COILS. PLOW INDICATION NOT PROVIDED AND VALVES NOT	14	(SAHR AS 6.4.1.3.1)	
· ·	447,463	•		IN LOCKING PROGRAM, THEREFORE STRTEM HYDRAULIC BALANCE REQUIRED WITH VALVES PULLT OPEN			
4.01.15.1.CHBCE_YALVBS	CCN-001, 011,	NONE (PASSIVE)		*RCP-A THREMAL BARRIER COOLING/BHERGENCT	_14.4_	DETERMINE FUNCTIONAL REQUIREMENTS AND APPROPE	
CORNON PLON	PATH 025, 035			THERMAL BARRIER PATH. CCN-001 AND 025 NOT IN 1ST PROGRAM		SURVEILLANCES FOR CCW CHECK VALVES, AND IMPLEMENTATIONS AS MESDED	MBNT
				PCP-A THERMAL BARRIER COOLING/RHERGENCY	.11.5	BRVISE 1ST PROGRAM TO INCLUDE CCM CARCE VALVE	S AS STATION TRCE
CORROR PLUE	PATE 025, 035			THREMAL BARRIER PATH. CCU-001 AND 025 NOT IN IST PROGRAM		MBEDBD	
	PATH 082, 092	"HORE"(6V88]AB) "		*BCP-B TBBBMAL BARBIER COOLING/BMBRGBMCT THBBMAL BARBIER PATH. CCV-024 AND 002	_ <b>11</b>	(SANR AS 6.4.).15.1)	
A DI 12 3 CHRCE VALVES	CCM-002 A12	NUMB (DISSIAB)		NOT IN IST PROGRAM	14	(SANE AS 6.4.1.15.1)	
	PATH 026, 032	mont (tindfid)		THERMAL BARRIER PATH. CCV-002 AND 026 NOT IN 18T PROGRAM	I I		
CORNON BOUND 1.05.01.1 MANUAL VALVI		QPBM	PUMPING DUE TO UNISOLABLE LOSS OF LINESTORY TRACES OF LINESCABLE LOSS			(SARR_AS 6,1.2.1.1)	······ = ·
			LOCERD CLOSED OF PROVIDED WITH SAPETY RELATED BACEUPS				
4.03.01.1 TCV-6014	VALVE/ACTUATOR	OPBN	PLON TO BCCS LOADS REDUCED TO HININGS	PINCLUDES PCV-1601A. ONE OF TCV-601A/B		IMPLEMENT DCP 1-3553	MECHANICAL
			SPENT FUEL PIT CON PLON BATE	LIMITED BY STEM TRAVEL COLLAR. CONFIGURATION NOT ACCEPTABLE AFTER CYCLE	l		
				II REPUBLING, DUB TO INCREASED SPENT PUBL PIT WEAT LOAD			· - · - · · · · · · · · · · · · · · · ·
4.03.02.2 TCV-601A	TC-6014 LOOP	(ATTAE OBER)	(SAMB AS 6.4.3.1.1)	TONE OF TCY-601A/B ISOLATED BY BLOCK VALVE, OTHER FLOW LIBITED BY STEM TRAVEL		(SANE AS 6.4.3.1.1)	
				COLLAR. COMPIGURATION NOT ACCEPTABLE			
				AFTER CYCLE II REPUBLING DUE TO INCREASED SPENT PUBL PIT HEAT LOAD			
4.03.02.3 TCV-601A	TC-6014 LOOP	BQ		FORE OF TOW-SOIA/B ESOLATED BY BLOCK VALVE, OTHER PLOW LINITED BY STEM TRAVEL		(BANE AS 6.4.3.1.1)	
<del>.</del>			SPRNT PURL PIT HBAT LOAD	COLLAR. CONFIGURATION NOT ACCEPTABLE AFTER CICLE 11 REPUBLING DUE TO			
		•		INCREASED SPENT FUEL PIT HEAT LOAD			
1.03.03.1 TCV-6014	ISA	burgsinum fom	FLOW TO BCCS LOADS REDUCED TO HINIHUM ACCEPTABLE WITH ONE CCW PUMP AND REDUCED	•	_ 14	(SANE AS 6.4.3.1.1)	
			SPRUT FUEL PIT BEAT LOAD	OTHER PLOW LIMITED BY STEM TRAVEL COLLAR. COMPIGURATION NOT ACCEPTABLE			
				APTER CYCLE 11 REPUBLING DUE TO	<del></del>		
4.04.01.1 1CV-601B	VALVE/ACTUATOR	OPEN	FLOW TO BCCS LOADS REDUCED TO MINIMUM	INCREASED SPENT FUEL PIT EBAT LOAD INCLUDES PCY-1601B. ONE OP TCY-601A/B	_11	(SAME AS 6.4.3.1.1)	
			ACCEPTABLE WITH ONE CCW PUMP AND REDUCED SPENT PUBL PIT CCW PLOW RATE	ISOLATED BY BLOCK VALVE, OTHER PLOW LIMITED BY STEM TRAVEL COLLER.			
			TIONI FURD IN COM FLOW BAIR	CONFIGURATION NOT ACCEPTABLE AFTER CTCLE	1		
				IN REFUELING, DUR TO INCREASED SPENT FUEL PIT HEAT LOAD			

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#### EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONORDE UNIT 1 ACTION ITEMS FOR SIGNIFICANT PINDINGS

	COMPONENT ID	FAILURE HOUR	RFFRCT OM RCCS	EGMARES	REPORT	ACTION ITEM . RESP DISCIPLINE	
06 4 A4 09 4 POV CA18	***************************************						<u> </u>
06.4.04.02.2 TCV-601B	TC-601B LOOP	(ATTAR OBER) ONLEAT TOR	(SAMB AS 6.4.4.1.1)	FORE OF TCV-601A/B ISOLATED BY BLOCE VALVE, OTHER FLOW LIMITED BY STEM TRAVEL COLLAR. CONFIGURATION NOT ACCEPTABLE	14	(SAME AS 6.4.3.1.1)	
		The second section of the second section secti	- 1004100 FF 400 - 100	APTER CYCLE II REPUBLING DUE TO INCREASED SPENT FUEL PIT BEAT LOAD			
06.4.84.92.1 TCY-6918	TC-601B LOOP	19	PLON TO RCCS LOADS REDUCED TO MINIMUM.		.14	(SAMR AS 6.4.2.1.1)	-
			SPENT PUEL PLT BEAT LOAD	COLLAR. CONFIGURATION NOT ACCEPTABLE APTER CYCLE 11 REPUBLING DVE TO			
06.4.04.03.1 TCV-601B	ISA	PRESSURE LOW	PLOW TO RCCS LOADS REDUCED TO MINIMUM	INCREASED SPENT FUEL PIT MEAT LOAD *INCLUDES VALVE ISA-1243. ONE OF		(SAME AS 6.4.3.1.1)	
			ACCEPTABLE WITH ONE COV PUMP AND REDUCED SPENT PUBL PIT HEAT LOAD	OTHER PLOW LIMITED BY STEM TRAVEL  COLLAR. COMPIGURATION NOT ACCEPTABLE			
		·		APTER CYCLE 11 REPUBLING DUE TO INCREASED SPENT FUEL PIT BEAT LOAD	<del></del>		
06.4.05.01.1 TCV-601A TCV-601B	VITAL BUS 44 (V1021-8)	VOLTS LON	PLOW TO BCCS LOADS BEDUCED TO MINIMUM ACCEPTABLE WITH ONE CCW PUMP AND REDUCES	FONE OF TOV-SOIA/B ISOLATED BY BLOCK VALVE, OTHER PLOY LINITED BY STEN TRAVEL		(SAME AS 6.4.3.1.1)	
			SPENT PUBL PIT BEAT LOAD	COLLAR. CONFIGURATION NOT ACCEPTABLE APTER CYCLE 11 REPUBLING DUE TO			
06.4.05.01.1 PC-605 LOOP	PC-605	CONTACTS OPEN (LO BDE PRESS)	POTENTIAL LOSS OF TRAIN A AND B BLECTRICAL POWER DUR TO OUT OF SEQUENCE	INCREASED SPENT PURL PIT HEAT LOAD NORMAL RESPONSE POLLOWING BUS UNDERVOLTAGE TRIPS POR SISLOP EVENT	11	(SAME AS 6.1.3.6.2)	1
06.4.06.01.3 PC-605 LOOP	PC-605	BQ	BUS LOADING DUBING SISLOP, NONE FOR SIS *POTENTIAL LOSS OF TRAIN A AND B	RQ FAILURE (INCLUDING OPEN, SHORT OR	if	(SAMB AS 6.1.3.6.2)	
	ann andre also syspekkesk substitutes yet		BUS LOADING DURING SISLOP, NONE FOR SIS				<u> </u>
06.4.06.02.4 PC-605 LOOP	PC-605E (RELAT)	OUTPUT SHORT OR GROUND	POTENTIAL LOSS OF TRAIN A AND B	SISLOP EVENT SCOMMON-MODE LOSS OF BOTE ELECTRICAL TRAINS COULD OCCUR WITH PRE-BHISTING	17	(SAMB AS 6.1.3.6.2)	
			BUS LOADING DURING SISLOP, NONE FOR SIS				
06.4.06.02.4 PC-605 LOOP	PC-605I (RBLAY)	OUTPUT SHORT OR GROUND	POTRNTIAL LOSS OF TRAIN A AND B	STATEM GROUNDED  COMMON-MODE LOSS OF BOTH BURCTRICAL	31	(SAHB A8 6.1.3.3.5)	
			BUS TOYDING DABING SISTON WORR LOS BIS	TRAINS COULD OCCUR WITH PRE-BIISTING GROUND ON MEGATIVE POLE OF DC STSTEM. TROE SPEC ACTION ENTRY REQUIRED WITH DC			ऻ
06.4.06.03.1 PC-605 LGOP	VITAL BUS \$4	VOLTS LOW	*POTENTIAL LOSS OF TRAIN A AND B	STSTEM GROUNDED	17	(SAMB AS 6.1.3.6.2)	L
	(8-1415V)	•••	BLECTRICAL POWER DUB TO OUT OF SEQUENCE BUS LOADING DURING SISLOP, NOME POR SIS				
06.4.07.03.1 CV-722A CV-722B	184	PRESSURE LOW	NONE	VALVES NORMALLY OPEN. THIS PAILURE WOULD PREVENT REMOTE-MANUALLY CLOSING	14.7	VEBIFY BY BIISTING OR NEW CALCULATION THAT RCS. MECHANICAL PLOW INTO FAILED THERMAL BARRIER COIL IS LESS THAN	
CV-122C				FOR THERMAL BARRIER COIL FAILURE. VERIFICATION REQUIRED THAT FLOW RATE INTO CCW SYSTEM FOR THIS EVENT IS LESS		300 GPM LOCA TBESSHHOLD	
				THAN LOCA THERSHBOLD			

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ITEM # DRVICE ID COMPONENT ID FAILUR	B MODE BFFRCT UN BCCS	DEMIRES	EEFGET		EESP BISCIFLING
06.4.08.01.2 G-984 FUNP/HOTOB BQ	125VDC CONTROL POWER FOR LOCA, MSLB GR	FOR IN-CONTAINMENT ENVIRONMENT, CIRCUIT		EVALUATE ISOLATION APEQUACY FOR UNQUALIFIED LOADS ON IZEVED BUS AS PART OF INTEGRATED RESOLUTION OF SEP. TOPIC VI-1.C.2	
O6.4.08.01.2 G:964PUMP/HOTOR EQ		CALCULATION  PUMP/MOTOR AND CABLING NOT QUALIFIED  FOR IN-CONTAINMENT REVIEWENT, CIRCUIT  NOT ISOLATED ON SIS/SISLOP, REFECT NOT	_19.2	- BRVISE BATTERY LOADING CALCULATION-TO ACCOUNT FOR HIGH INFEDANCE FAULTS OF UNQUALIFIED EQUIPMENT AS NEEDED	BLECTRICAL
		CALCULATION		· · · · · · · · · · · · · · · · · · ·	
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ERERGENCY CORE COCLIES THATM SINCLE FAILURE ANALYSIS

SAN ONOFEE UNIT 1

ACTION ITEMS FOR SIGNIFICANT FINDINGS

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_ liem # Device 1.	D COMPONENT ID	FAILULE MODE	. SFFECT ON ACCS	EXMAGES	REPORT LTRM		ACTION ITEM	ERSP DISCIPLIN
07.1.03.05.2 G-12A	63 (52-1214 LOW DISCH PRESS RELAT)	CONTACTS CLOSED (ON)	POTENTIAL INOPERABILITY OF TRAIN A BLECTRICAL POWER DUE TO OUT OF SEQUENCE BUS LOADING FOR SISLOP, NOWE FOR SIS	SWC PUMPS MUST BE MAINTAINED OUT OF AUTO, OR BUS WOLTAGE CALCULATIONS REVISED TO INCLUDE SWC PUMP START	11	REVISE SISLOP LO	ADING CALCULATION TO ACCOUNT FOR	ELECTRICAL
07.1.03.06.2 G-13A	86 (52-1214 OVLD		(SAME AS 7.1.3.5.2)	CONCURRENT WITH DG BRER CLOSURE *(SAME AS 7.1.3.5.2)	17	[SAME AS 1.1.3.5	.2)	
07.1.03.05.1 G-134	86 (52-1114 OVLD RBLAT)		SPOTENTIAL LOSS OF SWC PUNCTION FOR SISLOP DUR TO LOSS OF TRAIN A SWC PUNP (SIS/SISLOP) AND POTENTIAL CONCURRENT LOSS OF TRAIN B ELECTRICAL POWER DUR TO OUT OF SEQUENCE BUS LOADING (SISLOP	PARC PURPS HUST BE MAINTAINED OUT OF AUTO OR BUS VOLTAGE CALCULATIONS REVISED TO CONCURRENT WITH DG BREE CLOSURE	ı	(SAHR 48 7.1.3.5	.2)	
07.1.03.11.1 G-13A	SERVICE WATER	PRESSURE LOW	ONLY)  POTENTIAL INOPERABILITY OF SVC FOR LONG-TERM POST-SIS/SISLOP OPERATION	*COMMON-CAUSE PAILURE MAY OCCUE DUE TO POSTULATED CONCURRENT SRIENIC RVENT. BACKUP BRARING COOLING STEPS REQUIRED IN BOIL. ALSO, PAILURE REDUCES PUMP OUTPUT UNTIL BOUNDARY VALVES LOCALLY CLOSED, SO TRAT PUMP IST REQUIRED WITH BACKPLOW.		801-7-12, 801-7-	N REQUIRED. ETISTING PROCEDURES 19 AND 301-2.4-1 (A01) HAVE BEEN 838 JULE FINDING CONSISTENT WITH 1.1	
07.2.03.05.2 G-13B	63 (52-1114 LOW DISCH PRESS BRLAT)		POTENTIAL INOPERABILITY OF TRAIN B BLECTRICAL POWER DUB TO OUT OF SEQUENCE BUS LOADING FOR SISLOP, NONE FOR SIS	CONDITIONS  SENC PUMPS MUST BE MAINTAINED OUT OF AUTO, OR BUS VOLTAGE CALCULATIONS REVISED TO INCLUDE SMC PUMP START	11	(SAMB AS 7.1.3.5	.2)	
11.2.03.06.2 G-130	#\$ 152-1114 QYLD	CONTACTS CLOSED	(SAME 48.7.2.3,5.2)	CONCURRENT WITH DG BREE CLOSURE	11	. (8ABE AR. 1.1.1.2.5	21	
7.2.03.09.1 G-138	86 (52-1214 OVLD <u>RBLAT)</u>		SISTON DUB TO LOSS OF SMC PUNCTION FOR SISTON DUB TO LOSS OF TRAIN B SMC PUMP (SIS/SISLOP) AND POTENTIAL CONCURRENT LOSS OF TRAIN A SLECTBICAL POWER DUB TO OUT OF REPOYENCE BUR LOADING (SISLOP)	AUTO OR BUS VOLTAGE CALCULATIONS REVISED TO CONSIDER SWC PUMP START CONCURRENT		(SAHR AS 7.1.3.5	.2)	
7.2.03.11.1 G-138	SERVICE WATER	PRESSURE LOW	ONLT) *POTENTIAL INOPERABILITY OF SMC FOR LONG-TERM POST-SIS/SISLOP OPERATION	*COMMON-CAUSE FAILURE MAY OCCUR DUE TO POSTULATED CONCURRENT SEISMIC SVENT. BACEUP BEARING COOLING STRPS REQUIRED IN BOLS. ALSO, FAILURE REDUCES PUMP OUTPUT UNTIL BOUNDARY VALVES LOCALLY CLOSED, SO THAT PUMP IST REQUIRED WITE BACEFLOW		(SAME AS AS 7.1.	2.11.1)	
7.4.03.01.2.809-9	VALVB/ACTUATOR	CroãBĎ	PLOSE OF SUCTION HEAD TO BOTH TRAINS OF SMC PUMPS, POTENTIALLY CAUSING LOSS OF BOTH PUMPS FOR SIS RYBNTS (NO CIRC WATER PUMP TRIP) OR 19 PRIOR TO SISLOP	SUPPICIENTLY ABOVE SWC PUMP SUCTION TO PERVENT LOSS OF SWC PP MPSS. AUI SWC PUMP IS MON-SAPETT RELATED AND POWERED PROM SWCR \$3, WEICE IS ISOLATED ON	16.1	PROVIDE ADMINIST	ATIVE POWER LOCKOUT TO MOV-9, 11	OPERATIONS
7.4.05.01.2 MOV-]1	VALVB/ACTUATOB	CLOSED	*LOSS OF SUCTION HEAD TO BOTH TRAINS OF SWC PUMPS, POTENTIALLY CAUSING LOSS OF BOTH PUMPS FOR SIS EVENTS (NO CIRC WATER PUMP TRIP) OR IP PRIOR TO SISLOP	SUFFICIENTLY ABOVE SWC PUMP SUCTION TO	.16	(SAMB AS 7.4.3.1.	2]	

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## EMERGENCY CORR COOLING SYSTEM SINGLE FAILURE AFALTSIS SAN OMOFRE UNIT I ACTION ITEMS FOR SIGNIFICANT FINDINGS

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. _	ISEM 1	DRAICE ID CORPONENT ID	FAILURE HODE	BPFBCT ON BCCS	BRHARRS	REPORT . 1784		BESP DISCIPLINE		
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		-10 -11		SMC PUMPS, POTBUTIALLY CAUSING LOSS OF BOTH PUMPS FOR RIS BYRNTS (NO CIRC NATER	WATER PURP SUCTION NOT LOCATED		REQUALIFY MOV-9 AND 11 ACTUATORS AND GATES TO SBISHIC CATEGORY A	CIVIL		
	ROA	-12		PUEP TRIP) OR IF PRIOR TO SISLOP	PREVENT LOSS OF SMC PUMP MPSE			· · · · · · · · · · · · · · · · · · ·		1
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### EKERGENCY CORB COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN GNOPRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT PINDINGS

CONTACTS OPEN	TRAIN A SECONDARY RECIRC PUMPING  DISIBLED, LOSS OF SECONDARY RECIRC FLOW PATS  REDUCED RELIABILITY OF TRAIN A FOR SIS/SISLOP, TRAIN A SECONDARY RECIRC	ADJACENT CONTACTS FROM SAME PZE PRESSURE RELATS. 1004 BREE RATING TOO HIGH TO PROTECT RELATS CV-142/143/144 ACTUATED CLOSED ST 1	12.1	SEATER SECONDARY SECURC BOT to CORTEON SEON CA-145/147/144 POCUPLE IN CREATER SECONDARY SECURCES SEAT SEON CONTROL SEON SECURE SECURE SECURE SECURE SECURE SECURE SECURE SECURE SECURE SECURE SECURE SECURE SECURE SECURE SEC	CONTROLS
CONTACTS OPEN	PATS	PROTECT RELATS  CV-142/143/144 ACTUATED CLOSED ST  REDUNDANT SOLEMOID VALVES (OWE PRE SEQ/TEAIN PER CV). CLE AND BLE UNAPPECTED ST TRIS PALLURE SINCE FCY-1112 (SW-1112) BAS AN OVERFIDE SWITCE/RELAT TO PREMIT RODULATION/CLOSURE EVEN WITH SIS/SISLOP STILL PRESENT.	12.1	SEATER SECONDARY SECURC BOT to CORTEON SEON CA-145/147/144 POCUPLE IN CREATER SECONDARY SECURCES SEAT SEON CONTROL SEON SECURE SECURE SECURE SECURE SECURE SECURE SECURE SECURE SECURE SECURE SECURE SECURE SECURE SECURE SEC	OPERATIONS
CONTACTS OPEN	REDUCED RELIABILITY OF TEAIN A FOR SIS/SISLOP, TEAIN A SECONDARY RECIRC	SWITCE/RELAT TO PERMIT MODULATION/CLOSURE BYEN WITH SIS/SISLOP STILL PRESENT			
IGRML/RESET	REDUCED RELIABILITY OF TRAIN A FOR SIS/SISLOP, TRAIN A SECONDARY RECIEC				
	PUMPING DISABLED, LOSS OF SECONDARY				
INPUT SHORT	RECIRC PLON PATE			(SAMB AS 0.1.9.2.2)	
SÉ CONTACTS OPEI		RELATS. 100A BREE RATING TOO NICH TO PROTECT RELATS CY-142/142/144 ACTUATED CLOSED BY 1 REDUNDANT SOLENOID VALVES (ONE PER SEQ/TRAIN PER CY). CLE AND SLE	12	(SAHB AS 8.1.11.2.1)	
		PCV-1112 (8V-1112) HAS AN OVERRIDE SWITCE/RELAT TO PERMIT NODULATION/CLOSURE EVEN WITH SIS/BISLOP			
		ROTARY SWITCE ON BLES SURVEILLANCE PANEL 1		· ·	· <u> </u>
10	CONTACTS OPEN	CONTACTS OPEN STRAIM B SECONDART RECIEC PUMPING  DISABLED, LOSS OF SECONDART RECIEC FLOW  PATE  CONTACTS OPEN SERDUCED RELIABILITY OF TRAIN B FOR RML/RESET SIS/RISLOP, TRAIN B SECONDART RECIEC  PUMPING DISABLED, LOSS OF SECONDART	ADJACENT CONTACTS PROM SAME PZE PRESSURE  CONTACTS OPPN STRAIM & SECONDARY RECISC PUMPING CY-142/143/144 ACTUATED CLOSED BY  DISSUED, LOSS OF SECONDARY RECIRC FLOW REDUNDANT SOLENOID VALVES (ONE PER SEQUENT OF PATE SECONDARY RECIRC FLOW REDUNDANT SOLENOID VALVES (ONE PER SEQUENT OF PATE SECONDARY RECIRC FLOW REDUNDANT SOLENOID VALVES (ONE PER SEQUENT OF PATE SECONDARY RECIRC FLOW PROCESSES AND OVERFIDE SWITCS/BELLET OF PERMIT SOLENOIC SWITCS/BELLET OF PERMIT SOLENOIC FLOW STILL PRESENT STILL PRESENT ROTALL PRESENT SIS/SISLOP, TRAIN & SECONDARY RECIRC PANEL SIS/SISLOP, TRAIN & SECONDARY RECIRC PUMPING DISABLED, LOSS OF SECONDARY	ADJACENT CONTACTS PROM SAME PZE PRESSURE  RELATS. 100A BREE RATING TOO BIGH TO PROTECT RELATS  CONTACTS OPPN STRIM & SECONDARY RECIRC PUMPING CY-142/143/144 ACTUATED CLOSED BY 12  SET) DISSBLED, LOSS OF SECONDARY RECIRC FLOW REDUNDANT SOLENOID VALVES (ONE PER SEG/FRAIN PER CY). CLE AND BLE UNAPPECTED BY THIS FAILURE SLUCE PCV-1112 (SV-1112) HAS AN OVERBIDE SWITCE/ERLAT TO PERHIT BODULATION/CLOSURE RYEN WITH SIS/BISLOP. STILL PRESENT CONTACTS OPEN SEBUCED RELIABILITY OF TRAIN 8 FOR ROTHER SWITCE ON SLSS SURVEILLANCE PANEL 12  REAL/RESET SIS/SISLOP, TRAIN & SECONDARY RECIRC.  PUMPING DISABLED, LOSS OF SECONDARY	ADJACRNI CONTACTS PROM SARR PZR PRESSURE  RELATS. 100A BRER RATING TOO BIGH TO PROTECT BRLATS  CONTACTS OPPN TRAIN B SECONDARY RECIEC PUNPING CY-142/142/144 ACTUATED CLOSED BY 12 (SARE AS 8.1.11.2.1)  SET) DISABLED, LOSS OF SECONDARY RECIEC FLOW REDUNDANT SOLENOID VALUES (ONE PER SEQUENTAL PER CY). CLR AND SLR UNAPPECTED BY TRIB FAILURE SINCE  PCV-1112 (SV-1112) BAS AN OVERRIDE SWITCH/RELAT TO PREMIT HODULATION/CLOSURE RYEN WITH SIS/BISLOP. STILL PRESENT CONTACTS OPEN TREDUCED RELIABILITY OF TRAIN B FOR BOTARY SWITCS ON SLSS SURVEILLANCE PANEL 12 (SARE AS 8.1.11.2.1)  REAL/RESET SIS/SISLOP, TRAIN B SECONDARY RECIEC.

# EMPLISHED CLEE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

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	1768 1	DEVICE ID	COMPONENT ID	FAILURE HOFE	RPPRCT ON BCCS	RBMARRS	REPORT 1TRM		
	09.1.08.01.2	CSAS TRAIN A (SBQ 1 TBST)	APIA (BBLAY)	UNTRIPPED (OFF)	REDUCED EBLIABILITY OF TRAIN A CSAS PURP ACTUATION	*NORMAL POSITION. RELAT FAILURE NOT DRIECTABLE FROM CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAT APIR	26	VBRIPT SEQ/CSAS SURVEILLANCE PROCEDURES DRIECT CONTROLS INDIVIDUAL RELAT (CONTACT) FAILURES	
	09.1.08.01.3	CSAS TRAIN A (SEQ 1 TEST)	APRA (RELAT)	INPUT OPEN	(S.1.0.1.0 8A BMAS)	BELAT FAILURE NOT DETECTABLE FROM CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAT APER	26	(SABR AS 9.1.8.1.2)	
		CSAS TRAIN A (SEQ 1 TEST)	AVIA (RBLAT)	UNTRIPPED (OFF)	TRAIN A CSAS VALVE ACTUATION INOPERABLE	SHORMAL POSITION. RELAY PAILURE NOT DRYECTABLE FROM CSAS CARINET INDICATION PROVIDED BY PARALLEL RELAY AVIB	26	{SAHB AS 9.1.8.1.2}	
	08.1.08.03.3	CSAS TRAIN A (SEQ 1 TEST)	AVIA (BELAY)	INPUT OPEN	[SANR AS 9.1.8.3.2]	*PAILURB NOT DETECTABLE PROM CSAS CABINET INDICATION PROVIDED BY PARALLEL	26	(SAHR AS 9.1.8.1.2)	
	09.1.08.05.2	CSAS TRAIN A (SEQ 1 TEST)	APYA (BELAY)	UNTRIPPED (OFF)	(SAME AS 9.1.8.1.2)	RRLAT AVIB *MORMAL POSITION. BRLAT PAILURE NOT DRIECTABLE FROM CSAS CABINET INDICATION PROVIDED BY PARALLEL BRLAY APYB	26	(SAMB AS 9.1.8.1.2)	-
	09.1.08.05.3	CSAS TRAIN A (SEQ 1 TEST)	APTA (RELAY)	INPUT OPEN	(SAMB AS 9.1.8.1.2)	PRELAT FAILURE NOT DETECTABLE PROM CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAT APPR		(SAHR AS 9.1.8.1.2)	
	09.1.08.07.2	CSAS TRAIN A (SBQ 1 TRST)	AVYA (RBLAY)	UNTRIPPED (OFF)	(SANE AS 9.1.0.3.2)	*NORMAL POSITION. RELAY PAILURE NOT DRYSCYABLE FROM CSAS CABINET INDICATION PROPYIDED BY PARALLEL RELAY AVYR	26	(SAME AS 9.1.8.1.2)	
	09.1.08.07.3	CSAS TRAIN A (SEQ 1 TEST)	AVTA (BELAT)	INPUT OPEN	(SANE AS 9.1.8.3.2)	*RELAT PAILURE NOT DETECTABLE PROK CSAS CABINET INDICATION PROVIDED BY PARALLEL	26	(SAME AS 9.1.8.1.2)	
	09.1.09.01.4	CSAS TRAIN A (UV TEST)	APDR (TUR RELAY)	IMPUT SHORT	PTRAIN A CSAS INOPERABLE, POTENTIAL INPACT TO REDUNDANT VITAL BUSSES \$1 AND	BREAKERS COORDINATED WITH VITAL BUS	19.3	SUBMIT LICENSE AMENDMENT REQUEST TO DEFER LICENSING HODIFICATIONS ADDRESSING SPURIOUS AUTO-TRANSFER OF WITAL BUSSES UNTIL INTEGRATED RESOLUTION OF SEP	
		CSAB TRAIN A (UV TBST)	AVDR (TDR RELAY)	INPUT SHORT	TRAIN A CSAS LUOPBRABLE, POTRUTIAL LUPACT TO REDUNDANT VITAL BUSSES 81 AND 81A	CAUSE AUTO-TRANSPER OF BOTH VITAL BUSSES PRIOR TO TRIP OF APSA/APSS LOAD BREAKERS BREAKERS COORDINATED WITS VITAL BUS PREDRES, HOWEVER FAILURE (SEORT OF BOTH +15VDC AND -15VDC ON APSA AND APSS) HAT	_19	TOPIC VI-7.C.2 (SAMB AS 9.1.9.1.4)	
	09.1.10.01.1	CSAS TRAIN A	APMIA, APMZA [RBLATS]	TRIPPED (ONB RELAT)	CSAS LOGIC FOR TRAIN A PUMPE BECOMES 1/1	CAUSE AUTO-TRANSPER OF BOTH VITAL BUSSES PRIOR TO TRIP OF APPAIAPED LOAD BREAKERS *RELATS ARE DE-BUBBCIZE TO ACTUATE. BELAT FAILURE MOT DETECTABLE PROM CSAS CABINET INDICATION PROVIDED BY PARALLEL		{SAMB AS 9.1.8.1.2}	
	09.1.10.03.1	(LOGIC) CSAS TRAIN A	APBIA, APHZA (RBLAYB) AVBIA, AVBZA	INPUT OPEN TRIPPED	(SAME AS 9.1.10.1.1) CSAS LOGIC FOR TRAIN A VALVES BECOMES	BELATS APHIB OR APHIB	_26_ 	(SAMB AS 9.1.8.1.2) (SAMB AS 9.1.8.1.2)	
:   	09.1.10.03.3 (	(LOGIC)	(RBLAYS) AVHIA, AVHZA	INDUT ONEN  (ONB BELTA)		RELAT FAILURE NOT DETECTABLE PROM CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAYS AVMIB OR AVM2B			
	*** * * * * * * * * * * * * * * * * * *	FOCIC)	(RELAYS)	(ONE RELAT)	(SAMB AS 9.1.10.3.1)	*(SAME AS 9.1.10.3.1)	.71	(SAMB 45 9.1.8-1.2)	

11	TEM # .DEV	ICB ID	COMPONENT 10	FAILURE MODE	EFFECT ON BCCS	BBHARES	REPORT 1788		BESP_DISCIPLINE	
09.2.	.08.01.2 CSAS TE		SFIA (RELAT)	UNTRIPPED (OFF)	REDUCED RELIABILITY OF TRAIN B CSAS PUMP ACTUATION	NORMAL POSITION. RELAT FAILURE NOT DETECTABLE PROM CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAT RPIE	26	(SAMB AS 9.1.8.1.2)		
09.2.	.08.01.3 (SAS TR (SEQ 2		BPIA (RBLAT)	INPUT OPEN	(SAHR AS 9.2.8.1.2)	*BELAY PAILURE NOT DETECTABLE FROM CSAS CASINET INDICATION PROVIDED BY PARALLEL RELAT BPIB	26	(SAME AS 9.1.8.1.2)		
09.2.	08.03.2 CSAS TR (SEQ 2		BVIA (RBLAY)	UNTRIPPED (OFF)	TRAIN B CSAS VALUE ACTUATION INOPERABLE		26	(SANE AS 9.1.8.1.2)		
09.2.	08.03.3 CSAS TR (SRQ 2		BVIA (RELAT)	IMPUT OPEN	(SAME AS 9.2.8.3.2)	IPATLURE NOT DETECTABLE PROM CRAS . CABINET INDICATION PROVIDED BY PARALLEL RELAT BVIB	25	(SAME AS 9.1.8.1.2)		
09.2.	08.05.2 CSAS TR (SBQ 2		BPTA (RBLAT)	UNTRIPPED (OFF)	(SABB AB 9.2.0.1.2)	*NORMAL POSITION. RELAY FAILURE NOT DETECTABLE FROM CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAY BPYB	26	(BAHR AS 9.1.8.1.2)		
09.2.	08.05.3 CSAS TR (SEQ 2		BPTA (RBLAT)	INPUT OPEN	(SAME AS 9.2.8.1.2)	*RELAY FAILURE NOT DETECTABLE FROM CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAY BPTS	26	(SAMB AS 9.1.0.1.2)		
09.2.	08.01.2 CSAS TR (SEQ 2		BYTA (EBLAT)	UNTRIPPED (OFF)	(SABB AS 9.2.8.3.2)	*MORMAL POSITION. RELAY FAILURE NOT DETECTABLE FROM CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAY BYYE	26	(SAME AS 9.1.8.1.2)		
09.2.	08.07.3 CSAS TE (SEQ 2		BVTA (RELAT)	INPUT OPBN	(SAHE AS 9.2.8.3.2)	*BELAY FAILURE NOT DETECTABLE FROM CSAS CABINET INDICATION PROVIDED BY PARALLEL RELAY BYTE	26	(SAME AS 9.1.8.1.2)		
09.2.	10.01.1 CSAS TR (LOGIC)		BPMIA, BPMZA (RBLATS)	TRIPPED (ONB RELAT)	CSAS LOGIC FOR TRAIN 8 PUMPS BECOMES 1/1 ON REMAINING MATRIE OUTPUT RELAY	PRELATS ARE DE-EMERGIZE TO ACTUATE. RELAT PAILURE NOT DETECTABLE FROM CSAS CABINET INDICATION PROVIDED BY PARALLEL	26	(SAMB AS 9.1.8.1.2)		
09.2.	10.01.3 CSAS TR (LOGIC)		•	INPUT OPEN (ONE RELAT)	{SAME AS 9.2.10.1.1}	RELATE SPHIS OR SPHIS *(SAME AS 9.2.10.1.1)	26	(SAME AS 9.1.8.1.2)		
09.2.	10.03.1 CSAS TR (LOGIC)		•	TRIPPED (ONE RELAT)	CSAS LOGIC FOR TRAIN B VALVES BECOMES 1/1 ON REMAINING MATRIX OUTPUT RELAT	PRELATS ARE DE-EMERCIZE TO ACTUATE. RELAT PAILURE NOT DETECTABLE FROM CSAS CABINET INDICATION PROVIDED BY PARALLEL	26	(SABE AS 9.1.8.1.2)		
09.2.	10.03.3 CSAS TR		•	IMPUT OPEN (OMB RELAT)	(SAME AS 9.2.10.3.1)	PELATS BYMIB OR BYMIB  *{SAME AS 9.2.10.3.1}	26	(BAME AS 9.1.8.1.2)		
09.2.	11.01.3 CSAS TR (POWER)		· · · · · · · · · · · · · · · · · · ·	INPUT SHORT	INOPPRABILITY OF TRAIN B CSAS	JOUTPUT RELATS ARE PRESCIZE TO ACTUATE. TRAIN B CSAS KELIABILITY COULD BE IMPROVED BY SEPARATELY FUSING IMPUTS TO		NO PURTHER ACTION REQUIRED. REDUNDANT TRAIN PROTECTS AGAINST FAILURE		
09.2.	11.02.1 CSAS TR. (POWER)		BPSB (15VDC PWR SUPL)	INPUT SHORT	(SAMB AS 9,2.11,1.3)	ISVDC SUPPLIBS BPSA AND BPSB, SIMILAR TO TRAIN A *[SAMB AS 9.2.11.1.3]		(SANE AS 9.2.11.2.3)		



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	. LIBR	i 	PEAICE ID	COMPGNENT ID	PAILURE MODE	REFFECT ON RCCS	•		ACTION ITEM	
	10.1.02.	01.2 DG	DI BRBAKER	BUS #10 (11014)	CLOSED	OF TRAIN B FOR SIS WITH LOSS OF OFFSITE	SINGLE PAILURE RELIEF DURING DG TESTING		IMPLEMENT MMP 1-3634 TO CHANGE DG LOADING LOGIC PROM SISLOP TO 818LOB	CONTROLS
			\$1 PRBARRE	SBQ 1 (14-5, 7)	CONTACTS OPEN (OFF)		*NORMAL POSITION. (SAME AS 10.1.2.1.2)			
:	. 10.1.02.0	05.1 DG	- \$1 BRRAER	CONTROL POWER	. VOLTS LOV		SINGLE PAILURE RELIEF DURING DG TESTING		(SANB AS 10.1.2.1.2)	
_	10.2.02.0		#2 BREAKER	BUS #2C (12C15)	CLOSED	CLOSED. TRAIN B UNAPPRICED POR SIS DEGRADED TRAIN D RESPONSE AND FAILURE DE TRAIN A FOR SIS WITE LOSS OF OPPRITE.				
			#2 BREATER	SBQ 2 (14:5, 7)		POWER 1(SIME AS 10.2.2.1.2)	UNLESS SISLOP LOGIC CHANGED TO SISLOB  *MORMAL POSITION. (SAME AS 10.2.2.1.2)	21	(SAMB AS 10.1.2.1.2)	
•				BUS #2C 125VDC CONTROL POWER	VOLTS LOW	INOPERABILITY OF TRAIN B FOR SIS AND	SINGLE PAILURE RELIEF DURING DG TESTING		(SAME AS 10.1.2.1.2)	
						AZC UNDERVOLTAGE, IF BREE INITIALLY CLOSED. TRAIN A UNAFFECTED FOR SIS				
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#### EMERGENCY CORE CUOLING SISTEM SINGLE FAILURE ANALYSIS SAN ONOPER UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

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1600 4 000440 10					BEPORT		
ITEM # DEVICE ID	COMPONENT ID	FAILURE MODE	REFECT ON BCCS	SEMABES	ITEM	ACTION ITEM	RESP. DISCIPLING
11.1.01.02.1 VITAL BUS #1	AUTO IFBE SW #1	NORMAL	REDUCED RELIABILITY OF VITAL BUS AT AND	*TECH SPEC ACTION BUTET BEQUIRED FOR	31.2	IDENTIFY VITAL AND UTILITY BUS TRANSPER SWITCH	ELECTRICAL
			REGULATED BUS \$1 BCCS LOADS	THIS FAILURE		SURVEILLANCE REQUIREMENTS	
11.1.01.02.1 WITAL BUS.81	_ AUTO IPRR SW AL	MORMAL	REDUCED RELIABILITE OF VITAL BUS \$1 AND		_ 31.3	PROCESS. TECH. SPEC_CHANGE_TO_ADD. VITAL/UTILITE. BUS.	- FICENSING
			BEGULATED BUS \$1 ECCS LOADS	THIS PAILURE		AND TRANSPER SWITCE LCO AND SURVEILLANCE	}
11.1.01.02.1 VITAL BUE &L	AUTO TORR EN AL	MODMAS	DENNICAN DELL'ABILLES NE ALORE BING ST AND	TODGE ODDG 10010N BUTDE BROWLDD BOD	14.4	REQUIREMENTS - IMPLEMENT - VITAL/UTILITY BUS AND TRANSPER SWITCH	ODBD**IVM6
The state of the s	ANIV. AIDS OF PL.	. AVADAL	REGULATED BUS \$1 BCCS LOADS	TRIS PAILURE	41.3	REQUIREMENTS IN APPLICABLE PROCEDURES (INCLUDING	VF38811V83
						BO(s)	
11.1.01.02.4 VITAL BUS AL	_AUTO_JEBR.SM. 61.	CONTACTS CLOSED	(848L48_11.1.1.2.2)	*TRCM SPEC ACTION BUTER REQUIRED MITH	11	(SAME 49.11.1.1.2.1)	
				THIS FAILURE			
11.1.01.02.5 VITAL BUS \$1	AUTO IFBE SW \$1	CONTACTS GROUNDED	*POTENTIAL UNISOL DIVERSION OF SI/RCS	(SAME AS 11.1.1.2.2). ALSO SEE UTILITY		REVISE RUST AND SI/FW LO-LO SETPOINT CALCULATIONS	MUCLEAR
			INVESTORY TO REDT AND LOSS OF CLR	_BU8_10AD_ITRM8_1.4.16.11.1.2.4.12.1.1.		TO ADDRESS INVENTORY DIVERSIONS	
			CAPABILITY FOR SBLOCA. INOP OF 1/2 BI-FLOW CONTAINMENT SPRAY VALVES, SEQ	2.4.27.4.1, 2.4.28.4.1, 3.1.7.1.1, 3.2.12.11.1, 3.2.15.2.1. 1/2 PORV# AND			
			11. ALR PRIMARY PATH, REDUCED REDUNDANCE	The state of the s			
			AGAINST SI BLOCK PERM, OP OF 2 CHG PP	PORVE NOT CREDITED FOR MELB OR LOCA		,	
			DURING INJ				
11.1.01.02.5 YITAL BUS 11	AUTO IPBR SY 41	CONTACTS GROUNDED	POTRATIAL UNISOL DIVERSION OF SIZECS	(SAME AS 11.1.1.2.2). ALSO SER UTILITY	_01.4	LOCK CV-4064 OR B CLOSED AS PER RESOLUTION OF NCR	OPERATIONS
			INVENTORY TO ROOT AND LOSS OF CLR	BUS LOAD ITEMS 1.4.16.11.1, 2.4.12.1.1,		1-P-7467 AND LER 1-90-06 TO PREVENT CHARGING PUMP	· }
			CAPABILITY FOR SBLOCA. INOP OF 1/2	2.4.27.4.1, 2.4.28.4.1, 3.1.7.1.1,		GAS BINDING DUB TO LOSS OF UTILITY BUS	
<del></del>			RI-PLOW CONTAINMENT SPRAY VALVES, SEQ	3.2.12.11.1. 3.2.15.2.1. 1/2 PORYA AND			· · · · · · · · · · · · · · · · · · ·
			\$1, BLR PRIMARY PATH. BEDUCKO BEDUNDANCY AGAINST SI BLOCK PERM. OP OF 2 CMG PP	PORVE NOT CREDITED FOR MALE OR LOCA			
			DURING IN]	LORAL BOI CERDIISD LOR MATE OF TOCA			
11.1.01.02.5 VITAL BUS #1	AUTO IPER SW AL	CONTACTS GROUNDED	POTENTIAL UNISOL DIVERSION OF SI/ECS	(SAME AS 11.1.1.2.2). ALSO SEE UTILITY	34	(SAME AS 11.1.1.2.1)	
•	***************************************		INVENTORY TO REST AND LOSS OF CLR	BUS LOAD ITEMS 1.4.16.11.1, 2.4.12.1.1,	••	(Canal Co. 10101010)	
		<u> </u>	CAPABILITY FOR SBLOCA INOP OF 1/3	2.4.21.4.1. 2.4.21.4.1.1.1.1.1.1.1			
			HI-PLOW CONTAINMENT SPRAY VALVES, SEQ	3.2.12.11.1, 3.2.15.2.1. 1/2 PORVE AND			ì
			AL BELLEVING BEAR STATE STATE AND STATE OF STATE				
			AGAINST SI BLOCK PARM, OP OF 2 CHG PP	PORYGENOT CREDITED FOR MELB OR LOCA.			
11.1.01.10.1 VITAL BUS #1	8-1107V	OPRN	DURING INJ INOPRRABILITY OF MLR PRIMARY PATR.	SER ITEMS 1.4.6.5.3, 2.4.9.6.1,	12.1	REVISE SECONDARY RECIEC POL TO POSITION	OPERATIONS
II.I.VI.IV.I VIIND BUS VI	(BRBARBR)	Oraș	REDUCED REDUNDANCY AGAINST SEQ \$1	3.1.4.6.1, 3.1.10.2.1, 0.1.3.5.1. NO	16.1	CV-142/143/144 LOCALLY IF UNSUCCESSFUL FROM	
	. Meraneers		SIS/SISLOP AND SI BLOCK PERMISSIVE FOR	SECONDARY RECIRC EPPECTS IF B/G OVERPIL	 Լ	CONTROL ROOM	
			SEQ #1 AND #2, LOSS OF SECONDARY RECIRC	PROTECTION CIRCUIT DISCONNECTED PENDING			•
				CICLE 12 HODIPICATIONS			
11.1.01.10.1 VITAL BUS #1	8-1107V	OPBN	INOPERABILITY OF BLE PRIMARY PATH,	*88B [TBBS 1.4.6.5.3, 2.4.9.6.1,	12.2	RITEND TEMPORARY MODIFICATION TPM-1-90-FW9-001	MECHANICAL
	(BREARRE)		REDUCED REDUNDANCE AGAINST SEQ #1	3.1.4.6.1, 3.1.10.2.1, 4.1.1.5.1. NO	,	(DISCONNECTION OF S/G OVERFILL SIGNALS FROM FCVs/CVs) UNTIL PERMANENT OVERFILL MODIFICATIONS	
			SIS/SISLOP AND SI BLOCK PERMISSIVE FOR	SECONDARY RECIRC EFFECTS IF S/G OVERFILE PROTECTION CIRCUIT DISCONNECTED PRODUING		ARE INSTALLED IN CICLE 12	
			TO 8/G A	CYCLE 12 HODIPICATIONS		was taithhin to come ip	
11.1.02.01.1 REGULATED BUS #1	BEGULATOR #1	INPUT OPBN	INOPERABILITY OF BLE PRIMARY PATH,	1888 17888 1.4.6.5.3, 2.4.9.6.1,	12	(SANE AS 11.1.1.10.1)	
··	(TWINCO)		REDUCED REDUNDANCY AGAINST SEQ 41	3.1.4.6.1, 3.1.10.2.1, 8.1.1.5.1. NO			
			SIS/SISLOP AND BE BLOCK PERMISSIVE FOR	SECONDARY RECIRC EFFECTS IF S/G OVERFILE	L		}
			38Q 11 AND 12, LOSS OF SECONDARY BECIEC			and the control of th	
	•		TO S/G A	CYCLE 12 HODIFICATIONS			1

# EMBERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM CHOPPE UNIT I ACTION ITEMS FOR SIGNIFICANT FINDINGS

CDM "M" No. M-4
Revision No. 1
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	ITEM #	.DBYICR ID.	COMPONENT 10	. FAILURE MODE	BPPBCT ON BCCS	PRMARES	REPORT LIRM	ACTION 17PM RESP. DISCIPLINE	
	11.1.02.02.1 K	EGULATED BUS #1	(PUSE)	OPEN	NONE FOR SI, LOSS OF SECONDARY RECIEC TO S/G A	*SBB ITBM 1.4.6.5.3. NO BCCB BFFRCTS IP S/G OVBRPILL PROTECTION CIRCUIT DISCOMMECTED PRODUING CTCLB 12	12	(SAME AS 11.1.10.1)	
1		******* *** *** ***				HODIFICATIONS. SEE SECTION 8 OF M39405 FOR RPS RPPECTS			
1	11.2.01.02.1 Y	ITAL BUS 12	_AUTO IFBR SW BZ	_MORMAL			_31	[SAMB AS 11.1.1.2.1]	
-	11.2.01.02.4 ¥	ITAL BUS #2	AUTO IFER SW #2	CONTACTS CLOSED	REGULATED SUS &2 ECCS LOADS (SARE AS 11.2.1.2.2)	THIS FAILURE STECH SPEC ACTION ENTEY REQUIRED WITH TRIS PAILURE	34	(SAME AS 19.1.1.2.3)	
I	11.2.01.02.5 V	ITAL BUS #2	AUTO IFRE SU #2	CONTACTS GROUNDED	POTENTIAL UNISOL DIVERSION OF SI/RCS	(BANE AS 11.2.1.2.2). ALSO SEE UTILITY	01	(SANS AS 11.1.1.2.5)	
i					INVENTORY TO REDY AND LOSS OF CLR	BUS LOAD [TRM9 1.4.16.11.1, 2.4.12.1.1,			} '
					CAPABILITY FOR SBLOCA. REDUCED  RELIABILITY FOR SBQ 41 913/818LOPAND	. 2.4.27.4.1. 2.4.24.4.1. 3.1.7.1.1. 3.2.12.11.1, 3.2.15.2.1 PORVa NOT			
1					AGAINST SEQ #1 AND #2 BLOCE PERMISSIVE. 1/2 PORV# AND ITS BLOCE VALVE INOPERABLE	CREDITED FOR MSLE OR LOCA			
ĺ	11.2.01.02.5 V	ITAL BUS \$2	AUTO IPER SW #2	CONTACTS GROUNDED	POTENTIAL UNISOL DIVERSION OF SI/RCS	(SAME AS 11.2.1.2.2). ALSO SEE UTILITY	01	(SAHR AS 11.1.1.2.5)	
i					INVENTORY TO ECOT AND LOSS OF CLE	BUS LOAD ITEMS 1.4.16.11.1, 2.4.12.1.1,			1
-					CAPABILITY FOR SBLOCA REDUCED	2.4.27.4.1, 2.4.28.4.1, 2.1.7.1.1. 3.2.12.11.1, 3.2.15.2.1 PORVs NOT			
ļ					AGAINST SEQ \$1 AND \$2 BLOCK PERMISSIVE.	· · · · · · · · · · · · · · · · ·			J
1	<del></del>			<u> </u>	IVS BORA WHO ILE STOCE ANTAR INOBERABLE				_
1	11.2.01.02.5 ¥	ITAL BUS #2	AUTO IPER SW 12	CONTACTS GROUNDED	POTENTIAL UNISOL DIVERSION OF SI/RCS	(SAME AS 11.2.1.2.2). ALSO SEE UTILITY	34	(SAUR AS 11.1.1.2.1)	1 :
					INVENTORY TO ECDY AND LOSS OF CLE CAPABILITY FOR SELOCA. REDUCED	BUS LOAD ITEMS 1.4.16.11.1, 2.4.12.1.1, 2.4.27.4.1, 2.4.28.4.1, 3.1.7.1.1,			1
ŀ					RELIABILITY POR SEQ AI SIS/SISLOPAND	3.2.12.11.1, 3.2.15.2.1 PORVs NOT			-[
1	*				AGAINST BEQ \$1 AND \$2 BLOCK PERMISSIVE.				[
}	11.2.01.10.1 V	Teal Bill As	A 1989U	OPRN .	1/2 PORVA AND ITS BLOCK VALVE INOPERABLE			(SAME AS 11.1.1.10.1)	-
!	11.2.01.10.1 ¥	I INC BOS PE	(BRRAERR)	OPER	REDUCED REDUNDANCY AGAINST SEQ \$1 919/818LOP AND SI BLOCK PERMISSIVE FOR	SEE ITEMS 1.4.7.5.3, 4.1.2.5.1. NO SECONDARY RECIEC EFFECTS IF S/G OVERFILL		(3AB AS 11.1.1.1V.1)	1
Ĺ					SEQ 11 AND 12, LOSS OF SECONDARY RECIEC				i
					TO S/G B	CYCLE 12 HODIPICATIONS		,	
	11.2.02.01.1 k	EGULATED BUS #2	REGULATOR #2 (TWINCO)	INPUT OPEN	REDUCED REDUNDANCY AGAINST SEQ \$1 . 819/819LOP AND 81 BLOCK PRENISSIVE FOR	*SER ITEMS 1.4.7.5.3, 8.1.2.5.1. NO SECONDARY RECIRC REFECTS IF S/G OVERFILL	12	(SAMB AS 11.1.1.10.1)	1
ŀ			(intro)	•	SEQ 11 AND 12. LOSS OF SECONDARY RECIEC				
1					TO S/G B	CTCLE 12 HODIFICATIONS			
-	11.2.02.02.1 R	GULATED BUS 12		OPEN		ISBE ITEM 1.4.1.5.3. NO BCC9 EPPECTS IP	12	(SABB AS 11.1.1.10.1)	
1			(PUSB)		\$/G B	S/G OVERPILL PROTECTION CIRCUIT DISCONNECTED PENDING CYCLE 12			1
1					•	MODIFICATIONS. SEE SECTION 0 OF M39405			
	·					POR RPS EPPECTS			
-	11.3.01.02.1 V		AUTO IFER SW #3	_	REDUCED RELIABILITY OF VITAL BUS \$3, 3A AND REGULATED BUS \$3 ECCE LOADS	THIS FAILURE	34	(SAME AS 11.1.1.2.1)	.
1	11.3.01.02.3 V	TAL BUS 13	AUTO IFER SW #3	CONTACTS OPEN	LOSS OF CLR AND CLR/HLR PLOW BALANCE	(SAMB AS 11.3.1.2.2 POR BCCS) POR B.G.	08.1	PERFORM EVENT-SPECIFIC ANALYSIS OF CLE/HLE FLOW NUCLEAR	
i						1.97 AND THE STSTEMS, REDUNDANT TRAIN B		BALANCING	
:					11 SIS/SISLOP AND AGAINST SBQ 11 AND 42 BLOCK PREMISSIVE, LOSS OF SECONDARY RECILC TO S/G A/B/C	GIGIPOS FROTIUS SAFEIT PUBLICUS			

### RMERCENCY CORE COOLING SYSTEM SINCLE FAILURE ANALYSIS SAN ONOFRE UNIT I ACTION ITEMS FOR SIGNIFICANT FINDINGS

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TIEM & DEVICE ID COMPONENT ID FAILURE MODE	EPPECT ON ECCS		BEPORT	ACTION LIBM	EESP DISCIPLINE	
11.3.01.02.3 VITAL BUS #3 AUTO REFER SW #3 CONTACTS OPEN	CAPABILITY, REDUCED BRIJARILITY OF SEC	1.47 AND THE STRURG, REDUNDANT TRAIN B		REVISE BOIS AS MEEDED BASED ON ANALYSIS RESULTS		
11.3.01.02.3 VITAL BUS 83 AUTO REER SM 83 CONTACTS OPEN	RECIRC TO B/G A/B/C	1.97 AND THE STSTEMS, REDUNDANT TRAIN B STSTEMS PROVIDE SAPETY PUNCTION	_ 12	-{SAMB A8-11.1.1.10.1}		
11.3.01.02.4 VITAL BUS #3 AUTO IFER SW #3 CONTACTS CLOSED	RECIRC TO B/G A/B/C (BAME AS 11.3.1.2.2)	STECH SPEC ACTION ENTRY REQUIRED WITH				
11.3.01.02.5 VITAL BUS #3 AUTO EFER SW #3 CONTACTS GROUNDED	*POTENTIAL UNISOL DIVERSION OF SI/RCS INVENTORY TO ROOT, LOSS OF CLR AND	(SAME AS 11.3.1.2.2). ALSO SEE UTILITY BUS LOAD ITEMS 1.4.16.11.1. 2.4.12.1.1.	04	(SAHE AS 11.1.1.2.5)		
	CLE PUMPING. REDUCES RELIABILITY FOR SEQ AL SIS/SISION AND AGAINST SEQ AL AND AZ	3.2.12.11.1, 3.2.15.2.1				
11.3.01.02.5 VITAL BUS #3 AUTO IPER SW #3 CONTACTS GROUNDED	INVENTORY TO REDT, LOSS OF CLR AND.	BUS LOAD LTENS 1.4.16.11.1, 2.4.12.1.1,	08	(SAMB AS 11.3.1.2.3)		
	CLE/BLE FLOW BALANCE, AND (FOR SBLOCA) CLE PUMPING. REDUCED RELIABILITY FOR SEQ #1.818/813LOP.AND.AGAINST.SEQ.61.AND.#2.	1 2 12 11 1 1 1 2 16 2 1				
1), 3, 01, 02, 5, VITAL_BUS_83AUTO_RPBB_SN_83_CONTACTS_GBOUNDBD_	BLOCE PREMISSIVE, LOSS OF SECONDARY RECIRC TO S/G A/S/C POTENTIAL UNISOL DIVERSION OF SI/RCS INVENTORY TO ECOT, LOSS OF CLE AND	[SAMB AS ]].3.1.2.2]. ALSO SER UTILITE. BUS LOAD ITEMS 1.4.16.11.1, 2.4.12.1.1,		(SAMB AN 11.1.1.1.10.1)		
	CLR/HLR FLOW BALANCE, AND (FOR SBLOCA) CLR PUMPING. RROUGED RELIABILITY FOR SEC #1 313/#18LOP AND AGAINST SEQ #1 AND #2	2.4.27.4.1, 2.4.28.4.1, 3.1.7.1.1, 1.2.12.11.1, 3.2.15.2.1				
11.3.02.01.1 REGULATED BUS \$3 REGULATOR \$3 INPUT OPEN	BLOCE PERMISSIVE, LOSS OF SECONDARY BECIEC TO S/G A/B/C REDUCED REDUNDANCY AGAINST SEQ \$1	SEE ITEMS 1.4.8.5.3, 8.1.3.5.1. NO		{SAHE AS 11.1.1.10.1}	na je na populari i i napolini dina	
(1WINCO)	REQ \$1 AND \$2, LOSS OF SECONDARY RECIRC. TO S/G C	CYCLE 12 HODIFICATIONS				-
11.3.02.02.1 kRGULATRO BUS \$3 8-13R1 OPRM [PVSR]	NOME FOR SI, LOSS OF SECONDARY RECIRC TO S/G C	) *SBE ITEM 1.4.8.5.3, NO BCCS EFFECTS IF <u>S/G OVERPILL PROTECTION CIRCUIT</u> DISCONNECTED PENDING CTCLE 12	12	(SAHB AS 11.1.10.1)		
11.3.03.01.1 VITAL BUS #3A VITAL BUS #3A OPEN	ICLE PLOW TO 2/3 RCS LOOPS WOULD BE	MODIFICATIONS. SEE SECTION & OF M39405 FOR RPS SPECTS SEE ITEMS 1.4.9.10.1, 1.4.19.3.1,	08	{SAMP AS 11.3.1.2.3}		
AC8	INCREASED PER PROCEDURE, RESULTING IN CLR AND CLR/BLR FLOW IMPALANCE, POTENTIALLY RICERDING RECIRC PUMP LIMITATIONS	2.4.25.4.1, 3.1.12.4.1, 3.2.16.2.1, 4.1.3.2.1 FOR RCCS LOADS. FOR R.G. 1.97 AND THI SYSTEMS, REDUNDANT TRAIN B SYSTEM PROVIDES SAFETY FUNCTION				-

	ITEM \$ DEVICE ID	COMPONENT ID	FAILURE HOUR	BEFFECT ON BCCS	REMARES	REPORT	ACTION LYEN	EESP DISCIPLINE	-	1
	11.3.03.14.1 VITAL BUS \$3A	8-3313 (BRBAKER)	OPBN	INCREASED PER PROCEDURE, RESULTING IN	SBB 1TEMS 2.4.25.4.1 AND 3.1.12.4.1	08	(SAMB AS 11.3.1.2.3)			-
į	11 2 02 16 1 1/12/4 200 441		4004	POTENTIALLY BICEBOING BECIEC PUMP			(OAMB AO 13 1 1 10 1)			
-		(BRRAERR)	UPSB	PLOW DISABLED, BLOWDOWN ISOLATED, LOSS OF SECONDARY RECIRC TO S/G A/B/C AFFER RFW PUMPR TRIPPED	BLONDOWN ISOLATION VALVE SAPETY FUNCTION	-16	(SAMB AS 11.1.1.10.1)	•		
-	11.4.01.01.1 VITAL BUS #4	INVERTER #4	INPUT OPBN	*POTENTIAL LOSS OF TRAIN A AND B BLECTRICAL POWER FOR SISLOP DUE TO OUT	SEE ITEMS 1.4.9.9.1, 2.4.4.2.1, 2.4.7.1.1, 2.4.6.3.2, 2.4.22.1.1, 3.1.3.2.1, 3.2.9.2.1, 3.2.9.3.1,		REVISE SISLOP LOADING CALCULATION TO ACCOUNT FOR OUT OF SEQUENCE CCM/SMC PUMP LOADING	BLECTRICAL	_	
i				RESULTING FROM PC-605	3.2.13.2.1, 3.2.14.4.1, 6.4.5.1.1, 6.4.6.3.1. FAILURE MODE CONSERVATIVELY ASSUMED. MORMAL OPERATION OF STATIC IPER		<u> </u>			
i	11 4 01 01 0 0101 010 01	INVERSOR AA	FURNIS ORANS		SWITCH DORS NOT RESULT IN INTERRUPTION	19	(SAMB AS 11.4.1.1.1)			-
٠	11.4.01.01.2 VITAL BUS \$4 11.4.01.01.3 VITAL BUS \$4	INVERTER \$4	INPUT SHORT OUTPUT VOLTS LOW	*(SAME AS 11.4.1.1.1) *(SAME AS 11.4.1.1.1)	(SAMB AS 11.4.1.1.1) (SAMB AS 11.4.1.1.1)		[SAHR AS 11.4.1.1.1]		1	ł
	11.4.01.01.4 VITAL BUS #4	INVERTER #4	OUTPUT SHORT OR GROUND	*(SANE AS 11.4.1.1.1)	(SAME AS 11.4.1.1.1)		(SAMB AS 11.4.1.1.1)			
١,	11.4.01.02.1 YITAL BUS 44	AUTO IPER SM	NORMAL	_ REDUCED BELIABILITY OF VITAL BUS 44 AND.	STRUE SPEC ACTION ENTRY REQUIRED FOR	.н	(SAMB, AS, 11.1.1.2.1)			-{
· i	•	(INABBLES 14)		REGULATED BUS \$4 BCCS LOADS	TRIS PAILURE		40.44B +0 +1 4 1 4 1 4		1	t
1	11.4.01.02.2 VLTAL BUS #4	AUTO IFER SM	ALTERNATE	SPOTENTIAL LOSS OF TRAIN A AND B	SEE ITEMS 1.4.9.9.1, 2.4.4.2.1,	11	(SAME AS 1).4.1.1.1)		1	
٠.		(INVERTER 44)		PLECTRICAL POWER FOR SISLOP DUE TO OUT OF SEQUENCE BUS LOADING OF CCW PUMPS	3.1.3.2.1, 3.2.9.2.1, 3.2.9.3.1,				1	 i
				RESULTING PROM PC-605	3.2.13.2.1, 3.2.14.4.1, 6.4.5.1.1, 6.4.6.1.1				<u> </u>	
	11.4.01.02.3 VITAL BUS #4	AUTO IFER SW	CONTACTS OPEN	SPOTENTIAL LOSS OF TRAIN A AND B			REVISE PROCEDURES (INCLUDING BOIL) AS NEEDED TO	OPERATIONS		١
1		(INABSIBE \$4)		BLECTRICAL POWER POR SISLOP DUE TO OUT	BACKUP PRIMARY PATE PLO DETERMINATION OR		INCLUDE DCP 1-3548 REQUIREMENTS	•		i
-				OP SEQUENCE BUS LOADING OF CCM PUMPS RESULTING FROM PC-605. BLR PRIMARY AND	JUNPER ACROSS PT-425X CONTACTS IN HOV-813 CONTROLS TO MITIGATE LOSS OF HER				-1	
1	• •			ALTERNATE PATES ALSO LOST	PUNCTION. BOI CHANGE REQD IRRESPECTIVE OF THIS PAILURE DUE TO INADEQUACT OF					
ď					FIT(PT)-1112 BANGE				1	-
·i	11.4.01.02.3 VITAL BUS #4	AUTO IFBR SW	CONTACTS OPEN	POTENTIAL LOSS OF TRAIN A AND B			IMPLEMENT DCP 1-3548 BLE MODIFICATIONS (REPOWER	MACTRVR	1	
ŀ		(INVERTER 44)		OF STOURNCE BUS LOADING OF CCW PUMPS	DACTUP PRIMARY PATH PLO DETERMINATION OF JUMPER ACROSS PT-425% CONTACTS IN	L	AND REPAND BANGE OF PIT-11121 TO PRECLUDE		-	
				DESULTING FROM PC-605. HER PRIMARY AND	MOV-813 CONTROLS TO MITIGATE LOSS OF HLE	!	Condon-nobs and farmen			-
				ALTERNATE PATHS ALSO LOST	PUNCTION. BOI CHANGE REQD IRRESPECTIVE				[	_
٠;			-	211-1212-1-1012-1012-1-1-1-1-1-1-1-1-1-1	OF THIS PAILURE DUE TO INADEQUACT OF			•	1	ļ
:					PIT(PT)-1111 RANGE					
	11.4.01.02.3 VITAL BUS #4		CONTACTS OPEN	POTENTIAL LOSS OF TRAIN A AND B	SISANE AS 11.4.1.2.21. BOI GRY REGD FOR		(2908 92 11:471:1-1)			
i	•	(INVERTER #4)		OF SEQUENCE BUS LOADING OF CCM PUMPS	BACKUP PRIMART PATH PLO DETERMINATION OR JUMPER ACROSS PT-425% CONTACTS IN	1			1	i
				RESULTING PROM PC-605. HER PRIMARY AND	HOV-813 CONTROLS TO MITIGATE LOSS OF HER	1			.	
•				ALTROMATE PATHS ALSO LOST	PUNCTION. BOI CHANGE REQUIRERSFECTIVE				1	
					OF THIS FAILURE DUB TO INADEQUACT OF FIT(PT)-1112 RANGE			•		

# EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPPER UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

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_	DEVICE ID	COMPONENT 1D	FAILURE MODE	REFERENCE ON RECES	EBBARBS	EEPORT		ACTIONITEM	LESP DISCIPLINE	
	11.4.01.02.4 VITAL BUS \$4	AUTO IPER SU (INVERTER 64)	CONTACTS CLOSED	*(SANE AS 11.4.1.2.2)	*TRCM SPBC ACTION BUTRY REQUIRED WITH THIS PAILURE	34	(SAMB AS 11.1.1.2.1	)		
<u>L</u>	11.4.01.02.5_Y1TAL_BUS_14	AUTO IFER SU	CONTACTA GROUNDED.	PPOTENTIAL LOSS OF TRAIN A AND B	*(SANR AS 11.4.1.2.3). UTILITY BUS LOAD	8 10	(SAMB AS 11.4.1.2.3	}		.
		(INVESTER #4)		BLECTRICAL POWER FOR SISLOP DUR TO OUT	NOT APPROVED DUE TO SEPARATE PUSE FOR					1 1
1				OF SEQUENCE BUS LOADING OF CCM PUMPS	1.5 EVA IPHR PRIMARY, WRICE PROTECTS					1 )
				RESULTING FROM PC-605. BLR PRIMARY AND	BACKUP POR VITAL/REGULATED BUSSES #1, 2	··				1
				REDUCED TO MINIMUM FOR RCCE LOADS	3/34	•		•		
	11.4.01.02.5 VITAL BUS 44	AUTO IFBE SM	CONTACTS GROUNDED	SPOTENTIAL LOSS OF TRAIN & AND B	*(SARE AS 11.4.1.2.3). UTILITY BUS LOAD	<u> 11 </u>	(SAMB AS 11.4.1.1.1	<b>)</b>		.
1		(IMARGIBE 14)		BLECTRICAL POWER FOR SIELOP DUE TO OUT	NOT APPROTED DUE TO SEPARATE PUSE POR					1
ì				OF SEQUENCE BUS LOADING OF CCM PUMPS	1.5 LVA TONG GROUNG DESIGN RING AND					
<u></u> -				ABBULTING PROM PC-605. BLR PRIMARY AND ALTERNATE PATES ALSO LOST AND CCW PLOW	31.5 EVA IPME SERVING UTILITY BUS AND BACKUP FOR VITAL/REGULATED BUSSES \$1, 2					
ĺ				REDUCED TO MINIMUM FOR ECCS LOADS	3/34	•				1
! !	11:4:01:03:2 VITAL BUS 44	HAM IPBR SW 14	ALTERNATE	POTRUTIAL LOSS OF TRAIN A AND B	SRR ITEMS 1.4.9.9.1, 2.4.4.2.1,		(SAME AS 11.4.1.1.1	<b>)</b>		
i				RESCRECAL POWER FOR SISLOP DUE TO OUT	2.4.1.1.1, 2.4.1.3.2, 2.4.22.1.1,					l j
				OF SEQUENCE BUS LOADING OF CCW PUMPS	3.1.3.2.1, 3.2.5.2.1, 3.2.5.3.1,		•			
				RESULTING FROM PC-605	3.2.13.2.1, 3.2.14.4.1, 6.4.5.1.1, 6.4.5.1.1					· [
	11.4.01.03.3 VITAL BUS #4	MAN IFBR SW 14	CONTACTS OPEN	SPOTENTIAL LOSS OF TRAIN A/B ELECTRICAL	#(SAMB AS 11.4.1.3.2). BOI BRY BRQD FOR	10	(SAMB AS 11.4.1.2.3	1		
			***************************************		BACKUP PRIMARY PATH PLO DETERMINATION O					
i			·	BUS LOADING OF CCW PUMPS RESULTING PROM						1 1
İ					HOV-813 CONTROLS TO MITIGATE LOSS OF HE					1
ļ				ALSO LOST	PUNCTION. BOL CHANGE BEGD LERESPECTIVE OF THIS PAILURE DUE TO INAURQUATE					·
ļ					PIT(PT)-1112 BANGE					1
	11.4.01.03.3 VITAL BUS #4	NAM IPER SW #4	CONTACTS OPEN	SPOTENTIAL LOSS OF TRAIN A/B BLECTRICAL	S(SAME AS 11.4.1.3.2). BOT REV REQD FOR	11	(SAMB AS 11.4.1.1.1	1		.
					BACKUP PRIMARY PATE PLO DETERMINATION O	2				
				BUS LOADING OF CCW PUMPS RESULTING PROM	JUMPER ACROSS PT-4252 CONTACTS IN					
				PC-605. BLR PRIMARY AND ALTERNATE PATES ALSO LOST	MOV-813 CONTROLS TO MITIGATE LOSS OF BL FUNCTION. BOI CHANGE REQD IRRESPECTIVE	<b></b>				
ļ			•	100 001	OF THIS PAILURE DUE TO INADEQUATE					
İ					PIT(PT)-1112 BANGE			****		
	11.4.01.03.4 VITAL BUS #4	MAN IFBR SW #4	CONTACTS CLOSED	*(SAMB AB 11.4.1.3.2)		34	(SAMB AS 11.1.1.2.1	j		<u> </u>
İ				ADDRESS TORS OF BUILD A LUB D	THIS PAILURE	0.4	(SANR 48 11.).1.2.5	ı.		
<u> </u>	11.4.01.03.5 VITAL BUS \$4	BYN TARR 2A 14	CONTACTS GROUNDED	*POTENTIAL LOSS OF TRAIN A AND B RESCRECAL POWER FOR SISLOP DUR TO OUT	ALSO SER UTILITY AND INALITY A		13408 40 11.1.1.6.	1		1
				OF SEQUENCE BUS LOADING OF CCW PUMPS.	1.4.16.11.1, 2.4.12.1.1, 2.4.27.4.1,					
!				UNISOLABLE DIVERSION OF SI/ECS INVENTOR						ļ
				TO BODY. BLE PRIMARY AND ALTERNATE PATE	3 3.2.15.2.1					
i				ALSO LOST AND CCW PLOW REDUCED TO			•	•		1
i	11.4.01.63.5 VITAL BUS 14	HAN IFBR SW 44	CONTACTS GROUNDED	MINIMUM FOR RCCS LOADS  POTENTIAL LOSS OF TRAIN A AND B	*(SAHE AS 11.4.1.3.2 AND 11.4.1.3.3.)	11	(SAMB AS 11.4.1.1.1			
ļ	11.4.01.03.3 VIIAL DUS #4	HAR AFOR JE #1	CONTROLS CROSSINGS	BLECTRICAL POWER FOR SISLOP DUE TO OUT		••		•		
;				OF SEQUENCE BUS LOADING OF CCW PUMPS,	1.4.16.11.1, 2.4.12.1.1, 2.4.27.4.1,					
	,			UNISOLABLE DIVERSION OF SI/RCS INVENTOR						1
				TO BOOT. BLE PRIMARY AND ALTERNATE PATH:	8 3.2.15.2.1					1
				ALSO LOST AND CCM PLOW REDUCED TO MINIMUM POR ECCS LOADS						
				DIMINAD LAW BOOM DAWNS						1

.17EH # DEVICE ID	COMPONENT 1D PAILURE MODE			REPORT ITRU	
1.4.01.03.5 VITAL BUS #4	MAN IPER SV 84 CONTACTS GROUNDED	POTRATIAL LOSS OF TRAIN A AND B	*(SAME AS 11.4.1.3.2 AND 11.4.1.3.3.)	34	(SAMB AS 11.1.1.2.1)
		BLECTRICAL POWER FOR SISLOP DUE TO OUT	ALSO SEE UTILITY BUS LOAD ITEMS		
		UNISOLABLE DIVERSION OF SI/RCS INVENTORY			
		TO BOST. BLE PRIMARY AND ALTERNATE PATRS ALSO LOST AND COM PLOW REDUCED TO			
		MINIMUM FOR RCCS LOADS			
1.4.01.04.1 VITAL BUS 44	VITAL BUS 84 ACB OPEN	POTENTIAL LOSS OF TRAIN A AND B	*SRB ITEMS 1.4.9.9.1, 3.2.9.2.1,	10	(SAME AS 11.4.1.2.3)
		RESTRICAL POWER FOR RISLOP DUE TO OUT	1.1.2.1.d. 1.d.4.1.l. 1.d.1.l.d		
•		OF SIGURNCE BUS LOADING OF CCM PUMPS	2.4.8.3.2, 2.4.22.1.1, 3.1.3.2.1,		
	•		3.2.9.2.1, 3.2.9.3.1, 3.2.13.2.1,		:
			3.2.14.4.1, 6.4.5.1.1, 6.4.6.3.1. BOL RRV RRQD AS PRE ITEM 11.4.1.3.3		
1.4.01.04.1 VITAL BUS 44	MITAL BUG AA ACB ODDM	REDUCED TO MINIMUM FOR RCCS LOADS		17	{SAMR AS 11.4.1.1.1}
PLING BOG 61	ALIED BOS SA BOR OLSE		1.2.9.3.1. 2.4.4.2.1. 2.4.2.1.1.		
		OF SIQUENCE BUS LOADING OF CCW PUMPS	2.4.8.3.2, 2.4.22.1.1, 3.1.3.2.1,		
		RESULTING PROM PC-605. WLR PRIMARY AND	1.2.4.2.1, 3.2.4.3.1, 3.2.13.2.1,		
		REDUCED TO MINIMUM POR RCCS LOADS	REV REQD AS PER ITEM 11.4.1.3.3		
	VITAL BUS #4 ACB INPUT SHORT OR	*(SANE AS 11.4.1.4.1)	*(SAMB AS 11.4.1.4.1). FAULT WILL CAUSE		
	CROUND		AUTO-TRANSPRR SWITCH, WHICH THRM		
			AUTO-TRANSPERS PAULT TO MCC-2 POWERED		
			1.5 EVA IPHE PRIMARY PROTECTS 37.5 EVA		
			IFMR SUPPLIING UTILITY BUS		
.4.01.04.3 VITAL BUS #4	VITAL BUS \$4 ACB IMPUT SHORT OR	*(SAMB AS 11.4.1.4.1)	*(SAME AS 11.4.1.4.1). PAULT WILL CAUSE	11	(SAME AS 11.4.1.1.1)
	GROUND		UNDERVOLTAGE CONDITION AT INVESTEE		
			AUTO-TRANSPER SVITCE, MAICA TARE		
			AUTO-TRANSPERS PAULT TO MCC-2 POWERED 7.5 AVA BACKUP SOURCE. SEPARATE FUSE ON		
			1.5 LVA IPUB PRIMARI PROTECTS 31.5 LYA		
			IFME SUPPLYING UTILITY BUS		
.4.01.12.1.VITAL BUS 44	OPBN	LOSS OF BLR PRIMARY PATH	19RB_ITRES_1.1.1.2.1, 1.2.9.2.1. SER	_10	(BAHR AS 11.4.1.2.3)
	(BREATER)		SECTION & OF MISSOS FOR MPS BEFRECTS		
.4.01.19.1 VITAL BUS #4	8-1415V OPEN	POTENTIAL LOSS OF TRAIN A/B BLECTRICAL	SEE 1788 6.4.6.3.1		(SAMB AS 11.4.1.1.1)
£ 01 01 1 10071700 010 '	NAM SEED ON AT MODINA	OF CCM PUMPS	STECH SPEC ACTION BUTST REQUIRED FOR	14	COMP 40 11 1 1 9 11
.5.01.01.1 UTILITY BUS	MAN IPBR SW 87 NORMAL (MCC-2)	TOWARD CAMEN OF THE PRINCE ALLOWS TO THE PRINCE ALLOWS TO THE PRINCE ALLOWS THE PRIN	ANIE BYTTINGS	**	(JABB AD ELLI-1-6-1)
	(nvv:s).	SAFBIT RELATED POWER]			
.5.01.01.2 UTILITY BUS	MAN IPER SW \$7 ALTERNATE	*POTENTIALLY UNISOLABLE DIVERSON OF	SEE 1788S 1.4.16.11.1, 2.4.12.1.1,		(SAMB AS 11.1.1.2.5)
	(MCC-1)	SI/RCS INVENTORY TO RCDT, LOSS OF CLR			and a contract of the contract
		PUMPING CAPABILITY FOR SBLOCA, LOSS OF			.'·
		HLR PRIMARY PATH	PER TECH SPEC 4.1.1 PREVENT POWER VIA		
			MCC-1 BYEN WITH TRANSPER SMITCH IN THIS.		•

		COMPONENT ID					ACTION ITEM RESP DISCIE	PLINE	
1									
	11.5.01.01.2 UTILITY BUS	MYN ISSE 2A 93	ALTERNATE (MCC-1)	POTENTIALLY UNISOLABLE DIVERISON OF SI/ECS INVENTORY TO RECOT, LOSS OF CLE	SBB 178H8 1.4.16.11.1, 2.4.12.1.1, 2.4.27.4.1, 2.4.28.4.1, 3.1.7.1.1,		(SAHR AS 11.1.1.2.5)	-	
				PURPING CAPABILITY-FOR SBLOCA, LOSS OF - BLR PRIMARY PATE	. 3.2.12.11.1, J.2.15.2.1. BUSES REMOVED PRE THE SPEC 4.1.1 PREVENT POWER VIA MCC-1 EVEN WITH TRANSPER SWITCH IN THIS POSITION.				
	11.5.01.01.4 UTILITY BUS	MAN IFER SN 87	CONTACTS CLOSED	POTENTIAL LOSS OF TRAIN A/B DUB TO PARALLBURING THROUGH MANUAL TRANSFER SWITCE	STRCE SPEC ACTION BUTRY REQUIRED WITH TRIS PAILURE		NO PURTURE ACTION REQUIRED. PUSE BLOCK POR ALTERNATE FEED ALERADY REMOVED		
	11.5.01.01.5 UTILITY BUS	MAN IFER SW #1	CONTACTS GROUNDED	*(SAME AS 11.5.1.1.2)	(SAME AS 11.5.1.).2)	04	(SABB AS 11.1.1.2.5)		$\neg \neg$
	11.5.01.01.5 UTILITY BUS	HAN IPBR SW AT	CONTACTS GROUNDED	*(BAHE AS 31.5.1.1.2)	(SAMB AS 11.5.1.1.2)	07	(SAMB AS 11.1.1.2.5)		
-	11.5.01.02.2 UTILITE BU8		_ALTERNATE	#(SANE AS.11.5.1.1.2)	(SAME AS 11.5.1.1.2)	04	(SAMB.AS 11.1.1.2.5)		
١,	11.5.01.02.2 UTILITY BUS	AUTO IPER SW #6		*(SANR AS 11.5.1.1.2)	(SAME AS 11.5.1.1.2)	07	(SAMB AS 11.1.1.2.5)		
Li	11.5.01.02.3 UTILITY BUS	AUTO IPER SW 46		4(SANB AS 11.5.1.1.2)	(SAME AS 11.5.1.1.2)		(SAMB AS 11.1.1.2.5)		
	11.5.01.02.1 WILLITE BUS	AUTO_LPRR_SM_46					(SAMR. AS. 11.1.1.2.5)		
ľ.	11.5.01.02.4 UTILITE BUS	_	CONTACTS CLOSED	4(SAHB AS 11.5.1.1.2)	ATECH SPEC ACTION BUTET REQUIRED WITH THIS PAILURE	04	(BARE AS 11.1.1.2.5)	i	
	11.5.01.02.4_VIILITE BUS	AUTQ_EFFE_SV. 16	CONTACTS CLOSED	1(8AHB AR 11.5.1.1.2)	THE PAILURE STATEMENT OF STATEM	_07	(SABB AS. 11.1.1.2.5)		
i	11.5.01.02.5 UTILITY BUS	AUTO IFER SW SE	CONTACTS GROUNDED	3(SARE AS 11.5.1.1.2)	(SAME AS 11.5.1.1.2)	04	(SAME AS 11.1.1.2.5)		
1	11.5.01.02.5 UTILITY BUS		CONTACTS GROUNDED	1(8AND AB.)1.5.1.1.21	[SABR 48 11.5.1.1.8]		_ (SAMB_AS_)].1.1.2.5)		
	11.5.01.03.1 UTILITY BUS	NCC-1 (8-1181)	VOLTS LOW	REDUCED RELIABILITY OF BLA PRIMARY PATH (CV-305 CANNOT BE SWING ALIGNED TO SAFETY RELATED POWDE)	TRIE PAILURE	. 31	(SAHB AS 11.1.1.2.1)		
1 2 4	11.5.01.03.2 UTILITY BUS	MCC-2 (8-1238)	VOLTS LOW	*POTENTIAL UNISOLABLE DIVERSION OP SI/RCS INVENTORY TO RCDT, LOSS OF CLR PUMPING CAPABILITY FOR SBLOCA, REDUCED	*BOI REVISION REQUIRED TO SPECIFY LOCAL OPERATOR ACTION TO REALIGN MANUAL TRANSFER SMITCE AT TO RESTORE SAFETY	04	(SAHR AS 11.1.1.2.5)		
				BELLISILITY OF SLE PRIMARY PATE	RELATED POWER FROM REDUNDANT TRAIN TO UTILITY BUS IN SUPPORT OF MLR PRIMARY PATS	<u>_</u>			
	11.5.01.03.2 UTILITY BUS	HCC-2 (8-1238)	VOLTS LOW	APOTESTIAL UNISOLABLE DIVERSION OF SI/RCS INVENTORY TO RCDT, LOSS OF CLR PUMPING CAPABILITY FOR SBLOCA. REDUCED	*BOI REVISION REQUIRED TO SPECIFY LOCAL OPERATOR ACTION TO REALIGN MANUAL TRANSPER SWITCH AT TO RESTORE SAPETY		(SAMB AS 11.1.1.2.5)		
:[				RELIABILITY OF BLE PRIMARY PATH	BELATED POWER FROM REDUNDANT TRAIN TO UTILITY BUS IN SUPPORT OF BLE PRIMARY PATS				
	11.5.01.03.2 UTILITY BUS	HCC-2 (8-1238)	VOLTS LOW	IPOTRYTIAL UNISOLABLE DIVERSION OF SI/RCS INVENTORY TO RCDY, LOSS OF CLR PUMPING CAPABILITY FOR SBLOCA. REDUCED	JBOI REVISION REQUIRED TO SPECIFY LOCAL OPERATOR ACTION TO REALIGN MANUAL TRANSPER SAITCH AT TO RESTORE SAFRIY	34	(SAMB AS 11.1.1.2.1)		
.				BRLIABILITY OF BLE PRIMARY PATH	RELATED POWER PROM REDUNDANT TRAIN TO UTILITY BUS IN SUPPORT OF ALR PRIMARY PATE				
	11.5.02.01.1 UTILITY BUS	UTILITY BUS ACB	OPEN	*POTENTIAL UNISOLABLE DIVERISON OF SI/BCS INVENTORY TO RCDT, LOSS OF CLR PUMPING CAPABILITY FOR SBLOCA, AND LOSS	SBB 1TBMS 1.4.16.11.1, 2.4.12.1.1, 2.4.27.4.1, 2.4.28.4.1, 3.1.7.1.1,	04	(SAHE AS 11.1.1.2.5)		
				OF HER PRIMARY PATH	**************************************				

### EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OWOFRE UNIT 1 ACTION 178MS FOR SIGNIFICANT FINDINGS

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	COMPONENT ID.	. FAILURE MODE	BPFBCT ON BCC\$	BENARES	BBPOET 		<u></u> 88	SP_DISCIPLINE
11.5.02.01.1 UTILITY BUS	UTILITY BUS ACB	OPBN -		SER ITEMS 1.4.16.11.1, 2.4.12.1.1, 2.4.27.4.1, 2.4.28.4.1, 3.1.7.1.1, 3.2.12.11.1, 3.2.15.2.1	07	(SANB AS 11.1.1.2.5)		
11.5.02.01.3 UTILITY BUS	UTILITY BUS ACB		OP BUR PRIMARY PATH *(SAMB AS 11.5.1.1.2)	(SAMB AS 11.5.1.1.2). FAULT WILL RESULT IN UNDERVOLTAGE CONDITION, CAUSING TREE	04	(SAME AS 11.1.1.2.5)	The second control of the second control of	
11.5.02.01.3 UTILITY BUS	UTILITY BUS ACB	INPUT SHORT OR	*(SIMB AS 11.5.1.1.2)	SW SE TO AUTO-TRANSFRR TO NON-SAFRET BRLATED LIGHTING SWGR [SAMR AS 11.5.1.1.2]. PAULT WILL RESULT	01	(EAMB AS 11.1.1.2.5)		
		CEOURD		IN UNDERVOLTAGE CONDITION, CAUSING IFER SW &6 TO AUTO-TRANSPER TO NON-SAPETT RELATED LIGHTING SWGR			,	
11.5.02.01.3 UTILITE BUS	UTILITY BUS ACB	INPUT SHORT OR GROUND	*(SAHB AS 11.5.1.1.2)	(SAME AS 11.5.1.1.2). FAULT WILL RESULT IN UNDERVOLTAGE CONDITION, CAUSING IFEE SW 36 TO AUTO-TRANSFEE TO NON-SAFETT		(SAMP AS 11.1.1.2.1)		
11.5.02.03.1 UTILITY BUS	8-1502 (BREABBR)	OPEN	*POTENTIAL UNISOLABLE DIVERSION OF SI/RCS LHVENTORY TO RODY, HOME FOR INJECTION OR CLE FLOW DUB TO CONTINUED	BRLATED LIGHTING SWGR SRB ITEM 2.4.28.4.1	01	(SAHR AS 11.1.1.2.5)	•	
11.5.02.19.1 UTILITY BUS	8-1518	OFRI	FUNCTIONING OF RCP SEALS  POTENTIAL LOSS OF CLR PUMPING	SBB ITEMS 1.4.16.31.1, 2.4.27.4.1,	01	(SAME AS 11.1.1.2.5)		
1476'01'05'1'A114F BA8"46Ve	(BRBAGBR) AUTO IPBR SW (INVERTER #5)	Mosmar	CAPABILITY FOR SBLOCA BEDUCED BELIABILITY OF VITAL BUSSES 15/5 ECCS LOADS	3.2.12.11.1 PTROW SPRC ACTION ENTRY REQUIRED FOR THIS FAILURE. MANUAL TRANSFER SWITCH AVAILABLE BUT NOT CREDITED	_31	(SAME 48 11.1.1.2.1)		
11.6.01.02.3 VITAL BUS 45/6	AUTO IFER SW (INVERTER #5)	CONTACIS OVEN	ICLE FLOW TO 1/3 BCS LOOPS WOULD BE INCREASED PER PROCEDURE, RESULTING IN CLEAND CLEARLY FLOW INSULANCE,	SEB 178HS 1.4.9.11.1, 1.4.11.5.1, 2.4.24.3.1, 3.1.11.3.1, 3.2.19.3.1, 4.2.3.2.1, 8.2.8.2.1	08	(SAME AS 11.3.1.2.3)	· · · · · · · · · · · · · · · · · · ·	
			POTENTIALLY RICEBOING RECIRC PUMP LIMITATIONS. TRAIN B SEQUENCER AND APW INOFERABLE, LOSS OF SECONDARY RECIRC TO S/G A/B/C APTER MFW FP TRIPPED					
11.6.01.02.3 VITAL BUS 45/6	AUTO EPER SU (INVERTER #5)	CONTACTS OPEN	CLE FLOW TO 1/3 RCS LOOPS WOULD BE INCERASED PER PROCEDURB, RESULTING IN CLE AND CLE/BLE FLOW INBALANCE,	SEB ITEMS 1.4.9.11.1, 1.4.11.5.1, 2.4.24.3.1, 3.1.11.3.1, 3.2.17.3.1, 4.2.3.2.1, 8.2.8.2.1	i2	(SAME AS 11.1.1.10.1)		
<u> </u>			POTENTIALLY BECREDING RECIEC PUMP LIBITATIONS. TRAIN B SEQUENCER AND AFW INOPERABLE, LOSS OF SECONDARY RECIEC TO					
11.6.01.02.4 VITAL BUS \$5/6	AUTO IPRE SW (INVERTER 45)	CONTACTS CLOSED	S/G 1/B/C AFTER HPW PP TRIPPED (SAHE AS 11.6.1.2.2)	ITECH SPEC ACTION ENTRY REQUIRED WITH THIS FAILURE		(SAHB AS 11.1.1.2.1)		
11.6.01.02.5 VITAL BUS #5/6	AUTO IFER SW (INVERTER #5)	CONTACTS GROUNDED	*(SAME AS 11.6.1.2.3)	(SAMB AS 11.6.1.2.3)	08	(SAME AS 11.3.1.2.3)		
11.6.01.02.5 VITAL BUS 15/6	AUTO IPBR SW (INVERTER 45)	CONTACTS GROUNDED	*(SAMB AS 11.6.1.2.3)	(SAME AS 11.6.1.2.3)	12	(SAME AS 11.1.10.1)		

No. (90)

# LEFECTACY CORE COOLING SYSTEM SINGLE FAILULE AMALTSIS. SAN OMOFEE UNIT 1 ACTION LIBERS FOR SIGNIFICANT PINDINGS

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						T ACTION ITEM RESP DISCIP	LINE -
1.6.01.03.3 VITAL BUS #5/6	MANUAL TEER SW	CONTACTS OPEN	1(SAHB AS 11.6.1.2.3)	10.400 -0.00 -0.00			
	(INVESTED AS)		•			(SAMB AS 11.3.1.2.3)	
1.6.01.03.3. VITAL BUS 85/6	MANUAL IFER SM . (INVERTER AS)	CONTACTS OPEN		(SAHR AS 11.6.1.2.3)	-12	- (SAEB AS: 11.1.1.10.1)	
1.6.01.03.4 VITAL BUS 45/6	MANUAL IFER SW (INVERTER 45)		(SAMB AS 11.6.1.2.2)	STECH SPEC ACTION BUTET REQUIRED WITH	34	•	
1.6.01.03.5 WITAL BUS \$5/6	MANUAL IPRR SW (INVERTER AS)	CONTACTS GROUNDED	*(SANE AS 11.6.1.2.3)	(SAMB AS 11.6.1.2.3)	08	(SAME AS 11.3.1.2.3)	
.6.01.03.5.VITAL.BUS.65/6.	HANDAL IFER SY (INVERTER AS)	CONTACTS . GROUNDED .	_!(SAUR_AB_11.6.1.2.3)	(SAME AS 11.6.1.2.1)	_12	(SANR AS 11.1.1.10.1)	
1.6.02.01.1 VITAL BUS #5			ECLE FLOW TO 1/3 RCS LOOPS WOULD BE INCREASED PER PROCEDURE, RESULTING IN	SBB (TEMS 1.4.9.1).1, 2.4.24.3.1, 3.1.11.3.1, 3.2.11.2.1, 4.2.3.2.1,	08	(SABB AS 11.3.1.2.3)	
			CLB AND CLR/RLR PLOW IMBALANCE, POTRWIIALLY BECREDING RECIRC PUMP	8.2.8.2.1			
.6.02.01.3 VITAL BUS 45	VITAL BUB 45 ACB		ALSO INOPERABLE 3(SAHE AS 11.6.1.2.3)	(SAME AS 11.6.2.1.1). PAULT WILL CAUSE CONCURRENT LOSS OF WITAL BUS 26	08	•	
.6.02.01.3 VITAL BUS 45	VITAL BUS AS ACB		*(9AHE A9 11.6.1.2.3)	(SAMB AS 11.6.2.1.1). PAULT WILL CAUSE CONCURRENT LOSS OF VITAL BUS #6		(SAME AS 11.1.1.10.1)	
.6.02.04.1 VITAL BUS 15	8-290) (BBBARER)	OPBN	ICLE FLOW TO RCS LOOP A WOULD BE INCREASED PER PROCEDURE, RESULTING IN CLE AND CLE/BLE FLOW IMBALANCE.		. 98	[SARR AS 11.3.1.2.3]	
		•	POTENTIALLY BECERDING RECIEC PUMP	The second secon			
6.03.01.3 VITAL BUS 46	VITAL BUS SE ACB	INPUT SHORT OR Ground	*(SAHR AS 11.6.1.2.3)	(SAME AS 11.6.1.2.3). FAULT WILL CAUSE CONCURRENT LOSS OF VITAL BUS AS	08	(SAMB AS 11.3.1.2.3)	
6.03.01.3 VITAL BUS 46	VITAL BUS \$6 ACB	IMPUT SHORT OR GROUND	*(SABE AS 11.6.1.2.3)	(SAME AS 11.6.1.2.3). PAULT WILL CAUSE CONCURRENT LOSS OF VITAL BUS 45	12	(SAMB AS 11.1.1.10.1)	
.1.01.01.1 <u>.C3A3 .INVBBTBR</u>	LNYBRTBR8_A/B	IMPUT OPRM	WILL ACTUATE UPON SEQ \$1 SIS/SISLOP (DUB	SECT BRY BEQUIEED TO WARN OPERATORS THAT		NO PURTURE ACTION REQUIRED. SUBSEQUENT ROL BRY NOW ADDRESSES THIS ISSUE	
<u>-</u>	<del></del>		SIGNALS PROB PAILED BELATED. TRAIN B. CLB	2.4.23.1.1, 5.2.4.5.1, 5.2.6.6.1, 9.2.1.5.1, 9.2.2.5.1, 9.2.1.5.1			

## EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPER UNIT 1 ACTION ITEMS FOR SIGNIFICANT PINDINGS

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	ICB ID COMPONENT ID	- FAILURE MODE	BEFRET ON BCCS	REMARES	BRPORT LTRM		GESP DISCIPLINE
	NG LIMITING	OPBO	INOPERABILITY OF TRAIN A FOR SIS DURING OG TESTING, NOWE FOR SIS DURING NORMAL OPERATION OR FOR SISLOP		21.1	IMPLEMENT MMP 1-3634 TO CHANGE DG LOADING LOGIC PROM SISLOP TO SISLOB	CONTROLS
2.1.01.01.2 I-WINDI	NG LIMITING	SHORT	POTENTIAL INOPERABILITY OF TRAIN A DURING DG TESTING, NONE FOR NORMAL OPERATION	TRUE SPEC ACTION SHIEF REQUIRED FOR DG	21	(SAHR AS 12.1.1.1.1)	
2.1.02.01.1 152-1RE (BRBAES		OPEN	INOPERABILITY OF TRAIN A FOR 318. NO REPERT FOR SISLOP	FINCLUDES CONTROL BOOM BANDSWITCH BS-123. TECH SPEC ACTION ENTRY REQUIRED POR TRIS CONDITION (EG. DURING DG	21.2	PERFORM CALCULATION TO DETERMINE CONDITIONS (EG. GRID VOLTACE) UNDER WHICH SIS LOADING IS ACCEPTABLE WITE REACTOR RYPASS APPARER OPEN	BLBCTRICAL
2.1.02.01.L 152-1RI (BRBARB	I	OPBN	INOPRESELLITE OF TRAIN A FOR SIS. NO	SURVBILLANCE) BECAUSE OF SUS VOLTAGE DEGRADATION VEICE WOULD OCCUR ON SIS PINCLUDES CONTROL ROOM BANDSWITCH HS-123. TECH SPEC ACTION ENTER REQUIRED FOR THIS CONDITION (BG. DURING DG		ISBUR TROU SPEC CLARIFICATION ON REACTOR APPASS Brbarer erquirements	ONL
2.1.02.02.1 152-122 (BREAKE	BlB. CONTACT	OPBN	(SAMB AS 12.1.2.1.1)	SURVBILLANCE) BECAUSE OF BUS VOLTAGE DEGRADATION WEICH WOULD OCCUB ON SIS *TECH SPEC ACTION ENTEY REQUIRED FOR DG LOAD TESTING		(SAME AS 12.1.2.1.1)	
.1.02.02.2 152-181 BRBAER .1.02.03.1 152-181	b' CONTACT	CLOSED	(SAME AS 12.1.2.1.2)	NORMAL POSITION. TECH SPEC ACTION ENTRY REQUIRED FOR DG LOAD TESTING		(SAME AS 12.1.2.1.1)	
.1.02.03.2 152-181 (BRBARR .1.02.03.2 152-181	CBLL SWITCH 152-11C14	CLOSED	(SAME AS 12.1.2.1.2)	TRUE SPEC ACTION ENTER ENQUIRED FOR DG. LOAD TESTING *NORMAL POSITION. TECH SPEC ACTION ENTER REQUIRED FOR DG LOAD TESTING		(SAMR AS 12.1.2.1.1) (SAMR AS 12.1.2.1.1)	
.1.02.04.1 152-1RI (BREACE			INOPERIBILITY OF TRAIN A WITH BYPASS BREAKER HISPORITIONED	STRCE SPEC ACTION ENTRY REQUIRED WITH BTPASS BREAKER HISPOSITIONED	21	(SANB AS 12.1.2.1.1)	
.1.03.01.1 152-11C	2 BREAKER	OPEN	INOPERIBILITY OF TRAIN A FOR SIS, NOME FOR SISLOP	*MORNAL PREDER BERARE FOR BUS \$1C. TECH SPEC ACTION ENTET REQUIRED FOR THIS CONDITION DUR TO INABILITY OF ALTERNATE	35.1	VERIFY LICENSING BASIS BEQUIREMENTS FOR ALTERNATE OPPSITE SOURCE RE: CAPABILITY TO START/POWER ECCS LOADS, AND OBTAIN TECH SPEC RELIEF IF REQUIRED	LICENSING
.1.01.01.1.152-11C1 (BRRARRI	BRDATER	OPEN	INOPERABILITY OF TRAIN A FOR SIS. NONE- FOR SISLOP	OPPSITE SOURCE TO MAINTAIN ADEQUATE BUS VOLTAGE DURING SIS LOADING TRANSIENT	35.2	ISSUE TECH SPEC CLARIFICATION TO BEQUIRE ACTION STATEMENT ENTEY FOR BUS IC OR 2C INOPERABLE WHENEVER REREGIZED PROM A/B IPER	ONF
1.03.01.2 152-11CC	2 BRPAGBR	CLOSED	*INOPSEABILITY OF TRAIN A FOR SISLOP, INOPSEABILITY OF TRAIN B FOR SISLOP WITH	OPPRITE SOURCE TO MAINTAIN ADROUATE BUS VOLTAGE DURING SIS LOADING TRANSIENT NORMAL POSITION	21	(SARE AS 12.1.1.1.1)	
.1.03.02.1 152-11CG (BRBARRE		CONTACTS OF BRE	DEGRADED GRID CONDITIONS, MOME FOR SIS *(SAME AS 12.1.3.1.2)	RBLAT ACTUATED BY SEQ   OR BUS BIC UV	21	(SAME AS 12.1.1.1.1)	
.1.03.02.2 152-11C0 (BRBARKS	2 194 (RBLAT)	CONTACTS CLOSED (ON)	(SAMB AS 12.1.3.1.1)	SPECIAL 141-741  SURVEILLANCE TESTING MUST SPECIFICALLY CHBCE FOR RELAT CONTACT FAILURE, SINCE		NO FURTERS ACTION REQUIRED. RHOW \$6060000084 AND \$6000000085 ALREADY PERFORM THIS TESTING	The state of the s

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#### EMERCENCY CURE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 ACTION 17885 FOR SIGNIFICANT FINDINGS

•							
	DEVICE ID CO	DEPONENT ID	PAILURE MODE	BEFECT ON ECCS		BEPORT LTEM	ACTION LYRE RRSP DISCIPLING
	·						
2.1.03.03.2 152	<b></b>		CONTACTS CLOSED	INOPERABILITY OF TRAIN A FOR SIS, NONE	*TECH SPEC ACTION BUTET REQUIRED FOR	21	(SAHB AS 12.1.1.1.1)
(Bi	REARER) PRO1	TRCTIVE TRIPS		POR SISLOP OR IP BUS AIC EMERGIZED PROM ALTERNATE SOURCE VIA TIE BREAKER 11001	THIS CONDITION		
t.1.03.03.2 15; (8)		PMR PRCTIVE TRIPS	CONTACTS CLOSED	INOPERABILITY OF TRAIN A FOR SIS, NONE FOR SISLOP OR IF BUS AIC ENERGIZED PROM		35	(SAME AS 12.1.3.1.1)
				ALTERNATE SOURCE VIA TIE BREAKER 11CO1	1818 COMPLIAN		
.1.03.05.1 152		CONTACTS	CONTACTS OPEN	POTENTIAL LONG-TERM INOPERABILITY OF	PIECE SPEC ACTION ENTER REQUIRED FOR		NO PURTURE ACTION REQUIRED. BRISTING TECH SPEC
(61	REARE)				TRIS CONDITION. DROOP HODE REQUIRED FOR PARALLELED OPERATION TO PREMIT CONTROL		HONTBLY LOAD TESTING (SOI-12.3-10) INCLUDES REBREISING OF THIS PRATURE
				OPPRITE SOURCE WITHOUT LOSS OF ECCS	OF DG LOADING. DROP AND PICTUP OTHERWISE	···	PARECISIAN OF 1818 LOSIVAD
				LOADS	REQUIRED		
.1. <u>01.05.2</u> 158	R-11002 'a"	CONTACTS	CONTACTA CLOSED	UQPBRABILITE OF TRAIN A DG	STRUE SPEC ACTION BUTEY REQUIRED FOR		(SABE AS 12.1.3.5.1)
(BS	RBAEBR)				THIS PAILURE. NORMAL POSITION.		
					ISOCHRONOUS MODE BEQUIERD FOR LOB, LOP		
					OR SISLOP OPERATION TO ENSURE PROPER PREQUENCY FOR LOAD MOTOR PERFORMANCE		
.1.04.01.1 152	2-11404 RREA	LER	OPRN	TRAIN A ALTREMATE OPPSITE SQUECE		24.1	REVISE SGTE DOSE CALCULATIONS (AS NEEDED TO NUCLEAR
	BARBR)			INOPERABLE, RESULTING IN POTENTIAL	TO STUCHRONIZING MAIN GRN TO GRID. SCTB.		PRECLUDE CREDIT FOR RCPs) AS PART OF UPSAB CHAPTER
•				LONG-TERM INOPERABILITY OF TRAIN A FOR	DOSE CALC REV (TO PRECLUDE CREDIT FOR		15 RBANALTS19
				SISLOP DUB TO INABILITY TO TRANSPER BUS			
	·			AIC PROM DG TO OPPSITE SOURCE VITE	START BCPs PROM BUS A1C/2C	·	
				C-1PMR RELATED LOP	POST-SIS/SISLOP WITHOUT INTERRUPTION OF ECCS LOADS DUE TO VOLT TRANSIENT		
.1.04.01.1 152	K-11494BBBA	RRR	OPEN	TRAIN A ALTERNATE OPPSITS SOURCE		35.3	PREFORM CALCULATION TO DETERMINE CONDITIONS (EG. BLECTRICAL
	EARRE)		X: *F .	INOPERABLE, RESULTING IN POTENTIAL	TO STRCHRONIZING MAIN GEN TO GRID. SCTR		GRID VOLTAGE AND BUS LOAD) UNDER WHICH BCPs MAY BB
, ,	•			LONG-TERM INOPERABILITY OF TRAIN A FOR	DOSE CALC REV (TO PRECLUDE CREDIT FOR		RESTARTED FROM BUS 1C/2C WITH ECCS LOADS ALREADY
				SISLOP DUB TO INABILITY TO TRANSFER BUS			RUNNING
				SIC FROM DG TO OPPRITE SOURCE WITH	START RCPs PROM BUS \$1C/2C		
				C-IPME RELATED LOP	POST-SIS/SISLOP WITHOUT INTERRUPTION OF BCCS LOADS DUE TO VOLT TRANSIENT		
1.04.01.1 152	2-11AO4 BRBA	RPR	OPEN	TRAIN A ALTERNATE OFFSITE SOURCE	*NORMAL POSITION DURING PLANT S/U PRIOR	35.4	REVISE BOIS AS WEEDED TO REPLECT BLECTRICAL OPERATIONS
	(BARBR)			INOPERABLE, RESULTING IN POTENTIAL	TO STUCHBOUIZING MAIN GEN TO GRID. SGTR		CALCULATION RESULTS FOR RCP RESTART LIBITATIONS
				LONG-TERM INOPERABILITY OF TRAIN A FOR	DOSE CALC REV (TO PRECLUDE CREDIT FOR		
		•		SISLOP DUE TO INABILITY TO TRANSFER BUS		-31	
				HIC PROM DE TO OFFSITE SOURCE WITH	START RCPs PROM BUS \$1C/2C		•
				C-IPHR RELATED LOP	POST-SIS/SISLOP WITHOUT INTERRUPTION OF ECCS LOADS DUE TO VOLT TRANSIENT		
.1.04.02.2 152	-11464 RRY	(RBLAT)	CONTACTS CLOSED	NGNB :	*VERIFICATION REQUIRED THAT MAIN		NO FURTHER ACTION REQUIRED. BREAKER ANTI-PUMPING
	REARBR)		(ON)		GENERATOR UNDERVOLTAGE RELAY 2271		PREVENTS RECLOSE. BIISTING RMO. ALREADY PERFORM
					SETPOINT (40%) IS LOW ENOUGH TO PREVENT		TRATING OF THIS FRATURE
				• •	MOTOR-OPERATED DISCONNECT FAILURE DUE TO		
					FLASHOVER BY RESIDUAL OUTPUT OF		
1 64 63 3 153	11464 106	1, 186-2,	ON	TRAIN A ALTERNATE OFFSITE SOURCE	GRNBRATOR TRON SPRC ACTION BRITER REQUIRED FOR		NO FURTHER ACTION REQUIRED. ALREADY COVERED BY
2.1.04.03.2 152 /BR	:-11AU4 186- !EAEBB) 186-		V.B.	INOPERABLE, RESULTING IN POTENTIAL	THIS CONDITION		REQUIPMENT CONTROL LOCAR/ROME PROCESS AND
lòë		APS)		LONG-TERM INOPERABILITY OF TRAIN A FOR	inter Constitue		OPERABILITY ASSESSMENT FOR M.O.
	. 1000	-,		SISLOP DUE TO INABILITY TO TRANSPER BUS			
				AIC FROM DG TO OPPSITE SOURCE WITH			

C-IFHE RELATED LUP

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## EMERGRACY COER COOLING SYSTEM SINCLE FAILURE ANALYSIS SAM ONORPH UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

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		•				•
_1TEH	DEVICE 1D	COMPONENT ID	FAILURE MODE	APPROT ON RCCS	REPOR	
.1.04.04.2 1	152-11A04 (BRBAKER)	OTHER MAIN CEN MAIN/A/B-IPMR		(SAMB AS 12.1.4.3.2)	*TRCH SPRC ACTION ENTRY REQUIRED FOR THIS CONDITION. CONTACTS CLOSED ON OUT.OR. STEP OVERSPERS LOSE OF FIRED	(SAHE AS 12.1.4.3.2)
					DIFFERENTIAL, MEGATIVE PRASS SEQUENCE, STATOR GROUND, SUDDEN PRESSURE, OR OVERCURRENT	
.1.04.05.2 1	152-11404 (BREAKER)	194-2 (RBLAT)	CONTACTS CLOSED	(SAHE AS 12.1.4.3.2)	OTECH SPEC ACTION ENTER REQUIRED FOR	{SAME AS 12.1.4.3.2}
.1.04.06.1 1	,	"a" CONTACTS	CONTACTS OPEN	POTENTIAL LONG-TERM INOPERABILITY OF TRAIN A FOR SISLOP DUS TO INABILITY TO TRANSPER BUS SIC PROM DG TO OFFSITE	THECH SPEC ACTION ENTRY REQUIRED FOR THIS CONDITION. LOVATS AND RCP SLOW COASTDOWN NOT CREDITED IN \$18/818LOP EVENTS	NO PURTHER ACTION REQUIRED. RNO 96431215006 ALREADY PREPORMS OPERABILITY TESTING OF THIS PRATURE
	352-11404 BRBAEBR)	fat CONTACTS .	CONTACTS CLOSED		FROI RRY REQD: IFER FROM DG TO ALT	RVALUATE EOI CHANGES TO PRECLUDE DG DROOP IN OPERATIONS
	152-11A04 (BRFAEBR)	BUS \$1A 125VDC CONTROL POWER	VOLTS LOW	TRAIN A ALTREMATE OPPSITE SOURCE IMOPERABLE, RESULTING IN POTENTIAL LONG-TERM ENOPERABILITY OF TRAIN A POR	TECH SPEC ACTION BATHT REQUIRED FOR THIS CONDITION	(SAME AS 12.1.4.3.2)
				SISLOP DUB TO INABILITY TO TRANSPER BUS BIC PROM DG TO OPPSITE SOURCE WITH C-IPMR RELATED LOP		
.1.05.01.2 B	BUS 114 ISB LOADS	BERARER(S)	CLOSED	DURING PLANT S/U (W/ TIR BRER 11001	*NORMAL POSITION DURING POWER OPERATION. TECH SPEC ACTION ENTER REQUIRED WITH THIS PAILURE. PAILURE TO TRIP RCP4 SHOWN	(SAMB AS 12.1.4.3.2)
			· .	INOP, RESULTING IN POTENTIAL LONG-TERM INOP OF TRAIN A FOR SISLOP DUR TO INABILITY TO TRANSPER BUS AIC FROM DG TO	POR SIS BY BUS VOLTAGE CALC DC-3125 (DC-3225 FOR POST-DCP 3552	
.1.05.05.2 B _ N	IUS #14 ISB LOADS	194-2 (RELAY)	CONTACTS CLOSED (ON)	OPPSITE M/C-TENE LOP HOUR POR SIE/SISLOP	PERCLUDE CARDIT FOR ECPS. BOI REVISION REQUIRED TO ADDRESS POTENTIAL INABILITY	(SAMB AS 12.1.4.1.1)
	ISB LOADS	191=2 (RBLAT).	CONTACTS CLOSED (ON)	NONE FOR SIS/SISLOP	TO RESTART RCPS IN UNAPPROTED LOOPS	(SANT AS 12.1.1.1)
1.05.06.2 B	US #14 ISR LOADS	186-S13 (BBLAT)	CONTACTS CLOSED (ON)	MONE POR SIS/SISLOP	TO RESTART RCPS IN UNAFFECTED LOOPS  *SGTR DOSE CALC REVISION REQUIRED TO 24 PRECLUDE CREDIT FOR RCPS	
).05. <u>0</u> 7.1 B	US 114 ISB LOADS	BUS SIA 125VDC CONTROL POWER	VOLTS LOW	BRDUCED TRAIN A RESCRICAL MARGIM FOR SIS DURING PLANT S/U (W/ TIE BREE 11COL CLOSED). TRAIN A ALT OFFSITE SOURCE ALSO IMOP, CAUSING POTENTIAL LONG TERM IMOP	A. PAILURE TO TRIP RCPs SHOWN ACCEPTABLE	[SAMB AS 12.1.4.7.2]
				OF TRAIN A FOR SISLOP DUB TO INABILITY TO TRANSFER BUS \$1C FROM DG TO OFFSITB W/ C-TFME LOP	(DC-3225 FOR POST-DCP 3552	

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		BEMARES	REFECT ON ACCS	PAILURE BODE.	COMPONENT ID	
(SAME AS 12.1.1.1.1)		STRCH SPEC ACTION ENTRY REQUIRED MERNEVER BUS SIC OR 2C ENERGIZED FROM ALTERNATE OFFSITE SOURCE	TRAIM A ALTERNATE OFFSITE SOURCE EMOPERABLE, RESULTING IN POTENTIAL LONG-TERM INOPERABILITY OF TRAIM A FOR	CONTACTS CLOSED (ON)	194-2 (RBLAT)	12.1.06.01.2 BUS \$14 CONTROLS
		3	SISLOP DUB TO INABILITY TO TRANSPER BUS SIC PROM DG TO OPPSITE SOURCE WITH C-IPHE RELATED LOP. NOME FOR SIS MITE	. ,		
 (SAMB AS 12.1.4.1.1)	LOP	OP RESTART PROM BUS 11C/2C POST-S18/81SLOI		OPBN	8884888	12.1.07.01.1 152-11C01 (BRBARRS)
	GTR	SEVERE BUS UNDERVOLTAGE TRANSIENT. SCTU- DOSE CALC BRYISION REQUIRED TO PRECLUDI	TRANSPER BUS SIC PRON DG TO OPPSITE  SOURCE FOR C-1PMB RELATED LOP. RCPR A			
 (SAMB AS 12.1.4.1.1)			MAIN/A-IPME POST-SCTE TRAIN A ALTERNATE OPPSITE SQUECE INOP.	OPBN	8884886	12.1.07.01.1 152-11C01
 · · · · · · · · · · · · · · · · · · ·	CTR	TO PREVENT LOSS OF ECCS LOADS DUB TO 88YERS BUS UNDERVOLTAGE TRANSIENT. SCTI	TRIBM A POR SISLOP DUE TO INABILITY TO TRIBSPER AUG AIC PROM DG TO OFFSITE			(BREATER)
		CREDIT FOR ECP OPERATION	AND C CANNOT BE RE-ENERGIZED FROM MAIN/A-EPHR POST-SCTE		DODLESS	19 1 09 01 9 159 1100
 (BARK AS 17.1.1.1.1)	R TO	ALIGNMENT OF ALTERNATE OFFSITE SOURCE 1 BUS AIC. ROI CHANGE REQUIRED TO PRECLU	TRAIN A INDYRRABLE FOR SISLOP, REDUCED RELIABILITY FOR SIS	CLOSED	BARTER	(BREATER)
 (CAMP AG 19 1 4 1 1)	IBNT	ALIGNMENT TO PREVENT LOSS OF ECCS LOADS DUE TO SEVERE BUS UNDERVOLTAGE TRANSIES	TOLIN A FMADDOLDI P CAD CICIAD DENIARD	CLOSED	RDPAFRO	12 1 02 01 2 152-11001
 (onno ao 16.1.1.1.1)	<b>1</b> 10	ALIGNMENT OF ALTERNATE OPPSITE SOURCE 1 BUS AIC. ROL CHANGE REQUIRED TO PRECLU	RELIABILITY FOR SIS			(BRRAESE)
 (SAME AS 12.1.4.1.1)		ALIGNMENT TO PREVENT LOSS OF ECCS LOADS DUE TO SEVERE BUS UNDERVOLTAGE TRANSIES	TRAIN A INOPERABLE FOR SISLOP, REDUCED	CLOSED	BRBACRR	12.1.07.01.2 152-11001
		ALICHMENT OF ALTERNATE OFFSITE SOURCE 1 BUS BIC, BOI CHANGE BROUIERD TO PRECLUI RCP RESTART POST-SIS/SISLOP IN THIS	RELIABILITY FOR SIS	-		(BRBARR)
 (SAMB AS 12.1.4.3.2)	ERNT	ALIGNMENT TO PERVENT LOSS OF ECCE LOADS DUB TO SEVERE BUS UNDREVOLTAGE TRANSIES *TECH SPEC ACTION ENTRY REQUIRED WITH	INOPERABILITY OF TRAIN A ALTERNATE	CONTACTS CLOSED	SBQ 1	12.1.07.01.2 152-11C01
 	·		LONG-TERM INOPERABLLITY OF TRAIN A FOR SISLOP DUR TO INABILITY TO TRANSPER BUS	(ON) .	(13-9,11)	(BRBARSR)
 (SABE AS 12.1.3.1.1)		BUS AIC ENERGIZED FROM ALTERNATE OFFSI	C-IPME RELATED LOP REDUCED RELIABILITY OF TRAIN A FOR SIS DURING PLANT STARTUP (WITH BUS \$1A/IC TIB BREE CLOSED), WONE FOR SISLOP DUE TO	CONTACTS CLOSED (ON)	194 (kBLAY)	12.1.67.68.2 152-11C01 (BREARPR)
(SAME AS 12.1.4.1.1) (SAME AS 12.1.4.1.1) (SAME AS 12.1.4.1.1)	CP 35 LOP GTR UDB 21 R TO LUDR ADS IRNT 24 R TO LUDR ADS IRNT 35 R TO LUDR ADS IRNT 35 R TO LUDR ADS IRNT 35 R TO LUDR ADS IRNT 35 R TO LUDR ADS IRNT 35 R TO LUDR ADS IRNT 35 R TO LUDR ADS IRNT 8	DOSE CALC BRYISION REQUIRED TO PERCLUDIC CREDIT FOR ECP OPERATION  PROI REYISION REQUIRED TO PERCLUDE RCP OF RESTART FROM BUS &IC/2C POST-SIS/SISLO) TO PERVENT LOSS OF ECCS LOADS DUE TO SEVERE BUS UNDERVOLTAGE TRANSIENT, SCTI DOSE CALC REVISION REQUIRED TO PERCLUDIC CREDIT FOR ECP OPERATION  NORMAL DURING PLANT STARTUP OR ALIGNMENT OF ALTERNATE OFFSITE SOURCE TENSIFIED FOR THE START POST-SIS/SISLOP IN THIS ALIGNMENT TO PERVENT LOSS OF ECCS LOADS DUE TO SEVERE BUS UNDERVOLTAGE TRANSIES ALIGNMENT OF ALTERNATE OFFSITE SOURCE TO SUSTAIL DESTAIL POST-SIS/SISLOP IN THIS ALIGNMENT TO PERVENT LOSS OF ECCS LOADS DUE TO SEVERE BUS UNDERVOLTAGE TRANSIES HORMAL DURING PLANT STARTUP OR ALIGNMENT TO PERVENT LOSS OF ECCS LOADS DUE TO SEVERE BUS UNDERVOLTAGE TRANSIES HORMAL DURING PLANT STARTUP OR ALIGNMENT OF ALTERNATE OFFSITE SOURCE TO SEVERE BUS UNDERVOLTAGE TRANSIES ALIGNMENT TO PERVENT LOSS OF ECCS LOADS DUE TO SEVERE BUS UNDERVOLTAGE TRANSIES TECH SPEC ACTION ENTER ERQUIRED WITH THIS FAILURE  S  **TECH SPEC ACTION ENTER REQUIRED WITH THE SPECH SPEC ACTION ENTER REQUIRED WITH THE SPECH SPEC ACTION ENTER REQUIRED WITH THE SPECH SPEC ACTION ENTER REQUIRED WITH THE SPECH SPEC ACTION ENTER REQUIRED WITH THE SPECH SPEC ACTION ENTER REQUIRED WITH THE SPECH SPEC ACTION ENTER REQUIRED WITH THE SPECH SPEC ACTION ENTER REQUIRED WITH THE SPECH SPEC ACTION ENTER REQUIRED WITH THE SPECH SPEC ACTION ENTER REQUIRED WITH THE SPECH SPEC ACTION ENTER REQUIRED WITH THE SPECH SPEC ACTION ENTER REQUIRED WITH THE SPECH SPECK ACTION ENTER REQUIRED WITH THE SPECH SPECK ACTION ENTER REQUIRED WITH THE SPECH SPECK ACTION ENTER REQUIRED WITH THE SPECK SPECK ACTION ENTER REQUIRED WITH THE SPECK SPECK ACTION ENTER REQUIRED WITH THE SPECK SPECK ACTION ENTER REQUIRED WITH THE SPECK SPECK ACTION ENTER REQUIRED WITH THE SPECK	AND C CANNOT BE RE-EMERGIZED FROM  AND C CANNOT BE RE-EMERGIZED FROM  MAIN/A-IPME POST-SCTE  TRAIN A ALTERNATE OPPSITE SOURCE INOP.  RESULTING IN POTENTIAL LONG-TERM INOP OP  TRAIN A POR SIBLOP DUE TO IMABILITY TO  TRANSPER AND SIC FROM DG TO OPPSITE  SOURCE POR C-IPME RELATED LOP. RCPS A  AND C CANNOT BE RE-EMERGIZED FROM  MAIN/A-IPME POST-SCTE  TRAIN A INOPERABLE FOR SISLOP, REDUCED  RELIABILITY FOR SIS  TRAIN A INOPERABLE FOR SISLOP, REDUCED  RELIABILITY FOR SIS  INOPERABILITY FOR SIS  INOPERABILITY FOR SIS  INOPERABILITY FOR SIS  INOPERABILITY FOR SIS  COFFSITE SOURCE, RESULTING IN POTENTIAL  LONG-TERM INOPERABILITY OF TRAIN A FOR  SISLOP DUE TO IMABILITY TO TRANSPER BUS  AIC PROM DG TO OPPSITE SOURCE WITH  C-IPME RELATED LOP  REDUCED RELIABILITY OF TRAIN A FOR SIS  DURING PLANT STARTUP (WITH BUS \$1A/IC	CLOSED  CLOSED  CLOSED  CONTACTS CLOSED  (ON)	BRRATER  BRRATER  SEQ 1 (13-9,11)	[BRRAER]  12.1.07.01.2 152-11C01 (BRRAER)  12.1.07.01.2 152-11C01 (BRRAER)  12.1.07.01.2 152-11C01 (BRRAER)

	LTEM # .	DEVICE. 1D	COMPONENT 1D	PAILURE MODE	BFFBCT ON BCCS		RBPORT ltem		
•				• •••••					
	12.1.07.09.1	152-11COL (BREAKER)	"A" CONTACTS	OPBN	POTENTIAL LONG-TERM IMOPERABILITY OF TRAIN A FOR SISLOP DUR TO IMABILITY TO TRANSFER BUS AIC PROM DG TO OPPSITE	INDEMAL POSITION DURING POWER OPERATION. THEE SPEC ACTION RETEY REQUIRED FOR THIS FAILURE, DROOP MODE REQUIRED TO CONTROL		(SAME AS 12.1.4.6.1)	
					SOURCE WITH C-IPME RELATED LOP. MOME FOR	DG LOAD WHEN PARALLELED TO OPPSITE SOURCE. OTHERWISE DROP AND PICEUP REQUIRED			
	12.1.07.12.1	152-11C01 (BRBAERE)	BUS \$1C 125VDC CONTROL POWER	VOLTS LOW	INOPERABILITY OF TRAIM A FOR SISLOP, AND TRAIM B FOR SISLOP WITE TRAIM A ALIGNED TO ALTERNATE OPPSITE SOURCE		21	(SAMB 45 12.1.1.1.1)	
						SINGLE FAILURE, THES SPEC 3.0.3 ACTION ENTRY IS REQUIRED WRREEFER BUS AIC OR 2C 18 ALIGHED TO THE ALTERNATE OPPSITE SOURCE			
	12.1.02.12.1	.152-11601 (BRBAEBE)	BUS AIC 125VDC CONTROL POWER	VOLTS LOW	INOPERABILITY OF TRAIN A FOR SISLOP	ASINCE MAIN GRAPEATOR COASTDOWN ON APPECTED BUSSES PREVENTS SISLOP DETECTION, WITE OR WITHOUT A CONCURRENT		[SAMB_AS_12.1.3.1.1]	
						SINGLE PAILURE, TROE SPEC 3.0.3 ACTION ENTRY IS REQUIRED WERNEVER BUS AIC OR 2C IS ALIGNED TO THE ALTERNATE OPPSITE SOURCE			
	12.1.09.01.1		BRBAKER	OPSM	*TRAIN A RCCS INOPRRABLE, TRAIN S CLR UBAT REMOVAL DEGRADED DUE TO UNISOLABLE	SST \$1 4LV PREDER BRIE. SEE 17EMS 6,1.4.2.1 AND J.1.3.2.1. ADDITIONALLY.		VBRIFF CURRENT BOI FLOATING STRPS ADEQUATBLY OPERATIONS ADDRESS SI/PM TERMINATION WITH 1254DC BUS FAILURE	,
					BYPASS THROUGH IDLE CCV HI	ROI REVISION REQUIRED TO TRIP TRAIN A SI/FW PUMPS PRIOR TO LOSS OF 125VDC BUS \$1 FOR THIS PAILURE, TO RUSURE SI			
	12.1.09.01.1	152-11C10 (BREAKER)	BREATER	OPBN	TRAIN A BCCS INOPERABLE, TRAIN B CLR HRAT BRHOVAL DECRAPED DUE TO UNISOLABLE	TRREINATION AT LO-LO BWST LEVEL SETPOINT SST \$1 4kV FEEDER BREE. SEE ITEMS 6.1.4.3.1 AND 7.1.3.2.1. ADDITIONALLY,	15	COMPLETE CALCULATION (DC-3410) TO DETERMINE MECHANICAL ACCEPTABILITY OF SWC/CCWN1 BYPASSED CONFIGURATION	
·   ·					BYPASS THROUGH IDLE CCW HI	EOF REVISION REQUIRED TO TRIP TRAIN A SI/FW PURPS PRIOR TO LOSS OF 125VDC BUS AT FOR THIS FAILURE, TO EMBURE SI		<u> </u>	
!	12.1.09.01.2	152-11C10 [BRBAKER]	BRIATER	CLOSED	NORB	TRRMINATION AT LO-LO RUST LEVEL SETPOINT FECH SPEC ACTION ENTET REQUIRED IF 480V SUGE 41 EMERGIZED FROM BUS 1-3 715		NO PURTERS ACTION BEQUIRED. COMPIGURATION BLIMINATED BY DCP 1-3552, NEW COMPIGURATION	
:						BREAKER IN LIKU OF SST \$1 VIA THIS BREAKER		CONTROLLED BY AMENDMENT \$134 (PCM-217) PER SO1-3-3	ŀ
-	_ 12.1,12, <u>06.1</u>	BUS &IC UNDERVOLTAGE AND CONTROL	SEQ 1 (15-9,11)	CONTACTS OPEN (OPP)	INOPERABILITY OF TRAIN A FOR SISLOP, NONE FOR SIS	PHORMAL POSITION. MAINTAINED TRIP SIGNAL REQUIRED FOR MER LOADS TO PREVENT START POST-SIRLOP, COMP PPS, BTR DR PP, TPCW	<u> 15.6</u>	EVALUATE CONTINUED ACCEPTABILITY OF NO MAINTAINED ELECTRICAL LOCEOUT ON SIS AND SISLOP FOR MSR LOADS AS PART OF INTEGRATED RESOLUTION OF SRP TOPIC VI-7.C.2.  [CONFIGURATION ACCEPTABLE UNTIL THEM BASED ON	
						PP AND BUS \$1A/1C TIE BREE ARE LOCEED OUT BY SEPARATE MAINTAINED SEQ CONTACTS OR OVERLOAD LOCEOUT RELAY ACTUATION	-	AMENDHENT 38 SECTION 1.3.7.1]	
		BUS AIC UNDERVOLTAGE AND CONTROL	194-1 (Belats)	CONTACTS CLOSED (CM)	INOPERABILITY OF TRAIN A	LOCKOUT NOT CURRENTLY PROVIDED FOR USE LOADS, BECEPT THOSE RECEIVING A SEPARATE MAINTAINED SISLOP SIGNAL (BG. CONDENSATE AND HEATER DRAIN PP) OR SISLOP ACTUATION OF OVERLOAD LOCKOUT (BG. TPCW)	3	(SAMB AS 12.1.12.6.1)	

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118#. # · · ·	DBVICB.1D	COMPONENT ID	- FAILURE MODE			REPORT ITEM	ACTION ITEM	
	T-WINDING CURRENT LIMITING RRACTOR		OPEN	DG TESTING, MONE FOR SIS DURING MORNAL		21	(SAMB AS 12.1.1.1)	
12.2.01.01.2	T-WINDING CURRENT LIMITING		SHORT	POTENTIAL INOPERABILITY OF TRAIN B DUBING DG TESTING, NOME FOR NORMAL OPERATION	*TECH SPEC ACTION BUTET REQUIRED FOR DG LOAD TESTING	21	(SANB AS 12.1.1.1.1)	·
12.2.02.01.1	152-1RY1 (BRBAEBR)	BREATER	OPRN	INOPERABILITY OF TRAIN B FOR SIS. NO BYPECT FOR SISLOP	HS-167. TECH SPEC ACTION BUTET REQUIRED		(SAMB AS 12.1.2.1.1)	
12.2.02.02.1	152-1RTI	152-12015	OPEN .	(SAME AS 12.2.2.1.1)	SURVEILLANCE) BECAUSE OF BUS VOLTAGE DEGRADATION WHICE WOULD OCCUR ON SIS ATECH SPEC ACTION RATES REQUIRED FOR DG	21	(SAMB AS 12.1.2.1.1)	_
	(BRBARRR) 152-1871	"b" CONTACT 152-12C15 "h" CONTACT	CLOSED	(SAME AS 12.2.2.1.2)	LOAD TESTING *MORHAL POSITION. TECH SPEC ACTION ENTRY	21	(SAME AS 12.1.2.1.1)	
12.2.02.03.1	152-1RY1 (BRBAEER)	152-12C15 CBLL SWITCH	OPEN	(SAMB AS 12.2.2.1.1)	STECH SPRC ACTION BUTHY BEQUIRED FOR DC LOAD TRESTING	21	(SAME AS 12.1.2.1.1)	
12.2.02.04.1	(BRBAKER) 152-1871	CELL SWITCE BUS #2C 125VDC	VOLTS LOW	INOPERABILITY OF TRAIN B WITH STPASS	REQUIRED FOR DG LOAD TESTING TECH SPEC ACTION ENTRY REQUIRED WITH	21	(SAHE AS 12.1.2.1.1) (SAHE AS 12.1.1.1.1)	
12.2.03.01.1	152-12002	(012C15) BREAKER	OPEN	INOPERABILITY OF TRAIN B POR SIA, NOME	SHORMAL PREDER BREAKER FOR BUS \$20. TROP	1 15	(SAHE AS 12.1.3.1.1)	
	(BREATER)			POR SISLOP	CONDITION DUE TO INABILITY OF ALTERNATE OFFSITE SOURCE TO MAINTAIN ADEQUATE BUS			
12.2.03.01.2	152-12C02 (BRBAERR)	BREAGER	CLOSED	SINOPERABILITY OF TRAIN B FOR SISLOP, INOPERABILITY OF TRAIN A FOR SISLOP WITE			(SAME AS 12.1.1.1)	
12.2.01.02.1	152-12C02 (BRBASER)	194-4 (RBLAT)	CONTACTS OPEN (OFF)	DEGRADED GRID CONDITIONS, NOME FOR SIS_ S[SAME AS 12.2.3.1.2]	RELAT ACTUATED BY SEQ 2 OR BUS \$2C UV			
1 <u>2.2.01.0</u> 2.2	152-12CO2 (BREAKER)	<u> 194-4</u> (RBLAT)	CONTACTS CLOSED (ON)	(SAMR AS 12-2-3-1-1).	SUBVEILLANCE TESTING MUST SPECIFICALLY CHECK FOR RELAY CONTACT FAILURE, SINCE TOR PREVENTS RETRIP IF BREE SUBSEQUENTLY RECLOSED			
12.2.03.03.2	152-12CO2 (BRRAEBR)	C-IPMR PROTECTIVE TRIPS	CONTACTS CLOSED	INOPERABILITY OF TRAIN B FOR SIS, NONB		21	(SAMB AS 12.1.1.1.1)	
	152-12CD2 (BRBAEBR)	C-EPMB PROTECTIVE TRIPS	CONTACTS CLOSED	INOPERABILITY OF TRAIN B FOR SIS, MONE FOR SISLOP	ADRQUATE BUS VOLTAGE DUBING SIS LOADING TRANSIENT  *TECH SPEC ACTION ENTER REQUIRED FOR THIS CONDITION DUE TO INABILITY OF ALTERNATE OPPSITE SOURCE TO MAINTAIN	35_	[SAMB AS ]2.1.3.1.1]	
				•••	AUBQUATE BUS VOLTAGE DURING SIS LEADING		والمرابع والمعادرة والمستور سيسو	

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-  -  -		DBVICE I	D COMPONENT 1D	FAILURE MODE	BPFRCT ON BCCS	BEMARES	REPORT	ACTION 17RM .	RESP. DISCIPLINE	<del></del>
-	12 4 83 05 1	169 19000	5 B 00000000							
	12.2.03.05.1	(BRBARRE)	"A" CONTACTS	CONTACTS OPEN	POTENTIAL LONG-TERM INOPERABILITY OF TRAIN B DUE TO INABILITY TO TRANSFER BUS \$2C FROM DG TO ALTERNATE OR NORMAL	*TECH SPEC ACTION ENTRY REQUIRED FOR THIS CONDITION. DROOP MODE REQUIRED FOR PARALLELED OPPRATION TO PERMIT CONTROL		AHB A8 12.1.3.5.1)		l
	12.2.03.05.2	152-12002	"a" CONTACTS	CONTACTS CLOSED	LOIDS	OF DG LOADING. DROP AND PICEUP OTBERWISE REQUIRED STECK SPEC ACTION ENTRY REQUIRED FOR	15	SAME AS 12.1.3.5.11		
		(BREARER)				TRIS PAILURE. NORMAL POSITION. ISOCRRONOUS HODE REQUIRED FOR LOB, LOP				
	12.2.04.01.1	152-11804	BRBAERR	OPBN	TRAIN & ALTERNATE OPPSITE SOURCE	OR SISLOP OPERATION TO RESURE PROPRE PROPRE CANDIDATE OF LOAD MOTOR PERFORMANCE FROM POSITION DURING PLANT S/U PRIOR	24 (5	SAMB AS 12.1.4.1.1)		
	<del></del>	(BREAGER)			LONG-TERM INOPERABILITY OF TRAIN B FOR	TO STUCERONIZING MAIN GRE TO GRID. SGTR DOSE CALC REV (TO PRECLUDE CREDIT FOR RCPs) AND BOI REV REQD SINCE CANNOT				
						START RCPA FROM BUS \$10/20 POST-SIS/SISLOP WITHOUT INTERRUPTION OF RCCS LOADS DUR TO VOLT TRANSIENT				<del></del>
		152:11804 (BREAESE)	BRRAKER	OPBN .	INOPERABLE, RESULTING IN POTENTIAL	ENORMAL POSITION DURING PLANT S/U: PRIOR TO STNCERONIZING MAIN GRN TO GRID. SCTR DOSE CALC RRY (TO PRECLUDE CREDIT FOR	. 35 (8	BAMB AS. 12.1.4.1.1)		
A    -  -					SISTOP DUE TO INABILITY TO TRANSPER BUS AZC PROM DG TO OPPSITE SOURCE WITH	RCPs) AND BOL RBY RPQD SINCE CANNOT START RCPs FROM BUS \$10/20	· <del>-</del> ·			
	12.2.04.02.2		BBI (RBLAY)	CONTACTS CLOSED	C-19MB RELATED LOP	POST-SIS/SISLOP WITHOUT INTERRUPTION OF SCCE LOADS DUE TO YOLF TRANSIENT *VERIFICATION REQUIRED THAT MAIN	(	SAME AS 12.1.4.2.2)		
		(BRBACER) 		(OM)		CEMERATOR UNDERVOLTAGE RELAT 2271 SETPONT (1921) IS LOW EMOUGH TO PREVENT MOD PAILURE DUE TO PLASHOVER BY RESIDUAL				
	12.2.04.01.2		186-3 <u></u> 186-3A, 186-4	ON	TRAIN B ALTERNATE OFFSITE SOURCE	CRNERATOR OUTPUT TECS SPEC ACTION ENTET REQUIRED FOR THIS CONDITION	ti	SAME AS 12.1.4.3.21.		
 			(RBLATS)		LONG-TERM INOPERABILITY OF TRAIN & FOR SISLOP DUE TO IMABILITY TO TRANSFER BUS AZC FROM BG TO OFFRITE SOURCE WITH					
	12.2.04.04.2		OTHER MAIN GEN		C-IPMR RELATED LOP  (SAME AS 12.2.4.3.3)		(:	SAME AS 12.1.4.3.21		ļ
,-,-		(BREAEER)	MAIN/A/B-IPHR PROTECTIVE TRIPS			THIS CONDITION. CONTACTS CLOSED ON OUT-OF-STEP, OVERSPEED, LOSS OF FIELD, DIFFERENTIAL, NEGATIVE PRASE SEQUENCE,				
	12.2.04.05.2	152-11804	194-3 (RELAT)	CONTACTS CLOSED	(SAMR AS 12.2.4.3.2)	STATOR GROUND, SUDDEN PRESSURE, OR OVERCURENT STECH SPEC ACTION ENTRY REQUIRED FOR		SAMB AS 12.1.4.3.2)		
.	12.2.04.06.1	(BREAERR)	"a" CONTACTS	(ON)	POTENTIAL LONG-TERM INOPERABILITY OF	THIS CONDITION PIECH SPEC ACTION BUTER REQUIRED FOR THIS CONDITION. LOVATS AND RCP SLOW	(	SAMB AS 12.1.4.6.1)		
	•	Jane Dara!			TRANSPER BUS \$2C PROM DG TO OFFSITE	COASTDOWN NOT CREDITED IN SIS/SISLOP EVENTS		·		

## BHERGENCY COME COOLING SYSTEM SINCLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

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	DEVICE	D COMPONENT ID	FAILURE MODE	BEFFECT ON RCCS	LRMARES	BBPORT LTEM		RESP. DISCIPLINE_	
12.2.04.06	2 152-11804 (BREAKER)	°a° CONTACTS		MORE	*BOI REVISION REQD: REFR PROM DG TO ALT OFFSITE SOURCE MUST OCCUR WITH BUS \$18 ENERGIZED REFORE TIE BEER CLOSED. WITH	35	(SAHB AS 12.1.4.6.2)		
ľ	1 152-11804 (BRBAKER)	BUS \$18 125VDC	VOLTS LOW	TRIIN B ALTERNATE OPPSITE SOURCE	THIS PAILURE  THESE SPEC ACTION ENTRY REQUIRED FOR THIS CONDITION		(SAME AS 12.1.4.3.2)		
t	· - · · · — — · · · · · · · · · · · · ·			LONG-TRAM INOPRRIBILITY OF TRAIN B FOR SISLOP DUE TO INABILITY TO TRANSPER BUS ARC FROM DG TO OPPRITE SOURCE WITH					
12.2.05.01	2 BUB \$18 BGAOL 928	BREARBR(S)	CLOSED	C-IPME RELATED LOP REDUCED TRAIN B BLECTRICAL MARGIN FOR SIS DURING PLANT 8/U_(M/ TIR BRER_12COL.	*MORNAL POSITION DURING POWER OPERATION.		(SAME AS 12.1.4.3.2)		
		~~~~		CLOSED). TRAIN B ALT OPPSITE SOURCE ALSO INOP, CAUSING POTENTIAL LONG-TERN INOP				•	
12.2.05.05	2. BUS. 81B.	194-3 (RRLAT)	_ CONTACTS CLOSED	TO TRANSPER BUS \$2C PROM DG TO OFFSITE W/ C-XPHR LOP					
	NSR LOADS		(OM)		PRECLUDE CREDIT FOR RCPS. ROI REVISION REQUIRED TO ADDRESS POTENTIAL IMABILITY TO RESTART RCPS IN UNAFFRCTED LOOPS				
12.2.05.05.	2 BUS #1B MSE LOADS	194-3 (RBLAT)	CONTACTS CLOSED (OM)	NOME FOR SIS/SISLOP	PRICTE DORR CALC REVISION REQUIRED TO PRECLUDE CREDIT FOR SCPS. SOI REVISION REQUIRED TO ADDRESS POTENTIAL IMABILITY	35	(SANE AS 12.1.4.1.1)		
12.2.05.06.	2 BUS #1B MSB LOADS	186-SIS (BBLAY)	CONTACTS CLOSED	MONE FOR SIS/SISLOP	TO RESTART SCPS IN UNAPPRICED LOOPS *SGTE DOSE CALC REVISION REQUIRED TO PRECLUDE CREDIT FOR SCPS	24	(SAMB AS 12.1.4.1.1)		
12.2.05.07.	NSR LOADS	BUS \$18 125VDC CONTROL PONER	VOLTS LOW	REDUCED BLEC MARGINS ON SOTH TRAINS FOR SIS DURING PLANT 2/U (W/ TIE BREES 11CO], 12CO] CLOSED]. TRAIN B ALT			(SAME AS 12.1.4.3.2)		
				OPPSITE SOURCE INOP, CAUSING POTENTIAL LONG-TERM INOP OF TRAIN B FOR SISLOP DUB TO IMABILITY TO IFEE BUS 42C PROM DG TO					
12.2.06.01.		194-3 (RELAT)	CONTACTS CLOSED	OPPSITS W/ C-IPME LOP NOBE FOR SIS/SISLOP. TRAIN B ALTERNATE OFFSITE AVAILABLE AFTER MOTOR OPERATED	*TECE SPEC ACTION ENTRY REQUIRED WHENEVER BUS 41C OR 2C ENERGIZED FROM	21	(SAME AS 12.1.1.1.1)		
12.2:07.01.		BREATER	OPEN	DISCONNECT OPENED, AS NORMAL TRAIN B ALT OPPSITE SOURCE INOPERABLE, CAUSING POTENTIAL LONG-TERM	ALTERNATE OFFSITE SOURCE *ROI REVISION REQUIRED TO PRECLUDE RCP RESTART FROM BUS \$1C/2C POST-SIS/SISLOP	24	(SAMB AS 12.1.4.1.1)		
				INOPERABILITY OF TRAIN B FOR SISLOP DUE TO INABILITY TO TRANSPER BUS 82C FROM DG TO OPPSITE SOURCE FOR C-IFHE RELATED	SEVERE BUS UNDERVOLTAGE TRANSIENT. SGTE DOSE CALC REVISION REQUIRED TO PRECLUDE				
12.2.07.01.		BRRAKER	OPEN	MAIN/B-IPHE POST-SCTE TRAIN B ALT OPFSITE SOURCE INOPERABLE,	CREDIT FOR RCP OPERATION  BOI EEVISION REQUIRED TO PRECLUDE RCP	35	(SAME AS 12.1.4.1.1)		
:	(BRBAEBR)			CAUSING POTENTIAL LONG-TERM INOPERABILITY OF TRAIN B FOR SISLOP DUE TO INABILITY TO TRANSFER BUS \$2C FROM DG	SEVERE BUS UNDERVOLTAGE TRANSIENT. SCTR				
,				TO OFFSITE SOURCE FOR C-IFMR ESLATED LOP. ECP B CANNOT BE KE-ENERGIZED FROM MAIN/B-IFMR POST-SGTR	DOSE CALC REVISION REQUIRED TO PRECLUDE CREDIT FOR RCP OFBRATION				

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12.2.07.01.2 152- (BRE					·		ACT.	 	
	-12C01	BRPARER	CLOSED	TRAIN B INOPERABLE FOR SISLOP, REDUCED RELIABILITY FOR SIS	ALIGNMENT OF ALTERNATS OFFSITE SOURCE TO	21	,,	 · · · · · · · · ·	
					BCP RESTART POST-SIS/SISLOP IN THIS ALIGNMENT TO PREVENT LOSS OF ECCS LOADS -DUS TO SEVERE BUS UNDERVOLTAGE TRANSIENT				
2.2.07.01.2 152- (BRR	-12C01 BARRE)	BREAKRE	CLOSED	TRAIN B INOPERABLE FOR SISLOP, REDUCED BELIABILITY FOR SIS	*NORMAL DURING PLANT STARTUP OR ALIGNMENT OF ALTERNATE OFFSITE SOURCE TO	24	(SAMB AS 12.1.4.1.1)	 	
					BUB AZC. BOI CHANGE REQUIRED TO PRECLUDE BCP RESTART POBT-SIS/SISLOP IN THIS ALIGNMENT TO PREVENT LOSS OF BCCS LOADS DUB TO SEVERE BUS UNDERVOLTAGE TRANSIENT.			 	
2.2.07.01.2 152- (BRE	-12CO1 BARGRI	BRRAKER	CLOSED	TRAIN B INOPERABLE FOR SISLOP, REDUCED RELIABILITY FOR SIS	*NORMAL DURING PLANT STARTUP OR ALIGNMENT OF ALTRENATE OFFSITE SOURCE TO BUS. \$2C. BOL. CHANGE REQUIRED TO PRECLUDE	35	(SAHE AS 12.1.4.1.1)	 	
					RCP RESTART POST-SIS/SISLOP IN TRIS ALIGNMENT TO PREVENT LOSS OF RCCS LOADS DUE TO SEVERE BUS UNDERVOLTAGE TRANSIENT			 	
2.2.07.07.2 152- (BRE		SEQ 2 (13-9,11)	CONTACTS CLOSED (ON)	INOPERABILITY OF TRAIN B ALTERMATE OFFSITE BOURCE, RESULTING IN POTENTIAL LONG-TERM INOPERABILITY OF TRAIN B FOR	PIECE SPEC ACTION ENTRY REQUIRED WITH		(SAME AS 12.1.4.3.2)	 	
				SISLOP DUE TO IMBILITY TO TRANSPER BUS \$2C PROM DG TO OPPSITE SOURCE WITH C-IPME RELATED LOP				 	
2.2.07.08.2 152-1 (BRB/	12COL IAEBR)	194-4 (RBLAY)	CONTACTS CLOSED (ON)	DUBING PLANT STARTUP (WITH BUS \$18/2C TIE BRER_CLOSED), MONE FOR SIELOP DUE TO	STREE SPEC ACTION ENTRY REQUIRED MITH BUS \$2C ENERGIZED FROM ALTERNATE OFFSITE SOURCE		(SABR AS 12.1.3.1.1)	 •	··-
.2.07.09.1 152-1		A" CONTACTS	OPBN	SEPARATE SISLOP TRIP SIGNAL POTENTIAL LONG-TERM INOPERABILITY OF TRAIN & FOR SISLOP DUE TO INABILITY TO	*NORMAL POSITION DUBING POWER OPERATION. TRCE SPEC ACTION BUTRY REQUIRED FOR THIS		(SAME AS 12.1.4.6.1)	 	
			. <del>.</del> .	TRANSFER BUS AZC PROM DG TO OPPSITE SOURCE WITH C-IPME RELATED LOP. NOWE FOR 819	SOURCE. OTHERNISE DROP AND PICTUP			 	
2.07.12.1 152-1 		BUS #2C 125VDC CONTROL POVER			APPRETED BUSSES PREVENTS STREET	21	(SAME AS 12.1.1.1.1)	 	
				ALIGNED TO ALTERNATE OFFSITE SOURCE	DETECTION, WITH OR WITHOUT A CONCURRENT SINGLE PAILURE, TECE SPEC 3.0.3 ENTRY IS REQUIRED WEENEVER BUS AIC OR 2C IS ALIGNED TO THE ALTERNATE OFFSITE SOURCE			 	
2-2-07-12-1 <u>-152-1</u> (BRBA		US #ZC 125VDC ONTROL POWER	YOLTS LOW	**INOPERABILITY OF TRAIN B FOR SISLOP,	ISINCE MAIN GENERATOR COASTDOWN ON APPECTED BUSSES PERVENTS SISLOP	.35	(SAMB AS. 12.1.3.1.1)	 	
				ALIGNED TO ALTERNATE OFFSITE SOURCE	DETECTION, WITH OR WITHOUT A CONCURRENT SINGLE PAILURE, TECH SPEC 3.0.3 ENTRY IS. REQUIRED WERNEVER BUS AIC OR 2C 18				

## EMSEGENCY CORE COOL STEE SINGLE FAILURE ANALYSIS SAN ONOPER UNIT 1 ACTION ITEMS POR SIGNIFICANT PINDINGS

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	1785 \$	. DRVICE 1D .	COMPONENT LD	FAILURE MODE	RPPRCT ON BCCS		REPOST LTRN		RESPROTECTIVE .	
!	12.2.09.01.1	152-12C10 (BREARDE)	BERATER	OPRW	TRAIN B ECCS INOPERABLE, TRAIN A CLE ERAT REMOVAL DEGRADED	SST \$2 4by PERDER BRER. SER ITEMS 6.2.4.3.1 AND 7.2.3.2.1. ADDITIONALLY, BOI REVISION REQUIRED TO TRIP TRAIN B	01	(SAME AS 12.1.9.1.1)		
						SI/FW PUMPS PRIOR TO LOSS OF 125VDC BUS \$2 FOR TRIS PAILURE, TO ENSURE SI				1
		152-12010 (BREAKER)	BRRAERR	OPEN	TRAIN B ECCS INOPSPABLE, TRAIN A CLR HEAT REMOVAL DEGRADED	TRANSMATION AT LO-LO REST LEVEL SETPOINT 1337 & ALV PERDER BERR. SEE ITEMS 6.2.4.3.1 AND 7.2.3.2.1. ADDITIONALLY, ROS REVISION REQUIRED TO TRIP TRAIN A	15	(SABR AS 12.3.5.1.1)		1
<u> </u>		,				SI/PU PUMPS PRIOR TO LOSS OF 125VDC BUS \$2 POR THIS PAILURE, TO RESURE SI TERMINATION AT LO-LO REST LEVEL SETPOINT				
-	12.2.09.01.2	152-12C10 (BREARER)	BRRIER	CLOSED	HOMB	STECH SPEC ACTION ENTET REQUIRED IF 480V SWCR #2 ENERGIZED FROM BUS 2-3 TIE BREAEBR IN LIBY OF SST #2 VIA TRIS	·-	(SAMB AS 12.1.9.1.2)		
		BUS AZC Undervoltage and Control	8EQ 2 L_(15:9,11)	CONTACTS OPEN (OPP)	INOPERABILITY OF TRAIN B FOR SISLOP, NOVE FOR SIS	BREATER *NORMAL POSITION. MAINTAINED TRIP RIGNAL REQUIRED FOR MAR LOADS TO PREVENT START: POST-SISLOP. COND PPS, RTR DR PP, TPCW		{SAME AS 12.1.12.6.1}		
			<del></del>			PP AND BUS \$18/2C TIE BEER ARE LOCEED OUT BY SEPARATE MAINTAINED SEQ CONTACTS OR OVERLOAD LOCEOUT BELAY ACTUATION				<u> </u>
· 		BUS \$2C UNDERVOLTAGE AND CONTROL	194-4 194-5 (RRLAYS)	CONTACTS CLOSED (ON)	INOPERABILITY OF TRAIN B	PLOCEOUT NOT CURRENTLY PROVIDED FOR MER LOADS, SICEPT THOSE RECEIVING A SEPARATE MAINTAINED SISLOP SIGNAL (RG. CONDENSATE		(SAMB AS 12.1.12.6.1)	······································	
. <u> </u>	·					AND MEATER DEAIN PP) OR SISLOP ACTUATION OF OVERLOAD LOCKOUT (RG. TPCM)				-
<u> </u>				- · · - ·						
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## SMESCENCY COME COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINALINGS

ITEM #	DRVICE ID	COMPONENT 1D	FAILURE MODE	EPFECT ON ECCS	GEMARES	BEFORT	ACTION LIBR	RESP DISCIPLINE
					· · · · · · · · · · · · · · · · · · ·			
2.3.01.0i.1		ELEASER	GPRN	ITRAIN & BCCS INOR FOR INJECTION, TRAIN	1160V ACE FROM SST DI. ECT REV EFRO TO	03.1	PETERNING THI-SOURCE TERM DOSE BATES POR	NUCLEAR
	(BREARRE)			A DG AND MPW PUMP POTENTIALLY INOP DUE			APPLICABLE MANUAL ACTION LOCATIONS, INCLUDING	
				TO INTERRUPTION OF AUXILIARIES INCLUDING	LOADS AND RE-ENERGIZE SUCH #1. CONTAINMENT P/T CALC REV REOD TO INCL 10		ACCESS/EGRESS ROUTES (INCLUDING 4kV SWGR ROOM,	
				INTERRUPTION OF C/R COOLING. REDUCED	HIM INTERRUPT OF CLUG. YERIF OF BU CAR		480A SAGE BOOM WAD BEVCLOR WAT STDE!	
		•			VENT ADEQUACT ALSO REQD. HAIN IFHE HAS 2			
					TRAINS OF PORCED AIR CLNG			
2.3.01.01.1		ERRAERE	OPEN	•	*480V ACB FROM SST #1. BOI RRY REQD TO	03.2	BVALUATE SHIRLDING OR BEST-ESTIMATE SOURCE TERM TO	HUCLBAR
	(BREARRE)			A DG AND HEW PUMP POTENTIALLY INOP DUE	PROMPTLY TRIP NON-BSSENTIAL SWGR #3		RESOLVE MANUAL ACTION LOCATIONS AND ACCESS/BGRESS	
				TO INTERRUPTION OF AUTILIARIES INCLUDING	CONTAINMENT P/T CALC REV REQU TO INCL 10		BOUTES WITH UNACCEPTABLE THI-SOURCE TERM DOSE BATES	
				INTERBUPTION OF C/R COOLING. REDUCED	HIN INTEREUPT OF CLUG. VERIF OF B/U C/R		BATAJ .	
					VENT ADEQUACY ALSO REQD. MAIN IFME HAS 2			
					TRAINS OF FORCED AIR CLNG			
2.3.01.01.1		BRBARRR	OPEN	TRAIN A BCCS INOP FOR INJECTION, TRAIN		03.3	OBTAIN REGULATORY BELIEF FROM THE SOURCE TERMS FOR	LICENSING
	(BREARRE)				PROMPTLY TRIP NON-ESSENTIAL SWGR #3		SINGLE PAILURE EVENTS IF NEEDED BASED ON DOSE	
				TO INTERRUPTION OF AUXILIARIES INCLUDING	CONTAINMENT P/T CALC EBV EBGD TO INCL 10		CALCULATION RESULTS	
				INTERRUPTION OF C/R COOLING. REDUCED	MIN INTERRUPT OF CLNG. VERIF OF BU CAR		,	
				and the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contra	VENT ADEQUACY ALSO REQD. MAIN 15HR HAS 2			
					TRAINS OF FORCED AIR CLNG			
.3.01.01.1		ERBARRE	OPBN	STRAIN A BCCS INOP FOR INJECTION, TRAIN	480V ACB FROM SST \$1. BOI RBV REQD TO	18.1	DETERMINE LICENSING BASIS FOR RVAC RE:	LICENSING
	(BRBAEBR)				PROMPTLY TRIP NON-ESSENTIAL SUGR #3		POST-ACCIDENT FUNCTION, AND RE: SINGLE FAILURE	
				TO INTERRUPTION OF AUXILIARIES INCLUDING				
				INTERRUPTION OF C/R COOLING. REDUCED	CONTAINMENT P/T CALC BRY RRUD TO INCL 10 MIN INTERRUPT OF CLNG. VERIF OF B/U C/R			
				•	VENT ADROUACT ALSO REQD. MAIN IPHE BAS 2			
					TRAINS OF FORCED AIR CLNG			
.1.01.01.1	52-1102	BREARER	OPBW	STRAIN A BCCS INOP FOR INJECTION, TRAIN	*480V ACB FROM SST \$1. BOL REV REQD TO	18.2	VALIDATE OF REVISE APPLICABLE POST-ACCIDENT	MBCHANICAL
	(BREAKER)		•	A DG AND MPW PUMP POTRNTEALLY INOP DUB	PROMPTLY TRIP NON-ESSENTIAL SWGR #3		TEMPERATURE CALCS FOR: CONTROL ROOM, CHG PP ROOM,	
				TO INTERRUPTION OF AUXILIARIES INCLUDING			4LV AND 48QV SUGE ROOMS, AND DETERMINE DURATION,	
				INTERRUPTION OF CAR COOLING. REDUCED	CONTAINMENT P/T CALC RBV RBQD TO INCL 10 HIM INTERBUPT OF CLNG. VERIF OF B/U C/R		IF ANT, THAT CONTROL BOOM TRUP WOULD RICERD SEQ OR CRAS INST/LOGIC LIMITS AFTER FAILURE OF MORMAL	
					VENT ADBQUACT ALSO REQD. MAIN IFMR BAS 2		BVAC	
					TRAINS OF PORCED AIR CLNG			
.3.01.01.1		BREARR	OPEN	*TRAIN A BCCS INOP FOR INJECTION, TRAIN	#480V ACB FROM SST \$1. BOI KBV REQD TO	18.3	OBTAIN REGULATORY RELIEF TO DEFER BYAC	LICENSING
	(BREAKER)			A DG AND HEN PUMP POTENTIALLY INOP DUB	PROMPTLY TRIP NON-BSSENTIAL SWCR 43		MODIFICATIONS, IF ANY, DETERMINED TO BE WEEDED BY	
				TO INTERRUPTION OF AUTILIARIES INCLUDING			MBCBANICAL CALCULATIONS	
				INTERRUPTION OF C/R COOLING, REDUCED	CONTAINMENT P/T CALC REV REQD TO INCL 10 MIN INTERRUPT OF CLNG. VERIF OF B/U C/R			
					VENT ADEQUACY ALSO REQD. MAIN 15HR HAS 2		and the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s	
					TRAINS OF FORCED AIR CING			
.3.01.01.1	52-1102	BREAEKR	OPRN	*TRAIN A BCCS INOP FOR INJECTION, TRAIN	14BOV ACB FROM SST \$1. BOL REV REGD TO	18.4	REVISE PROCEDURES (INCLUDING TECH SPEC ACTION	OPERATIONS
(	(BREVERS)		•	A DG AND MFW PUMP POTENTIALLY INOP DUB			BUTET CRITERIA AS NEEDED TO JUSTIPY OPERATION	
				TO INTERRUPTION OF AUXILIARIES INCLUDING			UNTIL COMPLETION OF ANY REQUIRED BYAC	
		٠ -		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	CONTAINMENT P/T CALC REV BEQD TO INCL 10		HODIFICATIONS	** .
				INTERRUPTION OF C/R COULING. REDUCED	HIN INTERBUFT OF CLNG. VEGIP OF B/U C/R			

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## EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OMOFRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

item #	DRVICE ID	COMPONENT ID	PAILURE MODE	RFFRCT ON ECCS	REMAKES	REPORT		RESP DISCIPLINE
	nealce In	CONFURBIL IV	Lairnes mons	arraci va acca	Bundes		avisva 1190	
.1.01.01.1	57-1107	RRRARPO	OPEN	ATRAIN A RCCS INOP FOR INJECTION, TRAIN	*480V ACB FROM SST &L. ROI REV REQD TO	18.5	ABBILL 15 CONTROL BOOM DOSE CALCULATIONS WER	NUCLBAR
	(BRRAERR)			A DG AND MEN PUMP POTENTIALLY INOP DUB	PROMPTLY TRIP NON-BSSENTIAL SMGR #3		CONSISTENT WITH SINGLE PAILURE BASIS (BG. 10 MIN	
	,			TO INTERRUPTION OF AUXILIARIES INCLUDING	LOADS AND RE-ENERGIZE SUCE \$1.		INJECTION MODE SPRAY, I SEP WIR PUMP AND NO CREDIT	
					CONTAINBENT P/T CALC REV REOD TO INCL 10	ــــــ	POR BYAC PILIBE UNITI	
				INTERRUPTION OF C/R COOLING. REDUCED	MIN INTERRUPT OF CLNG. VERIF OF B/U C/R		,	
				REFIREITIA ON STIRMENE ANDRINE SAMECE	VENT ADEQUACT ALSO REQD. MAIN IFRE HAS 2 TRAINS OF FORCED AIR CLNG			
3.01.01.1	52-1102	BREATER .	OPEN	STRAIN A RCCH INOP FOR INSECTION, TRAIN	14804 ACS FROM 387 \$1. BOI BRY BROD TO	18.6	BEVISE CONTROL BOOM DOSE CALCULATIONS AS PART OF	NUCLBAR
• • • • • • • • • • • • • • • • • • • •	(BRBAERR)		V. 35	A DG AND MPN PUMP POTENTIALLY INOP DUE	PROMPTLE TRIP NON-BESENTIAL SUGB 43		UPSAR CHAPTER 15 REANALYSIS USING CONTROL ROOM	
				TO INTERBUPTION OF AUXILIARIES INCLUDING			BABITABILITY UPGRADE CRITERIA	
				COOLING. TRAIN B POTENTIALLY INOP DUR TO	CONTAINMENT P/T CALC REV REQU TO INCL 10	)		
				INTERRUPTION OF C/R COOLING. REDUCED	BIN INTERRUPT OF CLNG. VERIF OF B/U C/R			
				BELIABILITY OF ALTERNATE OFFSITE SOURCE	VENT ADROUACT ALSO REOD. HAIN IPHR HAS 2			
1 01 45 *	49 1109	69 1109	ODDH	MOMB	TRAINS OF PORCED AIR CLNG OTROE SPEC ACTION ENTRY REQUIRED IF SWGE	,	NO PURTHER ACTION REQUIRED. COMPIGURATION	
3.01.02.1	(BRRAKER)	52-1103 "b" CONTACT	OPEN	FURS	AT NOT BUREGIZED VIA BEER 52-1102 PROM	•	BLININATED BY DCP 1-3552. NEW CONFIGURATION	
	120000000	- AABIRCI		The control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the co	SST 11		CONTROLLED BY AMENDMENT \$134 (PCM 217) PER SO1-9-3	·
3.01.06.1	52-1102	86 (BELAT)	OM	TRAIN A BCCS INOPERABLE, TRAIN B	DELATED PAILURES RESULT FROM LOSS OF	04.4		CHOITARAGO
	(BREAKER)			POTENTIALLY INOP DUE TO: UNISOLABLE CCM			ADDRESS SI/FW TERMINATION WITH 125VDC BUS PAILURE	
				PLOW BYPASS, LOSS OF LO-LO BUST LEVEL	REQU TO TRIP APPECTED SI/PW PP BEFORE DO	;		
				TRIP FOR TRAIN A SI/FW, LOSS OF C/B	POWER LOST. DOSB CALC REV BRQD FOR 10			
				COOLING FOR ECCS ACTUATION AND CONTROL.	MIN LUI MODE SPRAT MY ONE BEP VIR PP AND	<u></u>		
				REDUCED RELIABILITY OF ALT OFFSITE SOURCE. RCP4 ALSO UNAVAIL	NO PILTERED BYAC. VERIF OF B/U C/R VENT ADBQUACY ALSO REQD			
3.01.06.1	52-1102	86 (RELAT)	ON	TRAIN A BCCS INOPERABLE, TRAIN B	DELATED PAILURES RESULT FROM LOSS OF	15	COMPLETE CALCULATION (DC-3410) TO DETERMINE	BECHANICAL
	(BREALER)	1		POTENTIALLY INOP DUE TO: UNISOLABLE CCW	COOLING OR BATTERY CHARGING. BOL REV		ACCEPTABILITY OF SUC/CONNE BYPASSED CONFIGURATION	
				PLOW BYPASE, LOSS OF LO-LO RWST LEVEL	REQU TO TRIP APPROTED SI/FW PP BEFORE DO	;		
				TRIP FOR TRAIN A SI/PM, LOSS OF C/R	POWER LOST. DOSE CALC REV REQD FOR 19			
				COOLING FOR BCCS ACTUATION AND CONTROL.	MIN INJ MODE SPEAT W/ ONE BEP WIR PP AND	)	•	
				REDUCED RELIABILITY OF ALT OFFSITE	NO PILTERED BYAC. VERIF OF 8/U C/R VENT			
3.01.06.1	69.1169	86 (RELAT)	ON	SOURCE. RCP: ALSO UNAVAIL TRAIN A RCCS INOPERABLE, TRAIN B	ADBQUACT ALSO REQD DELATED PAILURES RESULT PROM LOSS OF	18	(SAME AS 12.3.1.1.1)	
a. 01. 00. 1	(BREATER)	es (mpres)	VB	POTENTIALLY IMOP DUE TO: UNISOLABLE CCM	COOLING OR BATTERY CHARGING. BOI BRY	••	4	
	(			PLOW BYPASS, LOSS OF LO-LO BUST LEVEL	REQUITO TRIP AFFECTED SI/FW PP BEFORE DO	<u>;</u>		
				TRIP FOR TRAIN A ST/FW, LOSS OF C/R	POWER LOST. DOSE CALC REV REQD FOR 10			
				COOLING FOR BCCS ACTUATION AND CONTROL.	MIN INJ MODE SPRAY W/ ONE REP WTR PP AND	)		
	·			BROUGED BELIABILITY OF ALT OFFSITE	NO FILTERED HVAC. VERIF OF B/U C/B VENT			
	<b>60.1100</b>	46 4000	0.11	SOURCE. RCPs ALSO UNAVAIL	ADBQUACY ALSO REQD	24.1	REVISE SCIE DOSE CALCULATIONS (AS NEEDED TO	MUCLBAR
3.01.06.1		86 (RELAT)	ON	TRAIN A BCCS INOPERABLE, TRAIN B POTENTIALLY INOP DUE TO: UNISOLABLE CCM	*DELAYED FAILURES RESULT FROM LOSS OF COOLING OR BATTERY CHARGING. ROI REV	44.1	PRECLUDE CREDIT FOR RCPs) AS PART OF UPBAR CHAPTER	
	(BREALER)			FLOW BYPASS, LOSS OF LO-LO RWST LBYSL	REQUITO TRIP AFFECTED SI/PW PP BEFORE DO	 C	15 RBANALISIS	
				TRIP FOR TRAIN A SI/PW, LOSS OF C/R	POWER LOST. DOSE CALC REV REGD FOR 10		•	
				COOLING FOR BCCS ACTUATION AND CONTROL.	MIN INJ HOLE SPRAT W/ ONE REP WTR PP AND			
				REDUCED RELIABILITY OF ALT OFFSITE	NO PILTERED HVAC. VERIF OF B/U C/R VENT			
				SOURCE. ECPs ALSO UNAVAIL	ADEQUACT ALSO BEQD		COMP AD LE S 1 S 14 PCD DIDOSHICAL ALLUMSHIS	
3.62.01.2		BBBÝREB	CLOSED	ITBAIN A POTENTIALLY INOP DUB TO VOLTAGE		•	(SANB AS 12.3.1.2.1) FOR BLECTRICAL ALIGNMENT	
	(BREVRER)			PEGRADATION AND SST \$1/BRIE OVERLOAD	11-3 OR SWER 12-3 TIB BRER CLOSED DURING	•		
				DURING SIS/SISLOP LOADING. TRAIN B	NORMAL OPS. EOI REV REGD TO PROMPTLY TRIP HON-ESSENTIAL LOADS AND RE-ENERGIZE	£		
				CONTROL BOOM COOLING. BRDUCED	SWOR AL LO-LO RUST LEVEL TRIP OF SI/FU	7		
				CONTROL BOOM COURTED ATT ALCOHOL SAMER				

BELLABILITY OF ALTERNATE OFFSITE SOUNCE AFFECTED IF ANNUAC AND 125000 1157 F.

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# EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPER UNIT 1 ACTION SYEMS FOR SIGNIFICANT FINDINGS

ITEM #	DEVICE ID	COMPONENT 1D	FAILURE MODE	EFFECT ON BCCS	REMARES	ITEM	ACTION (TBM	BESP DISCIPLINE
12.1.02.01.2		BREAKER	CLOSED	TRAIN A POTENTIALLY ENOP DUE TO VOLTAGE	*TRCR SPRC ACTION BNTRY REQD WITH SWGR	04	(SAMB AS 12.3.1.6.1)	
	(BREATER)			DEGRADATION AND SST \$1/BREE OVERLOAD	11-3 OR SWGR 12-3 TIB BREE CLOSED DURING			
				DURING SIS/SISLOP LOADING. TRAIN B	NORMAL OPS. SOI REV REQD TO PROMPTLY			
				POTENTIALLY_INOP_DUE_TO_INTERSUPTION_OF CONTROL ROOM COOLING. REDUCED	TRIP NON-RESENTIAL LOADS AND RE-EMBRGIZE SWGR 81. LO-LO RUST LEVEL TRIP OF SI/PW			
				RELIABILITY OF ALTERNATE OFFSITE SOURCE				
				PROTECTION OF SPISSARID VICELIE SCORES	4hV RHRRGIZED			
2.3.02.01.2		BREARRE	CLOSED	STRAIM A POTENTIALLY INOP DUE TO VOLTAGE	TROE SPEC ACTION ENTRY REQUIRED ENGR	18	(BAMB AS 12.3.1.1.1)	
	(BRRAEER)			DEGRADATION AND SET \$1/BRED OVERLOAD	\$1-3 OR SWGR \$2-3 TIR BREE CLOSED DURING			
		<del></del>		DURING SIS/SISLOP LOADING. TRAIN S	MORNAL OPS. SOI BRY BROD TO PROMPTLY			
				CONTROL ROOM COOLING. REDUCED	TRIP NON-ESSENTIAL LOADS AND RE-ENERGIZE SUGE AL. LO-LO BUST LEVEL TRIP OF SI/PW			
				RELIABILITY OF ALTERNATE OFFSITE SOURCE				
					4hV BNBRGIZED			
2.1.02.03.2		52-1203	CLOSED	LOSS OF AUTOMATIC PROTECTION AGAINST	*TRCE SPEC ACTION ENTRY REQD FOR THIS		(SAME AS 12.3.1.2.1)	
	(BREARER)	.P. CONTACT OF		PARALLELING REDUNDANT TRAINS A AND B	CONDITION SINCE \$18/818LOP TRIP SIGNALS			
		133 CONTACT		480V SWGR	ARE MOMENTARY ONLY (VIA TORE) AND DO NOT			
					PREVENT PARALLELING BY A SUBSEQUENT SINGLE PAILURE OR OPERATOR BRECK AFTER			
			• •		TRIP			
2.3.02.07.1	52-1103	SEQ 1	CONTACTS OPEN	NONE IF BEER INITIALLY OPEN	*NORMAL POSITION. TECH SPEC ACTION ENTRY		(1.3.1.2.1 PA MAR)	
· · · · · · · · · · · · · · · · · · ·	(BREAKER)	[18-6,8]	(OPP)	and the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s	REQUIRED IF THE BREE CLOSED IN HODES 1 -			
2.3.02.09.1	69 1109	133 00001000	OPRN	000 44 C+UNA 88 00 DMDAC190A	TOTALCE MAN AND ALEA APPROPER AND CANNOD		ABAND AS 19 9 1 9 11 COS SIRVEDICAL ALICUMPUT	
	52-1103 (BREARRR)	133 CONTACTS	UPAN	SWGR #3 CANNOT BE RE-ENERGIZED POST-SIE/SIELOP WITHOUT INTERRUPTION OF	*SINCE HOV-SUB ALSO AFFECTED AND CANNOT		(SAME AS 12.3.1.2.1) FOR BLECTRICAL ALIGNMENT	
			*	TRAIN B 480V POWER, DISABLING 1/3 81	VALVE CRS-301 REQUIRES SEAT LEARAGE			
				VALVES FOR LO-LO RUST LEVEL TRIP	TESTING FOR THE RECIRC BOUNDARY PUNCTION			
				FUNCTION AND 1/3 CLR PATRS				
2.3.02.09.1		133 CONTACTS	OPEN	SUGR \$3 CANNOT BE RE-ENERGIZED	SINCE HOV-883 ALSO AFFECTED AND CANNOT	02.3	DETERMINE APPLICABLE LEAR TEST ERQUIREMENTS FOR	
	(BREATER)			POST-SIS/SISLOP WITHOUT INTERRUPTION OF TRAIN B 480V POWER, DISABLING 1/3 81	VALVE CRS-JOI BEQUIERS SEAT LEARAGE		RECIEC SYSTEM (CRS-301 CURRENTLY TESTED ONLY FOR GROSS LEARAGE PER SOI-12.4-15)	
	· · ·			VALVES FOR LO-LO REST LEVEL TRIP	TRSTING FOR THE RECIRC BOUNDARY FUNCTION		CHOS PRESENT LEE SOLLIFFA-191	
				PUNCTION AND 1/3 CLR PATHS				
2.3.02.10.1		SWGR #1 125VDC	VOLTS LOW		*TECH SPEC ACTION BATET REQUIRED IF SWCB		(SAMB AS 12.3.1.2.1)	
	(BERAKER)	CONTROL POWER		BB RB-BNBRGIZED PROM TRAIN A VIA 52-1303			•	
	<b>***</b>	£4 1114	CREN	OR TRAIN B VIA 52-1203	OPERATION		101MB 40 19 9 1 1 11	
2.3.03.01.1 1	MCL-1	52-1118 (BRBARBR)	OPEN	TRAIN A BCCS INOPBRABLE, TRAIN B	*MCC-1 480V ACB. C/R DOSB CALC RRV RRQD TO PRECLUDE CREDIT FOR BVAC PILTER UNIT.		(SAMB AS 12.3.1.1.1)	
		(000000)		INTERBUPTION OF CONTROL ROOM COOLING.	ALSO, VERIFICATION REQUIREM PORTABLE			
					BACKUP VENTILATION PROVIDES ADEQUATE			
* *************************************				SOURCE. RCPS ALSO UNAVAILABLE FOR SCIE	COOLING FOR C/R EQUIPMENT. CHARGING		The second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second secon	
					PUMPS ALSO UNAVAILABLE FOR INJECTION IF			
	ucc 1	52-1118	OPKN	TRAIN A BCCS INOPERABLE, TRAIN B	MOV-1100C ON TRAIN A *MCC-1 480V ACB. C/R DOSE CALC REV REQU	j	(SAME AS 12.1.1.6.1)	
3.03.01.1 1	ncc-1	(BREAKER)	OFER	POTENTIALLY INOPERABLE DUE TO	TO PRECLUDE CREDIT FOR BYAC FILTER UNIT.	.1	faun ag 1974-114-11	
		[220,000]		INTERRUPTION OF CONTROL ROOM COOLING.	ALSO, VERIFICATION REQUIREM PORTABLE			
•					BACRUP VENTILATION PROVIDES ADEQUATE			
				SOURCE. RCPS ALSO UNAVAILABLE FOR SCTR	COOLING FOR C/R EQUIPMENT. CHARGING			
		•			PUMFS ALSO UNAVAILABLE FOR INJECTION IF			

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## EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM ONOPRE UNIT 1 ACTION ITEMS FOR SIGNIFICANY FINDINGS

ITEM A DEVICE ID	COMPONENT ID	PAILURE MODE	BPPBCT ON BCCS	RÉNARES	REPORT	ACTION ITEM RESP DISCIPLINE	
12.3.03.01.2 MCC-1	52-1118 (BRBAEER)	CLOSED		*NORMAL POSITION. NON-SE LOADS NOT ALL TRIPPED/LOCEED-OUT ON SISLOP. BREES HUST COORDINATE TO PERVENT PERDER TRIP UNDER SIS AS WELL AS SISLOP. HCC BUS PAULT	<u> 36.1</u> _	IDENTIFY CALCULATION WHICH DEMONSTRATES 480V BLECTRICAL BREEFE COORDINATION	
12.3.03.02.1 MCC-1	MSE FOUNDS	ON (BREE CLOSED)	*(SAMB AS 12.3.3.1.1)	PLUS BREE PAILURE IS OUTSIDE SIS/SISLOP DESIGN BASIS INCLUDES C/S COOLING, ECP MOTOR COOLING AND T OF 2 TRAINS OF MAYN THE PORCED AIR COOLING	18	(SAHB AB 12.3.1.1.1)	
12.3.03.02.2 MCC-1	WSR LOADS	OPP (BRER OPRM)	DUE TO INTERBUPTION OF CONTROL ROOM COOLING, REDUCED BELIABILITY OF ALTERNATE OFFSITE SOURCE, RCP=	SVERIFICATION REQUIRED OF BACEUP CONTROL ROOM VERTILATION ADEQUACY. HAIN 15MR BAS 2 TRAINS OF FORCED AIR COOLING		(SABB AS 12.3.1.1.1)	
12.3.03.02.2 HCC-1	MSB LOADS	OPP (BREE OPRN)	DUE TO INTERRUPTION OF CONTROL ROOM	AVERIFICATION REQUIRED OF BACEUP CONTROL BOOM VENTILATION ADEQUACY. MAIN IFME BAS 2 TRAINS OF FORCED AIR COOLING		(SAME AS 12.3.1.6.1)	
12.3.03.02.3 HCC-1	HSB LOADS	BQ/SBISHIC	TRAIN A DUE TO 480W SWGB/MCC DEGRAPATION	*NOW-SE LOADS NOT ALL TRIPPED/LOCEED-OUT ON SISLOP. COMPIGURATION DOES NOT MEET EG 1.75 OR IREE 384 CRITERIA WHICH REQUIRE TRIP OF ALL NOW-IE LOADS ON A	35.6	EVALUATE CONTINUED ACCEPTABILITY OF NO MAINTAINED BLECTRICAL LOCEOUT ON SIS AND SISLOP FOR MSR LOADS AS PART OF INTEGRATED RESOLUTION OF SEP TOPIC VI-7.C.2.  [CONFIGURATION ACCEPTABLE UNTIL THEM BASED ON	
12.3.04.01.2 HCC-14	52-1123 (BRBAEBR)	Crosid	MONB	SAPETT SIGNAL (IR, SIS AND SISLOP) *NORMAL POSITION. NON-SE LOADS NOT TRIPPED/LOCERD-OUT OR SISLOP. BREES MUST COORDINATE TO PREVENT FERDER TRIP. MCC	36	AMENDMENT 18 SECTION 1.3.7.1) (SABE AS 12.3.3.1.2)	
12.3.04.02.3 HCC-14	MSR LOADS	BQ/SB1SHLC		BUS PAULT PLUS BRER PAILURE IS OUTSIDE SIS/SISLOP DESIGN BASIS *CALCULATION REQUIRED TO DEMONSTRATE THAT OPERATION OF PAN COOLER WOULD NOT ADVERSELY APPROT HPW PUMP PUNCTION FOR	36.2	IDENTIFY CALCULATION WHICH JUSTIFIES MAIN FW PUMP MECHANICAL PAN COOLER OPERATION IN A STEAM BUVIRONMENT (BG. POST-MSLBI	
12.3.05.01.2 HCC-1B	52-1129	CLOSED	MONB	MSLB VIA RICESSIVE LUBE OIL TEMPERATURE IN THIS EVENT, CAUSED BY INDUCTION OF STRAM THROUGH PAN/COIL UNIT *NORMAL POSITION. NON-SR LOADS NOT	36	(SAME AS 12.3.3.1.2)	
12.3.05.02.3 BCC-18	(BRBARRR) NSR LOADS	BQ/SBISMIC		TRIPPED/LOCEBD-OUT ON SISLOP. HOWEVER, BREES COORDINATE TO PREVENT PREDER TRIP. HCC BUS FAULT PLUS BREE FAILURE IS OUTSIDE SIS/SISLOP DESIGN BASIS FNON-SE LOADS NOT TRIPPED/LOCEED OUT ON	35	[SARR AS 12.3.3.7.2.3]	
			TRAIN A DUB TO 480V SUGR/MCC DEGRADATION RESULTING FROM FAILURE TO 180LATE ALL UNQUALIFIED LOADS ON SIS AND SISLOP	SISLOP. CONFIGURATION DOBS NOT MBBT RC 1.75 OR IBRE 384 CRITERIA WRICH RRQUIRE TRIP OF ALL MON-IE LOADS ON A SAPRTY SIGNAL (IB, SIS AND SISLOP)			-
12.3.08.01.3 SWGR #1 MSB LGAFS	BREATER(S)	BQ/SBISMIC	TRAIN A DUB TO 480V SWGB/MCC DEGRADATION EBSULTING FROM FAILURE TO ISOLATE ALL	SCONFIGURATION DORS NOT MERT RG 1.75 OR 1668 384 CRITERIA WHICE BEQUIRE TRIP OF ALL NOW-18 LOADS ON A SAPRTY SIGNAL (18, SIS AND SISLOP)	35	(SAMB &S 12.3.3.2.3)	!

## EMBRCENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

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ITSH # [	BVICE ID	COMPONENT ID	FAILURE MODE	EPPECT ON ECCS	PRINCES	REPORT LTRE	ACTION ITEM	RESP DISCIPLINE
_12.1.01.01.1. SNGR.			CONTACTS_OPEN			04		
UNDRE	RVOLTAGE AND ROL	(11-2,4)	(OFF)	DUB TO SWGR #1 VOLTAGE DEGRADATION AND/OR DG OVERLOAD, W/ POTENTIAL INOP OF TRAIN A DUB TO: UNISOLABLE CCW FLOW				
				SIPASS, LOSS OF LO-LO BUST LEVEL TRIP OF SI/PM. BEDUCED RELIABILITY OF ALT OFFSITE SOURCE	FUELDER, SEE . DOVALES			
12.1.09.01.1 SWCR	#1 EVOLTAGE AND	SEQ 1 (11-2.4)	CONTACTS OPEN (OPP)	POTENTIAL INOP OF TRAIN A FOR SISLOP BUR TO SWER AT VOLTAGE DEGRADATION	NORMAL POSITION. RCPS ALSO UNAVAILABLE DUR TO LOSS OF MOTOR COOLING WITH THIS	15	(SAME AS 12.3.1.6.1)	
CONT				AND/OR DG OVERLOAD, N/ POTENTIAL INOP OF	PAILURE, MAIN JPHE BAS 2 TRAINS OF			
				TRAIN B DUR TO: UNISOLABLE CCW PLOW BYPASE, LOSE OF LO-LO RWST LEVEL TRIP OF SI/PW. REDUCED RELIABILITY OF ALT	PORCED AIR COOLING			
12.3.09.01.1 SWGR	#1	880 l	CONTACTS OPEN	OPPSITE SOURCE *POTENTIAL INOP OF TRAIN A FOR SISLOP	NORMAL POSITION. RCPS ALSO UNAVAILABLE	24	(SAME AS 12.3.1.6.1)	
UNDER	VOLTAGE AND	0.1	(OPP)	DUE TO SWEE AS VOLTAGE DEGRAPATION	DUR TO LOSS OF MOTOR COOLING WITH THIS			
CONTR	OL			AND/OR DG OVERLOAD, W/ POTENTIAL INOP OF TRAIN B DUE TO: UNISOLABLE CCW FLOW BIPASS, LOSE OF LO-LO RWST LEVEL TRIP OF	PORCED AIR COOLING			
				SI/PW. REDUCED RELIABILITY OF ALT OFFSITE SOURCE				
12.3.09.01.2 9¥GR		989 1	CONTACTS CLOSED	*TRAIN A BCCS INOPPRABLE, TRAIN B	SISLOP SIGNAL TO UV BELATS IS NORMALLY	04	(SAHE AS 12.3.1.6.1)	
CONTR	VOLTAGE AND	(11-2,4)	(OH)	POTENTIALLY INOPERABLE DUE TO: CCW PLOW BYPASS VIA MOV-720B AND LOSS OF LO-LO BYST LEVEL TRIP OF TRAIN A SI/PW	ROMENTARY. MAINTAINED SIGNAL DUE TO RELAT FAILURE PERVENTS RESTARY OF AFFECTED LOADS		•	
12.3.09.01.2 SWGR	• -	SEQ 1	CONTACTS CLOSED	STRAIN A BCCS INOPERABLE, TRAIN S	SISLOP SIGNAL TO UV RELATS IS NORMALLY	15	(SAME AS 12.3.1.6.1)	
CONTR	VOLTAGE AND	(11-2,4)	(ON) .	POTENTIALLY INOPERABLE DUE TO: CCW PLOW BYPASS VIA NOV-7208 AND LOSS OF LO-LO	RELAY PAILURE PREVENTS RESTART OF			
12.3.09.02.1 SWGR	#1	27-1	ON	RUST LEVEL TRIP OF TRAIN A SI/FW	APPROTED LOADS -ROI REV REGO TO CLOSE AFFECTED CON HI	04	(SAMB AS 12.3.1.6.1)	
UNDER	VOLTAGE AND		(VOLTS LOW)		BOY TO RECOVER CCW BRAT REBOVAL			
CONTR	OL .				CAPABILITY WITH FAILURS OF OWN SWC PUMP AND TRIP APPROTED SI/FW PUMPS BRFORE DC POWER IS LOST	-		
12.3.09.02.1 SWGR		21-1	ON	*(SAHB AS 12.3.5.1.2)	*BOI RBY REQUITO CLOSE APPROTED CON HE	15	(SAHB AS 12.3.1.6.1)	
CONTR	VOLTAGE AND OL	(OA RRUYA)	(VOLTS LOW)		NOV TO RECOVER CCW HEAT REMOVAL CAPABILITY WITE PAILURE OF ONE SWC PURP	·		an
					AND TRIP APPECTED SI/FW PUMPS BEFORE DO	;	,	
12.3.09.03.1 SWGR		SBQ 1	CONTACTS OPEN	POTENTIAL INOP OF TRAIN A FOR SISLOP	INCRMAL POSITION. INCLUDES RESET SWITCH		(SAHB AS 12.3.1.6.1)	
UNDER	VOLTAGE AND OL	(10-10,12)	(OPP)	DUB TO 480V SWGR/MCC VOLTAGE DEGRADATION AND/OR DG OVERLOAD, WITH POTENTIAL INOP		·B		
				OF TRAIN B DUR TO: UNISOLABLE CCW FLOW BYPASS, LOSS OF LO-LO RWST LEVEL TRIP OF		<u></u>		
				SI/FW. REDUCED RELIABILITY OF ALT	RCP# POST-SCTR. MAIN IPMR MAS 2 TRAINS			
•				OPPSITH SOURCE	OF FORCED AIR COOLING			

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## BMBRGBNCT CORS COOLING SYSTEM SINGLE FAILURE AMALTSIS SAM OMOPPE UNIT 1 ACTIOM ITEMS FOR SIGNIFICANT FINDINGS

1788 #	DBVICE ID	COMPONENT 1D	FAILURE MODE	RPPRCT ON BCCS	REMARKS	EEPORT LTEN	ACTION ITSE	BESP DISCIPLINE
2.3.09.03.1	SUGR AL	_ SEQ. 1	CONTACTS OPEN	POTRUTIAL INOP OF TRAIN A FOR SISLOP	MORMAL POSITION. INCLUDES RESET SWITCH.	15	(SAMB AS 12.3.1.6.1)	
	CONTROL		(OFF)	DUB TO 4804 SWGR/MCC VOLTAGE DEGRADATION AND/OR DG OVERLOAD, WITH POTENTIAL INOP	RCPA ALSO LOST. VERIF ENQU TRAT PORTABLE B/U VENTILATION POR C/R PROVIDES			
				OF TRAIN & DUR TO: UNISOLABLE CON PLON- STPASS, LOSS OF LO-LO EWST LEVEL TRIP OF ST/FW. REDUCED RELIABILITY OF ALT	BLIMINATE CREDIT POR PILTERED EVAC AND BCPs POST-SCTR. MAIN JFMR HAS 2 TRAINS			
	ONCD 41	600 1	AANB (ABA ABBN	OFFSITE SOURCE	OF FORCED AIR COOLING		(SAHR AS 12.3.).1.3 AND 12.3.3.1.1)	
2.3.09.03.1	UNDREVOLTAGE AND	SEQ 1 (10-10,12)	CONTACTS OPEN (OPP)	POTENTIAL INOP OF TRAIN A FOR SISLOP BUE TO 480V SWCR/MCC VOLTACE DEGRADATION AND/OR DG OVERLOAD, WITH POTENTIAL INOP	SHORMAL POSITION. INCLUDES RESET SWITCH. ECPS ALSO LOST. VERIF REQD TRAT PORTABLE B/U VENTILATION FOR C/R PROVIDES	10	[3408 43 14.3.1.1.1 AND 14.3.3.1.1]	
				OF TRAIN B DUR TO: UNISOLABLE CON PLON BYPASS, LOSS OF LO-LO RWSY LEVEL TRIP OF	ADEQUATE COOLING. DOSE CALC REV REQD TO BLININATE CREDIT FOR PILTERED EVAC AND			
		·		SI/FW. REDUCED RELIABILITY OF ALT OPPSITE BOURCE	BCPs POST-SGTB. MAIN IPMB HAS 2 TRAINS OF FORCED AIR COOLING			
.3.09.04.2	SWGR #1 UNDRRVOLTAGE AND	86-1 (RBLAT)	RESET	1(SAHE AS 12.3.9.3.1)	or resease and comprise	04	(SAHE AS 12.3.1.6.1)	
.3.09.04.2	CONTROL SWGR #1 UNDERVOLTAGE AND	86-1 (RELAY)	RESET	*(SAHE AS 12.3.9.3.1)		15	(SAMB AS 12.3.1.6.1)	
.3.09.04.2	CONTROL SWGR \$1 UNDERVOLTAGE AND	86-1 (RELAT)	RESET	*[SAHR AS 12.3.5.3.1]		18	(SAMB AS 12.3.1.1.1 AND 12.3.3.1.1)	
.3.09.05.1	CONTROL SWGR #1 UNDERVOLTAGE AND	SEQ 1	CONTACTS OPEN (OFF)	POTENTIAL INOP OF TRAIN A FOR SISLOP BUE TO 480V SWCF/MCC VOLTAGE DEGRADATION	MORMAL POSITION. REDUNDANT IMPUTS FROM	04	(SAME AS 12.3.1.6.1)	
	CONTROL	(11-9,11)		AND/OR OG OVERLOAD, WITH POTRUTIAL INOP OF TRAIN & DUR TO: UNISOLABLE CCW PLOW	LOAD GROUP A OUTPUT OR RELAY DRIVER			··
				STPASS, LOSS OF LO-LO EVET LEVEL TRIP OF	UNAVAILABLE FOR SCTR. MAIN IPHE HAS 2 TRAINS OF FORCED AIR COOLING			
				SI/PW. REDUCED RELIABILITY OF ALT OPPSITE SOURCE	INTING OF FORCED AIR COOLING			
.3.09.05.1		SBQ 1	CONTACTS OPEN	POTENTIAL INOP OF TRAIN A FOR SISLOP		15	(SAME AS 12.3.1.6.1)	
	UNDERVOLTAGE AND CONTROL	(11-9,7) (11-9,11)	(088)	DUR TO 1884 BUGR/MCC VOLTAGE DEGRADATION AND/OR DG OVERLOAD, WITH POTENTIAL INOP				
		( •),			CARD(8) PAIL. RCPs ALSO LOST,			
				BIPASS, LOSS OF LO-LO BUST LBURG TRIP OF S1/FW. REDUCED RELIABILITY OF ALT	UNAVAILABLE FOR SCIE. MAIN IPMR BAS 2 TRAINS OF FORCED AIR COOLING			
				OPPSITE SOURCE				
3.09.05.1	•	SEQ 1	CONTACTS OPEN	SPOTENTIAL INOP OF TRAIN A POR SISLOP	MORNAL POSITION. BEDUNDANT INPUTS PROM	11	(SAMB AS 12.3.1.1.1 AND 12.3.3.1.1)	
	UNDERVOLTAGE AND	(11-5,7) (11-9,11)	(OPP)	DUE TO 480V SWGR/MCC VOLTAGE DEGRADATION AND/OR DG OVERLOAD, WITH POTENTIAL INOP				
	COMINGE	711.411.1		OF TRAIN B DUR TO: UNISOLABLE CON PLOY				
				STPASS, LOSS OF LO-LO BUST LEVEL TRIP OF				
-				SI/PW. REDUCED RELIABILITY OF ALT OPPSITE SOURCE	TRAINS OF PORCED AIR COOLING	,		
.3.09.05.2			CONTACTS CLOSED	SPOTENTIAL INOP OF TRAIN A AND B DUE TO	CONTACTS NORMALLY MAINTAINED ON SISLOP		(SAME AS 12.3.1.1.1)	
	UNDERVOLTAGE AND		(ON)	LOSS OF CONTROL BOOM COOLING AFFECTING	UNTIL SEG I BLOCE/RESET. MAIN IPME BAS 2			e.
	CONTROL	(11-9,11)		BOTH TRAINS OF BCCS ACTUATION AND CONTROL. REDUCED RELIABILITY OF	TRAINS OF PORCED AIR COOLING			
				ALTERNATE OFFSITE SOURCE. BCPS				
				UNAVAILABLE FOR SGTR	•			

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# EMBRGENCY CORB COOLING STSTEM SINGLE PAILURE AMALTSIS SAN ONOPRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT PINDINGS

CONTROL CONTROL	IB AS 12.3.9.5.1)	REMARES  LOCKOUT RESET RELAT FOR 86-H1-1, 86-H1-2, 86-H1-3. INCLUDES HANDSWITCH	RSPORT ITEM	ACTION LTEM RESP DISCIPLINE (SAME AS 12.3.1.6.1)
UNDERVOLTAGE AND CONTROL 12.3.05.06.1 SWGR #1 SD-1-3 (RBLAT) ON 1(SAM. UNDERVOLTAGE AND	IB AS 12.3.9.5.1)	86-81-2, 86-81-3. INCLUDES HANDSWITCH	04	(SAMB AS 12.3.1.6.1)
UNDERVOLTAGE AND CONTROL 12.3.05.06.1 SMCR #1 SD-1-3 (RELAT) ON 4(SAM. UNDERVOLTAGE AND	IB AS 12.3.9.5.1)			
UNDERVOLTAGE AND				
CONTROL		LOCKOUT RESET RELAT FOR 86-H1-1, 86-H1-2, 86-H1-3, INCLUDES HANDSWITCH	15	(SAMB AS 12.3.1.6.1)
		LOCKOUT BESSE BELAT FOR \$6-H1-1,	18	(SAMB AS 12.3.1.1.1 AND 12.3.3.1.1)
UNDERVOLTICE AND CONTROL		86-M1-2, 86-M1-3. ENCLUDES MANDSWITCE		
C.1.09.06.2 SMCR #1 SD-1-3 (RBLAT) OPP (SAM) UNDERVOLTAGE AND		NORMAL POSITION. MAIN IPMR HAS 2 TRAINS OF FORCED AIR COOLING	18	(SAME AS 12.3.1.1.1)
CONTROL			18	(SAME AS 12.3.1.1.1)
UNDERVOLTAGE AND CONTROL	A CONTRACTOR OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY O	COOLING		
2.3.09.07.2 SWGR \$1	FOR SISLOP	*MORMAL POSITION. MANUAL ACTUATION OF SISLOP LOCEOUT BELATS COULD BE REQUIRED FOR SIS EVENT WITH COMMON-CAUSE FAILURES		(SAMB AS 12.3.3.2.3)
		OF MSR EQUIPMENT DUB TO LACE OF AN AUTOMATIC TRIP/LOCEOUT AS PRB BG 1.75		
		AND IEEE 384 NORMAL POSITION	04	(SAMR AQ 12.3.1.6.1)
UNDERVOLTAGE AND (LOCHOUT RELAT) CONTROL				
2.1.09.08.2 SUGR #1 86-B1-1 RESET 4(SAM) UNDERVOLTAGE AND (LOCKOUT RELAT) CONTROL	IB AS 12.3.9.5.1]	MORMAL POSITION	15	(SAHR AS 12.3.1.6.1)
	B 49 12.3.9.5.1}	MORNAL POSITION	18	(SAMB AS 12.3.1.1.1 AND 12.3.3.1.1)
CONTROL	OF CONTROL BOOM COOLING,	*VERIFICATION REQUIRED THAT PORTABLE	18	(SAME AS 12.3.1.1.1)
UNDREVOLTAGE AND (LOCEOUT RELAT) POTEN	ACTUATION AND CONTROL	BACKUP VENTILATION PROVIDES ADROUATE COOLING. DOSE CALC REV REQD TO BLIMINATE CREDIT FOR FILTERED SVAC AND POST-SCIE		1000 10 10 10 10 10 10 10 10 10 10 10 10
UNDERVOLTAGE AND (LOCKOUT RELAT)		BCP OPS NORMAL POSITION	04	(SAMB AS 12.3.1.6.1)
UNDERVOLTAGE AND (LOCEOUT RELAY)	B AS 12.3.9.5.1)	NORMAL POSITION	15	(SAME AS 12.3.1.6.1)
:3.09.09.2 SWGR #1 86-M1-2 RESRT #{SAM  UNDERVOLTAGE AND {LOCKOUT RELAT}	•	NORMAL POSITION	18	(SAMB AS 12.3.1.1.1 AND 12.3.3.1.1)
CONTROL  .3.09.10.2 SWGR #1 86-H1-3 RESET *{SAM} UNDERVOLTAGE AND (LOCKOUT RELAT)	B AS 12.3.9.5.1)	NORMAL POSITION	04	(SAME AS 12.3.1.6.1)

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## EMBRGENCY CORE COOLING STSTEM SINGLE FAILURE ANALYSIS SAM ONOFRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

ITBN #	DBAICE ID	COMPONENT ID	PAILURE HODE	RPPECT ON ECCS	DRHARES	REPORT	ACTION ITEM RESP DISCIPLINE
	SMGR AL UNDERVOLTAGE AND CONTROL		RBSRT	#(SAME_AS_)2.3.3.5.3}	NORMAL POSITION	15	[SANB AS 12.3.1.6.1]
_12.1.09.10.2		AG-M1-3 (LOCEOUT BELAT)	_ BISST	#(9AMR. 48_12.3.9.5.1)	NOBHAL POSITION	.11	(SAMB AS 12.2.1.1:1 AND 12.2.3:1:1)
12.1.09.11.1		125VDC BUS (1 (12-118)	AOTAS FOR .	PROTENTIAL INOP OF TRAIN A FOR SISLOP DUB TO 4800 SUGR/MCC VOLT DEGRADATION AND/OR DG OVERLOAD, WITH POTENTIAL INOP OF TRAIN B DUB: UNISOLABLE CCY PLOW	ECPS ALSO UNAVAILABLE FOR SCIR. MAIN 1PMR BAS 2 TRAINS OF PORCED AIR COOLING	04	(SAMB AS 12.3.1.6.1)
				BIPASS, LOSS OF LO-LO RWST LEVEL TRIP OF TRAIN A SI/PW. REDUCED RELIABILITY OF ALT OFFSITE SOURCE			
	SWGR #1 UNDERVOLTAGE AND CONTROL		VOLTS LOW	POTENTIAL INOP OF TRAIN A FOR SISLOP DUE TO 486V SUGR/MCC VOLT DEGRADATION AND/OB DG OVERLOAD, WITH POTENTIAL INOP OF TRAIN B DUE: UNISOLABLE CCU PLOW	RCPs ALSO UMAYAILABLE FOR SCTR. MAIN IPMR BAS 2 TRAINS OF FORCED AIR COOLING		(SAME AS 12.3.1.6.1)
12.3.09.{1.1	9469 41	125VDC BUS 41	VOLTS LOW	SIPASS, LOSS OF LO-LO BUST LEVEL TRIP OF TRAIN A SI/PW. REDUCED RELIABILITY OF ALT OPPSITE SOURCE *POTENTIAL INOP OF TRAIN A FOR SISLOP	RCPs ALSO UNAVAILABLE FOR SCIR. MAIN	12	(SAME AS 12.3.1.1.1 AND 12.3.3.1.1)
··	CONTROL  ONTROL			DUE TO 480V BUGE/MCC VOLT DECRADATION AND/OR DG OVERLOAD, WITE POTENTIAL INOP OF TRAIN & DUE: UNISOLABLE CON FLOW BIPASS, LOSS OF LO-LO RWST LEVEL TRIP OF TRAIN & SI/PW. REDUCED RELIABILITY OF	1PMR WAS 2 TRAINS OF FORCED AIR COOLING		
2.4.01.01.1	52-1202 (BRBARRE)	BRBAKER	OPRN	ALT OFFSITE SOURCE	PROMPTLY TREE NOW EXCHANGE AS	03	(SANS AS 12.3.1.1.1)
				INTERRUPT OF AUXILIARIES, INCL CLNG. TRAIN A POTENTIALLY INOP FOR BECIEC DUE TO LOSS OF LO-LO RWST LEVEL TRIP OF TRAIN B SI/PW. REDUCED RELIABILITY OF	LOADS AND BE-EMBRGIZE SWCR 42 TO RESTORE POWER TO MOV-850A AND DC BUS 42 BATTERY CRAFGERS FOR TRAIN B SI/PW TERMINATION. MAIN 1PMR BAS 2 TRAINS OF FORCES AIR		
2.4.01.01.1	52-1202 (BREAKER)	BRBAKER	OPBN	B DG AND MPW PP POTENTIALLY INOP DUE TO INTERRUPT OF AUXILIARIES, INCL CLNG.	COOLING  1480V ACB FROM SST \$2. BOI REV REQD TO PROMPTLY TRIP NON-BSSENTIAL SWCR \$3  LOADS AND RB-ENERGIZE SWCR \$2 TO RESTORE POWER TO BOY-850A AND DC BUS \$2 BATTERY		(SAME AS 12.3.1.1.1)
		·-················.		TO LOSS OF LO-LO RWST LEVEL TRIP OF TRAIN B SI/PM. REDUCED RELIABILITY OF ALT OFFSITE SOURCE	COARGES FOR TRAIN 9 81/PW TERMINATION. MAIN IPME HAS 2 TRAINS OF FORCED AIR COOLING		
2.4.01.02.1		52-1203 "b" CONTACT	OPEN	MORE	THECH SPEC ACTION ENTRY REQUIRED IF SUCH 42 NOT BHERGIZED VIA BREE 52-1202 FROM SST 42		(SAHB AS 12.3.1.2.1)
2.4.01.04.1		52-1200 "b" contact	CSBR	NONB	SNOR AZ EMBEGENCY POWER VIA 1PME FROM SDGAB 12 LV LINE VS. SONGS 220 LV SMID. TECH SPEC ACTION BNTRY REQUIRED IP SWGE AZ NOT BNERG12ED VIA BREG 52-1202 FROM	36.3	ISSUE CLARIPICATION TO IDENTIFY 52-1200 AS A TIE ONL BREE WITHIN DEPINITION OF TECH SPEC 3.7 LCO

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EMERGENCE CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS

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### EMBREGBACT CORE COOLING SYSTEM SINGLE PAILURE AMALTS!S SAN ONOPRE UNIT 1... ACTION ITEMS FOR SIGNIFICANT PINDINGS

STRAIN 8 BCCS INOPPRABLE, TRAIN 8   DELAYED FAILURES RESULT FROM LOSS OF 15 (SAME AS 12.3.1.6.1)	
PLOW BYPASS, LOSS OF LO-LO RWST LEVEL TRIP FOR TRAIN & SI/FM. REDUCED POWER LOST, SWGR &2 SHERGENCY POWER FROM  RELIABILITY OF ALT OPPSITE SOURCE. BCPs ALSO UNAVAILABLE FOR SCTE ALSO UNAVAILABLE FOR SCTE AMALYZED/CREDITED. MAIN IFME BAS 2 TRAINS OF FORCED AIR COOLING  12.4.01.08.1 52-1202 86 (BELAY) ON STRAIN & ECCS INOPREABLE, TRAIN A DELAYED FAILURES RESULT FROM LOSS OF 18 (SAME AS 12.3.1.1.1)  (BREATER) POTENTIALLY INOP DUE TO: UNISOLABLE CCU PLOW BYPASS, LOSS OF LO-LO RWST LEVEL REQU TO TRIP APPRICTED SI/FW P BEFORE DC  TRIP FOR TRAIN & SI/FW. REDUCED POWER LOST. SWGR #2 EMERCENCY POWER FROM  RELIABILITY OF ALT OFPSITE SOURCE. BCPs AMALYZED/CREDITED. MAIN IPME BAS 2 TRAINS OF FORCED AIR COOLING	
TRIP FOR TRAIN & SI/FM. REDUCED POWER LOST, SWGR &2 BRERGENCY FOWER FROM  BELIABILITY OF ALT OPPRITE SOURCE. BCP.  ALSO UMAVAILABLE FOR SCTR  ALSO UMAVAILABLE FOR SCTR  AMALYZED/CREDITED. MAIN THME BAS 2  TRAINS OF FORCED AIR COOLING  12.4.01.08.1 52-1202 86 (BBLAY) ON STRAIN & ECCS INOPREABLE, TRAIN A DELAYED FRILURES BESULT FROM LOSS OF 18 (SAME AS 12.3.1.1.1)  (BREAGER) POTENTIALLY INOP DUE TO: UMISOLABLE CCU  PLOW BIPASS, LOSS OF LO-LO RWST LEVEL  REQU TO TRIP AFFECTED BL/FM PP BEFORE DC  TRIP FOR TRAIN SI/FM. BEDUCED POWER LOST. SWGR #2 BHERCENCY FOWER FROM  RELIABILITY OF ALT OFFSITE SOURCE. BCP.  AMALYZED/CREDITED. MAIN 1PMB BAS 2  TRAINS OF FORCED AIR COOLING	
RELIABILITY OF ALT OPPRITE SOURCE. RCP- ALSO UNAVAILABLE FOR SGTR ANALTZED/CREDITED. MAIN IPHE BAS 2 TRAINS OF FORCED AIR COOLING  12.4.01.08.1 52-1202 86 (RBLAY) ON STRIN & ECCS INOPREABLE, TRAIN A SCOLING OF PORCED AIR COOLING OF ASTRET CHARGING. BOI REV POTENTIALLY INOP DUE TO: UNISOLABLE COU COULING OR BATTERY CHARGING. BOI REV PLOW SIPASS, LOSS OF LO-LO RWST LEVEL PLOW SIPASS, LOSS OF LO-LO RWST LEVEL REGO TO TRIP APPROTED BI/PW PP BEFORE DC  TRIP POR TRAIN & SI/PW. REDUCED POWER LOST. SWGR \$2 BHRRGENCY POWER FROM RELIABILITY OF ALT OPPRITE SOURCE. RCP- SUGAR 12 by SOURCE NOT ALSO UNAVAILABLE FOR SCTR AMALTZED/CREDITED. MAIN IPHE BAS 2 TRAINS OF FORCED AIR COOLING	_
TRAINS OF FORCED AIR COOLING  12.4.01.08.1 52-1202 86 (RELAT) ON STRAIN & SCCS INOPRRABLE, TRAIN & SDEATED FAILURES RESULT FROM LOSS OF 18 (SAME AS 12.3.1.1.1)  (BREARRY) POTRITIALLY INOP DUE TO: UNISOLABLE CCU COOLING OR BATTER CRAGGING. ROI REV  PLOW STPASS, LOSS OF LO-LO RWST LEVEL REQUIRED AFFECTED SI/FW PP BEFORE DC  TRIP FOR TRAIN & SI/FW. REDUCED POWER LOST. SUGR 22 BRECENCY POWER FROM  RELIABILITY OF ALT OPPSITE SOURCE. RCPs.  ALSO UNAVAILABLE FOR SCTR  ANALYZED/CREDITED. MAIN 1PME BAS 2  TRAINS OF FORCED AIR COOLING	_
12.4.01.08.1 52-1202 86 {BBLAY} ON STRING BICCS INOPPRABLE, TRAIN A SPELATED FAILURES RESULT FROM LOSS OF 18 (SAME AS 12.3.1.1.1)  (BRBARBE) POTENTIALLY INOP DUE TO: UNISOLABLE CCU COOLING OR BATTERT CHARGING. BOI REV  FLOW STPASS, LOSS OF LO-LO RWST LEVEL REGO TO TRIP APPECTED SI/PW PP BEFORE DC  TRIP FOR TRAIN B SI/PW. REDUCED POWER LOST. SWGR 22 BHRRCENCY POWER FROM  RELIABILITY OF ALT OFFSITE SOURCE. BCP: SDGAR 12 by SOURCE NOT  ALSO UNAVAILABLE FOR SGTR ANALYZED/CREDITED. MAIN 1PME HAS 2  TRAINS OF FORCED AIR COOLING	_
(BRRAKER)  POTENTIALLY INOP DUE TO: UNISOLABLE CCU COOLING OR BATTERY CHARGING. ROI REV  PLOW STPASS, LOSS OF LO-LO RWST LEVEL REGD TO TRIP APPECTED SI/FW PP BEFORE DC  TRIP FOR TRAIN A SI/FW. REDUCED POWER LOST. SWCR 12 EMERCENCY FOWER FROM  RELIABILITY OF ALT OFFSITE SOURCE. RCP: SDCAR 12 by Source not  ALSO UNAVAILABLE FOR SCTR  TRAINS OF FORCED AIR COOLING	-
PLOW STPASS, LOSS OF LO-LO RWST LEVEL REGD TO TRIP APPRICTED SI/FW PP BEFORE DC  TRIP FOR TRAIN & SI/FW. REDUCED POWER LOST. SWCR \$2 EMERCENCY POWER FROM  RELIABILITY OF ALT OPPSITE SOURCE. RCP: SDC&R 12 by SOURCE NOT  ALSO UMAVAILABLE FOR SCTR AMALTZED/CREDITED. MAIN 1PME HAS 2  TRAINS OF FORCES AIR COOLING	
RELIABILITY OF ALT OPPSITE SOURCE. RCP. SDCAR 12 by SOURCE NOT  ALSO UNAVAILABLE FOR SCTR ANALYZED/CREDITED. MAIN 1PME HAS 2  TRAINS OF FORCES ALE COOLING	
ALSO UNAVAILABLE FOR SCTR ANALYZED/CREDITED. MAIN 1PMB BAS 2 TRAINS OF FORCED AIR COOLING	
TRAINS OF FORCED AIR COOLING	·
12.4.01.08.1 52-1202 86 (BBLAT) ON STRAIN B BCCS INOPERABLE, TRAIN A SDELATED FAILURES RESULT FROM LOSS OF 24 (SAMB AS 12.3.1.6.1)	•
(BRBARR) POTRWYIALLY INOP DUB TO: UNISOLABLE CCW COOLING OR BATTERY CHARGING, BOI RRY	
PLOW BYPASS, LOSS OF LO-LO EWST LEVEL REQU TO TRIP APPECTED 81/PW PP BEFORE DC	
TRIP POR TRAIN B 81/PW. REDUCED POWER LOST. SWCR BE BERGENCY POWER FROM	•
RBLIABILITY OF ALT OPPSITE SOURCE. RCPs. SDGAR 12 by SOURCE NOT  ALSO UNIVALIABLE FOR SGTR ANALYZED/CREDITED. MAIN 1PMR BAS 2	
TRAINS OF FORCED AIR COOLING	
12.4.02.01.2 52-1203 BREATER CLOSED STRAIN & POTENTIALLY INOP DUE TO VOLTAGE STRON SPEC ACTION ENTRY REQUIRED (SAME AS 12.3.1.2.1)	
(BRRAERR) DECRADATION AND SET \$2/BRER OVERLOAD SWCR \$1-3 OR SWCR \$2-3 THE BREE CLOSED	
DURING SIS/SISLOP LOADING. TRAIN A DURING NORMAL OPS. ROL SEV REQD TO TRIP	
POTENTIALLY INOP FOR RECIEC DUR TO LOSS APPROTED SI/FW PP BEFORE DC POWER LOST  OF LO-LO EWET LEVEL TRIP OF TRAIN B IF CANNOT RE-EMERCIZE 480V SUCE. LO-LO	
SI/FW. REDUCED RELIABILITY OF ALTERNATE RWET LEVEL TRIP APPROTED IF 4EW POWER	
OFFRITA BOURCE NOT LOST VITA 480V	
12.4.02.03.2 52-1203 52-1103 CLOSED LOSS OF AUTOMATIC PROTECTION AGAINST STRUCK SPEC ACTION BUTRY REQUIPED FOR THIS (SAME AS 12.3.1.2.1)	
(BRBARR) "5" CONTACT OR PARALLELING REDUNDANT TRAINS A AND S CONDITION SINCE SIS/SISLOP TRIP SIGNALS  133 CONTACT 480V SWGR ARB MOMENTARY ONLY (VIA TDR4) AND DO NOT	
PREVENT PARALLELING OF A SUBSEQUENT	
SINGLE FAILURE OR OPPRATOR BREOR APTER	
TRIP	
12.4.02.08.1 52-1203 BEQ 2 CONTACTS OPEN MONE IP BERE INITIALLY OPEN *MORMAL POSITION. TECH SPEC ACTION ENTRY (SAME AS 12.3.1.2.1)	
(BRRAIBE) (21-5,1) (OFF) REQUIRED IF THE BREE CLOSED IN MODES 1 -	
12.4.02.09.2 52-1203 "A" CONTACTS CLOSED NORE STRUE SPEC ACTION BUTEF BEQUIERD FOR (SAME AS 12.3.1.2.1)	
(BERAER) THIS COMMITTION, HINCE A SUBSEQUENT	
SINGLE PAILURE COULD RESULT IN	
CROSS-TRAIN POWER/CONTROL AT SWGR 13 AND	]
LOSS OF BLECTRICAL SEPARATION BETWEEN  REDUNDANT TRAINS A AND B	
12.4.02.10.1 52-1203 "b" CONTACTS OPEN NOWE FOR SHORT TERM. FOR LONG TERM, SWGR "HOV-358/HOV-850C UPS DUTY CICLE > 30 (SAME 49 12.3.1.2.1)	
(BERAERE) \$3 CAN BE RE-EMBRGIZED WITH THIS FAILURE HIMUTES TO PERMIT CREDIT FOR OPERATOR	
BY LOCALLY RACEING-OUT SWGB 82-3 TIB ACTION LOCALLY IN THE 44V ROOM OR 480V	
BRIR 52-1203 IN 480V ROOM AND THRN ROOM. BOI CHANGE REQUIRED TO INCLUDE CONNECTING TO TRAIN A VIA 52-1303 OR PLACING SWGR A3 CONTROL POWER SELECTOR	
52-1103 TO PREVENT LOSS OF IN MANUAL TO RE-ESTABLISE 125VDC CONTROL	
MOV-356/HOV-850C UPS POWER TO SWIR AS BREES	1

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## EMERGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAM ONOPRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

ITEM #	DBAICE ID	COMPONENT ID	PAILURE MODE	EPPECT ON ECCS	BEHARES	ERPORT LTEN	ACTION ITEM RESP DISCIPLINE
12.4.02.10.2		.P. CONTACAS	CLOSED	NONE	INORMAL POSITION. TECH SPEC ACTION BUTET		(SAME AS 12.3.1.2.1)
	(BREAKER)				REQUIRED FOR THIS COMDITION SINCE A		
					SUBSEQUENT SINCLE PAILURE OR OPERATOR REFOR COULD RESULT IN CROSS-TRAIN POWER		
					AND CONTROL AT SWGR \$3 AND LOSS OF	·	
					BLECTRICAL SEPARATION BETWEEN REDUNDANT		
12.4.02.11.1	52-1203	133 CONTACTS	OPRN	AUAD IA ALUMAN DE DE DURAGERA	TRAINS		
	(BREALER)	113 00818013	UPSE	SUGR 43 CANNOT BE RE-ENERGIZED POST-318/818LOP WITHOUT INTERRUPTION OF	STINCE HOV-SOS ALSO APPECTED AND CANNOT		(SAMB AS 12.3.1.2.1) POB BLECTRICAL ALIGNMENT
				TRAIN B 480V POWER, DISABLING 1/3 SI	VALVE CRS-301 REQUIRES SEAT LEAGUE		
				VALVES POR LO-LO REST LEVEL TRIP	TESTING FOR THE RECIRC BOUNDARY PUNCTION		
	£9 1909	111 0040.000	4554	FUNCTION AND 1/3 CLB PATES			
2.4.02.11.1	(BRRAERR)	133 CONTACTS	OPRN	SUGR \$3 CANNOT BE RE-BUBBCCIZED	ISINCE HOV-883 ALBO AFFECTED AND CANNOT	02	(SAHE AS 12.3.2.9.1)
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			POST-SIS/SISLOP WITHOUT INTERRUPTION OF TRAIN S 4804 POWER, DISABLING 1/3 SI	VALVE CRS-301 REQUIRES SEAT LEARAGE		
				VALVES FOR LO-LO ENST LEVEL TRIP	TESTING FOR THE RECIRC BOUNDARY FUNCTION		
• • • • • •				PUNCTION AND 1/3 CLE PATHS			
2.4.02.12.1	SZ-1203 (BRBAKER)	SWGR #2 125VDC CONTROL POWER	AOTAS FOR	NORE IF BEER INITIALLY OPEN. SUGE \$3 CAN	PERCH SPEC ACTION BUTET REQUIRED IF SWGE		(SAME AS 12.3.1.2.1)
	108288887	CONTROL PURSE		BR BR-BHRRGIZED PROM TRAIN A VIA 52-1303 AND REF \$3 OR 52-1103 AND RECR \$1	02-3 THE BREE CLOSED DURING NORMAL OPERATION		
2.4.03.01.1	HCC-2	52-1218	OPRM	TRAIN & BCCS INOPERABLE. REDUCED		24	(SAHR AS 12.3.1.6.1)
<del></del>		(BRBARRR)		BELLABILITY OF ALT OFFSITE SOURCE. BCP.	RE-ENERGIZE UTILITY BUS PRON MCC-1 VIA	••	(
				UNAVAILABLE POR BGTR	BIS-1-40-BECOASE RUE BEIRTEA BY ALM ALLE		
					THIS PAILURE. CRARGING PUMPS ALSO UNAVAILABLE FOR INJECTION IF MOV-1100C		
					IS ON TRAINS. MAIN IPHR HAS 2 TRAINS OF		
					PORCED AIR COOLING		
2.4.03.01.1 1	HCC-\$	52-1218	OPBN	TRAIN B BCCB INOPERABLE. REDUCED	INCC-2 1804 ACB. BOI BRY REQD TO		REVISE PROCEDURES AS MERBED TO ADDRESS OPERATIONS
		(BBBAEBE)		BALIABILITY OF ACT OPPSITE SOURCE. BCP. UNIVALLABLE FOR SGTE			RE-EMBRGIZING THR UTILITY BUS PRON MCC-1 VIA MTS-Y
•				ONLY AT LESS TO SELE	HTS-7 TO RECOVER BLE PRIMARY PATH WITH THIS PAILURE. CHARGING PUMPS ALSO		
			-		UNAVAILABLE POR INJECTION IF MOV-1100C		
					18 ON TRAIN B. MAIN IPME MAS 2 TRAINS OF		
.1.03.01.2	100.)	32-1216	CLOSED	NAUD.	FORCED AIR COOLING	.,	
. 1.03.01.6	aco-6	(BRRAERR)	CLUSED	MUNE	*MORNAL POSITION. NON-SE LOADS NOT ALL TRIPPED/LOCARD-OUT ON SISLOP. BREES MUST	16	(89RR VA 1812-1715)
					COORDINATE TO PREVENT PREDER TRIP UNDER		
					SIS AS WELL AS SISLOP. MCC BUS PAULT		
					PLUS BRER FAILURE IS OUTSIDE SIS/SISLOP		
.4.03.02.2 B	1CC-2	NSR LOADS	OFF		DESIGN BASIS DOSE CALCERY REQUITO BLININATE CREDIT	yı	TSANE AS (12.301.601)
	· · · · ·		(BRER OPEN)	OF ALT OPPSITE SOURCE. BCPs UNAVAILABLE	FOR RCP OPERATION POST-SCIR. MAIN IFMR	• *	fauns sa 19-4-11-4-11
			• •	POR SCTR	HAS 2 TRAINS OF FORCED AIR COOLING		
.4.03.02.3 H	ICC-2	MSR LOADS	BQ/SBISHIC		NON-SR LOADS NOT THE TRIPPED TECCERD-OUT	35	(SAME AS 12.3.3.2.3)
				TRAIN B DUR TO 480V SWGR/MCC DEGRADATION RESULTING FROM FAILURE TO ISOLATE ALL			
		•			RG 1.75 OR 1868 384 CRITERIA WHICH REQUIRE TRIP OF ALL WON-18 LOADS ON A		
					SAFBTY SIGNAL (IB, SIS AND SISLOP)		

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ITEN (	DRVICE ID	COMPONENT ID	PAILURE HODE	BPPBCT ON BCCS	PRHARES	REPORT ITEM	ACTION ITEM . RBS	P DISCIPLINE
12.4.04.01.1 H	CC-24	. 52-1223 (BRBAERB)	. OPR#	POTENTIALLY INOPERABLE FOR RECIRC DUE TO	JMCC-2A 480W ACB. VERIFICATION REQUIPMENT OF ADEQUACY OF POSTABLE BACKUP VERTILATION FOR CHARGING PUMP ROOM AND ACCRESIBILITY OF ROOM MITH THE SOURCE TREAS	.01	(SANR AS 12.3.1.1.1)	
12.4.04.01.1 8	CC-24	52-1223 (BRBARRR)	OPBN		*MCC-2A 486V ACD. VBBIFICATION REQU OF ADEQUACT OF PORTABLE BACKUP VENTILATION FOR CHARGING PUMP ROOM AND ACCESSIBILITY	18	(SAMB AS 12.3.1.1.1)	
12.4.04.01.2 H	CC-24	52-1121 (RRRAKEB)	CLOSED	MONE	OP BOOM WITH THE SOURCE TRAMS *MORMAL POSITION. MOM-SE LOADS NOT TRIPPED/LOCESD-OUT ON SISLOP. BREES MUST COORDINATE TO PREVENT PREDER TRIP. NCC BUS FAULT FLUS BREE FAILURE IS OUTSIDE	36	(SAHR AS 12.3.3.1.2)	
12.4.04.02.2 H	CC-24	WSR LOADS	OFF (BRER OPEN)	POTENTIAL INOPERABILITY OF BOTH TRAINS FOR RECIEC DUB TO LOSS OF COOLING FOR CHARGING PUMP ROOM	SIS/SISLOP DESIGN BASIS  *VERIFICATION REQU OF ADEQUACE OF PORTABLE BACKUP VENTILATION FOR CHARGING PUMP SOOM COOLING AND ACCESSIBILITY OF	03	(SAHE AS 12.3.1.1.1)	
12.4.04.02.2 H	CC-24	MSR LOADS	OPP (BREE OPEN)	*POTENTIAL INOPERABILITY OF ROTE TRAINS FOR BECIEC DUE TO LOSS OF COOLING FOR CHARGING PUMP ROOM	BOOM WITH THI SOURCE TERMS **VERIFICATION BEGO OF ADEQUACY OF PORTABLE BACKUP VENTILATION FOR CHARGING PUMP BOOM COOLING AND ACCESSIBILITY OF ROOM WITH THI SOURCE TERMS	18	(SAMB AS 12.3.1.1.1)	
12,4.01.02.3 #	CC-34	HSE LOADS	_RQ/SBISHIC	POTENTIAL INOPERABILITY OF BOTE TRAINS FOR BECIEC DUE TO LOSS OF COOLING FOR CHARGING PUMP ROOM		_10	(SAMB 48 12.3.1.1.1.1)	
12.4.05.01.2 H	CC-28	52-1229 (BRRAERR)	CLOSED	NONE	INCREAL POSITION. NON-SE LOADS NOT TRIPPED/LOCERD-OUT ON SISLOP. BOWEVER, BRIES COORDINATE TO PREVENT PREDER TRIP. NCC BUS FAULT PLUS BREE FAILURE IS	36	(SAHR AS 12.3.3.1.2)	
12.4.05.02.3 M	CC-28	MSB LOADS	R9/SPISHIC	*POTENTIAL COMMON-CAUSE INOPERABILITY OF TRAIN & DUE TO 480V SWGE/ECC DEGRADATION RESULTING FROM FAILURE TO ISOLATE ALL UNQUALIFIED LOADS ON 818 AND SISLOP	1.15 OR IBRE 384 CRITERIA MBICE REQUIRE TRIP OF ALL MON-12 LOADS ON A SAPETY	35	[SAMB AS 12.3.3.2.3]	
12.4.08.01.3 S	WGR #2 WSR DADS	BREAKER(S)	BQ/SBISMIC	TRAIN B DUB TO 480V SWGR/MCC DEGRADATION BESULTING FROM FAILURE TO ISOLATE ALL	SIGNAL (IR, SIS AND SISLOP) *COMPIGURATION DORS NOT MEET RG 1.75 OR ISER 184 CRITERIA MMICH REQUIRE TRIP OF ALL NON-18 LOADS ON A SAFRET SIGNAL (IR,	15	{SAMB AS 12.3.3.2.3}	
	MCR #2 NÖBRVÖLTAGB AND ONTROL	SEQ 2 (11-2,4)	CONTACTS OPEN (OFF)	UNQUALIFIED LOADS ON BIS AND SISLOP POTENTIAL INOP OF TRAIN B FOR SISLOP DUB TO SWGR 12 VOLTACE DEGLADATION AND/OR DC OVERLOAD, WITH POTENTIAL INOP OF TRAIN A DUB TO: UNISOLABLE CCU FLOW BIPASS, LOSS OF LO-LO RWST LEVEL TRIP OF SI/FW. REDUCED REL ABILITY OF ALTERNATE OFFSITE SOURCE		04	[SANB AS 12.3.1.6.1]	

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## EMPREENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINGINGS

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						REPORT	na managana na na na pana na mana manana na mana	
ITEN I	DBVICE ID	COMPONENT ID	PAILURB NODB	EFFECT ON BCCS	PRMARES	iten	ACTION ITEM	RBSP DISCIPLIN
2.4.09.01.1	SYGR AZ	SEG 2	CONTACTS OPEN	POTENTIAL INOP OF TRAIN & POR SISLOP	NORMAL POSITION, RCPS UNAVAILABLE DUB	TO 15	(SAMB AS 12.3.1.6.1)	
	CONTROL AND		(OFF)	DUE TO SWGB #2 VOLTAGE DEGRADATION	LOSS OF MOTOR CLNG WITH THIS PAILURE.			
	<del></del>			OF TRAIN A DUB TO: UNISOLABLE CCU PLON BIPASS, LOSS OF LO-LO RUST LEVEL TRIP OF	BUCK 43 LOADS, HOVRYRR, SUGE 43 18 130LATED ON SIS/SISLOP VIA SEPARATE			
				SI/PW. REDUCED BELIABILITY OF ALTERNATE OFFSITE SOURCE	TRAINS OF FORCED AIR COOLING			
.4.05.01.1	SWGR 12 Undervoltage and	SBQ 2 {11-2,4}	CONTACTS OPEN (OFF)	SPOTENTIAL INOP OF TRAIN B FOR SISLOP DUE TO SWEE 82 VOLTAGE BEGRADATION	NORMAL POSITION. SCPS UNAVAILABLE DUE LOSS OF MOTOR CLUG WITH THIS FAILURE.	TO 24	(SANR AS 12.3.1.6.1)	
	CONTROL	<del></del>			SWGR #3 LOADS. HOWEVER, SWGR #3 18	OF		
				BIPASS, LOSS OF LO-LO BUST LEVEL TRIP OF SI/FW. REDUCED RELIABILITY OF ALTERNATE	SEQUENCER CONTACTS. MAIN IFHE HAS 2			
4.09.01.2		81Q Z	CONTACTS CLOSED	OPPSITE SOURCE PRAIN B ECCS INOPERABLE, TRAIN A	TRAINS OF FORCED AIR COOLING SISLOP SIGNAL TO SWGR #2 UV BELATS IS		{SAME AS 12.3.1.6.1}	
	UNDERVOLTAGE AND CONTROL	111-2(1)	TONT	BIPASS VIA MOV-1204 AND LOSS OF LO-LO	DUE TO RELAY PAILURE PREVENTS RESTART	1 O <b>P</b>		
·				ENST LEVEL TRIP OF TRAIN B SI/PM	AFFECTED LOADS. SWGR 33 LOADS OTHER TAIR COMPRESSOR AND MCCS WILL ALSO TRI			
.4.09.01.2		SIQ 2	CONTACTS CLOSED	ITRAIN B RCCS [NOPERABLE, TRAIN A	SISLOP SIGNAL TO SUGR #2 UV RELATS IS		(SAME AS 12.3.1.6.1)	
	UNDERVOLTAGE AND	(11-2,4)	(ON)	BIPASS VIA MOV-720A AND LOSS OF LO-LO	DUE TO RELAT FAILURE PREVENTS RESTART	TOF		
		-		RUST LEVEL TRIP OF TRAIN B 81/FW	AFFECTED LOADS. SWGR #3 LOADS OTHER 1 AIR COMPRESSOR AND MCCS WILL ALSO TRI			
.4.09.02.1		21-1	ON	*(SAME AS 12.4.9.1.2)	HITE THIS PAILURE  BOI REV BEGD TO CLOSE APPROTED CON I	11 04	{SAMB AS 12.3.1.6.1}	
	UNDERVOLTAGE AND CONTROL	(SA ERFEA)	(VOLTS LOW)		MOV TO RECOVER CCW HEAT REMOVAL CAPABILITY WITH FAILURE OF ONE SWC PO AND TRIP AFFECTED SI/FW PUMPS BEFORE	•	· · · · · · · · · · · · · · · · · · ·	
		27-1	- ON	*(SAHB AS 12.4.5.1.2)	POWER IS LOST  REOF REV REOF TO CLOSE APPECTED CCW I		(SAME AD 12.3.1.6.1)	
	UNDERVOLTAGE AND		(VOLTS LOW)	*/38B #0 15:2:3:1:51	MOY TO ERCOVER CCH HRAT REMOVAL  CAPABILITY WITH FAILURE OF ONE SWC PR		(**************************************	
<u></u>	CV#1BVU		and the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second o		AND TRIP APPROTED SI/PW PUMPS BEFORE POWER IS LOST	<del></del>		
4.09.03.1	SWGR #2 UNDERVOLTAGE AND	88Q Z	CONTACTS OPEN	POTRITIAL INOP OF TRAIN B FOR SISLOP DUE TO 480V SECRIPIC VOLTACE DEGRADATION	*NORMAL POSITION. INCLUDES RESET SWIT		(SAME AS 12.3.1.6.1)	· · · · · · · · · · · · · · · · · · ·
	CONTROL	():6;	1+1+1	AND/OR DG OVERLOAD, WITH POTENTIAL INOP OF TRAIN A DUE TO: UNISOLABLE CCW FLOW	BEFORE 125 VDC CONTROL POWER IS LOST.			
	- A Marie - An A A A A 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 -		÷	BIPASS, LOSS OF LO-LO BUST LEVEL TRIP OF SI/PW. REDUCED RELIABILITY OF ALT				
.4.09.01.1	SUGR 12	S6Q 2	CONTACTS OPEN	OPPSITE SOURCE *POTENTIAL IMOP OF TRAIN B FOR SISLOP	*NORMAL POSITION. INCLUDES RESET SWI		(SAMB AS 12.3.1.6.1)	
	UNDERVOLTAGE AND CONTROL	(10-10,12)	(OPP)	DUB TO 180V SWGR/MCC VOLTAGE DEGRADATION AND/OR DG OVERLOAD, WITH POTENTIAL INOP	BEFORE 125VLC CONTROL POWER IS LOST.			
				OF TRAIN A DUB TO: UNISOLABLE CON FLOW BYFASS, LOSS OF LO-LO EWST LEVEL TELP OF	BCFS ALSO LOST, UNAVAILABLE FOR SCIE			
				SI/FW. REDUCED RELIABILITY OF ALT OFFSITE SOURCE	COOLING			

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EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT ]
ACTION ITEMS FOR SIGNIFICANT FINDINGS

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1768 \$	DENICE ID	COMPONENT LD	FAILURE HODE	BPPRCT ON BCCS	BEHARES	REPORT	ACTION ITEM	RESP DISCIPLIN
2.1.09.03.1	SWGR 82 Undervoltage and		CONTACTS OPEN (OPP)	APOTENTIAL INOP OF TRAIN B FOR SISLOP DUB TO 480V SWGR/MCC VOLTAGE DEGRADATION		24	(SAMB AS 12.3.1.6.)).	
<del></del>	CONTROL			AND/OR DG OVERLOAD, WITH POTENTIAL INOP OF TRAIN A DUE TO: UNISOLABLE CCW FLOW BYFASS, LOSS OF LO-LO RWST LEVEL TRIP OF SI/FW. REDUCED RELIABILITY OF ALT OPPSITE SOURCE	RCPS ALSO LOST, UNAVAILABLE FOR SCTR.			
2.4.09.04.2	SWGR #2 UNDERVOLTAGE AND CONTROL	86-2 (RELAT)	RESET	*(SANE AS 12.4.9.3.1)		04	(SAHR AS 12.3.1.6.1)	
2.4.09.04.2		86-2 (RELAT)	RESET	#(SAHB AS 12.4.9.3.1)		15	(SAMB AS 12.3.1.6.1)	
2.4.09.04.2	SUGR #2 UNDBRYOLTAGE AND CONTROL	86-2 (RBLAT)	RESET	({SAHE AS 12.4.9.3.1}		24	(SARB AS 12.3.1.6.1)	
2.4.09.05.1	UNDBRVOLTAGE AND	SEQ 2 (12-1,3) (12-5,1)	CONTACTS OPEN (OPP)	POTENTIAL INOP OF TRAIN B FOR SISLOP DUB TO 480V SWGR/MCC VOLT DBGRADATION AND/OR DG OVERLOAD, WITE POTENTIAL INOP OF TRAIN A DUB TO: UNISOLABLE CCW FLOW	NORMAL POSITION. REDUNDANT INPUTS PROM SEQ 2 PREVENT THIS PAILURE UNLESS SEQ 2 LOAD GROUP A OUTPUT OR RELAT DRIVER CARD(S) FAIL. RCPs ALSO LORT,	01	(SARR AS 12.3.1.6.1)	
<del></del>		· · · · · · · · · · · · · · · · · · ·		BIPASS, LOSS OF LO-LO RWST LEVEL TRIP OF SI/PW. REDUCED BELIABILITY OF ALT OFFSITE SOURCE				
2.4.09.05.1	SWGR #2 UNDERVOLTAGE AND CONTROL	SEQ 2 (12-1,3) [12-5,1]	CONTACTS OPEN (OPP)	POTENTIAL INOP OF TRAIN B FOR SISLOP DUB TO 480V SWGR/MCC VOLT DEGRADATION TAB/OR DG OVERLOAD, WITH POTENTIAL INOP	NORMAL POSITION. REDUNDANT INPUTS FROM SEQ 2 PREVENT THIS PAILURE UNLESS SEQ 2 LOAD GROUP A OUTPUT OF RELAT DRIVER		[SAUB AS 12.3.1.6.1]	
				OF TRAIN A DUR TO: UNISOLABLE CCW FLOW BIPASS, LOSS OF LO-LO BWST LEVEL TRIP OF SI/PW. REDUCED RELIABILITY OF ALY	CARD(8) PAIL. BCPs ALSO LOST, FUNAVAILABLE FOR SCTR. HAIN IPHR HAS 2 TRAINS OF FORCED AIR COULTNG	<del></del> -		
2.4.09.05.1		SEQ 2	CONTACTS OPEN	OFFSITE SOURCE *POTENTIAL INOP OF TRAIN B POR SISLOP	NORMAL POSITION. REDUNDANT INPUTS PROM		(SAME AS 12.3.1.6.1)	
	UNDERVOLTAGE AND CONTROL	(12-1,3) (12-5,1)	(OPP)	DUE TO 1809 SUGBINCE VOLT DEGRADATION  AND/OR DG OVERLOAD, WITE POTENTIAL INOP OF TRAIN A DUE TO: UNISOLABLE CCU PLOW  BYPASS, LOSS OF LO-LO BUST LEVEL TRIP OF	CARD(S) PAIL. RCPs ALSO LOST,			
			·	SI/PW. REDUCED RELIABILITY OF ALT OFFSITE SOURCE	TRAINS OF FORCED AIR COOLING			
	SWGR 82 UNDERVOLTAGE AND CONTROL	SEQ 2 {12-1,3} {12-5,7}	CONTACTS CLOSED (ON)	SPERRE PORGE UNAVAILABLE FOR POST-LOCA"  12 CONTROL, REDUCED RELIABILITY OF ALT OFFSITE SOURCE	*CONTACTS NORMALLY MAINTAINED ON SISLOP UNTIL SEQ 2 BLOCE/RESET. VERIF REQD OF ADEQUACY OF CONTAINMENT SPRAY M/ B2	21	(SANK AS 12.3.1.6.1)	
- · · · · · · ·		AND			RECOMBINEE FOR CONTAINMENT ATMOSPHERE HILING TO PREVENT POST-LOCA EZ POCERTS. RCP# ALSO LOST. HAIR IPRE BAS 2 TRAINS			
	UNDBEVOLTAGE AND	SEQ 2 {12-1,3} {12-5,7}	CONTACTS CLOSED (ON)	SPHBER PURCE UNAVAILABLE FOR POST-LOCA HZ CONTROL, REDUCED RELIABILITY OF ALT OFFSITE SOURCE	OF FORCED AIR COOLING CONTACTS NORMALLY MAINTAINED ON SISLOP UNTIL SEQ 2 BLOCE/RESET. VERIF REQU OF ADEQUACY OF CONTAINMENT SPRAY W/ H2	25.1	IDENTIFF EXISTING BASIS OF UPSAR SECTION 6 ADBQUACT OF POST-ACCIDENT CONTAINMENT HYDR MIXING VIA CONTAINMENT SPEAT	
					HECOMBINER FOR CONTAINMENT ATMOSPHERE MILING TO PREVENT POST-LOCA NZ POCERTS. BUYE ALSO LOST. MAIN THR BAS 2 TRAINS			

OF PURCID AIR COOLING

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## EMPROBMET CORB COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM ONOFRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT PINDINGS

ITEN A	DRUICE (A	COMPONENT TO	B. IL HER MAN	B0000		REPORT		DDOB DEGENERAL ***
1188 #	DEVICE ID	COMPONENT ID	PAILUBB NODB	REPRET ON BCCS	kánabes	ITEM	ACTION ITEM	BBSP DISCIPLINE
12.4.09.05.2	SNGR 42	SPQ. 2	CONTACTS CLOSED	SPHERE PUBGE UNAVAILABLE FOR POST-LOCA		25.2	BRVIEW POST-LOCA CONTAINMENT HYDROGEN HITING AS	DBD
	UNDERVOLTAGE AND CONTROL	(12-1,3) (12-5,7)	(ON)	B2 CONTROL, REDUCED RELIABILITY OF ALT OFFSITE SOURCE	UNTIL SEG 2 BLOCE/RESET. VERIF REGD OF ADEQUACT OF CONTAINMENT SPRAY W/ 82 RECOMBINER FOR CONTAINMENT ATMOSPHERE		PART OF DBD	
					HILING TO PERVENT POST-LOCA 82 POCERTS.  RCPs 4LSO LOST. MAIN IPHE 8AS 2 TRAINS OF FORCED AIR COOLING			
	SWGR #2 UNDERVOLTAGE AND CONTROL	SD-1-5 (RELAY)	ON	*(SAMB AS 12.4.9.5.1)	LOCKOUT RESET RELAY FOR 86-H2-1, 86-H2-2, 86-H2-3. INCLUDES HANDSWITCH	01	(SAME AS 12.3.1.6.1)	
12.4.09.06.1		SD-1-5 (RELAY)	ON	*(SAME AS 12.4.9.5.1)	LOCEOUT BESET RELAT FOR 86-M2-1, 86-M2-2, 86-M2-3. INCLUDES BANDSWITCH	15	(SAHE AS 12.3.1.6.1)	
	SWGR #2 UNDERVOLTAGE AND CONTROL	SD-1-5 (RELAY)	ON	*(SAMB AS 18.4.9.5.1)	LOCKOUT RESET RELAT FOR 86-M2-1, 86-M2-2, 86-M2-3. INCLUDES HANDSWITCH	24	(SAME AS 12.3.1.6.1)	, <u></u>
	SUGR #2 Undervoltage and Control	86-1 (RBLAT)	OFF	REDUCED RELIABILITY OF TRAIN B FOR SIS, MONE POR SISLOP	NORMAL POSITION. MANUAL ACTUATION OF SISLOP LOCKOUT RELATS COULD BE REQUIRED FOR SIS EVENT WITE COMMON-CAUSE PAILURES	35	(SAMB AS 12.3.3.2.3)	
					OF MER EQUIPMENT DUE TO LACK OF AM AUTOMATIC TRIP/LOCKOUT AS PRE EG 1.75 AND IRRE 284			
	SWGR #2 UNDERVOLTAGE AND CONTROL	86-H2-1 (LOCEOUT RELAT)	TRIP	FANS UNAVAILABLE FOR FORCED CIRCULATION OF SPHERE ATMOSPHERE FOR POST-LOCA BZ CONTROL, REDUCED BELIABILITY OF	CONTAINMENT SPEAT PLUS BY RECOMBINER FOR CONTAINMENT ATMOSPHERE MIXING TO PREVENT		(SAME AS 12.4.9.5.2)	
	CHOD 18	** ** *		ALTERNATE OFFSITE SOURCE	POST-LOCA BE POCRETS. MAIN IPER BAS 2 TRAINS OF PORCED AIR COOLING	••	(0.00 .0.00 0.00 0.00	
	UNDERVOLTAGE AND CONTROL	86-H2-1 (LOCEOUT BBLAT)	BRSET	*(SAMB AD 12.4.9.5.1)	HORNAL POSITION	04	(SAHB AS 12.3.1.6.1)	
12.4.09.08.2		86-B2-1 (LOCEOUT RELAT)	RESET	*(SAHB AS 12.4.9.5.1)	HORMAL POSITION	15	{SABB A8 12.3.1.6.1}	
12.4.09.08.2		86-HZ-1 (LOCEOUT RELAY)	RESET	*(SAMB AB 12.4.9.5.1)	NORMAL POSITION	24	(SAMB AS 12.3.1.6.1)	
12.4.09.09.1	CONTROL	86-82-2	TRIP	FARS UNAVAILABLE FOR FORCED CIRCULATION OF SPERRE ATMOSPHERE FOR POST-LOCA E2	*VERIFICATION REQU OF ADEQUACT OF CONTAINMENT SPRAY PLUS B2 RECONSINER FOR	- <del></del>	(SAMB AS 12.4.9.5.2)	
	CONTROL			CONTROL	CONTAINMENT ATMOSPHERE MIXING TO PREVENT POST-LOCA BE POCERTS			
	SWGR #2 UNDERVOLTAGE AND CONTROL	86-M2-2 (LOCEOUT RELAY)	RESET	*(9AHE AS 12.4.9.5.1)	NORMAL POSITION	04	(SAHR AS 12.3.1.6.1)	
12.4.09.09.2	<del></del>	86-M2-2 (LOCEOUT &BLAY)	RESET	*(SAMB AS 12.4.9.5.1)	NOBHAL POSITION	15	(SAMB AS 12.3.1.6.1)	1 1 pt 1 pt 1 pt 1

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## EMBRGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOPRE UNIT 1 ACTION 17EMS FOR SIGNIFICANT FINDINGS

ITEM )	DRAICE ID	COMPONENT ID	PAILURE MODE	EFFBCT ON BCCS	REMARES	REPORT	ACTION LIBH	RESP DISCIPLINE
	CONTROL	85-M2-2 (LOCKOUT RELAT)	_BISET		NORMAL POSITION	31 <sub></sub> _	_ (SAUR 48.12.3,1,6,1)	
12.4.09.10.1	CONTROL  CONTROL	A6-B2-3 (LOCEOUT BELAY)		PANS UNAVAILABLE FOR SPEER PURGE FOR POST-LOCA B2 CONTROL OR FOR ECP HOTOR COOLING	EVERIFICATION REED OF ADROVACE OF CONTAINMENT SPEAT PLUS BE RECOMBINER FOR CONTAINMENT ATMOSPERS MIRING TO PREVENT POST-LOCA BE POCRES	. 11	_(SAME AS 12.4.9.5.2)	
12.4.09.10.2	SWCR \$2 UMDBRVOLTAGE AND CONTROL	86-H2-3 (LOCEOUT BELAT)	RESET	*{SAME A2 12.4.9.5.1}		04	(SAHR AS 12.3.1.6.1)	
12.4.09.10.2	SNGR \$2 UNDBRVOLTAGE AND CONTROL	86-H2-3 (LOCEOUT BELAY)	RESET	*(SAH\$ AS 12.4.9.5.1)	NORMAL POSITION	15	(SAMB AS 12.3.1.6.1)	
12.4.05.10.2	CONTROL	· · · · · · · · · · · · · · · · · · ·	RESET	*(SAME AB 12.4.9.5.1)	NORMAL POSITION	24	(SAMB A9 12.3.1.6.1)	···
12.4.09.11.1	SWGR #2 UNDBREVOLTAGE AND CONTROL	SEQ 2 (11-9,11)	CONTACTS OPEN (OPP)	POTENTIAL INOP OF TRAIN B FOR SISLOP DUB TO 488V SWGR/MCC VOLT DBGRADATION AND/OB DG OVERLOAD, WITH POTENTIAL INOP OF TRAIN A DUB TO: UNISOLABLE CCW PLOW BTPASS, LOSS OF LO-LO BWST LEVEL TRIP OF		04	(SAME AS 12.3.1.6.1)	
	SWGR #2 UNDERVOLTAGE AND CONTROL	SBQ 2 (11-9,11)	CONTACTS OPEN (OPP)	SI/PN. ECP UNAVAIL FOR SCTR SPOTENTIAL INOP OF TRAIN B FOR SISLOP DUE TO 4889 SUGE/MCC VOLT DEGRADATION AND/OR DG OVERLOAD, WITE POTENTIAL INOP OF TRAIN A DUE TO: UNISOLABLE CCM PLOM BYEASS, LOSS OF LO-LO RMST LEVEL TRIP OF SI/FN. ECP UNAVAIL FOR SCTR		15	(SAME AS 12.3.1.6.1)	
	SWGR #2 UNDERVOLTAGE AND CONTROL	SBQ 2 (11-9,11)	CONTACTS OPEN (OPF)	IPOTENTIAL INOP OF TRAIN 8 FOR SISLOP DUE TO 480V SWGR/MCC VOLT DEGRADATION AND/OR DG OVERLOAD, WITH POTENTIAL INOP OF TRAIN A DUE TO: UNISOLABLE CCW PLOW BTP138, LOSS OF LO-LO RWST LEVEL TRIP OP 81/PW. RCPs UNAVAIL FOR SCTE		24	(SAME AS 12.3.1.6.1)	
	SWGR #2 UNDERVOLTAGE AND CONTROL	SBQ 2 {11-9,11}	CONTACTS CLOSED (ON)	POTRNITAL INOPERABILITY OF BOTH TRAINS	*CONTACTS NORMALLY MAINTAINED ON SISLOP UNTIL SEQ 2 BLOCE/RESET. VERIFICATION REQD OF ADEQUACY OF PORTABLE BACEUP VENTILATION FOR CRARGING PUMP ROOM AND ACCESSIBILITY OF ROOM WITH THE SOURCE TREM	03	(SAME AS 12.3.1.1.1)	
	SWGR #2 Undervoltage and Control	SBQ 2 (11-9,11)	CONTACTS CLOSED (ON)		*CONTACTS NORMALLY MAINTAINED ON SISLOP UNTIL SEQ 2 BLOCE/RESET. VERIFICATION BEGD OF ADEQUACY OF PORTABLE BACEUP VENTILATION FOR CHARGING PUMP ROOM AND ACCESSIBILITY OF ROOM WITE THE SOURCE TERM	10	(SAHB AS 12.3.1.1.1)	

# EMBRGENCY CORB COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONOPER UNIT 1 ACTION 17889 FOR SIGNIFICANT PINDINGS

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	ITBH #	DRVICE ID	COMPONENT ID	PAILURE MODE	BFFRCT ON BCCS	SEMADES .	REPORT		RESP DISCIPLINE	
-	12.4.09.12.	I SUGR 43UNDERVOLTAGE AND	SD-1-4_(BBLAT) . )	ON .	1[SANR AS 12.4.9.11.1]	LOCEOUT RESET RELAT FOR 86-M24-1,	01	(SAMB AS 12.3.1.6.1)		
	12,4,99,12,	UNDERVOLTAGE AND	<u> </u>	_ ON	*(SAKB 49 12.4.4.11.1)	LOCEOUT RESET RELAT FOR 86-M24-1, 86-M24-2. INCLUDES MANDSWITCH	15	[SAMB AS 12.3.1.6.1]	·	
	12.4.09.12.	CONTROL  SWGR 82  UNDERVOLTAGE AND CONTROL	SD-1-4 (RBLAY)	OM	*{SAMB AS 12.4.9.11.1}	LOCEOUT BESET RELAT FOR 86-M24-1, 86-M24-2. INCLUDES MANDSWITCH	24	(SABB AS 12.3.1.6.1)		
	12.4.09.13.		86-8 (RBLAT) )	ON	POTENTIAL INOP OF BOTH TRAINS FOR RECIRC DUE TO LOSS OF COOLING FOR CHARGING PUMP ROOM	AUTILIARY TOME A/B HAVE "OA" RAYING (IE, WITHOUT PANS) SUPPICIÊNT FOR POST-ACCIDENT ALTERNATE OFFSITE SOURCE	03	(SAHR AS 12.3.1.1.1)		
	12.4.09.13.	1 SWGR #2 UNDERVOLTAGE AND CONTROL	86-8 (RILAY)	CM	POTENTIAL INOP OF BOTH TRAINS FOR RECIRC DUE TO LOSS OF COOLING FOR CHARGING PUMP ROOM	DUTY WITHOUT BCPs AUTILITY THE A/B BAVE "OA" BATING (IB, WITHOUT PANS) SUFFICIENT POR POST-ACCIDENT ALTREMATE OPPSITE SOURCE	18	(SAMB AS 12.3.1.1.1)		<del></del>
	12.4.09.13.2	2 SWGR #2 UNDERVOLTAGE AND CONTROL	86-8 (RELAT)	OPP	REDUCED RELIABILITY OF TRAIN B AND SWING LOADS (SWCR #3) FOR SIS, NOWE FOR SISLOP		15	(SAMB AS 12.3.3.2.3)		
	12.4.09.14.1	UNDERVOLTAGE AND	86-M2A-1 (LOCEOUT RELAT)	TRIP	*(SABB AS 12.4.9.11.2)	AUTOMATIC TRIP/LOCKOUT AS PER RG 1.15 AND TREE 184 BORIC ACID SYSTEM NOT CREDITED FOR SIS/SISLOP EVENTS	03	(SAME AS 12.3.1.1.1)		
	12.4.09.14.1	UNDERVOLTAGE AND	86-H2A-1 (LOCKOUT RELAT)	TRIP		BORIC ACID STRIBM NOT CREDITED FOR 818/819LOP EVENTS	18	(SAMB AS 12.3.1.1.1)		
	12.4.09.14.2		86-H2A-1 (LOCEOUT RELAT)	RESET	*(SANE AS 12.4.9.11.1)	NORMAL POSITION	04	(SAME AS 12.3.1.6.1)		
	12.4.09.14.2		#6-M2A-1 (LOCEOUT RELAT)	RESET	*(SAME AS 12.4.9.11.1)	NORMAL POSITION	15	(SAME AS 12.3.1.6.1)		
	12.4.09.14.2		86-M2A-1 (LOCEOUT RELAT)	RESET	*(SAHE AS 12.4.9.11.1)	NORMAL POSITION	24	(SAMB AS 12.3.1.6.1)		
	12.4.09.15.2		(FOCEORE BETTA)	RESET	*{SAME AS 12.4.9.11.1}	NORMAL POSITION	04	(SAMB AS 12.3.1.6.1)		
	12.4.09.15.2	SWGR #2 UNDERVOLTAGE AND CONTROL	(LOCEOUT BELAY)	RESET		NORMAL POSITION		(SAME AS 12.3.1.6.1)		
	12.4.09.15.2	SWGR #2 UNDERVOLTAGE AND	86-HZA-Z (LOCEOUT BELAT)	RESET	*(SANB AS 12.4.9.11.1)	NORMAL POSITION	24	(SAME AS 12.3.1.6.1)		

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## EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM ONOPER UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

ITEM #	DRAICE ID	COMPONENT ID	FAILURE MODE	BFFRCT ON RCCS	REMARES	BEPORT ITEM	ACTION 1788	RESP DISCIPLINE
2.4.09.16.1	_SVGR_12	_125YDC_BU8_12	_YOLTA LON	POTENTIAL INOP OR TRAIN & POR SISLOP	*SWCR 43 ISOLATED ON SIS/SISLOP		SAMB AS 12.2.1.2.1) FOR BLECTRICAL ALIGNMENT	
	UNDBRVOLTAGE AND	(12-226)		DUE TO 480V SWGB/MCC VOLT DECRADATION	INDEPENDENT OF LOCEOUT RELATS. BOI REV		2240 Se . 281F1 Y. #1.1 1 1 14 - SMEKI #17. PA - BATABBAT	***************************************
	CONTROL			AND/OR DG OVERLOAD, M/ POTENTIAL INOP OF	REQD TO INDIVIDUALLY ISOLATE			
				TRAIN A DUR TO: UNISOLABLE CCV. PLON	NOW-BSSENTIAL SUGB. \$3/MCC-3.LOADS_PREQR_			
				BIPASS, LOSS OF LO-LO RUST LEVEL TRIP OF				
				TRAIN A 81/FW. RESUCED RELIABILITY OF	POST-SIS/SISLOP. RCPs ALSO LOST,			
				ALT OPPSITE SOURCE	UNAVAILABLE FOR SCIE. HAIN IFME HAS 2 TRAINS OF COOLING		THE COLUMN TO THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT THE COLU	·
2.4.09.16.1	SWCR #2	125VDC BUS #2	VOLTS LOW	PPOTENTIAL INOP OF TRAIN & FOR SISLOP	SUGE 43 ISOLATED ON \$18/\$15LOP	04 (:	BAMR AS 12.3.1.6.1)	
	UNDERVOLTAGE AND		102.12 202	DUR TO 480V SWGR/MCC VOLT DEGRADATION	INDEPENDENT OF LOCKOUT BELATS. BOI REV	• •	ANDE NO 15.3.1.4.1	
	CONTROL			AND/OR DG OVERLOAD, W/ POTENTIAL INOP OF				
				TRAIN A DUR TO: UNISOLABLE CCU FLOW	NON-RESENTIAL SUGR #3/MCC-3 LOADS PRIOR	!		
				BTPASS, LOSS OF LO-LO BUST LEVEL TRIP OF	TO RE-ENERGIZING SUCR 43			
				TRAIN A SI/FW. REDUCED RELIABILITY OF	POST-SIS/SISLOP. BCP: ALSO LOST,		· ·	
				ALT OFFSITE SOURCE	UNAVAILABLE POR SGTR. HAIN IPHR HAS 2			
	CUCO 44	146400 040 44	HALBO LOU		TRAINS OF COOLING	·		
2.4.09.16.1		125 VDC BUS #2	VOLTS LOW	POTENTIAL INOP OF TRAIN B FOR BISLOP	SUCR 83 ISOLATED ON SIS/SISLOP	15 (:	BAMB AS 12.3.1.6.1)	
	UNDERVOLTAGE AND CONTROL	(12-220)		DUE TO 488V SUGR/MCC VOLT DEGRADATION	INDEPENDENT OF LOCEOUT RELATS. EOI REV			
	COBIROL			AND/OR DC OVERLOAD, W/ POTENTIAL INOP OF TRAIN A DUE TO: UNISOLABLE CCU FLOW	MON-RESERVIAL SWGR \$3/MCC-3 LOADS PRIOR			
*				BTPASS, LOSS OF LO-LO ENST LEVEL TRIP OF				
				TRAIN A SI/PW. REDUCED RELIABILITY OF	POST-SIS/SISLOP. RCPs ALSO LOST,			
				ALT OFFSITE SOURCE	UNAVAILABLE POR SCTR. MAIN IPHE BAS 2			
					TRAINS OF COOLING			
1.4.09.16.1		125VDC BU8 #2	VOLTS LOW	*POTENTIAL INOP OF TRAIN B FOR SISLOP	SWCR #3 ISOLATED ON SIS/SISLOP	24 (	SAME AS 12.3.1.6.1)	
	UNDERVOLTAGE AND	(12-226)		DUE TO 4804 SHGB/HCC VOLT DEGRADATION	INDEPENDENT OF LOCEOUT RELATE. BOI REV			
-	CONTROL			AND/OR DG OVERLOAD, W/ POTENTIAL INOP OF				
				TRAIN A DUB TO: UNISOLABLE CCV PLON	NON-BASENTIAL SUGR 13/MCC-3 LOADS PRIOR			
				BTPASS, LOSS OF LO-LO RYST LEVEL TRIP OF TRAIN A SI/PW. REDUCED RELIABILITY OF	POST-SIS/SISLOP. RCPs ALSO LOST.			
				ALT OFFSITE SOURCE	UNAVAILABLE FOR SGTR. HAIN IPHR HAS 2		•	
				uni Atlanta adabat	TRAINS OF COOLING			
.6.01.03.2	52-1303	52-1203	CLOSED	LOSS OF AUTOMATIC PROTECTION AGAINST	STECH SPEC ACTION BUTRY REQUIPOR THIS	t:	BAME AS [2.3.1.2.1]	
	(BREAERR)	.P. CONTACT OF		PARALLELING REDUNDANT TRAINS A AND B AT	CONDITION SINCE SIS/SISLOP TRIP SIGNALS		·	
		133 CONTACT		4804 SACE	ARE HOMENTARY ONLY (VIA TORe) AND DO NOT			
					PREVENT PARALLELING BY A SUBSEQUENT		ī	
					SINGLE FAILURE OR OPERATOR REPOR AFTER			
	62 1202	69 1303	LUMBTUS VDDR	CHCO AT CANDOD DB DD BUDDCITED	TEIP			
.6.01.05.1		52-1303 86, 86-1	CONTACTS OPEN (ON)	SWGB 43 CANNOT BE RE-BUBRGIZED POST-SIS/SISLOP, DIBABLING 1/3 SI VALVES	*SINCE MOV-883 ALSO APPROTED AND CANNOT	U	SAMB AS 12.3.1.2.1)	
		(RELATE)	'ioni		VALVE CRS-301 REQUIRES SEAT LEARAGE		<u> </u>	
		,		1/3 CLR PATHS	TESTING FOR THE RECIRC BOUNDARY FUNCTION			
.6.01.05.1	52-1303	52-1303	CONTACTS OFBN	SWGR #3 CANNOT BE RE-ENERGIZED	ISINCE HOV-583 ALSO APPROTED AND CANNOT	02 (:	SAMB AS 12.3.2.9.1)	
		86, 86-1	(0))	POST-SIS/SIBLOP, DISABLING 1/3 SI VALVES				
		(RBLATS)		FOR LO-LO RUST LEVEL TRIP PUNCTION AND	VALVE CRS-301 REQUIRES SEAT LEARAGE			
				1/3 CLR PATHS	TESTING FOR THE RECIRC BOUNDARY PUNCTION			



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## EMBRGENCY CORB COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM ONOPER UMIT 1. ACTION ITEMS FOR SIGNIFICANT PINDINGS

ITEN A	DRAICE 1D	COMPONENT 1D	FAILURB MODE	BFFBCT ON BCCS	REMARES	REPORT	ACTION ITEM	RESP DISCIPLINE	
12.6.02.01.1 HC	C:1	52-1314 (BRBAERR)	_OPBN	POTENTIAL INOPERABILITY OF BOTH TRAINS DUE TO LOSS OF SWCE RM BVAC. ALSO RESULTS IN DISABLING 1/3 SI VALVES FOR	PORTABLE BACKUP VENTILATION PROVIDES ADEQUATE COOLING FOR SUCE BOOM		(SAMB AS 12.3.1.1.1)		-
12.6.02.01.1 MC	n_ 1	52-1314	OPRN	COLO BART TRABE TRIB ENHOLION WHO 1/3	ROVICHENT. AUX IPME A/B BAYE "OA" RATING (IS, NITHOUT PANS) SUPPICIENT FOR POST-ACCIDENT ALTERNATE OPFSITE SOURCE DUTY NITHOUT ECP4				-
14.4.02.01.1 80		(BREAKES)		SPOTENTIAL INOPERABILITY OF BOTE TRAINS DUE TO LOSS OF SEGR RESULTS IN DISABLING 1/3 SI VALVES FOR LO-LO EVET LEVEL TRIP PUNCTION AND 1/3	PHEC-3 480V ACB. VERIF REQUITMENT PORTABLE BACRUP VENTILATION PROVIDES ADEQUATE COOLING FOR SUGE ROOM EQUIPMENT. AUX IFRE A/B BAVE "OA" RATING	16	(SAHS AS 12.3.1.1.1)		
12.6.02.01.1 HC		52-1314	- OPRN	*POTENTIAL INOPERABILITY OF BOTH TRAINS	(IR, WITHOUT PANS) SUPPLICIBNT FOR POST-ACCIDENT ALTERNATE OPPSITE SOURCE DUTT WITHOUT ECPS	<u></u>	70 MB 10 10 5 5 7 7 11		
				DUE TO LOSS OF SMGR RM BYAC. ALSO RESULTS IN DISABLING 1/3 SI VALVES FOR LO-LO EMST LEVEL TRIP PUNCTION AND 1/3 CLR PATES	PORTABLE BACKUP VENTILATION PROVIDES  RQUIPMENT. AUX IFRE A/B BAVE "OA" BATING (18, WITHOUT PANS) SUPPICIENT FOR	24 	(SAME AS 12.3.1.6.1)	· · · · · · · · · · · · · · · · · · ·	
12.6.02.01.2 MCC	-3	52-1314 (BRBAEBR)	Crosed	Port	POST-ACCIDENT ALTERNATE OFFSITE SOURCE DUTT WITHOUT RCPA	36	(SANB AS 12.3.3.1.2)		
· · · · · · · · · · · · · · · · · · ·		<del></del>			COORDINATE TO PREVENT PREDER TRIP UNDER 819 AS WELL AS SISLOP. MCC BUS FAULT PLUS BREE FAILURE IS OUTSIDE SIS/SISLOP DESIGN BASIS	···			-
12.6.02.02.1 MCC		MSR LOADS	ON (BREE CLOSED)	*(SAME AS 12.6.2.1.1) *(SAME AS 12.6.2.1.1)			(SAHB AS 12.3.1.1.1)		-
12.6.02.02.1 MCC		MSR LOADS	(BRER CLOSED)	*(SANB AS 12.6.2.1.1)		18	(SAMB AS 12.3.1.1.1) (SAMB AS 12.3.1.6.1)		<u> </u>
12.6.02.02.2 MCC	-1	MSB LOADS	(BREE CLOSED) OFF (BREE OPEN)	*POTENTIAL INOPERABILITY OF BOTH TRAINS	RCPS ALSO UNAVAILABLE FOR SCIR. REBEATER STEAM ISOLATION NOT CREDITED FOR MSLB.	18	(SANB AS 12.3.1.1.1)		<u> </u>
		<del></del>			AUT IFMR A/B EAVE "OA" RATING (IR, MITHOUT PANS) SUPPICIENT FOR POST-ACCIDENT ALTERNATE OPPSITE SOURCE				
12.6.02.02.2 HCC	·1	NSR LOADS	OFF (BRER OPEN)	POTENTIAL INOPERABILITY OF BOTH TRAINS DUE TO LOSS OF SUCE ON HVAC	DUTY WITHOUT BCPs  BCPS ALSO UNAVAILABLE FOR SCTR. REHEATER STRAM ISOLATION NOT CREDITED FOR MSLB.  AUI IPAR A/B BAVE "OA" RATING (18,	24	(SANE AS 12.3.1.6.1)		<u> </u> 
12.6.02.02.3 MCC-	i	NSR LOADS	EQ/SBISHIC	*POTENTIAL COMMON-CAUSE INOPERABILITY OF	WITHOUT FAMS! SUPPICIENT FOR POST-ACCIDENT ALTREMATE OPPSITE SOURCE DUTY WITHOUT ECPS *NON-SE LOADS NOT ALL TRIPPED/LOCEED-OUT		(SAMB AS 12.3.1.1.1)		
·					ON SISLOP. CONFIGURATION DOES NOT MEET RC 1.75 OR TERB 384 CRITERIA WHICH REQUIRE TRIP OF ALL NON-IB LOADS ON A SAFETY SIGNAL (IB, SIS AND SISLOP)				

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## EMBERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

(BDM )					•	REPORT		
ITEM #	DEVICE ID	COMPONENT ID	FAILURB MODB	EPPECT ON ECCS	REMARES	ITRE	ACTION LIBM	RESP DISCIPLINE
12.6.02.02.1	NCC-3	NSB LOADS	#9/SBISHIC	PPOTENTIAL COMMON-CAUSE INOPERABILITY OF	PHON-SR LOADS NOT ALL TRIPPRD/LOCERD-OUT	35	(SAMB AS 12.3.1.2.1)	
				BOTS TRAINS DUE TO LOSS OF SUGR RM BYAC	ON SISLOP. CONFIGURATION BORS NOT HERT RG 1.75 OR IRER 384 CRITERIA WRICH REQUIRE TRIP OF ALL NON-IE LOADS ON A			
12.6.03.01.2	HCC-3A	52-1307. (BRBARR)	CLOSED	MONB	SAPETY SIGNAL (IB, SIS AND SISLOP) *NORMAL POSITION. BOI REV REQD TO INDIVIDUALLY ISOLATE NON-RESERVIAL LOADS		(SAMB AS 12.3.1.2.1)	
12.6.06.01.3	SWGR #1 WSR	BRBAKER(S)	BQ/SBISHIC		PROM SMCR \$3 BBFORE RE-ENERGIZING POST-S18/SIGLOP		JOHN AND IS A S. N. DAR DIRABBIAN ALTANADAS	
	LOADS	DESCRIPTION	PA/3813010		IBBN 384 CRITERIA WHICH REQUIRE TRIP OF ALL NON-IB LOADS ON SAPETT SIGNAL (IB.		(SAMB AS 12.3.1.2.1) FOR BLECTRICAL ALIGNMENT	
<del></del>			-	DECRADATION RESULTING FROM PAILURE TO ISOLATE ALL UNQUALIFIED LOADS ON SIS AND SISLOP	RE-ENERGIZING SWCR #3. BRER COORD ALSO			
2.6.06.01.3	SUGR #3 MSR LOADS	BRRAKER(S)	BQ/SBISHIC	*POTENTIAL COMMON-CAUSE INOPERABILITY OF SWGR #3, IP BB-BWRRGIZED	BRQD FOR TIB BER ALIGN SCONFIGURATION DOBS NOT MEET BG 1.75 OR IBER 384 CRITERIA WHICH REQUIRE TRIP OF	35	(SAME AS 12.3.3.2.3)	
					ALL NON-IB LOADS ON SAFETY SIGNAL (IB, 913 AND SISLOP). ROL REV BROD TO [SOLATB ALL NON-ESSENTIAL LOADS PRIOR TO			
1.6.01.02.2	SMCB 13	21-1	OPP		BE-BURBGIZING SYGR #3. BREE COORD ALSO READ FOR TIR BEE ALIGN *NORMAL POSITION. BOI REV READ TO	··	(SAMB AS 12.3.1.2.1)	
	UNDBRVOLTAGE AND CONTROL	(UV RELAY)	(VOLTS NORMAL)	813/813LOP TRIP OF 4EV SST 83 PREDER AND	INDIVIDUALLY ISOLATE NON-ESSENTIAL LOADS PRIOR TO RE-ENERGIZING ENGE #3 POST-SIS/SISLOP	Marie & Statement Co.		
	BUGR #3 UNDERVOLTAGE AND CONTROL	SRQ 2 (11-5,1)	CONTACTS OPEN (OPP)		1(SAME AS 12.6.7.2.2)		(SAMB AS 12.3.1.2.1)	
6.07.05.1	SWGR 13 UNDERVOLTAGE AND	SEQ 2	CONTACTS OPEN (OFF)	NOME. SUGE AT ISOLATED BY SEPARATE TRIP OP 444 SET AT PERDER AND 4864 TIE BREES	SEQ 2 PREVENT THIS FATLURE UNLESS SEQ 2		(SAMB AS 12.3.1.2.1)	
	CONTROL	(13-5,1)			LOAD CROUP A OUTPUT OR RELAT DRIVER CARD(S) FAIL. BOI REW REQD TO INDIVIDUALLY TRIP/LOCKOUT NOW-ESSENTIAL			
6.07.01.1	SACE 13	86-8 (RRLAY)	ON		LOADS PRIOR TO RE-ENERGIZING SWGR #3 POST-SIB/SISLOP AUT TPHRS A/B BAVE "OA" RATING TIE,	18	(SAMB'AS' 1213/17171)	
	UNDERVOLTAGE AND CONTROL	· · · · · · · · · · · · · · · · · · ·		RECIRC DUE TO LOSS OF COOLING FOR CHARGING PUMP ROOM, MONE FOR INJECTION	WITHOUT PANS) SUFFICIENT FOR POST-ACCIDENT ALTERNATE OFFSITE SOURCE DUTT WITHOUT ROPS			
	SWGR 13 UNDERVOLTAGE AND CONTROL	86-8 (EBLAY)	ON -	POTENTIAL INOP OF BOTH TRAINS FOR RECIRC DUE TO LOSS OF COOLING FOR		24	(SAME AS 12.3.1.6.1)	
	SWGR #3 UNDBEVÖLTAGE AND CONTROL		OFF	REDUCED RELIABILITY OF TRAIN B AND SWING (SWCR #3) FOR SIS, NONE FOR SISLOP	SISLOP LOCKOUT RELAYS COULD BE REQUIRED	35	{SAME AS 12.3.3.2.3}	
	ocni <u>a</u> ∪t		·		FOR SIS EVENT WITH COMMON-CAUSE FAILURES OF MSR EQUIPMENT FUE TO LACE OF AM AUTOMATIC TELP/LOCEOUT AS PER RG 1.75			

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#### BHERGENCY CORE COOLING SYSTEM SINGLE PAILURE ANALYSIS SAN ONOPRE UNIT 1. ACTION ITEMS FOR SIGNIFICANT FINDINGS

ITEH #	DRAICE ID	COMPONENT ID	PAILURB HODE	BPPBCT ON BCCS	BENARES	REPORT		RESP DISCIPLINE	
_12.6.07.08.1	SYCR 13	.16:11-1	TRIP	MONR	*VERIFICATION REQUIRED THAT LOSS OF	23.1	VBRIPT WHRTHER NRC BTP 9.5-1 AND APPRINTER R	MBCHANICAL (PP)	
	UNDERVOLTAGE AND CONTROL	(LOCEOUT RELAT)			TURBINE-GREERATOR STAROGEN SEAL OIL OR OTHER AUSILIARIES WILL NOT RESULT IN FIRE OR REPLOSION CONCURRENT WITE		RICLUDE BOTE PIRES AND BIPLOSIONS MECHANISTICALLY CAUSED BY AN ACCIDENT (RG. OF HYDROGEN DUR TO LUBE OIL/SEAL OIL PAILURE OR 15MP DUR TO PAULT WITH		
19 6 09 08 1	CHCD AS	00 HA 1	4010		SIS/SISLOP EVENT. BORIC ACID STATEM NOT CREDITED FOR SIS/SISLOP EVENTS		PROTECTION PAILURE, POST-818/SISLOP)		
12.6.01.08.1	UNDERVOLTAGE AND CONTROL	86-M3-1 (LOCEOUT RELAT)	TRIP	MONB	TURBIFICATION REQUIRED THAT LOSS OF TURBINE-GENERATOR HYDROGEN SEAL OIL OR OTHER AUXILIABLES WILL NOT RESULT IN		ADDRESS MECHANISTICALLY CAUSED FIRES AND BIPLOSIONS NOT BICLUDED BY NEC BYP 3.5-1 OR APPRIORIE B AS PART OF INTEGRATED RESOLUTION OF SEP	BLECTRICAL	<u> </u>
					FIRE OR EIPLOSION CONCURRENT WITH SIS/SISLOP EVENT. BORIC ACID SYSTEM NOT CREDITED FOR SIS/SISLOP EVENTS		TOPIC VI-1.C.2, IP WERDED		+
12.6.07.09.1	SUGR 43 UNDERVOLTAGE AND CONTROL	86-H3-2 (LOCEOUT RELAT)	TEIP	NORE	*VBRIFICATION REQUIRED THAT LOSS OF GENERATOR SYDROGEN SEAL OIL OR OTHER AUXILIARIES WILL NOT RESULT IN REPLOSION		(SAMB A8 12.6.1.8.1)	· · · · · · · · · · · · · · · · · · ·	-
12.6.07.12.1		125 VDC BUS 12	AOF18 FOR	*POTENTIAL IMOPERABILITY OF TRAIN 8 FOR SISLOP DUE TO 480V SWGR/HCC VOLT	OR FIRE CONCURRENT WITH SIS/SISLOP BYENT	<b>!</b>	(SAMB AS 12.3.1.2.1)		-
	CONTROL			DEGRADATION AND/OR DG OVERLOAD, WITH POTENTIAL INOP OF TRAIN A DUE TO:	INDEPENDENT OF LOCEOUT RELATS. BOI BEY REQD TO INDIVIDUALLY ISOLATE SWCR \$3/MCC-3 LOADS PRIOR TO RE-EMBEGIZING			· · · · · · · · · · · · · · · · · · ·	-
				UNISOLABLE CCW PLOW STPASS, LOSS OF LO-LO EWST LEVEL TRIP OF TRAIN A SI/FW. ECPS ALSO UNAVAILABLE FOR SCTR	SVGR #3 POST-818/813LOP			- · · · · · · · · · · · · · · · · · · ·	-
12.6.07.12.1	SWGR #3 UNDERVOLTAGE AND CONTROL	125VDC BUS 42 (12-226)	VOLTS LOW	*POTENTIAL INOPERABILITY OF TRAIN B FOR SISLOP DUR TO 480V SWGR/MCC WOLT DEGRADATION AND/OR DG OVERLOAD, WITH	PRICE #3 ISOLATED ON SIS/SISLOP INDEPENDENT OF LOCEOUT RELATS. BOI REV REOD TO INDIVIDUALLY ISOLATE SUCE	01	(SAMR AS 12.3.1.6.1)		-
		-		POTENTIAL INOP OF TRAIN A DUR TO: UNISOLABLE CCW FLOW BTPASS, LOSS OF LO-LO RWST LEVEL TRIP OF TRAIN A SI/PW.	#3/MCC-3 LOADS PRIOR TO RE-EMERGIZING SWGR #3 POST-818/SISLOP				_
12.6.07.12.1		125 VDC BUS #2	AOTAS TON	RCPS ALSO UNAVAILABLE FOR SGTE OPOTENTIAL INOPERABILITY OF TRAIN B FOR		15	(SAME AS 12.3.1.6.1)		
	UNDERVOLTAGE AND CONTROL	(72-226)		BISLOP DUB TO 480V SWGB/MCC VOLT DEGRADATION AND/OR DG OVERLOAD, WITH POTENTIAL INOP OF TRAIN A DUB TO:	INDEPENDENT OF LOCEOUT RELATS. BOL REV REQD TO INDIVIDUALLY ISOLATE SWGR #3/MCC-3 LOADS PRIOR TO RE-EMERGIZING				
				UNISOLABLE CON FLOW STPASS, LOSS OF LO-LO RWST LEVEL TRIP OF TRAIN A SI/FW. RCPS ALSO UNAVAILABLE POR SCTR	SWGR #3 POST-318/818LOP				
12.6.01.12.1	SWGR #3 UNDBEVOLTAGE AND CONTROL	125VDC BU9 #2 (12-226)	VOLTS LOW	SPOTENTIAL INOPERABILITY OF TEAM B FOR SISLOP DUR TO 480V SWGR/MCC VOLT DECRADATION AND/OR DG OVERLOAD, WITH	SSWCE 43 ISOLATED ON SIE/SIELOP INDEPENDENT OF LOCEOUT RELATS. BOI REV REQD TO INDIVIDUALLY ISOLATE SWCR	24	(SAMB AB 12.3.1.6.1)		
	LV#18VL			POTENTIAL INOP OF TRAIN A DUB TO: UNISOLABLE CCU PLOW BTPASS, LOSS OF	#3/MCC-3 LOADS PRIOR TO RE-BURRGIZING SWGR #3 POST-SIS/SISLOP				
12.6.08.01.1	SWGR #3	SSI (SWITCH)	AUTO	LO-LO RWST LEVEL TRIP OF TRAIN A SI/PW. RCPS ALSO UNAVAILABLE FOR SCTR NOME. SWCR #3 CONTROL POWER AUTO-SELECTS	*NORMAL POSITION. TECH SPEC ACTION ENTER	 I	(SAMB AS 12.3.1.2.1)	e service services	-
	CONTROL POWER			TO TRAIN A OR B AS REQUIRED	REQD IF SST #3 EMERGIZED VIA 152-12CI1 {TRAIN B} IM MODES I - 4, SINCE SUCH AN ALIGNMENT COULD RESULT IN CROSS-TRAIN POWER AND CONTROL				-

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ITEM /	DRVICE ID	COMPONENT 1D	PAILURE MODE	BFFBCT ON BCCS	REMARES	REPORT 1788	ACTION ITEM	RESP DISCIPLINE
12.6.08.01.2		_ SSL (SWITCH)				(SAME_AS	.12.3.1.2.1)	
	CONTROL POWER			#3 POWER AND CONTROL IF SHOR #3  BE-BHERGIZED FROM TRAIN B VIA SHOR #2-3  TIE BRER POST-RIB/RISLOP	TRIS FAILURE. BOI REV REGD TO PRECLUDE CROSS-TRAIN ALIGNMENT POST-819/819LOP			
12.6.08.01.3	SWCR #3 CONTROL POWER	SS1 (SWITCH)	OPP	REDUCED REDUNDANCY FOR RE-ENERGIZING SWGB 43 POST-SIS/SISLOP. ISOLATION OF SWGB 42 LOADS BY SIS/SISLOP TRIP OF 14V		(SAME AS	12.3.1.2.1)	•
				PERDER AND 480V TIE BRERS ISOLATES COMMON-CAUSE PAULTS FROM REDUNDANT TRAINS A AND B	BB-BNBRGIZING SWGR #3 POST-SIS/SISLOP			
12.6.08.02.1	SWGR #3 CONTROL POWER	52-1203 *b* CONTACTS	OPBN	NOME FOR SHORT TREM. POR LONG TERM, CONTROL POWER CAN BE MANUALLY SELECTED TO PERMIT SUGR #3 TO BE ER-EMBEGIZED	BOI REV REQD FOR LOCAL OPERATOR ACTION TO MANUALLY SELECT CONTROL POWER VIA SSI AND SSZ. UPS DUTY CTCLE > 30 MINUTES	CA BHAZ)	12.3.1.2.1)	
1 12.6.08.02.2	SMCR 41	52-1203	CLOSED	FROM BITSER TRAIN VIA SWGR \$1-3 AND SWGF \$2-3 TIE BREES {Same as 12.6.8.1.2}	PERMITS CREDIT FOR LOCAL OPERATOR ACTION AT SUGR \$3 AND \$31/532 *NORMAL POSITION. TECH SPEC ACTION ENTRY		12.3.1.2.1)	
	CONTROL POWER	"b" CONTACTS C14 (BBLAY)	ON	REDUCED REDUNDANCE FOR RE-RNERGIZING	REQUIRED TOUS FAILURE FIECH SPEC ACTION ENTRY REQUIRED WITH		12.3.1.2.1)	
12.6.08.03.2	CONTROL POWER SWGR #3 CONTROL POWER	CIA (RELAY)	OPP	SMGR 43 (SAHR AR 12.6.8.1.3)	THIS FAILURE F(BAHB AS 12.6.8.1.3)	(SAME AS	12.3.1.2.1)	
12.6.08.04.1		CIB (RBLAY)	QN	REDUCED REDUNDANCY FOR SEPARATION OF TRAIN & (DC BUS \$1) AND TRAIN B (DC BUS	*TECH SPEC ACTION BUTBY REQUIRED WITH THE	(SAHE AS	12.3.1.2.1)	
12.6.08.04.2	SWGR #3 CONTROL POWER	CIB (RBLAT)	OFF	12) CONTROL POWER (SAME AS 12.6.8.1.3)	*[SAMB AS 12.6.8.1.3]	(SAHE AS	12.3.1.2.1]	
12.6.08.05:1		125VDC BUS #1 (72-116)	VOLTS LOW	REDUCED REDUNDANCY FOR RE-ENERGIZING SUGR \$3. ISOLATION OF SUGR \$3 LOADS BY SIS/SISLOF TRIP OF 44Y PREDER AND 460V	*TRCE SPEC ACTION ENTRY REQUIRED WITH THIS PAILURE	(SANE AS	12.3.1.2.1)	
				TIE BREES PROVIDES ISOLATION OF COMMON-CAUSE FAULTS FROM REDUNDANT TRAINS A AND B			<u> </u>	
12.6.08.06.2	SWGR #3 Control Power	982 (SWITCH)	ON	REDUCED REDUNDANCY FOR SEPARATION OF TRAIN A (DC BUS \$1) AND TRAIN B (DC BUS	PAILURE	(SAME AS	12.1.1.2.1)	
	CONTROL POWER	SS2 (SWITCH)	OFF	12) CONTROL POWER REDUCED REDUNDANCY FOR RE-EMBEGIZING SWGR #3	*TECH SPEC ACTION ENTRY REQUIRED WITH THIS FAILURE	·	12,3.1.2.1)	
12.6.08.07.1	SAGE \$3 CONTROL POWER	'a' CONTACTS	OPBN	REDUCED REDUNDANCY FOR RE-EMBEGIZING SWGR 43 IN SHORY TREM. FOR LONG TERM, CONTROL POWER CAN BE MANUALLY BELECTED	PROT REW REQUIRED FOR LOCAL OPERATOR ACTION TO MANUALLY SELECT CONTROL POWER VIA SS1 AND SS2. UPS DUTY CYCLE > 30	(SAMB AS	18.3.1.2.1)	
12.6.08.07.2	SVGR 43	52-1203	CLOSED	TO PREMIT SUCE 43 TO BE RE-EMERGIZED PROM BITHER TRAIN (SAMS AS 12.6.8.6.2)	MINUTES PERMITS CREDIT FOR OPERATOR ACTION LOCALLY AT SWGR \$3 AND SSI/SSZ *(SAME AS 12.6.8.6.2)	(SAMP AS	12.3.1.2.1)	
12.6.08.08.1	CONTROL POWER	a CONTACTS C2a (RELAY)	ON	REDUCED REDUNDANCE FOR RE-EMERCIZING SWGR \$3. ISOLATION OF SWGR \$3 LOADS BE	*TRCH SPRC ACTION BUTRY REQUIRED WITH THIS FAILURE		12.3.1.4.1)	
·				SIS/SISLOP TRIP OF ARV PREUER AND ABOV THE PREES PROVIDES ISOLATION OF COMMON-CAUSE FAULTS FROM REDUNDANT				

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## EMBERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

ITEN #	DEVICE ID	COMPONENT ID	FAILURE MODE	BPPBCT ON BCCS	PRHARES	RBPORT ITBN	ACTION 17BH	RPSP DISCIPLINB
12.6.08.08.2.5	SVCR 13	_CZA_(BBLAT)	.011	(SINB AS 12.6.8.6.3)	1(SAMB AS 12.6.8.6.3)	(SAMB AS	12.3.1.2.1)	
12.6.08.09.1 9		C2B (RBLAT)	OM	TRAIN A IDC BUS ATT AND TRAIN B (DC BUS	TRCE SPEC ACTION BUTER REQUIRED WITH JUIS FAILURE	(SAME AS	12.3.1.2.1)	
12.6.08.09.2 S	ONTROL POWER	CZB (RBLAY)	OFF .	82) CONTROL POWER (SAME AS 12.6.8.6.3)	*{SAHR AS 12.6.8.5.3}	(SAMB AS)	12.3.1.2.1)	
		The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s	<del>-</del>	····································				
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## EMPRGENCY CORE COOLING SYSTEM SINGLE FAILURE AWALTSIS SAM ONOPPE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

ITBH #	DBVICE ID	COMPONENT ID	FAILURB MODR	BPFBCT ON BCCS	REMARES	REPORT	ACTION LYBR RESP DISCIPLINE	
12.7.01.01.	3 125VDC BUS AL BATTERT CHARGER SET A	CHARGER	QUIPUT VOLTS HIGH	POTRUTIAL INOPERABILITY OF TRAIN A 125VDC LOADS DUR TO LOSS OF QUALIFIED LIFE	SHUTDOWN. VERIF REQUITED BY POR 125VDC LOADS BOUNDS THIS CONDITION (BG. EQUALIZING CRARGE FOR SATTERS BANK).	31.2	VERIFT EGDF FOR 125YDC LOADS BOUND CONDITIONS OF ELECTRICAL (BQ) EQUALIZING CHARGE	
12.7.02.01.	3 125VDC BUS \$1 BATTERY CHARGER	CRABGER	OUTPUT VOLTS BIGS	POTRUTIAL INOPERABILITY OF TRAIN A 1254DC LOADS DUR TO LOSS OF QUALIFIED	SEUTDOWN. VERIF REQ TEAT EQ FOR 125VDC	31	(SAHB AS 12.7.1.1:3)	
	SBT B.				LOADS BOUNDS THIS CONDITION (RG.  EQUALIZING CHARGE FOR BATTERT BANK).  FAILURE DORS NOT IMPACT TRAIN A  VITAL/REG BUSSES 1, 2, 3/3A, 4 DUE TO  VOLTS REGULATE CAPABILITY OF INVERTERS			
12.7.03.01	1 125VDC BATTERY BANK #1		OUTPUT VOLTS LOW	NOME FOR SIS (CONTINUED CHGR OPS). INOP OF TRAIN A FOR SISLOP, POTRNTIAL INOP OF TRAIN B FOR SISLOP DUB TO 4 EV ROOM FIRE OR LOSS OF CONTAINMENT INTECRITY DUB TO COMMON-CAUSE FAULT OF NON-EQ	12.7.5.14.2. 12.7.6.1.1. 12.7.6.1.2. 12.7.6.2.1, 12.7.6.2.2, 12.7.6.3.1. SBB FOLLOWING 1TRM FOR DISCUSSION OF PAULT PROPAGATION SCRNABIO. OVERCUREPHT TRIP	20.1	IMPLEMENT MMP 1-3633 TO PROVIDE BACEUP OVERCURERY BLECTRICAL PROTECTION FOR MCP PRESTRATIONS	
12.7.03.01.	1 125 VDC BATTERY BANK #1	<del></del>	ŌŃIBAL AOFLŻ FOR	RCP#/BICITER W/ CONCURRENT LOSS OF BUS/LOAD O/C PROTECTION IMONE FOR SIS (CONTINUED CHEE OPS). IMOP OF TRAIN A FOR SISLOP. POTENTIAL IMOP OF TRAIN B FOR SISLOP DUB TO 4 LY ROOM FIRE OR LOSS OF CONTAINMENT INTEGRITT DUE TO	12.7.5.14.2, 12.7.6.1.1, 12.7.6.1.2, 12.7.6.2.1, 12.7.6.2.2, 12.7.6.3.1. SER	20.2	EVALUATE POTENTIAL PAULT PROPAGATION DUB TO BLECTRICAL COMMON-CAUSE PAULTS WITH CONCURRENT 125 VDC FAILUBB (EG. EXCITER DUBING HSLB) AS PART OF INTEGRATED ERSOLUTION OF SEP TOPIC VI-1.C.2	
12.7.03.01.	2 125VDC BATTERY BANE #1		OUTPUT SHORT	COMMON-CAUSE FAULT OF NON-RQ RCP*/BICITER N/ CONCURRENT LOSS OF BUS/LOAD O/C PROTECTION *INOP OF TRAIN A, POTENTIAL INOP OF TRAIN B DUB TO 4 EV ROOM FIRE OR LOSS OF	ALL BUS \$1A/1B/1C BRERS. B/U O/C	20	(SAHR AS 12.7.3.1.1)	
				CONTAINMENT INTEGRITT BESULTING FROM COMMON-CAUSE FAULT OF NON-BQ RCPs (LOCA/MSLB) OR BICITER (MSLB 0/S CONTAINMENT) M/ CONCUBERNT LOSS OF BUS/LOAD OVERCURERNT PROTECTION	PROTECTION REQD FOR ECP. AND MAIN GEN RICITER TO PREVENT PROPAGATING COMMON-CAUSE FAULTS OF TRESE LOADS USING ENERGY OF MAIN GRN/IPHE, FOR WHICH LOW-SIDE PROTECTION CONCURRENTLY LOST			
	1 125VDC BATTBRY BANK #1 1 125VDC BUS #1 SHUNT	(BEBARRE)	OPEN	*(SAMB AS 12.7.3.1.1) *(SAMB AS 12.7.3.1.2)	(SAME AS 12.7.3.1.1)  *(SAME AS 12.7.3.1.2)	20	(SAMB AS 12.7.3.1.1)  [SAMB AS 12.7.3.1.1]	-
12,7,04.01.	3 125VD <u>C BUS 41</u> Shunt		GROUWD	MONB	*BOUNDS GROUND OF ANY OTHER 125VDC BUS \$1 DEVICE: T/S ACTION ENTRY REQD FOR THIS CONDITION, SINCE A SECOND COMMON-CAUSE GROUND OF NON-EQ LOADS COULD DISABLE 125VDC BUS \$1 SE LOADS. VERIF REQD ON % GROUND FOR T/S ENTRY IN	<u> 17.</u> 1	EVALUATE: 125 VDC BUS & GROUND CRITERIA FOR TECH PLECTRICAL  SPEC ACTION ENTRY AND/OR MODIFICATIONS TO FLIMINATE TRAIN-COMMON 125 VDC DEVICES AS PART OF INTEGRATED RESOLUTION OF SEP TOPIC VI-1.C.2	

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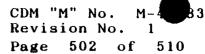
ITEM A	DRVICE ID	COMPONENT ID	FAILURE MODE	EPPECT ON BCCS	DDM.nss	BBPORT	ACTION LTRN RESP DISCIPLI
1150 4	DRAICE IN	COMPONENT ID		EALECT ON RCC2	REMARKS		ACTION TION KEST DISCIPLI
2.1.05.01.1.	125YDC BUS A1	.12-135	OPRE	NONR	TECH SPEC ACTION ENTRY REQUIRED 1F		NO FUETHER ACTION REQUIRED. AMENDMENT 1131 (PCH
	SR LOADS	(BRBAERR)			VITAL BUS NOT ENERGIZED PROM INVERTER	•	217) ALBEADY IMPLEMENTS THIS CONTROL
					MAY ALSO RESULT IN INTERRUPTION OF		
		<del></del>			VITAL/REGULATED BUS AT LOADS BETWEEN. TIME OF SISLOP AND RE-ENERGIZING MCC-	2	
•					FROM TRAIN B DG	•	
	125VDC BUS #1	72-136	OPBM	RONE	TECH SPEC ACTION BUTET REQUIRED IF		(SAMB AS 12.7.5.1.1)
	SR LOADS	(BREAKER)			VITAL BUS NOT BURRGIZED PROM INVERTER	•	
					MAY ALSO RESULT IN INTERRUPTION OF	<b>\</b>	
		<b></b>			VITAL/REGULATED BUS \$2 LOADS BETWEEN TIME OF SISLOP AND RE-ENERGIZING MCC-		
					FROM TRAIN B DG	•	
2.7.05.03.1	125 VDC BUS 41	72-137	OPEN	RONR	TECH SPEC ACTION BUTRY REQUIRED IF		(SAHB AS 12.7.5.1.1)
	SE LOADS	(BREARRE)			VITAL BUS NOT ENERGIZED PROM INVESTER		The second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second secon
					MAY ALSO RESULT IN INTERRUPTION OF		
		<del></del>			VITAL/REGULATED BUS #3 LOADS BETWEEN		
					TIME OF SISLOP AND RE-ENERGIZING MCC-	Z	
1 1 05 04 1	125VDC BUS #1	72-131	OPBN	MONE	FROM TRAIN B DG STRCH SPEC ACTION BNTRY REQUIRED IF	•	(SAME AS 12.7.5.1.1)
	SR LOADS	(BREAKER)	_ *: *:		VITAL BUS NOT ENERGIZED PROM INVERTER		
		·			MAT ALSO RESULT IN INTERRUPTION OF		
					VITAL/REGULATED BUS \$4 LOADS BETWEEN		
	•				TIME OF SISLOP AND RE-ENERGIZING MCC-	2	
1 20 20 1 1	125VDC BUS #1	72-103	OPEN	SINOP OF TRAIN A, WITH POTENTIAL INOP OF	FROM TRAIN B DG	20	(SAME AS 12.7.3.1.1)
	SR LOADS	(BREALER)		TRAIN B DUR TO 4 NV ROOM PIRE OR LOSS OF			(DATE AV 15.1.1)
		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		CONTAINMENT INTEGRITY, DUR TO	8.3.1.7.1, 10.1.2.5.1, 12.1.2.4.1,		
				COMMON-CAUSE FAULT OF NON-BQ RCP MOTORS	12.1.3.8.1, 12.1.4.8.1, 12.1.5.7.1,		
				PED BY MAIN CRN/A/B-IPMRs W/ LOSS OF BUS	· · · · · · · · · · · · · · · · · · ·		
				#1A/1B CONTROL POWER. SISLOP LOGIC	12.1.12.8.1, 12.2.5.7.1. B/U PENBTRAT	IOM	
• • AE AA	125 VGC BUS 41	12-116	OPEN	BECOMES 1/2 ON BUS 82C REDUCED REDUNDANCY FOR RE-EMPRGIZING	O/C PROTECT REQD FOR ECP MOTORS *SEE ITEMS 6.3.3.11.1, 7.3.3.7.1,		NO PURTEER ACTION REQUIRED. COMPIGURATION
	SR LOADS	(BERAKER)	VPEN	480V SHCR #3 POST-SIS/SISLOP	12.6.8.5.1. TROM SPEC ACTION ENTRY		BLIMINATED BY DCP 1-3552. NEW CONFIGURATION
	as board	(0000000)	*	,	REQUIRED WITH BREE IN THIS POSITION		CONTROLLED BY AMENDMENT \$134 (PCH-217) PER SO1-9-3
12.7.65.09.1	125VDC BUS 11	72-118	OPEN	POTENTIAL INOP OF TEATH & FOR SISLOP	SEE ITEM 12.3.09.11.1. RCPs ALSO LOST		VERIFY CUERRYT EOI PLOATING STRPS ADROUATELY OFBRATIONS
	SR LOADS	(BREARER)		DUB TO 480V SWGR/MCC VOLT DEGRAPATION	UNAVAILABLE FOR SCTE. MAIN EFME HAS 2		ADDRESS SI/FW TERMINATION WITH 125VDC BUS FAILURE
				AND/OR DC OVERLOAD, W/ POTENTIAL INOP OF TRAIN B DUB TO: UNISOLABLE CCM PLOW	TRAINS OF FORCED AIR COOLING		NAME OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY
				BYPASS, LOSS OF LO-LO BWST LRVBL TRIP OF	•		•
				TRAIN A SI/FW. REDUCED BELIABILITY OF			
			•	ALT OFFSITE SOURCE			
2.7.05.09.1	125VDC BUS 41	72-118	OPEN	POTENTIAL INOP OF TRAIN A FOR SISLOP	SER ITEM 12.3.09.11.1. BCPs ALSO LOST		COMPLETE CALCULATION (DC-3410) TO DETERMINE MECHANICAL
	SE LOADS	(BREVERB)		BUR TO 480V SWGR/MCC VOLT DEGRADATION	UNAVAILABLE FOR SGTR. MAIN IFME HAS 2		ACCEPTABILITY OF SUC/CCUME BYPASSED CONFIGURATION
				AND/OR DC OVERLOAD, W/ POTENTIAL INOP OF	TRAINS OF FORCED AIR COOLING		
				TRAIN B DUB TO: UNISOLABLE CCM FLOW BYPASS. LOSS OF LO-LO BWST LEVEL TRIP GI	•		
				TRAIN A SI/FW. REDUCED RELIABILITY OF			
				ALT OFFSITE SCURCE			

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## EMPEGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN OHOPEB UNIT 1 ACTION ITEMS FOR SIGNIPICANT FINDINGS

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ITEM (	DEVICE ID	COMPONENT ID	FAILURB HODB	RPFECT ON BCCS		REPORT ITBN	ACTION STEM	RESP DISCIPLIME
12.7.05.09.1	.125YDC BUS AI SR LOADS	72-110 (5584588)	OPBN	POTENTIAL INOP OF TRAIN A FOR SISLOP DUB TO 480V SUGB/MCC VOLT DEGRADATION AND/OR DC OVERLOAD, M/ POTENTIAL INOP O TRAIN B DUB TO: UNISOLABLE CCW PLOW	SER ITEM 12.3.09.11.1. RCPs ALSO LOST, 2 UNAVAILABLE FOR SGTR. HAIN 1PHR HAS 2 P TRAINS OP FORCED AIR COOLING		REVISE SGTE DOSE CALCULATIONS (AS MEETED TO PRECLUDE CREDIT FOR RCPs) AS PART OF UPSAR CHAPTER 15 REAMALISIS	HUCLBAR
	125VDC BUS #1 SR LOADS	72-128 (BRBAEBR)	CLOSED	BYPASS, LOSS OF LO-LO BWST LEVEL TRIP O TRAIN A SI/FW. REDUCED RELIABILITY OF ALT OFFSITE SOURCE SPOTENTIAL INOP OF TRAIN A WITH POTENTIAL INOP OF TRAIN B DUB TO: UNISOLABLE CCW PLOW BYPASS AND INABILIT	VSTRAM DUMP SYSTEM AND SOLEHOLDS NOT EQ. ( TECH SPEC ACTION ENTRY REQD WITH THIS	04	(SAMB AS 12.7.5.9.1)	
	125,000,000,01	•••••		TO TRANSPRE PROM DG TO OFFSITE SOURCE WITH C-IPME RELATED (SIS)LOP, LOSS OF LO-LO RWST LEVEL TRIP CAPABILITY FOR TRAIN & SI/PW				
	125VDC BUS \$1 SB LOADS	12-128 (BRBARR2)	CLOSED	POTENTIAL INOP OF TRAIN A WITH POTENTIAL INOP OF TRAIN B DUB TO: UNISOLABLE COP PLOW BYPASS AND INABILIT TO TRANSPER PROM DG TO OPFSITE SOURCE WITH C-IFME BELATED (SIS)LOP, LOSS OF LO-LO-RUST LEVEL TRIP CAPABILITY POR	STRAM DUMP SYSTEM AND SOLEMOIDS NOT BQ. TROB SPRC ACTION BUTRY REQU WITH THIS Y FAILURE		(SAMB AS 12.7.5.9.1)	
	125VDC BUS \$1 SB LOADS	12-128 (BREAERR)	CLOSED	TRAIN A SI/PU PPOTENTIAL INOP OF TRAIN A WITH POTENTIAL INOP OF TRAIN B DUE TO: UNISOLABLE CCW FLOW BYPASS AND INABILIT TO TRANSFER FROM DG TO OPPSITE SOURCE	*STEAM DUMP SYSTEM AND SOLEMOIDS NOT EQ. : TREE SPEC ACTION ENTEY REQD WITH THIS Y FAILURE		VERIFF THAT PROCEDURES BRIST TO BRING ADDITIONAL DG FUEL ONSITE BEPORE T DAY OWNITE SUPPLY COULD BE REHAUSTED POST-ACCIDENT	
	125VDC BUS \$1 SR LOADS	12-128 (BRPAEER)	CLOSED	WTE C-IPME RELATED (STS)LOP, LOSS OP LO-LO EWST LEVEL TRIP CAPABILITY FOR TRAIN A SI/FW *POTENTIAL INOP OF TRAIN A WITH POTENTIAL INOP OF TRAIN B DUB TO: UNISOLABLE CCW FLOW BYPASS AND INABILITY	TECH SPEC ACTION BUTRY REQD WITH THIS	-	IDENTIFF SETUSE ISOLATION DEVICE SURVEILLANCE REQUIREMENTS FOR MCCs, 125VDC AND 120VAC BUSSES	BLECTRICAL
	125VDC BUS #1	72-128	CLOSED	TO TRANSPER PROM DC TO OPPSITE SOURCE WITH C-IFMR RELATED (SIS)LOP, LOSS OF LO-LO RUST LEVEL TRIP CAPABILITY FOR TRAIN A SI/FW POTENTIAL INOP OF TRAIN A WITH	STEAM DUMP SYSTEM AND SOLEMOIDS HOT BQ.		VERIFY RHOS RIIST WHICH IMPLEMENT SRANSR ISOLATION	( MAINTENANCE
	SB LOADS	(BRPATER)		POTENTIAL INOP OF TRAIN B DUB TO: UNISOLABLE CCU PLOW BYPASS AND INABILIT TO TRANSPER PROH DG TO OFPSITE SOURCE WTH C-IFHE RELATED (SIS)LOP, LOSS OF LO-LO EWST LEVEL TRIP CAPABELITY FOR TRAIN A SI/FW	TECH SPEC ACTION ENTRY REQD WITH THIS FAILURE		REVICE SURVEILLANCE REQUIREMENTS IDENTIFIED BY BLECTRICAL	
	115VUC BUS 81 SR LOADS	12-128 (BRBARRR)	CLOSED	POTENTIAL INOP OF TRAIN A MITH POTENTIAL INOP OF TRAIN B DUB TO: UNISOLABLE CCW FLOW STPASS AND INABILIT TO TRANSFER FROM DG TO OFFSITE SOURCE WITH C-IFME RELATED (SIS)LOP, LOSS OF	STEAM DUMP SYSTEM AND SOLENOIDS NOT BQ. TECH SPEC ACTION BUTBY BEQUITH THIS FAILURE		VEHIFY LOCAR PROCESS AND RELATED PROCEDURES REQUIRE TECH SPEC ACTION BUTRY WITH FAILURE OF BUS/HCC SB/NSR ISOLATION DEVICE (EG. UNTIL APPECTED LOAD IS ISOLATED)	OFERATIONS



## EMBRGENCY CORR COOLING SYSTEM SINCLE FAILURE AMALYSIS ... SAN ONOFRE UNIT 1. \_\_\_\_\_\_\_\_ ACTION 17EMS FOR SIGNIFICANT PINDINGS

ITEM #	DEVICE 10	COMPONENT ID	FAILURE MODE	REFERCT ON BCCS		PORT Tre	ACTION ITEM	RESP DISCIPLINE
		*	• • • • • • • • • • • • • • • • • • • •		- Tanada and an ang and a second community and an artificial description of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of the second community of th		;	·
12.7.06.01.1.125\			_OPBN	LOSS OF TURBINE TRIP CAPABILITY FOR SIS	STURBING TRIP VALVE IS BURRGIZE TO		FURTHER ACTION REQUIRED, REDUNDANT AC TRIP	
MSB	LOADS	12-111	•	EVENTS, RESULTING IN RICESS STRAM DEMANE			UATED FROM SCRAM BRERS WEICH ARE TRIPPED ON SIS	
		72-113		(SINILAR TO STEAM LINE BREAK) CONCURRENT		OR E	DC BUS UNDERVOLTAGE	
		(BREAKERS)		WITH SBLOCA OR SCIEN NOVE FOR SISLOP DUE				
**				TO MECHANICAL TRIPS ON LOW CONDENSER VACUUM OR OVERSPRED	BY RADIOLOGICAL CONDITIONS. DIVERSE			
				720000 08 079891389	TURBING TRIP TO BE ADDED BY DCP 1-3407		• •	
12.7.06.01.2 1251	DC BUS AT	12-101	CLOSED	POTENTIAL INOP OF TRAIN A WITH	*COMPIGURATION DORS NOT HERT R.G. 1.75 04	(SAR	MB AS 12.7.5.9.1)	
MSR	LOADS	72-111		POTENTIAL INOP OF TRAIN B DUE TO:	OR IERE 384 CRITERIA DUE TO LACE OF A	•	·	
·		72-113		UNISOLABLE CCW PLOW BYPASS AND INABILITY	SIS/SISLOP TRIP OF THE NON-18 LOADS PROM			
•		(BEBARERS)		TO TRANSPER PROM DG TO OFFSITE SOURCE	THIS BUS			
				WITH C-IPHE RELATED (SIS)LOP, LOSS OF	•			
			<u></u>	LO-LO RWST LEVEL TRIP CAPABILITY POR				
19 4 66 61 4 145	10.0 Blie 41	44 101	CLACEA	TRAIN A SI/PH	SAMPLANDIAN SADA NAS MADE D A 1 85 45		in .a . 4 f & . 1	j
12.7.06.01.2 125V		72-101	CLOSED	POTENTIAL INOP OF TRAIN A WITH	*CONFIGURATION DOES NOT MEET B.G. 1.75 15	(281	HB AS 12.7.5.9.1)	
	LOADS	12-111 12-113		POTENTIAL INOP OF TRAIN B DUE TO:	OR IEEE 384 CRITERIA DUE TO LACE OF A SIS/SISLOP TRIP OF THE MON-IE LOADS FROM			
		(EPPAREES)		TO TRANSPER PROM DG TO OPPSITE SOURCE	THIS BUS	•		
				WITE C-IFME BELATED (SIS)LOP, LOSS OF	1020 000			i
			*** **	LO-LO RWST LEVEL TRIP CAPABILITY POR				
				TRAIN A SI/FU				
12.1.06.01.2 1259	DC BUS 41	72-101	CLOSED	POTENTIAL INOP OF TRAIN A WITH	*CONFIGURATION DOES NOT HERT R.G. 1.75 19	.1 BYAI	LUATE ISOLATION ADEQUACY FOR UNQUALIFIED LOADS	BLECTRICAL
MSR	LOADS	72-111		POTENTIAL INOP OF TRAIN B DUE TO:	OR IRER 384 CRITERIA DUE TO LACE OF A	ON 1	125VDC BUS AS PART OF INTEGRATED RESOLUTION OF	
		12-113			SIS/SISLOP TRIP OF THE NON-IE LOADS PROM	SEP	TOPIC VI-1.C.2	
		(BREATERS)		TO TRANSPER PROM DG TO OPPSITE SOURCE	THIS BUS			
		,		WITH C-IFHE BELATED (919)LOP, LOSS OF				•
				LO-LO RUST LEVEL TRIP CAPABILITY FOR TRAIN A 81/FW				
12.7.06.01.2 125V	DC RUS A1	72-101	CLOSED	POTENTIAL INOP OF TRAIN A MITH	*CONFIGURATION DORS NOT HERT R.G. 1.75 22	181	HE AS 12.7.5.14.2)	
	LOADS	72-111	CLOJED	POTENTIAL INOP OF TRAIN B DUE TO:	OR LERR 384 CRITERIA DUB TO LACE OF A	. (281	NO NO 16-11-04	
	DO 11.00	72-113			SIS/SISLOP TRIP OF THE NON-IE LOADS FROM			
		(BREAKERS)		TO TRANSPER FROM DG TO OPPOITE SOURCE	THIS BUS			
				WITH C-MPHR RELATED (SIS)LOP, LOSS OF	•		•	
				LO-LO RUST LEVEL TRIP CAPABILITY FOR				
				TRAIN A SI/FU				
12.7.06.02.1 125V		72-108	OPEN	LOSS OF ALTERNATE OFFSITE SOURCE FOR	*SEE ITEM 12.9.8.1.1. VERIF EBQD TBAT 22	182)	MB AS 12.1.5.14.2}	
NSR	LOADS	72-109		BOTE TRAINS, RESULTING IN POTENTIAL	LOSS OF H2 CATL DOES NOT CAUSE LOSS OF			
		12-115		LONG-TERM INOPERABILITY DUE TO INABILITY	MOA-320/820C IMARRIBE' NEM DAMBS) AIV			
•		(BREARBES)		TO TRANSPER PROM DGM TO OPPSITE SOURCE FOR SISLOP EVENT INVOLVING C-IFMR	PIRE OR RIPLOSION. SEPARATE 220hV BREE			
				BELATED LOP	AND RCP O/C TRIPS PREVENT PROPAGATION OF			
					COMMON-CAUSE PAULTS			
12.7.06.02.1 125V	6C BUS #1	72-108	OFFR	LOSS OF ALTERNATE OFFSITE SOURCE FOR		.) VER	IFT WHETHER NEC BTP 9.5-1 AND APPENDIX R	MECHANICAL (PP)
	LOADS	12-109		BOTH TRAINS, BESULTING IN POTENTIAL	LCSS OF H2 CHTL DOBS NOT CAUSE LOSS OF		LUDE BOTH FIRES AND BEPLOSIONS MECHANISTICALLY	
		12-115		LONG-TERM INOPERABILITY DUE TO INABILITY	NBARBY BCCS EQUIP AND CABLING (INCL	CAUS	SED BY AN ACCIDENT (EG. OF HYPROCEN DUB TO LUBI	
		(BREAKERS)		TO TRANSPER PROM QCs TO OPPSITE SOURCE	HOV-358/850C [NVBRTBR, HPW PUHPS] VIA		SBAL OIL FAILURE OR IFHE DUE TO FAULT WITH	
				FOR SISLOP EVENT INVOLVING C-IFMR	FIRE OR EXPLOSION. SEPARATE 220HV BREE	PROT	TECTION FAILURE, POST-SIS/SISLOP)	
				BPLATED LOP	AND ECP O/C TRIPS FREVENT PROPAGATION OF			1
					CORMON-CAUSE FAULTS			

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### EMERGENCY CORR COOLING SYSTEM SINGLE FAILURE ANALYSIS SAN ONOFER UNIT 1

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	SIGNIFICANT E	

ITEN 1	DRAICE ID	COMPONENT ID	FAILURB HODB	RPPBCT ON BCCS	ERHARES	REPORT	ACTION LIBR	RESP DISCIPLINE
	NSR LOADS	72-109 72-115 (BREAKBRS)	OPRIL	!LOSS OF ALTREMATE OFFSITE SQUECE FOR BOTH TRAINS, BESULTING IN POTBUTIAL LONG-TERM INOPERABILITY DUE TO INABILITY TO TRANSFER FROM DGG TO OFFSITE SQUECE FOR SISLOP EVENT INVOLVING C-IPME RELATED LOP	LOSS OF HE CHEL DORS NOT CAUSE LOSS OF	21.2	ADDRESS HECHAMISTICALLY CAUSED FIRES AND EXPLOSIONS NOT EXCLUDED BY NEC BTP 9.5-1 OR APPENDIX & AS PART OF INTEGRATED RESOLUTION OF SEITOPIC VI.7.C.2. IF WEEDED	
	125VDC BUS \$1 NSR LOADS	72-108 72-109 72-115	CLOSED	0{8AHB A8 12.7.6.1.2}	*(SAMB AS 12.7.6.1.2)	04	(SAMB AS 12.7.5.9.1)	
	125VDC BUS \$1 NSR LOADS	(BRBAERES) 12-108 12-109 12-115	CLOSED	*(SAMB AS 12.7.6.1.2)	*(SAME 48 12.7.6.1.2)	15	(SANB AS 12.7.5.9.1)	
	1254DC BUS 41 NSR LOADS	(BRRAERRS) 72-108 72-109 72-115 (BRRAERRS)	<u>crosid</u>	!(SANR AS. 12-1.6.1-2)	4(SABB AS 12.7.6.1.2)	19	(SABR AS 12.7.5.1.2)	
	125VDC BUS \$1 MSR LOADS	12-108 72-109 72-115	CLOSED	*(SAMB A8 12.7.6.1.2)	*(SABB AS 12.7.6.1.2)	22	(SAMB AS 12.7.5.14.2)	
	125VDC BUS \$1 WSR LOADS	(BRRAKERS) OTUBR	OPEN	*LOSS OF ALTERNATE OFFSITE SOURCE FOR BOTH TRAINS, RESULTING IN INABILITY TO TRANSPER PROM DCA TO OFFSITE FOR C-1PMR RELATED (818)LOP		22	(SAMB AS 12.7.5.14.2)	··-
	125VDC BUS \$1 BSR LOADS	OTHER	CLOSED	1(SAHE AS 12.7.6.1.2)	STILL BLOCK BECLOSING OF SWID BREES *(SAHB AS 12.7.6.1.2)	04	(SAHB AS 12.7.5.9.1)	
	125VDC BUS #1 NSR LOADS	OTHER	CLOSED	*(SANR AB 12.7.6.1.2)	*[SAHB AS 12.7.6.1.2]	īs	(SAME AS 12.7.5.9.1)	
	125VDC BUS \$1 MSR LOADS	OTHER	CLOSED	*(SAMB AS 12.7.6.1.2)	*(SAME AS 12.7.6.1.2)	19	(SAME AS 12.7.6.1.2)	
	125 VDC BUS 41 NSR LOADS	OTHER	CLOSED	*(SAHB AS 12.1.6.1.2)	•(SAMB AS 12.7.6.1.2)	22	(SAMB AS 12.7.5.14.2)	William William William September 1
	125VDC BUS #2 BATTERT CHARGER SET C	CHARGER	OUTPUT VOLTS HIGH	POTENTIAL INOPERABILITY OF TRAIN B 125VDC LOADS DUB TO LOSS OF QUALIFIED LIFE	CONDITION LIMITED BY CHARGER HI-VOLTS SHUTDOWN. VBBIF REQD THAT EQ FOR 125VDC LOADS BOUNDS THIS CONDITION (EG. EQUALIZING CHARGE FOR BATTERT BANK). FAILURE DORS NOT IMPACT TRAIN B VITAL BUS 5, 6 OR CSAS IMVESTERS DUB TO VOLTAGE RECULATING CAPABILITY	31	(SAME AS 12.7.1.1.3)	

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## EMERCENCY CORR COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM ONOPRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

ITBH   DEVICE I	COMPONENT ID	FAILURE MODE	REPRECT ON BCCS	PEHAPES	REPORT	ACTION 1TBH	·	RESP DISCIPLINE
12.4.02.01.3 125VDC BUS 4 BATTERY CHAR SET D		OUTPUT VOLTS BIGB	POTENTIAL INOPERABILITY OF TEAIN B 125YDC LOADS DUB TO LOSS OF QUALIFIED LIFE	*CONDITION LIMITED BY CHARGER HI-VOLTS SHUTDOWN. VERIF REQUIRENT TO THE TOTAL SHOUNDS THIS CONDITION (RG. RQUALIZING CHARGE FOR BATTERY BAME).	37	(SAHB AS 12.7.1.1.1)		
				FAILURE DOES NOT IMPACT TRAIN B VITAL BUS 5, 6 OR CSAS INVERTERS DUE TO VOLTAGE REGULATING CAPABILITE				
12.8.04.01.3 125VDC BUS 42 SAUNT		GROUND	MORE	180UNDS GROUND OF ANY OTHER 125VDC BUS 12 DEVICE. T/S ACTION ENTET REQD FOR TRIS CONDITION. SINCE A SECOND	11	(SAMB AS 12.7.4.1.3)	-	
		· —		COMMON-CAUSE GROUND OF NON-EQ LOADS COULD DISABLE 125VDC BUS 82 SR LOADS IN THIS WORMALLY UNGROUNDED SYSTEM. VERIF	<del>-</del>			
12.8.05.01.1 125VDC BUS #2 SR LOADS	72-217 (BREAKER)	OPBN	MONB	REQUION & GROUND FOR T/S ENTRY  THECH SPEC ACTION ENTRY REQUIRED IF VITAL BUS NOT ENERGIZED FROM INVERTER.		(SARB AS 12.7.5.1.1)	·	
<u> </u>	· · · · · · · · · · · · · · · · · · ·			MAY ALSO RESULT IN INTERBUPTION OF VITAL BUSSES 5, 6 LOIDS BETWEEN TIME OF SISLOP AND RE-BNERGIZING MCC-2 FROM TRAIN B DG				
2.8.05.03.1 125VDC BUS 92 SR LOADS	(BRBAEBR)	OPRN	REDUCED REDUNDANCY FOR RE-EMERGIZING	ISBE 1788 12.6.8.10.1. TRCB SPEC ACTION BATEY BEQUIESD WITH BELD IN THIS POSITION		(SAMB AS 12.7.5.8.1)		
2.8.05.05.1 125VDC BUS #2 SR LOADS	12-206 (BRBARRR)	OPBU	*INOP OF TRAIN B, WITH POTENTIAL INOP OF TRAIN A DUB TO LOSS OF LO-LO RUST LEVEL TRIP CAPABILITY FOR TRAIN A SI/FW PUMPS. TRAIN A SISLOP LOGIC BECOMES 1/2 ON BUS		04	(SAME AS 12.7.5.9.1)		
2.8.05.(2.1°125VDC BUS #2	93.996	OPRN	Nic uv	12.2.12.8.1. BOT REV EROD TO TRIP PUMP BREES LOCALLY TO ISOL FAULTS DUB TO LOSS-OF-SUCTION BOTOR FAILURES		Joseph and S. S. S. A. M.		
SR LOADS	12-226 (BRBAER)		*POTENTIAL INOP OF TEAIN B FOR SISLOP DUB TO 480V SWGR/MCC VOLT DEGRADATION AMD/OR DG OVERLOAD, W/ POTENTIAL INOP OF TRAIN A DUB TO: UMISOLABLE CCW FLOW	SER ITEMS 12.4.3.16.1, 12.6.7.12.1. SUGR #3 NOM-SE LOADS CAN BE MANUALLY ISOLATED PRIOR TO RE-ENERGIZING THE BUS FROM TRAIN A OR B. HAIN TEMP HAS 2 TRAINS OF		(3488 AS 12.7.3.3.1)		
			BIPASS, LOSS OF LO-LO RWST LBVBL TRIP OF TRAIN B SI/FW. REDUCED BELIABILITY OF ALT OFFSITE SOURCE	FORCED AIR COOLING			i	
2.8.05.12.1 125VDC BUS 82 SR LOADS	72-226 (BREAKER)	OPEN .	POTENTIAL INOP OF TRAIN B FOR SISLOP DUB TO 480V SWCR/MCC VOLT DEGRADATION AND/OR DG OVERLOAD, W/ POTENTIAL INOF OF TRAIN A DUB TO: UNISOLABLE CCW FLOW	SEB ITEMS 12.4.9.16.1, 12.6.7.12.1. SWGR 43 NON-SE LOADS CAN BE MANUALLY ISOLATED PRIOR TO RE-EMBRIZING THE BUS PROM TRAIN A OR B. MAIN 15MR HAS 2 TRAINS OF		(SAHB AS 12.7.5.9.1)		·
			BYPASS, LOSS OF LO-LO BUST LEVEL TRIP OF TRAIN 8 SI/PW. BROUCED BELIABILITY OF ALT OFFSITS SOURCE					· · · · · · · · · · · · · · · · · · ·
2.8.06.01.2 125VDC BUS 42 NSW LOADS	72-20 <b>8</b> (ELEAEER)	CLOSED	POTENTIAL INOP OF TRAIN B WITH POTENTIAL INOP OF TRAIN A DUE TO: UNISCLABLE CCW FLOW BYPASS AND LOSS OF	*CONPIGURATION DORS NOT MERT R.G. 1.75 OR IEER 384 CRITERIA DUR TO LACK OP A SIS: SISLOP TRIP OF THE NON-IR LOADS FROM	04	(SAMB AS 12.7.5.9.2)		

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## EMERGENCY CORE COOLING SYSTEM SINGLE FAILURE ANALYSIS SAM ONOFER UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

1988 8	DBVICE ID	COMPONENT ID	PAILURB MODB	EPPECT ON ACCS	REMARES	REPORT	ACTION ITEM	RESP DISCIPLINE
12.8.06.01.2	125VDC BUS 42 BSB LOADS	. J2-208(BRBAEER)	CLOSED	POTENTIAL INOP OF TRAIN & WITH POTENTIAL INOP OF TRAIN A DUB TO: UNISOLABLE CCU PLOW BYPASE AND LOSS OF LO-LO RWAT LEVEL TRIP CAPABILITY FOR TRAIN A SIPP	PROMPTGUBATION DORS NOT MERT R.G. 1.75 OR IBRE 384 CRITERIA DUR TO LACE OF A SIS/SISLOP TRIP OF THE MON-18 LOADS PROM TRIA RUS		.(SAMB_AS_12.7.5.9.1)	
	125VDC BUS 42 NSR LGADS	72-208 (BRBAERR)	CLOSED	*POTENTIAL INOP OF TRAIN B WITH POTENTIAL INOP OF TRAIN A DUB TO:	*CONFIGURATION DORS NOT MEET R.G. 1.75 OR 1888 384 CRITERIA DUE TO LACE OF A	19	(SAMB AS 12.1.6.1.2)	
				UNISOLABLE CCU PLOW STPASS AND LOSS OF LO-LO RUST LEVEL TRIP CAPABILITY FOR TRAIN A SI/PU	SIS/SISLOP TRIP OF THE NOW-IE LOADS FROM THIS BUS			
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					REPORT	
ITEM   DEVICE ID	COMPONENT ID	FAILURE MODE	RFFRCT ON BCCS	PRHARES	1788	ACTION ITEM RESP DISCIPLINE
2.9.04.01.2 CB 4012	ARRAKER	CLOSED	PLACE US TEASONTES USES OF THE STATE OF	*VERIFICATION REQUIRED THAT APPLICABLE		NO PURTHER ACTION REQUIRED, SQ1-13-10 ALREADY
(PCB-1)	***************************************		BUS 41C/2C POST-SISLOP OR OTHER CAUSE OF			ADDRESSES THIS FAILURE
			UNIT TRIP, UNTIL BREE IS ISOLATED BY DISCONNECTS AND LOCAL RESET OF BELSU IN	POST-SISLOP		
			SWID, MONE FOR SIS			
2.9.04.02.1 CB 4012	BREARER PAILURS	TRIPPED	LOSS OF ALTERNATE OFFSITE SOURCE FOR	BPLBU PROVIDES FAULT ISOLATION IN TER		(SAME AS 12.9.4.1.2)
(PCB-1)	LOCAL BACRUP		BUS ALC/2C POST-SISLOP, NONE POR SIS	BYENT THAT BEER RECEIVES A TRIP SIGNAL		
	(BFLBU)	*	•	BUT DOES NOT TRIP. SPURIOUS BPLBU BOUNDS	•	
				ACTUATION OF SWID HE BUS DIFFERENTIAL JBIP, WHICH DOES NOT TRIP BREE 6012		
2.9.05.01.2 CB 6012	BREALER	CLOSED	LOSS OF ALTERNATE OFFSITE SOURCE FOR	*VBRIPICATION REQUIRED THAT APPLICABLE		(SAME AS 12.9.4.1.2)
(PCB-2)			BUS \$1C/2C POST-SISLOP OR OTHER CAUSE OF			
			UNIT TRIP. UNTIL BREE IS ISOLATED BT	POST-818LOP		
			DISCONNECTS AND LOCAL RESET OF BPLBU IN SWID, NONE FOR SIS			
2.9.05.02.1 CB 6012	BRRAEBE PAILURE	TRIPPRD	LOSS OF ALTERNATE OFFSITE SOURCE FOR	RPLBU PROVIDES FAULT ISOLATION IN THE		(SAME AS 12.9.4.1.2)
(PCB-2)	LOCAL BACKUP		BUS \$1C/2C POST-SISLOP, MONS FOR SIS	BURNT THAT BREE RECEIVES A TRIP SIGNAL		THE REAL PROPERTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY
	(BFLBU)			BUT DORS NOT TRIP. SPURIOUS BELBU BOUNDS		•
				ACTUATION OF SAID NE BAS DIFFERENTIAL		,
				TRIP, WHICH DORS NOT TRIP BREE 4032		,
2.9.06.01.2 CB 4012	MAIN GRN.	CONTACTS CLOSED	LOSS OF ALTERNATE OFFSITE SQUECE FOR	DISCONNECT SWITCHES IN CONTROL CABINETS	22	VERIPT THAT PROCEDURES BEIST TO BRING ADDITIONAL MECHANICAL
CB 6012		(ON)	BOTH TRAINS, RESULTING IN ABILITY TO	CAN ALSO BE USED TO INTERRUPT THE TRIP		DG PUBL ONSITE BEFORE I DAY OMBITE SUPPLY COULD BE
	PROTECTIVE TRIPS		TRANSPER BUS \$1C/2C PROM BGs FOR SISLOP	SIGNALS		RIBAUSTED POST-ACCIDENT
12.9.06.03.2 CB 4012	18-1	CONTACTS OPEN	RABAL INVOLATED C-ILMS BETTED TOD FOR STATEMENT OF SILE BORCE BOR		22	(SAHE AS 12.9.6.1.2)
CB 6012	(RELAT)	(OFF)	BOTE TRAINS, RESULTING IN INABILITY TO		••	(ougs #9 19:3:4:1:2)
			TRANSPER BUS \$1C/2C PRON DGs FOR C-IFMR			
			RELATED (SIS)LOP, NOWE FOR SIS			
2.9.07.01.2 HOTOR OPERATED	SWITCH	CLOSED	LOSS OF ALTERNATE OFFSITE SOURCE FOR	NORMAL POSITION	22	(SABB AS 12.9.6.1.2)
DISCONNECT			BOTH TRAINS, RESULTING IN INABILITY TO TRANSPER BUS AIC/2C FROM DGs FOR SISLOP		· <del></del>	The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s
			EVENT INVOLVING C-IFMR RELATED LOP			
2.9.07.02.2 HOTOR OPERATED	18, 18-1	OPP	LOSS OF ALTERNATE OFFSITE SOURCE FOR	RELAY IS LATCHING TYPE	22.	(SANS AS 12.9.6.1.2)
DISCONNECT	(RELATS)	,	BOTE TRAINS, RESULTING IN INABILITY TO			
			TRANSPER BUS \$1C/2C FROM DGs POR SISLOP			
2.9.07.03.1 MOTOR OPERATED	125VDC BUS 41	VOLTS LOW	BYBHT INVOLVING C-IPME RELATED LOP ILOSS OF ALTERNATE OFFSITE SOURCE FOR	HOTOR OPERATED DISCONNECT CAN BE	22	(SAHE AS 12.9.6.1.2)
DISCONNECT	(72-132)	ACTIS FOR	BOTH TRAINS, RESULTING IN IMABILITY TO	OPERATED MANUALLY VIA ATTACHED	• •	(unus au 15.0.0.1.5)
	1-2 100,		TRANSPER BUS SIC/2C FROM DG. FOR SISLOP			
			EVENT INVOLVING C-IPHE EBLATED LOP	PAILED RELAYS WILL STILL BLOCK RECLOSURE		
				OF SWID BREES		
2.9.08.01.1 CB 4012	125 VDC BUS #1	NOTES FOR	LOSS OF ALTERNATE OFFSITE SOURCE FOR	SEPARATE 220 LV BREE AND RCP OVERCURRENT		(SANR AS 12.9.6.1.2)
CB 4032 CB 6012	(72-108)		BOTH TRAINS, RESULTING IN POTENTIAL ONG-TROM INOPPRARILITY DUR TO INABILITY	TRIPS PREVENT PROPAGATION OF COMMON-CAUSE PAULTS (RG. INTO 4 by ROOM)		
CB 6032			TO TRANSFER BUS AIC/2C FROM DGs FOR	WITH THIS FAILURE		
		•	SISLOP BUBNT INVOLVING C-IPHR RELATED			
			I.OP	•		

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## EMBRGBUCT CORE COOLING STSTEM SINGLE FAILURE ANALYSIS SAM ONOPRE UNIT 1 ACTION ITEMS FOR SIGNIFICANT FINDINGS

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ITEN 4	DEVICE ID	COMPONENT ID	PAILURE HODE	EPPRCT ON BCCS	ESHARES	BEPORT		RESP DISCIPLINE	
	CB 4012 CB 4032 CB 6012 CB 6032	J25YDC PANBL	YOLTA LOW	C-IPHE AND SUID DUE TO INABILITY TO	PRALICHMENT TO ALTERNATE OFFSITE SOURCE NOT REQUIRED IMMEDIATELT, PREMITTING CREDIT FOR LOCAL OPERATION OF SWID BRIES AND REPAIRS WITHIM T DAY CAPACITY OF DG FUBL SUPPLY. C-IPME SEPARATED FROM BSSENTIAL EQUIPMENT AS PER UPPA		VERIFY WHETHER HRC BTP 9.5-1 AND APPENDIX E EXCLUDE SOTH FIRES AND REPLOSIONS BECHANISTICALLY CAUSED BY AN ACCIDENT (EG. OF HITHOGEN DUR TO LUBB OIL/SEAL OIL FAILURE OR IPHE DUR TO FAULT WITE PROTECTION FAILURE, POST-SIS/SISLOP)	NECHANICAL (PP)	
: <del></del>	CB 4012 CB 4032 CB 6012 CB 6032	125VDC PANBL BDP2	VOLTS LOW	POTENTIAL FOR PIRE OR EXPLOSION AT C-IPHE AND SWID DUE TO INABILITY TO ISOLATE 220 BY SUPPLY AUTOMATICALLY PROM C-IPHE CAUSED LOP. POTENTIAL DAMAGE TO ALTERNATE OPPSITE SOURCE FOR BOTE TRAINS DUE TO SUSTAINED MOTORING	AND REPAIRS WITHIN 7 DAY CAPACITY OF DG		ADDRESS MECHANISTICALLY CAUSED FIRES AND/OR BIPLOSIONS NOT RICLUDED BY MEC BTP 9.5-1 OR APPRIDIT B AS PART OF INTEGRATED RESOLUTION OF SEPTOPIC VI-7.C.2, IF NEEDED	BLECTRICAL	
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