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February 25, 1989

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

Gentlemen:

Subject: Docket No. 50-206
Updated Single Failure Analyses
San Onofre Nuclear Generating Station
Unit 1

Single failure analyses of the Engineered Safety Features (ESF) and Reactor Protection System (RPS) for San Onofre Unit 1 were performed at the request of the NRC. Reports documenting the ESF and RPS single failure analyses were submitted to the NRC on November 6, 1987 and March 11, 1987, respectively.

During the San Onofre Unit 1 Cycle 10 refueling outage, several plant modifications were implemented which have affected the results of the ESF and RPS single failure analyses. Accordingly, a reanalysis of the Event Specific Single Failure Response Evaluation was completed.

It was determined that the following systems/functions included in the original ESF report required reanalysis:

- 1) 480V switchgear No. 3 Event Specific Single Failure Response Evaluation (TAB V.A2)
- 2) Main Feedwater Isolation (ECCS) Function (TAB V.C)
- 3) Auxiliary Feedwater/Reactor Protection Function (TAB V.E)

In addition, the following two new safety functions required analysis:

- 1) Charging System Recirculation Realignment.
- 2) Main Feedwater Pump Realignment and Interlocks.

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The conclusion from this ESF single failure reanalysis is that the single failure response for all the above systems/functions were found to be acceptable. The results of the RPS single failure reanalysis show that all scram functions and permissives were also found to be acceptable.

The purpose of this letter is to transmit page changes to the reports entitled, "Engineered Safety Features Single Failure Analysis, San Onofre Nuclear Generating Station, Unit 1," and "San Onofre Nuclear Generating Station Unit 1, Reactor Protection System Single Failure Analysis" to reflect the reanalyses caused by several of the Cycle 10 modifications.

The following original pages in the ESF single failure analysis report should be replaced with new pages:

<u>Page/Tab</u>	<u>Title</u>
Title Page	Engineered Safety Features Single Failure Analysis
Table of Contents	
1-8	Introduction, Scope, Methodology, Summary of Results
V.A	Emergency Core Cooling System (ECCS)
V.C	Main Feedwater Isolation Function of the ECCS
C.2	Appendix (deleted)**
V.E	Auxiliary Feedwater/Reactor Protection Systems
*V1.A	Emergency Core Cooling System References
*V1.C	Main Feedwater Isolation References
*V1.E	Auxiliary Feedwater/Reactor Protection Systems References

 *including all drawings

**Appendix C.2 was deleted because it served only as a means to initially identify potential event specific single failures. Plant modifications implemented to address the single failure concerns were evaluated through event specific single failure analysis methodology to show acceptability. Updating the FMEA to reflect the modifications would therefore be superfluous.

<u>Page/Tab</u>	<u>Title</u>
V.A.2 (whole section)	Swing 480V SWGR #3/MCC-3 Realignment, Event Specific Single Failure Response Evaluation
V.C (whole section)	Main Feedwater Isolation (ECCS) Function, Event Specific Single Failure Response Evaluation
V.E.1 (whole section)	Auxiliary Feedwater/Reactor Protection Systems, Event Specific Single Failure Response Evaluation
V.E.2 (whole section)	Auxiliary Feedwater System Single Failure Analysis

The following new sections and tabs should be inserted in the report:

<u>Page/Tab</u>	<u>Title</u>
V.A.3	Charging System Recirculation Realignment, Event Specific Single Failure Response Evaluation
V.A.4	Main Feedwater Pump Realignment and Interlocks, Event Specific Single Failure Response Evaluation

The following Pages/Tabs in the RPS Single Failure Analysis Report should be replaced with the new pages:

<u>Page/Tab</u>	<u>Title</u>
Title page	San Onofre Nuclear Generating Station Unit 1, Reactor Protection System Single Failure Analysis
	Record of Revisions (new page)
	Table of Contents
P1-6	Reactor Protection System Single Failure Analysis
Table 1*	Pressurizer Pressure SCRAMS
Table 2*	Pressurizer Level SCRAM
Table 3*	Turbine Trip SCRAM
Table 4*	NIS SCRAMS and Permissives

*Includes Reference Sheet and all pages of Table.

<u>Page/Tab</u>	<u>Title</u>
Table 5*	RCS Low Flow SCRAM
Table 6*	Steam/Feedwater Flow Mismatch SCRAM
Table 7*	SCRAM Matrix and Breakers
Table 8-1*	Power Supplies
Table 8-2*	Sort by Rack Power Supply
Table 9*	Control/Protection System Interactions
Attachment C	Developmental References (Drawings)**

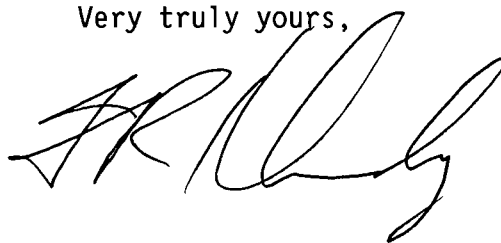
*Includes Reference Sheet and all pages of Table.

**Replace all drawings.

A few additional plant modifications are currently being implemented which may impact the results of the single failure analyses. These changes will be documented and appropriate revision pages to the single failure analyses reports will be submitted to the NRC on a schedule to be determined later based on discussions with the NRC Project Manager.

If you have any questions or desire more information on this subject, please contact me.

Very truly yours,



cc: J. B. Martin, Regional Administrator, NRC Region V
F. R. Huey, NRC Senior Resident Inspector, San Onofre Units 1, 2 and 3

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
 SAN ONDRE UNIT 1
 SECTION 2: PRESSURIZER LEVEL SCRAM

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
2.1.1.1	LT 430	SIGNAL HIGH	HIGH PRESSURIZER LEVEL SIGNAL TO CHANNEL I TRIP BISTABLE, LEVEL RECORDER VIA SW. LR/430, LEVEL CONTROLLER VIA SW. L/432, AND INDICATOR. CHANNEL I TRIP RELAY ACTUATED.	ANNUNCIATION, CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF HIGH LEVEL TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	MAY ENERGIZE PRESSURIZER HEATERS AND CAUSE LEVEL DECREASE IF CONNECTED VIA L/432 SWITCH.
2.1.1.2	LT 430	SIGNAL LOW	LOW PRESSURIZER LEVEL SIGNAL TO CHANNEL I TRIP BISTABLE, LEVEL RECORDER VIA SW. LR/430, LEVEL CONTROLLER VIA SW. L/432 AND INDICATOR.	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF HIGH LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	MAY DE-ENERGIZE PRESSURIZER HEATERS AND CAUSE LEVEL INCREASE IF CONNECTED VIA L/432 SWITCH.
2.1.2.1	LI 430	OPEN	(SAME AS 2.1.1.2)	(SAME AS 2.1.1.2)	(SAME AS 2.1.1.2)	(SAME AS 2.1.1.2)	(SAME AS 2.1.1.2) IN LT-430 CURRENT LOOP.
2.1.2.2	LI 430	SHORT	NO EFFECT	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	LOSS OF CHANNEL I PRESSURIZER LEVEL INDICATION.
2.1.3.1	LC 430A	TRIPPED	CHANNEL I TRIP RELAY ACTUATED (LC-430A-X)	ANNUNCIATION	NONE REQUIRED	CHANNEL I OF HIGH LEVEL TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	
2.1.3.2	LC 430A	AS-IS (UNTRIPPED)	LOSS OF CAPABILITY TO ACTUATE TRIP RELAY (LC-430A-X)	PERIODIC TESTING	REDUNDANT CHANNELS.	CHANNEL I OF HIGH LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	
2.1.4.1	Y 430A	OPEN	CHANNEL I TRIP RELAY ACTUATED	ANNUNCIATION, PERIODIC TESTING	(SAME AS 2.1.1.1)	(SAME AS 2.1.1.1)	SWITCH FAILURE OR OPERATOR ERROR, RELAY IS DE-ENERGIZE TO ACTUATE
2.1.4.2	Y 430A	SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	
2.1.5.1	LC 430A-X	TRIPPED	(SAME AS 2.1.3.1)	(SAME AS 2.1.3.1)	(SAME AS 2.1.3.1)	(SAME AS 2.1.3.1)	
2.1.5.2	LC 430A-X	AS-IS (UNTRIPPED)	(SAME AS 2.1.3.2)	(SAME AS 2.1.3.2)	(SAME AS 2.1.3.2)	(SAME AS 2.1.3.2)	
2.1.6.1	LM 430	INPUT OPEN	(SAME AS 2.1.1.2)	(SAME AS 2.1.1.2)	(SAME AS 2.1.1.2)	(SAME AS 2.1.1.2)	(SAME AS 2.1.1.2) IN LT-430 CURRENT LOOP.
2.1.6.2	LM 430	INPUT SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 2.1.1.2)
2.1.6.3	LM 430	OUTPUT HIGH	HIGH PRESSURIZER LEVEL SIGNAL TO LEVEL CONTROLLER VIA SW. L/432	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 2.1.1.1)
2.1.6.4	LM 430	OUTPUT LOW	LOW PRESSURIZER LEVEL SIGNAL TO LEVEL CONTROLLER VIA SW. L/432	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 2.1.1.2)
2.1.7.1	YE 430A	OUTPUT VOLTS HIGH	(SAME AS 2.1.1.1)	(SAME AS 2.1.1.1)	(SAME AS 2.1.1.1)	(SAME AS 2.1.1.1)	(SAME AS 2.1.1.1)
2.1.7.2	YE 430A	OUTPUT VOLTS ZERO	(SAME AS 2.1.1.2)	(SAME AS 2.1.1.2)	(SAME AS 2.1.1.2)	(SAME AS 2.1.1.2)	(SAME AS 2.1.1.2)
2.1.8.1	REG SUPL I (R3/R4)	VOLTS ZERO OR GROUNDED	(SAME AS 2.1.1.2) LOW SIGNAL TO FC-1112, LI-419, RECORDER LR-430, TC-419	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT CHANNELS	CHANNEL I OF HIGH LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	DE-ENERGIZES PRESSURIZER HEATERS AND CAUSES LEVEL INCREASE
2.1.9.1	NON-REG SUPL I (R3/R4)	VOLTS ZERO OR GROUNDED	CHANNEL I TRIP RELAY AND PRESSURIZER HEATER HI/LO LEVEL BREAKER ACTUATED	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF HIGH LEVEL TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	TRIP RELAY IS DE-ENERGIZE TO ACTUATE
2.2.1.1	LT 431	SIGNAL HIGH	HIGH PRESSURIZER LEVEL SIGNAL TO CHANNEL II TRIP BISTABLE, LEVEL RECORDER VIA SW. LR/430, LEVEL CONTROLLER VIA SW. L/432, AND INDICATOR. CHANNEL II TRIP RELAY ACTUATED	ANNUNCIATION, CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF HIGH LEVEL TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	MAY ENERGIZE PRESSURIZER HEATERS AND CAUSE LEVEL DECREASE IF CONNECTED VIA L/432 SWITCH
2.2.1.2	LT 431	SIGNAL LOW	LOW PRESSURIZER LEVEL SIGNAL TO CHANNEL II TRIP BISTABLE, LEVEL RECORDER VIA SW. LR/430, LEVEL CONTROLLER VIA SW. L/432 AND INDICATOR	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF HIGH LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	MAY DE-ENERGIZE PRESSURIZER HEATERS AND CAUSE LEVEL INCREASE IF CONNECTED VIA L/432 SWITCH
2.2.2.1	LI 431	OPEN	(SAME AS 2.2.1.2)	(SAME AS 2.2.1.2)	(SAME AS 2.2.1.2)	(SAME AS 2.2.1.2)	(SAME AS 2.2.1.2) IN LT-431 CURRENT LOOP
2.2.2.2	LI 431	SHORT	NO EFFECT	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	LOSS OF CHANNEL II PRESSURIZER LEVEL INDICATION

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDRE UNIT 1
SECTION 2: PRESSURIZER LEVEL SCRAM

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
2.2.3.1	LC 431A	TRIPPED	CHANNEL II TRIP RELAY ACTUATED (LC-431A-X)	ANNUNCIATION	NONE REQUIRED	CHANNEL II HIGH LEVEL TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	
2.2.3.2	LC 431A	AS-IS (UNTRIPPED)	LOSS OF CAPABILITY TO ACTUATE TRIP RELAY (LC-431A-X)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF HIGH LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	
2.2.4.1	Y 431A	OPEN	CHANNEL II TRIP RELAY ACTUATED	ANNUNCIATION, PERIODIC TESTING	(SAME AS 2.2.1.1)	(SAME AS 2.2.1.1)	SWITCH FAILURE OR OPERATOR ERROR, RELAY IS DE-ENERGIZE TO ACTUATE
2.2.4.2	Y 431A	SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	
2.2.5.1	LC 431A-X	TRIPPED	(SAME AS 2.2.3.1)	(SAME AS 2.2.3.1)	(SAME AS 2.2.3.1)	(SAME AS 2.2.3.1)	
2.2.5.2	LC 431A-X	AS-IS (UNTRIPPED)	(SAME AS 2.2.3.2)	(SAME AS 2.2.3.2)	(SAME AS 2.2.3.2)	(SAME AS 2.2.3.2)	
2.2.6.1	LM 431	INPUT OPEN	(SAME AS 2.2.1.2)	(SAME AS 2.2.1.2)	(SAME AS 2.2.1.2)	(SAME AS 2.2.1.2)	(SAME AS 2.2.1.2) IN LT-431 CURRENT LOOP
2.2.6.2	LM 431	INPUT SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 2.2.1.2)
2.2.6.3	LM 431	OUTPUT HIGH	HIGH PRESSURIZER LEVEL SIGNAL TO LEVEL CONTROLLER VIA SW. L/432	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 2.2.1.1)
2.2.6.4	LM 431	OUTPUT LOW	LOW PRESSURIZER LEVEL SIGNAL TO LEVEL CONTROLLER VIA SW. L/432	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 2.2.1.2)
2.2.7.1	YE 431A	OUTPUT VOLTS HIGH	(SAME AS 2.2.1.1)	(SAME AS 2.2.1.1)	(SAME AS 2.2.1.1)	(SAME AS 2.2.1.1)	(SAME AS 2.2.1.1)
2.2.7.2	YE 431A	OUTPUT VOLTS ZERO	(SAME AS 2.2.1.2)	(SAME AS 2.2.1.2)	(SAME AS 2.2.1.2)	(SAME AS 2.2.1.2)	(SAME AS 2.2.1.2)
2.2.8.1	REG SUPPL II (R3/R4)	VOLTS ZERO OR GROUNDED	LOW PRESSURIZER LEVEL SIGNAL TO CHANNEL II TRIP BISTABLE, LEVEL RECORDER VIA SW LR/430, LEVEL CONTROLLER VIA SW L/432 AND INDICATOR. LOW SIGNAL TO RECORDER TR-405-1 VIA TC-419	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT CHANNELS	CHANNEL II OF HIGH LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	MAY DE-ENERGIZE PRESSURIZER HEATERS AND CAUSE LEVEL INCREASE IF CONNECTED VIA L/432 SWITCH
2.2.9.1	NON-REG SUPPL II (R3/R4)	VOLTS ZERO OR GROUNDED	CHANNEL II TRIP RELAY ACTUATED, LOSS OF CAPABILITY TO ACTUATE PRESSURIZER HEATER LD-LO CUTOFF	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF HIGH LEVEL TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	TRIP RELAY IS DE-ENERGIZE TO ACTUATE
2.3.1.1	LT 432	SIGNAL HIGH	HIGH PRESSURIZER LEVEL SIGNAL TO CHANNEL III TRIP BISTABLE, LEVEL RECORDER VIA SW. LR/430, LEVEL CONTROLLER VIA SW. L/432, AND INDICATOR. CHANNEL III TRIP RELAY ACTUATED	ANNUNCIATION, CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III OF HIGH LEVEL TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	MAY ENERGIZE PRESSURIZER HEATERS AND CAUSE LEVEL DECREASE IF CONNECTED VIA L/432 SWITCH
2.3.1.2	LT 432	SIGNAL LOW	LOW PRESSURIZER LEVEL SIGNAL TO CHANNEL III TRIP BISTABLE, LEVEL RECORDER VIA SW. LR/430, LEVEL CONTROLLER VIA SW. L/432 AND INDICATOR	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF HIGH LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	MAY DE-ENERGIZE PRESSURIZER HEATERS AND CAUSE LEVEL INCREASE IF CONNECTED VIA L/432 SWITCH
2.3.2.1	LI 432	OPEN	(SAME AS 2.3.1.2)	(SAME AS 2.3.1.2)	(SAME AS 2.3.1.2)	(SAME AS 2.3.1.2)	(SAME AS 2.3.1.2) IN LT-432 CURRENT LOOP.
2.3.2.2	LI 432	SHORT	NO EFFECT	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	LOSS OF CHANNEL III PRESSURIZER LEVEL INDICATION
2.3.3.1	LC 432A	TRIPPED	CHANNEL III TRIP RELAY ACTUATED (LC-432A-X)	ANNUNCIATION	NONE REQUIRED	CHANNEL III OF HIGH LEVEL TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	
2.3.3.2	LC 432A	AS-IS (UNTRIPPED)	LOSS OF CAPABILITY TO ACTUATE TRIP RELAY (LC-432A-X)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF HIGH LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	
2.3.4.1	Y 432A	OPEN	CHANNEL III TRIP RELAY ACTUATED	ANNUNCIATION, PERIODIC TESTING	(SAME AS 2.3.1.1)	(SAME AS 2.3.1.1)	SWITCH FAILURE OR OPERATOR ERROR, TRIP RELAY IS DE-ENERGIZE TO ACTUATE
2.3.4.2	Y 432A	SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	
2.3.5.1	LC 432A-X	TRIPPED	(SAME AS 2.3.3.1)	(SAME AS 2.3.3.1)	(SAME AS 2.3.3.1)	(SAME AS 2.3.3.1)	
2.3.5.2	LC 432A-X	AS-IS (UNTRIPPED)	(SAME AS 2.3.3.2)	(SAME AS 2.3.3.2)	(SAME AS 2.3.3.2)	(SAME AS 2.3.3.2)	

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
 SAN ONOFRE UNIT 1
 SECTION 2: PRESSURIZER LEVEL SCRAM

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
2.3.6.1	LM 432	INPUT OPEN	(SAME AS 2.3.1.2)	(SAME AS 2.3.1.2)	(SAME AS 2.3.1.2)	(SAME AS 2.3.1.2)	(SAME AS 2.3.1.2) IN LT-432 CURRENT LOOP
2.3.6.2	LM 432	INPUT SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 2.3.1.2)
2.3.6.3	LM 432	OUTPUT HIGH	HIGH PRESSURIZER LEVEL SIGNAL TO LEVEL CONTROLLER VIA SW. L/432	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 2.3.1.1)
2.3.6.4	LM 432	OUTPUT LOW	LOW PRESSURIZER LEVEL SIGNAL TO LEVEL CONTROLLER VIA SW. L/432	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 2.3.1.2)
2.3.7.1	YE 432A	OUTPUT VOLTS HIGH	(SAME AS 2.3.1.1)	(SAME AS 2.3.1.1)	(SAME AS 2.3.1.1)	(SAME AS 2.3.1.1)	(SAME AS 2.3.1.1)
2.3.7.2	YE 432A	OUTPUT VOLTS ZERO	(SAME AS 2.3.1.2)	(SAME AS 2.3.1.2)	(SAME AS 2.3.1.2)	(SAME AS 2.3.1.2)	(SAME AS 2.3.1.2)
2.3.8.1	REG SUPL III (R3/R4)	VOLTS ZERO OR GROUNDED	LOW PRESSURIZER LEVEL SIGNAL TO CHANNEL III TRIP BISTABLE, LEVEL RECORDER VIA SW LR/430, LEVEL CONTROLLER VIA SW L/432 AND INDICATOR	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT CHANNELS	CHANNEL III OF HIGH LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	MAY DE-ENERGIZE PRESSURIZER HEATERS AND CAUSE LEVEL INCREASE IF CONNECTED VIA L/432 SWITCH
2.3.9.1	NON-REG SUPL III (R3/R4)	VOLTS ZERO OR GROUNDED	CHANNEL III TRIP RELAY ACTUATED	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III OF HIGH LEVEL TRIPPED, LOGIC TRIP RELAY IS DE-ENERGIZE TO ACTUATE BECOMES 1/2 ON REMAINING CHANNELS	
2.4.1.1	SW. LR/430	CONTACTS OPEN	LOW SIGNAL TO PRESSURIZER LEVEL RECORDER	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	
2.4.1.2	SW. LR/430	CONTACTS CLOSED	PARALLELING OF LEVEL SIGNAL CURRENT LOOPS ACROSS LOOP RESISTORS	PERIODIC TESTING	NONE	LOGIC BECOMES 3/3 FOR PRESSURIZER HIGH LEVEL TRIP	
2.4.1.3	SW. LR/430	CONTACTS GROUNDED	CURRENT LOOP RESISTORS SHORTED, CAUSING HIGH LOOP SIGNALS TO TRIP BISTABLES, LEVEL CONTROLS VIA SW. L/432. LOW SIGNAL TO RECORDER	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	REACTOR TRIP ON 3/3 PRESSURIZER HIGH LEVEL TRIP CHANNELS	(SAME AS 2.1.1.1)
2.4.2.1	SW. L/432	CONTACTS OPEN	LOW SIGNAL TO LEVEL CONTROL DEVICES AND PRESSURIZER HEATER BREAKER CONTROLS, INTERCHANNEL ISOLATION AT SWITCH L/432	ANNUNCIATION, PERIODIC TEST	NONE REQUIRED	NONE	MANUAL LEVEL CONTROL REQUIRED
2.4.2.2	SW. L/432	CONTACTS CLOSED	PARALLELING OF LEVEL SIGNALS TO LEVEL CONTROL DEVICES AND PRESSURIZER HEATER CONTROLS, INTERCHANNEL ISOLATION AT LM-430, LM-431, LM-432	PERIODIC TEST	NONE REQUIRED	NONE	
2.4.2.3	SW. L/432	CONTACTS GROUNDED	LOSS OF NON-REG SUPL IV (R3/R4). LOW SIGNALS TO LEVEL CONTROL DEVICES AND PRESSURIZER HEATER BREAKER CONTROLS. INTERCHANNEL ISOLATION AT LM-430, LM-431, LM-432	ANNUNCIATION, PERIODIC TEST	NONE REQUIRED	NONE	MANUAL LEVEL CONTROL MAY BE REQUIRED.

EMERGENCY CORE COOLING SYSTEM

<u>Drawing No.</u>	<u>Title</u>
5178105	Pressurizer & Pressurizer Relief Tank System
5178110	Reactor Coolant Pump Seal Water System
5178135	Volume Control & Charging System
5178136	Volume Control & Charging System
5678769	Safety Injection System (old P&ID)
5149180	Logic Diag. - Sequencer Logic Diagram
5102165	One Line Diag. - 480 V MCC-1 Front
5102166	One Line Diag. - 480 V MCC-1 Rear
5102169	One Line Diag. - 480 V MCC-2A Front & Rear
5102173	One Line Diag. - Main
5146828	One Line Diag. - Main
5149348	One Line Diag. - 125 VDC System #2
5130351	Elementary - 4.16 KV Busses Undervoltage Relays
5150876	Elementary - 4.16 KV Busses Undervoltage & Generator Underfrequency Relays
455429	Elementary - Station Sen. Trans 3 450 VACB
455431	Elementary - Bustle 2-3 480 V ACB
455369	Elementary - MOV 1100B, D
455371	Elementary - MOV 356, 7, 8
5102170	One Line - 480 V MCC3 Front
5102171	One Line - 480 V MCC3 Rear
5148063	One Line - SWGR 2 & 3
5150626	Elementary - G8A, G8B
5151028	Elementary - MOV 1100C
5151906	480 V SWGR3 125 VDC Control
63715-9	Elementary - Safety Injection System
SD-S01-580	System Desc. - Safety Injection, Recirculation and Containment Spray
SD-S01-590	System Desc. - Safeguard Load Sequencing
NUS Report	NUS 1792, Single Failure Analysis, SONGS 1, Emergency Core Cooling System dated December 1976, submitted by letter from SCE (K. P. Baskin) to NRC (A. Schwencer) dated December 21, 1976

SOUTHERN CALIFORNIA EDISON CO.
SONGS, UNIT 1
AFWS Single Failure Analysis

AUXILIARY FEEDWATER SYSTEM (AFWS) SINGLE FAILURE ANALYSIS
SONGS UNIT 1

IDENTIFICATION ITEM TRAIN COMPONENT	FAILURE MODE	LOCAL EFFECTS INCLUDING DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISION(S)	EFFECTS UPON AFWS	REMARKS AND OTHER EFFECTS
27 B Vital Bus No. 5	Fails to supply power	Complete loss of AFW flow indication In Train B AFW - Loss of S/G water level instrumentation - Loss of status indication - Loss of AFW initiation logic. - G10W pump suction pressure automatic protection tripped - Loss of G10W pump discharge pressure automatic operation interlock - Loss of FCVs control (F.O.) - Loss of G10W pump discharge valve (CV3110) control (F.O.)	Control Room Alarm, Indication	Redundant Train, with combined G10 and G10S capa- city for FWLB (upstream of checks valves)	Train B initiation not provided automatically when S/G's at low level condition; loss of flow equalization capability for FWLB (upstream of check valves)	G10W pump is still avail- able by manual operation from Control Room. (Ref. 5159826, 5151027, 5159843). Train A is still available.
28 B 125 Vdc Bus No. 2	Fails to supply power	Same as Vital Nis No. 5 above, plus: - Loss of G10W pump control - Loss of G10W pump discharge valve (CV3110) control (Power Failure Interlock closes valve if V. B. No. 5 energized).	Control Room Alarm, Indication	Redundant Train	Train B controls in- operable.	G10W pump could be started from 4160V Swgr breaker, but without electrical fault protection since it requires external control power; CV3110 can be oper- ated locally at valve. (Ref. 5145828, 5151027) Train A is still available.
29 B 480V MCC No.2, 2A, or 2B	Fails to supply power	No AFW effect	Control Room Status	None Required	None	(Reference: 5146828).
30 B 480V MCC No.2	Fails to supply power	No AFW effect	Control Room Alarm, Status, Indication	None Required	None	(Reference: 5146828), 5148063, 5150885)
31 B 4160V Bus No. 2	Fails to supply power	In Train B AFW: - Loss of G10W Pump	Control Room Alarm, Status, Indication	Redundant Train	Inoperability of Train B pumping capability.	(Reference: 5146828, 5102163, 5130351, 5150876). Train A is still available.

SOUTHERN CALIFORNIA EDISON CO.
 SONGS, UNIT 1
 AFW Single Failure Analysis

AUXILIARY FEEDWATER SYSTEM (AFWS) SINGLE FAILURE ANALYSIS
 SONGS UNIT 1

IDENTIFICATION			FAILURE MODE	LOCAL EFFECTS INCLUDING DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISION(S)	EFFECTS UPON AFWS	REMARKS AND OTHER EFFECTS
ITEM	TRAIN	COMPONENT						
32	B	AFW Flow Indication (Loop 3453, 3454 or 3455)	Flow Low (Output Low)	Inoperability of flow equalization capability	Periodic Testing; Control Room Indication	Combined G10 & G10S Pumps capacity (Redundant Train)	Inoperability of flow equalization capability.	Operator would use Train B indication to balance flow under line break-pressurized S/G's scenario. Balancing need can be avoided by running both G10 and G10S pumps together. Indication devices include: FTH3453, FYV3453B, FYQ3453B, FYA3453, FIL3453, FYV3453A, FYQ3453A, FYS3453A, F13453, FYI3453, FTH3454, FYV3454B, FYQ3454B, FYA3454, FTL3454, FYV3454A, FYQ3454A, FYS3454A, F13454, FYI3454, FTH3455, FYV3455B, FYQ3455B, FYA3455, FTL3455, FYV3455A, FYQ3455A, FYS3455A, F13455, FYI3455 (Ref. 451876, 5159843) NOTE: EQ is required. Train A is still available.
			Flow High (Output High)	Inoperability of flow equalization capability	Control Room Indication; Periodic Testing	Combined G10 & G10S Pumps capacity Redundant Train	Inoperability of flow equalization capability.	

ENGINEERED SAFETY FEATURES SINGLE FAILURE ANALYSIS

SAN ONOFRE NUCLEAR GENERATING STATION

UNIT 1

FEBRUARY 1989

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ENGINEERED SAFETY FEATURES SINGLE FAILURE ANALYSIS
SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 1

I. INTRODUCTION:

- A. 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.
- B. Previous single failure analyses (submitted per SCE letter dated December 21, 1976 to the NRC) were 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. However, these analyses did not evaluate the single failure susceptibility of the containment isolation or main feedwater isolation functions associated with emergency core cooling system (ECCS) operation during a LOCA or secondary system rupture, respectively. Subsequently, containment isolation was reviewed as part of Systematic Evaluation Program Topic VI-4.
- C. The Auxiliary Feedwater (AFW) system was previously identified as susceptible to single active failures during postulated secondary system pipe ruptures. Correction of the AFW single failure susceptibilities was performed during the Cycle 10 refueling outage.
- D. The Reactor Coolant System (RCS) Overpressure Mitigation System (OMS), which provides protection of the RCS pressure boundary at low temperatures, had not been previously evaluated for single failure susceptibility.

II. SCOPE:

- A. A review of the previous ECCS Single Failure Analysis against the resulting design changes was performed to verify that the identified single failure susceptibilities have been corrected.
- B. A module-level failure modes and effects analysis of the Containment Isolation function was performed from input instrumentation through final actuated devices, including vital/regulated bus/DC system dependencies, for function during a LOCA.

C. (Deleted)

D. A module-level failure modes and effects analysis of the Overpressure Mitigation function was performed from input instrumentation through final actuated devices, including vital/regulated bus/DC system dependencies, for function in response to RCS overpressure challenges during reactor shutdown conditions.

E. A module-level failure modes and effects analysis of the Auxiliary Feedwater function, including interlocks to prevent waterhammer, was performed for the plant configuration following completion of single failure modifications during the Cycle 10 refueling outage.

In addition, because of event-specific safety analysis requirements and potential single failure impacts, an event-specific single failure response evaluation was performed in Revision 0 of this analysis for the Main Feedwater Isolation function, the integrated response of the Auxiliary Feedwater and Reactor Protection Systems, and the time-dependent failure response of Swing 480 V SWGR #3 / MCC-3. In Revision 1 of this analysis, the event-specific analysis of Swing 480 V SWGR #3 / MCC-3 was split into a short-term impact evaluation (Charging System recirculation realignment) and a long-term impact evaluation (re-energizing Swing 480 V SWGR #3 / MCC-3), and an evaluation of the time-dependent failure response of Main Feedwater Pump realignment and interlocks was added.

III. METHODOLOGY:

A. To the extent practical, the failure modes and effects analyses for the ESF functions were performed using notation, format and assumptions consistent with the Reactor Protection System Single Failure Analysis submitted to the NRC on March 11, 1987. 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:

- 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 ESF 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 ESF output functions 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 ESF output and interface (including isolation device) failure combinations were bounded. The failure modes 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 (or OUTPUT HIGH OR LOW)
 - o Valves: OPEN OR CLOSED
 - o Pumps: TRIPPED OR UNTRIPPED
 - 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 (eg. postulated failures of the pressure regulating valve or solenoid operated pilot valve for a pneumatically activated isolation valve are bounded by failures of the isolation valve itself).
 - d. The failure modes for any channel-common devices (eg. selector switches, transfer switches, auctioneering or signal comparison devices) were conservatively considered to result in channel-common failures, if unisolated channel signals were present in the device and channel separation and identity were not maintained through the device. The postulated failure modes were:
 - o OPEN (at all input channels)
 - 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 ESF actuation could be initiated from any applicable plant condition.
 - f. The only applicable ESF actuation instrumentation which have control functions are associated with the Reactor Protection System and have been previously analyzed. Accordingly, a control/protection system interaction (multiple failure) analysis was not performed as part of the ESF evaluation.
2. The vital and regulated bus system and the auxiliary power system were previously analyzed as part of the

RPS Single Failure Analysis and ECCS Single Failure Analysis, respectively.

B. Because the ESF systems include final actuated devices different than the RPS (eg. pumps and valves vs. scram breakers), the following additional criteria were applied:

1. Power-operated valve/actuator mechanical failures (eg. as-is due to stem binding), were considered as single active failures separate from those of the actuating circuitry and motive power source where local manual actuation could be credited for performing the ESF function within the required time. Per Section III.A.1 above, the actuator control circuit was considered as a single entity (black box) if no interface devices (such as interlocks, overrides, or selector switches) were in the circuit. Motor breaker failures were specifically addressed: for example, those which affect MOV operation (eg. as-is) as well as those which cause loss of the supply bus (eg. input short).
2. Manually-operated valve single failures were considered: for example, due to operator error or mechanical failure, respectively. Valves subject to the valve locking program were so noted under "remarks". Consistent with current NRC criteria, check valves were considered as active devices (ie, as subject to single active failure) only for the containment isolation and reactor coolant pressure boundary functions.
3. For containment isolation, penetration isolation redundancy was considered relative to the criteria of Standard Review Plan Section 6.4.

C. Notation / Numbering

Each SFA item in the module-level FMEAs for containment isolation and OMS was assigned a unique item number, made up of [system].[train].[device].[failure model] similar to the RPS-SFA. Train (or channel) common devices for a system were generally addressed following the items for each train; for example, in a 2-train, 2-channel system, item [system].3.[device].[failure model] would be a train-common device.

IV. SUMMARY OF RESULTS

A. Emergency Core Cooling System (ECCS)

1. Review of ECCS Single Failure Analysis (1976)

The 1976 ECCS Single Failure Analysis (SFA) evaluated the SONGS 1 systems required to mitigate the effects of a postulated Loss of Coolant Accident (LOCA), for

potential susceptibility to single failures; the systems evaluated included the safety injection, charging, containment spray and recirculation, component cooling water, salt water cooling and auxiliary power systems. The results of the 1976 analysis included several recommended modifications to eliminate potential single failure susceptibilities in these systems. For the current review, the modifications performed in response to the 1976 analysis were reviewed to determine their acceptability relative meeting the single failure criterion.

The single failure modifications performed as a result of the 1976 SONGS 1 single failure analysis were determined to have corrected the identified susceptibilities, with the exception of control redundancy for each of the recirculation flow control valves. Only one of the two control paths for each of these valves was provided with a seismically qualified air supply. However, this configuration was previously reviewed and accepted by the NRC in paragraph 4.25.2 of the Integrated Plant Safety Assessment for SONGS 1.

2. Swing 480 V SWGR #3 / MCC-3 Realignment, Single Failure Response Evaluation

In Revision 0 of this report, single failure susceptibilities were identified for those ESF functions in which a redundant post-accident load was powered from Swing 480 V SWGR #3/MCC-3 (ie, the Charging System recirculation realignment function). To address these findings, the applicable loads were reconnected to other sources, as discussed in item 3 below, eliminating the need for any Swing 480 V SWGR #3/MCC-3 loads before operator actions can be credited outside the control room.

In Revision 1 of this report, the realignment of Swing 480 V SWGR #3/MCC-3 was evaluated for the plant configuration following implementation of single failure modifications completed during the Cycle 10 refueling outage. The applicable events were evaluated with and without loss of offsite power, and failure timing before or after the applicable safety signals (SIS or SISLOP) for each of three possible initial alignments (the currently approved alignment to Bus #1C via Station Service Transformer (SST) #3, and potential alternate alignments to SWGR #1 or SWGR #2 via the 480 V bus tie breakers).

The single failure response of the Swing 480 V SWGR #3 / MCC-3 realignment was found to be acceptable for the existing Bus #1C/SST #3 initial alignment, subject to the specified operator actions from the control room and credit for manually tripping open breakers locally

at the switchgear. The single failure response for the potential alternate initial alignments (ie, to SWGR #1 or SWGR #2 via the 480 V bus tie breakers) was found to be acceptable, subject to the specified operator actions from the control room and credit for manually tripping and racking open breakers locally at the switchgear.

3. Charging System Recirculation Realignment, Single Failure Response Evaluation

In Revision 0 of this report, single failure susceptibilities of the charging system recirculation realignment function were identified relating to the Swing 480 V SWGR #3/MCC-3 power for charging pump suction valve MOV-1100D and cold leg recirculation isolation valve MOV-358. To address these findings, MOV-1100D was reconnected to a dedicated Train B source (ie, MCC-2), and MOV-358 was reconnected to the MOV-850C Uninterruptible Power Supply (UPS), eliminating the need for Swing 480 V SWGR #3/MCC-3 loads until operator action can be credited outside the control room.

In Revision 1 of this report, the realignment of the Charging System for recirculation was evaluated on the basis that operator actions could not be credited outside the control room within the time frame required. (The longer term actions to re-energize Swing 480 V SWGR #3/MCC-3 for charging of the MOV-358 UPS battery are addressed in item 2 above.) The plant configuration following implementation of the above discussed modifications during the Cycle 10 refueling outage was evaluated for applicable events with and without loss of offsite power, and failure timing before or after the applicable safety signals (SIS or SISLOP) for each train as the pre-selected one (ie, the train whose pump starts on SIS or SISLOP).

The single failure response of Charging System recirculation realignment was found to be acceptable, with no restrictions on preferred charging alignment.

4. Main Feedwater Pump Realignment and Interlocks, Single Failure Response Evaluation

The valves, controls and interlocks for Main Feedwater Pump realignment were evaluated for single failures occurring before the applicable safety signal (SIS or SISLOP), after the safety signal but before valve realignment is completed, after valve realignment is completed but before safety signal reset, and after safety signal reset.

The single failure response of the Main Feedwater Pump realignment and interlocks was found to be acceptable.

B. Containment Isolation

The evaluation of the containment isolation function included an analysis of the containment isolation actuation instrumentation relative to applicable IEEE criteria as well as the isolation provisions for each containment penetration relative to Standard Review Plan criteria.

No single failure susceptibilities were identified in the containment isolation actuation system, although several containment penetrations were determined to have isolation valve configurations which are not consistent with Standard Review Plan 6.4 redundancy criteria. However, each of these penetrations was previously evaluated against the applicable criteria and determined to provide an acceptable level of safety by the NRC Integrated Plant Safety Assessment (IPSAR) for SONGS 1.

C. Main Feedwater Isolation

Main feedwater isolation is required within 10 seconds following a Safety Injection Signal (plus bus voltage recovery delays during load sequencing) to terminate secondary side mass addition to the steam generators and to backup the safety injection realignment valves, in both the MSLB and LOCA accident analyses.

In Revision 0 of this report, a failure mode and effects analysis was performed on the Main Feedwater Isolation function of the Emergency Core Cooling System (ECCS). Based on these FMEA results, which identified cross-train power and control dependencies, an event-specific single failure response evaluation was performed which explicitly accounted for common cause effects and the event-dependent alignment of 480 V MCC #3 (which powered one of the isolation valves). The Revision 0 evaluation identified single failure and environmental common-cause susceptibilities which could have resulted in failure to isolate main feedwater during LOCA and MSLB events. To address these findings, the MOV and solenoid valve power was reconnected to as necessary to provide train-alignment with the respective safety signals, the actuators and cabling were replaced with environmentally qualified components, backup nitrogen was provided for each main feedwater flow control valve (in accordance with a Cycle 9 outage water hammer commitment) and redundant solenoid valves were added for each main feedwater bypass flow control valve.

In Revision 1 of this report, an event-specific single failure response evaluation was performed for the plant configuration following completion of single failure and other related modifications during the Cycle 10 refueling outage. Four specific main steam line break event scen-

arios (inside containment, with and without loss of off-site power, and outside containment, with and without loss of offsite power), and two LOCA scenarios (LOCA with and without loss of offsite power) were evaluated, considering credible common-cause failures resulting from the event plus a concurrent single active failure.

The single failure response of the Main Feedwater Isolation ECCS function was found to be acceptable without further reliance on operator action. This evaluation confirmed that there are no remaining single failure susceptibilities in this ECCS function.

D. Overpressure Mitigation

The evaluation of the Overpressure Mitigation function included an analysis of the OMS instrumentation (which is different than the normal PORV control system instrumentation) as well as the pressurizer power operated relief valves and associated block valves.

No single failure susceptibilities were identified. However, a potential single or environmental common-cause failure of the dedicated shutdown (DSD) control transfer switches for one train of PORV/block valve was discovered. As corrective action, the 120 VAC circuit breakers for the associated pneumatic control transfer solenoid valves will be maintained open by administrative control at all times except during DSD testing or operation.

E. Auxiliary Feedwater / Reactor Protection Systems

In Revision 0 of this report, the proposed Cycle 10 configuration of the AFWS and RPS (based on scoping studies completed at the time) was evaluated with both a failure modes and effects analysis and an event-specific single failure response evaluation.

In Revision 1 of this report, the plant configuration following completion of final engineering and implementation of the actual design changes was evaluated, including the interlocks which were added to the AFWS design to prevent exceeding water hammer flow limits.

The single failure response of the AFWS and RPS was found to be acceptable subject to the specified operator actions in the control room (to close a diesel generator breaker, equalize flow to the three steam generators, or isolate the blowdown sample lines).

V.A EMERGENCY CORE COOLING SYSTEM (ECCS)

Four evaluations were performed for the emergency core cooling functions of the ECCS:

- a. A review of the mitigating measures implemented as a result of the single failure susceptibilities identified in the 1976 SONGS 1 single failure analysis for Loss of Coolant Accidents (submitted by SCE (K. P. Baskin) letter to the NRC (A. Schwencer) on December 21, 1976), and
- b. An event-specific single failure response evaluation of those ECCS functions in which a redundant post-accident load is powered from Swing 480 V Switchgear (SWGR) #3 or MCC-3.
- c. An event-specific single failure response evaluation of Charging System realignment for recirculation.
- d. An event-specific single failure response evaluation of Main Feedwater Pump realignment and interlocks.

The single failure modifications performed as a result of the 1976 SONGS 1 single failure analysis were determined to have corrected the identified susceptibilities, with the exception of control redundancy for each of the recirculation flow control valves. Only one of the two control paths for each of these valves was provided with a seismically qualified air supply. However, this configuration was previously reviewed and accepted by the NRC in paragraph 4.25.2 of the Integrated Plant Safety Assessment for SONGS 1.

The event-specific single failure evaluation of Swing 480 V SWGR #3/MCC-3 performed in Revision 0 of this report identified time and event-dependent single failure susceptibilities. In Revision 1, these time and event-dependent evaluations were expanded to cover alternate alignments of Swing 480 V SWGR #3/MCC-3, and additional features of the ECCS realignment functions for the plant configuration following completion of single failure modifications during the Cycle 10 refueling outage.

These evaluations verified that there are no remaining single failure susceptibilities in these ECCS functions.

V.C MAIN FEEDWATER ISOLATION FUNCTION OF THE ECCS

Main feedwater isolation is required within 10 seconds following a Safety Injection Signal (plus bus voltage recovery delays during load sequencing) to terminate secondary side mass addition to the steam generators and to backup the safety injection realignment valves, in both the MSLB and LOCA accident analyses.

In Revision 0 of this report, a failure mode and effects analysis was performed on the Main Feedwater Isolation function of the Emergency Core Cooling System (ECCS). Based on these FMEA results, which identified cross-train power and control dependencies, an event-specific single failure response evaluation was performed which explicitly accounted for common cause effects and the event-dependent alignment of 480 V MCC #3 (which powered one of the isolation valves). The Revision 0 evaluation identified single failure and environmental common-cause susceptibilities which could have resulted in failure to isolate main feedwater during LOCA and MSLB events. To address these findings, the MOV and solenoid valve power was reconnected to as necessary to provide train-alignment with the respective safety signals, the actuators and cabling were replaced with environmentally qualified components, backup nitrogen was provided for each main feedwater flow control valve (in accordance with a Cycle 9 outage water hammer commitment) and redundant solenoid valves were added for each main feedwater bypass flow control valve.

In Revision 1 of this report, an event-specific single failure response evaluation was performed for the plant configuration following completion of single failure and other related modifications during the Cycle 10 refueling outage. Four specific main steam line break event scenarios (inside containment, with and without loss of offsite power, and outside containment, with and without loss of offsite power), and two LOCA scenarios (LOCA with and without loss of offsite power) were evaluated, considering credible common-cause failures resulting from the event plus a concurrent single active failure.

The single failure response of the Main Feedwater Isolation ECCS function was found to be acceptable without further reliance on operator action. This evaluation confirmed that there are no remaining single failure susceptibilities in this ECCS function.

SAN ONOFRE NUCLEAR GENERATING STATION

UNIT 1

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS

REVISION 1

RECORD OF REVISIONS

REVISION 0: Original issue.

REVISION 1: Changes to reflect modifications to the nuclear instrument system (DCPs 3003), Vital Bus 4 alignment (DCP 3400.13, PFC 1-87-3465, DCPs 3003), and the steam/feedwater mismatch scram (DCPs 3496); addition of references for loss of flow analysis and event-specific RPS/AFW response analysis; insertion of the applicable data in lieu of the existing "same as" entries for the bus power supply items in each scram function table, to improve the readability of the automated sort for power supply dependency provided as Table 8-2.

V.E AUXILIARY FEEDWATER / REACTOR PROTECTION SYSTEMS

The proposed post-Cycle 10 configuration of the Auxiliary Feedwater and Reactor Protection systems (AFWS and RPS) were developed through an iterative process of conceptual design, event-specific single failure response and design basis transient analyses. An event-specific analysis of the integrated AFWS/RPS response to single failures is provided in Appendix V.E.1. A failure modes and effects analysis (FMEA) is provided in Appendix V.E.2.

The analyses demonstrate that the proposed design of these systems meet the single failure criterion.

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REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS

I. SCOPE

The Single Failure Analysis of the SONGS 1 Reactor Protection System (RPS) was performed per the applicable criteria of IEEE Standard 279-1971, including control/protection system interaction (multiple failure) criteria, in four sequential, overlapping, parts:

- o A single failure analysis of each scram function including interfaces and power supply dependencies
- o A single failure analysis of the scram matrix and breakers, including the manual scram function
- o A single failure analysis of the channelized vital and regulated bus system common to the scram functions, and
- o A control/protection system interaction evaluation which analyzed the effect of initiating plus concurrent (ie. multiple) failures.

II. CRITERIA

- A. The Single Failure Analysis of the SONGS 1 RPS was 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:
1. 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 channel output 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 channel output functions were so addressed.
 2. The failure modes for each channel device which result in the most limiting effects or combination of effects were selected so that all pertinent channel output and interface (including isolation device) failure combinations were bounded. The failure modes 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 (or OUTPUT HIGH or LOW)

In addition, single pole or phase GROUNDS were postulated in all grounded circuits.

3. 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 (eg. the device identified as COMP CH I consists of several tag-numbered reactor coolant temperature signal processing devices in a portion of Variable Low Pressurizer Pressure Scram Channel I).
 4. The failure modes for channel-common devices (eg. selector switches, transfer switches, auctioneering or signal comparison devices) were conservatively considered to result in channel-common failures, if unisolated channel signals were present in the device and channel separation and identity were not maintained through the device. The postulated failure modes were:
 - o OPEN (at all input channels)
 - o SHORT (of all like poles or phases, resulting in paralleling of all inputs)
 - o GROUND (of all poles or phases)
 5. It was assumed that failures could be initiated from any applicable reactor power. Accordingly, availability of trips as a function of power was specifically addressed.
 6. For the control/protection system interaction (multiple failure) analysis, initiating failures which cause control actions were considered concurrent with a second random failure, including that of channel-common and interface devices which could result in additional, multiple, channel failures.
- B. For the control/protection system interaction (multiple failure) analysis, certain additional scoping criteria were applied to limit the failure combinations considered to those of interest. These scoping criteria are as detailed in the notes for Table 9.

III. NOTATION

A. Each single failure and control/protection system interaction failure pair was assigned a unique identifying number to facilitate compilation and review of the analysis.

1. The item numbers in Tables 1 through 8 of the analysis consist of :

<section #>. <channel #>. <device>. <failure mode>

Channel-common devices were assigned channel numbers one larger than the number of channels, so as to follow the channel-specific devices.

2. The item numbers in Table 9 of the analysis consist of:

<9>. <section #>. <failure mode>. <device 1>. <device 2>

where <section #> is the Table number corresponding to the applicable control/protection system instrumentation, <device 1> is the initiating failure and <device 2> is the concurrent failure.

B. Actuation at the channel level is referred to as a TRIP, and that at the system level as a SCRAM.

C. The notation used for scram function logic in the analysis is number of channels TRIPPED for SCRAM, over total number of channels of that function (eg. 2/3).

IV. SUMMARY OF RESULTS

All scram functions and permissives were found to be acceptable with the following exceptions or amplifications:

A. Relative to the single failure analysis criteria described above:

1. The susceptibilities of the Steam/Feedwater Flow Mismatch Scram identified in Revision 0 of this analysis have been corrected by the modifications performed as part of DCPs 3496. However, these modifications also installed a P-8 permissive, which disables this scram function below 50% power. Consequently, as described in Reference E.1 of this analysis, the High Pressurizer Level Scram (with reduced setpoint per Proposed Change Number 165 to the San Onofre Unit 1 Technical Specifications) must still be credited to back up the mismatch scram under low power conditions.

2. For the Pressurizer Pressure Scrams, certain control/protection system interactions (multiple failures) could result in loss of all three channels of pressurizer pressure for the Reactor Protection System and Safeguards Load System Sequencer #1 (SEQ #1). However, the electrically and physically separate pressurizer pressure input channels for SEQ #2 would remain unaffected. For pressurizer pressure instrumentation control/protection interactions involving low pressure (eg. PORVs opened), SEQ #2 would remain available to initiate a low pressurizer pressure scram and safety injection, if required. For pressurizer pressure instrumentation control/protection interactions involving high pressure (eg. pressurizer heaters energized), automatic protective action would not be required and SEQ #2 would remain available to provide unaffected channels of indication to permit operator action as credited after 30 minutes.

3. For the Pressurizer Level Scram, certain control/protection system interactions (multiple failures) involving inter-channel failures of the channel-common level recorder selector switch were predicted to result in loss of all three channels of control room indication concurrent with an uncontrolled increase in level. Inter-channel failures of channel-common recorder selector switches, which were found to have acceptable consequences in all other cases analyzed, were conservatively postulated in the single failure analysis due to the presence of unisolated channel signals and loss of channel identity at the selector switch output. However, these switches have been previously evaluated by Systematic Evaluation Program Topic VII-I.A and determined to provide adequate separation to preclude such failures.

B. A review was also made of the acceptability of the spatial (RCS loop or steam generator) distribution of inputs to the RPS for loop-specific events not covered by the control/protection system interaction evaluation. The loop-distributed inputs and associated scram functions (RCS T-average and Delta-T inputs to the Variable Low Pressurizer Pressure Scram; RCS low flow input to the RCS Low Flow Scram; and the steam and feedwater flow inputs to the Steam/Feedwater Flow Mismatch Scram) were found to be acceptable with the following exceptions or amplifications:

1. The loop-specific susceptibilities of the Steam/Feedwater Flow Mismatch Scram for feedwater line break events downstream of the associated feed flow element, identified in Revision 0 of this analysis, have been corrected by the modifications performed as

part of DCPs 3496. However, a further event-specific analysis was performed for the mismatch scram as part of the RPS/AFW integrated response evaluation in Reference E.1 of this analysis, which identified an additional susceptibility of the mismatch scram for single loop loss of feedwater events. In such an event, only one steam generator is affected, so that coincidence of a second mismatch scram channel can not occur even in the absence of a single failure. As described in Reference E.1 of this analysis, the High Pressurizer Level Scram (with reduced setpoint per Proposed Change Number 165 to the San Onofre Unit 1 Technical Specifications) is credited to backup the mismatch scram for such events.

2. For the RCS Low Flow Scram, the one channel provided per RCS loop is backed up by the Reactor Coolant Pump (RCP) breaker auxiliary contact scram for any loss of flow event in the FSA design basis and for the RCP locked rotor event (evaluated under Systematic Evaluation Program Topic XV-7), because bus undervoltage, motor overcurrent or other causes of breaker trip would occur. However, for a sheared RCP shaft event, RCP breaker trip would not occur and single failure of the RCS flow transmitter or associated scram channel in the affected RCS loop would disable the single loop loss of flow protection of the RPS. Because of this single failure susceptibility, the sheared RCP shaft event has been reanalyzed assuming loss of the RCS Low Flow Scram. Above the P-8 permissive setpoint (50% power), the power-to-flow mismatch and fuel heat-up in this event would be terminated as needed by the Variable Low Pressure Scram (via the channels in the unaffected loops). As discussed in Reference D.1 of this analysis, it was determined that peak RCS pressure and fuel clad temperature would remain within the applicable acceptance criteria, provided that the Variable Low Pressure Scram setpoint coefficients have been adjusted when the reduced T-average program is in use. Below the P-8 permissive setpoint, the single loop loss of flow scrams are bypassed and automatic protection for this event is not required.

V. REFERENCES

A. Mismatch Scram Failures

1. Westinghouse (L. E. Elder) letter SCE-86-581 to SCE (J. L. Rainsberry) dated August 28, 1986, subject: "Feedline Break/Loss of Normal Feedwater Sensitivities"
2. SCE (M. O. Medford) letter to NRC (G. E. Lear) dated October 31, 1986, subject: "Pressure Transmitter 459 Failure"

B. Pressurizer Pressure Control Interactions

1. SCE (K. P. Baskin) letter to NRC (A. Schwencer) dated December 21, 1976, subject: "Single Failure Analysis" (for SONGS 1 ECCS)

C. Pressurizer Level Control Interactions

1. NRC (H. R. Denton) letter to SCE (K. P. Baskin) dated December 18, 1986, subject "Final Integrated Plant Safety Assessment Report for the San Onofre Nuclear Generating Station, Unit 1 (NUREG-0829)"

D. RCS Low Flow Scram Failure

1. Westinghouse (L. E. Elder) letter SCE-87-510 to SCE (J. L. Rainsberry) dated February 24, 1987, subject: "Reactor Coolant Pump Shaft Break Analysis"

E. Steam/Feedwater Flow Mismatch Scram

1. Event Specific Single Failure Response Evaluation, M39419, Part 1, "Auxiliary Feedwater/Reactor Protection Systems Integrated Response"

TABLE 1: PRESSURIZER PRESSURE SCRAMS

- REFERENCES:
- A. SYSTEM DESCRIPTIONS:
 - SD-S01-390 PRIMARY PROCESS INSTRUMENTATION
 - SD-S01-400 ROD CONTROL SYSTEM
 - SD-S01-570 REACTOR PROTECTION SYSTEM AND PERM.
 - SD-S01-590 SEQUENCER SYSTEM
 - B. DRAWINGS:
 - 63716
 - 63720

TABLE 2: PRESSURIZER LEVEL SCRAM

- REFERENCES:
- A. SYSTEM DESCRIPTIONS:
 - SD-S01-390 PRIMARY PROCESS INSTRUMENTATION
 - SD-S01-570 REACTOR PROTECTION SYSTEM AND PERM.
 - B. DRAWINGS:
 - 63717

TABLE 3: TURBINE TRIP SCRAM

- REFERENCES:
- A. SYSTEM DESCRIPTIONS:
 - SD-S01-270 TURBINE CONTROL SYSTEM
 - SD-S01-570 REACTOR PROTECTION SYSTEM AND PERM.
 - B. DRAWINGS:
 - N1541 Sh 2
 - 5112259

TABLE 4: NIS SCRAMS AND PERMISSIVES

- REFERENCES: A. SYSTEM DESCRIPTIONS:
SD-S01-380 NUCLEAR INSTRUMENT SYSTEM
SD-S01-400 ROD CONTROL SYSTEM
SD-S01-570 REACTOR PROTECTION SYSTEM AND PERM.
- B. DRAWINGS:
5150625 W 2D33793
5102173 W 2D33794
63714 W 2D33795
W 2D33791 W 1872E50 (Sh 2 - 9)

- NOTES: a. SOURCE RANGE CHANNELS (NE-1201, NE-1202) AND PERMISSIVES NOT ASSOCIATED WITH SAFETY FUNCTIONS CREDITTED IN THE TRANSIENT ANALYSES ARE NOT SPECIFICALLY EVALUATED, SINCE THEIR IMPACTS ON THE SAFETY FUNCTIONS ARE BOUNDED BY THE POSTULATED FAILURES OF THE REMAINING DEVICES.
- b. CHANNEL NOTATION FOR THIS ANALYSIS IS BASED ON POWER SUPPLY (TO FACILITATE AUTOMATED SORT FOR SECTIONS 8 AND 9) AS FOLLOWS:
- | | |
|-------------------|-------------------------------|
| POWER CHANNEL I | NIS CHANNEL NE-1205 (NE-1203) |
| POWER CHANNEL II | NIS CHANNEL NE-1207 (NE-1204) |
| POWER CHANNEL III | NIS CHANNEL NE-1206 |
| POWER CHANNEL IV | NIS CHANNEL NE-1208 |
- c. DEVICES FOR INTERMEDIATE RANGE CHANNELS (NE-1203 AND NE-1204) ARE ADDRESSED IN SECTIONS 4.5 AND 4.6 RESPECTIVELY, AND CHANNEL-COMMON DEVICES, INCLUDING BOTH COINDICENTORS, IN SECTION 4.7.
- d. THE REDUNDANT A AND B COINCIDENTORS ARE INSTALLED IN SONGS 1 AS PART OF THE RPS, WHICH IS WHOLLY TRAIN A. WESTINGHOUSE DRAWING NOTATION FOR "TRAIN A" AND "TRAIN B" COINCIDENTORS IS THEREFORE NOT APPLICABLE TO THIS INSTALLATION.
- e. FAILURE MODES OF THE ROD CONTROL RATE AMPLIFIER ARE NOT SPECIFICALLY ADDRESSED BECAUSE THE ANALOG INPUT SIGNALS ARE ISOLATED AT THE OUTPUT OF EACH NIS CHANNEL, AND THE OUTPUT ONLY AFFECTS ROD SPEED SELECTION.

- f. THE DROPPED-ROD ROD-STOP IS EXPLICITLY EVALUATED IN THIS ANALYSIS BECAUSE THIS FUNCTION IS CREDITTED IN THE TRANSIENT ANALYSES (FOR MULTIPLE DROPPED ROD EVENTS) APPLICABLE TO THE REPLACEMENT NIS INSTALLED BY DCPs 3003. TURBINE RUN-BACK, WHICH CAN ALSO BE CREDITTED FOR DROPPED ROD EVENTS FROM HIGH POWER ON THE NORMAL T-AVERAGE PROGRAM, IS ACTUATED FROM THE DROPPED-ROD ROD-STOP OUTPUTS.
- g. ONLY ONE NIS CHANNEL CAN BE BYPASSED AT A TIME, DUE TO USE OF KEYED BYPASS SWITCHES, ALARMS, AND ADMINISTRATIVE CONTROLS.
- h. ONLY ONE COINCIDENTOR (A OR B) CAN BE BYPASSED AT A TIME, DUE TO USE OF KEYED BYPASS SWITCHES, ALARMS, AND ADMINISTRATIVE CONTROLS.

TABLE 5: RCS LOW FLOW SCRAMS

REFERENCES: A. SYSTEM DESCRIPTIONS:
SD-S01-390 PRIMARY PROCESS INSTRUMENTATION
SD-S01-570 REACTOR PROTECTION SYSTEM AND PERM.

B. DRAWINGS:
63714

NOTES: a. REACTOR COOLANT PUMP BREAKER AUXILIARY CONTACT-
INITIATED SCRAMS ARE ADDRESSED IN SECTION 7 OF THIS
ANALYSIS

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS

SAR UNDFRE UNIT 1

SECTION 1: PRESSURIZER PRESSURE SCRAMS

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
1.1.01.1	PT 430	SIGNAL HIGH	HIGH PRESSURE SIGNAL TO CHANNEL I FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE BISTABLES, RECORDER VIA SW. P/430, PRESSURE CONTROL SYSTEM VIA SW. P/432, AND INDICATOR.	ANNUNCIATION, CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF FIXED HIGH PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS. CHANNEL I OF VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS.	MAY DE-ENERGIZE PRESSURIZER HEATERS, OPEN PORV 545, AND CAUSE REPOSITIONING OF PCV-430C, -430H IF CONNECTED VIA SW. P/432. SEE ECCS SFA FOR SEQ EFFECTS
1.1.01.2	PT 430	SIGNAL LOW	LOW PRESSURE SIGNAL TO CHANNEL I FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE BISTABLES, RECORDER VIA SW. P/430, PRESSURE CONTROL SYSTEM VIA SW. P/432, AND INDICATOR.	ANNUNCIATION, CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF FIXED HIGH PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS. CHANNEL I OF VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	MAY ENERGIZE PRESSURIZER HEATERS AND CAUSE REPOSITIONING OF PCV-430C, -430H IF CONNECTED VIA SW. P/432. SEE ECCS SFA FOR SEQ EFFECTS
1.1.02.1	PI 430	OPEN	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	IN PT 430 CURRENT LOOP (OTHER EFFECTS SAME AS 1.1.1.2)
1.1.02.2	PI 430	SHORT	NO EFFECT	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	LOSS OF CHANNEL I INDICATION
1.1.03.1	PC 430K	INPUT OPEN	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)
1.1.03.2	PC 430K	INPUT SHORT	LOSS OF CAPABILITY TO ACTUATE TRIP RELAY (PC-430XX)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF FIXED HIGH PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND VARIABLE LOW PRESSURE TRIPS UNAFFECTED	
1.1.03.3	PC 430K	TRIPPED	CHANNEL I FIXED HIGH PRESSURE TRIP RELAY ACTUATED (PC-430XX)	ANNUNCIATION	NONE REQUIRED	CHANNEL I OF FIXED HIGH PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS, SEQ #1 AND VARIABLE LOW PRESSURE TRIPS UNAFFECTED	
1.1.03.4	PC 430K	AS-IS (UNTRIPPED)	(SAME AS 1.1.3.2)	(SAME AS 1.1.3.2)	(SAME AS 1.1.3.2)	(SAME AS 1.1.3.2)	
1.1.04.1	PC 430K-X	TRIPPED	(SAME AS 1.1.3.3)	(SAME AS 1.1.3.3)	(SAME AS 1.1.3.3)	(SAME AS 1.1.3.3)	
1.1.04.2	PC 430K-X	AS-IS (UNTRIPPED)	(SAME AS 1.1.3.2)	(SAME AS 1.1.3.2)	(SAME AS 1.1.3.2)	(SAME AS 1.1.3.2)	
1.1.05.1	Y 430B	OPEN	CHANNEL I FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIP RELAYS (PC-430XX, PC-430FX) ACTUATED	PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	SWITCH FAILURE OR OPERATOR ERROR, RELAYS ARE DE-ENERGIZE TO ACTUATE
1.1.05.2	Y 430B	SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	
1.1.06.1	PC 430B	INPUT OPEN	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.2.1)
1.1.06.2	PC 430B	INPUT SHORT	LOSS OF CAPABILITY TO ACTUATE CHANNEL I INPUT TO SEQ #1	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF SEQ #1 PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #2 AND VARIABLE LOW PRESSURE AND FIXED HIGH PRESSURE TRIPS UNAFFECTED.	SEE ECCS SFA FOR SEQ EFFECTS
1.1.06.3	PC 430B	TRIPPED	CHANNEL I INPUT TO SEQ #1 ACTUATED	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF SEQ #1 PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS, SEQ #2 AND VARIABLE LOW PRESSURE AND FIXED HIGH PRESSURE TRIPS UNAFFECTED.	(SAME AS 1.1.6.2)
1.1.06.4	PC 430B	AS-IS (UNTRIPPED)	(SAME AS 1.1.6.2)	(SAME AS 1.1.6.2)	(SAME AS 1.1.6.2)	(SAME AS 1.1.6.2)	(SAME AS 1.1.6.2)
1.1.07.1	PC 430F	INPUT OPEN	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)
1.1.07.2	PC 430F	INPUT SHORT	LOSS OF CAPABILITY TO ACTUATE TRIP RELAY (PC-430FX)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED.	
1.1.07.3	PC 430F	TRIPPED	CHANNEL I, VARIABLE LOW PRESSURE TRIP RELAY ACTUATED (PC-430FX)	ANNUNCIATION	NONE REQUIRED	CHANNEL I OF VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	
1.1.07.4	PC 430F	AS-IS (UNTRIPPED)	(SAME AS 1.1.7.2)	(SAME AS 1.1.7.2)	(SAME AS 1.1.7.2)	(SAME AS 1.1.7.2)	

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT 1
SECTION 1: PRESSURIZER PRESSURE SCRAMS

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
1.1.08.1	PC 430F-X	TRIPPED	(SAME AS 1.1.7.3)	(SAME AS 1.1.7.3)	(SAME AS 1.1.7.3)	(SAME AS 1.1.7.3)	
1.1.08.2	PC 430F-X	AS-IS (UNTRIPPED)	(SAME AS 1.1.7.2)	(SAME AS 1.1.7.2)	(SAME AS 1.1.7.2)	(SAME AS 1.1.7.2)	
1.1.09.1	TC 400B						COMPONENT HAS BEEN DELETED
1.1.10.1	PI 400B	OPEN	LOW SETPOINT SIGNAL TO CHANNEL I VARIABLE LOW PRESSURE TRIP BISTABLE	CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL I OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	
1.1.10.2	PI 400B	SHORT	NO EFFECT	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	LOSS OF CHANNEL 1 VARIABLE LOW PRESSURE SETPOINT INDICATION
1.1.11.1	PM 430	INPUT OPEN	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	IN PT-430 CURRENT LOOP (SEE 1.1.1.2)
1.1.11.2	PM 430	INPUT SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 1.1.1.2)
1.1.11.3	PM 430	OUTPUT HIGH	HIGH PRESSURIZER PRESSURE SIGNAL TO PRESSURE CONTROLLER VIA SW. P/432	PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 1.1.1.1)
1.1.11.4	PM 430	OUTPUT LOW	LOW PRESSURIZER PRESSURE SIGNAL TO PRESSURE CONTROLLER VIA SW. P/432	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 1.1.1.2)
1.1.12.1	YE 430B	OUTPUT VOLTS HIGH	(SAME AS 1.1.1.1)	(SAME AS 1.1.1.1)	(SAME AS 1.1.1.1)	(SAME AS 1.1.1.1)	(SAME AS 1.1.1.1)
1.1.12.2	YE 430B	OUTPUT VOLTS ZERO	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)	(SAME AS 1.1.1.2)
1.1.13.1	TE 401A TYV 401A	SIGNAL HIGH	HIGH CHANNEL I T-AVG SIGNAL TO VARIABLE LOW PRESSURE TRIP SETPOINT CONTROLLER (PC-430F), RECORDER (TR-401-1) AND ROD CONTROL SYSTEM VIA SW. #1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	MAY CAUSE ROD INSERTION IF CONNECTED VIA SW. #1, LOOP A T-AVG T-H RTD
1.1.13.2	TE 401A TYV 401A	SIGNAL LOW	LOW CHANNEL I T-AVG SIGNAL TO VARIABLE LOW PRESSURE TRIP SETPOINT CONTROLLER (PC-430F), RECORDER (TR-401-1) AND ROD CONTROL SYSTEM VIA SW. #1	ANNUNCIATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	MAY CAUSE ROD WITHDRAWAL IF CONNECTED VIA SW. #1
1.1.14.1	TE 401C TYV 401C	SIGNAL HIGH	(SAME AS 1.1.13.1)	(SAME AS 1.1.13.1)	(SAME AS 1.1.13.1)	(SAME AS 1.1.13.1)	MAY CAUSE ROD INSERTION IF CONNECTED VIA SW. #1, LOOP A T-AVG T-C RTD
1.1.14.2	TE 401C TYV 401C	SIGNAL LOW	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	MAY CAUSE ROD WITHDRAWAL IF CONNECTED VIA SW. #1
1.1.15.1	VLPS CH I	OUTPUT SIGNAL HIGH	(SAME AS 1.1.13.1)	(SAME AS 1.1.13.1)	(SAME AS 1.1.13.1)	(SAME AS 1.1.13.1)	(SAME AS 1.1.13.1) INCLUDES TR 401A, TYI-401A&B, TYM-401, TR 401, TYS-401A&B, TYV-401B
1.1.15.2	VLPS CH I	OUTPUT SIGNAL LOW	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)
1.1.16.1	TE 400A	SIGNAL HIGH	HIGH CHANNEL I DELTA-T SIGNAL TO VARIABLE LOW PRESSURE TRIP SETPOINT CONTROLLER (PC-430F), RECORDER (TR-400), AND SHUTDOWN MARGIN ANNUNCIATOR VIA SW. #2	(SAME AS 1.1.13.1)	(SAME AS 1.1.13.1)	(SAME AS 1.1.13.1)	LOOP A DELTA-T T-H RTD
1.1.16.2	TE 400A	SIGNAL LOW	LOW OR REVERSE CHANNEL I DELTA-T SIGNAL TO VARIABLE LOW PRESSURE TRIP SETPOINT CONTROLLER (PC-430F), RECORDER (TR-400)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	
1.1.17.1	TE 400C	SIGNAL HIGH	(SAME AS 1.1.16.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	LOOP A DELTA-T T-C RTD
1.1.17.2	TE 400C	SIGNAL LOW	(SAME AS 1.1.16.1)	(SAME AS 1.1.13.1)	(SAME AS 1.1.13.1)	(SAME AS 1.1.13.1)	
1.1.18.1	TT 400	OUTPUT HIGH	(SAME AS 1.1.16.1)	(SAME AS 1.1.13.1)	(SAME AS 1.1.13.1)	(SAME AS 1.1.13.1)	(SAME AS 1.1.17.2)
1.1.18.2	TT 400	OUTPUT LOW	(SAME AS 1.1.16.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	
1.1.19.1	TR 400	INPUT OPEN	(SAME AS 1.1.16.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	
1.1.19.2	TR 400	INPUT SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	IN TT-400 CURRENT LOOP
1.1.20.1	TC 400C/D	INPUT OPEN	(SAME AS 1.1.16.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDFRE UNIT 1
SECTION 1: PRESSURIZER PRESSURE SCRAMS

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
1.1.20.2	TC 400C/D	INPUT SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	IN TT-400 CURRENT LOOP
1.1.21.1	TI 400	INPUT OPEN	(SAME AS 1.1.16.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	(SAME AS 1.1.13.2)	
1.1.21.2	TI 400	INPUT SHORT	NO EFFECT	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	IN TT-400 CURRENT LOOP
1.1.22.1	REB SUPPL I (R1/R2)	VOLTS ZERO OR GROUNDED	LOW SETPOINT SIGNAL TO CHANNEL I VARIABLE LOW PRESSURE TRIP BISTABLE	CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL I OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	
1.1.23.1	NON-REG SUPPL I (R1/R2)	VOLTS ZERO OR GROUNDED	LOSS OF CHANNEL I (LOOP A) T-AVG AND DELTA-T ANNUNCIATION	PERIODIC TEST	NONE REQUIRED	NONE	
1.1.24.1	REB SUPPL I (R3/R4)	VOLTS ZERO OR GROUNDED	LOW PRESSURE SIGNAL TO CHANNEL I FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE BISTABLES, RECORDER VIA SW PR/430, PRESSURE CONTROL SYSTEM VIA SW P/432, AND INDICATOR	ANNUNCIATION, CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL I OF FIXED HIGH PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS. CHANNEL I OF VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	MAY ENERGIZE PRESSURIZER HEATERS AND CAUSE REPOSITIONING OF PCV-430C, -430H IF CONNECTED VIA SW P/432. SEE ECCS SFA FOR SEQ EFFECTS
1.1.25.1	NON-REG SUPPL I (R3/R4)	VOLTS ZERO OR GROUNDED	CHANNEL I FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIP RELAYS ACTUATED	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	RELAYS ARE DE-ENERGIZE TO ACTUATE
1.2.01.1	PT 431	SIGNAL HIGH	HIGH PRESSURE SIGNAL TO CHANNEL II FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE BISTABLES, RECORDER VIA SW. PR/430, PRESSURE CONTROL SYSTEM VIA SW. PR/432, AND INDICATOR. FIXED HIGH PRESSURE TRIP RELAY ACTUATED.	ANNUNCIATION, CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF FIXED HIGH PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS. CHANNEL II OF VARIABLE LOW PRESSURE AND SEQ. #1 PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS.	MAY DE-ENERGIZE PRESSURIZER HEATERS AND OPEN PORV 546 IF CONNECTED VIA SW. P/432. SEE ECCS SFA FOR SEQ EFFECTS.
1.2.01.2	PT 431	SIGNAL LOW	LOW PRESSURE SIGNAL TO CHANNEL II FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE BISTABLES, RECORDER VIA SW. PR/430, PRESSURE CONTROL SYSTEM VIA SW. PR/432, AND INDICATOR. VARIABLE LOW PRESSURE TRIP RELAY ACTUATED.	ANNUNCIATION, CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF FIXED HIGH PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS. CHANNEL II OF VARIABLE LOW PRESSURE AND SEQ. #1 PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS.	MAY ENERGIZE PRESSURIZER HEATERS AND CAUSE REPOSITIONING OF PCV-430C, -430H IF CONNECTED VIA SW. P/432. SEE ECCS SFA FOR SEQ EFFECTS.
1.2.02.1	PI 431	OPEN	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	IN PT-431 CURRENT LOOP (OTHER EFFECTS SAME AS 1.2.1.2)
1.2.02.2	PI 431	SHORT	NO EFFECT	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	LOSS OF CHANNEL II INDICATION (SAME AS 1.2.1.2)
1.2.03.1	PC 431H	INPUT OPEN	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	
1.2.03.2	PC 431H	INPUT SHORT	LOSS OF CAPABILITY TO ACTUATE TRIP RELAY (PC-431HX)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF FIXED HIGH PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND VARIABLE LOW PRESSURE TRIPS UNAFFECTED	
1.2.03.3	PC 431H	TRIPPED	CHANNEL II FIXED HIGH PRESSURE TRIP RELAY ACTUATED (PC-431HX)	ANNUNCIATION	NONE REQUIRED	CHANNEL II OF FIXED HIGH PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS, SEQ #1 AND VARIABLE LOW PRESSURE TRIPS UNAFFECTED	
1.2.03.4	PC 431H	AS-IS (UNTRIPPED)	(SAME AS 1.2.3.2)	(SAME AS 1.2.3.2)	(SAME AS 1.2.3.2)	(SAME AS 1.2.3.2)	
1.2.04.1	PC 431H-X	TRIPPED	(SAME AS 1.2.3.3)	(SAME AS 1.2.3.3)	(SAME AS 1.2.3.3)	(SAME AS 1.2.3.3)	
1.2.04.2	PC 431H-X	AS-IS (UNTRIPPED)	(SAME AS 1.2.3.2)	(SAME AS 1.2.3.2)	(SAME AS 1.2.3.2)	(SAME AS 1.2.3.2)	
1.2.05.1	Y 431B	OPEN	CHANNEL II FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIP RELAYS (PC-431HX, PC-431DX) ACTUATED	PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	SWITCH FAILURE OR OPERATOR ERROR, RELAYS ARE DE-ENERGIZE TO ACTUATE
1.2.05.2	Y 431B	SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	

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ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
1.2.06.1 PC	431E	INPUT OPEN	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.2.1)
1.2.06.2 PC	431E	INPUT SHORT	LOSS OF CAPABILITY TO ACTUATE CHANNEL II INPUT TO SEQ #1	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF SEQ #1 PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #2 AND VARIABLE LOW PRESSURE AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	SEE ECCS SFA FOR SEQ EFFECTS
1.2.06.3 PC	431E	TRIPPED	CHANNEL II INPUT TO SEQ #1 ACTUATED	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF SEQ #1 PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS, SEQ #2 AND VARIABLE LOW PRESSURE AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	(SAME AS 1.2.6.2)
1.2.06.4 PC	431E	AS-IS (UNTRIPPED)	(SAME AS 1.2.6.2)	(SAME AS 1.2.6.2)	(SAME AS 1.2.6.2)	(SAME AS 1.2.6.2)	(SAME AS 1.2.6.2)
1.2.07.1 PC	431D	INPUT OPEN	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)
1.2.07.2 PC	431D	INPUT SHORT	LOSS OF CAPABILITY TO ACTUATE TRIP RELAY (PC-431DX)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	(SAME AS 1.2.1.2)
1.2.07.3 PC	431D	TRIPPED	CHANNEL II VARIABLE LOW PRESSURE TRIP RELAY ACTUATED (PC-431DX)	ANNUNCIATION	NONE REQUIRED	CHANNEL II OF VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	
1.2.07.4 PC	431D	AS-IS (UNTRIPPED)	(SAME AS 1.2.7.2)	(SAME AS 1.2.7.2)	(SAME AS 1.2.7.2)	(SAME AS 1.2.7.2)	
1.2.08.1 PC	431D-X	TRIPPED	(SAME AS 1.2.7.3)	(SAME AS 1.2.7.3)	(SAME AS 1.2.7.3)	(SAME AS 1.2.7.3)	
1.2.08.2 PC	431D-X	AS-IS (UNTRIPPED)	(SAME AS 1.2.7.2)	(SAME AS 1.2.7.2)	(SAME AS 1.2.7.2)	(SAME AS 1.2.7.2)	
1.2.09.1 TC	410						COMPONENT HAS BEEN DELETED
1.2.10.1 PI	410B	OPEN	LOW SETPOINT SIGNAL TO CHANNEL II VARIABLE LOW PRESSURE TRIP BISTABLE	CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL II OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	
1.2.10.2 PI	410B	SHORT	NO EFFECT	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	LOSS OF CHANNEL II VARIABLE LOW PRESSURE SETPOINT INDICATION
1.2.11.1 PM	431	INPUT OPEN	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	IN PT-431 CURRENT LOOP (SEE 1.2.1.2)
1.2.11.2 PM	431	INPUT SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 1.2.1.2)
1.2.11.3 PM	431	OUTPUT HIGH	HIGH PRESSURIZER PRESSURE SIGNAL TO PRESSURE CONTROLLER VIA SW. P/432	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 1.2.1.1)
1.2.11.4 PM	431	OUTPUT LOW	LOW PRESSURIZER PRESSURE SIGNAL TO PRESSURE CONTROLLER VIA SW. P/432	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 1.2.1.2)
1.2.12.1 YE	431B	OUTPUT VOLTS HIGH	(SAME AS 1.2.1.1)	(SAME AS 1.2.1.1)	(SAME AS 1.2.1.1)	(SAME AS 1.2.1.1)	(SAME AS 1.2.1.1)
1.2.12.2 YE	431B	OUTPUT VOLTS ZERO	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)	(SAME AS 1.2.1.2)
1.2.13.1 TE	411A/TYV 411A	SIGNAL HIGH	HIGH CHANNEL II T-AVG SIGNAL TO VARIABLE LOW PRESSURE TRIP SETPOINT CONTROLLER (PC-431D), RECORDER (TR-401-2) AND ROD CONTROL SYSTEM VIA SW. #1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	MAY CAUSE ROD INSERTION IF CONNECTED VIA SW. #1, LOOP B T-AVG T-H RTD
1.2.13.2 TE	411A/TYV 411A	SIGNAL LOW	LOW CHANNEL II T-AVG SIGNAL TO VARIABLE LOW PRESSURE TRIP SETPOINT CONTROLLER (PC-431D), RECORDER (TR-401-2) AND ROD CONTROL SYSTEM VIA SW. #1	ANNUNCIATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING VIA SW. #1 CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	MAY CAUSE ROD WITHDRAWAL IF CONNECTED VIA SW. #1
1.2.14.1 TE	411C/TYV 411C	SIGNAL HIGH	(SAME AS 1.2.13.1)	(SAME AS 1.2.13.1)	(SAME AS 1.2.13.1)	(SAME AS 1.2.13.1)	MAY CAUSE ROD INSERTION IF CONNECTED VIA SW. #1, LOOP B T-AVG T-C RTD
1.2.14.2 TE	411C/TYV 411C	SIGNAL LOW	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	MAY CAUSE ROD WITHDRAWAL IF CONNECTED VIA SW. #1

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1.2.15.1	VLPS CH II	OUTPUT SIGNAL HIGH	(SAME AS 1.2.13.1)	(SAME AS 1.2.13.1)	(SAME AS 1.2.13.1)	(SAME AS 1.2.13.1)	(SAME AS 1.2.13.1) INCLUDES TO 411A, TYI-411A&B, TYK-411, TO 411, TYS-411A&B, TYV-411B
1.2.15.2	VLPS CH II	OUTPUT SIGNAL LOW	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)
1.2.16.1	TE 410A	SIGNAL HIGH	HIGH CHANNEL II DELTA-T SIGNAL TO VARIABLE LOW PRESSURE TRIP SETPOINT CONTROLLER (PC-431D), RECORDER (TR-400), AND SHUTDOWN MARGIN ANNUNCIATION VIA SW. #2	(SAME AS 1.2.13.1)	(SAME AS 1.2.13.1)	(SAME AS 1.2.13.1)	LOOP B DELTA-T T-H RTD
1.2.16.2	TE 410A	SIGNAL LOW	LOW OR REVERSE CHANNEL II DELTA-T SIGNAL TO VARIABLE LOW PRESSURE TRIP SETPOINT CONTROLLER (PC-431D), RECORDER (TR-400)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	
1.2.17.1	TE 412C	SIGNAL HIGH	(SAME AS 1.2.16.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	LOOP B DELTA-T T-C RTD
1.2.17.2	TE 412C	SIGNAL LOW	(SAME AS 1.2.16.1)	(SAME AS 1.2.13.1)	(SAME AS 1.2.13.1)	(SAME AS 1.2.13.1)	
1.2.18.1	TT 410	OUTPUT HIGH	(SAME AS 1.2.16.1)	(SAME AS 1.2.13.1)	(SAME AS 1.2.13.1)	(SAME AS 1.2.13.1)	(SAME AS 1.2.17.2)
1.2.18.2	TT 410	OUTPUT LOW	(SAME AS 1.2.16.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	
1.2.19.1	TR 400	INPUT OPEN	(SAME AS 1.2.16.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	
1.2.19.2	TR 400	INPUT SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	IN TT-410 CURRENT LOOP
1.2.20.1	TC 410C/D	INPUT OPEN	(SAME AS 1.2.16.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	
1.2.20.2	TC 410C/D	INPUT SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	IN TT-410 CURRENT LOOP
1.2.21.1	TI 410	INPUT OPEN	(SAME AS 1.2.16.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	(SAME AS 1.2.13.2)	
1.2.21.2	TI 410	INPUT SHORT	NO EFFECT	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	IN TT-410 CURRENT LOOP
1.2.22.1	REG SUPL II (R1/R2)	VOLTS ZERO OR GROUNDED	LOW SETPOINT SIGNAL TO CHANNEL II VARIABLE LOW PRESSURE TRIP BISTABLE	CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL II OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	
1.2.23.1	NON-REG SUPL II (R1/R2)	VOLTS ZERO OR GROUNDED	LOSS OF CHANNEL II (LOOP B) T-AVG AND DELTA-T ANNUNCIATION	PERIODIC TEST	NONE REQUIRED	NONE	
1.2.24.1	REG SUPL II (R3/R4)	VOLTS ZERO OR GROUNDED	LOW PRESSURE SIGNAL TO CHANNEL II FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE BISTABLES, RECORDER VIA SW PR/430, PRESSURE CONTROL SYSTEM VIA SW PR/432, AND INDICATOR. VARIABLE LOW PRESSURE TRIP RELAY ACTUATED	ANNUNCIATION, CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL II OF FIXED HIGH PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS. CHANNEL II OF VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	MAY ENERGIZE PRESSURIZER HEATERS AND CAUSE REPOSITIONING OF PCV-430C, -430H IF CONNECTED VIA SW P/432. SEE ECCS SFA FOR SEQ EFFECTS
1.2.25.1	NON-REG SUPL II (R3/R4)	VOLTS ZERO OR GROUNDED	CHANNEL II FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIP RELAYS ACTUATED	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	RELAYS ARE DE-ENERGIZE TO ACTUATE
1.3.01.1	PT 432	SIGNAL HIGH	HIGH PRESSURE SIGNAL TO CHANNEL III FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE BISTABLES, RECORDER VIA SW. PR/430, PRESSURE CONTROL SYSTEM VIA SW. PR/432, AND INDICATOR. FIXED HIGH PRESSURE TRIP RELAY ACTUATED.	ANNUNCIATION, CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF FIXED HIGH PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS. CHANNEL III OF VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	MAY DE-ENERGIZE PRESSURIZER HEATERS, OPEN PORV-545, AND CAUSE REPOSITIONING OF PCV-430C, -430H IF CONNECTED VIA SW. P/432. SEE ECCS SFA FOR SEQ EFFECTS
1.3.01.2	PT 432	SIGNAL LOW	LOW PRESSURE SIGNAL TO CHANNEL III FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE BISTABLES, RECORDER VIA SW. PR/430, PRESSURE CONTROL SYSTEM VIA SW. PR/432, AND INDICATOR. VARIABLE LOW PRESSURE TRIP RELAY ACTUATED.	ANNUNCIATION, CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF FIXED HIGH PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS. CHANNEL III OF VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	MAY ENERGIZE PRESSURIZER HEATERS AND CAUSE REPOSITIONING OF PCV-430C, -430H IF CONNECTED VIA SW. P/432. SEE ECCS SFA FOR SEQ EFFECTS

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1.3.02.1	PI 432	OPEN	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	IN PT-432 CURRENT LOOP (OTHER EFFECTS SAME AS 1.3.1.2)
1.3.02.2	PI 432	SHORT	NO EFFECT	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	LOSS OF CHANNEL III INDICATION
1.3.03.1	PC 432E	INPUT OPEN	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.2.1)
1.3.03.2	PC 432E	INPUT SHORT	LOSS OF CAPABILITY TO ACTUATE TRIP RELAY (PC-432E-X)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF FIXED HIGH PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND VARIABLE LOW PRESSURE TRIPS UNAFFECTED	
1.3.03.3	PC 432E	TRIPPED	CHANNEL III FIXED HIGH PRESSURE TRIP RELAY ACTUATED (PC-432E-X)	ANNUNCIATION	NONE REQUIRED	CHANNEL III OF FIXED HIGH PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS, SEQ #1 AND VARIABLE LOW PRESSURE TRIPS UNAFFECTED	
1.3.03.4	PC 432E	AS-IS (UNTRIPPED)	(SAME AS 1.3.3.2)	(SAME AS 1.3.3.2)	(SAME AS 1.3.3.2)	(SAME AS 1.3.3.2)	
1.3.04.1	PC 432E-X	TRIPPED	(SAME AS 1.3.3.3)	(SAME AS 1.3.3.3)	(SAME AS 1.3.3.3)	(SAME AS 1.3.3.3)	
1.3.04.2	PC 432E-X	AS-IS (UNTRIPPED)	(SAME AS 1.3.3.2)	(SAME AS 1.3.3.2)	(SAME AS 1.3.3.2)	(SAME AS 1.3.3.2)	
1.3.05.1	Y 432B	OPEN	CHANNEL III FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIP RELAYS (PC-432E-X, PC-432B-2) ACTUATED	PERIODIC TESTING	NONE REQUIRED	CHANNEL III OF FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	SWITCH FAILURE OR OPERATOR ERROR, RELAYS ARE DE-ENERGIZE TO ACTUATE
1.3.05.2	Y 432B	SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	
1.3.06.1	PC 432C	INPUT OPEN	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.2.1)
1.3.06.2	PC 432C	INPUT SHORT	LOSS OF CAPABILITY TO ACTUATE CHANNEL III INPUT TO SEQ #1	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF SEQ #1 PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #2 AND VARIABLE LOW PRESSURE AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	SEE ECCS SFA FOR SEQ EFFECTS
1.3.06.3	PC 432C	TRIPPED	CHANNEL III INPUT TO SEQ #1 ACTUATED	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III OF SEQ #1 PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS, SEQ #2 AND VARIABLE LOW PRESSURE AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	(SAME AS 1.3.6.2)
1.3.06.4	PC 432C	AS-IS (UNTRIPPED)	(SAME AS 1.3.6.2)	(SAME AS 1.3.6.2)	(SAME AS 1.3.6.2)	(SAME AS 1.3.6.2)	(SAME AS 1.3.6.2)
1.3.07.1	PC 432B	INPUT OPEN	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)
1.3.07.2	PC 432B	INPUT SHORT	LOSS OF CAPABILITY TO ACTUATE TRIP RELAY (PC-432B-X)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	
1.3.07.3	PC 432B	TRIPPED	CHANNEL III VARIABLE LOW PRESSURE TRIP RELAY ACTUATED (PC-432B-X)	ANNUNCIATION	NONE REQUIRED	CHANNEL III OF VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	
1.3.07.4	PC 432B	AS-IS (UNTRIPPED)	(SAME AS 1.3.7.2)	(SAME AS 1.3.7.2)	(SAME AS 1.3.7.2)	(SAME AS 1.3.7.2)	
1.3.08.1	PC 432B-X	TRIPPED	(SAME AS 1.3.7.3)	(SAME AS 1.3.7.3)	(SAME AS 1.3.7.3)	(SAME AS 1.3.7.3)	
1.3.08.2	PC 432B-X	AS-IS (UNTRIPPED)	(SAME AS 1.3.7.2)	(SAME AS 1.3.7.2)	(SAME AS 1.3.7.2)	(SAME AS 1.3.7.2)	
1.3.09.1	TC 420B						COMPONENT HAS BEEN DELETED
1.3.10.1	PI 420B	OPEN	LOW SETPOINT SIGNAL TO CHANNEL III VARIABLE LOW PRESSURE TRIP BISTABLE	CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL III OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	
1.3.10.2	PI 420B	SHORT	NO EFFECT	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	LOSS OF CHANNEL III VARIABLE LOW PRESSURE SETPOINT INDICATION
1.3.11.1	PM 432	INPUT OPEN	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	IN PT-432 CURRENT LOOP (SEE 1.3.1.2)

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT 1
SECTION 1: PRESSURIZER PRESSURE SCRAMS

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
1.3.11.2	PM 432	INPUT SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 1.3.1.2)
1.3.11.3	PM 432	OUTPUT HIGH	HIGH PRESSURIZER PRESSURE SIGNAL TO PRESSURE CONTROLLER VIA SW. P/432	PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 1.3.1.1)
1.3.11.4	PM 432	OUTPUT LOW	LOW PRESSURIZER PRESSURE SIGNAL TO PRESSURE CONTROLLER VIA SW. P/432	PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 1.3.1.2)
1.3.12.1	YE 432B	OUTPUT VOLTS HIGH	(SAME AS 1.3.1.1)	(SAME AS 1.3.1.1)	(SAME AS 1.3.1.1)	(SAME AS 1.3.1.1)	(SAME AS 1.3.1.1)
1.3.12.2	YE 432B	OUTPUT VOLTS ZERO	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)	(SAME AS 1.3.1.2)
1.3.13.1	TE 421A/TYV 421A	SIGNAL HIGH	HIGH CHANNEL III T-AVG SIGNAL TO VARIABLE LOW PRESSURE TRIP SETPOINT CONTROLLER (PC-432B), RECORDER (TR-401-3) AND ROD CONTROL SYSTEM VIA SW. #1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III OF VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	MAY CAUSE ROD INSERTION IF CONNECTED VIA SW. #1, LOOP C T-AVG T-H RTD
1.3.13.2	TE 421A/TYV 421A	SIGNAL LOW	LOW CHANNEL III T-AVG SIGNAL TO VARIABLE LOW PRESSURE TRIP SETPOINT CONTROLLER (PC-432B), RECORDER (TR-401-3) AND ROD CONTROL SYSTEM VIA SW. #1	ANNUNCIATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	MAY CAUSE ROD WITHDRAWAL IF CONNECTED VIA SW. #1
1.3.14.1	TE 421C/TYV 421C	SIGNAL HIGH	(SAME AS 1.3.13.1)	(SAME AS 1.3.13.1)	(SAME AS 1.3.13.1)	(SAME AS 1.3.13.1)	MAY CAUSE ROD INSERTION IF CONNECTED VIA SW. #1, LOOP C T-AVG T-C RTD
1.3.14.2	TE 421C/TYV 421C	SIGNAL LOW	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	MAY CAUSE ROD WITHDRAWAL IF CONNECTED VIA SW. #1
1.3.15.1	VLPS CH III	OUTPUT SIGNAL HIGH	(SAME AS 1.3.13.1)	(SAME AS 1.3.13.1)	(SAME AS 1.3.13.1)	(SAME AS 1.3.13.1)	(SAME AS 1.3.13.1) INCLUDES TO 421A, TYI-421A&B, TYM-421, TO 421, TYS-421A&B, TYV-421B
1.3.15.2	VLPS CH III	OUTPUT SIGNAL LOW	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)
1.3.16.1	TE 420A	SIGNAL HIGH	HIGH CHANNEL III DELTA-T SIGNAL TO VARIABLE LOW PRESSURE TRIP SETPOINT CONTROLLER (PC-432B), RECORDER (TR-400), AND SHUTDOWN MARGIN ANNUNCIATION VIA SW. #2	(SAME AS 1.3.13.1)	(SAME AS 1.3.13.1)	(SAME AS 1.3.13.1)	LOOP C DELTA-T T-H RTD
1.3.16.2	TE 420A	SIGNAL LOW	LOW OR REVERSE CHANNEL III DELTA-T SIGNAL TO VARIABLE LOW PRESSURE TRIP SETPOINT CONTROLLER (PC-432B), RECORDER (TR-400)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	
1.3.17.1	TE 420C	SIGNAL HIGH	(SAME AS 1.3.16.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	LOOP C DELTA-T T-C RTD
1.3.17.2	TE 420C	SIGNAL LOW	(SAME AS 1.3.16.1)	(SAME AS 1.3.13.1)	(SAME AS 1.3.13.1)	(SAME AS 1.3.13.1)	
1.3.18.1	TT 420	OUTPUT HIGH	(SAME AS 1.3.16.1)	(SAME AS 1.3.13.1)	(SAME AS 1.3.13.1)	(SAME AS 1.3.13.1)	(SAME AS 1.3.17.2)
1.3.18.2	TT 420	OUTPUT LOW	(SAME AS 1.3.16.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	
1.3.19.1	TR 400	INPUT OPEN	(SAME AS 1.3.16.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	
1.3.19.2	TR 400	INPUT SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	IN TT-420 CURRENT LOOP
1.3.20.1	TC 420C/D	INPUT OPEN	(SAME AS 1.3.16.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	
1.3.20.2	TC 420C/D	INPUT SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	IN TT-420 CURRENT LOOP
1.3.21.1	TI 420	INPUT OPEN	(SAME AS 1.3.16.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	(SAME AS 1.3.13.2)	
1.3.21.2	TI 420	INPUT SHORT	NO EFFECT	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	IN TT-420 CURRENT LOOP
1.3.22.1	REG SUPL. III (R1/R2)	VOLTS ZERO OR GROUNDED	LOW SETPOINT SIGNAL TO CHANNEL III VARIABLE LOW PRESSURE TRIP BISTABLE	CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL III OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	
1.3.23.1	NON-REG SUPL. III (R1/R2)	VOLTS ZERO OR GROUNDED	LOSS OF CHANNEL III (LOOP C) T-AVG AND DELTA-T ANNUNCIATION	PERIODIC TEST	NONE REQUIRED	NONE	

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDFRE UNIT 1
SECTION 1: PRESSURIZER PRESSURE SCRAMS

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
1.3.24.1	REG SUPL III (R3/R4)	VOLTS ZERO OR GROUNDED	LOW PRESSURE SIGNAL TO CHANNEL III FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE BISTABLES, RECORDER VIA SW PR/430, PRESSURE CONTROL SYSTEM VIA SW PR/432, AND INDICATOR. VARIABLE LOW PRESSURE TRIP RELAY ACTUATED	ANNUNCIATION, CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL III OF FIXED HIGH PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS. CHANNEL III OF VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	MAY ENERGIZE PRESSURIZER HEATERS AND CAUSE REPOSITIONING OF PCV-430C, -430H IF CONNECTED VIA SW P/432. SEE ECCS SFA FOR SEQ EFFECTS
1.3.25.1	NON-REG SUPL III (R3/R4)	VOLTS ZERO OR GROUNDED	CHANNEL III FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIP RELAYS ACTUATED	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	RELAYS ARE DE-ENERGIZE TO ACTUATE
1.4.01.1	SW. PR/430	CONTACTS OPEN	LOW SIGNAL TO PRESSURIZER PRESSURE RECORDER	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED	NONE	
1.4.01.2	SW. PR/430	CONTACTS CLOSED	PARALLELING OF PRESSURE SIGNAL CURRENT LOOPS ACROSS LOOP RESISTORS	PERIODIC TESTING	NONE	LOGIC BECOMES 3/3 FOR FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE TRIPS	
1.4.01.3	SW. PR/430	CONTACTS GROUNDED	CURRENT LOOP RESISTORS SHORTED, CAUSING HIGH LOOP SIGNALS TO TRIP BISTABLES, PRESSURE CONTROLS VIA SW. P/432. LOW SIGNAL TO RECORDER.	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	REACTOR TRIP ON 3/3 PRESSURIZER FIXED HIGH PRESSURE CHANNELS	(SAME AS 1.1.1.1)
1.4.02.1	SW. P/432	CONTACTS OPEN	LOW PRESSURE SIGNAL TO PRESSURE CONTROL DEVICES, INTERCHANNEL ISOLATION AT SW. P/432	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE	MANUAL PRESSURE CONTROL MAY BE REQUIRED.
1.4.02.2	SW. P/432	CONTACTS CLOSED	PARALLELING OF PRESSURE SIGNALS TO PRESSURE CONTROL DEVICES. INTERCHANNEL ISOLATION AT PM-430, PM-431, PM-432	PERIODIC TESTING	NONE REQUIRED	NONE	
1.4.02.3	SW. P/432	CONTACTS GROUNDED	LOSS OF NON-REG SUPL IV (R3/R4), LOW PRESSURE SIGNALS TO PRESSURE CONTROL DEVICES. INTERCHANNEL ISOLATION AT PM-430, PM-431, PM-432	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE	MANUAL PRESSURE CONTROL MAY BE REQUIRED.
1.4.03.1	SW. 1	CONTACTS OPEN	LOW T-AVG SIGNAL TO ROD CONTROL SYSTEM, INTERCHANNEL ISOLATION AT SWITCH	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE	MANUAL ROD CONTROL MAY BE REQUIRED
1.4.03.2	SW. 1	CONTACTS CLOSED	PARALLELING OF T-AVG SIGNALS TO ROD CONTROL SYSTEM. INTERCHANNEL ISOLATION AT TYI 401A&B, TYI 411A&B, TYI 421 & 421A.	PERIODIC TESTING	NONE REQUIRED	NONE	
1.4.03.3	SW. 1	CONTACTS GROUNDED	LOCAL CURRENT LOOP RESISTORS SHORTED, CAUSING HIGH LOOP SIGNALS TO RECORDERS (TRA01-1, -2, -3) AND BISTABLES FOR T-AVG ANNUNCIATORS, LOW T-AVG SIGNAL TO ROD CONTROL SYSTEM, INTERCHANNEL SAME AS 1.4.3.2	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE	MANUAL ROD CONTROL MAY BE REQUIRED
1.4.04.1	SW. 2	CONTACTS OPEN	LOW DELTA-T SIGNAL TO SHUTDOWN MARGIN ANNUNCIATOR, INTERCHANNEL ISOLATION AT SWITCH	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE	
1.4.04.2	SW. 2	CONTACTS CLOSED	PARALLELING OF DELTA-T SIGNAL CURRENT LOOPS ACROSS RESISTORS	PERIODIC TESTING	NONE REQUIRED	LOGIC BECOMES 3/3 FOR DELTA-T INPUT TO VARIABLE LOW PRESSURE TRIP SETPOINT CHANNELS I, II AND III OF VARIABLE LOW PRESSURE TRIPPED	
1.4.04.3	SW. 2	CONTACTS GROUNDED	CURRENT LOOP RESISTORS SHORTED, CAUSING HIGH LOOP SIGNALS TO VARIABLE LOW PRESSURE TRIP SETPOINT COMPENSATION, AND DELTA-T INDICATION AND ANNUNCIATOR BISTABLES	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNELS I, II AND III OF VARIABLE LOW PRESSURE TRIPPED	SCRAM OCCURS UNLESS P-7 IS ON

ENGINEERED SAFETY FEATURES SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT 1
MAIN FEEDWATER ISOLATION
FILE: MFI

ITEM NO.	DEVICE ID	FAILURE MODE	EFFECT-LOC.	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON ESF FUNCTION	REMARKS
2.1.01.01	MOV 21	FAIL OPEN (AS-IS)	FW BLOCK VALVE FOR STEAM GENERATOR A DOES NOT CLOSE	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN A	REF P&I 5178206
2.1.01.02	MOV 21	FAIL CLOSED	NONE, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.01.15	MOV 21	SEQ. 2 CONTACTS FAIL OPEN	MOV 21 FAILS TO CLOSE SINCE SEQ. 2 CONTACTS FAIL TO CLOSE ON SIS SIGNAL	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN A	REF P&I 5178206
2.1.01.18	MOV 21	SEQ. 2 CONTACTS SHORTED	NONE, MOV 21 CLOSED, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.02.15	HS 1021A	FAIL AS-IS (OPEN)	LOSS OF MANUAL CONTROL TO OPEN MOV 21 SINCE SWITCH CONTACTS CANNOT BE CLOSED. NO EFFECT ON VALVE CLOSURE UNDER SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.02.16	HS 1021A	FAIL AS-IS (CLOSED)	MOV 21 OPENS ON VALVE OPEN SIGNAL. VALVE CLOSURE IS UNAFFECTED SINCE SIS OVERRIDES "VALVE OPEN" SIGNAL	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.02.18	HS 1021A	CONTACTS SHORTED	MOV 21 OPENS ON VALVE OPEN SIGNAL. VALVE CLOSURE IS UNAFFECTED SINCE SIS OVERRIDES "VALVE OPEN" SIGNAL	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.03.15	HS 1021B	FAIL AS-IS (OPEN)	LOSS OF MANUAL CONTROL TO CLOSE MOV 21 SINCE SWITCH CONTACTS CANNOT BE CLOSED. NO EFFECT ON VALVE CLOSURE UNDER SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.03.16	HS 1021B	FAIL AS-IS (CLOSED)	NONE, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.03.18	HS 1021B	CONTACTS SHORTED	MOV 21 CLOSURES ON VALVE CLOSE SIGNAL. NO ADVERSE EFFECT. NORMAL SIS STATUS.	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.04.15	HS 1021C	FAIL AS-IS (OPEN)	MOV 21 MOVEMENT IS INTERRUPTED. VALVE REMAINS IN LAST POSITION AND DOES NOT RESPOND TO SIS SIGNAL. VALVE COULD BE FULL OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN A	REF P&I 5178206
2.1.04.16	HS 1021C	FAIL AS-IS (CLOSED)	LOSS OF MANUAL CONTROL OVER MOV 21 SINCE "STOP" SWITCH CANNOT BE ACTUATED. NO EFFECT ON VALVE CLOSURE UNDER SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.04.18	HS 1021C	CONTACTS SHORTED	LOSS OF MANUAL CONTROL OVER MOV 21 SINCE "STOP" SWITCH CANNOT BE ACTUATED. NO EFFECT ON VALVE CLOSURE UNDER SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.05.11	BREAKER 42-1242	TRIPPED	LOSS OF 480 VAC MOTIVE POWER AND LOSS OF 120 VAC POWER TO CONTROL CIRCUITRY CAUSES MOV 21 TO FAIL AS-IS, COULD BE FULL OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN A	REF ELEMENTARY 455379
2.1.06.01	FCV 456	FAIL OPEN	FCV 456 REMAINS OPEN AFTER SIS SIGNAL TO CLOSE	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN A	REF P&I 5178206
2.1.06.02	FCV 456	FAIL CLOSED	NONE, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.07.01	SV 456	FAIL OPEN	NONE, NORMAL FOR SIS, FCV 456 CLOSURES	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206

ENGINEERED SAFETY FEATURES SINGLE FAILURE ANALYSIS
SAN ONDFRE UNIT 1
MAIN FEEDWATER ISOLATION
FILE: MFI

ITEM NO.	DEVICE ID	FAILURE MODE	EFFECT-LOC	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON ESF FUNCTION	REMARKS
2.1.07.02	SV 456	FAIL CLOSED	FCV 456 REMAINS OPEN AFTER SIS SIGNAL TO CLOSE	TO FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN A	REF P&I 5178206
2.1.07.04	SV 456	INPUT SHORTED	NONE, FCV 456 CLOSES	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.07.12	SV 456	FAIL AS-IS	FCV 456 REMAINS OPEN AFTER SIS SIGNAL TO CLOSE	TO FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN A	REF P&I 5178206
2.1.08.01	CV 142	FAIL OPEN	FW BYPASS CV 142 REMAINS OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN A	REF P&I 5178206
2.1.08.02	CV 142	FAIL CLOSED	NONE, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.09.01	SV 149	FAIL OPEN	FW BYPASS CV 142 COULD BE OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN A	REF P&I 5178206
2.1.09.02	SV 149	FAIL CLOSED	NONE, NORMAL FOR SIS, CV 142 CLOSED	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.09.04	SV 149	INPUT SHORTED	NONE, NORMAL FOR SIS, CV 142 CLOSED	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.1.09.12	SV 149	INPUT FAIL AS-IS	FW BYPASS CV 142 MAY REMAIN OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN A	REF P&I 5178206
2.2.01.01	MOV 20	FAIL OPEN (AS-IS)	FW BLOCK VALVE FOR STEAM GENERATOR B DOES NOT CLOSE	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN B	REF P&I 5178206
2.2.01.02	MOV 20	FAIL CLOSED	NONE, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.01.15	MOV 20	SEQ. 1 CONTACTS FAIL OPEN	MOV 20 FAILS TO CLOSE SINCE SEQ. 1 CONTACTS FAIL TO CLOSE ON SIS SIGNAL	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN B	REF P&I 5178206
2.2.01.18	MOV 20	SEQ. 1 CONTACTS SHORTED	NONE, MOV 20 CLOSED, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.02.15	HS 1020A	FAIL AS-IS (OPEN)	LOSS OF MANUAL CONTROL TO OPEN MOV 20 SINCE SWITCH CONTACTS CANNOT BE CLOSED. NO EFFECT ON VALVE CLOSURE UNDER SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.02.16	HS 1020A	FAIL AS-IS (CLOSED)	MOV 20 OPENS ON VALVE OPEN SIGNAL. VALVE CLOSURE IS UNAFFECTED SINCE SIS OVERRIDES "VALVE OPEN" SIGNAL	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.02.18	HS 1020A	CONTACTS SHORTED	MOV 20 OPENS ON VALVE OPEN SIGNAL. VALVE CLOSURE IS UNAFFECTED SINCE SIS OVERRIDES "VALVE OPEN" SIGNAL	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.03.15	HS 1020B	FAIL AS-IS (OPEN)	LOSS OF MANUAL CONTROL TO CLOSE MOV 20 SINCE SWITCH CONTACTS CANNOT BE CLOSED. NO EFFECT ON VALVE CLOSURE UNDER SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.03.16	HS 1020B	FAIL AS-IS (CLOSED)	NONE, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206

ENGINEERED SAFETY FEATURES SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT 1
MAIN FEEDWATER ISOLATION
FILE: MFI

ITEM NO.	DEVICE ID	FAILURE MODE	EFFECT-LOC	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON ESF FUNCTION	REMARKS
2.2.03.18	HS 1020B	CONTACTS SHORTED	MOV 20 CLOSURES ON VALVE CLOSE SIGNAL. NO ADVERSE EFFECT. NORMAL SIS STATUS.	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.04.15	HS 1020C	FAIL AS-IS (OPEN)	MOV 20 MOVEMENT IS INTERRUPTED. VALVE REMAINS IN LAST POSITION AND DOES NOT RESPOND TO SIS SIGNAL. VALVE COULD BE FULL OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN B	REF P&I 5178206
2.2.04.16	HS 1020C	FAIL AS-IS (CLOSED)	LOSS OF MANUAL CONTROL OVER MOV 20 SINCE "STOP" SWITCH CANNOT BE ACTUATED. NO EFFECT ON VALVE CLOSURE UNDER SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.04.18	HS 1020C	CONTACTS SHORTED	LOSS OF MANUAL CONTROL OVER MOV 20 SINCE "STOP" SWITCH CANNOT BE ACTUATED. NO EFFECT ON VALVE CLOSURE UNDER SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.05.11	BREAKER 42-1197	TRIPPED	LOSS OF 480 VAC MOTIVE POWER AND LOSS OF 120 VAC POWER TO CONTROL CIRCUITRY CAUSES MOV 20 TO FAIL AS-IS, COULD BE FULL OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN B	REF ELEMENTARY 455379
2.2.06.01	FCV 457	FAIL OPEN	FCV 457 REMAINS OPEN AFTER SIS SIGNAL TO CLOSE	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN B	REF P&I 5178206
2.2.06.02	FCV 457	FAIL CLOSED	NONE, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.07.01	SV 457	FAIL OPEN	NONE, NORMAL FOR SIS, CLOSURES FCV 457	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.07.02	SV 457	FAIL CLOSED	FCV 457 REMAINS OPEN AFTER SIS SIGNAL TO CLOSE	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN B	REF P&I 5178206
2.2.07.04	SV 457	INPUT SHORTED	FCV 457 CLOSURES	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.07.12	SV 457	FAIL AS-IS	FCV 457 REMAINS OPEN AFTER SIS SIGNAL TO CLOSE	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN B	REF P&I 5178206
2.2.08.01	CV 144	FAIL OPEN	FW BYPASS CV 144 REMAINS OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN B	REF P&I 5178206
2.2.08.02	CV 144	FAIL CLOSED	NONE, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.09.01	SV 151	FAIL OPEN	FW BYPASS CV 144 COULD BE OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN B	REF P&I 5178206
2.2.09.02	SV 151	FAIL CLOSED	NONE, NORMAL FOR SIS, CV 144 CLOSED	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.09.04	SV 151	INPUT SHORTED	NONE, NORMAL FOR SIS, CV 144 CLOSED	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.2.09.12	SV 151	INPUT FAIL AS-IS	FW BYPASS CV 144 MAY REMAIN OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN B	REF P&I 5178206
2.3.01.01	MOV 22	FAIL OPEN (AS-IS)	FW BLOCK VALVE FOR STEAM GENERATOR C IS NOT CLOSED	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN C	REF P&I 5178206

ENGINEERED SAFETY FEATURES SINGLE FAILURE ANALYSIS
SAN ONDRE UNIT 1
MAIN FEEDWATER ISOLATION
FILE: MFI

ITEM NO.	DEVICE ID	FAILURE MODE	EFFECT-LOC	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON ESF FUNCTION	REMARKS
2.3.01.02	MOV 22	FAIL CLOSED	NONE, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.01.15	MOV 22	SEQ. 1 CONTACTS FAIL OPEN	MOV 22 FAILS TO CLOSE SINCE SEQ. 1 CONTACTS FAIL TO CLOSE ON SIS SIGNAL	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN C	REF P&I 5178206
2.3.01.18	MOV 22	SEQ. 1 CONTACTS SHORTED	NONE, MOV 22 CLOSED, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.02.15	HS 1022A	FAIL AS-IS (OPEN)	LOSS OF MANUAL CONTROL TO OPEN MOV 22 SINCE SWITCH CONTACTS CANNOT BE CLOSED. NO EFFECT ON VALVE CLOSURE UNDER SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.02.16	HS 1022A	FAIL AS-IS (CLOSED)	MOV 22 OPENS ON VALVE OPEN SIGNAL. VALVE CLOSURE IS UNAFFECTED SINCE SIS OVERRIDES "VALVE OPEN" SIGNAL	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.02.18	HS 1022A	CONTACTS SHORTED	MOV 22 OPENS ON VALVE OPEN SIGNAL. VALVE CLOSURE IS UNAFFECTED SINCE SIS OVERRIDES "VALVE OPEN" SIGNAL	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.03.15	HS 1022B	FAIL AS-IS (OPEN)	LOSS OF MANUAL CONTROL TO CLOSE MOV 22 SINCE SWITCH CONTACTS CANNOT BE CLOSED. NO EFFECT ON VALVE CLOSURE UNDER SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.03.16	HS 1022B	FAIL AS-IS (CLOSED)	NONE, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.03.18	HS 1022B	CONTACTS SHORTED	MOV 22 CLOSURES ON VALVE CLOSE SIGNAL. NO ADVERSE EFFECT. NORMAL SIS STATUS.	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.04.15	HS 1022C	FAIL AS-IS (OPEN)	MOV 22 MOVEMENT IS INTERRUPTED. VALVE REMAINS IN LAST POSITION AND DOES NOT RESPOND TO SIS SIGNAL. VALVE COULD BE FULL OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN C	REF P&I 5178206
2.3.04.16	HS 1022C	FAIL AS-IS (CLOSED)	LOSS OF MANUAL CONTROL OVER MOV 22 SINCE "STOP" SWITCH CANNOT BE ACTUATED. NO EFFECT ON VALVE CLOSURE UNDER SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.04.18	HS 1022C	CONTACTS SHORTED	LOSS OF MANUAL CONTROL OVER MOV 22 SINCE "STOP" SWITCH CANNOT BE ACTUATED. NO EFFECT ON VALVE CLOSURE UNDER SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.05.11	BREAKER 42-1387	TRIPPED	LOSS OF 480 VAC MOTIVE POWER AND LOSS OF 120 VAC POWER TO CONTROL CIRCUITRY. CAUSES MOV. 22 TO FAIL AS-IS, COULD BE FULL OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN C	REF ELEMENTARY 455379
2.3.06.01	FCV 458	FAIL OPEN	FCV 458 REMAINS OPEN AFTER SIS SIGNAL TO CLOSE	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN C	REF P&I 5178206
2.3.06.02	FCV 458	FAIL CLOSED	NONE, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.07.01	SV 458	FAIL OPEN	NONE, NORMAL FOR SIS, FCV 458 CLOSURES	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.07.02	SV 458	FAIL CLOSED	FCV 458 REMAINS OPEN AFTER SIS SIGNAL TO CLOSE	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN C	REF P&I 5178206

ENGINEERED SAFETY FEATURES SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT 1
MAIN FEEDWATER ISOLATION
FILE: MFI

ITEM NO.	DEVICE ID	FAILURE MODE	EFFECT-LOC	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON ESF FUNCTION	REMARKS
2.3.07.04	SV 458	INPUT SHORTED	NONE, FCV 458 CLOSES	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.07.12	SV 458	INPUT FAIL AS-IS	FCV 458 REMAINS OPEN AFTER SIS SIGNAL TO CLOSE	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN C	REF P&I 5178206
2.3.08.01	CV 143	FAIL OPEN	FW BYPASS CV 143 REMAINS OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN C	REF P&I 5178206
2.3.08.02	CV 143	FAIL CLOSED	NONE, NORMAL FOR SIS	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.09.01	SV 150	FAIL OPEN	FW BYPASS CV 143 COULD BE OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN C	REF P&I 5178206
2.3.09.02	SV 150	FAIL CLOSED	NONE, NORMAL FOR SIS, CV 143 CLOSED	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.09.04	SV 150	INPUT SHORTED	NONE, NORMAL FOR SIS, CV 143 CLOSED	FLOW INDICATION IN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178206
2.3.09.12	SV 150	INPUT FAIL AS-IS	FW BYPASS CV 143 MAY REMAIN OPEN	FLOW INDICATION IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN C	REF P&I 5178206
2.4.01.11	6 1A	FAIL TRIPPED	NONE, NORMAL FOR SIS ACTUATION	STATUS LIGHT IN MAIN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178201
2.4.01.12	6 1A	FAIL TO TRIP	PUMP CONTINUES TO SUPPLY FEEDWATER AND ELECTRICAL LOAD REMAINS ON LINE	PUMP MOTOR AMMETER AND STATUS LIGHT IN MCR. PERIODIC TESTING OF PUMP BREAKER	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 2	NONE	REF P&I 5178201
2.4.02.11	6 1B	FAIL TRIPPED	NONE, NORMAL FOR SIS ACTUATION	STATUS LIGHT IN MAIN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178201
2.4.02.12	6 1B	FAIL TO TRIP	PUMP CONTINUES TO SUPPLY FEEDWATER AND ELECTRICAL LOAD REMAINS ON LINE	PUMP MOTOR AMMETER AND STATUS LIGHT IN MCR. PERIODIC TESTING OF PUMP BREAKER	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 2	NONE	REF P&I 5178201
2.4.03.11	6 1C	FAIL TRIPPED	NONE, NORMAL FOR SIS ACTUATION	STATUS LIGHT IN MAIN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178201
2.4.03.12	6 1C	FAIL TO TRIP	PUMP CONTINUES TO SUPPLY FEEDWATER AND ELECTRICAL LOAD REMAINS ON LINE	PUMP MOTOR AMMETER AND STATUS LIGHT IN MCR. PERIODIC TESTING OF PUMP BREAKER	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1	NONE	REF P&I 5178201
2.4.04.11	6 1D	FAIL TRIPPED	NONE, NORMAL FOR SIS ACTUATION	STATUS LIGHT IN MAIN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178201
2.4.04.12	6 1D	FAIL TO TRIP	PUMP CONTINUES TO SUPPLY FEEDWATER AND ELECTRICAL LOAD REMAINS ON LINE	PUMP MOTOR AMMETER AND STATUS LIGHT IN MCR. PERIODIC TESTING OF PUMP BREAKER	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1	NONE	REF P&I 5178201
2.4.05.11	6 36A	FAIL TRIPPED	NONE, NORMAL FOR SIS ACTUATION	STATUS LIGHT IN MAIN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178211
2.4.05.12	6 36A	FAIL TO TRIP	PUMP CONTINUES TO SUPPLY FEEDWATER AND ELECTRICAL LOAD REMAINS ON LINE	PUMP MOTOR AMMETER AND STATUS LIGHT IN MCR. PERIODIC TESTING OF PUMP BREAKER	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 2	NONE	REF P&I 5178211
2.4.06.11	6 36B	FAIL TRIPPED	NONE, NORMAL FOR SIS ACTUATION	STATUS LIGHT IN MAIN CONTROL ROOM	NONE REQUIRED	NONE	REF P&I 5178213

ENGINEERED SAFETY FEATURES SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT 1
MAIN FEEDWATER ISOLATION
FILE: MFI

ITEM NO.	DEVICE ID	FAILURE MODE	EFFECT-LOC	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON ESF FUNCTION	REMARKS
2.4.06.12	6 36B	FAIL TO TRIP	PUMP CONTINUES TO SUPPLY FEEDWATER AND ELECTRICAL LOAD REMAINS ON LINE	PUMP MOTOR AMMETER AND STATUS LIGHT IN MCR. PERIODIC TESTING OF PUMP BREAKER	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1	NONE	REF P&I 5178213
2.4.07.11	BREAKER 72-130	FAIL OPENED	SV 456, SV 457, SV 458, SV 149, SV 150 AND SV 151 DO NOT RESPOND TO SIS DUE TO LOSS OF DC POWER. FCV 457, FCV 456, FCV 458, CV 142, CV 143, CV 144 DO NOT CLOSE ON SIS	FLOW INDICATION AND VALVE POSITION LIGHTS IN CONTROL ROOM	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION FOR ALL 3 STM GEN	REF ELEMENTARY 449408
2.4.08.10	ISA 921	LOSS OF INSTRUMENT AIR HEADER	FCV 456,457,458 FAIL OPEN. CV 142,143,144 FAIL CLOSED. HV 852 A&B, HV 854A&B CLOSE INSTANTANEOUSLY AND MOV 20,21,22 CLOSE IN *90 SECONDS, ISOLATING FW FLOW	CONTROL ROOM SYSTEM INDICATION	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION FOR ALL 3 STM GEN	REF P&I 5178206, 5178205, 5178444
2.4.09.10	SEQ 1/ISA 921	LOSS OF SEQ 1 & INSTRUMENT AIR HEADER	FCV 456,457,458 FAIL OPEN. MOV 20,22, HV 852B, HV 854B FAIL TO CLOSE. FW TRAIN 1 PUMPS REMAIN UNTRIPPED FEEDING STM GEN B&C. STM GEN A IS ISOLATED BY MOV 21 IN *90 SECONDS BY SEQ 2 WHICH EXCEEDS THE 8 SECONDS FOR LIMITING MSLB PER CURRENT ACCID ANALY.	CONTROL ROOM SYSTEM INDICATION	NONE	FAILURE TO ACHIEVE REQUIRED FW ISOLATION UNDER SIS OR MSLB	REF P&I 5178206, 5178205, 5178444
2.4.10.10	SEQ 2/ISA 921	LOSS OF SEQ 2 & INSTRUMENT AIR HEADER	FCV 456,457,458 FAIL OPEN. MOV 21, HV 852A, HV 854A FAIL TO CLOSE. FW TRAIN 2 PUMPS REMAIN UNTRIPPED FEEDING STM GEN A. STM GEN B&C ARE ISOLATED BY MOV 20,22 IN *90 SECONDS BY SEQ 1 WHICH EXCEEDS THE 8 SECONDS FOR LIMITING MSLB PER CURRENT ACCID ANALY.	CONTROL ROOM SYSTEM INDICATION	NONE	FAILURE TO ACHIEVE REQUIRED FW ISOLATION UNDER SIS OR MSLB	REF P&I 5178206, 5178205, 5178444
2.4.11.10	SEQ 1	LOSS OF OUTPUT	FCV 456,CV 142,MOV 20,22,HV 852B,HV 854B FAIL TO CLOSE. FCV 457,458,CV 143,144 CLOSE AFTER 20 SEC. FW TRAIN 1 PUMPS REMAIN UNTRIPPED FEEDING STM GEN A UNTIL SEQ 2 CLOSES MOV 21 IN *90 SECONDS WHICH EXCEEDS 8 SEC FOR LIMITING MSLB PER ACCIDENT ANALY	CONTROL ROOM SYSTEM INDICATION	NONE	FAILURE TO ACHIEVE REQUIRED FW ISOLATION UNDER SIS OR MSLB	REF P&I 5178206, 5178205
2.4.12.10	SEQ 2	LOSS OF OUTPUT	FCV 457,458,CV 143,144,MOV 21,HV 852A,HV 854A FAIL TO CLOSE. FCV 456&CV 142 CLOSE AFTER 20 SEC. FW TRAIN 2 PUMPS REMAIN UNTRIPPED FEEDING STM GEN B&C UNTIL SEQ 1 CLOSES MOV 20,22 IN *90 SECONDS WHICH EXCEEDS 8 SEC FOR LIMITING MSLB PER ACCIDENT ANALY.	CONTROL ROOM SYSTEM INDICATION	NONE	FAILURE TO ACHIEVE REQUIRED FW ISOLATION UNDER SIS OR MSLB	REF P&I 5178206, 5178205
2.4.13.14	125 VDC BUS 1	LOSS OF POWER	SEQ 1 FAILS. HV 852B,HV 854B FAIL TO CLOSE. FCV 456,7,8,CV 142,3,4,MOV 20,22 FAIL-AS-IS. FW TRAIN 1 PUMPS ON 4160 V BUS 1C REMAIN UNTRIPPED FEEDING ALL SG UNTIL SEQ 2 CLOSES MOV 21 IN *90 SEC REDUCING FW FLOW TO SG A, EXCEEDS 8 SEC MSLB LIMIT PER ANAL	CONTROL ROOM SYSTEM INDICATION	NONE	FAILURE TO ACHIEVE REQUIRED FW ISOLATION UNDER SIS OR MSLB	REF P&I 5178206, 5178205. ONE LINE 5146828, 5102173

ENGINEERED SAFETY FEATURES SINGLE FAILURE ANALYSIS
SAN ONDRE UNIT 1
MAIN FEEDWATER ISOLATION
FILE: MFI

ITEM NO.	DEVICE ID	FAILURE MODE	EFFECT-LOC	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON ESF FUNCTION	REMARKS
2.4.14.14	125 VDC BUS 2	LOSS OF POWER	SEQ 2 FAILS. HV 852A, HV 854A FAIL TO CLOSE. FCV 457, 8, CV 143, 4, MOV 21 FAIL-AS-IS. FCV 456 & CV 142 CLOSE AFTER 20 SEC. FW TRAIN 2 PUMPS ON 4160 V BUS 2C REMAIN UNTRIPPED FEEDING SG B&C UNTIL SEQ 1 CLOSURES MOV 20, 22 IN ~90 SEC (CON'T UNDER REMARKS)	CONTROL ROOM SYSTEM INDICATION NONE		FAILURE TO ACHIEVE REQUIRED FW ISOLATION UNDER SIS OR MSLB	REF P&I 5178206, 5178205. ONE LINE 5146828, 5102173 (CON'T FROM EFFECT-LOC) REDUCING FW FLOW TO SG B&C BUT EXCEEDING 8 SEC MSLB LIMIT PER ACCIDENT ANALYSIS
2.4.15.14	4160 V BUS 1C	LOSS OF POWER	TRAIN 1 FW, CONDENSATE AND HEATER DRAIN PUMPS FAIL TRIPPED. 480 VAC POWER LOST IN MCC 1 CAUSING MOV 20 TO FAIL-AS-IS ASSUMING 480V SWGR IS ALIGNED TO BUS 2C	CONTROL ROOM SYSTEM INDICATION	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN B	REF P&I 5178206. ONE LINE 5146828
2.4.16.14	4160 V BUS 2C	LOSS OF POWER	TRAIN 2 FW, CONDENSATE AND HEATER DRAIN PUMPS FAIL TRIPPED. 480 VAC POWER LOST IN MCC 2&3 CAUSING MOV 21, 22 TO FAIL-AS-IS ASSUMING 480V SWGR IS ALIGNED TO BUS 2C	CONTROL ROOM SYSTEM INDICATION	REDUNDANT VALVE(S) IN FW FLOW TRAIN ACTUATED BY SEQ 1 AND/OR 2	REDUCED REDUNDANCY FOR FW ISOLATION STM GEN A&C	REF P&I 5178206. ONE LINE 5146828

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT 1
SECTION 3: TURBINE TRIP SCRAM

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
3.1.1.1	PS-113	CONTACTS OPEN	DE-ENERGIZES CHANNEL I TRIP RELAY	PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF TURBINE TRIP SCRAM ACTUATED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	
3.1.1.2	PS-113	CONTACTS CLOSED (AS-IS)	UNABLE TO DETECT DECREASING AUTO-STOP OIL PRESSURE IN CHANNEL I	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF TURBINE TRIP SCRAM DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	
3.1.2.1	63X-1	TRIPPED	(SAME AS 3.1.1.1)	(SAME AS 3.1.1.1)	(SAME AS 3.1.1.1)	(SAME AS 3.1.1.1)	
3.1.2.2	63X-1	NOT TRIPPED (AS-IS)	(SAME AS 3.1.1.2)	(SAME AS 3.1.1.1)	(SAME AS 3.1.1.2)	(SAME AS 3.1.1.2)	
3.2.1.1	PS-33	CONTACTS OPEN	DE-ENERGIZES CHANNEL II TRIP RELAY	(SAME AS 3.1.1.1)	NONE REQUIRED	CHANNEL II OF TURBINE TRIP SCRAM ACTUATED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	
3.2.1.2	PS-33	CONTACTS CLOSED (AS-IS)	UNABLE TO DETECT DECREASING AUTO-STOP OIL PRESSURE IN CHANNEL II	(SAME AS 3.1.1.1)	REDUNDANT CHANNELS	CHANNEL II OF TURBINE TRIP SCRAM DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	
3.2.2.1	63X-2	TRIPPED	(SAME AS 3.2.1.1)	(SAME AS 3.1.1.1)	(SAME AS 3.2.1.1)	(SAME AS 3.2.1.1)	
3.2.2.2	63X-2	NOT TRIPPED (AS-IS)	(SAME AS 3.2.1.2)	(SAME AS 3.1.1.1)	(SAME AS 3.2.1.2)	(SAME AS 3.2.1.2)	
3.3.1.1	PS-112	CONTACTS OPEN	DE-ENERGIZES CHANNEL III TRIP RELAY	(SAME AS 3.1.1.1)	NONE REQUIRED	CHANNEL III OF TURBINE TRIP SCRAM ACTUATED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	
3.3.1.2	PS-112	CONTACTS CLOSED (AS-IS)	UNABLE TO DETECT DECREASING AUTO-STOP OIL PRESSURE IN CHANNEL III	(SAME AS 3.1.1.1)	REDUNDANT CHANNELS	CHANNEL III OF TURBINE TRIP SCRAM DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	
3.3.2.1	63X-3	TRIPPED	(SAME AS 3.3.1.1)	(SAME AS 3.3.1.1)	(SAME AS 3.3.1.1)	(SAME AS 3.3.1.1)	
3.3.2.2	63X-3	NOT TRIPPED (AS-IS)	(SAME AS 3.3.1.2)	(SAME AS 3.3.1.1)	(SAME AS 3.3.1.2)	(SAME AS 3.3.1.2)	
3.4.1.1	125VDC BUS #1	VOLTS ZERO	DE-ENERGIZES CHANNEL I, II AND III TRIP RELAYS	ANNUNCIATION	NONE REQUIRED	CHANNELS I, II AND III OF TURBINE TRIP REACTOR SCRAM ACTUATED	TRIP BLOCKED IF P-7 IS ON. HOWEVER, SCRAM OCCURS VIA UNDERVOLTAGE RELAYS IRRESPECTIVE OF TURBINE TRIP SIGNAL

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT 1

TABLE 4: NIS SCRAMS AND PERMISSIVES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.1.01.1	NE 1205A DETECTOR	SIGNAL HIGH	HIGH SUBCHANNEL FLUX SIGNAL (LOOP CURRENT) TO SHUNT TO CHANNEL I: SUMMING AMP TO LEVEL AMP TO ANALOG OUTPUTS, LAS AMP, B/S AMPS FOR P-7, P-8, OVERPOWER TRIPS AND ROD STOPS. HIGH RATE SIGNAL MAY ALSO BE SENT TO ROD CONTROL VIA I/N48A AND DIFFERENTIATOR	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED FOR OVERPOWER TRIPS, REDUNDANT CHANNELS FOR P-7, P-8, DROPPED ROD STOP.	CHANNEL I OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. CHANNEL I DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS.	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME 1/3 ON REMAINING CHANNELS.
4.1.01.2	NE 1205A DETECTOR	SIGNAL LOW	LOW SUBCHANNEL FLUX SIGNAL (LOOP CURRENT) TO SHUNT TO CHANNEL I: SUMMING AMP TO LEVEL AMP TO ANALOG OUTPUTS, LAS AMP, B/S AMPS FOR P-7, P-8, OVERPOWER TRIPS AND ROD STOPS. NEGATIVE RATE SIGNAL MAY CAUSE DROPPED ROD STOP.	(SAME AS 4.1.1.1)	REDUNDANT CHANNELS FOR OVERPOWER TRIPS AND DROPPED ROD STOPS, NONE REQUIRED FOR P-7, P-8	CHANNEL I OVERPOWER AND DROPPED ROD STOPS DISABLED, LOGIC BECOMES 2/3 AND 1/3 RESPECTIVELY ON REMAINING CHANNELS	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME 2/3 ON REMAINING CHANNELS
4.1.02.1	NE 1205A SHUNT	OPEN	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)
4.1.02.2	NE 1205A SHUNT	SHORT	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)
4.1.03.1	NE 1205B DETECTOR	SIGNAL HIGH	(SAME AS 4.1.1.1) HIGH RATE SIGNAL MAY ALSO RESULT TO N1203 WIDE RANGE AMP	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1) CHANNEL I HIGH SUR TRIP MAY OCCUR IF D-7 IS ON.	(SAME AS 4.1.1.1) ALSO CONNECTS TO N1203 INTERMEDIATE RANGE CHANNEL.
4.1.03.2	NE 1205B DETECTOR	SIGNAL LOW	(SAME AS 4.1.1.2) LOW RATE SIGNAL MAY ALSO RESULT TO N1203 WIDE RANGE AMP	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2) CHANNEL I HIGH SUR TRIP DISABLED, LOGIC BECOMES 1/1 ON OTHER CHANNEL	(SAME AS 4.1.1.2)
4.1.04.1	NE 1205B SHUNT	OPEN	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)
4.1.04.2	NE 1205B SHUNT	SHORT	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)
4.1.05.1	NE 1205A&B HIGH VOLTS HIGH VOLTAGE SUPPL	HIGH	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)
4.1.05.2	NE 1205A&B HIGH VOLTS ZERO VOLTAGE SUPPL	ZERO	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)
4.1.06.1	SUMMING AMP I	OPEN	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)
4.1.06.2	SUMMING AMP I	SHORT	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)
4.1.07.1	LEVEL AMP I	INPUT OPEN	LOW CHANNEL I FLUX SIGNAL TO ANALOG OUTPUTS, LAS AMP, B/S AMPS FOR P-7, P-8 OVERPOWER TRIPS, AND ROD STOPS	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)
4.1.07.2	LEVEL AMP I	INPUT SHORT	(SAME AS 4.1.7.1) LOOP CURRENT MAY INCREASE, RESULTING HIGH RATE SIGNAL TO ROD CONTROL VIA I/N48A AND DIFFERENTIATOR	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)
4.1.07.3	LEVEL AMP I	OUTPUT HIGH	HIGH CHANNEL I FLUX SIGNAL TO ANALOG OUTPUTS, LAS AMP, B/S AMPS FOR P-7, P-8 OVERPOWER TRIPS AND ROD STOPS	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)
4.1.07.4	LEVEL AMP I	OUTPUT LOW	(SAME AS 4.1.7.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)
4.1.07.5	LEVEL AMP I	TEST	(SAME AS 4.1.7.1)	ANNUNCIATION (NA-1200-1)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2) TEST/CALIBRATE SWITCH
4.1.08.1	NI 41A	INPUT OPEN	LOSS OF % FP INDICATION FOR NE-1205	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	NONE
4.1.08.2	NI 41A	INPUT SHORT	(SAME AS 4.1.7.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2) DRAWER INDICATOR BOUNDS SHORT IN INPUT OF ANY OTHER CHANNEL I DEVICES ON LEVEL AMP OUTPUT
4.1.09.1	NC-41P BISTABLE	TRIPPED	CHANNEL I LOW-RANGE OVERPOWER TRIP SIGNAL TO COINCIDENTOR VIA RANGE SWITCH NCS-1200-1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	IF LOW RANGE SELECTED, CHANNEL I OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. IF MID OR HI RANGE, NO EFFECT	0-10% POWER RANGE OVERPOWER BISTABLE AMP

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TABLE 4: NIS SCRAMS AND PERMISSIVES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.1.09.2	NC-4IP BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CH I OVERPOWER RELAYS IN COINCIDENTOR WHEN NCS-1200-1 IS IN LOW RANGE	PERIODIC TESTING	IF LOW RANGE SELECTED, REDUNDANT CHANNELS. IF MID OR HI RANGE, NONE REQUIRED	IF LOW RANGE SELECTED, CHANNEL I OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS. IF MID OR HI RANGE, NO EFFECT	
4.1.10.1	NC-4IJ BISTABLE	TRIPPED	CHANNEL I MID-RANGE OVERPOWER TRIP SIGNAL TO COINCIDENTOR VIA RANGE SWITCH NCS-1200-1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	IF MID RANGE SELECTED, CHANNEL I OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. IF LOW OR HI RANGE, NO EFFECT	10-70% POWER RANGE OVERPOWER BISTABLE AMP
4.1.10.2	NC-4IJ BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CH I OVERPOWER RELAYS IN COINCIDENTOR WHEN NCS-1200-1 IS IN MID RANGE	PERIODIC TESTING	IF MID RANGE SELECTED, REDUNDANT CHANNELS. IF LOW OR HI RANGE, NONE REQUIRED	IF MID RANGE SELECTED, CHANNEL I OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS. IF LOW OR HI RANGE, NO EFFECT	
4.1.11.1	NC-4IR BISTABLE	TRIPPED	CHANNEL I HI-RANGE OVERPOWER TRIP SIGNAL TO COINCIDENTOR VIA RANGE SWITCH NCS-1200-1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	IF HI RANGE SELECTED, CHANNEL I OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. IF LOW OR MID RANGE, NO EFFECT	70-100% POWER RANGE OVERPOWER BISTABLE AMP
4.1.11.2	NC-4IR BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CH I OVERPOWER RELAYS IN COINCIDENTOR WHEN NCS-1200-1 IS IN HI RANGE	PERIODIC TESTING	IF HI RANGE SELECTED, REDUNDANT CHANNELS. IF LOW OR MID RANGE, NONE REQUIRED	IF HI RANGE SELECTED, CHANNEL I OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS. IF LOW OR MID RANGE, NO EFFECT	
4.1.12.1	NC-4IM BISTABLE	TRIPPED	CHANNEL I P-7 RELAYS ACTUATED IN COINCIDENTOR	ANNUNCIATION	REDUNDANT CHANNELS FOR P-7 DEFEAT	P-7 DEFEAT LOGIC BECOMES 2/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	P-7 BISTABLE AMP
4.1.12.2	NC-4IM BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO ACTUATE CHANNEL I P-7 RELAYS IN COINCIDENTOR	PERIODIC TESTING	REDUNDANT CHANNELS FOR P-7 SUR SCRAM CUT-IN	P-7 DEFEAT LOGIC BECOMES 1/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	
4.1.13.1	NC-4IN BISTABLE	TRIPPED	CHANNEL I P-8 RELAYS ACTUATED IN COINCIDENTOR	ANNUNCIATION	REDUNDANT CHANNELS FOR P-8 DEFEAT	P-8 DEFEAT LOGIC BECOMES 2/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	P-8 BISTABLE AMP
4.1.13.2	NC-4IN BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO ACTUATE CHANNEL I P-8 RELAYS IN COINCIDENTOR	PERIODIC TESTING	NONE REQUIRED	P-8 DEFEAT LOGIC BECOMES 1/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	
4.1.14.1	NC-4IK BISTABLE	TRIPPED	CHANNEL I DROPPED ROD STOP SIGNAL TO COINCIDENTOR	ANNUNCIATION	NONE REQUIRED	ROD STOP	
4.1.14.2	NC-4IK BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CHANNEL I DROPPED ROD STOP RELAYS IN COINCIDENTOR (SAME AS 4.1.7.3)	PERIODIC TEST	REDUNDANT CHANNELS	CHANNEL I DROPPED ROD STOP DISABLED LOGIC BECOMES 1/3 ON REMAINING CHANNELS	
4.1.15.1	N 1205 LOW VOLTAGE SUPPLY	VOLTS HIGH		(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)
4.1.15.2	N 1205 LOW VOLTAGE SUPPLY	VOLTS ZERO	LOSS OF POWER TO CHANNEL I OVERPOWER, P-7, P-8 AND ROD STOP BISTABLES.	ANNUNCIATION	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)
4.1.16.1	NC-4IPJRTA1 & NC-4IPJRTB1	TRIP	CHANNEL I OVERPOWER TRIP SIGNAL IN COINCIDENTOR	ANNUNCIATION (NCS-1200-6)	NONE REQUIRED	CHANNEL I OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS	
4.1.16.2	NC-4IPJRTA1 & NC-4IPJRTB1	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL I OVERPOWER TRIP IN COINCIDENTOR	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS	
4.1.17.1	NC-4INTA1 & NC-4INTB1	TRIPPED	CHANNEL I P-7 ACTUATION SIGNAL IN COINCIDENTOR	(SAME AS 4.1.12.1)	(SAME AS 4.1.12.1)	(SAME AS 4.1.12.1)	P-7 RELAYS
4.1.17.2	NC-4INTA1 & NC-4INTB1	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL I P-7 ACTUATION IN COINCIDENTOR	(SAME AS 4.1.12.2)	(SAME AS 4.1.12.2)	(SAME AS 4.1.12.2)	
4.1.18.1	NC-4INTA1 & NC-4INTB1	TRIPPED	CHANNEL I P-8 ACTUATION SIGNAL IN COINCIDENTOR	(SAME AS 4.1.13.1)	(SAME AS 4.1.13.1)	(SAME AS 4.1.13.1)	P-8 RELAYS
4.1.18.2	NC-4INTA1 & NC-4INTB1	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL I P-8 ACTUATION IN COINCIDENTOR	(SAME AS 4.1.13.2)	(SAME AS 4.1.13.2)	(SAME AS 4.1.13.2)	

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ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.1.19.1	NC-41PJRXA1&2 & NC-41PJRXB1&2	TRIPPED	CHANNEL I OVERPOWER TRIP IN COINCIDENTOR (SAME AS 4.1.16.1)	(SAME AS 4.1.16.1)	(SAME AS 4.1.16.1)	(SAME AS 4.1.16.1)	BOTH OVERPOWER SCRAM COINCIDENTOR A AND B RELAYS MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.1.19.2	NC-41PJRXA1&2 & NC-41PJRXB1&2	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL I OVERPOWER TRIP IN COINCIDENTOR	(SAME AS 4.1.16.2)	(SAME AS 4.1.16.2)	(SAME AS 4.1.16.2)	
4.1.20.1	NC-41MXA & NC-41MXB	TRIPPED	CHANNEL I P-7 TRIP IN COINCIDENTOR	(SAME AS 4.1.17.1)	(SAME AS 4.1.17.1)	(SAME AS 4.1.17.1)	BOTH P-7 COINCIDENTOR RELAYS A & B MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.1.20.2	NC-41MXA & NC-41MXB	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL I P-7 ACTUATION IN COINCIDENTOR	(SAME AS 4.1.17.2)	(SAME AS 4.1.17.2)	(SAME AS 4.1.17.2)	
4.1.21.1	NC-41NXA & NC-41NXB	TRIPPED	CHANNEL I P-8 TRIP IN COINCIDENTOR	(SAME AS 4.1.18.1)	(SAME AS 4.1.18.1)	(SAME AS 4.1.18.1)	BOTH P-8 COINCIDENTOR A & B RELAYS MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.1.21.2	NC-41NXA & NC-41NXB	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL I P-8 ACTUATION IN COINCIDENTOR	(SAME AS 4.1.18.2)	(SAME AS 4.1.18.2)	(SAME AS 4.1.18.2)	(SAME AS 4.1.18.2)
4.1.22.1	NC-41KXA & NC-41KXB	TRIPPED	CHANNEL I DROPPED ROD STOP IN COINCIDENTOR	ANNUNCIATION	NONE REQUIRED	ROD STOP	BOTH DROPPED ROD STOP A & B RELAYS MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.1.22.2	NC-41KXA & NC-41KXB	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL I DROPPED ROD STOP IN COINCIDENTOR	PERIODIC TEST	REDUNDANT CHANNELS	CHANNEL I DROPPED ROD STOP DISABLED, LOGIC REMAINING CHANNELS	
4.1.23.1	REG SUPL I (NIS)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO CHANNEL I (N-1203 AND N-1205) HIGH, LOW AND AUX VOLTAGE SUPPLIES AND BISTABLES	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED FOR OVERPOWER TRIPS, REDUNDANT CHANNELS FOR P-7, P-8, DROPPED ROD STOP	CHANNEL I OVERPOWER TRIPPED, DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. REACTOR TRIP ON CHANNEL I HIGH SUR IF P-7 IS ON	1/3 ON REMAINING CHANNELS
4.2.01.1	NE 1207A DETECTOR	SIGNAL HIGH	HIGH SUBCHANNEL FLUX SIGNAL (LOOP CURRENT) TO SHUNT TO CHANNEL II: SUMMING AMP TO LEVEL AMP TO ANALOG OUTPUTS LAG AMP, B/S AMPS FOR P-7, P-8, OVERPOWER TRIPS AND ROD STOPS. HIGH RATE SIGNAL MAY ALSO BE SENT TO ROD CONTROL VIA I/N-48A AND DIFFERENT	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED FOR OVERPOWER TRIPS, REDUNDANT CHANNELS FOR P-7, P-8 DROPPED ROD STOP	CHANNEL II OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. CHANNEL II DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME 1/3 ON REMAINING CHANNELS
4.2.01.2	NE 1207A DETECTOR	SIGNAL LOW	LOW SUBCHANNEL FLUX SIGNAL (LOOP CURRENT) TO SHUNT TO CHANNEL II: SUMMING AMP TO LEVEL AMP TO ANALOG OUTPUTS LAG AMP, B/S AMPS FOR P-7, P-8, OVERPOWER TRIPS AND ROD STOPS, NEGATIVE RATE SIGNAL MAY CAUSE DROPPED ROD STOP	(SAME AS 4.2.1.1)	REDUNDANT CHANNELS FOR OVERPOWER TRIPS AND DROPPED ROD STOPS, NONE REQUIRED FOR P-7, P-8	CHANNEL II OVERPOWER AND DROPPED ROD STOP DISABLED, LOGIC BECOMES 2/3 AND 1/3 2/3 ON REMAINING CHANNELS RESPECTIVELY ON REMAINING CHANNELS	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME 2/3 AND 1/3 2/3 ON REMAINING CHANNELS
4.2.02.1	NE 1207A SHUNT	OPEN	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2)
4.2.02.2	NE 1207A SHUNT	SHORT	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)
4.2.03.1	NE 1207B DETECTOR	SIGNAL HIGH	(SAME AS 4.2.1.1) HIGH RATE SIGNAL MAY ALSO RESULT TO N-1204 WIDE RANGE AMP	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1) CHANNEL II HIGH SUR TRIP MAY OCCUR IF P-7 IS ON	(SAME AS 4.2.1.1) ALSO CONNECTS TO N-1204 INTERMEDIATE RANGE CHANNEL
4.2.03.2	NE 1207B DETECTOR	SIGNAL LOW	(SAME AS 4.2.1.2) LOW RATE SIGNAL MAY ALSO RESULT TO N-1204 WIDE RANGE AMP	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2) CHANNEL II HIGH SUR DISABLED, LOGIC BECOMES 1/1 ON OTHER CHANNEL	(SAME AS 4.2.1.2)
4.2.04.2	NE 1207B SHUNT	SHORT	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)
4.2.05.1	NE 1207A&B HIGH VOLTS VOLTAGE SUPL	HIGH	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)
4.2.05.2	NE 1207A&B HIGH VOLTS VOLTAGE SUPL	ZERO	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2)
4.2.06.1	SUMMING AMP II	OPEN	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2)

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TABLE 4: NIS SCRAMS AND PERMISSIVES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.2.06.2	SUMMING AMP II	SHORT	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)
4.2.07.1	LEVEL AMP II	INPUT OPEN	LOW CHANNEL II FLUX SIGNAL TO ANALOG OUTPUTS LAG AMP, B/S AMPS FOR P-7, P-8, OVERPOWER TRIPS AND ROD STOPS	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2)
4.2.07.2	LEVEL AMP II	INPUT SHORT	(SAME AS 4.2.7.1) LOOP CURRENT MAY INCREASE AND RESULT IN HIGH RATE SIGNAL TO ROD CONTROL VIA I/N-48A AND DIFFERENTIATOR	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2) CHANNEL II HIGH SUR TRIP MAY OCCUR IF P-7 IS ON	(SAME AS 4.2.1.2)
4.2.07.3	LEVEL AMP II	OUTPUT HIGH	HIGH CHANNEL II FLUX SIGNAL TO ANALOG OUTPUTS LAG AMP, B/S AMPS FOR P-7, P-8, OVERPOWER TRIPS AND ROD STOPS	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)
4.2.07.4	LEVEL AMP II	OUTPUT LOW	(SAME AS 4.2.7.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2)
4.2.07.5	LEVEL AMP II	TEST	(SAME AS 4.2.7.1)	ANNUNCIATION (NA-1200-1)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2) TEST/CALIBRATE SWITCH
4.2.08.1	NI-42A	INPUT OPEN	LOSS OF * FP INDICATION FOR NE-1207	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	
4.2.08.2	NI-42A	INPUT SHORT	(SAME AS 4.2.7.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2) DRAWER INDICATOR, BOUNDS SHORT IN INPUT OF ANY OTHER CHANNEL II DEVICES ON LEVEL AMP OUTPUT
4.2.09.1	NC-42P	TRIPPED	CHANNEL II LOW-RANGE OVERPOWER TRIP SIGNAL TO COINCIDENTOR VIA RANGE SWITCH NCS-1200-1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	IF LOW RANGE SELECTED, CHANNEL II OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. IF MID OR HI RANGE, NO EFFECT	0-10% POWER RANGE OVERPOWER BISTABLE AMP
4.2.09.2	NC-42P	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CH II OVERPOWER RELAYS IN COINCIDENTOR WHEN NCS-1200-1 IS IN LOW RANGE	PERIODIC TESTING	IF LOW RANGE SELECTED, REDUNDANT CHANNELS. IF MID OR HI RANGE, NONE REQUIRED	IF LOW RANGE SELECTED, CHANNEL II OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS. IF MID OR HI RANGE, NO EFFECT	
4.2.10.1	NC-42J	TRIPPED	CHANNEL II MID-RANGE OVERPOWER TRIP SIGNAL TO COINCIDENTOR VIA RANGE SWITCH NCS-1200-1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	IF MID RANGE SELECTED, CHANNEL II OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. IF LOW OR HI RANGE, NO EFFECT	10-70% POWER RANGE OVERPOWER BISTABLE AMP
4.2.10.2	NC-42J	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CH II OVERPOWER RELAYS IN COINCIDENTOR WHEN NCS-1200-1 IS IN MID RANGE	PERIODIC TESTING	IF MID RANGE SELECTED, REDUNDANT CHANNELS. IF LOW OR HI RANGE, NONE REQUIRED	IF MID RANGE SELECTED, CHANNEL II OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS. IF LOW OR HI RANGE, NO EFFECT	
4.2.11.1	NC-42R	TRIPPED	CHANNEL II HI-RANGE OVERPOWER TRIP SIGNAL TO COINCIDENTOR VIA RANGE SWITCH NCS-1200-1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	IF HI RANGE SELECTED, CHANNEL II OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. IF LOW OR MID RANGE, NO EFFECT	70-120% POWER RANGE OVERPOWER BISTABLE AMP
4.2.11.2	NC-42R	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CH II OVERPOWER RELAYS IN COINCIDENTOR WHEN NCS-1200-1 IS IN HI RANGE	PERIODIC TESTING	IF HI RANGE SELECTED, REDUNDANT CHANNELS. IF LOW OR MID RANGE, NONE REQUIRED	IF HI RANGE SELECTED, CHANNEL II OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS. IF LOW OR MID RANGE, NO EFFECT	
4.2.12.1	NC-42M	TRIPPED	CHANNEL II P-7 RELAYS ACTUATED IN COINCIDENTOR	ANNUNCIATION	REDUNDANT CHANNELS FOR P-7 DEFEAT	P-7 DEFEAT LOGIC BECOMES 2/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	P-7 BISTABLE AMP
4.2.12.2	NC-42M	UNTRIPPED	LOSS OF CAPABILITY TO ACTUATE CH II P-7 RELAYS IN COINCIDENTOR	PERIODIC TEST	REDUNDANT CHANNELS FOR P-7 SUR SCRAM CUT-IN	P-7 DEFEAT LOGIC BECOMES 1/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	
4.2.13.1	NC-42N	TRIPPED	CHANNEL I P-8 RELAYS ACTUATED IN COINCIDENTOR	ANNUNCIATION	REDUNDANT CHANNELS FOR P-8 DEFEAT	P-8 DEFEAT LOGIC BECOMES 2/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	P-8 BISTABLE AMP
4.2.13.2	NC-42N	UNTRIPPED	LOSS OF CAPABILITY TO ACTUATE CH II P-8 RELAYS IN COINCIDENTOR	PERIODIC TESTING	NONE REQUIRED	P-8 DEFEAT LOGIC BECOMES 1/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
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TABLE 4: NIS SCRAMS AND PERMISSIVES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.2.14.1	NC-42K BISTABLE	TRIPPED	CHANNEL II DROPPED ROD STOP TO COINCIDENTOR	ANNUNCIATION	NONE REQUIRED	ROD STOP	
4.2.14.2	NC-42K BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CHANNEL II DROPPED ROD STOP RELAYS IN COINCIDENTOR (SAME AS 4.2.7.3)	PERIODIC TEST (SAME AS 4.2.1.1)	REDUNDANT CHANNELS (SAME AS 4.2.1.1)	CHANNEL II DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS (SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)
4.2.15.1	N 1207 LOW VOLTAGE SUPPL	VOLTS HIGH			(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)
4.2.15.2	N 1207 LOW VOLTAGE SUPPL	VOLTS ZERO	LOSS OF POWER TO CHANNEL II OVERPOWER, P-7, P-8 AND ROD STOP BISTABLES,	ANNUNCIATION	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)	(SAME AS 4.2.1.1)
4.2.16.1	NC-42PJRTA1 & NC-42PJRTB1	TRIPPED	CHANNEL II OVERPOWER TRIP SIGNAL IN COINCIDENTOR	ANNUNCIATION (NCS-1200-6)	NONE REQUIRED	CHANNEL II OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS	
4.2.16.2	NC-42PJRTA1 & NC-42PJRTB1	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL II OVERPOWER TRIP IN COINCIDENTOR	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS	
4.2.17.1	NC-42MTA1 & NC-42MTB1	TRIPPED	CHANNEL II P-7 ACTUATION SIGNAL IN COINCIDENTOR	(SAME AS 4.2.12.1)	(SAME AS 4.2.12.1)	(SAME AS 4.2.12.1)	P-7 RELAYS
4.2.17.2	NC-42MTA1 & NC-42MTB1	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL II P-7 ACTUATION IN COINCIDENTOR	(SAME AS 4.2.12.2)	(SAME AS 4.2.12.2)	(SAME AS 4.2.12.2)	
4.2.18.1	NC-42NTA1 & NC-42NTB1	TRIPPED	CHANNEL II P-8 ACTUATION SIGNAL IN COINCIDENTOR	(SAME AS 4.2.13.1)	(SAME AS 4.2.13.1)	(SAME AS 4.2.13.1)	P-8 RELAYS
4.2.18.2	NC-42NTA1 & NC-42NTB1	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL II P-8 ACTUATION IN COINCIDENTOR	(SAME AS 4.2.13.2)	(SAME AS 4.2.13.2)	(SAME AS 4.2.13.2)	
4.2.19.1	NC-42PJRXA1&2 & NC-42PJRXB1&2	TRIPPED	CHANNEL II OVERPOWER TRIP IN COINCIDENTOR	(SAME AS 4.2.16.1)	(SAME AS 4.2.16.1)	(SAME AS 4.2.16.1)	BOTH OVERPOWER SCRAM COINCIDENTOR A & B RELAYS MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.2.19.2	NC-42PJRXA1&2 & NC-42PJRXB1&2	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL II OVERPOWER TRIP IN COINCIDENTOR	(SAME AS 4.2.16.2)	(SAME AS 4.2.16.2)	(SAME AS 4.2.16.2)	
4.2.20.1	NC-42KXA & NC-42KXB	TRIPPED	CHANNEL II P-7 TRIP IN COINCIDENTOR	(SAME AS 4.2.17.1)	(SAME AS 4.2.17.1)	(SAME AS 4.2.17.1)	BOTH P-7 COINCIDENTOR A & B RELAYS MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.2.20.2	NC-42KXA & NC-42KXB	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL II P-7 ACTUATION IN COINCIDENTOR	(SAME AS 4.2.17.2)	(SAME AS 4.2.17.2)	(SAME AS 4.2.17.2)	
4.2.21.1	NC-42NXA & NC-42NXB	TRIPPED	CHANNEL II P-8 TRIP IN COINCIDENTOR	(SAME AS 4.2.18.1)	(SAME AS 4.2.18.1)	(SAME AS 4.2.18.1)	BOTH P-8 COINCIDENTOR RELAYS A & B MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.2.21.2	NC-42NXA & NC-42NXB	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL II P-8 ACTUATION IN COINCIDENTOR	(SAME AS 4.2.18.2)	(SAME AS 4.2.18.2)	(SAME AS 4.2.18.2)	
4.2.22.1	NC-42KXA & NC-42KXB	TRIPPED	CHANNEL II DROPPED ROD STOP IN COINCIDENTOR	ANNUNCIATION	NONE REQUIRED	ROD STOP	BOTH DROPPED ROD STOP A & B RELAYS MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.2.22.2	NC-42KXA & NC-42KXB	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL II DROPPED ROD STOP IN COINCIDENTOR	PERIODIC TEST	REDUNDANT CHANNELS	CHANNEL II DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS	
4.2.23.1	REG SUPPL II (NIS)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO CHANNEL II (N-1204 AND N-1207) HIGH, LOW AND AUX VOLTAGE SUPPLIES AND BISTABLES	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED FOR OVERPOWER TRIPS, REDUNDANT CHANNELS FOR P-7, P-8 AND DROPPED ROD STOP	CHANNEL II OVERPOWER TRIPPED, DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. REACTOR SCRAM ON CHANNEL II HIGH SUR IF P-7 IS ON STOP	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME 1/3 ON REMAINING CHANNELS
4.3.01.1	NE 1206A DETECTOR	SIGNAL HIGH	HIGH SUBCHANNEL FLUX SIGNAL (LOOP CURRENT) TO SHUNT TO CHANNEL III; SUMMING AMP TO LEVEL AMP ANALOG OUTPUTS LAG AMP, B/S AMPS FOR P-7, P-8, OVERPOWER TRIPS AND ROD STOPS. HIGH RATE SIGNAL MAY ALSO BE SENT TO ROD CONTROL VIA I/N-48A AND DIFFERENTIATER	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED FOR OVERPOWER TRIPS, REDUNDANT CHANNELS FOR P-7, P-8, DROPPED ROD STOP	CHANNEL III OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. CHANNEL III DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME 1/3 ON REMAINING CHANNELS

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ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.3.01.2	NE 1206A DETECTOR	SIGNAL LOW	LOW SUBCHANNEL FLUX SIGNAL (LOOP CURRENT) TO SHUNT TO CHANNEL III: SUMMING AMP TO LEVEL AMP TO ANALOG OUTPUTS LAG AMP, B/S AMPS FOR P-7, P-8, OVERPOWER TRIPS, AND ROD STOPS. NEGATIVE RATE SIGNAL MAY CAUSE DROPPED ROD ROD STEP	(SAME AS 4.3.1.1)	REDUNDANT CHANNELS FOR OVERPOWER TRIPS ARE DROPPED ROD STOP, NONE REQUIRED FOR P-7, P-8	CHANNEL III OVERPOWER AND DROPPED ROD STOP DISABLED, LOGIC BECOMES 2/3 AND 1/3 2/3 ON REMAINING CHANNELS	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME
4.3.02.1	NE 1206A SHUNT	OPEN	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)
4.3.02.2	NE 1206A SHUNT	SHORT	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)
4.3.03.1	NE 1206B	SIGNAL HIGH	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)
4.3.03.2	NE 1206B	SIGNAL LOW	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)
4.3.04.1	NE 1206B SHUNT	OPEN	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)
4.3.04.2	NE 1206B SHUNT	SHORT	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)
4.3.05.1	NE 1206A&B HIGH VOLTS HIGH VOLTAGE SUPPL	HIGH	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)
4.3.05.2	NE 1206A&B HIGH VOLTS ZERO VOLTAGE SUPPL	HIGH	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)
4.3.06.1	SUMMING AMP III	OPEN	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)
4.3.06.2	SUMMING AMP III	SHORT	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)
4.3.07.1	LEVEL AMP III	INPUT OPEN	LOW CHANNEL III FLUX SIGNAL TO ANALOG OUTPUTS, LAG AMP, B/S AMPS FOR P-7, P-8, OVERPOWER TRIPS AND ROD STOPS	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)
4.3.07.2	LEVEL AMP III	INPUT SHORT	(SAME AS 4.3.7.1) LOOP CURRENT MAY INCREASE AND RESULT IN HIGH RATE SIGNAL TO ROD CONTROL I/N-48A AND DIFFERENTIATOR	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)
4.3.07.3	LEVEL AMP III	OUTPUT HIGH	HIGH CHANNEL III FLUX SIGNAL TO ANALOG OUTPUTS, LAG AMP, B/S AMPS FOR P-7, P-8, OVERPOWER TRIPS AND ROD STOPS	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)
4.3.07.4	LEVEL AMP III	OUTPUT LOW	(SAME AS 4.3.7.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)
4.3.07.5	LEVEL AMP III	TEST	(SAME AS 4.3.7.1)	ANNUNCIATION (NA-1200-1)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2) TEST/CALIBRATE SWITCH
4.3.08.1	NI 43A	INPUT OPEN	LOSS OF % FP INDICATION FOR NE-1206	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	
4.3.08.2	NI 43A	INPUT SHORT	(SAME AS 4.3.7.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2)	(SAME AS 4.3.1.2) DRAWER INDICATOR, BOUNDS SHORT IN INPUT OF ANY OTHER CHANNEL III DEVICES ON LEVEL AMP OUTPUT
4.3.09.1	NC-43P BISTABLE	TRIPPED	CHANNEL III LOW-RANGE OVERPOWER TRIP SIGNAL TO COINCIDENTOR VIA RANGE SWITCH NCS-1200-1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	IF LOW RANGE SELECTED, CHANNEL III OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. IF MID OR HI RANGE, NO EFFECT	0-10% POWER RANGE OVERPOWER BISTABLE
4.3.09.2	NC-43P BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CH III OVERPOWER RELAYS IN COINCIDENTOR WHEN NCS-1200-1 IS IN LOW RANGE	PERIODIC TESTING	IF LOW RANGE SELECTED, REDUNDANT CHANNELS. IF MID OR HI RANGE, NONE REQUIRED	IF LOW RANGE SELECTED, CHANNEL III OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS. IF MID OR HI RANGE, NO EFFECT	
4.3.10.1	NC-43J BISTABLE	TRIPPED	CHANNEL III MID-RANGE OVERPOWER TRIP SIGNAL TO COINCIDENTOR VIA RANGE SWITCH NCS-1200-1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	IF MID RANGE SELECTED, CHANNEL III OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. IF LOW OR HI RANGE, NO EFFECT	10-70% POWER RANGE OVERPOWER BISTABLE
4.3.10.2	NC-43J BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CH III OVERPOWER RELAYS IN COINCIDENTOR WHEN NCS-1200-1 IS IN MID RANGE	PERIODIC TESTING	IF MID RANGE SELECTED, REDUNDANT CHANNELS. IF LOW OR HI RANGE, NONE REQUIRED	IF MID RANGE SELECTED, CHANNEL III OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS. IF LOW OR HI RANGE, NO EFFECT	

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ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.3.11.1	NC-43R BISTABLE	TRIPPED	CHANNEL III HI-RANGE OVERPOWER TRIP SIGNAL TO COINCIDENTOR VIA RANGE SWITCH NCS-1200-1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	IF HI RANGE SELECTED, CHANNEL III OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. IF LOW OR MID RANGE, NO EFFECT	70-120% POWER RANGE OVERPOWER BISTABLE AMP
4.3.11.2	NC-43R BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CH III OVERPOWER RELAYS IN COINCIDENTOR WHEN NCS-1200-1 IS IN HI RANGE	PERIODIC TESTING	IF HI RANGE SELECTED, REDUNDANT CHANNELS. IF LOW OR MID RANGE, NONE REQUIRED	IF HI RANGE SELECTED, CHANNEL III OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS. IF LOW OR MID RANGE, NO EFFECT	
4.3.12.1	NC-43M BISTABLE	TRIPPED	CHANNEL III P-7 RELAY IN COINCIDENTOR ACTUATED	ANNUNCIATION	REDUNDANT CHANNELS FOR P-7 DEFEAT	P-7 DEFEAT LOGIC BECOMES 2/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	P-7 BISTABLE AMP
4.3.12.2	NC-43M BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO ACTUATE CH III P-7 RELAYS IN COINCIDENTOR	PERIODIC TESTING	REDUNDANT CHANNELS FOR P-7 SUR SCRAM CUT-IN	P-7 DEFEAT LOGIC BECOMES 1/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	
4.3.13.1	NC-43N BISTABLE	TRIPPED	CHANNEL III P-8 RELAY IN COINCIDENTOR ACTUATED	ANNUNCIATION	REDUNDANT CHANNELS FOR P-8 DEFEAT	P-8 DEFEAT LOGIC BECOMES 2/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	P-8 BISTABLE AMP
4.3.13.2	NC-43N BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO ACTUATE CH III P-8 RELAYS IN COINCIDENTOR	PERIODIC TESTING	NONE REQUIRED	P-8 DEFEAT LOGIC BECOMES 1/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	
4.3.14.1	NC-43K BISTABLE	TRIPPED	CHANNEL III DROPPED ROD STOP SIGNAL TO COINCIDENTOR	ANNUNCIATION	NONE REQUIRED	ROD STOP	
4.3.14.2	NC-43K BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CHANNEL III DROPPED ROD STOP RELAYS IN COINCIDENTOR (SAME AS 4.3.7.3)	PERIODIC TEST	REDUNDANT CHANNELS	CHANNEL III DROPPED ROD STOP DISABLED, LOGIC 1/3 ON REMAINING CHANNELS (SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)
4.3.15.1	N 1206 LOW VOLTAGE SUPR	VOLTS HIGH		(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)
4.3.15.2	N 1206 LOW VOLTAGE SUPR	VOLTS ZERO	LOSS OF POWER TO CHANNEL III OVERPOWER, P-7, P-8 AND ROD STOP BISTABLES.	ANNUNCIATION	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)	(SAME AS 4.3.1.1)
4.3.16.1	NC-43PJRTA1 & NC-43PJRTB1	TRIPPED	CHANNEL III OVERPOWER TRIP SIGNAL IN COINCIDENTOR	ANNUNCIATION (NCS-1200-6)	NONE REQUIRED	CHANNEL III OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS	
4.3.16.2	NC-43PJRTA1 & NC-43PJRTB1	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL III OVERPOWER TRIP IN COINCIDENTOR	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS	
4.3.17.1	NC-43MTA1 & NC-43MTB1	TRIPPED	CHANNEL III P-7 ACTUATION SIGNAL IN COINCIDENTOR	(SAME AS 4.3.12.1)	(SAME AS 4.3.12.1)	(SAME AS 4.3.12.1)	P-7 RELAYS
4.3.17.2	NC-43MTA1 & NC-43MTB1	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL III P-7 ACTUATION IN COINCIDENTOR	(SAME AS 4.3.12.2)	(SAME AS 4.3.12.2)	(SAME AS 4.3.12.2)	
4.3.18.1	NC-43NTA1 & NC-43NTB1	TRIPPED	CHANNEL III P-8 ACTUATION SIGNAL IN COINCIDENTOR	(SAME AS 4.3.13.1)	(SAME AS 4.3.13.1)	(SAME AS 4.3.13.1)	P-8 RELAYS
4.3.18.2	NC-43NTA1 & NC-43NTB1	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL III P-8 ACTUATION IN COINCIDENTOR	(SAME AS 4.3.13.2)	(SAME AS 4.3.13.2)	(SAME AS 4.3.13.2)	
4.3.19.1	NC-43PJRXA1&2 & NC-43PJRXB1&2	TRIPPED	CHANNEL III OVERPOWER TRIP IN COINCIDENTOR	(SAME AS 4.3.16.1)	(SAME AS 4.3.16.1)	(SAME AS 4.3.16.1)	BOTH OVERPOWER SCRAM COINCIDENTOR A & B RELAYS MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.3.19.2	NC-43PJRXA1&2 & NC-43PJRXB1&2	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL III OVERPOWER TRIP IN COINCIDENTOR	(SAME AS 4.3.16.2)	(SAME AS 4.3.16.2)	(SAME AS 4.3.16.2)	
4.3.20.1	NC-43MXA & NC-43MYB	TRIPPED	CHANNEL III P-7 TRIP IN COINCIDENTOR	(SAME AS 4.3.17.1)	(SAME AS 4.3.17.1)	(SAME AS 4.3.17.1)	BOTH P-7 COINCIDENTOR A & B RELAYS MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.3.20.2	NC-43MXA & NC-43MYB	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL III P-7 ACTUATION IN COINCIDENTOR	(SAME AS 4.3.17.2)	(SAME AS 4.3.17.2)	(SAME AS 4.3.17.2)	
4.3.21.1	NC-43NXA & NC-43NXB	TRIPPED	CHANNEL III P-8 TRIP IN COINCIDENTOR	(SAME AS 4.3.18.1)	(SAME AS 4.3.18.1)	(SAME AS 4.3.18.1)	BOTH P-8 COINCIDENTOR A & B RELAYS MUST TRIP FOR CHANNEL TO OCCUR
4.3.21.2	NC-43NXA & NC-43NXB	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL III P-8 ACTUATION IN COINCIDENTOR	(SAME AS 4.3.18.2)	(SAME AS 4.3.18.2)	(SAME AS 4.3.18.2)	(SAME AS 4.3.18.2)

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ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.3.22.1	NC-43KXA & NC-43KXB	TRIPPED	CHANNEL III DROPPED ROD STOP IN COINCIDENTOR	ANNUNCIATION	NONE REQUIRED	ROD STOP	BOTH DROPPED ROD STOP A & B RELAYS MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.3.22.2	NC-43KXA & NC-43KXB	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL III DROPPED ROD STOP IN COINCIDENTOR	PERIODIC TEST	REDUNDANT CHANNELS	CHANNEL III DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS	
4.3.23.1	REG SUPL III (NIS)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO CHANNEL III (N-1208) HIGH AND LOW VOLTAGE SUPPLIES.	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED FOR OVERPOWER TRIPS, REDUNDANT CHANNELS FOR P-7, P-8, DROPPED ROD STOP	CHANNEL III OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. CHANNEL III DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME 1/3 ON REMAINING CHANNELS
4.4.01.1	NE 1208A	SIGNAL HIGH	HIGH SUBCHANNEL FLUX SIGNAL (LOOP CURRENT) TO SHUNT TO CHANNEL IV: SUMMING AMP TO LEVEL AMP TO ANALOG OUTPUTS, LAG AMP, B/S AMPS FOR P-7, P-8, OVERPOWER TRIPS AND ROD STOPS	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED FOR OVERPOWER TRIPS, REDUNDANT CHANNELS FOR P-7, P-8, DROPPED ROD STOP	CHANNEL IV OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. CHANNEL IV DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 IN REMAINING CHANNELS	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME 1/3 ON REMAINING CHANNELS
4.4.01.2	NE 1208A	SIGNAL LOW	LOW SUBCHANNEL FLUX SIGNAL (LOOP CURRENT) TO SHUNT TO CHANNEL IV: SUMMING AMP TO LEVEL AMP TO ANALOG OUTPUTS, LAG AMP, B/S AMPS FOR P-7, P-8, OVERPOWER TRIPS AND ROD STOPS. NEGATIVE RATE SIGNAL MAY CAUSE DROPPED ROD STOP	(SAME AS 4.4.1.1)	REDUNDANT CHANNELS FOR OVERPOWER TRIPS AND DROPPED ROD STOP, NONE REQUIRED FOR P-7, P-8	CHANNEL IV OVERPOWER AND DROPPED ROD STOP DISABLED, LOGIC BECOMES 2/3 AND 1/3 2/3 ON REMAINING CHANNELS RESPECTIVELY ON REMAINING CHANNELS	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME 1/3 ON REMAINING CHANNELS
4.4.02.1	NE 1208A SHUNT	OPEN	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)
4.4.02.2	NE 1208A SHUNT	SHORT	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)
4.4.03.1	NE 1208B	SIGNAL HIGH	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)
4.4.03.2	NE 1208B	SIGNAL LOW	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)
4.4.04.1	NE 1208B SHUNT	OPEN	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)
4.4.04.2	NE 1208B SHUNT	SHORT	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)
4.4.05.1	NE 1208A&B HIGH VOLTS HIGH VOLTAGE SUPL	HIGH	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)
4.4.05.2	NE 1208A&B HIGH VOLTS ZERO VOLTAGE SUPL	HIGH	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)
4.4.06.1	SUMMING AMP IV	OPEN	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)
4.4.06.2	SUMMING AMP IV	SHORT	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)
4.4.07.1	LEVEL AMP IV	INPUT OPEN	LOW CHANNEL IV FLUX SIGNAL TO ANALOG OUTPUTS, LAG AMP, B/S AMPS FOR P-7, P-8, OVERPOWER TRIPS AND ROD STOPS	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)
4.4.07.2	LEVEL AMP IV	INPUT SHORT	(SAME AS 4.4.7.1) LOOP CURRENT MAY INCREASE, RESULTING IN HIGH RATE SIGNAL TO ROD CONTROL VIA I/N-48A AND DIFFERENTIATOR	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)
4.4.07.3	LEVEL AMP IV	OUTPUT HIGH	HIGH CHANNEL IV FLUX SIGNAL TO ANALOG OUTPUTS, LAG AMP, B/S LAMPS FOR P-7, P-8, OVERPOWER TRIPS AND ROD STOPS	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)
4.4.07.4	LEVEL AMP IV	OUTPUT LOW	(SAME AS 4.4.7.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)
4.4.07.5	LEVEL AMP IV	TEST	(SAME AS 4.4.7.1)	ANNUNCIATION (NA-1200-1)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2)	(SAME AS 4.4.1.2) TEST/CALIBRATE SWITCH
4.4.08.1	NI 44A	INPUT OPEN	LOSS OF X FP INDICATION FOR NE-1208	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	
4.4.08.2	NI 44A	INPUT SHORT	(SAME AS 4.4.7.1)	(SAME AS 4.4.7.1)	(SAME AS 4.4.7.1)	(SAME AS 4.4.7.1)	(SAME AS 4.4.7.1) BOUNDS SHORT IN INPUT OF ANY OTHER CHANNEL IV DEVICES ON LEVEL AMP OUTPUT

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
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TABLE 4: NIS SCRAMS AND PERMISSIVES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.4.09.1	NC-44P BISTABLE	TRIPPED	CHANNEL IV LOW-RANGE OVERPOWER TRIP SIGNAL TO COINCIDENTOR VIA RANGE SWITCH NCS-1200-1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	IF LOW RANGE SELECTED, CHANNEL IV OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. IF MID OR HI RANGE, NO EFFECT	0-10% POWER RANGE OVERPOWER BISTABLE AMP
4.4.09.2	NC-44P BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CHANGE IV OVERPOWER RELAYS IN COINCIDENTOR WHEN NCS-1200-1 IS IN LOW RANGE	PERIODIC TESTING	IF LOW RANGE SELECTED, REDUNDANT CHANNELS. IF MID OR HI RANGE, NONE REQUIRED	IF LOW RANGE SELECTED, CHANNEL IV OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS. IF MID OR HI RANGE, NO EFFECT	
4.4.10.1	NC-44J BISTABLE	TRIPPED	CHANNEL IV MID-RANGE OVERPOWER TRIP SIGNAL TO COINCIDENTOR VIA RANGE SWITCH NCS-1200-1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	IF MID RANGE SELECTED, CHANNEL IV OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. IF LOW OR HI RANGE, NO EFFECT	10-70% POWER RANGE OVERPOWER BISTABLE AMP
4.4.10.2	NC-44J BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CHANNEL IV OVERPOWER RELAYS IN COINCIDENTOR WHEN NCS-1200-1 IS IN MID RANGE	PERIODIC TESTING	IF MID RANGE SELECTED, REDUNDANT CHANNELS. IF LOW OR HI RANGE, NONE REQUIRED	IF MID RANGE SELECTED, CHANNEL IV OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS. IF LOW OR HI RANGE, NO EFFECT	
4.4.11.1	NC-44R BISTABLE	TRIPPED	CHANNEL IV HI-RANGE OVERPOWER TRIP SIGNAL TO COINCIDENTOR VIA RANGE SWITCH NCS-1200-1	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	IF HI RANGE SELECTED, CHANNEL IV OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. IF LOW OR MID RANGE, NO EFFECT	70-120% POWER RANGE OVERPOWER BISTABLE AMP
4.4.11.2	NC-44R BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CHANNEL IV OVERPOWER RELAYS IN COINCIDENTOR WHEN NCS-1200-1 IS IN HI RANGE	PERIODIC TESTING	IF HI RANGE SELECTED, REDUNDANT CHANNELS. IF LOW OR MID RANGE, NONE REQUIRED	IF HI RANGE SELECTED, CHANNEL IV OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS. IF LOW OR MID RANGE, NO EFFECT	
4.4.12.1	NC-44M BISTABLE	TRIPPED	CHANNEL IV P-7 RELAYS ACTUATED IN COINCIDENTOR	ANNUNCIATION	REDUNDANT CHANNELS FOR P-7 DEFEAT	P-7 DEFEAT LOGIC BECOMES 2/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	P-7 BISTABLE AMP
4.4.12.2	NC-44M BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO ACTUATE CHANNEL IV P-7 RELAYS IN COINCIDENTOR	PERIODIC TESTING	REDUNDANT CHANNELS FOR P-7 SUR SCRAM CUT-IN	P-7 DEFEAT LOGIC BECOMES 1/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	
4.4.13.1	NC-44N BISTABLE	TRIPPED	CHANNEL IV P-8 RELAYS ACTUATED IN COINCIDENTOR	ANNUNCIATION	REDUNDANT CHANNELS FOR P-8 DEFEAT	P-8 DEFEAT LOGIC BECOMES 2/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	P-8 BISTABLE AMP
4.4.13.2	NC-44N BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO ACTUATE CHANNEL IV P-8 RELAYS IN COINCIDENTOR	PERIODIC TESTING	NONE REQUIRED	P-8 DEFEAT LOGIC BECOMES 1/3, ALL SCRAM FUNCTIONS REMAIN UNAFFECTED	
4.4.14.1	NC-44K BISTABLE	TRIPPED	CHANNEL IV DROPPED ROD STOP SIGNAL TO COINCIDENTOR	ANNUNCIATION	NONE REQUIRED	ROD STOP	
4.4.14.2	NC-44K BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CHANNEL IV DROPPED ROD STOP RELAYS IN COINCIDENTOR (SAME AS 4.4.7.3)	PERIODIC TEST	REDUNDANT CHANNELS	CHANNEL IV DROPPED ROD STOP DISABLED LOGIC BECOMES 1/3 ON REMAINING CHANNELS (SAME AS 4.1.1.1)	
4.4.15.1	N 1208 LOW VOLTAGE SUPL	VOLTS HIGH		(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.1)
4.4.15.2	N 1208 LOW VOLTAGE SUPL	VOLTS ZERO	LOSS OF POWER TO CHANNEL IV OVERPOWER, P-7, P-8 AND ROD STOP BISTABLES.	ANNUNCIATION	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)	(SAME AS 4.4.1.1)
4.4.16.1	NC-44PJRTA1 & NC-44PJRTB1	TRIPPED	CHANNEL IV OVERPOWER TRIP SIGNAL IN COINCIDENTOR	ANNUNCIATION (NCS-1200-6)	NONE REQUIRED	CHANNEL IV OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS	
4.4.16.2	NC-44PJRTA1 & NC-44PJRTB1	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL IV OVERPOWER TRIP IN COINCIDENTOR	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL IV OVERPOWER DISABLED, LOGIC BECOMES 2/3 ON REMAINING CHANNELS	
4.4.17.1	NC-44MTA1 & NC-44MTB1	TRIPPED	CHANNEL IV P-7 ACTUATION SIGNAL IN COINCIDENTOR	(SAME AS 4.4.12.1)	(SAME AS 4.4.12.1)	(SAME AS 4.4.12.1)	P-7 RELAYS
4.4.17.2	NC-44MTA1 & NC-44MTB1	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL IV P-7 ACTUATION IN COINCIDENTOR	(SAME AS 4.4.12.2)	(SAME AS 4.4.12.2)	(SAME AS 4.4.12.2)	

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ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.4.18.1	NC-44NTA1 & NC-44NTB1	TRIPPED	CHANNEL IV P-8 ACTUATION SIGNAL IN COINCIDENTOR	(SAME AS 4.4.13.1)	(SAME AS 4.4.13.1)	(SAME AS 4.4.13.1)	P-8 RELAYS
4.4.18.2	NC-44NTA1 & NC-44NTB1	UNTRIPPED	CHANNEL IV P-8 ACTUATION SIGNAL IN COINCIDENTOR	(SAME AS 4.4.13.1)	(SAME AS 4.4.13.1)	(SAME AS 4.4.13.1)	
4.4.19.1	NC-44PJRXA1&2 & NC-44PJRXB1&2	TRIPPED	CHANNEL IV OVERPOWER TRIP IN COINCIDENTOR	(SAME AS 4.4.16.1)	(SAME AS 4.4.16.1)	(SAME AS 4.4.16.1)	BOTH OVERPOWER SCRAM COINCIDENTOR A & B RELAYS MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.4.19.2	NC-44PJRXA1&2 & NC-44PJRXB1&2	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL IV OVERPOWER TRIP IN COINCIDENTOR	(SAME AS 4.4.16.2)	(SAME AS 4.4.16.2)	(SAME AS 4.4.16.2)	
4.4.20.1	NC-44KXA & NC-44KXB	TRIPPED	CHANNEL IV P-7 TRIP IN COINCIDENTOR	(SAME AS 4.4.17.1)	(SAME AS 4.4.17.1)	(SAME AS 4.4.17.1)	BOTH P-7 COINCIDENTOR A & B RELAYS MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.4.20.2	NC-44KXA & NC-44KXB	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL IV P-7 ACTUATION IN COINCIDENTOR	(SAME AS 4.4.17.2)	(SAME AS 4.4.17.2)	(SAME AS 4.4.17.2)	
4.4.21.1	NC-44NXA & NC-44NXB	TRIPPED	CHANNEL IV P-8 TRIP IN COINCIDENTOR	(SAME AS 4.4.18.1)	(SAME AS 4.4.18.1)	(SAME AS 4.4.18.1)	BOTH P-8 COINCIDENTOR A & B RELAYS MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.4.21.2	NC-44NXA & NC-44NXB	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL IV P-8 ACTUATION IN COINCIDENTOR	(SAME AS 4.4.18.2)	(SAME AS 4.4.18.2)	(SAME AS 4.4.18.2)	(SAME AS 4.4.18.2)
4.4.22.1	NC-44KXA & NC-44KXB	TRIPPED	CHANNEL IV DROPPED ROD STOP IN COINCIDENTOR	ANNUNCIATION	NONE REQUIRED	ROD STOP	BOTH DROPPED ROD STOP A & B RELAYS MUST TRIP FOR CHANNEL ACTUATION TO OCCUR
4.4.22.2	NC-44KXA & NC-44KXB	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL IV DROPPED ROD STOP IN COINCIDENTOR	PERIODIC TEST	REDUNDANT CHANNELS	CHANNEL IV DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS	
4.4.23.1	REG SUPPL IV (NIS)	VOLTS ZERO OR GROUNDING	LOSS OF POWER TO CHANNEL IV (N-1208)	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED FOR OVERPOWER TRIPS, REDUNDANT CHANNELS FOR P-7, P-8, DROPPED ROD STOP	CHANNEL IV OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. CHANNEL IV DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME 1/3 ON REMAINING CHANNELS
4.5.01.1	NY 1203 AUX POWER SUPPLY	VOLTS HIGH	(SAME AS 4.1.3.1)	CONTROL ROOM INDICATION, PERIODIC TESTING	(SAME AS 4.1.3.1)	(SAME AS 4.1.3.1)	(SAME AS 4.1.3.1)
4.5.01.2	NY 1203B AUX POWER SUPPLY	VOLTS LOW	(SAME AS 4.1.3.2)	CONTROL ROOM INDICATION, PERIODIC TESTING	(SAME AS 4.1.3.2)	(SAME AS 4.1.3.2)	(SAME AS 4.1.3.2)
4.5.02.1	NY 1203B WIDE RANGE AMP	INPUT OPEN	(SAME AS 4.1.7.1)	(SAME AS 4.1.1.1)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)	(SAME AS 4.1.1.2)
4.5.02.2	NY 1203B WIDE RANGE AMP	INPUT SHORT	LOW CHANNEL I LOG POWER AND RATE SIGNALS TO ANALOG OUTPUTS, RATE AMP, N-1201 HIGH VOLTAGE PERMISSIVE, INDICATION. LOOP CURRENT MAY INCREASE TO LEVEL AMP I	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I HIGH SUR DISABLED, LOGIC BECOMES 1/1 ON REMAINING CHANNEL	HIGH SUR ROD STOP LOGIC BECOMES 1/1 ON REMAINING CHANNEL.
4.5.02.3	NY 1203B WIDE RANGE AMP	LOG OUTPUT HIGH	HIGH CHANNEL I LOG POWER SIGNAL TO RECORDER, RATE AMP, N-1201 HIGH VOLTAGE PERMISSIVE, INDICATION. HIGH RATE SIGNAL MAY OCCUR DURING FAILURE TRANSIENT	(SAME AS 4.5.2.2)	(SAME AS 4.5.2.2)	(SAME AS 4.5.2.2) REACTOR TRIP MAY OCCUR DURING FAILURE TRANSIENT IF P-7 IS ON	(SAME AS 4.5.2.2) HIGH SUR ROD STOP MAY OCCUR DURING FAILURE TRANSIENT IF P-7 IS ON
4.5.02.4	NY 1203B WIDE RANGE AMP	LOG OUTPUT LOW	(SAME AS 4.5.2.2)	(SAME AS 4.5.2.2)	(SAME AS 4.5.2.2)	(SAME AS 4.5.2.2)	(SAME AS 4.5.2.2)
4.5.02.5	NY 1203B WIDE RANGE AMP	COUNTS OUTPUT HIGH	HIGH CPS SIGNAL TO ANALOG OUTPUTS	PERIODIC TEST	NONE REQUIRED	NONE	
4.5.02.6	NY 1203B WIDE RANGE AMP	COUNTS OUTPUT LOW	LOW CPS SIGNAL TO ANALOG OUTPUTS	PERIODIC TEST	NONE REQUIRED	NONE	
4.5.02.7	NY 1203B WIDE RANGE AMP	TEST	(SAME AS 4.5.2.2)	ANNUNCIATION (NA-1200-1)	(SAME AS 4.5.2.2)	(SAME AS 4.5.2.2)	(SAME AS 4.5.2.2) TEST/CALIBRATE SWITCH

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TABLE 4: NIS SCRAMS AND PERMISSIVES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.5.03.1	NI 35A (LOS)	INPUT OPEN	LOSS OF CHANNEL II INTERMEDIATE RANGE POWER INDICATION (SAME AS 4.5.2.2)	CONTROL ROOM INDICATION, PERIODIC TESTING (SAME AS 4.5.2.2)	NONE REQUIRED	NONE	DRAWER INDICATION (SAME AS 4.5.2.2)
4.5.03.2	NI 35A (LOS)	INPUT SHORT			(SAME AS 4.5.2.2)	(SAME AS 4.5.2.2)	(SAME AS 4.5.2.2)
4.5.04.1	RATE AMP I	INPUT OPEN	LOW CHANNEL I RATE SIGNAL TO INDICATION, B/S AMPS FOR HIGH SUR TRIP AND ROD STOP (SAME AS 4.5.2.2)	CONTROL ROOM INDICATION (SAME AS 4.5.2.2)	REDUNDANT CHANNELS	CHANNEL I HIGH SUR DISABLED, LOGIC BECOMES 1/1 ON REMAINING CHANNEL (SAME AS 4.5.2.2)	HIGH SUR ROD STOP LOGIC BECOMES 1/1 ON REMAINING CHANNEL (SAME AS 4.5.2.2)
4.5.04.2	RATE AMP I	INPUT SHORT			(SAME AS 4.5.2.2)	(SAME AS 4.5.2.2)	(SAME AS 4.5.2.2)
4.5.04.3	RATE AMP I	OUTPUT HIGH	HIGH CHANNEL I RATE SIGNAL TO INDICATION, B/S AMPS FOR HIGH SUR TRIP AND ROD STOP	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	HIGH SUR REACTOR TRIP IF P-7 IS ON	HIGH SUR ROD STOP IF P-7 IS ON
4.5.04.4	RATE AMP I	OUTPUT LOW	LOW CHANNEL I RATE SIGNAL TO INDICATION, B/S AMPS FOR HIGH SUR TRIP AND ROD STOP	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNEL	CHANNEL I HIGH SUR DISABLED, LOGIC BECOMES 1/1 ON REMAINING CHANNEL	CHANNEL I HIGH SUR ROD STOP DISABLED, LOGIC BECOMES 1/1 ON REMAINING CHANNEL
4.5.06.1	NC-35F BISTABLE	TRIPPED	CHANNEL I HIGH SUR TRIP SIGNAL TO COINCIDENTOR	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	HIGH SUR REACTOR TRIP IF P-7 IS ON	
4.5.06.2	NC-35F BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CHANNEL I HIGH SUR RELAYS IN COINCIDENTOR (SAME AS 4.5.2.3)	PERIODIC TESTING (SAME AS 4.5.2.3)	(SAME AS 4.5.4.4)	(SAME AS 4.5.4.4)	(SAME AS 4.5.2.3)
4.5.07.1	N 1203 LOW VOLTAGE SUPPL	VOLTS HIGH			(SAME AS 4.5.2.3)	(SAME AS 4.5.2.3)	(SAME AS 4.5.2.3)
4.5.07.2	N 1203 LOW VOLTAGE SUPPL	VOLTS ZERO	LOSS OF POWER TO CHANNEL I (N-1203) HIGH SUR TRIP AND ROD STOP BISTABLES.	ANNUNCIATION	NONE REQUIRED	HIGH SUR REACTOR TRIP IF P-7 IS ON	HIGH SUR ROD STOP IF P-7 IS ON
4.5.08.1	NC-35FTA1 & NC-35FTB1	TRIPPED	CHANNEL I HIGH SUR TRIP SIGNAL IN COINCIDENTOR	(SAME AS 4.5.6.1)	(SAME AS 4.5.6.1)	(SAME AS 4.5.6.1)	
4.5.08.2	NC-35FTA1 & NC-35FTB1	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL I HIGH SUR TRIP IN COINCIDENTOR	PERIODIC TESTING	(SAME AS 4.5.4.4)	(SAME AS 4.5.4.4)	
4.5.09.1	NC-35FXA & NC-35FXB	TRIPPED	CHANNEL I HIGH SUR TRIP IN COINCIDENTOR	(SAME AS 4.5.6.1)	(SAME AS 4.5.6.1)	(SAME AS 4.5.6.1)	BOTH HIGH SUR SCRAM COINCIDENTOR A & B RELAYS MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.5.09.2	NC-35FXA & NC-35FXB	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL I HIGH SUR TRIP IN COINCIDENTOR (SAME AS 4.2.3.1)	(SAME AS 4.5.6.2)	(SAME AS 4.5.6.2)	(SAME AS 4.5.6.2)	(SAME AS 4.2.3.1)
4.6.01.1	NY 1204B AUX POWER SUPPLY	VOLTS HIGH		CONTROL ROOM INDICATION, PERIODIC TESTING	(SAME AS 4.2.3.1)	(SAME AS 4.2.3.1)	(SAME AS 4.2.3.1)
4.6.01.2	NY 1204B AUX POWER SUPPLY	VOLTS HIGH	(SAME AS 4.2.3.2)	CONTROL ROOM INDICATION, PERIODIC TESTING	(SAME AS 4.2.3.2)	(SAME AS 4.2.3.2)	(SAME AS 4.2.3.2)
4.6.02.1	NY 1204B WIDE RANGE AMP	INPUT OPEN	(SAME AS 4.3.7.1)	CONTROL ROOM INDICATION, PERIODIC TESTING (SAME AS 4.2.1.1)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2)	(SAME AS 4.2.1.2)
4.6.02.2	NY 1204B WIDE RANGE AMP	INPUT SHORT	LOW CHANNEL II LOG POWER SIGNAL TO ANALOG OUTPUTS, RATE AMP, N-1202 HIGH VOLTAGE PERMISSIVE, INDICATION. LOOP CURRENT MAY INCREASE TO LEVEL AMP II	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II HIGH SUR DISABLED, LOGIC BECOMES 1/1 ON REMAINING CHANNEL	HIGH SUR ROD STOP LOGIC BECOMES 1/1 ON REMAINING CHANNEL.
4.6.02.3	NY 1204B WIDE RANGE AMP	OUTPUT HIGH	HIGH CHANNEL II LOG POWER SIGNAL TO RECORDER, RATE AMP, N-1202 HIGH VOLTAGE PERMISSIVE, INDICATION. HIGH RATE SIGNAL MAY OCCUR DURING FAILURE TRANSIENT	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2) REACTOR TRIP MAY OCCUR DURING FAILURE TRANSIENT IF P-7 IS ON	HIGH SUR ROD STOP MAY OCCUR DURING FAILURE TRANSIENT IF P-7 IS ON
4.6.02.4	NY 1204B WIDE RANGE AMP	OUTPUT LOW	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2)
4.6.02.5	NY 1204B WIDE RANGE AMP	COUNTS OUTPUT HIGH	HIGH CPS SIGNAL TO ANALOG OUTPUTS	PERIODIC TEST	NONE REQUIRED	NONE	
4.6.02.6	NY 1204B WIDE RANGE AMP	COUNTS OUTPUT LOW	LOW CPS SIGNAL TO ANALOG OUTPUTS	PERIODIC TEST	NONE REQUIRED	NONE	

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4.6.02.7	NY 1204B WIDE RANGE AMP	TEST	(SAME AS 4.6.2.2)	ANNUNCIATION (NA-1200-1)	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2) TEST/CALIBRATE SWITCH
4.6.03.1	NI 36A (LOS)	INPUT OPEN	LOSS OF CHANNEL II INTERMEDIATE RANGE POWER INDICATION	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED	NONE	DRAWER INDICATION
4.6.03.2	NI 36A (LOS)	INPUT SHORT	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2)
4.6.04.1	RATE AMP II	INPUT OPEN	LOW CHANNEL II RATE SIGNAL TO INDICATION, B/S AMPS FOR HIGH SUR TRIP AND ROD STOP	CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL II HIGH SUR DISABLED, LOGIC BECOMES 1/1 ON REMAINING CHANNEL	HIGH SUR ROD STOP LOGIC BECOMES 1/1 ON REMAINING CHANNEL
4.6.04.2	RATE AMP II	INPUT SHORT	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2)	(SAME AS 4.6.2.2)
4.6.04.3	RATE AMP II	OUTPUT HIGH	HIGH CHANNEL II RATE SIGNAL TO INDICATION, B/S AMPS FOR HIGH SUR TRIP AND ROD STOP	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	HIGH SUR REACTOR TRIP IF P-7 IS ON	HIGH SUR ROD STOP IF P-7 IS ON
4.6.04.4	RATE AMP II	OUTPUT LOW	LOW CHANNEL II RATE SIGNAL TO INDICATION, B/S AMPS FOR HIGH SUR TRIP AND ROD STOP	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNEL	CHANNEL II HIGH SUR DISABLED, LOGIC BECOMES 1/1 ON REMAINING CHANNEL	CHANNEL II HIGH SUR ROD STOP DISABLED, LOGIC BECOMES 1/1 ON REMAINING CHANNEL
4.6.06.1	NC-36F BISTABLE	TRIPPED	CHANNEL II HIGH SUR TRIP SIGNAL TO COINCIDENTOR	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	HIGH SUR REACTOR TRIP IF P-7 IS ON	
4.6.06.2	NC-36F BISTABLE	UNTRIPPED	LOSS OF CAPABILITY TO TRIP CHANNEL II HIGH SUR RELAYS IN COINCIDENTOR	PERIODIC TESTING	(SAME AS 4.6.4.4)	(SAME AS 4.6.4.4)	
4.6.07.1	N 1204 LOW VOLTAGE SUPPL	VOLTS HIGH	(SAME AS 4.6.2.3)	(SAME AS 4.6.2.3)	(SAME AS 4.6.2.3)	(SAME AS 4.6.2.3)	(SAME AS 4.6.2.3)
4.6.07.2	N 1204 LOW VOLTAGE SUPPL	VOLTS ZERO	LOSS OF POWER TO CHANNEL II (N-1204) HIGH SUR TRIP AND ROD STOP BISTABLES.	ANNUNCIATION	NONE REQUIRED	HIGH SUR REACTOR TRIP RELAY P-7 IS ON	HIGH SUR ROD STOP IF P-7 IS ON
4.6.08.1	NC-36FTA1 & NC-36FTB1	TRIPPED	CHANNEL II HIGH SUR TRIP SIGNAL IN COINCIDENTOR	(SAME AS 4.6.6.1)	(SAME AS 4.6.6.1)	(SAME AS 4.6.6.1)	
4.6.08.2	NC-36FTA1 & NC-36FTB1	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL II HIGH SUR TRIP IN COINCIDENTOR	PERIODIC TESTING	(SAME AS 4.6.4.4)	(SAME AS 4.6.4.4)	
4.6.09.1	NC-36FXA & NC-36FXB	TRIPPED	CHANNEL II HIGH SUR TRIP IN COINCIDENTOR	(SAME AS 4.6.6.1)	(SAME AS 4.6.6.1)	(SAME AS 4.6.6.1)	BOTH HIGH SUR SCRAM COINCIDENTOR A & B RELAYS MUST TRIP FOR CHANNEL TRIP TO OCCUR
4.6.09.2	NC-36FXA & NC-36FXB	UNTRIPPED	LOSS OF CAPABILITY FOR CHANNEL II HIGH SUR TRIP IN COINCIDENTOR	(SAME AS 4.6.6.2)	(SAME AS 4.6.6.2)	(SAME AS 4.6.6.2)	
4.7.01.1	PT 415	SIGNAL HIGH	HIGH FIRST STAGE TURBINE PRESSURE TO P-7, P-8, INPUT BISTABLES, ROD CONTROL SYSTEM (T-REF) AND INDICATOR	CONTROL ROOM INDICATION, PERIODIC TESTING	PC-415-X (WILL INTERRUPT CURRENT LOOP UPON TURBINE TRIP) FOR UN-P7 DEFEAT	REDUCED REDUNDANCY AGAINST HIGH SUR TRIP REMAIN OPERABLE AS REQUIRED	P-7 AND P-8 DEFEATED UNTIL TURBINE TRIPPED
4.7.01.2	PT 415	SIGNAL LOW	LOW FIRST STAGE TURBINE PRESSURE TO P-7, P-8 INPUT BISTABLES, ROD CONTROL SYSTEM (T-REF) AND INDICATOR	CONTROL ROOM INDICATION, PERIODIC TESTING	NIS CHANNELS FOR P-7, P-8 DEFEAT, NONE REQUIRED FOR UN-P7 DEFEAT	REDUCED REDUNDANCY FOR P-7, P-8 ALL SCRAM FUNCTIONS REMAIN OPERABLE AS REQUIRED	
4.7.02.1	DI 415	INPUT OPEN	(SAME AS 4.7.1.2)	CONTROL ROOM INDICATION	(SAME AS 4.7.1.2)	(SAME AS 4.7.1.2)	IN PT-415 CURRENT LOOP
4.7.02.2	DI 415	INPUT SHORT	LOSS OF FIRST STAGE PRESSURE INDICATION	(SAME AS 4.7.1.2)	NONE REQUIRED	NONE	
4.7.03.1	PC 415-X1	ON	(SAME AS 4.7.1.2)	(SAME AS 4.7.1.2)	(SAME AS 4.7.1.2)	(SAME AS 4.7.1.2)	ENERGIZED ON 2/3 LOW TURBINE AUTOSTOP OIL PRESSURE
4.7.03.2	PC 415-X1	OFF	NO EFFECT. NORMAL POSITION DURING TURBINE OPERATION	PERIODIC TESTING	PT-415 (WILL PROVIDE LOW SIGNAL) FOR UN-P7 DEFEAT	(SAME AS 4.7.1.1)	
4.7.04.1	TC 415	INPUT OPEN	(SAME AS 4.7.1.2)	CONTROL ROOM INDICATION	(SAME AS 4.7.1.2)	(SAME AS 4.7.1.2)	IN PT-415 CURRENT LOOP. PROVIDES T-REF SIGNAL TO ROD CONTROL SYSTEM
4.7.04.2	TC 415	INPUT SHORT	NO EFFECT	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	LOSS OF T-REF INPUT TO ROD CONTROL SYSTEM

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS

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TABLE 4: NIS SCRAMS AND PERMISSIVES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.7.05.1	OC 415A	TRIPPED	LOW FIRST STAGE TURBINE PRESSURE CONTACTS OPENED FOR AP4A, AP4C (P-7), CLOSED FOR AP4B, AP4D (UN-P7).	ANNUNCIATION, PERIODIC TESTING	NIS CHANNELS FOR UN-P7 DEFEAT, NONE REQUIRED FOR P-7 DEFEAT	(SAME AS 4.7.1.1)	ON (AS-IS DURING POWER OPERATION)
4.7.05.2	OC 415A	UNTRIPPED	LOW FIRST STAGE TURBINE PRESSURE CONTACTS CLOSED FOR AP4A, AP4C (P-7), OPENED FOR AP4B, AP4D (UN-P7)	PERIODIC TESTING	NIS CHANNELS FOR P-7 DEFEAT, NONE REQUIRED FOR UN-P7 DEFEAT	REDUCED REDUNDANCY FOR P-7 DEFEAT, ALL SCRAM FUNCTIONS REMAIN OPERABLE AS REQUIRED	OFF
4.7.06.1	OC 415A-X	TRIPPED	(SAME AS 4.7.5.1)	(SAME AS 4.7.5.1)	(SAME AS 4.7.5.1)	(SAME AS 4.7.5.1)	ENERGIZED (AS-IS DURING POWER OPERATION)
4.7.06.2	OC 415A-X	UNTRIPPED	(SAME AS 4.7.5.2)	(SAME AS 4.7.5.2)	(SAME AS 4.7.5.2)	(SAME AS 4.7.5.2)	DE-ENERGIZED
4.7.07.1	OC 415C/D	INPUT OPEN	(SAME AS 4.7.1.2)	CONTROL ROOM INDICATION	(SAME AS 4.7.1.2)	(SAME AS 4.7.1.2)	IN PT-415 CURRENT LOOP
4.7.07.2	OC 415C/D	INPUT SHORT	NO EFFECT	PERIODIC TESTING	NONE REQUIRED	NONE	
4.7.08.1	OC 415E	TRIPPED	LOW FIRST STAGE PRESSURE CONTACTS OPENED FOR AP10A, AP10C (P-8)	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	P-8 DEFEATED, 1/3 LOW RCS FLOW TRIP REMAINS OPERABLE (CANNOT BE BYPASSED), ALL OTHER SCRAM FUNCTIONS REMAIN OPERABLE AS REQUIRED	ON (AS-IS DURING FULL POWER OPERATION)
4.7.08.2	OC 415E	UNTRIPPED	LOW FIRST STAGE PRESSURE CONTACTS CLOSED FOR AP10A, AP10C (P-8)	PERIODIC TESTING	NIS CHANNELS FOR P-8 DEFEAT	REDUCED REDUNDANCY FOR P-8 DEFEAT, ALL SCRAM FUNCTIONS REMAIN OPERABLE AS REQUIRED	OFF
4.7.09.1	OC 415E-X	TRIPPED	(SAME AS 4.7.8.1)	(SAME AS 4.7.8.1)	(SAME AS 4.7.8.1)	(SAME AS 4.7.8.1)	ENERGIZED (AS-IS DURING POWER OPERATION)
4.7.09.2	OC 415E-X	UNTRIPPED	(SAME AS 4.7.8.2)	(SAME AS 4.7.8.2)	(SAME AS 4.7.8.2)	(SAME AS 4.7.8.2)	DE-ENERGIZED
4.7.10.1	YE 415	VOLTS HIGH	(SAME AS 4.7.1.1)	(SAME AS 4.7.1.1)	(SAME AS 4.7.1.1)	(SAME AS 4.7.1.1)	(SAME AS 4.7.1.1)
4.7.10.2	YE 415	VOLTS ZERO	(SAME AS 4.7.1.2)	(SAME AS 4.7.1.2)	(SAME AS 4.7.1.2)	(SAME AS 4.7.1.2)	(SAME AS 4.7.1.1)
4.7.11.1	AP4A	ON	ONE OF TWO SETS OF CONTACTS ACTUATED FOR P-7 BYPASS OF NON-NIS SCRAMS	ANNUNCIATION	REDUNDANT RELAY (AP4C)	REDUCED REDUNDANCY FOR P-7 DEFEAT, ALL SCRAM FUNCTIONS REMAIN OPERABLE AS REQUIRED	
4.7.11.2	AP4A	OFF	LOSS OF CAPABILITY FOR P-7 BYPASS OF NON-NIS SCRAMS	PERIODIC TESTING	NONE REQUIRED	P-7 DEFEATED, NON-NIS SCRAMS CANNOT BE BYPASSED EXCEPT 1/3 LOW RCS FLOW (P-8)	UN-P7 (HIGH SUR SCRAM PERMISSIVE) AND P-8 UNAFFECTED
4.7.12.1	AP4B	ON	ONE OF TWO SETS OF CONTACTS ACTUATED FOR UN-P7 BYPASS OF HIGH SUR SCRAM	ANNUNCIATION	REDUNDANT RELAY (AP4D)	REDUCED REDUNDANCY FOR UN-P7 DEFEAT, ALL SCRAM FUNCTIONS REMAIN OPERABLE AS REQUIRED	
4.7.12.2	AP4B	OFF	LOSS OF CAPABILITY FOR UN-P7 BYPASS OF HIGH SUR SCRAM	PERIODIC TESTING	NONE REQUIRED	HIGH SUR CHANNELS REMAIN OPERABLE DURING POWER OPERATION, ALL OTHER TRIP FUNCTIONS REMAIN OPERABLE AS REQUIRED	
4.7.13.1	AP4C	ON	(SAME AS 4.7.11.1)	(SAME AS 4.7.11.1)	REDUNDANT RELAY (AP4A)	(SAME AS 4.7.11.1)	
4.7.13.2	AP4C	OFF	(SAME AS 4.7.11.2)	(SAME AS 4.7.11.2)	(SAME AS 4.7.11.2)	(SAME AS 4.7.11.2)	
4.7.14.1	AP4D	ON	(SAME AS 4.7.12.1)	(SAME AS 4.7.12.1)	REDUNDANT RELAY (AP4B)	(SAME AS 4.7.12.1)	
4.7.14.2	AP4D	OFF	(SAME AS 4.7.12.2)	(SAME AS 4.7.12.2)	(SAME AS 4.7.12.2)	(SAME AS 4.7.12.2)	
4.7.15.1	AP10A	ON	ONE OF TWO SETS OF CONTACTS ACTUATED FOR P-8 BYPASS OF NON-NIS SCRAMS	ANNUNCIATION	REDUNDANT RELAY (AP10C)	REDUCED REDUNDANCY FOR P-8 DEFEAT, ALL SCRAM FUNCTIONS REMAIN OPERABLE AS REQUIRED	
4.7.15.2	AP10 A	OFF	LOSS OF CAPABILITY FOR P-8 BYPASS OF NON-NIS SCRAMS	PERIODIC TEST	NONE REQUIRED	P-8 DEFEATED, NON-NIS SCRAMS CANNOT BE BYPASSED EXCEPT BY P-7	P-7 AND UN-P7 UNAFFECTED
4.7.16.1	AP10C	ON	(SAME AS 4.7.15.1)	(SAME AS 4.7.15.1)	REDUNDANT RELAY (AP10A)	(SAME AS 4.7.15.1)	
4.7.16.2	AP10C	OFF	(SAME AS 4.7.15.2)	(SAME AS 4.7.15.2)	(SAME AS 4.7.15.2)	(SAME AS 4.7.15.2)	
4.7.17.1	N 1215 (COMPARATOR)	INPUTS OPEN	LOSS OF CHANNEL DEVIATION ALARM CAPABILITY NO EFFECT ON NIS CHANNELS THEMSELVES	PERIODIC TESTING	NONE REQUIRED	NONE	
4.7.17.2	N 1215 (COMPARATOR)	INPUTS SHORTED	(SAME AS 4.7.17.1)	PERIODIC TESTING	(SAME AS 4.7.17.1)	(SAME AS 4.7.17.1)	CHANNEL FAILURE PRECLUDED BY ANALOG OUTPUT ISOLATORS

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TABLE 4: NIS SCRAMS AND PERMISSIVES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.7.17.3	N 1215 (COMPARATOR)	INPUT GROUNDED	(SAME AS 4.7.17.1)	(SAME AS 4.7.17.1)	(SAME AS 4.7.17.1)	(SAME AS 4.7.17.1)	(SAME AS 4.7.17.2)
4.7.18.1	NLR 1200-1	INPUT OPEN	LOSS OF CHANNEL RECORDING CAPABILITY FOR ONE CHANNEL, NO EFFECT ON NIS CHANNELS	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	
4.7.18.2	NLR 1200-1	INPUT SHORTED	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.1)	ANALOG OUTPUT ISOLATORS PREVENT SHORT OF CHANNELS
4.7.18.3	NLR 1200-1	INPUT GROUNDED	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.2)
4.7.19.1	NLR 1201	INPUTS OPEN	LOSS OF OVERPOWER RECORDING CAPABILITY, NO EFFECT ON NIS CHANNELS	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.1)	
4.7.19.2	NLR 1201	INPUTS SHORTED	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.2)
4.7.19.3	NLR 1201	INPUTS GROUNDED	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.1)	(SAME AS 4.7.18.2)
4.7.20.1	NCS 1200-1 (MODE SWITCH)	INPUTS OPEN (ONE DECK)	BISTABLE OUTPUT TO ONE CHANNEL OF OVERPOWER COINCIDENTOR INTERRUPTED, DE-ENERGIZING CHANNEL COINCIDENTOR RELAYS	ANNUNCIATION	NONE REQUIRED	AFFECTED CHANNEL TRIPPED, OVERPOWER LOGIC BECOMES 1/3 ON REMAINING CHANNELS	ONE CHANNEL PER SWITCH DECK
4.7.20.2	NCS 1200-1 (MODE SWITCH)	INPUTS SHORTED (ONE DECK)	BISTABLE OUTPUTS TO ONE CHANNEL OF OVERPOWER COINCIDENTOR PARALLELED	PERIODIC TESTING	REDUNDANT CHANNELS	AFFECTED CHANNEL SETPOINT BECOMES HI-RANGE VALUE. LOGIC UNCHANGED IN HI-RANGE, BECOMES 2/3 ON REMAINING CHANNELS IN LOW OR MID-RANGE	(SAME AS 4.7.20.1)
4.7.20.3	NCS 1200-1 (MODE SWITCH)	INPUTS GROUNDED (ONE DECK)	(SAME AS 4.7.20.1)	(SAME AS 4.7.20.1)	(SAME AS 4.7.20.1)	(SAME AS 4.7.20.1)	
4.7.20.4	NCS 1200-1 (MODE SWITCH)	RANGE HIGH	OVERPOWER TRIP SETPOINT SELECTED FOR WRONG RANGE ON ALL FOUR CHANNELS (WORST CASE HIGH RANGE WHEN BELOW LOW RANGE SELECT VALUE)	ANNUNCIATION	NONE	OVERPOWER TRIP SETPOINT ON ALL FOUR CHANNELS TOO HIGH TO PREVENT DNB FOR REACTIVITY ADDITION EVENTS FROM LOW POWER	PRECLUDED BY STRICT ADMINISTRATIVE CONTROL
4.7.21.1	REG SUPL IV (R5)	VOLTS ZERO OR GROUNDED	LOW FIRST STAGE TURBINE PRESSURE TO P-7, P-8 INPUT BISTABLES, ROD CONTROL SYSTEM (T-REF) AND INDICATOR	CONTROL ROOM INDICATION, PERIODIC TESTING	NIS CHANNELS FOR P-7, P-8 DEFEAT, NONE REQUIRED FOR UN-P7 DEFEAT	REDUCED REDUNDANCY FOR P-7 AND P-8 DEFEAT, ALL SCRAM FUNCTIONS REMAIN OPERABLE AS REQUIRED	STEAM DUMP (TEMPERATURE CONTROL MODE ONLY) AND ROD INSERTION MAY OCCUR DUE TO MISMATCH BETWEEN T-AVG AND INDICATED T-REF (PT-415) AND DECREASE IN INDICATED PWE (PT-417)
4.7.22.1	NON-REG SUPL IV (R5)	VOLTS ZERO OR GROUNDED	QC-415A-X, QC-415E-X DE-ENERGIZED, CLOSING CONTACTS IN AP4A, AP4C (P-7), AND AP10A, AP10C (P-8) CIRCUITS AND OPENING IN AP4B, AP4D (UN-P7) CIRCUITS	ANNUNCIATION	NIS CHANNELS FOR P-7, P-8 DEFEAT, NONE REQUIRED FOR UN-P7 DEFEAT	REDUCED REDUNDANCY FOR P-7, P-8 DEFEAT. HIGH SUR SCRAM REMAINS OPERABLE (UN-P7 DEFEATED, SCRAM CANNOT BE BYPASSED), ALL OTHER SCRAM FUNCTIONS REMAIN OPERABLE AS REQUIRED	STEAM DUMP (TEMPERATURE CONTROL MODE) AND AUTO ROD CONTROL DISABLED
4.7.23.1	72-141 (BREAKER)	TRIPPED	LOSS OF POWER TO AP4A, AP4B, AP4C, AP4D, AP10A, AP10C	ANNUNCIATION	NONE REQUIRED	P-7, P-8 DEFEATED, UN-P7 CANNOT BE DEFEATED. ALL SCRAM FUNCTIONS REMAIN OPERABLE	125 VDC SUPPLY TO PERMISSIVE RELAYS
4.7.24.1	PROPRT-A	TRIPPED	COINCIDENTOR A SHUNT TRIP SIGNAL TO SCRAM BREAKER-A AND UNDERVOLTAGE SIGNAL TO BOTH SCRAM BREAKERS	ANNUNCIATION	NONE REQUIRED	OVERPOWER REACTOR TRIP IF ABOVE P-7	POWER RANGE OVERPOWER REACTOR TRIP (PROPRT) A LOGIC IS 2/4 ON RELAYS NC-41PJRXA1 THROUGH NC-44PJRXA1
4.7.24.2	PROPRT-A	UNTRIPPED	LOSS OF CAPABILITY FOR COINCIDENTOR A OVERPOWER TRIP TO SCRAM BREAKERS	PERIODIC TEST	REDUNDANT COINCIDENTOR AND SCRAM BREAKER	COINCIDENTOR A OVERPOWER TRIP DISABLED. OVERPOWER TRIP LOGIC BECOMES 1/1 ON REMAINING COINCIDENTOR	COINCIDENTOR B PROVIDES SHUNT TRIP SIGNAL TO SCRAM BREAKER-B AND UNDERVOLTAGE SIGNAL TO BOTH SCRAM BREAKERS
4.7.25.1	PROPRT-B	TRIPPED	COINCIDENTOR B SHUNT TRIP SIGNAL TO SCRAM BREAKER-B AND UNDERVOLTAGE SIGNAL TO BOTH SCRAM BREAKERS	(SAME AS 4.7.24.1)	(SAME AS 4.7.24.1)	(SAME AS 4.7.24.1)	POWER RANGE OVERPOWER REACTOR TRIP (PROPRT) B LOGIC IS 2/4 ON RELAYS NC-41PJRXB1 THROUGH NC-44PJRXB1
4.7.25.2	PROPRT-B	UNTRIPPED	LOSS OF CAPABILITY FOR COINCIDENTOR B OVERPOWER TRIP TO SCRAM BREAKERS	(SAME AS 4.7.24.2)	(SAME AS 4.7.24.2)	COINCIDENTOR B OVERPOWER TRIP DISABLED. LOGIC BECOMES 1/1 ON REMAINING COINCIDENTOR	COINCIDENTOR A PROVIDES SHUNT TRIP SIGNAL TO SCRAM BREAKER A AND UNDERVOLTAGE SIGNAL TO BOTH SCRAM BREAKERS

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4.7.26.1	PRP7A	TRIPPED	COINCIDENTOR A P-7 SIGNAL TO AP4A AND C, ANNUNCIATION LOSS OF COINCIDENTOR A UN-P7 DEFEAT SIGNAL TO AP4 B AND D		REDUNDANT COINCIDENTOR	REDUCED REDUNDANCY FOR P-7 DEFEAT OF NON-NIS SCRAMS. HIGH SUR SCRAM CHANNELS REMAIN OPERABLE DURING POWER OPERATION	POWER RANGE P-7 (PRP7) A LOGIC IS 2/4 ON RELAYS NC-41MXA THROUGH NC-44MXA, WITH OUTPUT LOGIC 2/2 ON PRP7-A AND PRP7-B
4.7.26.2	PRP7-A	UNTRIPPED	COINCIDENTOR A UN-P7 DEFEAT SIGNAL TO AP4B AND D, LOSS OF CAPABILITY FOR COINCIDENTOR A P-7 SIGNAL TO AP4A AND C	PERIODIC TEST	REDUNDANT COINCIDENTOR	REDUCED REDUNDANCY FOR UN-P7 DEFEAT OF HIGH SUR SCRAM P-7 DEFEATED, NON-NIS SCRAMS CANNOT BE BY PASSED EXCEPT BY P-8	UN-P7 (HIGH SUR SCRAM PERMISSIVE) DEFEAT LOGIC IS 2/2 ON PRP7-A AND PRP7-B
4.7.27.1	PRP7-B	TRIPPED	COINCIDENTOR B P-7 SIGNAL TO AP4A AND C, UN-P7 DEFEAT SIGNAL TO AP4B AND D	(SAME AS 4.7.26.1)	(SAME AS 4.7.26.1)	(SAME AS 4.7.26.1)	POWER RANGE P-7 (PRP7) B LOGIC IS 2/4 ON RELAYS NC-41MXB THROUGH NC-44MXB, WITH OUTPUT LOGIC 2/2 ON PRP7-A AND PRP7-B
4.7.27.2	PRP7-B	UNTRIPPED	COINCIDENTOR B UN-P7 DEFEAT SIGNAL TO AP4B AND D, LOSS OF CAPABILITY FOR COINCIDENTOR A P-7 SIGNAL TO AP4A AND C	(SAME AS 4.7.26.2)	(SAME AS 4.7.26.2)	(SAME AS 4.7.26.2)	(SAME AS 4.7.26.2)
4.7.28.1	PRP8-A	TRIPPED	COINCIDENTOR A P-8 SIGNAL TO AP10A AND B ANNUNCIATION		REDUNDANT COINCIDENTOR	REDUCED REDUNDANCY FOR P8 DEFEAT OF NON-NIS SCRAM	POWER RANGE P-8 (PRP8) A LOGIC IS 2/4 ON RELAYS NC-41NXA THROUGH NC-44XA WITH OUTPUT LOGIC 2/2 ON PRP8-A AND PRP8-B
4.7.28.2	PRP8-A	UNTRIPPED	LOSS OF CAPABILITY FOR COINCIDENTOR A P8 PERIODIC TEST SIGNAL TO AP10A AND C		NONE REQUIRED	P-8 DEFEATED ALL SCRAM FUNCTIONS REMAIN OPERABLE	
4.7.29.1	PRP8-B	TRIPPED	COINCIDENTOR B P-8 SIGNAL TO AP10-A AND C	(SAME AS 4.7.28.1)	(SAME AS 4.7.28.1)	(SAME AS 4.7.28.1)	POWER RANGE P-8 (PRP8) B LOGIC IS 2/4 ON RELAYS NC-41NXB THROUGH NC-44NXB, WITH OUTPUT LOGIC 2/2 ON PRP8-A AND PRP8-B
4.7.29.2	PRP8-B	UNTRIPPED	LOSS OF CAPABILITY FOR COINCIDENTOR B P8 SIGNAL TO AP10A AND C	(SAME AS 4.7.28.2)	(SAME AS 4.7.28.2)	(SAME AS 4.7.28.2)	(SAME AS 4.7.28.2)
4.7.30.1	PRDRRS-A	TRIPPED	COINCIDENTOR A DROPPED ROD STOP SIGNAL ANNUNCIATION		NONE REQUIRED	DROPPED ROD STOP	POWER RANGE DROPPED RELAY ROD STOP (PRDRB) A LOGIC IS 1/4 ON RELAYS NC-41KXA THROUGH NC-44 KXA, WITH OUTPUT LOGIC 1/2 ON PRDRRS-A AND PRDRRS-B
4.7.30.2	PRDRRS-A	UNTRIPPED	LOSS OF COINCIDENTOR A DROPPED ROD STOP SIGNAL	PERIODIC TEST	REDUNDANT COINCIDENTOR	COINCIDENTOR A DROPPED ROD STOP DISABLED. LOGIC BECOMES 1/1 ON REMAINING COINCIDENTOR	
4.7.31.1	PRDRRS-B	TRIPPED	COINCIDENTOR B DROPPED ROD STOP SIGNAL	(SAME AS 4.7.30.1)	(SAME AS 4.7.30.1)	(SAME AS 4.7.30.1)	POWER RANGE DROPPED ROD/ROD STOP (PRDRRS) B LOGIC IS 1/4 ON RELAYS NC-41KXB THROUGH NC-44KXB WITH OUTPUT LOGIC 1/2 ON PRDRRS-A AND PRDRRS-B
4.7.31.2	PRDRRS-B	UNTRIPPED	LOSS OF COINCIDENTOR B DROPPED ROD STOP SIGNAL	(SAME AS 4.7.30.2)	(SAME AS 4.7.30.2)	COINCIDENTOR B DROPPED ROD STOP DISABLED. LOGIC BECOMES 1/1 IN REMAINING COINCIDENTOR	
4.7.32.1	HSRRT-A	TRIPPED	COINCIDENTOR A SHUNT TRIP SIGNAL TO SCRAM BREAKER A AND UNDERVOLTAGE SIGNAL TO BOTH SCRAM BREAKERS	ANNUNCIATION	NONE REQUIRED	HIGH SUR REACTOR TRIP IF BELOW P-7	HIGH STARTUP RATE REACTOR TRIP (HSRRT) A LOGIC IS 1/2 ON RELAYS NC-35FXA AND NC-36FXA
4.7.32.2	HSRRT-A	UNTRIPPED	LOSS OF CAPABILITY FOR COINCIDENTOR A HIGH SUR TRIP TO SCAM BREAKERS	PERIODIC TEST	REDUNDANT COINCIDENTOR AND SCRAM BREAKER	COINCIDENTOR A HIGH SUR TRIP DISABLED. LOGIC BECOMES 1/1 ON REMAINING COINCIDENTOR	COINCIDENTOR B PROVIDES SHUNT TRIP SIGNAL TO SCRAM BREAKER-B AND UNDERVOLTAGE SIGNAL TO BOTH SCRAM BREAKERS
4.7.33.1	HSRRT-B	TRIPPED	COINCIDENTOR B SHUNT TRIP SIGNAL TO SCRAM BREAKER B AND UNDERVOLTAGE SIGNAL TO BOTH SCRAM BREAKERS	(SAME AS 4.7.32.1)	(SAME AS 4.7.32.1)	(SAME AS 4.7.32.1)	HIGH STARTUP RATE REACTOR TRIP (HSRRT) B LOGIC IS 1/2 ON RELAYS NC-35FXB AND NC-36FXB
4.7.33.2	HSRRT-B	UNTRIPPED	LOSS OF CAPABILITY FOR COINCIDENTOR B HIGH SUR TRIP TO SCRAM BREAKERS	(SAME AS 4.7.32.2)	(SAME AS 4.7.32.2)	(SAME AS 4.7.32.2)	COINCIDENTOR A PROVIDES SHUNT TRIP SIGNAL TO SCRAM BREAKER A AND UNDERVOLTAGE SIGNAL TO BOTH SCRAM BREAKERS

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDRE UNIT 1

TABLE 4: NIS SCRAMS AND PERMISSIVES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.7.34.1	TEST BYP-A	ON	COINCIDENTOR A REACTOR TRIP P-7, UN-P7 AND P-8 OUTPUTS BYPASSED. ROD STOPS AND ANNUNCIATORS UNAFFECTED	ANNUNCIATION	REDUNDANT COINCIDENTOR AND SCRAM BREAKER	COINCIDENTOR A OVERPOWER AND HIGH SUR TRIPS DISABLED, P-7, UN-P7 AND P-8 DEFEAT REDUNDANCY REDUCED. LOGIC BECOMES 1/1 ON REMAINING COINCIDENTOR	
4.7.34.2	TEST BYP-A	OFF	COINCIDENTOR A REACTOR TRIP P-7, UN-P7 AND P-8 OUTPUTS CANNOT BE BYPASSED FOR TESTING	PERIODIC TEST	NONE REQUIRED	NONE	REACTOR SCRAM WILL OCCUR WHEN COINCIDENTOR TRIP RELAYS FOR OVERPOWER (ABOVE P-7) OR HIGH SUR (BELOW P-7) ARE TESTED
4.7.35.1	TEST BYP-B	ON	COINCIDENTOR B REACTOR TRIP, P-7, UN-P7 AND P-8 OUTPUTS BYPASSED ROD STOPS AND ANNUNCIATORS UNAFFECTED	(SAME AS 4.7.34.1)	(SAME AS 4.7.34.1)	COINCIDENTOR B OVERPOWER AND HIGH SUR TRIPS DISABLED, P-7, UN-P7 AND P-8 DEFEAT REDUNDANCY REDUCED. LOGIC BECOMES 1/1 ON REMAINING COINCIDENTOR	
4.7.35.2	TEST BYP-B	OFF	COINCIDENTOR B REACTOR TRIP, P-7, UN-P7 AND P-8 OUTPUTS CANNOT BE BY PASSED FOR TESTING	(SAME AS 4.7.34.2)	(SAME AS 4.7.34.2)	(SAME AS 4.7.34.2)	(SAME AS 4.7.34.2)
4.7.36.1	72-134 (BREAKER) TRIPPED		LOSS OF POWER TO COINCIDENTOR A AND B	ANNUNCIATION	NONE REQUIRED	OVERPOWER (ABOVE P-7) OR HIGH SUR (BELOW P-7) REACTOR TRIP	

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT 1
SECTION 5: RCS LOW FLOW SCRAMS
(RCP BRKR SCRAMS IN SECTION 7)

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
5.1.1.1	FT 400	SIGNAL HIGH	HIGH FLOW SIGNAL TO FI-400 AND LOOP A (CHANNEL I) TRIP BISTABLES AND RELAYS	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF LOW FLOW TRIP DISABLED, LOGIC BECOMES 1/2 (NO P7 OR P8) OR 2/2 (P8 BUT NO P7) ON REMAINING CHANNELS. PUMP BREAKER (LOW FLOW) TRIP UNAFFECTED	SEE SECTIONS 4 AND 7 FOR EVALUATION OF P7, P8. P8 BLOCKS 1/3 LOW FLOW TRIPS. P7 BLOCKS 2/3 LOW FLOW TRIPS.
5.1.1.2	FT 400	SIGNAL LOW	LOW FLOW SIGNAL TO FI-400 AND LOOP A (CHANNEL I) TRIP BISTABLES AND RELAYS. ENERGIZES LOW FLOW CONTACTS ON 1/3 AND 2/3 TRIP CIRCUITS AND ANNUNCIATOR CIRCUITS	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF LOW FLOW TRIP ACTUATED. REACTOR TRIP WILL OCCUR (NO P7 OR P8), OR LOGIC WILL BECOME 1/2 (P8 BUT NO P7) FOR LOW FLOW IN REMAINING CHANNELS	(SAME AS 5.1.1.1)
5.1.2.1	FI 400	OPEN	(SAME AS 5.1.1.2)	(SAME AS 5.1.1.2)	(SAME AS 5.1.1.2)	(SAME AS 5.1.1.2)	LOSS OF INDICATION
5.1.2.2	FI 400	SHORT	NO EFFECT	CONTROL ROOM INDICATION, PERIODIC TESTING	(SAME AS 5.1.1.1)	NONE	LOSS OF INDICATION
5.1.3.1	FC 400	TRIPPED	LOW FLOW TRIP SIGNAL TO FC-400X1 AND FC-400X2 AND TRIP MATRICES	ANNUNCIATION	(SAME AS 5.1.1.2)	(SAME AS 5.1.1.2)	(SAME AS 5.1.1.1)
5.1.3.2	FC 400	UNTRIPPED (AS-IS)	LOSS OF CHANNEL I LOW FLOW TRIP FUNCTION	PERIODIC TESTING	(SAME AS 5.1.1.1)	(SAME AS 5.1.1.1)	(SAME AS 5.1.1.1)
5.1.4.1	YE 400	OUTPUT VOLTS HIGH	(SAME AS 5.1.1.1)	(SAME AS 5.1.1.1)	(SAME AS 5.1.1.1)	(SAME AS 5.1.1.1)	(SAME AS 5.1.1.1)
5.1.4.2	YE 400	OUTPUT VOLTS ZERO	(SAME AS 5.1.1.2)	(SAME AS 5.1.1.2)	(SAME AS 5.1.1.2)	(SAME AS 5.1.1.2)	(SAME AS 5.1.1.1)
5.1.5.1	FC 400X1	TRIPPED	CHANNEL I LOW FLOW TRIP ACTUATED IN 2/3 MATRIX	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF LOW FLOW TRIPPED IN 2/3 MATRIX, LOGIC BECOMES 1/2 ON REMAINING CHANNELS (NO P7), 1/3 LOW FLOW TRIP AND PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.1.1.1)
5.1.5.2	FC 400X1	UNTRIPPED (AS-IS)	LOSS OF CAPABILITY FOR CHANNEL I LOW FLOW TRIP IN 2/3 MATRIX	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF LOW FLOW TRIP TO 2/3 MATRIX DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS (NO P7), 1/3 LOW FLOW TRIP AND PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.1.1.1)
5.1.6.1	FC 400X2	TRIPPED	CHANNEL I LOW FLOW TRIP ACTUATED IN 1/3 MATRIX	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF LOW FLOW TRIPPED IN 1/3 MATRIX, 2/3 LOW FLOW TRIP AND PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.1.1.1) SCRAM WILL OCCUR IF P-B IF OFF
5.1.6.2	FC 400X2	UNTRIPPED (AS-IS)	LOSS OF CHANNEL I LOW FLOW TRIP IN 1/3 MATRIX	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I 1/3 LOW FLOW TRIP DISABLED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS (NO P7 OR P8), 2/3 LOW FLOW TRIP AND PUMP BREAKER TRIPS UNAFFECTED	(SEE AS 5.1.1.1)
5.1.7.1	REG SUPPL I (RS)	VOLTS ZERO OR GROUNDED	LOW FLOW SIGNAL TO FI-400 AND LOOP A (CHANNEL I) TRIP BISTABLES AND RELAYS. ENERGIZES LOW FLOW CONTACTS IN 1/3 AND 2/3 TRIP MATRICES AND ANNUNCIATOR CIRCUITS	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF LOW FLOW TRIP ACTUATED. REACTOR SCRAM WILL OCCUR (NO P-7 AND NO P-8) OR LOGIC WILL BECOME 1/2 (P-8 BUT NO P-7) FOR LOW FLOW IN REMAINING CHANNELS	(SAME AS 5.1.1.1)
5.1.8.1	NON-REG SUPPL I (RS)	VOLTS ZERO OR GROUNDED	LOSS OF CHANNEL I LOW FLOW TRIP IN 1/3 AND 2/3 MATRICES	ANNUNCIATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I 1/3 AND 2/3 LOW FLOW TRIPS DISABLED, LOGIC BECOMES 1/2 AND 2/2 RESPECTIVELY ON REMAINING CHANNELS (NO P-7 OR P-8), PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.1.1.1) TRIP RELAYS ARE ENERGIZE TO ACTUATE
5.2.1.1	FT 410	SIGNAL HIGH	HIGH FLOW SIGNAL TO FI-410 AND LOOP B (CHANNEL II) TRIP BISTABLES AND RELAYS	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF LOW FLOW TRIP DISABLED, LOGIC BECOMES 1/2 (NO P7 OR P8) OR 2/2 (P8 BUT NO P7) ON REMAINING CHANNELS. PUMP BREAKER TRIPS UNAFFECTED	SEE SECTIONS 4 AND 7 FOR EVALUATION OF P7, P8. P8 BLOCKS 1/3 LOW FLOW TRIPS. P7 BLOCKS 2/3 LOW FLOW TRIPS. RCP BREAKER TRIPS ADDRESSED IN SECTION 7.
5.2.1.2	FT 410	SIGNAL LOW	LOW FLOW SIGNAL TO FI-410 AND LOOP B (CHANNEL II) TRIP BISTABLES AND RELAYS. ENERGIZES LOW FLOW CONTACTS ON 1/3 AND 2/3 TRIP CIRCUITS AND ANNUNCIATOR CIRCUITS	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF LOW FLOW TRIP ACTUATED. REACTOR TRIP WILL OCCUR (NO P7 OR P8), OR LOGIC WILL BECOME 1/2 (P8 BUT NO P7) FOR LOW FLOW IN REMAINING CHANNELS	(SAME AS 5.2.1.1)

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
 SAN ONDFRE UNIT 1
 SECTION 5: RCS LOW FLOW SCRAMS
 (RCP BRKR SCRAMS IN SECTION 7)

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
5.2.2.1	FI 410	OPEN	(SAME AS 5.2.1.2)	(SAME AS 5.2.1.2)	(SAME AS 5.2.1.2)	(SAME AS 5.2.1.2)	LOSS OF INDICATION
5.2.2.2	FI 410	SHORT	NO EFFECT	CONTROL ROOM INDICATION, PERIODIC TESTING	(SAME AS 5.2.1.1)	NONE	LOSS OF INDICATION
5.2.3.1	FC 410	TRIPPED	LOW FLOW TRIP SIGNAL TO FC-410X1 AND FC-410X2 AND TRIP MATRICES	ANNUNCIATION	(SAME AS 5.2.1.2)	(SAME AS 5.2.1.2)	(SAME AS 5.2.1.1)
5.2.3.2	FC 410	UNTRIPPED (AS-IS)	LOSS OF CHANNEL II LOW FLOW TRIP FUNCTION	PERIODIC TESTING	(SAME AS 5.2.1.1)	(SAME AS 5.2.1.1)	(SAME AS 5.2.1.1)
5.2.4.1	YE 410	OUTPUT VOLTS HIGH	(SAME AS 5.2.1.1)	(SAME AS 5.2.1.1)	(SAME AS 5.2.1.1)	(SAME AS 5.2.1.1)	(SAME AS 5.2.1.1)
5.2.4.2	YE 410	OUTPUT VOLTS ZERO	(SAME AS 5.2.1.2)	(SAME AS 5.2.1.2)	(SAME AS 5.2.1.2)	(SAME AS 5.2.1.2)	(SAME AS 5.2.1.1)
5.2.5.1	FC 410X1	TRIPPED	CHANNEL II LOW FLOW TRIP ACTUATED IN 2/3 MATRIX	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF LOW FLOW TRIPPED IN 2/3 MATRIX, LOGIC BECOMES 1/2 ON REMAINING CHANNELS (NO P7), 1/3 LOW FLOW TRIP AND PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.2.1.1)
5.2.5.2	FC 410X1	UNTRIPPED (AS-IS)	LOSS OF CAPABILITY FOR CHANNEL II LOW FLOW TRIP IN 2/3 MATRIX	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF LOW FLOW TRIP TO 2/3 MATRIX DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS (NO P7), 1/3 LOW FLOW TRIP AND PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.2.1.1)
5.2.5.1	FC 410X2	TRIPPED	CHANNEL II LOW FLOW TRIP ACTUATED IN 1/3 MATRIX	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF LOW FLOW TRIPPED IN 1/3 MATRIX, 2/3 LOW FLOW TRIP AND PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.2.1.1) SCRAM WILL OCCUR IF P-8 IS OFF
5.2.5.2	FC 410X2	UNTRIPPED (AS-IS)	LOSS OF CHANNEL II LOW FLOW TRIP IN 1/3 MATRIX	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II 1/3 LOW FLOW TRIP DISABLED, LOGIC BECOMES 1/2 IN REMAINING CHANNELS (NO P7 OR P8), 2/3 LOW FLOW TRIP AND PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.2.1.1)
5.2.7.1	REG SUPPL II (RS)	VOLTS ZERO OR GROUNDED	LOW FLOW SIGNAL TO FI-410 AND LOOP B (CHANNEL II) TRIP BISTABLES AND RELAYS. ENERGIZES LOW FLOW CONTACTS IN 1/3 AND 2/3 TRIP MATRICES AND ANNUNCIATOR CIRCUITS	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF LOW FLOW TRIP ACTUATED. REACTOR SCRAM WILL OCCUR (NO P-7 AND NO P-8) OR LOGIC WILL BECOME 1/2 (P-8 BUT NO P-7) FOR LOW FLOW IN REMAINING CHANNELS	(SAME AS 5.2.1.1)
5.2.8.1	NON-REG SUPPL II (RS)	VOLTS ZERO OR GROUNDED	LOSS OF CHANNEL II LOW FLOW TRIP IN 1/3 AND 2/3 MATRICES	ANNUNCIATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II 1/3 AND 2/3 LOW FLOW TRIPS DISABLED, LOGIC BECOMES 1/2 AND 2/2 RESPECTIVELY ON REMAINING CHANNELS (NO P-7 OR P-8), PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.2.1.1) TRIP RELAYS ARE ENERGIZE TO ACTUATE
5.3.1.1	FT 420	SIGNAL HIGH	HIGH FLOW SIGNAL TO FI-420 AND LOOP C (CHANNEL III) TRIP BISTABLES AND RELAYS	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF LOW FLOW TRIP DISABLED, LOGIC BECOMES 1/2 (NO P7 OR P8) OR 2/2 (P8 BUT NO P7) ON REMAINING CHANNELS. PUMP BREAKER (LOW FLOW) TRIP UNAFFECTED	SEE SECTIONS 4 AND 7 FOR EVALUATION OF P7, P8. P8 BLOCKS 1/3 LOW FLOW TRIPS. P7 BLOCKS 2/3 LOW FLOW TRIPS. RCP BREAKER TRIPS ADDRESSED IN SECTION 7.
5.3.1.2	FT 420	SIGNAL LOW	LOW FLOW SIGNAL TO FI-420 AND LOOP C (CHANNEL III) TRIP BISTABLES AND RELAYS. ENERGIZES LOW FLOW CONTACTS ON 1/3 AND 2/3 TRIP CIRCUITS AND ANNUNCIATOR CIRCUITS	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III OF LOW FLOW TRIP ACTUATED. REACTOR TRIP WILL OCCUR (NO P7 OR P8), OR LOGIC WILL BECOME 1/2 (P8 BUT NO P7) FOR LOW FLOW IN REMAINING CHANNELS	(SAME AS 5.3.1.1)
5.3.2.1	FI 420	OPEN	(SAME AS 5.3.1.2)	(SAME AS 5.3.1.2)	(SAME AS 5.3.1.2)	(SAME AS 5.3.1.2)	LOSS OF INDICATION
5.3.2.2	FI 420	SHORT	NO EFFECT	CONTROL ROOM INDICATION, PERIODIC TESTING	(SAME AS 5.3.1.1)	NONE	LOSS OF INDICATION
5.3.3.1	FC 420	TRIPPED	LOW FLOW TRIP SIGNAL TO FC-420X1 AND FC-420X2 AND TRIP MATRICES	ANNUNCIATION	(SAME AS 5.3.1.2)	(SAME AS 5.3.1.2)	(SAME AS 5.3.1.1)

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT 1
SECTION 5: RCS LOW FLOW SCRAMS
(RCP BRKR SCRAMS IN SECTION 7)

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
5.3.3.2	FC 420	UNTRIPPED (AS-IS)	LOSS OF CHANNEL III LOW FLOW TRIP FUNCTION	PERIODIC TESTING	(SAME AS 5.3.1.1)	(SAME AS 5.3.1.1)	(SAME AS 5.3.1.1)
5.3.4.1	YE 420	OUTPUT VOLTS HIGH	(SAME AS 5.3.1.1)	(SAME AS 5.3.1.1)	(SAME AS 5.3.1.1)	(SAME AS 5.3.1.1)	(SAME AS 5.3.1.1)
5.3.4.2	YE 420	OUTPUT VOLTS ZERO	(SAME AS 5.3.1.2)	(SAME AS 5.3.1.2)	(SAME AS 5.3.1.2)	(SAME AS 5.3.1.2)	(SAME AS 5.3.1.1)
5.3.5.1	FC 420X1	TRIPPED	CHANNEL III LOW FLOW TRIP ACTUATED IN 2/3 MATRIX	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III OF LOW FLOW TRIPPED IN 2/3 MATRIX, LOGIC BECOMES 1/2 ON REMAINING CHANNELS (NO P7), 1/3 LOW FLOW TRIP AND PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.3.1.1)
5.3.5.2	FC 420X1	UNTRIPPED (AS-IS)	LOSS OF CAPABILITY FOR CHANNEL III LOW FLOW TRIP IN 2/3 MATRIX	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF LOW FLOW TRIP TO 2/3 MATRIX DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS (NO P7), 1/3 LOW FLOW TRIP AND PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.3.1.1)
5.3.6.1	FC 420X2	TRIPPED	CHANNEL III LOW FLOW TRIP ACTUATED IN 1/3 MATRIX	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III OF LOW FLOW TRIPPED IN 1/3 MATRIX, 2/3 LOW FLOW TRIP AND PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.3.1.1) SCRAM WILL OCCUR IF P-8 IS OFF
5.3.6.2	FC 420X2	UNTRIPPED (AS-IS)	LOSS OF CHANNEL III LOW FLOW TRIP IN 1/3 MATRIX	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III 1/3 LOW FLOW TRIP DISABLED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS (NO P7 OR P8), 2/3 LOW FLOW TRIP AND PUMP BREAKER TRIPS UNAFFECTED	(SEE AS 5.3.1.1)
5.3.7.1	REG SUPL III (R5)	VOLTS ZERO OR GROUNDED	LOW FLOW SIGNAL TO FI-420 AND LOOP C (CHANNEL III) TRIP BISTABLES AND RELAYS. ENERGIZES LOW FLOW CONTACTS IN 1/3 AND 2/3 MATRICES AND ANNUNCIATOR CIRCUITS	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III OF LOW FLOW TRIP ACTUATED. REACTOR SCRAM WILL OCCUR (NO P-7 AND NO P-8) OR LOGIC WILL BECOME 1/2 (P-8 BUT NO P-7) FOR LOW FLOW IN REMAINING CHANNELS	(SAME AS 5.3.1.1)
5.3.8.1	NON-REG SUPL III (R5)	VOLTS ZERO OR GROUNDED	LOSS OF CHANNEL III LOW FLOW TRIP IN 1/3 AND 2/3 MATRICES	ANNUNCIATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III 1/3 AND 2/3 LOW FLOW TRIPS DISABLED, LOGIC BECOMES 1/2 AND 2/2 RESPECTIVELY (NO P-7 OR P-8) ON REMAINING CHANNELS, PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.3.1.1) -TRIP RELAYS ARE ENERGIZE TO ACTUATE

TABLE 6: STEAM/FEEDWATER FLOW MISMATCH SCRAM

REFERENCES: A. SYSTEM DESCRIPTIONS:
 SD-S01-260 FEEDWATER CONTROL SYSTEM
 SD-S01-570 REACTOR PROTECTION SYSTEM AND PERM.

B. DRAWINGS:

63714	237698	5206932
455116	237699	5206933
5112259	237701	5206934
5129817	237703	

NOTES: a. CHANNEL POWER ALIGNMENT FOR STEAM GENERATOR LEVEL INSTRUMENTATION IS AS FOLLOWS:

<u>S/G</u>	<u>NARROW RANGE</u>	<u>WIDE RANGE</u>
A	I	II
B	II	III
C	III	I

- b. HIGH STEAM GENERATOR LEVEL ENERGIZES A TURBINE TRIP RELAY FOR THE ASSOCIATED CHANNEL. COINCIDENT RELAY TRIP FOR THE NARROW AND WIDE RANGE CHANNELS IN THE SAME STEAM GENERATOR INITIATES TURBINE TRIP ON 1/3 STEAM GENERATORS.
- c. CONTROLLER CARDS FM-456, FM-457 AND FM-458 PROVIDE MISMATCH CHANNEL TRIP WHEN THE CALCULATED FEEDWATER MASS FLOW RATE IS EITHER LOWER THAN OR HIGHER THAN THE CALCULATED STEAM MASS FLOW RATE BY MORE THAN A PRE-PROGRAMMED MISMATCH VALUE. THE STEAM MASS FLOW RATE CALCULATED BY EACH CONTROLLER CARD IS DENSITY COMPENSATED IN PROPORTION TO THE SQUARE ROOT OF THE MEASURED STEAM PRESSURE (TO ACCOUNT FOR THE INVERSE DEPENDENCE OF MEASURED VOLUMETRIC FLOW ON THE SQUARE ROOT OF DENSITY, AS WELL AS THE DIRECT MASS FLOW DEPENDENCE ON DENSITY). EACH CONTROLLER CARD ALSO HAS A PRE-PROGRAMMED FLOOR VALUE FOR THE DENSITY INPUT, EQUIVALENT TO THAT AT 100% RATED THERMAL POWER ON THE APPLICABLE T-AVERAGE PROGRAM.

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT 1
SECTION 6: STEAM/FEED FLOW MISMATCH SCRAM

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
6.1.01.1	FT 460	SIGNAL HIGH	HIGH STEAM FLOW SIGNAL TO STEAM GENERATOR A FEEDWATER CONTROL SYSTEM, CHANNEL I STEAM/FEED FLOW MISMATCH TRIP AND RECORDER (YR-456)	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	UPWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR A
6.1.01.2	FT 460	SIGNAL LOW	LOW STEAM FLOW SIGNAL TO STEAM GENERATOR A FEEDWATER CONTROL SYSTEM, CHANNEL I STEAM/FEED FLOW MISMATCH TRIP AND RECORDER (YR-456)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	DOWNWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR A. BOUNDS FAILURE OF TEST SWITCH 460A
6.1.02.1	FY 460A	OUTPUT HIGH	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)
6.1.02.2	FY 460A	OUTPUT LOW	(SAME AS 6.1.1.2)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.2)
6.1.02.3	FY 460A	INPUT OPEN	(SAME AS 6.1.1.2)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.2)
6.1.02.4	FY 460A	INPUT SHORT	(SAME AS 6.1.1.2)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.2)
6.1.03.1	YE 460	OUTPUT VOLTS HIGH	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)
6.1.03.2	YE 460	OUTPUT VOLTS LOW	(SAME AS 6.1.1.2)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.1)	(SAME AS 6.1.1.2)
6.1.04.1	FT 456	SIGNAL HIGH	HIGH FEED FLOW SIGNAL TO STEAM GENERATOR A FEEDWATER CONTROL SYSTEM, CHANNEL I STEAM/FEED FLOW MISMATCH TRIP AND RECORDER (YR-456)	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	DOWNWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR A
6.1.04.2	FT 456	SIGNAL LOW	LOW FEED FLOW SIGNAL TO STEAM GENERATOR A FEEDWATER CONTROL SYSTEM, CHANNEL I STEAM/FEED FLOW MISMATCH TRIP AND RECORDER (YR-456)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	UPWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR A. BOUNDS FAILURE OF TEST SWITCH
6.1.05.1	FY 456A	OUTPUT HIGH	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)
6.1.05.2	FY 456A	OUTPUT LOW	(SAME AS 6.1.4.2)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.2)
6.1.05.3	FY 456A	INPUT OPEN	(SAME AS 6.1.4.2)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.2)
6.1.05.4	FY 456A	INPUT SHORT	(SAME AS 6.1.4.2)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.2)
6.1.06.1	YE 456	OUTPUT VOLTS HIGH	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)
6.1.06.2	YE 456	OUTPUT VOLTS LOW	(SAME AS 6.1.4.2)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.1)	(SAME AS 6.1.4.2)
6.1.07.1	PY 459A PP 459A	OUTPUT HIGH	HIGH MAIN STEAM HEADER PRESSURE INPUT TO DENSITY CORRECTION FOR STEAM GENERATOR A FEEDWATER CONTROL AND CHANNEL I OF STEAM/FEED MISMATCH TRIP	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	UPWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR A
6.1.07.2	PY 459A PP 459A	OUTPUT LOW	LOW MAIN STEAM HEADER PRESSURE INPUT TO DENSITY CORRECTION FOR STEAM GENERATOR A. DENSITY CORRECTION FAILS TO FLOOR VALUE FOR STEAM GENERATOR A FEEDWATER CONTROL AND CHANNEL I OF STEAM/FEED MISMATCH TRIP	(SAME AS 6.1.7.1)	NONE REQUIRED (INCLUDED IN SETPOINT ANALYSIS)	CHANNEL I STEAM/FEED MISMATCH TRIP SETPOINT FOR LOW FEED FLOW EVENTS DECALIBRATED UP TO 7X FROM REDUCED POWER	DOWNWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR A
6.1.07.3	PY 459A PP 459A	INPUT OPEN	(SAME AS 6.1.7.2)	(SAME AS 6.1.7.1)	(SAME AS 6.1.7.2)	(SAME AS 6.1.7.2)	(SAME AS 6.1.7.2)
6.1.07.4	PY 459A PP 459A	INPUT SHORT	LOW MAIN STEAM HEADER PRESSURE INPUT TO DENSITY CORRECTION FOR ALL THREE STEAM GENERATORS. DENSITY CORRECTION FAILS TO FLOOR VALUE FOR ALL THREE FEEDWATER CONTROL AND STEAM/FEED MISMATCH TRIP CHANNELS	(SAME AS 6.1.7.1)	(SAME AS 6.1.7.2)	STEAM/FEED MISMATCH TRIP SETPOINT FOR LOW FEED FLOW EVENTS DECALIBRATED UP TO 7X FROM REDUCED POWER FOR ALL THREE STEAM/FEED MISMATCH TRIP CHANNELS	DOWNWARD LEVEL TRANSIENT MAY OCCUR IN ALL THREE STEAM GENERATORS
6.1.08.1	FM 456	TRIPPED	CHANNEL I OF STEAM/FEED FLOW MISMATCH TRIPPED	ANNUNCIATION	NONE REQUIRED	CHANNEL I OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	NEST 1213A CONTROL CARD

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDRE UNIT 1
SECTION 6: STEAM/FEED FLOW MISMATCH SCRAM

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
6.1.08.2	FM 455	UNTRIPPED (AS-IS)	CHANNEL I OF STEAM/FEED FLOW MISMATCH DISABLED	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF STEAM/FEED MISMATCH DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	
6.1.09.1	FFSL 456A	TRIPPED	(SAME AS 6.1.8.1)	(SAME AS 6.1.8.1)	(SAME AS 6.1.8.1)	(SAME AS 6.1.8.1)	LOW FEED FLOW MISMATCH RELAY DRIVER
6.1.09.2	FFSL 456A	UNTRIPPED (AS-IS)	(SAME AS 6.1.8.2)	(SAME AS 6.1.8.2)	(SAME AS 6.1.8.2)	(SAME AS 6.1.8.2)	
6.1.10.1	FFSH 456A	TRIPPED	(SAME AS 6.1.8.1)	(SAME AS 6.1.8.1)	(SAME AS 6.1.8.1)	(SAME AS 6.1.8.1)	HIGH FEED FLOW MISMATCH RELAY DRIVER
6.1.10.2	FFSH 456A	UNTRIPPED (AS-IS)	(SAME AS 6.1.8.2)	(SAME AS 6.1.8.2)	(SAME AS 6.1.8.2)	(SAME AS 6.1.8.2)	
6.1.11.1	FM 456B-X	TRIPPED	(SAME AS 6.1.8.1)	(SAME AS 6.1.8.1)	(SAME AS 6.1.8.1)	(SAME AS 6.1.8.1)	MISMATCH TRIP MATRIX RELAY
6.1.11.2	FM 456B-X	UNTRIPPED (AS-IS)	(SAME AS 6.1.8.2)	(SAME AS 6.1.8.2)	(SAME AS 6.1.8.2)	(SAME AS 6.1.8.2)	
6.1.12.1	FY 456A/460A POWER SUPL	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO FY456A AND FY460A COMMON MODULE. LOW STEAM AND FEED FLOW OUTPUTS TO CHANNEL I OF STEAM/FEED MISMATCH TRIP AND STEAM GENERATOR A FEED CONTROL SYSTEM	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	(SAME AS 6.1.8.2)	BOUNDS MODULE OUTPUT FAILURE LOW. STEAM AND FEED FLOW OUTPUTS TO STEAM GENERATOR A FEED CONTROL SYSTEM AND CONTROL ROOM INDICATION WILL ALSO FAIL LOW
6.1.13.1	NEST 1213A POWER SUPL	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO FY456A, PY459A, FY460A, FM456, FFSL456A, AND FFSH456A	(SAME AS 6.1.8.1)	(SAME AS 6.1.8.1)	(SAME AS 6.1.8.1)	FFSL AND FFSH ARE DE-ENERGIZE TO ACTUATE. STEAM AND FEED FLOW OUTPUTS TO STEAM GENERATOR A FEED CONTROL SYSTEM AND CONTROL ROOM INDICATION WILL ALSO FAIL LOW
6.1.14.1	REG SUPL I (R10/R11)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO NEST 1213A AND STEAM GENERATOR A FEED CONTROL SYSTEM	ANNUNCIATION	NONE REQUIRED	CHANNEL I OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	STM GEN A FEEDWATER FLOW CONTROLLER/VALVE AND NR LEVEL REVERSE ACTING, VALVE FAILS OPEN, BUT HIGH LEVEL TURBINE TRIP DISABLED BY LOSS OF POWER TO NR LEVEL TRIP RELAY
6.1.15.1	NDR-REG SUPL I (R10/R11)	VOLTS ZERO OR GROUNDED	CHANNEL I STEAM/FEED FLOW MISMATCH TRIP RELAY DE-ENERGIZED	ANNUNCIATION	NONE REQUIRED	CHANNEL I OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	RELAY IS DE-ENERGIZE TO TRIP
6.2.01.1	FT 461	SIGNAL HIGH	HIGH STEAM FLOW SIGNAL TO STEAM GENERATOR B FEEDWATER CONTROL SYSTEM, CHANNEL II OF STEAM/FEED MISMATCH TRIP AND RECORDER (YR-457)	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	UPWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR B
6.2.01.2	FT 461	SIGNAL LOW	LOW STEAM FLOW SIGNAL TO STEAM GENERATOR B FEEDWATER CONTROL SYSTEM, CHANNEL II OF STEAM/FEED MISMATCH TRIP AND RECORDER (YR-457)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	DOWNWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR B. BOUNDS FAILURE OF TEST SWITCH 461A
6.2.02.1	FY 461A	OUTPUT HIGH	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)
6.2.02.2	FY 461A	OUTPUT LOW	(SAME AS 6.2.1.2)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.2)
6.2.02.3	FY 461A	INPUT OPEN	(SAME AS 6.2.1.2)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.2)
6.2.02.4	FY 461A	INPUT SHORT	(SAME AS 6.2.1.2)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.2)
6.2.03.1	YE 461	OUTPUT VOLTS HIGH	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)
6.2.03.2	YE 461	OUTPUT VOLTS LOW	(SAME AS 6.2.1.2)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.1)	(SAME AS 6.2.1.2)
6.2.04.1	FT 457	SIGNAL HIGH	HIGH FEED FLOW SIGNAL TO STEAM GENERATOR B FEED CONTROL, CHANNEL II STEAM/FEED TRIP AND RECORDER (YR-457)	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	DOWNWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR B
6.2.04.2	FT 457	SIGNAL LOW	LOW FEED FLOW SIGNAL TO STEAM GENERATOR B FEED CONTROL, CHANNEL II STEAM/FEED TRIP AND RECORDER (YR-457)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	UPWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR B. BOUNDS FAILURE OF TEST SWITCH
6.2.05.1	FY 457A	OUTPUT HIGH	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDFRE UNIT 1
SECTION 6: STEAM/FEED FLOW MISMATCH SCRAM

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
6.2.05.2	FY 457A	OUTPUT LOW	(SAME AS 6.2.4.2)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.2)
6.2.05.3	FY 457A	INPUT OPEN	(SAME AS 6.2.4.2)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.2)
6.2.05.4	FY 457A	INPUT SHORT	(SAME AS 6.2.4.2)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.2)
6.2.06.1	YE 457	OUTPUT VOLTS HIGH	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)
6.2.06.2	YE 457	OUTPUT VOLTS LOW	(SAME AS 6.2.4.2)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.1)	(SAME AS 6.2.4.2)
6.2.07.1	PY 459B PP 459B	OUTPUT HIGH	HIGH MAIN STEAM HEADER PRESSURE INPUT TO DENSITY CORRECTION FOR STEAM GENERATOR B FEEDWATER CONTROL AND CHANNEL II OF STEAM/FEED MISMATCH TRIP	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	UPWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR B
6.2.07.2	PY 459B PP 459B	OUTPUT LOW	LOW MAIN STEAM HEADER PRESSURE INPUT TO DENSITY CORRECTION FOR STEAM GENERATOR B. DENSITY CORRECTION FAILS TO FLOOR VALUE FOR STEAM GENERATOR B FEEDWATER CONTROL AND CHANNEL II OF STEAM/FEED MISMATCH TRIP	(SAME AS 6.2.7.1)	NONE REQUIRED (INCLUDED IN SETPOINT ANALYSIS)	CHANNEL II STEAM/FEED MISMATCH TRIP SETPOINT FOR LOW FEED FLOW EVENTS DECALIBRATED UP TO 7% FROM REDUCED POWER	DOWNWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR B
6.2.07.3	PY 459B PP 459B	INPUT OPEN	(SAME AS 6.2.7.2)	(SAME AS 6.2.7.1)	(SAME AS 6.2.7.2)	(SAME AS 6.2.7.2)	(SAME AS 6.2.7.2)
6.2.07.4	PY 459B PP 459B	INPUT SHORT	LOW MAIN STEAM HEADER PRESSURE INPUT TO DENSITY CORRECTION FOR ALL THREE STEAM GENERATORS. DENSITY CORRECTION FAILS TO FLOOR VALUE FOR ALL THREE FEEDWATER CONTROL AND STEAM/FEED MISMATCH TRIP CHANNELS	(SAME AS 6.2.7.1)	(SAME AS 6.2.7.2)	STEAM/FEED MISMATCH TRIP SETPOINT FOR LOW FEED FLOW EVENTS DECALIBRATED UP TO 7% FROM REDUCED POWER FOR ALL THREE STEAM/FEED MISMATCH TRIP CHANNELS	DOWNWARD LEVEL TRANSIENT MAY OCCUR IN ALL THREE STEAM GENERATORS
6.2.08.1	FM 457	TRIPPED	CHANNEL II OF STEAM/FEED MISMATCH TRIPPED	ANNUNCIATION	NONE REQUIRED	CHANNEL II OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	NEST 1213B CONTROL CARD
6.2.08.2	FM 457	UNTRIPPED (AS-IS)	CHANNEL II OF STEAM/FEED MISMATCH DISABLED	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF STEAM/FEED MISMATCH DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	
6.2.09.1	FFSL 457A	TRIPPED	(SAME AS 6.2.8.1)	(SAME AS 6.2.8.1)	(SAME AS 6.2.8.1)	(SAME AS 6.2.8.1)	LOW FEED FLOW MISMATCH RELAY DRIVER
6.2.09.2	FFSL 457A	UNTRIPPED (AS-IS)	(SAME AS 6.2.8.2)	(SAME AS 6.2.8.2)	(SAME AS 6.2.8.2)	(SAME AS 6.2.8.2)	
6.2.10.1	FFSH 457A	TRIPPED	(SAME AS 6.2.8.1)	(SAME AS 6.2.8.1)	(SAME AS 6.2.8.1)	(SAME AS 6.2.8.1)	HIGH FEED FLOW MISMATCH RELAY DRIVER
6.2.10.2	FFSH 457A	UNTRIPPED (AS-IS)	(SAME AS 6.2.8.2)	(SAME AS 6.2.8.2)	(SAME AS 6.2.8.2)	(SAME AS 6.2.8.2)	
6.2.11.1	FM 457B-X	TRIPPED	(SAME AS 6.2.8.1)	(SAME AS 6.2.8.1)	(SAME AS 6.2.8.1)	(SAME AS 6.2.8.1)	MISMATCH TRIP MATRIX RELAY
6.2.11.2	FM 457B-X	UNTRIPPED (AS-IS)	(SAME AS 6.2.8.2)	(SAME AS 6.2.8.2)	(SAME AS 6.2.8.2)	(SAME AS 6.2.8.2)	
6.2.12.1	FY 457A/461A POWER SUPL	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO FY457A AND FY461A COMMON MODULE. LOW STEAM AND FEED FLOW OUTPUTS TO CHANNEL II OF STEAM/FEED MISMATCH TRIP AND STEAM GENERATOR B FEED CONTROL SYSTEM	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	(SAME AS 5.2.8.2)	BOUNDS MODULE OUTPUT FAILURE LOW. STEAM AND FEED FLOW OUTPUTS TO STEAM GENERATOR B FEED CONTROL SYSTEM AND CONTROL ROOM INDICATION WILL ALSO FAIL LOW
6.2.13.1	NEST 1213B POWER SUPL	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO FY457A, PY459B, FY461A, FY457, FFSL457A, AND FFSH457A	(SAME AS 6.2.8.1)	(SAME AS 6.2.8.1)	(SAME AS 6.2.8.1)	FFSL AND FFSH ARE DE-ENERGIZE TO ACTUATE. STEAM AND FEED FLOW OUTPUTS TO STEAM GENERATOR B FEED CONTROL SYSTEM AND CONTROL ROOM INDICATION WILL ALSO FAIL LOW
6.2.14.1	RES SUPL II (R10/R11)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO NEST 1213B AND STEAM GENERATOR B FEED CONTROL SYSTEM	ANNUNCIATION	NONE REQUIRED	CHANNEL II OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	STM GEN B FEEDWATER FLOW CONTROLLER/VALVE AND NR LEVEL REVERSE ACTING, VALVE FAILS OPEN, BUT HIGH LEVEL TURBINE TRIP DISABLED BY LOSS OF POWER TO NR LEVEL TRIP RELAY

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDFRE UNIT 1

SECTION 6: STEAM/FEED FLOW MISMATCH SCRAM

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
6.2.15.1	NON-REG SUPL II (R10/R11)	VOLTS ZERO OR GROUNDED	CHANNEL II OF STEAM/FEED MISMATCH TRIP RELAY DE-ENERGIZED	ANNUNCIATION	NONE REQUIRED	CHANNEL II OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	RELAY IS DE-ENERGIZE TO TRIP
6.3.01.1	FT 462	SIGNAL HIGH	HIGH STEAM FLOW SIGNAL TO STEAM GENERATOR C FEED CONTROL, CHANNEL III OF STEAM/FEED MISMATCH TRIP AND RECORDER (YR-458)	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	UPWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR C
6.3.01.2	FT 452	SIGNAL LOW	LOW STEAM FLOW SIGNAL TO STEAM GENERATOR (SAME AS 6.3.1.1) C FEED CONTROL, CHANNEL III OF STEAM/FEED MISMATCH TRIP AND RECORDER (YR-458)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	DOWNWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR C. BOUNDS FAILURE OF TEST SWITCH 462A
6.3.02.1	FY 462A	OUTPUT HIGH	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)
6.3.02.2	FY 462A	OUTPUT LOW	(SAME AS 6.3.1.2)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.2)
6.3.02.3	FY 462A	INPUT OPEN	(SAME AS 6.3.1.2)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.2)
6.3.02.4	FY 462A	INPUT SHORT	(SAME AS 6.3.1.2)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.2)
6.3.03.1	YE 462	OUTPUT VOLTS HIGH	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)
6.3.03.2	YE 462	OUTPUT VOLTS LOW	(SAME AS 6.3.1.2)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.1)	(SAME AS 6.3.1.2)
6.3.04.1	FT 458	SIGNAL HIGH	HIGH FEED FLOW SIGNAL TO STEAM GENERATOR C FEED CONTROL, CHANNEL III STEAM/FEED TRIP AND RECORDER (YR-458)	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	DOWNWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR C
6.3.04.2	FT 458	SIGNAL LOW	LOW FEED FLOW TO STEAM GENERATOR C FEED CONTROL, CHANNEL III STEAM/FEED TRIP AND RECORDER (YR-458)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	UPWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR C. BOUNDS FAILURE OF TEST SWITCH
6.3.05.1	FY 458A	OUTPUT HIGH	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)
6.3.05.2	FY 458A	OUTPUT LOW	(SAME AS 6.3.4.2)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.2)
6.3.05.3	FY 458A	INPUT OPEN	(SAME AS 6.3.4.2)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.2)
6.3.05.4	FY 458A	INPUT SHORT	(SAME AS 6.3.4.2)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.2)
6.3.05.1	YE 458	OUTPUT HIGH	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)
6.3.05.2	YE 458	OUTPUT LOW	(SAME AS 6.3.4.2)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.1)	(SAME AS 6.3.4.2)
6.3.07.1	PY 459C PP 459C	OUTPUT HIGH	HIGH MAIN STEAM HEADER PRESSURE INPUT TO DENSITY CORRECTION FOR STEAM GENERATOR C FEEDWATER CONTROL AND CHANNEL III OF STEAM/FEED MISMATCH TRIP	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	UPWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR C
6.3.07.2	PY 459C PP 459C	OUTPUT LOW	LOW MAIN STEAM HEADER PRESSURE INPUT TO DENSITY CORRECTION FOR STEAM GENERATOR C. DENSITY CORRECTION FAILS TO FLOOR VALUE FOR STEAM GENERATOR C FEEDWATER CONTROL AND CHANNEL III OF STEAM/FEED MISMATCH TRIP	(SAME AS 6.3.7.1)	NONE REQUIRED (INCLUDED IN SETPOINT ANALYSIS)	CHANNEL III STEAM/FEED MISMATCH TRIP SETPOINT FOR LOW FEED FLOW EVENTS DECALIBRATED UP TO 7% FROM REDUCED POWER	DOWNWARD LEVEL TRANSIENT MAY OCCUR IN STEAM GENERATOR C
6.3.07.3	PY 459C PP 459C	INPUT OPEN	(SAME AS 6.3.7.2)	(SAME AS 6.3.7.1)	(SAME AS 6.3.7.2)	(SAME AS 6.3.7.2)	(SAME AS 6.3.7.2)
6.3.07.4	PY 459C PP 459C	INPUT SHORT	LOW MAIN STEAM HEADER PRESSURE INPUT TO DENSITY CORRECTION FOR ALL THREE STEAM GENERATORS. DENSITY CORRECTION FAILS TO FLOOR VALUE FOR ALL THREE FEEDWATER CONTROL AND STEAM/FEED MISMATCH TRIP CHANNELS	(SAME AS 6.3.7.1)	(SAME AS 6.3.7.2)	STEAM/FEED MISMATCH TRIP SETPOINT FOR LOW FEED FLOW EVENTS DECALIBRATED UP TO 7% FROM REDUCED POWER FOR ALL THREE STEAM/FEED MISMATCH TRIP CHANNELS	DOWNWARD LEVEL TRANSIENT MAY OCCUR IN ALL THREE STEAM GENERATORS
6.3.08.1	FX 458	TRIPPED	CHANNEL III OF STEAM/FEED MISMATCH TRIPPED	ANNUNCIATION	NONE REQUIRED	CHANNEL III OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	NEST 1213C CONTROL CARD

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAB DNOFRE UNIT 1
SECTION 6: STEAM/FEED FLOW MISMATCH SCRAM

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
6.3.08.2	FM 458	UNTRIPPED (AS-IS)	CHANNEL III OF STEAM-FEED MISMATCH TRIP DISABLED	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF STEAM/FEED MISMATCH DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	
6.3.09.1	FFSL 458A	TRIPPED	(SAME AS 6.3.8.1)	(SAME AS 6.3.8.1)	(SAME AS 6.3.8.1)	(SAME AS 6.3.8.1)	LOW FEED FLOW MISMATCH RELAY DRIVER
6.3.09.2	FFSL 458A	UNTRIPPED (AS-IS)	(SAME AS 6.3.8.2)	(SAME AS 6.3.8.2)	(SAME AS 6.3.8.2)	(SAME AS 6.3.8.2)	
6.3.10.1	FFSH 458A	TRIPPED	(SAME AS 6.3.8.1)	(SAME AS 6.3.8.1)	(SAME AS 6.3.8.1)	(SAME AS 6.3.8.1)	HIGH FEED FLOW MISMATCH RELAY DRIVER
6.3.10.2	FFSH 458A	UNTRIPPED (AS-IS)	(SAME AS 6.3.8.2)	(SAME AS 6.3.8.2)	(SAME AS 6.3.8.2)	(SAME AS 6.3.8.2)	
6.3.11.1	FM 458B-X	TRIPPED	(SAME AS 6.3.8.1)	(SAME AS 6.3.8.1)	(SAME AS 6.3.8.1)	(SAME AS 6.3.8.1)	MISMATCH TRIP MATRIX RELAY
6.3.11.2	FM 458B-X	UNTRIPPED (AS-IS)	(SAME AS 6.3.8.2)	(SAME AS 6.3.8.2)	(SAME AS 6.3.8.2)	(SAME AS 6.3.8.2)	
6.3.12.1	FY 458A/462A POWER SUPPL	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO FY458A AND FY462A COMMON MODULE. LOW STEAM AND FEED FLOW OUTPUTS TO CHANNEL III OF STEAM/FEED MISMATCH TRIP AND STEAM GENERATOR C FEED CONTROL SYSTEM	CONTROL ROOM INDICATION, PERIODIC TESTING	REDUNDANT CHANNELS	(SAME AS 6.3.8.2)	BOUNDS MODULE OUTPUT FAILURE LOW. STEAM AND FEED FLOW OUTPUTS TO STEAM GENERATOR C FEED CONTROL SYSTEM AND CONTROL ROOM INDICATION WILL ALSO FAIL LOW
6.3.13.1	NEST 1213C POWER SUPPL	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO FY458A, FY459C, FY462A, FM458, FFSL458A, AND FFSH458A	(SAME AS 6.3.8.1)	(SAME AS 6.3.8.1)	(SAME AS 6.3.8.1)	FFSL AND FFSH ARE DE-ENERGIZE TO ACTUATE. STEAM AND FEED FLOW OUTPUTS TO STEAM GENERATOR C FEED CONTROL SYSTEM AND CONTROL ROOM INDICATION WILL ALSO FAIL LOW
6.3.14.1	RES SUPPL III (R10/R11)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO NEST 1213C AND STEAM GENERATOR C FEED CONTROL SYSTEM	ANNUNCIATION	NONE REQUIRED	CHANNEL III OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	STM GEN C FEEDWATER FLOW CONTROLLER/VALVE AND NR LEVEL REVERSE ACTING, VALVE FAILS OPEN, BUT HIGH LEVEL TURBINE TRIP DISABLED BY LOSS OF POWER TO NR LEVEL TRIP RELAY
6.3.15.1	NDN-RES SUPPL III (R10/R11)	VOLTS ZERO OR GROUNDED	CHANNEL III STEAM/FEED FLOW MISMATCH TRIP RELAY DE-ENERGIZED	ANNUNCIATION	NONE REQUIRED	CHANNEL III OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	RELAY IS DE-ENERGIZE TO TRIP
6.4.01.1	PT 459	SIGNAL HIGH	HIGH MAIN STEAM HEADER PRESSURE SIGNAL TO STEAM DUMP OPERATIONAL MODE SELECTOR SWITCH, CONTROL ROOM INDICATION, AND STEAM DENSITY CORRECTION INPUT TO ALL THREE FEEDWATER CONTROL/MISMATCH TRIP CHANNELS	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTINGS	NONE REQUIRED	INCREASES CALCULATED STEAM MASS FLOW INPUT TO MISMATCH TRIP CHANNELS, CAUSING 3/3 MISMATCH TRIP (ABOVE P-8 REACTOR POWER)	INPUT (ALONG WITH T-AVG AND T-REF) TO DUMP, POTENTIAL FOR STEAM DUMP ACTUATION, WILL ALSO CAUSE TRANSIENT INCREASE IN FEEDWATER FLOW TO ALL THREE STEAM GENERATORS
6.4.01.2	PT 459	SIGNAL LOW	LOW MAIN STEAM HEADER PRESSURE SIGNAL TO STEAM DUMP OPERATIONAL MODE SELECTOR SWITCH, CONTROL ROOM INDICATION, AND STEAM DENSITY CORRECTION INPUT. DENSITY CORRECTION IN ALL THREE FEEDWATER CONTROL/MISMATCH TRIP CHANNELS FAILS TO FLOOR VALUE	(SAME AS 6.4.1.1)	NONE REQUIRED (INCLUDED IN SETPOINT ANALYSIS)	STEAM/FEED FLOW MISMATCH TRIP SETPOINT FOR LOW FEED FLOW EVENTS DECALIBRATED UP TO 7% FROM REDUCED POWER FOR ALL THREE STEAM/FEED MISMATCH TRIP CHANNELS	DOWNWARD LEVEL TRANSIENT MAY OCCUR IN ALL 3 STEAM GENERATORS FROM REDUCED POWER
6.4.02.1	PC 418A	OUTPUT HIGH	HIGH MAIN STEAM HEADER PRESSURE TO STEAM DUMP OPERATIONAL MODE SELECTOR SWITCH	ANNUNCIATION, PERIODIC TESTINGS	NONE REQUIRED	NONE	
6.4.02.2	PC 418A	OUTPUT LOW	LOW MAIN STEAM HEADER PRESSURE TO STEAM DUMP MODE SELECTOR SWITCH	PERIODIC TESTINGS	NONE REQUIRED	NONE	
6.4.02.3	PC 418A	INPUT OPEN	(SAME AS 6.4.2.2)	(SAME AS 6.4.2.2)	(SAME AS 6.4.2.2)	(SAME AS 6.4.2.2)	INPUT WIRED IN PARALLEL WITH PT-459 LOOP RESISTOR
6.4.02.4	PC 418A	INPUT SHORT	(SAME AS 6.4.1.2)	(SAME AS 6.4.1.1)	(SAME AS 6.4.1.2)	(SAME AS 6.4.1.2)	
6.4.03.1	YE 459	OUTPUT VOLTS HIGH	(SAME AS 6.4.1.1)	(SAME AS 6.4.1.1)	(SAME AS 6.4.1.1)	(SAME AS 6.4.1.1)	POWER SUPPLY FOR PT-459 CURRENT LOOP

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
 SAN ONOFRE UNIT 1
 SECTION 6: STEAM/FEED FLOW MISMATCH SCRAM

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
6.4.03.2	YE 459	OUTPUT VOLTS LOW	(SAME AS 6.4.1.2)	(SAME AS 6.4.1.2)	(SAME AS 6.4.1.2)	(SAME AS 6.4.1.2)	
6.4.04.1	PI 459	INPUT OPEN	MAIN STEAM HEADER PRESSURE INDICATION FAILS LOW	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	VOLTAGE-SENSING DEVICE ACROSS PT-459 CURRENT LOOP RESISTOR
6.4.04.2	PI 459	INPUT SHORT	(SAME AS 6.4.1.2)	CONTROL ROOM INDICATION, PERIODIC TESTING	(SAME AS 6.4.1.2)	(SAME AS 6.4.1.2)	
6.4.05.1	REG SUPPL IV (RS)	VOLTS ZERO OR GROUNDED	LOW MAIN STEAM HEADER PRESSURE SIGNAL TO STEAM DUMP OPERATIONAL MODE SELECTOR SWITCH, CONTROL ROOM INDICATION, AND STEAM DENSITY CORRECTION INPUT. DENSITY CORRECTION IN ALL THREE FEEDWATER CONTROL/MISMATCH TRIP CHANNELS FAILS TO FLOOR VALUE	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED (INCLUDED IN SETPOINT ANALYSIS)	STEAM/FEED MISMATCH TRIP SETPOINT FOR LOW FEED FLOW EVENTS DECALIBRATED UP TO 7% FROM REDUCED POWER FOR ALL THREE STEAM/FEED MISMATCH TRIP CHANNELS	LOSS OF T-REF (PT-415) AND MWE (PT-417) SIGNALS TO ROD CONTROL AND STEAM DUMP SYSTEMS
6.4.06.1	NON-REG SUPPL IV (R10/R11)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO RECORDERS (YA-456, -457, -458)	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED	NONE	

TABLE 7: SCRAM MATRIX AND BREAKERS
(INCLUDING MANUAL AND RCP BREAKER SCRAMS)

- REFERENCES:
- A. SYSTEM DESCRIPTIONS
SD-S01-570 REACTOR PROTECTION SYSTEM AND PERM.
 - B. DRAWINGS
5112259
5150410 (N1545 Sh 102)

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
 SAN ONDFRE UNIT 1
 SECTION 7: SCRAM MATRIX AND BREAKERS
 (INCLUDING MANUAL AND RCP BREAKER SCRAMS)

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
7.1.01.1	PC 430K-X	UNTRIPPED (AS-IS)	LOSS OF TWO OF THE POSSIBLE THREE MATRIX TRIP PATHS FOR FIXED HIGH PRESSURE ACTUATION OF SHUNT COIL A, SHUNT COIL B, AND UVS-2	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF FIXED HIGH PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, OTHER TRIP FUNCTIONS UNAFFECTED	
7.1.01.2	PC 431H-X	UNTRIPPED (AS-IS)	(SAME AS 7.1.1.1)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF FIXED HIGH PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, OTHER TRIP FUNCTIONS UNAFFECTED	
7.1.01.3	PC 432E-X	UNTRIPPED (AS-IS)	(SAME AS 7.1.1.1)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF FIXED HIGH PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, OTHER TRIP FUNCTIONS UNAFFECTED	
7.1.02.1	PC 430A-X	UNTRIPPED (AS-IS)	LOSS OF TWO OF THE POSSIBLE THREE MATRIX TRIP PATHS FOR VARIABLE LOW PRESSURE ACTUATION OF SHUNT COIL A, SHUNT COIL B, AND UVS-3	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, OTHER TRIP FUNCTIONS UNAFFECTED	
7.1.02.2	PC 431D-X	UNTRIPPED (AS-IS)	(SAME AS 7.1.2.1)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, OTHER TRIP FUNCTIONS UNAFFECTED	
7.1.02.3	PC 432B-X	UNTRIPPED (AS-IS)	(SAME AS 7.1.2.1)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, OTHER TRIP FUNCTIONS UNAFFECTED	
7.1.03.1	SEQ 1	UNTRIPPED (AS-IS)	LOSS OF SIS/SISLOP/LOP ACTUATION OF SHUNT COIL B, AND ONE OF TWO POSSIBLE MATRIX TRIP PATHS FOR SIS/SISLOP/LOP ACTUATION OF UVS-1	PERIODIC TESTING	REDUNDANT CHANNELS	SEQ #1 ACTUATED SCRAM DISABLED, SEQ #2 SCRAM (SHUNT COIL A, UVS-1) AND OTHER TRIP FUNCTIONS UNAFFECTED	SEE EDCS-SFA FOR SLS EVALUATION
7.1.03.2	SEQ 2	UNTRIPPED (AS-IS)	LOSS OF SIS/SISLOP/LOP ACTUATION OF SHUNT COIL A, AND ONE OF TWO POSSIBLE MATRIX TRIP PATHS FOR SIS/SISLOP/LOP ACTUATION OF UVS-1	PERIODIC TESTING	REDUNDANT CHANNELS	SEQ #2 ACTUATED SCRAM DISABLED, SEQ #1 SCRAM (SHUNT COIL B, UVS-1) AND OTHER TRIP FUNCTIONS UNAFFECTED	SEE EDCS-SFA FOR SLS EVALUATION
7.2.01.1	LC 430A-X	UNTRIPPED (AS-IS)	LOSS OF TWO OF THE THREE POSSIBLE MATRIX TRIP PATHS FOR HIGH PRESSURIZER LEVEL ACTUATION OF SHUNT COIL A, SHUNT COIL B, AND UVS-1	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF HIGH PRESSURIZER LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, OTHER TRIP FUNCTIONS UNAFFECTED	
7.2.01.2	LC 431A-X	UNTRIPPED (AS-IS)	(SAME AS 7.2.1.1)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF HIGH PRESSURIZER LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, OTHER TRIP FUNCTIONS UNAFFECTED	
7.2.01.3	LC 432A-X	UNTRIPPED (AS-IS)	(SAME AS 7.2.1.1)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF HIGH PRESSURIZER LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, OTHER TRIP FUNCTIONS UNAFFECTED	
7.3.01.1	63 X-1	UNTRIPPED (AS-IS)	LOSS OF TWO OF THREE POSSIBLE MATRIX TRIP PATHS FOR TURBINE TRIP ACTUATION OF SHUNT COIL A, SHUNT COIL B, AND UVS-3	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I OF TURBINE TRIP SCRAM TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, OTHER TRIP FUNCTIONS UNAFFECTED	

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDFRE UNIT 1
SECTION 7: SCRAM MATRIX AND BREAKERS
(INCLUDING MANUAL AND RCP BREAKER SCRAMS)

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
7.3.01.2	63 X-2	UNTRIPPED (AS-IS)	(SAME AS 7.3.1.1)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II OF TURBINE TRIP SCRAM TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, OTHER TRIP FUNCTIONS UNAFFECTED	
7.3.01.3	63 X-3	UNTRIPPED (AS-IS)	(SAME AS 7.3.1.1)	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III OF TURBINE TRIP SCRAM TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, OTHER TRIP FUNCTIONS UNAFFECTED	
7.4.01.1	AP4A	ON	LOSS OF 1 OF 2 POSSIBLE OUTPUT PATHS FROM 2/3 RCS LOW FLOW, 2/3 RCP BREAKER, VARIABLE LOW PRESSURE AND TURBINE TRIP SCRAM MATRICES TO SHUNT COIL A AND SHUNT COIL B, CLOSURE OF 1 OF 2 CONTACTS NEEDED TO BYPASS UVS-3 AND UVS-4 OUTPUT TO UV COILS A & B	ANNUNCIATION, PERIODIC TESTING	REDUNDANT OUTPUT PATHS TO SHUNT COILS VIA AP4C, ADDITIONAL UV BYPASS CONTACT AP4C	REDUCED REDUNDANCY AGAINST BYPASS OF 2/3 RCS LOW FLOW, 2/3 RCP BREAKER, VARIABLE LOW PRESSURE AND TURBINE TRIP SCRAMS, NO ON LOSS OF ANY SCRAM FUNCTION	PERMISSIVES, AP4A ENERGIZED WHEN P-7 IS
7.4.01.2	AP4B	OFF	LOSS OF CAPABILITY TO BYPASS VARIABLE LOW PRESSURE, 2/3 RCS LOW FLOW, 2/3 RCP BREAKER AND TURBINE TRIP SCRAMS	PERIODIC TESTING	NONE REQUIRED	NONE (P-7 OFF), REACTOR SCRAM IF VARIABLE LOW PRESSURIZER PRESSURE, 2/3 RCS FLOW, 2/3 RCP BREAKER OR TURBINE TRIP SCRAM SIGNALS PRESENT (P-7 ON)	
7.4.02.1	AP4B	ON	LOSS OF 1 OF 2 POSSIBLE OUTPUT PATHS FOR SUR SCRAM TO SHUNT COIL A AND SHUNT COIL B, CLOSURE OF 1 OF 2 CONTACTS NEEDED TO BYPASS SUR SCRAM TO UVS-2	ANNUNCIATION, PERIODIC TESTING	REDUNDANT OUTPUT PATHS TO SHUNT COILS VIA AP4D, ADDITIONAL UV BYPASS CONTACT AP4D	REDUCED REDUNDANCY AGAINST BYPASS OF SUR SCRAM, NO LOSS OF ANY SCRAM FUNCTION	AP4B ENERGIZED WHEN P-7 IS OFF
7.4.02.2	AP4B	OFF	LOSS OF CAPABILITY TO BYPASS SUR SCRAM	PERIODIC TESTING	NONE REQUIRED	NONE (P-7 ON), REACTOR SCRAM IF SUR SCRAM SIGNAL PRESENT (P-7 OFF)	
7.4.03.1	AP4C	ON	(SAME AS 7.4.1.1)	(SAME AS 7.4.1.1)	(SAME AS 7.4.1.1)	(SAME AS 7.4.1.1)	AP4C ENERGIZED WHEN P-7 IS ON
7.4.03.2	AP4C	OFF	(SAME AS 7.4.1.2)	(SAME AS 7.4.1.2)	(SAME AS 7.4.1.2)	(SAME AS 7.4.1.2)	
7.4.04.1	AP4D	ON	(SAME AS 7.4.2.1)	(SAME AS 7.4.2.1)	(SAME AS 7.4.2.1)	(SAME AS 7.4.2.1)	AP4D ENERGIZED WHEN P-7 IS OFF
7.4.04.2	AP4D	OFF	(SAME AS 7.4.2.2)	(SAME AS 7.4.2.2)	(SAME AS 7.4.2.2)	(SAME AS 7.4.2.2)	
7.4.05.1	AP10A	ON	LOSS OF 1 OF 2 POSSIBLE OUTPUT PATHS FOR 1/3 LOW RCS FLOW, 1/3 RCP BREAKER AND STEAM/FEED MISMATCH SCRAM MATRICES TO SHUNT COIL A, SHUNT COIL B, AND UVS-2	ANNUNCIATION, PERIODIC TESTING	REDUNDANT OUTPUT PATHS TO SHUNT COILS VIA AP10C, ADDITIONAL UV BYPASS CONTACT AP10C	REDUCED REDUNDANCY AGAINST P-8 BYPASS OF 1/3 LOW RCS FLOW, 1/3 RCP BREAKER AND STEAM/FEED MISMATCH SCRAMS, NO LOSS OF ANY SCRAM FUNCTION	AP10A ENERGIZED WHEN P-8 IS ON
7.4.05.2	AP10A	OFF	LOSS OF CAPABILITY TO BYPASS 1/3 LOW FLOW, 1/3 RCP BREAKER AND STEAM/FEED MISMATCH SCRAMS	PERIODIC TESTING	NONE REQUIRED	NONE (P-8 OFF), REACTOR SCRAM IF 1/3 LOW RCS FLOW, RCP BREAKER OPEN OR STEAM/FEED MISMATCH SCRAM SIGNAL PRESENT (P-8 ON)	
7.4.05.1	AP10C	ON	(SAME AS 7.4.5.1)	(SAME AS 7.4.5.1)	(SAME AS 7.4.5.1)	(SAME AS 7.4.5.1)	AP10C ENERGIZED WHEN P-8 IS ON
7.4.05.2	AP10C	OFF	(SAME AS 7.4.5.2)	(SAME AS 7.4.5.2)	(SAME AS 7.4.5.2)	(SAME AS 7.4.5.2)	
7.4.07.1	HSRAT-A	UNTRIPPED (AS-IS)	LOSS OF COINCIDENTOR-A SUR TRIP INPUT TO SHUNT COIL A AND UVS-2	PERIODIC TESTING	REDUNDANT SUR TRIP PATHS TO SHUNT COIL B AND UVS-2 FROM COINCIDENTOR-B	LOSS OF REDUNDANCY FOR SUR SCRAM, TRIP LOGIC UNAFFECTED	
7.4.08.1	HSRAT-B	UNTRIPPED (AS-IS)	LOSS OF COINCIDENTOR-B SUR TRIP INPUT TO SHUNT COIL B AND UVS-2	(SAME AS 7.4.7.1)	REDUNDANT SUR TRIP PATHS TO SHUNT COIL A AND UVS-2 FROM COINCIDENTOR-A	(SAME AS 7.4.7.1)	
7.4.09.1	PROPRT-A	UNTRIPPED (AS-IS)	LOSS OF COINCIDENTOR-A POWER RANGE OVERPOWER TRIP INPUT TO SHUNT COIL A AND UVS-1	(SAME AS 7.4.7.1)	REDUNDANT POWER RANGE OVERPOWER TRIP PATHS TO SHUNT COIL B AND UVS-1 FROM COINCIDENTOR-B	LOSS OF REDUNDANCY FOR POWER RANGE OVERPOWER SCRAM, TRIP LOGIC UNAFFECTED	

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDFRE UNIT 1
SECTION 7: SCRAM MATRIX AND BREAKERS
(INCLUDING MANUAL AND RCP BREAKER SCRAMS)

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
7.4.10.1	PROVRT-B	UNTRIPPED (AS-IS)	LOSS OF COINCIDENTOR-B POWER RANGE OVERPOWER TRIP INPUT TO SHUNT COIL B AND LVS-1	(SAME AS 7.4.7.1)	REDUNDANT POWER RANGE OVERPOWER TRIP PATHS TO SHUNT COIL A AND LVS-1 FROM COINCIDENTOR-A	(SAME AS 7.4.9.1)	
7.4.11.1	TEST BYP-A	ON	COINCIDENTOR-A SUR AND POWER RANGE OVERPOWER TRIP INPUTS TO SHUNT COIL A, LVS-1 AND LVS-2 BYPASSED	ANNUNCIATION	REDUNDANT SUR AND POWER RANGE OVERPOWER TRIP PATHS TO SHUNT COIL B, LVS-1 AND LVS-2 FROM COINCIDENTOR-B	LOSS OF REDUNDANCY FOR SUR AND POWER RANGE OVERPOWER SCRAMS, TRIP LOGIC UNAFFECTED	
7.4.12.1	TEST BYP-B	ON	COINCIDENTOR-B SUR AND POWER RANGE OVERPOWER TRIP INPUTS TO SHUNT COIL B, LVS-1 AND LVS-2 BYPASSED	ANNUNCIATION	REDUNDANT SUR AND POWER RANGE OVERPOWER TRIP PATHS TO SHUNT COIL A, LVS-1 AND LVS-2 FROM COINCIDENTOR-A	(SAME AS 7.4.11.1)	
7.5.01.1	FC 400-X1	UNTRIPPED (AS-IS)	LOSS OF LOOP A LOW FLOW INPUT TO 2/3 TRIP MATRIX FOR SHUNT COIL A, SHUNT COIL B, AND LVS-3	PERIODIC TESTING	LOOP A RCP BREAKER INPUT TO 2/3 MATRIX	LOSS OF REDUNDANCY FOR 2/3 LOSS OF RCS RELAY IS ENERGIZE TO TRIP FLOW EVENTS INVOLVING LOOP A, TRIP LOGIC UNAFFECTED	
7.5.01.2	FC 410-X1	UNTRIPPED (AS-IS)	LOSS OF LOOP B LOW FLOW INPUT TO 2/3 TRIP MATRIX FOR SHUNT COIL A, SHUNT COIL B, AND LVS-3	PERIODIC TESTING	LOOP B RCP BREAKER INPUT TO 2/3 MATRIX	LOSS OF REDUNDANCY FOR 2/3 LOSS OF RCS (SAME AS 7.5.1.1) FLOW EVENTS INVOLVING LOOP B, TRIP LOGIC UNAFFECTED	
7.5.01.3	FC 420-X1	UNTRIPPED (AS-IS)	LOSS OF LOOP C LOW FLOW INPUT TO 2/3 TRIP MATRIX FOR SHUNT COIL A, SHUNT COIL B, AND LVS-3	PERIODIC TESTING	LOOP C RCP BREAKER INPUT TO 2/3 MATRIX	LOSS OF REDUNDANCY FOR 2/3 LOSS OF RCS (SAME AS 7.5.1.1) FLOW EVENTS INVOLVING LOOP C, TRIP LOGIC UNAFFECTED	
7.5.02.1	FC 400-X2	UNTRIPPED (AS-IS)	LOSS OF LOOP A LOW FLOW INPUT TO 1/3 TRIP MATRIX FOR SHUNT COIL A, SHUNT COIL B, AND LVS-2	PERIODIC TESTING	LOOP A RCP BREAKER INPUT TO 1/3 MATRIX	LOSS OF REDUNDANCY FOR 1/3 LOSS OF RCS RELAY IS ENERGIZE TO TRIP FLOW EVENTS INVOLVING LOOP A, TRIP LOGIC UNAFFECTED	
7.5.02.2	FC 410-X2	UNTRIPPED (AS-IS)	LOSS OF LOOP B LOW FLOW INPUT TO 1/3 TRIP MATRIX FOR SHUNT COIL A, SHUNT COIL B, AND LVS-2	PERIODIC TESTING	LOOP B RCP BREAKER INPUT TO 1/3 MATRIX	LOSS OF REDUNDANCY FOR 1/3 LOSS OF RCS (SAME AS 7.5.2.1) FLOW EVENTS INVOLVING LOOP B, TRIP LOGIC UNAFFECTED	
7.5.02.3	FC 420-X2	UNTRIPPED (AS-IS)	LOSS OF LOOP C LOW FLOW INPUT TO 1/3 TRIP MATRIX FOR SHUNT COIL A, SHUNT COIL B, AND LVS-2	PERIODIC TESTING	LOOP C RCP BREAKER INPUT TO 1/3 MATRIX	LOSS OF REDUNDANCY FOR 1/3 LOSS OF RCS (SAME AS 7.5.2.1) FLOW EVENTS INVOLVING LOOP C, TRIP LOGIC UNAFFECTED	
7.5.03.1	b/152-11A01	OPEN (AS-IS)	LOSS OF LOOP A RCP BREAKER INPUT TO 1/3 AND 2/3 LOW FLOW TRIP MATRICES FOR SHUNT COIL A AND SHUNT COIL B	PERIODIC TESTING	LOOP A LOW FLOW CHANNEL (I) INPUT TO SHUNT COIL A, SHUNT COIL B, LVS-2 (1/3 ONLY) AND LVS-3 (2/3 ONLY) MATRICES	LOSS OF REDUNDANCY FOR LOSS OF RCS FLOW EVENTS INVOLVING LOOP A, TRIP LOGIC UNAFFECTED	BREAKER OR S-AUXILIARY SWITCH MALFUNCTION
7.5.03.2	b/152-11A02	OPEN (AS-IS)	LOSS OF LOOP B RCP BREAKER INPUT TO 1/3 AND 2/3 LOW FLOW TRIP MATRICES FOR SHUNT COIL A AND SHUNT COIL B	PERIODIC TESTING	LOOP B LOW FLOW CHANNEL (II) INPUT TO SHUNT COIL A, SHUNT COIL B, LVS-2 (1/3 ONLY) AND LVS-3 (2/3 ONLY) MATRICES	LOSS OF REDUNDANCY FOR LOSS OF RCS FLOW EVENTS INVOLVING LOOP B, TRIP LOGIC UNAFFECTED	(SAME AS 7.5.3.1)
7.5.03.3	b/152-11A03	OPEN (AS-IS)	LOSS OF LOOP C RCP BREAKER INPUT TO 1/3 AND 2/3 LOW FLOW TRIP MATRICES FOR SHUNT COIL A AND SHUNT COIL B	PERIODIC TESTING	LOOP C LOW FLOW CHANNEL (III) INPUT TO SHUNT COIL A, SHUNT COIL B, LVS-2 (1/3 ONLY) AND LVS-3 (2/3 ONLY) MATRICES	LOSS OF REDUNDANCY FOR LOSS OF RCS FLOW EVENTS INVOLVING LOOP C, TRIP LOGIC UNAFFECTED	(SAME AS 7.5.3.1)

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ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INGHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
7.5.04.1	a/152-11A01	CLOSED (AS-IS)	LOSS OF LOOP A RCP BREAKER INPUT TO LOW FLOW TRIP MATRICES FOR UVS-2 (1/3) AND UVS-4 (2/3)	PERIODIC TESTING	(SAME AS 7.5.3.1)	(SAME AS 7.5.3.1)	BREAKER OR A-AUXILIARY SWITCH MALFUNCTION
7.5.04.2	a/152-11A02	CLOSED (AS-IS)	LOSS OF LOOP B RCP BREAKER INPUT TO LOW FLOW TRIP MATRICES FOR UVS-2 (1/3) AND UVS-4 (2/3)	PERIODIC TESTING	(SAME AS 7.5.3.2)	(SAME AS 7.5.3.2)	(SAME AS 7.5.4.1)
7.5.04.3	a/152-11A03	CLOSED (AS-IS)	LOSS OF LOOP C RCP BREAKER INPUT TO LOW FLOW TRIP MATRICES FOR UVS-2 (1/3) AND UVS-4 (2/3)	PERIODIC TESTING	(SAME AS 7.5.3.3)	(SAME AS 7.5.3.3)	(SAME AS 7.5.4.1)
7.6.01.1	FM 456B-X	UNTRIPPED (AS-IS)	LOSS OF S/G A (CHANNEL I) STEAM/FEEDWATER FLOW MISMATCH INPUT TO 2/3 TRIP MATRICES FOR SHUNT COIL A, SHUNT COIL B AND UVS-2	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I (S/G A) OF STEAM/FEEDWATER FLOW MISMATCH TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS (S/G B AND S/G C)	SEE M39419 FOR EVENT-SPECIFIC EVALUATION OF STEAM/FEED MISMATCH SCRAM
7.6.01.2	FM 457B-X	UNTRIPPED (AS-IS)	LOSS OF S/G B (CHANNEL II) STEAM/FEEDWATER FLOW MISMATCH INPUT TO 2/3 TRIP MATRICES FOR SHUNT COIL A, SHUNT COIL B AND UVS-2	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II (S/G B) OF STEAM/FEEDWATER FLOW MISMATCH TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS (S/G A AND S/G C)	
7.6.01.3	FM 458B-X	UNTRIPPED (AS-IS)	LOSS OF S/G C (CHANNEL III) STEAM/FEEDWATER FLOW MISMATCH INPUT TO 2/3 TRIP MATRICES FOR SHUNT COIL A, SHUNT COIL B AND UVS-2	PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III (S/G C) OF STEAM/FEEDWATER FLOW MISMATCH TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS (S/G A AND S/G B)	
7.7.01.1	1/SPB 1	TRIPPED	ACTIONATION OF SHUNT COIL A, SHUNT COIL B, AND UV COILS A AND B VIA UVS-1	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED	REACTOR SCRAM	
7.7.01.2	1/SPB 1	UNTRIPPED (AS-IS)	LOSS OF 1 OF 2 MANUAL SCRAM PATHS IN SHUNT COIL A, SHUNT COIL B, AND UVS-1	PERIODIC TESTING	REDUNDANT SWITCH (1/SPB 2)	LOSS OF REDUNDANCY FOR MANUAL SCRAM, NO LOSS OF ANY SCRAM FUNCTION	
7.7.02.1	1/SPB 2	TRIPPED	(SAME AS 7.7.1.1)	(SAME AS 7.7.1.1)	(SAME AS 7.7.1.1)	(SAME AS 7.7.1.1)	
7.7.02.2	1/SPB 2	UNTRIPPED (AS-IS)	(SAME AS 7.7.1.2)	(SAME AS 7.7.1.2)	(SAME AS 7.7.1.2)	(SAME AS 7.7.1.2)	
7.7.03.1	286 613-1	ON	LOSS OF CAPABILITY TO BYPASS VARIABLE LOW PRESSURE, 2/3 RCS LOW FLOW, 2/3 RCP BREAKER, AND TURBINE TRIP SCRAMS	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	NONE (P-7 OFF), REACTOR SCRAM IF VARIABLE LOW PRESSURIZER PRESSURE, 2/3 RCS LOW FLOW, 2/3 RCP BREAKER OR TURBINE TRIP SCRAM SIGNAL PRESENT (P-7 ON)	286 613-1 ENERGIZED BY LOVATS UPON 4 KV BUS 1C, 2C UNDERVOLTAGE IF MAIN GENERATOR DISCONNECT SWITCH IS CLOSED
7.7.03.2	286 613-1	OFF (AS-IS)	LOSS OF CAPABILITY TO OVERRIDE P-7 BYPASS OF VARIABLE LOW PRESSURE, 2/3 RCS LOW FLOW, 2/3 RCP BREAKER AND TURBINE TRIP SCRAMS UPON LOVATS ACTIONATION	PERIODIC TESTING	SEQ 1 AND SEQ 2 TRIP OUTPUTS ACTUATED ON BUS 1C, 2C UNDER VOLTAGE (LOP)	NONE (P-7 OFF), REDUCED REDUNDANCY FOR REACTOR SCRAM ON BUS 1C, 2C UNDERVOLTAGE (P-7 ON)	SEE EDCS SFA FOR SEQ 1, SEQ 2 DISCUSSION
7.7.04.1	UVS 1	INPUT OPEN	LOSS OF UVS-1 HOLD-IN FORCE, INTERRUPTING CURRENT TO UV COIL A AND UV COIL B	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED	REACTOR SCRAM	
7.7.04.2	UVS 1	INPUT SHORT	(SAME AS 7.7.4.1) MAY ALSO BLOW FUSES IN COMMON UV COIL SUPPLY	(SAME AS 7.7.4.1)	(SAME AS 7.7.4.1)	(SAME AS 7.7.4.1)	FUSES FROM EACH POLE OF 125 VDC SUPPLY PREVENT LOSS OF SHUNT TRIP
7.7.04.3	UVS 1	TRIPPED	CURRENT INTERRUPTED TO UV COIL A AND UV COIL B	(SAME AS 7.7.4.1)	(SAME AS 7.7.4.1)	(SAME AS 7.7.4.1)	
7.7.04.4	UVS 1	UNTRIPPED (AS-IS)	LOSS OF MANUAL, SEQ 1, SEQ 2, NIS (POWER RANGE OVERPOWER) AND PRESSURIZER HIGH LEVEL TRIP CAPABILITY FOR UV COIL A AND UV COIL B	PERIODIC TESTING	SHUNT TRIPS A AND B	REDUCED REDUNDANCY FOR MANUAL, SEQ 1, SEQ 2, NIS (POWER RANGE OVERPOWER) AND PRESSURIZER HIGH LEVEL SCRAMS, NO LOSS OF ANY SCRAM FUNCTION	
7.7.05.1	UVS 2	INPUT OPEN	LOSS OF UVS-2 HOLD-IN FORCE, INTERRUPTING CURRENT TO UV COIL A AND UV COIL B	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED	REACTOR SCRAM	

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ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
7.7.05.2	LVS 2	INPUT SHORT	(SAME AS 7.7.5.1) MAY ALSO BLOW FUSES IN COMMON UV COIL SUPPLY	(SAME AS 7.7.5.1)	(SAME AS 7.7.5.1)	(SAME AS 7.7.5.1)	(SAME AS 7.7.4.2)
7.7.05.3	LVS 2	TRIPPED	CURRENT INTERRUPTED TO UV COIL A AND UV COIL B	(SAME AS 7.7.5.1)	(SAME AS 7.7.5.1)	(SAME AS 7.7.5.1)	
7.7.05.4	LVS 2	UNTRIPPED (AS-IS)	LOSS OF 1/3 LOW RCS FLOW, 1/3 RCP BREAKER, STEAM/FEEDWATER FLOW MISMATCH, FIXED HIGH PRESSURE AND NIS (SUR) TRIP CAPABILITY FOR UV COIL A AND UV COIL B	PERIODIC TESTING	SHUNT TRIPS A AND B	REDUCED REDUNDANCY FOR 1/3 LOW RCS FLOW, 1/3 RCP BREAKER, STEAM/FEEDWATER FLOW MISMATCH, FIXED HIGH PRESSURE AND NIS (SUR) SCRAMS, NO LOSS OF ANY SCRAM FUNCTION	REACTOR SCRAM
7.7.05.1	LVS 3	INPUT OPEN	LOSS OF LVS-3 HOLD-IN FORCE, INTERRUPTING CURRENT TO UV COIL A AND UV COIL B	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED		
7.7.06.2	LVS 3	INPUT SHORT	(SAME AS 7.7.6.1) MAY ALSO BLOW FUSES IN COMMON UV COIL SUPPLY	(SAME AS 7.7.6.1)	(SAME AS 7.7.6.1)	(SAME AS 7.7.6.1)	(SAME AS 7.7.4.2)
7.7.06.3	LVS 3	TRIPPED	CURRENT INTERRUPTED TO UV COIL A AND UV COIL B	(SAME AS 7.7.6.1)	(SAME AS 7.7.6.1)	(SAME AS 7.7.6.1)	
7.7.06.4	LVS 3	UNTRIPPED (AS-IS)	LOSS OF 2/3 LOW RCS FLOW, VARIABLE LOW PRESSURE AND TURBINE TRIP CAPABILITY FOR UV COIL A AND UV COIL B	PERIODIC TESTING	SHUNT TRIPS A AND B	REDUCED REDUNDANCY FOR 2/3 LOW RCS FLOW VARIABLE LOW PRESSURE AND TURBINE TRIP SCRAMS, NO LOSS OF ANY SCRAM FUNCTION	REACTOR SCRAM
7.7.07.1	LVS 4	INPUT OPEN	LOSS OF LVS-4 HOLD-IN FORCE, INTERRUPTING CURRENT TO UV COIL A AND UV COIL B	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED		
7.7.07.2	LVS 4	INPUT SHORT	(SAME AS 7.7.7.1) MAY ALSO BLOW FUSES IN COMMON UV COIL SUPPLY	(SAME AS 7.7.7.1)	(SAME AS 7.7.7.1)	(SAME AS 7.7.7.1)	(SAME AS 7.7.4.2)
7.7.07.3	LVS 4	TRIPPED	CURRENT INTERRUPTED TO UV COIL A AND UV COIL B	(SAME AS 7.7.7.1)	(SAME AS 7.7.7.1)	(SAME AS 7.7.7.1)	
7.7.07.4	LVS 4	UNTRIPPED (AS-IS)	LOSS OF 2/3 RCP BREAKER TRIP CAPABILITY FOR UV COIL A AND UV COIL B	PERIODIC TESTING	SHUNT TRIPS A AND B	REDUCED REDUNDANCY FOR 2/3 RCP BREAKER SCRAMS, NO LOSS OF ANY SCRAM FUNCTION	VARIABLE HIGH PRESSURE TRIP PERMANENTLY BYPASSED IN THIS CIRCUIT
7.7.08.1	SHUNT COIL A	OPEN	LOSS OF SCRAM BREAKER A SHUNT TRIP CAPABILITY	CONTROL ROOM INDICATION, PERIODIC TESTING	UNDERVOLTAGE TRIP, REDUNDANT BREAKER	LOSS OF REDUNDANCY FOR SCRAM BREAKER A ACTUATION, ALL SCRAM FUNCTIONS UNAFFECTED	VARIABLE HIGH PRESSURE TRIP PERMANENTLY BYPASSED IN THIS CIRCUIT
7.7.08.2	SHUNT COIL A	SHORT	LOSS OF SCRAM BREAKER A SHUNT TRIP CAPABILITY	CONTROL ROOM INDICATION, PERIODIC TESTING	(SAME AS 7.7.8.1)	(SAME AS 7.7.8.1)	FUSES FROM EACH POLE OF 125 VDC SUPPLY PREVENT LOSS OF REDUNDANT BREAKER SHUNT TRIP
7.7.08.3	SHUNT COIL A	GROUND	NONE	BUS GROUND INDICATION	NONE REQUIRED	NONE	DC SUPPLY IS UNGROUNDED, GROUND OF THIS COIL BOUNDS CASE OF GROUND IN ANY INPUT TO THIS COIL
7.7.09.1	SHUNT COIL B	OPEN	LOSS OF SCRAM BREAKER B SHUNT TRIP CAPABILITY	CONTROL ROOM INDICATION, PERIODIC TESTING	UNDERVOLTAGE TRIP, REDUNDANT BREAKER	LOSS OF REDUNDANCY FOR SCRAM BREAKER B ACTUATION, ALL SCRAM FUNCTIONS UNAFFECTED	
7.7.09.2	SHUNT COIL B	SHORT	LOSS OF SCRAM BREAKER B SHUNT TRIP CAPABILITY	CONTROL ROOM INDICATION, PERIODIC TESTING	(SAME AS 7.7.9.1)	(SAME AS 7.7.9.1)	FUSES FROM EACH POLE OF 125 VDC SUPPLY PREVENT LOSS OF REDUNDANT BREAKER SHUNT TRIP
7.7.09.3	SHUNT COIL B	GROUND	NONE	BUS GROUND INDICATION	NONE REQUIRED	NONE	DC SUPPLY UNGROUNDED, GROUND OF THIS COIL BOUNDS CASE OF GROUND IN ANY INPUT TO THIS COIL
7.7.10.1	UV COIL A	OPEN	LOSS OF UV COIL A HOLD-IN FORCE, ACTUATING SCRAM BREAKER A	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED	REACTOR TRIP	

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ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
7.7.10.2	UV COIL A	SHORT	(SAME AS 7.7.10.1) UV COIL B MAY ALSO BE DE-ENERGIZED IF COMMON UV COIL SUPPLY FUSES BLOW DUE TO SHORT	(SAME AS 7.7.10.1)	(SAME AS 7.7.10.1)	(SAME AS 7.7.10.1)	FUSES FROM EACH POLE OF 125 VDC SUPPLY PREVENT LOSS OF SHUNT TRIP CAPABILITY
7.7.10.3	UV COIL A	GROUND	NONE	BUS GROUND INDICATION	NONE REQUIRED	NONE	DC SUPPLY UNGROUNDED, GROUND OF UV COIL BOUNDS CASE OF GROUND IN ANY INPUT TO THIS COIL
7.7.11.1	UV COIL B	OPEN	LOSS OF UV COIL B HOLD-IN FORCE, ACTUATING SCRAM BREAKER B	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED	REACTOR SCRAM	
7.7.11.2	UV COIL B	SHORT	(SAME AS 7.7.11.1) UV COIL A MAY ALSO BE DE-ENERGIZED IF COMMON UV COIL SUPPLY FUSES BLOW DUE TO SHORT.	(SAME AS 7.7.11.1)	(SAME AS 7.7.11.1)	(SAME AS 7.7.11.1)	(SAME AS 7.7.10.2)
7.7.11.3	UV COIL B	GROUND	NONE	BUS GROUND INDICATION	NONE REQUIRED	NONE	(SAME AS 7.7.10.3)
7.7.12.1	72/SCRAM A (BREAKER)	TRIPPED	INTERRUPTS BOTH POLES OF 125 VDC POWER TO CONTROL ROD (RCCA) DRIVE MECHANISMS	ANNUNCIATION	NONE REQUIRED	REACTOR SCRAM	
7.7.12.2	72/SCRAM A (BREAKER)	UNTRIPPED (AS-IS)	LOSS OF 1 OF 2 SCRAM BREAKERS	PERIODIC TESTING	REDUNDANT BREAKER	LOSS OF REDUNDANCY IN FINAL ACTUATION DEVICE FOR REACTOR SCRAM	125 VDC POWER TO CONTROL ROD (RCCA) DRIVE MECHANISMS CAN ALSO BE INTERRUPTED AT 125 VDC BREAKER 72-141
7.7.13.1	72/SCRAM B (BREAKER)	TRIPPED	(SAME AS 7.7.12.1)	(SAME AS 7.7.12.1)	(SAME AS 7.7.12.1)	(SAME AS 7.7.12.1)	
7.7.13.2	72/SCRAM B (BREAKER)	UNTRIPPED (AS-IS)	(SAME AS 7.7.12.2)	(SAME AS 7.7.12.2)	(SAME AS 7.7.12.2)	(SAME AS 7.7.12.2)	(SAME AS 7.7.12.2)
7.8.01.1	72/141 (BREAKER)	TRIPPED	INTERRUPTS BOTH POLES OF 125 VDC POWER TO SCRAM BREAKER CONTROLS, CONTROL ROD (RCCA) SEQUENCING CONTROLS, AND CONTROL ROD (RCCA) DRIVE MECHANISMS	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED	REACTOR SCRAM	
7.9.01.1	125 VDC BUS 1	VOLTS LOW	UV COILS A AND B ACTUATED ON LOW VOLTAGE	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED	REACTOR SCRAM	

TABLE 8-1: POWER SUPPLIES

- REFERENCES:
- A. SYSTEM DESCRIPTIONS:
 - SD-S01-140 125VDC SYSTEM
 - SD-S01-150 MAINTAINED 120VAC SYSTEM
 - B. DRAWINGS:
 - 5102173
 - 5102174
 - 5149348

- NOTES:
- a. THIS SECTION EVALUATES FAILURES IN THE CHANNELIZED VITAL AND REGULATED BUS SYSTEM COMMON TO THE SCRAM FUNCTIONS. IT WAS DEVELOPED IN PART USING THE SORT OF TABLES 1 - 7 FOR RACK POWER SUPPLY DEPENDENCY WHICH IS PROVIDED AS TABLE 8-2.
 - b. THE CREDIBLE FAILURE MODES FOR THE VITAL AND REGULATED BUS INVERTER AND TRANSFORMER SUPPLIES WERE CONSIDERED TO BE THOSE RESULTING IN BUS VOLTS LOW OR ZERO. BUS VOLTS HIGH WAS NOT CONSIDERED CREDIBLE BECAUSE MULTIPLE FAILURES IN THE SAME CHANNEL (eg. INVERTER AND REGULATOR) WOULD BE REQUIRED TO PRODUCE SUCH AN EFFECT AND SINGLE CHANNEL FAILURES WERE NOT LIMITING.
 - c. EXISTING BREAKER AND FUSE COORDINATION WERE CREDITED FOR PREVENTING THE PROPAGATION OF FAULTS INTO THE VITAL AND REGULATED POWER SUPPLY SYSTEM.

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ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
8.1.01.1	72-135	INPUT SHORT	LOSS OF DC BUS 1. INTERRUPTION OF POWER TO VITAL BUSES 1, 2, 3, 3A, 4 AND REGULATED BUSES 1, 2, 3 AND 4 DURING AUTOTRANSFER TO BACKUP SOURCE FROM MCC-2	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED	REACTOR SCRAM ON DC BUS 1 UNDERVOLTAGE	125 VDC BUS 1 BREAKER FOR VITAL BUS 1 INVERTER. DC SYSTEM IS UNGROUNDED
8.1.01.2	72-135	TRIPPED	LOSS OF VITAL BUS 1 INVERTER, INTERRUPTION OF POWER TO VITAL BUS 1 AND REGULATED BUS 1 DURING AUTOTRANSFER TO 37.5 KVA BACKUP SOURCE FROM MCC-2	CONTROL ROOM ANNUNCIATION, LOCAL INDICATION	NONE REQUIRED	CHANNEL I MAY TRIP IN ALL SCRAM FUNCTIONS EXCEPT RCS LOW FLOW AND TURBINE TRIP DURING INPUT VOLTAGE TRANSIENT	REG SUP1 I AND NON-REG SUP1 I FOR R1/R2, R3/R4, R5, R10/R11 AND NIS INTERRUPTED FOR 1-2 CYCLES DURING TRANSFER
8.1.02.1	INVERTER 1	INPUT OPEN	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)
8.1.02.2	INVERTER 1	INPUT SHORT	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)
8.1.02.3	INVERTER 1	OUTPUT VOLTS ZERO	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)
8.1.02.4	INVERTER 1	OUTPUT SHORT OR GROUND	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)	(SAME AS 8.1.1.2)
8.1.03.1	AUTO TRANS SW 1	CONTACTS OPEN	LOSS OF VITAL BUS 1 AND REGULATED BUS 1	CONTROL ROOM INDICATION, ANNUNCIATION	RCP BREAKER SCRAMS FOR RCS LOW FLOW. NONE REQUIRED FOR OTHER SCRAM FUNCTIONS	CHANNEL I TRIPPED FOR ALL SCRAM FUNCTIONS EXCEPT RCS LOW FLOW AND TURBINE TRIP. CHANNEL I RCS LOW FLOW DISABLED, RCP BREAKER SCRAMS UNAFFECTED	REG SUP1 I AND NON-REG SUP1 I FOR R1/R2, R3/R4, R5, R10/R11 AND NIS LOST. SEE ITEMS 1.1.22.1, 1.1.23.1, 1.1.24.1, 1.1.25.1, 2.1.8.1, 2.1.9.1, 4.1.23.1, 5.1.7.1, 5.1.8.1, 6.1.14.1 AND 6.1.15.1 (SAME AS 8.1.3.1)
8.1.03.2	AUTO TRANS SW 1	CONTACTS CLOSED	INVERTER 1 AND 37.5 KVA BACKUP SOURCE FROM MCC-2 PARALLELED. IF OUT OF PHASE, INVERTER MAY CURRENT LIMIT AND TRIP INTERNALLY, LEAVING VITAL BUS 1 AND REGULATED BUS 1 ON MCC-2	PERIODIC TESTING, LOCAL INDICATION	NONE REQUIRED	NONE	
8.1.03.3	AUTO TRANS SW 1	CONTACTS GROUNDED	LOSS OF VITAL BUS 1, REGULATED BUS 1 AND 37.5 KVA BACKUP SOURCE FROM MCC-2	CONTROL ROOM INDICATION, ANNUNCIATION	(SAME AS 8.1.3.1)	(SAME AS 8.1.3.1)	(SAME AS 8.1.3.1) BOUNDS CASE OF GROUND ON ANY VITAL BUS 1 DEVICE. ALSO CAUSES LOSS OF UTILITY BUS
8.1.04.1	VITAL BUS 1 ACB	INPUT SHORT	(SAME AS 8.1.3.3) AUTO TRANS SW 1 WILL PROPAGATE SHORT TO 37.5 KVA BACKUP SOURCE FROM MCC-2	(SAME AS 8.1.3.3)	(SAME AS 8.1.3.1)	(SAME AS 8.1.3.1)	ALSO CAUSES LOSS OF UTILITY BUS
8.1.04.2	VITAL BUS 1 ACB	TRIPPED	LOSS OF VITAL BUS 1 AND REGULATED BUS 1	(SAME AS 8.1.3.3)	(SAME AS 8.1.3.1)	(SAME AS 8.1.3.1)	
8.1.05.1	8-1103V (BREAKER)	TRIPPED	LOSS OF NON-REG SUP1 I (R1/R2)	PERIODIC TEST	NONE REQUIRED	NONE	SEE ITEM 1.1.23.1
8.1.06.1	8-1101V (BREAKER)	TRIPPED	LOSS OF NON-REG SUP1 I (R3/R4)	ANNUNCIATION, PERIODIC TEST	NONE REQUIRED	CHANNEL I OF FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND HIGH PRESSURIZER LEVEL TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	SEE ITEMS 1.1.25.1 AND 2.1.9.1
8.1.07.1	8-1106V (BREAKER)	TRIPPED	LOSS OF NON-REG SUP1 I (R5)	ANNUNCIATION, PERIODIC TEST	REDUNDANT CHANNELS AND RCP BREAKER SCRAMS	CHANNEL I OF RCS LOW FLOW DISABLED IN 1/3 AND 2/3 MATRICES, LOGIC BECOMES 1/2 (NO P-8) AND 2/2 (NO P-7) RESPECTIVELY IN REMAINING CHANNELS. RCP BREAKER SCRAMS UNAFFECTED	SEE ITEM 5.1.8.1
8.1.08.1	8-1105V (BREAKER)	TRIPPED	LOSS OF NON-REG SUP1 I (R10/R11)	ANNUNCIATION, PERIODIC TEST	NONE REQUIRED	CHANNEL I OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	SEE ITEM 6.1.15.1
8.1.09.1	8-1107V (BREAKER)	TRIPPED	LOSS OF REGULATED BUS 1 (REG SUP1 I TO R1/R2, R3/R4, R5, R10/R11, NIS RACKS)	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT CHNLS FOR FIXED HI PRESSURE, VARIABLE LO PRESSURE AND HI PZR LEVEL SCRAMS. NONE REQUIRED FOR OTHER SCRAM FUNCTIONS	CHNL I OF FIXED HI PRESS, VAR LO PRESS AND HI PZR LEVEL DISABLED, LOGIC BECOMES 2/2 ON REM CHNLS. CHNL I OF SEQ #1, NIS SCRAMS UNTRIPPED. SCRAM OCCURS (P-7 OR NO P-8) OR LOGIC BECOMES 1/2, 1/3, 1/2 AND 1/2 RESP	SEE ITEMS 1.1.22.1, 1.1.24.1, 2.1.8.1, 4.1.23.1, 5.1.7.1 AND 6.1.14.1

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
 SAN ONDFRE UNIT 1
 SECTION 8: POWER SUPPLIES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
8.1.10.1	REGULATOR 1 (TWINCO)	INPUT OPEN	(SAME AS 8.1.9.1)	(SAME AS 8.1.9.1)	(SAME AS 8.1.9.1)	(SAME AS 8.1.9.1)	(SAME AS 8.1.9.1)
8.1.10.2	REGULATOR 1 (TWINCO)	INPUT SHORT	(SAME AS 8.1.9.1)	(SAME AS 8.1.9.1)	(SAME AS 8.1.9.1)	(SAME AS 8.1.9.1)	(SAME AS 8.1.9.1)
8.1.10.3	REGULATOR 1 (TWINCO)	OUTPUT VOLTS ZERO	(SAME AS 8.1.9.1)	(SAME AS 8.1.9.1)	(SAME AS 8.1.9.1)	(SAME AS 8.1.9.1)	BOUNDS OUTPUT SHORT OR GROUND
8.1.11.1	8-11R2 (FUSE)	OPEN	LOSS OF REG SUPL I (R1/R2)	CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL I OF VARIABLE LOW PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	SEE ITEM 1.1.22.1
8.1.12.1	8-11R4 (FUSE)	OPEN	LOSS OF REG SUPL I (R3/R4)	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT CHANNELS	CHANNEL I OF FIXED HIGH PRESSURE AND HIGH PRESSURIZER LEVEL DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, CHANNEL I OF VARIABLE LOW PRESSURE AND SEQ #1 PZR PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	SEE ITEMS 1.1.22.1 AND 2.1.8.1
8.1.13.1	8-11R6 (FUSE)	OPEN	LOSS OF REG SUPL I (R5)	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TEST	NONE REQUIRED	CHANNEL I OF RCS LOW FLOW TRIPPED, SCRAM OCCURS (NO P-8) OR LOGIC BECOMES 1/2 (NO P-7) ON REMAINING CHANNELS	SEE ITEM 3.1.7.1
8.1.14.1	8-11R1 (FUSE)	OPEN	LOSS OF REG SUPL I (R10/R11)	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED	CHANNEL I OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	SEE ITEM 6.1.14.1
8.1.15.1	8-11R3 (FUSE)	OPEN	LOSS OF REG SUPL I (NIS)	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED FOR NIS OVERPOWER OR HIGH SUR TRIPS, REDUNDANT CHANNELS FOR P-7 AND P-8	CHANNEL I OF NIS OVERPOWER AND SUR TRIPPED, SCRAM OCCURS (P-7) OR LOGIC BECOMES 1/3 (NO P-7) ON REMAINING CHANNELS	SEE ITEM 4.1.23.1
8.2.01.1	72-136	INPUT SHORT	LOSS OF DC BUS 1. INTERRUPTION OF POWER TO VITAL BUSES 1, 2, 3, 3A, 4 AND REGULATED BUSES 1, 2, 3, AND 4 DURING AUTOTRANSFER TO BACKUP SOURCE FROM MCC-2	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED	REACTOR TRIP ON DC BUS 1 UNDERVOLTAGE	125 VDC BUS 1 BREAKER FOR VITAL BUS 2 INVERTER. DC SYSTEM IS UNGROUNDED
8.2.01.2	72-136	TRIPPED	LOSS OF VITAL BUS 2 INVERTER, INTERRUPTION OF POWER TO VITAL BUS 2 AND REGULATED BUS 2 DURING AUTOTRANSFER TO 37.5 KVA BACKUP SOURCE FROM MCC-2	CONTROL ROOM ANNUNCIATION, LOCAL INDICATION	NONE REQUIRED	CHANNEL II MAY TRIP IN ALL SCRAM FUNCTIONS EXCEPT RCS LOW FLOW AND TURBINE TRIP DURING INPUT VOLTAGE TRANSIENT	REG SUPL II AND NON-REG SUPL II FOR R1/R2, R3/R4, R5, R10/R11 AND NIS INTERRUPTED FOR 1-2 CYCLES DURING TRANSFER
8.2.02.1	INVERTER 2	INPUT OPEN	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)
8.2.02.2	INVERTER 2	INPUT SHORT	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)
8.2.02.3	INVERTER 2	OUTPUT VOLTS ZERO	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)
8.2.02.4	INVERTER 2	OUTPUT SHORT OR GROUND	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)	(SAME AS 8.2.1.2)
8.2.03.1	AUTO TRANS SW 2	CONTACTS OPEN	LOSS OF VITAL BUS 2 AND REGULATED BUS 2	CONTROL ROOM INDICATION, ANNUNCIATION	RCP BREAKER SCRAMS FOR RCS LOW FLOW, NONE REQUIRED FOR OTHER SCRAM FUNCTIONS	CHANNEL II TRIPPED FOR ALL SCRAM FUNCTIONS EXCEPT RCS LOW FLOW AND TURBINE TRIP. CHANNEL II OF RCS LOW FLOW DISABLED, RCP BREAKER SCRAMS UNAFFECTED	REG SUPL II AND NON-REG SUPL II FOR R1/R2, R3/R4, R5, R10/R11 AND NIS LOST. SEE ITEMS 1.2.22.1, 1.2.23.1, 1.2.24.1, 1.2.25.1, 2.2.8.1, 2.2.9.1, 4.2.23.1, 5.2.7.1, 5.2.8.1, 5.2.14.1 AND 6.2.15.1 (SAME AS 8.2.3.1)
8.2.03.2	AUTO TRANS SW 2	CONTACTS CLOSED	INVERTER 2 AND 37.5 KVA BACKUP SOURCE FROM MCC-2 PARALLELED. IF OUT OF PHASE, INVERTER MAY CURRENT LIMIT AND TRIP INTERNALLY, LEAVING VITAL BUS 2 AND REGULATED BUS 2 ON MCC-2	PERIODIC TESTING, LOCAL INDICATION	NONE REQUIRED	NONE	

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDFRE UNIT 1
SECTION 8: POWER SUPPLIES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
8.2.03.3	AUTO TRANS SW 2	CONTACTS GROUNDED	LOSS OF VITAL BUS 2, REGULATED BUS 2 AND 37.5 KVA BACKUP SOURCE FROM MCC-2	CONTROL ROOM INDICATION, ANNUNCIATION	(SAME AS 8.2.3.1)	(SAME AS 8.2.3.1)	(SAME AS 8.2.3.1) BOUNDS CASE OF GROUND ON ANY VITAL BUS 2 DEVICE. ALSO CAUSES LOSS OF UTILITY BUS
8.2.04.1	VITAL BUS 2 ACB	INPUT SHORT	(SAME AS 8.2.3.3) AUTO TRANS SW 2 WILL PROPAGATE SHORT TO 37.5 KVA BACKUP SOURCE FROM MCC-2	(SAME AS 8.2.3.3)	(SAME AS 8.2.3.1)	(SAME AS 8.2.3.1)	ALSO CAUSES LOSS OF UTILITY BUS
8.2.04.2	VITAL BUS 2 ACB	TRIPPED	LOSS OF VITAL BUS 2 AND REGULATED BUS 2	(SAME AS 8.2.3.3)	(SAME AS 8.2.3.1)	(SAME AS 8.2.3.1)	
8.2.05.1	8-1203V (BREAKER)	TRIPPED	LOSS OF NON-REG SUPL II (R1/R2)	PERIODIC TEST	NONE REQUIRED	NONE	SEE ITEM 1.2.23.1
8.2.06.1	8-1201V (BREAKER)	TRIPPED	LOSS OF NON-REG SUPL II (R3/R4)	ANNUNCIATION, PERIODIC TEST	NONE REQUIRED	CHANNEL II OF FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND HIGH PRESSURIZER LEVEL TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS.	SEE ITEMS 1.2.25.1 AND 2.2.9.1
8.2.07.1	8-1206V (BREAKER)	TRIPPED	LOSS OF NON-REG SUPL II (R5)	ANNUNCIATION, PERIODIC TEST	REDUNDANT CHANNELS AND RCP BREAKER SCRAMS	CHANNEL II OF RCS LOW FLOW DISABLED IN 1/3 AND 2/3 MATRICES, LOGIC BECOMES 1/2 (NO P-8) AND 2/2 (NO P-7) RESPECTIVELY ON REMAINING CHANNELS. RCP BREAKER SCRAMS UNAFFECTED	SEE ITEM 5.2.8.1
8.2.08.1	8-1205V (BREAKER)	TRIPPED	LOSS OF NON-REG SUPL II (R10/R11)	ANNUNCIATION, PERIODIC TEST	NONE REQUIRED	CHANNEL II OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	SEE ITEM 6.2.15.1
8.2.09.1	8-1207V (BREAKER)	TRIPPED	LOSS OF REGULATED BUS 2 (REG SUPL II TO R1/R2, R3/R4, R5, R10/R11, NIS RACKS)	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT CHNLS FOR FIXED HI PRESSURE, VARIABLE LO AND HI PZR LVL DISABLED, LOGIC BECOMES 2/2 ON REM CHNLS. CHNL II OF SEQ #1, NIS SCRAMS, NONE REQUIRED FOR OVRPRW AND SUR, RCS LO FLO AND STM/FEED OTHER SCRAM FUNCTIONS	CHNL II OF FIXED HI PRESS, VAR LO PRESS AND HI PZR LVL DISABLED, LOGIC BECOMES 2/2 ON REM CHNLS. CHNL II OF SEQ #1, NIS SCRAMS, NONE REQUIRED FOR OVRPRW AND SUR, RCS LO FLO AND STM/FEED MISMATCH TRIPPED. SCRAM OCCURS (P-7 OR NO P-8) OR LOGIC BECOMES 1/2, 1/3, 1/2 AND 1/2 RESP	SEE ITEMS 1.2.22.1, 1.2.24.1, 2.2.8.1, 4.2.23.1, 5.2.7.1 AND 6.2.14.1
8.2.10.1	REGULATOR 2 (TWINCD)	INPUT OPEN	(SAME AS 8.2.9.1)	(SAME AS 8.2.9.1)	(SAME AS 8.2.9.1)	(SAME AS 8.2.9.1)	(SAME AS 8.2.9.1)
8.2.10.2	REGULATOR 2 (TWINCD)	INPUT SHORT	(SAME AS 8.2.9.1)	(SAME AS 8.2.9.1)	(SAME AS 8.2.9.1)	(SAME AS 8.2.9.1)	(SAME AS 8.2.9.1)
8.2.10.3	REGULATOR 2 (TWINCD)	OUTPUT VOLTS ZERO	(SAME AS 8.2.9.1)	(SAME AS 8.2.9.1)	(SAME AS 8.2.9.1)	(SAME AS 8.2.9.1)	(SAME AS 8.2.9.1) BOUNDS OUTPUT SHORT OR GROUND
8.2.11.1	8-12R2 (FUSE)	OPEN	LOSS OF REG SUPL II (R1/R2)	CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL II OF VARIABLE LOW PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS. SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	SEE ITEM 1.2.22.1
8.2.12.1	8-12R4 (FUSE)	OPEN	LOSS OF REG SUPL II (R3/R4)	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT CHANNELS	CHANNEL II OF FIXED HIGH PRESSURE AND HIGH PRESSURIZER LEVEL DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS. CHANNEL II OF VARIABLE LOW PRESSURE AND SEQ #1 PZR PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	SEE ITEMS 1.2.24.1, 2.2.8.1
8.2.13.1	8-12R6 (FUSE)	OPEN	LOSS OF REG SUPL II (R5)	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED	CHANNEL II OF RCS LOW FLOW TRIPPED, SCRAM OCCURS (NO P-8) OR LOGIC BECOMES 1/2 (NO P-7) ON REMAINING CHANNELS	SEE ITEM 5.2.7.1
8.2.14.1	8-12R1 (FUSE)	OPEN	LOSS OF REG SUPL II (R10/R11)	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED	CHANNEL II OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	SEE ITEM 6.2.14.1

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
 SAN ONDFRE UNIT 1
 SECTION 8: POWER SUPPLIES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
8.2.15.1	8-12R3 (FUSE)	OPEN	LOSS OF REG SUPL II (NIS)	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED FOR NIS OVERPOWER OR HIGH SUR TRIPS, REDUNDANT CHANNELS FOR P-7 AND P-8	CHANNEL II OF NIS OVERPOWER AND HIGH SUR TRIPPED, SCRAM OCCURS (P-7 ON) OR LOGIC BECOMES 1/3 (P-7 OFF) ON REMAINING CHANNELS	SEE ITEM 4.2.23.1
8.3.01.1	72-137	INPUT SHORT	LOSS OF DC BUS 1. INTERRUPTION OF POWER TO VITAL BUSES 1, 2, 3, 3A, 4 AND REGULATED BUSES 1, 2, 3 AND 4 DURING AUTOTRANSFER TO BACKUP SOURCE FROM MCC-2	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED	REACTOR SCRAM ON DC BUS 1 UNDERVOLTAGE	125 VDC BUS 1 BREAKER FOR VITAL BUS 3 INVERTER. DC SYSTEM IS UNGROUNDED
8.3.01.2	72-137	TRIPPED	LOSS OF VITAL BUS 3 INVERTER, INTERRUPTION OF POWER TO VITAL BUS 3, 3A AND REGULATED BUS 3 DURING AUTOTRANSFER TO 37.5 KVA BACKUP SOURCE FROM MCC-2	CONTROL ROOM ANNUNCIATION, LOCAL INDICATION	NONE REQUIRED	CHANNEL III MAY TRIP IN ALL SCRAM FUNCTIONS EXCEPT RCS LOW FLOW AND TURBINE TRIP DURING INPUT VOLTAGE TRANSIENT	REG SUPL III AND NON-REG SUPL III FOR R1/R2, R3/R4, R5, R10/R11 AND NIS INTERRUPTED FOR 1-2 CYCLES DURING TRANSFER
8.3.02.1	INVERTER 3	INPUT OPEN	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)
8.3.02.2	INVERTER 3	INPUT SHORT	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)
8.3.02.3	INVERTER 3	OUTPUT VOLTS ZERO	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)
8.3.02.4	INVERTER 3	OUTPUT SHORT OR GROUNDED	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)	(SAME AS 8.3.1.2)
8.3.03.1	AUTO TRANS SW 3	CONTACTS OPEN	LOSS OF VITAL BUS 3 AND REGULATED BUS 3	CONTROL ROOM INDICATION, ANNUNCIATION	RCP BREAKER SCRAMS FOR RCS LOW FLOW. NONE REQUIRED FOR OTHER SCRAM FUNCTIONS.	CHANNEL III TRIPPED FOR ALL SCRAM FUNCTIONS EXCEPT RCS LOW FLOW AND TURBINE TRIP. CHANNEL III RCS LOW FLOW DISABLED, RCP BREAKER SCRAMS UNAFFECTED	REG SUPL III AND NON-REG SUPL III FOR R1/R2, R3/R4, R5, R10/R11 AND NIS LOST. SEE ITEMS 1.3.22.1, 1.3.23.1, 1.3.24.1, 1.3.25.1, 2.3.8.1, 2.3.9.1, 4.3.23.1, 5.3.7.1, 5.3.8.1, 6.3.14.1 AND 6.3.15.1 (SAME AS 8.3.3.1)
8.3.03.2	AUTO TRANS SW 3	CONTACTS CLOSED	INVERTER 3 AND 37.5 KVA BACKUP SOURCE FROM MCC-2 PARALLELED. IF OUT OF PHASE, INVERTER MAY CURRENT LIMIT AND TRIP INTERNALLY, LEAVING VITAL BUSES 3, 3A AND REGULATED BUS 3 ON MCC-2	PERIODIC TESTING, LOCAL INDICATION	NONE REQUIRED	NONE	
8.3.03.3	AUTO TRANS SW 3	CONTACTS GROUNDED	LOSS OF VITAL BUS 3, 3A, REGULATED BUS 3 AND 37.5 KVA BACKUP SOURCE FROM MCC-2	CONTROL ROOM INDICATION, ANNUNCIATION	(SAME AS 8.3.3.1)	(SAME AS 8.3.3.1)	(SAME AS 8.3.3.1) BOUNDS CASE OF GROUND ON ANY VITAL BUS 3 DEVICE. ALSO CAUSES LOSS OF UTILITY BUS
8.3.04.1	VITAL BUS 3 ACB	INPUT SHORT	(SAME AS 8.3.3.3) AUTO TRANS SW 3 WILL PROPAGATE SHORT TO 37.5 KVA BACKUP SOURCE FROM MCC-2	(SAME AS 8.3.3.3)	(SAME AS 8.3.3.1)	(SAME AS 8.3.3.1)	ALSO CAUSES LOSS OF UTILITY BUS
8.3.04.2	VITAL BUS 3 ACB	TRIPPED	LOSS OF VITAL BUS 3 AND REGULATED BUS 3	(SAME AS 8.3.3.3)	(SAME AS 8.3.3.1)	(SAME AS 8.3.3.1)	
8.3.05.1	8-1303V (BREAKER)	TRIPPED	LOSS OF NON-REG SUPL III (R1/R2)	PERIODIC TEST	NONE REQUIRED	NONE	SEE ITEM 1.3.23.1
8.3.06.1	8-1301V (BREAKER)	TRIPPED	LOSS OF NON-REG SUPL III (R3/R4)	ANNUNCIATION, PERIODIC TEST	NONE REQUIRED	CHANNEL III OF FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND HIGH PRESSURIZER LEVEL TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	SEE ITEMS 1.3.25.1 AND 2.3.9.1
8.3.07.1	8-1306V (BREAKER)	TRIPPED	LOSS OF NON-REG SUPL III (R5)	ANNUNCIATION, PERIODIC TEST	REDUNDANT CHANNELS AND RCP BREAKER SCRAMS	CHANNEL III OF RCS LOW FLOW DISABLED IN 1/3 AND 2/3 MATRICES, LOGIC BECOMES 1/2 (NO P-8) AND 2/2 (NO P-7) RESPECTIVELY ON REMAINING CHANNELS. RCP BREAKER SCRAMS UNAFFECTED	SEE ITEM 5.3.8.1
8.3.08.1	8-1305V (BREAKER)	TRIPPED	LOSS OF NON-REG SUPL III (R10/R11)	ANNUNCIATION, PERIODIC TEST	NONE REQUIRED	CHANNEL III OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	SEE ITEM 6.3.15.1

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDFRE UNIT 1
SECTION 8: POWER SUPPLIES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
8.3.09.1	8-1307V (BREAKER)	TRIPPED	LOSS OF REGULATED BUS 3 (REG SUPL III TO CONTROL ROOM INDICATION, R1/R2, R3/R4, R5, R10/R11, NIS RACKS)	ANNUNCIATION	REDUNDANT CHNLS FOR FIXED HI PRESSURE, VARIABLE LO AND HI PZR LEVEL PRESSURE AND HI PZR LEVEL 2/2 ON REM CHNLS, CHNL III OF SEQ #1, SCRAMS. NONE REQUIRED FOR OTHER SCRAM FUNCTIONS	CHNL III OF FIXED HI PRESS, VAR LO PRESS AND HI PZR LEVEL DISABLED, LOGIC BECOMES 2/2 ON REM CHNLS, CHNL III OF SEQ #1, NIS OVRPWR, RCS LO FLOW AND STM/FEED MISMATCH TRIPPED. SCRAM OCCURS (NO P-8) OR LOGIC BECOMES 1/2, 1/3, 1/2 AND 1/2 (NO P-7) RESP	SEE ITEMS 1.3.22.1, 1.3.24.1, 2.3.8.1, 4.3.23.1, 5.3.7.1 AND 6.3.14.1
8.3.10.1	REGULATOR 3 (TWINCD)	INPUT OPEN	(SAME AS 8.3.9.1)	(SAME AS 8.3.9.1)	(SAME AS 8.3.9.1)	(SAME AS 8.3.9.1)	(SAME AS 8.3.9.1)
8.3.10.2	REGULATOR 3 (TWINCD)	INPUT SHORT	(SAME AS 8.3.9.1)	(SAME AS 8.3.9.1)	(SAME AS 8.3.9.1)	(SAME AS 8.3.9.1)	(SAME AS 8.3.9.1)
8.3.10.3	REGULATOR 3 (TWINCD)	OUTPUT VOLTS ZERO	(SAME AS 8.3.9.1)	(SAME AS 8.3.9.1)	(SAME AS 8.3.9.1)	(SAME AS 8.3.9.1)	(SAME AS 8.3.9.1) BOUNDS OUTPUT SHORT OR GROUND
8.3.11.1	8-13R2 (FUSE)	OPEN	LOSS OF REG SUPL III (R1/R2)	CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL III OF VARIABLE LOW PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS. SEQ #1 AND FIXED HIGH PRESSURE SCRAMS UNAFFECTED	SEE ITEM 1.3.22.1
8.3.12.1	8-13R4 (FUSE)	OPEN	LOSS OF REG SUPL III (R3/R4)	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT CHANNELS	CHANNEL III OF FIXED HIGH PRESSURE AND HIGH PRESSURIZER LEVEL DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS. CHANNEL III OF VARIABLE LOW PRESSURE AND SEQ #1 PZR PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	SEE ITEMS 1.3.24.1 AND 2.3.8.1
8.3.13.1	8-13R6 (FUSE)	OPEN	LOSS OF REG SUPL III (R5)	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TEST	NONE REQUIRED	CHANNEL III OF RCS LOW FLOW TRIPPED, SCRAM OCCURS (NO P-8) OR LOGIC BECOMES 1/2 (NO P-7) ON REMAINING CHANNELS	SEE ITEM 5.3.7.1
8.3.14.1	8-13R1 (FUSE)	OPEN	LOSS OF REG SUPL III (R10/R11)	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED	CHANNEL III OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	SEE ITEM 6.3.14.1
8.3.15.1	8-13R3 (FUSE)	OPEN	LOSS OF REG SUPL III (NIS)	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED FOR NIS OVERPOWER TRIP, REDUNDANT CHANNELS FOR P-7 AND P-8	CHANNEL III OF NIS OVERPOWER TRIPPED, LOGIC BECOMES 1/3 (NO P-7) ON REMAINING CHANNELS	SEE ITEM 4.3.23.1
8.4.01.1	72-131	INPUT SHORT	LOSS OF DC BUS 1. INTERRUPTION OF POWER TO VITAL BUSES 1, 2, 3, 3A, 4 AND REGULATED BUSES 1, 2, 3 AND 4 DURING AUTOTRANSFER TO BACKUP SOURCE FROM MCC-2	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED	REACTOR SCRAM ON DC BUS 1 UNDERVOLTAGE	125 VDC BUS 1 BREAKER FOR VITAL BUS 4 INVERTER. DC SYSTEM IS UNGROUNDED
8.4.01.2	72-131	TRIPPED	LOSS OF VITAL BUS 4 INVERTER, INTERRUPTION OF POWER TO VITAL BUS 4 AND REGULATED BUS 4 DURING AUTOTRANSFER TO 7.5 MVA BACKUP SOURCE FROM MCC-2	CONTROL ROOM ANNUNCIATION, LOCAL INDICATION	NONE REQUIRED	CHANNEL IV OF NIS OVERPOWER MAY TRIP DURING VOLTAGE INPUT TRANSIENT	REG SUPL IV AND NON-REG SUPL IV FOR R1/R2, R3/R4, R5, R10/R11 AND NIS RACKS INTERRUPTED FOR 1-2 CYCLES DURING TRANSFER
8.4.02.1	INVERTER 4	INPUT OPEN	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)
8.4.02.2	INVERTER 4	INPUT SHORT	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)
8.4.02.3	INVERTER 4	OUTPUT VOLTS ZERO	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)
8.4.02.4	INVERTER 4	OUTPUT SHORT OR GROUND	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)	(SAME AS 8.4.1.2)
8.4.03.1	AUTO TRANS SW (INVERTER 4)	CONTACTS OPEN	LOSS OF VITAL BUS 4 AND REGULATED BUS 4	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT NIS CHNLS FOR P-7, P-8 DEFEAT. NONE REQUIRED FOR NIS OVERPOWER TRIP OR STM/FEED MISMATCH TRIP (INCLUDED IN MISMATCH SETPOINT ANALYSIS)	CHNL IV OF NIS OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHNLS. NIS SUR TRIP REMAINS OPERABLE (UN-P7 DEFEATED). REDUCED REDUNDANCY FOR P-7, P-8 DEFEAT. STM/FEED MISMATCH TRIP SETPOINT DECALIBRATED UP TO 7% IN ALL THREE CHNLS AT REDUCED POWER	REG SUPL IV AND NON-REG SUPL IV FOR R1/R2, R3/R4, R5, R10/R11, AND NIS LOST. SEE ITEMS 4.4.23.1, 4.7.21.1, 4.7.22.1, 6.4.5.1 AND 6.4.6.1

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDRE UNIT 1
SECTION 8: POWER SUPPLIES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
8.4.03.2	AUTO TRANS SW (INVERTER 4)	CONTACTS CLOSED	INVERTER 4 AND 7.5 KVA BACKUP SOURCE FROM MCC-2 PARALLELED. IF OUT OF PHASE, INVERTER MAY CURRENT LIMIT AND TRIP INTERNALLY, LEAVING VITAL BUS 4 AND REGULATED BUS 4 ON MCC-2	CONTROL ROOM ANNUNCIATION, LOCAL INDICATION, PERIODIC TESTING	NONE REQUIRED	NONE	(SAME AS 8.4.3.1)
8.4.03.3	AUTO TRANS SW (INVERTER 4)	CONTACTS GROUNDED	LOSS OF VITAL BUS 4, REGULATED BUS 4 AND 7.5 KVA BACKUP SOURCE FROM MCC-2	CONTROL ROOM INDICATION, ANNUNCIATION	(SAME AS 8.4.3.1)	(SAME AS 8.4.3.1)	(SAME AS 8.4.3.1)
8.4.04.1	TRANS SW 4	CONTACTS OPEN	(SAME AS 8.4.3.1)	(SAME AS 8.4.3.1)	(SAME AS 8.4.3.1)	(SAME AS 8.4.3.1)	(SAME AS 8.4.3.1)
8.4.04.2	TRANS SW 4	CONTACTS CLOSED	INVERTER 4 AND 37.5 KVA BACKUP SOURCE FROM MCC-2 PARALLELED. IF OUT OF PHASE, INVERTER MAY CURRENT LIMIT AND TRANSFER INTERNALLY, LEAVING VITAL BUS 4 AND REGULATED BUS 4 ON PARALLELED 7.5 KVA AND 37.5 KVA BACKUP SOURCES FROM MCC-2	(SAME AS 8.4.3.2)	(SAME AS 8.4.3.2)	(SAME AS 8.4.3.2)	
8.4.04.3	TRANS SW 4	CONTACTS GROUNDED	LOSS OF VITAL BUS 4, REGULATED BUS 4 AND 37.5 KVA BACKUP SOURCE FROM MCC-2. INVERTER 4 AUTOTRANSFER WILL ALSO PROPAGATE GROUND TO 7.5 KVA BACKUP SOURCE FROM MCC-2	(SAME AS 8.4.3.1)	(SAME AS 8.4.3.1)	(SAME AS 8.4.3.1)	(SAME AS 8.4.3.1). BOUNDS CASE OF GROUND ON ANY VITAL BUS 4 DEVICE. ALSO CAUSES LOSS OF UTILITY BUS
8.4.05.1	VITAL BUS 4 ACB	INPUT SHORT	(SAME AS 8.4.3.3) INVERTER 4 AUTOTRANSFER WILL PROPAGATE SHORT TO 7.5 KVA BACKUP SOURCE FROM MCC-2	(SAME AS 8.4.3.3)	(SAME AS 8.4.3.1)	(SAME AS 8.4.3.1)	
8.4.05.2	VITAL BUS 4 ACB	TRIPPED	LOSS OF VITAL BUS 4 AND REGULATED BUS 4	(SAME AS 8.4.3.3)	(SAME AS 8.4.3.1)	(SAME AS 8.4.3.1)	
8.4.05.1	8-1403V (BREAKER)	TRIPPED	LOSS OF NON-REG SUPL IV (R1/R2)	CONTROL ROOM INDICATION, PERIODIC TEST	NONE REQUIRED	NONE	LOSS OF RECORDER POWER
8.4.07.1	8-1401V (BREAKER)	TRIPPED	LOSS OF NON-REG SUPL IV (R3/R4)	CONTROL ROOM INDICATION, PERIODIC TEST	NONE REQUIRED	NONE	LOSS OF RECORDER POWER
8.4.08.1	8-1406V (BREAKER)	TRIPPED	LOSS OF NON-REG SUPL IV (R5)	ANNUNCIATION	NIS CHANNELS FOR P-7 AND P-8 DEFEAT, NONE FOR UN-P7 DEFEAT	REDUCED REDUNDANCY FOR P-7 AND P-8 DEFEAT. HIGH SUR SCRAM REMAINS OPERABLE (UN-P7 DEFEATED)	SEE ITEM 4.7.22.1
8.4.10.1	8-1408V (BREAKER)	TRIPPED	LOSS OF REGULATED BUS 4 (REG SUPL IV TO R1/R2, R3/R4, R5, R10/R11 AND NIS RACKS)	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT NIS CHNLS FOR P-7, P-8 DEFEAT. NONE REQUIRED FOR NIS OVERPOWER OR STM/FEED MISMATCH TRIPS (INCLUDED IN MISMATCH SETPOINT ANALYSIS)	REDUCED REDUNDANCY FOR P-7, P-8 DEFEAT. CHNL IV OF NIS OVERPOWER TRIPED, LOGIC BECOMES 1/3 ON REMAINING CHNLS. STM/FEED MISMATCH SETPOINT DECALIBRATED UP TO 7% IN ALL THREE CHNLS AT REDUCED POWER	SEE ITEMS 4.4.23.1, 4.7.21.1, 6.4.5.1 AND 6.4.6.1
8.4.11.1	REGULATOR 4 (TWINCO)	INPUT OPEN	(SAME AS 8.4.10.1)	(SAME AS 8.4.10.1)	(SAME AS 8.4.10.1)	(SAME AS 8.4.10.1)	(SAME AS 8.4.10.1)
8.4.11.2	REGULATOR 4 (TWINCO)	INPUT SHORT	(SAME AS 8.4.10.1)	(SAME AS 8.4.10.1)	(SAME AS 8.4.10.1)	(SAME AS 8.4.10.1)	(SAME AS 8.4.10.1)
8.4.11.3	REGULATOR 4 (TWINCO)	OUTPUT VOLTS ZERO	(SAME AS 8.4.10.1)	(SAME AS 8.4.10.1)	(SAME AS 8.4.10.1)	(SAME AS 8.4.10.1)	BOUNDS OUTPUT SHORT OR GROUND
8.4.12.1	8-14R2 (FUSE)	OPEN	LOSS OF REG SUPL IV (R1/R2)	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	LOSS OF RECORDER POWER
8.4.13.1	8-14R4 (FUSE)	OPEN	LOSS OF REG SUPL IV (R3/R4)	CONTROL ROOM INDICATION	NONE REQUIRED	NONE	LOSS OF RECORDER POWER
8.4.14.1	8-14R5 (FUSE)	OPEN	LOSS OF REG SUPL IV (R5)	(SAME AS 8.4.10.1)	NIS CHANNELS FOR P-7, P-8 DEFEAT. NONE REQUIRED FOR STEAM/FEED MISMATCH TRIP SETPOINT (INCLUDED IN SETPOINT ANALYSIS)	REDUCED REDUNDANCY FOR P-7, P-8 DEFEAT. STEAM/FEED MISMATCH TRIP DECALIBRATED UP TO 7% IN ALL THREE CHANNELS FOR LOW FEED FLOW EVENTS FROM REDUCED POWER	SEE ITEMS 4.7.21.1 AND 6.4.5.1

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDFRE UNIT 1
SECTION 8: POWER SUPPLIES

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
8.4.15.1	B-14R3 (FUSE)	OPEN	LOSS OF REG SUPPL IV (NIS)	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED FOR NIS OVERPOWER TRIP. REDUNDANT CHANNELS FOR P-7 AND P-8 (NO P-7)	CHANNEL IV OF NIS OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS (NO P-7)	SEE ITEM 4.4.23.1
8.5.01.1	72-134	INPUT SHORT	LOSS OF DC BUS 1. INTERRUPTION OF POWER TO VITAL BUSES 1, 2, 3, 3A, 4 AND REGULATED BUSES 1, 2, 3 AND 4 DURING AUTOTRANSFER TO BACKUP SOURCE FROM MCC2	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED	REACTOR SCRAM ON DC BUS 1 UNDERVOLTAGE	125 VDC BUS 1 BREAKER FOR NIS COINCIDENTORS. DC SYSTEM IS UNGROUNDED
8.5.01.2	72-134	TRIPPED	LOSS OF 125 VDC POWER TO NIS COINCIDENTORS A AND B	ANNUNCIATION	NONE REQUIRED	REACTOR SCRAM ON NIS POWER RANGE OVERPOWER (NO P-7) OR SUR (P-7) DUE TO DROPOUT OF COINCIDENTOR OUTPUT RELAYS	

TABLE 8-2: SORT BY RACK POWER SUPPLY

REFERENCES: (SEE TABLES 1 - 7)

NOTES: a. THIS TABLE IS AN AUTOMATED SORT OF TABLES 1 - 7 FOR RACK POWER SUPPLY DEPENDENCY, PREPARED TO FACILITATE DEVELOPMENT AND REVIEW OF TABLE 8-1.

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
 SAN ONDFRE UNIT 1
 SORT BY RACK POWER SUPPLY

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
1.1.23.1	NON-REG SUPL I (R1/R2)	VOLTS ZERO OR GROUNDED	LOSS OF CHANNEL I (LOOP A) T-AVG AND DELTA-T ANNUNCIATION	PERIODIC TEST	NONE REQUIRED	NONE	
6.1.15.1	NON-REG SUPL I (R10/R11)	VOLTS ZERO OR GROUNDED	CHANNEL I STEAM/FEED FLOW MISMATCH TRIP RELAY DE-ENERGIZED	ANNUNCIATION	NONE REQUIRED	CHANNEL I OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	RELAY IS DE-ENERGIZE TO TRIP
2.1.9.1	NON-REG SUPL I (R3/R4)	VOLTS ZERO OR GROUNDED	CHANNEL I TRIP RELAY AND PRESSURIZER HEATER HI/LO LEVEL BREAKER ACTUATED	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF HIGH LEVEL TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	TRIP RELAY IS DE-ENERGIZE TO ACTUATE
1.1.25.1	NON-REG SUPL I (R3/R4)	VOLTS ZERO OR GROUNDED	CHANNEL I FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIP RELAYS ACTUATED	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	RELAYS ARE DE-ENERGIZE TO ACTUATE
5.1.8.1	NON-REG SUPL I (R5)	VOLTS ZERO OR GROUNDED	LOSS OF CHANNEL I LOW FLOW TRIP IN 1/3 AND 2/3 MATRICES	ANNUNCIATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL I 1/3 AND 2/3 LOW FLOW TRIPS DISABLED, LOGIC BECOMES 1/2 AND 2/2 RESPECTIVELY ON REMAINING CHANNELS (NO P-7 OR P-8), PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.1.1.1) TRIP RELAYS ARE ENERGIZE TO ACTUATE
1.2.23.1	NON-REG SUPL II (R1/R2)	VOLTS ZERO OR GROUNDED	LOSS OF CHANNEL II (LOOP B) T-AVG AND DELTA-T ANNUNCIATION	PERIODIC TEST	NONE REQUIRED	NONE	
6.2.15.1	NON-REG SUPL II (R10/R11)	VOLTS ZERO OR GROUNDED	CHANNEL II OF STEAM/FEED MISMATCH TRIP RELAY DE-ENERGIZED	ANNUNCIATION	NONE REQUIRED	CHANNEL II OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	RELAY IS DE-ENERGIZE TO TRIP
2.2.9.1	NON-REG SUPL II (R3/R4)	VOLTS ZERO OR GROUNDED	CHANNEL II TRIP RELAY ACTUATED, LOSS OF CAPABILITY TO ACTUATE PRESSURIZER HEATER LO-LO CUTOFF	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF HIGH LEVEL TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	TRIP RELAY IS DE-ENERGIZE TO ACTUATE
1.2.25.1	NON-REG SUPL II (R3/R4)	VOLTS ZERO OR GROUNDED	CHANNEL II FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIP RELAYS ACTUATED	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	RELAYS ARE DE-ENERGIZE TO ACTUATE
5.2.8.1	NON-REG SUPL II (R5)	VOLTS ZERO OR GROUNDED	LOSS OF CHANNEL II LOW FLOW TRIP IN 1/3 AND 2/3 MATRICES	ANNUNCIATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL II 1/3 AND 2/3 LOW FLOW TRIPS DISABLED, LOGIC BECOMES 1/2 AND 2/2 RESPECTIVELY ON REMAINING CHANNELS (NO P-7 OR P-8), PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.2.1.1) TRIP RELAYS ARE ENERGIZE TO ACTUATE
1.3.23.1	NON-REG SUPL III (R1/R2)	VOLTS ZERO OR GROUNDED	LOSS OF CHANNEL III (LOOP C) T-AVG AND DELTA-T ANNUNCIATION	PERIODIC TEST	NONE REQUIRED	NONE	
6.3.15.1	NON-REG SUPL III (R10/R11)	VOLTS ZERO OR GROUNDED	CHANNEL III STEAM/FEED FLOW MISMATCH TRIP RELAY DE-ENERGIZED	ANNUNCIATION	NONE REQUIRED	CHANNEL III OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	RELAY IS DE-ENERGIZE TO TRIP
2.3.9.1	NON-REG SUPL III (R3/R4)	VOLTS ZERO OR GROUNDED	CHANNEL III TRIP RELAY ACTUATED	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III OF HIGH LEVEL TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	TRIP RELAY IS DE-ENERGIZE TO ACTUATE
1.3.25.1	NON-REG SUPL III (R3/R4)	VOLTS ZERO OR GROUNDED	CHANNEL III FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIP RELAYS ACTUATED	ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III FIXED HIGH PRESSURE AND VARIABLE LOW PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	RELAYS ARE DE-ENERGIZE TO ACTUATE
5.3.8.1	NON-REG SUPL III (R5)	VOLTS ZERO OR GROUNDED	LOSS OF CHANNEL III LOW FLOW TRIP IN 1/3 AND 2/3 MATRICES	ANNUNCIATION, PERIODIC TESTING	REDUNDANT CHANNELS	CHANNEL III 1/3 AND 2/3 LOW FLOW TRIPS DISABLED, LOGIC BECOMES 1/2 AND 2/2 RESPECTIVELY (NO P-7 OR P-8) ON REMAINING CHANNELS, PUMP BREAKER TRIPS UNAFFECTED	(SAME AS 5.3.1.1) TRIP RELAYS ARE ENERGIZE TO ACTUATE
6.4.06.1	NON-REG SUPL IV (R10/R11)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO RECORDERS (VR-456, -457, -458)	CONTROL ROOM INDICATION, PERIODIC TESTING	NONE REQUIRED	NONE	

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDRE UNIT 1
SORT BY RACK POWER SUPPLY

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.7.22.1	NON-REG SUPPL IV (R5)	VOLTS ZERO OR GROUNDED	DC-415A-X, DC-415E-X DE-ENERGIZED, CLOSING CONTACTS IN AP4A, AP4C (P-7), AND AP10A, AP10C (P-8) CIRCUITS AND OPENING IN AP4B, AP4D (UN-P7) CIRCUITS	ANNUNCIATION	NIS CHANNELS FOR P-7, P-8 DEFEAT, NONE REQUIRED FOR UN-P7 DEFEAT	REDUCED REDUNDANCY FOR P-7, P-8 DEFEAT. HIGH SUR SCRAM REMAINS OPERABLE (UN-P7 DEFEATED, SCRAM CANNOT BE BYPASSED), ALL OTHER SCRAM FUNCTIONS REMAIN OPERABLE AS REQUIRED	STEAM DUMP (TEMPERATURE CONTROL MODE) AND AUTO ROD CONTROL DISABLED
4.1.23.1	REG SUPPL I (NIS)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO CHANNEL I (N-1203 AND N-1205) HIGH, LOW AND AUX VOLTAGE SUPPLIES AND BISTABLES	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED FOR OVERPOWER TRIPS, REDUNDANT CHANNELS FOR P-7, P-8, DROPPED ROD STOP	CHANNEL I OVERPOWER TRIPPED, DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. REACTOR TRIP ON CHANNEL I HIGH SUR IF P-7 IS ON	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME 1/3 ON REMAINING CHANNELS
1.1.22.1	REG SUPPL I (R1/R2)	VOLTS ZERO OR GROUNDED	LOW SETPOINT SIGNAL TO CHANNEL I VARIABLE LOW PRESSURE TRIP BISTABLE	CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL I OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	
6.1.14.1	REG SUPPL I (R10/R11)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO NEST 1213A AND STEAM GENERATOR A FEED CONTROL SYSTEM	ANNUNCIATION	NONE REQUIRED	CHANNEL I OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	STM GEN A FEEDWATER FLOW CONTROLLER/VALVE AND NR LEVEL REVERSE ACTING, VALVE FAILS OPEN, BUT HIGH LEVEL TURBINE TRIP DISABLED BY LOSS OF POWER TO NR LEVEL TRIP RELAY
2.1.8.1	REG SUPPL I (R3/R4)	VOLTS ZERO OR GROUNDED	(SAME AS 2.1.1.2) LOW SIGNAL TO FC-1112, LI-419, RECORDER LR-430, TC-419	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT CHANNELS	CHANNEL I OF HIGH LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	DE-ENERGIZES PRESSURIZER HEATERS AND CAUSES LEVEL INCREASE
1.1.24.1	REG SUPPL I (R3/R4)	VOLTS ZERO OR GROUNDED	LOW PRESSURE SIGNAL TO CHANNEL I FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE BISTABLES, RECORDER VIA SW P/430, PRESSURE CONTROL SYSTEM VIA SW P/432, AND INDICATOR	ANNUNCIATION, CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL I OF FIXED HIGH PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, CHANNEL I OF VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	MAY ENERGIZE PRESSURIZER HEATERS AND CAUSE REPOSITIONING OF PCV-430C, -430A IF CONNECTED VIA SW P/432. SEE EDCS SFA FOR SEQ EFFECTS
5.1.7.1	REG SUPPL I (R5)	VOLTS ZERO OR GROUNDED	LOW FLOW SIGNAL TO FI-400 AND LOOP A (CHANNEL I) TRIP BISTABLES AND RELAYS. ENERGIZES LOW FLOW CONTACTS IN 1/3 AND 2/3 TRIP MATRICES AND ANNUNCIATOR CIRCUITS	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL I OF LOW FLOW TRIP ACTUATED. REACTOR SCRAM WILL OCCUR (NO P-7 AND NO P-8) OR LOGIC WILL BECOME 1/2 (P-8 BUT NO P-7) FOR LOW FLOW IN REMAINING CHANNELS	(SAME AS 5.1.1.1)
4.2.23.1	REG SUPPL II (NIS)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO CHANNEL II (N-1204 AND N-1207) HIGH, LOW AND AUX VOLTAGE SUPPLIES AND BISTABLES	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED FOR OVERPOWER TRIPS, REDUNDANT CHANNELS FOR P-7, P-8 AND DROPPED ROD STOP	CHANNEL II OVERPOWER TRIPPED, DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. REACTOR SCRAM ON CHANNEL II HIGH SUR IF P-7 IS ON	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME 1/3 ON REMAINING CHANNELS
1.2.22.1	REG SUPPL II (R1/R2)	VOLTS ZERO OR GROUNDED	LOW SETPOINT SIGNAL TO CHANNEL II VARIABLE LOW PRESSURE TRIP BISTABLE	CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL II OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	
6.2.14.1	REG SUPPL II (R10/R11)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO NEST 1213B AND STEAM GENERATOR B FEED CONTROL SYSTEM	ANNUNCIATION	NONE REQUIRED	CHANNEL II OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	STM GEN B FEEDWATER FLOW CONTROLLER/VALVE AND NR LEVEL REVERSE ACTING, VALVE FAILS OPEN, BUT HIGH LEVEL TURBINE TRIP DISABLED BY LOSS OF POWER TO NR LEVEL TRIP RELAY
2.2.8.1	REG SUPPL II (R3/R4)	VOLTS ZERO OR GROUNDED	LOW PRESSURIZER LEVEL SIGNAL TO CHANNEL II TRIP BISTABLE, LEVEL RECORDER VIA SW LR/430, LEVEL CONTROLLER VIA SW L/432 AND INDICATOR. LOW SIGNAL TO RECORDER TR-405-1 VIA TC-419	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT CHANNELS	CHANNEL II OF HIGH LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	MAY DE-ENERGIZE PRESSURIZER HEATERS AND CAUSE LEVEL INCREASE IF CONNECTED VIA L/432 SWITCH

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDRE UNIT 1
SORT BY RACK POWER SUPPLY

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
1.2.24.1	REG SUPL II (R3/R4)	VOLTS ZERO OR GROUNDED	LOW PRESSURE SIGNAL TO CHANNEL II FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE BISTABLES, RECORDER VIA SW PR/430, PRESSURE CONTROL SYSTEM VIA SW PR/432, AND INDICATOR. VARIABLE LOW PRESSURE TRIP RELAY ACTUATED	ANNUNCIATION, CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL II OF FIXED HIGH PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS. CHANNEL II OF VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	MAY ENERGIZE PRESSURIZER HEATERS AND CAUSE REPOSITIONING OF PCV-430C, -430H IF CONNECTED VIA SW P/432. SEE ECCS SFA FOR SEQ EFFECTS
5.2.7.1	REG SUPL II (R5)	VOLTS ZERO OR GROUNDED	LOW FLOW SIGNAL TO FI-410 AND LOOP B. (CHANNEL II) TRIP BISTABLES AND RELAYS. ENERGIZES LOW FLOW CONTACTS IN 1/3 AND 2/3 TRIP MATRICES AND ANNUNCIATOR CIRCUITS	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL II OF LOW FLOW TRIP ACTUATED. REACTOR SCRAM WILL OCCUR (NO P-7 AND NO P-8) OR LOGIC WILL BECOME 1/2 (P-8 BUT NO P-7) FOR LOW FLOW IN REMAINING CHANNELS	(SAME AS 5.2.1.1)
4.3.23.1	REG SUPL III (N15)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO CHANNEL III (N-1208) HIGH AND LOW VOLTAGE SUPPLIES.	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED FOR OVERPOWER TRIPS, REDUNDANT CHANNELS FOR P-7, P-8, DROPPED ROD STOP	CHANNEL III OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. CHANNEL III DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME 1/3 ON REMAINING CHANNELS
1.3.22.1	REG SUPL III (R1/R2)	VOLTS ZERO OR GROUNDED	LOW SETPOINT SIGNAL TO CHANNEL III VARIABLE LOW PRESSURE TRIP BISTABLE	CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL III OF VARIABLE LOW PRESSURE TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS, SEQ #1 AND FIXED HIGH PRESSURE TRIPS UNAFFECTED	
6.3.14.1	REG SUPL III (R10/R11)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO NEST 1213C AND STEAM GENERATOR C FEED CONTROL SYSTEM	ANNUNCIATION	NONE REQUIRED	CHANNEL III OF STEAM/FEED MISMATCH TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	STM GEN C FEEDWATER FLOW CONTROLLER/VALVE AND NR LEVEL REVERSE ACTING, VALVE FAILS OPEN, BUT HIGH LEVEL TURBINE TRIP DISABLED BY LOSS OF POWER TO NR LEVEL TRIP RELAY
2.3.8.1	REG SUPL III (R3/R4)	VOLTS ZERO OR GROUNDED	LOW PRESSURIZER LEVEL SIGNAL TO CHANNEL III TRIP BISTABLE, LEVEL RECORDER VIA SW LR/430, LEVEL CONTROLLER VIA SW L/432 AND INDICATOR	CONTROL ROOM INDICATION, ANNUNCIATION	REDUNDANT CHANNELS	CHANNEL III OF HIGH LEVEL TRIP DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS	MAY DE-ENERGIZE PRESSURIZER HEATERS AND CAUSE LEVEL INCREASE IF CONNECTED VIA L/432 SWITCH
1.3.24.1	REG SUPL III (R3/R4)	VOLTS ZERO OR GROUNDED	LOW PRESSURE SIGNAL TO CHANNEL III FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE BISTABLES, RECORDER VIA SW PR/430, PRESSURE CONTROL SYSTEM VIA SW PR/432, AND INDICATOR. VARIABLE LOW PRESSURE TRIP RELAY ACTUATED	ANNUNCIATION, CONTROL ROOM INDICATION	REDUNDANT CHANNELS	CHANNEL III OF FIXED HIGH PRESSURE DISABLED, LOGIC BECOMES 2/2 ON REMAINING CHANNELS. CHANNEL III OF VARIABLE LOW PRESSURE AND SEQ #1 PRESSURE TRIPPED, LOGIC BECOMES 1/2 ON REMAINING CHANNELS	MAY ENERGIZE PRESSURIZER HEATERS AND CAUSE REPOSITIONING OF PCV-430C, -430H IF CONNECTED VIA SW P/432. SEE ECCS SFA FOR SEQ EFFECTS
5.3.7.1	REG SUPL III (R5)	VOLTS ZERO OR GROUNDED	LOW FLOW SIGNAL TO FI-420 AND LOOP C. (CHANNEL III) TRIP BISTABLES AND RELAYS. ENERGIZES LOW FLOW CONTACTS IN 1/3 AND 2/3 MATRICES AND ANNUNCIATOR CIRCUITS.	CONTROL ROOM INDICATION, ANNUNCIATION, PERIODIC TESTING	NONE REQUIRED	CHANNEL III OF LOW FLOW TRIP ACTUATED. REACTOR SCRAM WILL OCCUR (NO P-7 AND NO P-8) OR LOGIC WILL BECOME 1/2 (P-8 BUT NO P-7) FOR LOW FLOW IN REMAINING CHANNELS	(SAME AS 5.3.1.1)
4.4.23.1	REG SUPL IV (N15)	VOLTS ZERO OR GROUNDED	LOSS OF POWER TO CHANNEL IV (N-1208) HIGH AND LOW VOLTAGE SUPPLIES	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED FOR OVERPOWER TRIPS, REDUNDANT CHANNELS FOR P-7, P-8, DROPPED ROD STOP	CHANNEL IV OVERPOWER TRIPPED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS. CHANNEL IV DROPPED ROD STOP DISABLED, LOGIC BECOMES 1/3 ON REMAINING CHANNELS	P-7 DEFEAT AND P-8 DEFEAT LOGIC BECOME 1/3 ON REMAINING CHANNELS
6.4.05.1	REG SUPL IV (R5)	VOLTS ZERO OR GROUNDED	LOW MAIN STEAM HEADER PRESSURE SIGNAL TO STEAM DUMP OPERATIONAL MODE SELECTOR SWITCH, CONTROL ROOM INDICATION, AND STEAM DENSITY CORRECTION INPUT. DENSITY CORRECTION IN ALL THREE FEEDWATER CONTROL/MISMATCH TRIP CHANNELS FAILS TO FLOOR VALUE	CONTROL ROOM INDICATION, ANNUNCIATION	NONE REQUIRED (INCLUDED IN SETPOINT ANALYSIS)	STEAM/FEED MISMATCH TRIP SETPOINT FOR LOW FEED FLOW EVENTS DECALIBRATED UP TO 7% FROM REDUCED POWER FOR ALL THREE STEAM/FEED MISMATCH TRIP CHANNELS	LOSS OF T-REF (PT-415) AND MWE (PT-417) SIGNALS TO ROD CONTROL AND STEAM DUMP SYSTEMS

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
 SAN ONDRE UNIT 1
 SORT BY RACK POWER SUPPLY

ITEM #	DEVICE ID	FAILURE MODE	LOCAL EFFECTS AND DEPENDENT FAILURES	METHOD OF DETECTION	INHERENT COMPENSATING PROVISIONS	EFFECT ON RPS	REMARKS
4.7.21.1	REG SUPPL IV (RS)	VOLTS ZERO OR GROUNDED	LOW FIRST STAGE TURBINE PRESSURE TO P-7, CONTROL ROOM INDICATION, P-8 INPUT BISTABLES, ROD CONTROL SYSTEM (T-REF) AND INDICATOR	PERIODIC TESTING	NIS CHANNELS FOR P-7, P-8 REDUCED REDUNDANCY FOR P-7 AND P-8 DEFEAT, NONE REQUIRED FOR DEFEAT, ALL SCRAM FUNCTIONS REMAIN UN-P7 DEFEAT	OPERABLE AS REQUIRED	STEAM DUMP (TEMPERATURE CONTROL MODE ONLY) AND ROD INSERTION MAY OCCUR DUE TO MISMATCH BETWEEN T-AVG AND INDICATED T-REF (PT-415) AND DECREASE IN INDICATED MWE (PT-417)

TABLE 9: CONTROL/PROTECTION SYSTEM INTERACTIONS
(MULTIPLE FAILURE ANALYSIS)

REFERENCES: (SEE SECTIONS 1 - 8)

- NOTES:
- a. THIS SECTION EVALUATES THE CAPABILITY OF THE RCPS TO INITIATE A SCRAM IN RESPONSE TO CONTROL SYSTEM TRANSIENTS INITIATED BY A SINGLE RANDOM FAILURE IN THE PROTECTION SYSTEM CONCURRENT WITH AN ADDITIONAL SINGLE RANDOM FAILURE.
 - b. BECAUSE EVENTS INVOLVING ONLY A SINGLE SCRAM CHANNEL FAILURE ARE NOT LIMITING, ONLY THOSE INITIATING FAILURES WHICH BOTH INITIATE A CONTROL ACTION AND INHIBIT TRIP IN THE ASSOCIATED PROTECTION CHANNEL(S) ARE CONSIDERED. SIMILARLY, ONLY THOSE CONCURRENT FAILURES WHICH DISABLE ONE OR MORE ADDITIONAL SCRAM CHANNELS ARE CONSIDERED.
 - c. IN SOME CASES, THE LIMITING CHANNEL FAILURE FOR A CONTROL/PROTECTION SYSTEM INTERACTION IS A SPECIFIC ON-SCALE FAILURE HIGH OR LOW (DENOTED BY HIGH* AND LOW*) RATHER THAN AN UNSPECIFIED FAILURE HIGH OR LOW (WHICH INCLUDES OFF-SCALE FAILURES) AS ANALYZED IN SECTIONS 1 - 8.
 - d. FOR BREVITY, ALL DEVICES IN A GIVEN INSTRUMENT LOOP ARE TREATED AS A SINGLE ENTITY (eg. PT-430 LOOP). THUS, POWER SUPPLY FAILURES ARE EXPLICITLY CONSIDERED ONLY WHERE THEY AFFECT THE ASSOCIATED CONTROL SYSTEMS DIRECTLY.
 - e. FOR BREVITY, A SPECIFIC COMBINATION OF INITIATING AND CONCURRENT FAILURES IS NOT REPEATED WITH THE FAILURES TRANSPOSED (eg. THE COMBINATION PT-430 LOOP/PT-431 LOOP IS NOT REPEATED AS PT-431 LOOP/PT-430 LOOP).
 - f. FAILURES OF NON-REGULATED (VITAL BUS) POWER SUPPLIES ARE NOT ADDRESSED BECAUSE THESE RESULT IN DE-ENERGIZING (TRIPPING) THE SCRAM MATRIX RELAY FOR THE SCRAM FUNCTIONS ASSOCIATED WITH THE CONTROL PERTURBATION.

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
 SAN ONDFRE UNIT 1
 SECTION 9: CONTROL/PROTECTION SYSTEM INTERACTIONS
 (MULTIPLE FAILURE ANALYSIS)

ITEM #	INITIATING FAILURE	FAILURE MODE	CONCURRENT FAILURE	FAILURE MODE	CONTROL SYSTEM EFFECTS	INHERENT COMPENSATING PROVISIONS	PROTECTION SYSTEM EFFECTS	REMARKS
9.1.1.1.01	PT 430 LOOP	HIGH*	PT 431 LOOP	HIGH*	POBVS 545, 546, PRESSURIZER SPRAY VALVES SEQ #2 LOW PZR PRESSURE PCV 430C, 430H OPEN, CAUSING DECREASE IN RCS PRESSURE	(SAME AS 9.1.1.1.1)	2/3 FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PZR PRESSURE CHANNELS DISABLED. SEQ #2 UNAFFECTED.	BOUNDED BY LOCA ANALYSES. PT-432 MAY BE SUBSTITUTED FOR PT-430 OR PT-431 VIA SW. P/432 (BOUNDED BY 9.1.1.1.1)
9.1.1.1.02	PT 430 LOOP	HIGH*	PT 432 LOOP	HIGH*	POBVS 545, PRESSURIZER SPRAY VALVES PCV 430C, 430H OPEN, CAUSING DECREASE IN RCS PRESSURE	(SAME AS 9.1.1.1.1)	(SAME AS 9.1.1.1.1)	(BOUNDED BY 9.1.1.1.1)
9.1.1.1.03	PT 430 LOOP	HIGH*	SW. PR/430	CONTACTS CLOSED	(SAME AS 9.1.1.1.1)	(SAME AS 9.1.1.1.1)	3/3 FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PZR PRESSURE CHANNELS DISABLED. SEQ #2 UNAFFECTED	BOUNDED BY LOCA ANALYSES
9.1.1.2.01	PT 431 LOOP	HIGH*	PT 432 LOOP	HIGH*	POBVS 546 OPENS, CAUSING DECREASE IN RCS PRESSURE	(SAME AS 9.1.1.1.1)	(SAME AS 9.1.1.1.1)	(BOUNDED BY 9.1.1.1.1)
9.1.1.2.02	PT 431 LOOP	HIGH*	SW. PR/430	CONTACTS CLOSED	(SAME AS 9.1.1.1.1)	(SAME AS 9.1.1.1.1)	(SAME AS 9.1.1.1.3)	(SAME AS 9.1.1.1.3)
9.1.2.1.01	PT 430 LOOP	LOW*	PT 431 LOOP	LOW*	ALL PRESSURIZER HEATERS ENERGIZED AND PZR SPRAY VALVES AND POBVS COMMANDED SHUT (BY CHANNEL 1)	PRESSURIZER SAFETY VALVES	2/3 FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PZR PRESSURE CHANNELS DISABLED	PT-432 MAY BE SUBSTITUTED FOR PT-430 VIA SW. P/432. EVENT TERMINATED BY OPERATOR ACTION AFTER 30 MINUTES
9.1.2.1.02	PT 430 LOOP	LOW*	PT 432 LOOP	LOW*	(SAME AS 9.1.2.1.1)	(SAME AS 9.1.2.1.1)	(SAME AS 9.1.2.1.1)	EVENT TERMINATED BY OPERATOR ACTION AFTER 30 MINUTES
9.1.2.1.03	PT 430 LOOP	LOW*	SW. PR/430	CONTACTS CLOSED	(SAME AS 9.1.2.1.1)	(SAME AS 9.1.2.1.1)	3/3 FIXED HIGH PRESSURE, VARIABLE LOW PRESSURE AND SEQ #1 PZR PRESSURE CHANNELS DISABLED	(SAME AS 9.1.2.1.2)
9.1.3.1.01	TYI 401A TYI 401B	LOW*	TYI 411A TYI 411B	LOW*	CONTROL RODS WITHDRAW DUE TO LOW T-AVG SIGNAL VIA SW. 1 AND TM-405A	NIS OVERPOWER OR HIGH SUR SCRAMS	2/3 VARIABLE LOW PRESSURE CHANNELS DISABLED (VIA LOW SETPOINT). NIS SCRAMS UNAFFECTED	LOOP A AND B T-AVG TO VARIABLE LOW PRESSURE SCRAM AND ROD CONTROL VIA SW. 1. ABOVE P-7 POWER, HIGH SUR SCRAM BYPASSED AND VARIABLE LOW PRESSURE SCRAM ENABLED. EVENT BOUNDED BY ROD WITHDRAWAL ACCIDENT FROM LOW POWER
9.1.3.1.02	TYI 401A TYI 401B	LOW*	TYI 421 TYI 421A	LOW*	(SAME AS 9.1.3.1.1)	(SAME AS 9.1.3.1.1)	(SAME AS 9.1.3.1.1)	LOOP A AND C T-AVG TO VARIABLE LOW PRESSURE SCRAM AND ROD CONTROL VIA SW. 1
9.1.3.2.01	TYI 411A TYI 411B	LOW*	TYI 421 TYI 421A	LOW*	(SAME AS 9.1.3.1.1)	(SAME AS 9.1.3.1.1)	(SAME AS 9.1.3.1.1)	LOOP B AND C T-AVG TO VARIABLE LOW PRESSURE SCRAM AND ROD CONTROL VIA SW. 1
9.1.4.1.01	TYI 401A TYI 401B	HIGH*	TYI 411A TYI 411B	HIGH*	CONTROL RODS INSERT DUE TO HIGH T-AVG SIGNAL VIA SW. 1 AND TM-405A, STEAM DUMP INHIBITED BY LACK OF CONCURRENT LOAD REJECTION	NONE REQUIRED	INCREASE IN SETPOINT OF 2/3 VARIABLE LOW PRESSURE CHANNELS	EVENT TERMINATED BY OPERATOR ACTION AFTER 30 MINUTES
9.1.4.1.02	TYI 401A TYI 401B	HIGH*	TYI 421 TYI 421A	HIGH*	(SAME AS 9.1.4.1.1)	(SAME AS 9.1.4.1.1)	(SAME AS 9.1.4.1.1)	(SAME AS 9.1.4.1.1)
9.1.4.2.01	TYI 411A TYI 411B	HIGH*	TYI 421 TYI 421A	HIGH*	(SAME AS 9.1.4.1.1)	(SAME AS 9.1.4.1.1)	(SAME AS 9.1.4.1.1)	(SAME AS 9.1.4.1.1)
9.2.1.1.01	LT 430 LOOP	LOW	LT 431 LOOP	LOW	FCV-1112 OPENS (VIA SIGNAL FROM SW. L/432), CAUSING INCREASE IN PRESSURIZER LEVEL	NONE REQUIRED	2/3 HIGH PRESSURIZER LEVEL CHANNELS DISABLED	LT-432 MAY BE SUBSTITUTED FOR LT-430 OR -431 VIA SW. L/432. EVENT TERMINATED BY OPERATOR ACTION AFTER 30 MINUTES BASED ON UNAFFECTED LEVEL CHANNEL
9.2.1.1.02	LT 430 LOOP	LOW	LT 432 LOOP	LOW	(SAME AS 9.2.1.1.1)	(SAME AS 9.2.1.1.1)	(SAME AS 9.2.1.1.1)	(SAME AS 9.2.1.1.1)
9.2.1.1.03	LT 430 LOOP	LOW	SW. LR/430	CONTACTS CLOSED	(SAME AS 9.2.1.1.1)	PRESSURIZER SAFETY VALVES	3/3 HIGH PRESSURIZER LEVEL CHANNELS DISABLED	(SAME AS 9.2.1.1.1) HOWEVER, AS NO PRESSURIZER LEVEL CHANNELS REMAIN OPERABLE IN CONTROL ROOM, PRESSURIZER MAY GO SOLID PRIOR TO DISCOVERY, AND MONITORING OF LT-435 AT REMOTE SHUTDOWN PANEL MAY BE REQUIRED FOR EVENT RECOVERY

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDRE UNIT 1
SECTION 9: CONTROL/PROTECTION SYSTEM INTERACTIONS
(MULTIPLE FAILURE ANALYSIS)

ITEM #	INITIATING FAILURE	FAILURE MODE	CONCURRENT FAILURE	FAILURE MODE	CONTROL SYSTEM EFFECTS	INHERENT COMPENSATING PROVISIONS	PROTECTION SYSTEM EFFECTS	REMARKS
9.2.1.2.01	REG SUPL I (R3/R4)	VOLTS ZERO OR GROUNDED	LT 431 LOOP	LOW	FCV-1112 OPENS DUE TO LOSS OF CONTROL POWER, CAUSING INCREASE IN PRESSURIZER LEVEL	(SAME AS 9.2.1.1.1)	2/3 HIGH PRESSURIZER LEVEL CHANNELS AND 1/3 FIXED HIGH PRESSURE CHANNELS DISABLED. 1/3 VARIABLE LOW PRESSURE AND SEQ #1 CHANNELS TRIPPED.	(SAME AS 9.2.1.1.1)
9.2.1.2.02	REG SUPL I (R3/R4)	VOLTS ZERO OR GROUNDED	LT 432 LOOP	LOW	(SAME AS 9.2.1.2.1)	(SAME AS 9.2.1.1.1)	(SAME AS 9.2.1.2.1)	(SAME AS 9.2.1.1.1)
9.2.1.2.03	REG SUPL I (R3/R4)	VOLTS ZERO OR GROUNDED	SW. LR/430	CONTACTS CLOSED	(SAME AS 9.2.1.2.1)	(SAME AS 9.2.1.1.1)	3/3 HIGH PRESSURIZER LEVEL CHANNELS AND 1/3 FIXED HIGH PRESSURE CHANNELS DISABLED. 1/3 VARIABLE LOW PRESSURE AND SEQ #1 PZR PRESSURE CHANNELS TRIPPED	(SAME AS 9.2.1.1.3)
9.2.2.1.01	LT 430 LOOP	HIGH*	LT 431 LOOP	HIGH*	FCV-1112 CLOSSES (VIA SIGNAL FROM SW. L/432), CAUSING DECREASE IN PRESSURIZER LEVEL DUE TO CONTINUING LETDOWN	NONE REQUIRED	2/3 HIGH PRESSURIZER LEVEL CHANNELS DISABLED	LT-432 MAY BE SUBSTITUTED FOR LT-430 OR LT-431 VIA SW. L/432. EVENT TERMINATED BY OPERATOR ACTION AFTER 30 MINUTES BASED ON UNAFFECTED LEVEL CHANNEL. SCRAM ON VARIABLE LOW PRESSURE OR SEQ #1 OR #2 WOULD OCCUR IN THE ABSENCE OF OPERATOR ACTION
9.2.2.1.02	LT 430 LOOP	HIGH*	LT 432 LOOP	HIGH*	(SAME AS 9.2.2.1.1)	(SAME AS 9.2.2.1.1)	(SAME AS 9.2.2.1.1)	EVENT TERMINATED BY OPERATOR ACTION AFTER 30 MINUTES BASED ON UNAFFECTED LEVEL CHANNEL. SCRAM ON VARIABLE LOW PRESSURE OR SEQ #1 OR #2 WOULD OCCUR IN THE ABSENCE OF OPERATOR ACTION
9.2.2.1.03	LT 430 LOOP	HIGH*	SW. LR/430	CONTACTS CLOSED	(SAME AS 9.2.2.1.1)	VARIABLE LOW PRESSURE, SEQ #1 OR SEQ#2 LOW PZR PRESSURE SCRAMS	3/3 CHANNELS OF PRESSURIZER LEVEL (INDICATION AND HIGH LEVEL SCRAM) DISABLED	MONITORING OF LT 435 AT REMOTE SHUTDOWN PANEL MAY BE REQUIRED FOR EVENT RECOVERY
9.3	THERE ARE NO CONTROL INTERACTIONS WITH THE TURBINE TRIP SCRAM FUNCTION							
9.4.1.1.01	REG SUPL IV (R5)	VOLTS LOW	N 1215 (COMPARATOR)	INPUTS GROUNDED	CONTROL RODS INSERT AND STEAM DUMP VALVES OPEN DUE TO MISMATCH BETWEEN T-AVG AND INDICATED T-REF (PT-415) AND DECREASE IN INDICATED MWE (PT-417). DECREASING STEAM GENERATOR LEVEL TRANSIENT WITH RECOVERY IN 3/3 STEAM GENERATORS	NIS OVERPOWER, VARIABLE LOW PRESSURE OR SEQ #1 OR #2 LOW PZR PRESSURE SCRAMS, NIS CHANNELS FOR P-7 AND P-8 DEFEAT	3/3 STEAM/FEED MISMATCH CHANNELS DECALIBRATED UP TO 7% AT REDUCED POWER. REDUCED REDUNDANCY FOR P-7 AND P-8 DEFEAT. NIS CHANNEL IV (NE-1208) UNAFFECTED BY POWER SUPPLY TO R5	BOUNDED BY STEAM LINE BREAK ANALYSES. STEAM/FEED MISMATCH SCRAM IS NOT CREDITED FOR STEAM FLOW PERTURBATION EVENTS
9.4.1.1.02	REG SUPL IV (R5)	VOLTS LOW	NCS 1200-1 (MODE SWITCH)	RANGE HIGH	(SAME AS 9.4.1.1.1)	VARIABLE LOW PRESSURE OR SEQ #1 OR #2 LOW PZR PRESSURE SCRAMS, NIS CHANNELS FOR P-7 AND P-8 DEFEAT	3/3 STEAM/FEED MISMATCH CHANNELS DECALIBRATED UP TO 7% AT REDUCED POWER, OVERPOWER TRIP SETPOINT ON 4/4 NIS CHANNELS TOO HIGH FOR TRIP IF INITIATED FROM MID POWER RANGE, REDUCED REDUNDANCY FOR P-7 AND P-8 DEFEAT	NIS RANGE ERROR PRECLUDED BY STRICT ADMINISTRATIVE CONTROL
9.4.1.1.03	REG SUPL IV (R5)	VOLTS LOW	NE 1205 LOOP	LOW	(SAME AS 9.4.1.1.1)	VARIABLE LOW PRESSURE OR SEQ #1 OR #2 LOW PZR PRESSURE SCRAMS, REDUNDANT NIS CHANNELS AND P-7, P-8 DEFEAT LOGIC BECOME 2/3 ON FOR OVERPOWER SCRAMS, P-7 AND P-8 DEFEAT	3/3 STEAM/FEED MISMATCH CHANNELS DECALIBRATED UP TO 7% AT REDUCED POWER, 1/4 NIS CHANNELS DISABLED. NIS OVERPOWER AND P-7, P-8 DEFEAT LOGIC BECOME 2/3 ON REMAINING CHANNELS	(SAME AS 9.4.1.1.1)

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONOFRE UNIT 1
SECTION 9: CONTROL/PROTECTION SYSTEM INTERACTIONS
(MULTIPLE FAILURE ANALYSIS)

ITEM #	INITIATING FAILURE	FAILURE MODE	CONCURRENT FAILURE	FAILURE MODE	CONTROL SYSTEM EFFECTS	INHERENT COMPENSATING PROVISIONS	PROTECTION SYSTEM EFFECTS	REMARKS
9.4.1.1.04	REG SUPL IV (RS)	VOLTS LOW	NE 1207 LOOP	LOW	(SAME AS 9.4.1.1.1)	(SAME AS 9.4.1.1.3)	(SAME AS 9.4.1.1.3)	(SAME AS 9.4.1.1.1)
9.4.1.1.05	REG SUPL IV (RS)	VOLTS LOW	NE 1206 LOOP	LOW	(SAME AS 9.4.1.1.1)	(SAME AS 9.4.1.1.3)	(SAME AS 9.4.1.1.3)	(SAME AS 9.4.1.1.1)
9.4.1.1.06	REG SUPL IV (RS)	VOLTS LOW	NE 1208 LOOP	LOW	(SAME AS 9.4.1.1.1)	(SAME AS 9.4.1.1.3)	(SAME AS 9.4.1.1.3)	(SAME AS 9.4.1.1.1)
9.4.1.1.07	REG SUPL IV (RS)	VOLTS LOW	TEST BYP (A OR B)	DN	(SAME AS 9.4.1.1.1)	REDUNDANT COINCIDENTOR	3/3 STEAM/FEED MISMATCH CHANNELS DECALIBERATED UP TO 7% AT REDUCED POWER, NIS OVERPOWER AND SUR SCRAMS, P-7, P-8, UN-P7 OUTPUTS BYPASSED FROM ONE COINCIDENTOR	(SAME AS 9.4.1.1.1)
9.4.2.1.01	PT 415 LOOP	HIGH	N 1215 (COMPARATOR)	INPUTS BROUNDED	CONTROL RODS WITHDRAW DUE TO MISMATCH BETWEEN T-AVG AND T-REF (PT-415). STEAM DUMP INHIBITED BY LACK OF CONCURRENT LOAD REJECTION	NIS OVERPOWERS OR VARIABLE LOW PRESSURE SCRAMS, PC-415X AND NIS CHANNELS FOR UN-P7 DEFEAT	REDUCED REDUNDANCY FOR SUR BYPASS (UN-P7) DEFEAT	NIS OVERPOWER AND SUR ROD STOPS, SUR SCRAMS NOT CREDITED IN TRANSIENT ANALYSES
9.4.2.1.02	PT 415 LOOP	HIGH	NCS 1200-1 (MODE SWITCH)	RANGE HIGH	(SAME AS 9.4.2.1.1)	SUR SCRAM (P-7) OR VARIABLE LOW PRESSURE SCRAM (NO P-7)	SUR BYPASS (UN-P7) LOGIC BECOMES 2/4 ON NIS POWER CHANNELS, OVERPOWER TRIP SETPOINT ON 4/4 CHANNELS TOO HIGH FOR SCRAM IF EVENT INITIATED FROM MID OR LOW POWER	(SAME AS 9.4.1.1.2)
9.4.2.1.03	PT 415 LOOP	HIGH	NE 1205 LOOP	LOW	(SAME AS 9.4.2.1.1)	(SAME AS 9.4.2.1.2)	1/4 OVERPOWER AND 1/2 SUR CHANNELS DISABLED, OVERPOWER SCRAM AND P-7 DEFEAT LOGIC BECOME 2/3 AND SUR SCRAM BECOMES 1/1 ON REMAINING CHANNELS	(SAME AS 9.4.2.1.1)
9.4.2.1.04	PT 415 LOOP	HIGH	NE 1207 LOOP	LOW	(SAME AS 9.4.2.1.1)	(SAME AS 9.4.2.1.2)	(SAME AS 9.4.2.1.3)	(SAME AS 9.4.2.1.1)
9.4.2.1.05	PT 415 LOOP	HIGH	NE 1206 LOOP	LOW	(SAME AS 9.4.2.1.1)	(SAME AS 9.4.2.1.2)	1/4 NIS OVERPOWER CHANNELS DISABLED, OVERPOWER AND P-7 DEFEAT LOGIC BECOME 2/3 ON REMAINING CHANNELS	(SAME AS 9.4.2.1.1)
9.4.2.1.06	PT 415 LOOP	HIGH	NE 1208 LOOP	LOW	(SAME AS 9.4.2.1.1)	(SAME AS 9.4.2.1.2)	(SAME AS 9.4.2.1.5)	(SAME AS 9.4.2.1.1)
9.5					THERE ARE NO CONTROL INTERACTIONS WITH THE RCS LOW FLOW SCRAM FUNCTION			
9.6.1.1.01	FT 460 LOOP FT 456 LOOP	LOW* OR HIGH*, RESP.	FT 461 LOOP FT 457 LOOP	LOW* OR HIGH*, RESP.	DOWNWARD LEVEL TRANSIENT AND RECOVERY (DUE TO INTEGRATING LEVEL ERROR) IN 2/3 STEAM GENERATORS	NONE REQUIRED	2/3 STEAM/FEED MISMATCH CHANNELS DISABLED	NO PROTECTION SYSTEM OR OPERATOR ACTIONS REQUIRED
9.6.1.1.02	FT 460 LOOP FT 456 LOOP	LOW* OR HIGH*, RESP.	FT 462 LOOP FT 458 LOOP	LOW* OR HIGH*, RESP.	(SAME AS 9.6.1.1.1)	(SAME AS 9.6.1.1.1)	(SAME AS 9.6.1.1.1)	(SAME AS 9.6.1.1.1)
9.6.1.2.01	FT 461 LOOP FT 457 LOOP	LOW* OR HIGH*, RESP.	FT 462 LOOP FT 458 LOOP	LOW* OR HIGH*, RESP.	(SAME AS 9.6.1.1.1)	(SAME AS 9.6.1.1.1)	(SAME AS 9.6.1.1.1)	(SAME AS 9.6.1.1.1)
9.6.1.3.01	REG SUPL I (R10/R11)	VOLTS ZERO OR GROUNDDED	FT 461 LOOP FT 457 LOOP	LOW* OR HIGH*, RESP.	FLOW CONTROL VALVE FAILS OPEN TO 1/3 STEAM GENERATORS (ON LOSS OF CONTROL POWER), DOWNWARD LEVEL TRANSIENT AND RECOVERY IN 1/3 STEAM GENERATORS	VARIABLE LOW PRESSURE, SEQ #1 OR #2 LOW PZR PRESSURE SCRAMS	1/3 STEAM/FEED MISMATCH CHANNELS TRIPPED AND 1/3 DISABLED, LOGIC BECOMES 1/1 ON REMAINING CHANNELS (NO P-8)	HIGH LEVEL TURBINE TRIP IN AFFECTED STM GEN DISABLED BY LOSS OF POWER TO NR LEVEL TRIP RELAY, HOWEVER FEEDWATER IS ISOLATED BY SEQ #1/#2 AND TURBINE TRIP OCCURS ON REACTOR SCRAM
9.6.1.3.02	REG SUPL I (R10/R11)	VOLTS ZERO OR GROUNDDED	FT 462 LOOP FT 458 LOOP	LOW* OR HIGH*, RESP.	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.1.1)	(SAME AS 9.6.1.3.1)

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ITEM #	INITIATING FAILURE	FAILURE MODE	CONCURRENT FAILURE	FAILURE MODE	CONTROL SYSTEM EFFECTS	INHERENT COMPENSATING PROVISIONS	PROTECTION SYSTEM EFFECTS	REMARKS
9.6.1.3.03	REG SUPPL I (R10/R11)	VOLTS ZERO OR GROUNDED	PY 459A PP 459A	INPUT SHORT	FEEDWATER FLOW CONTROL VALVE FAILS OPEN TO 1/3 STEAM GENERATORS (ON LOSS OF CONTROL POWER), DOWNWARD LEVEL TRANSIENT AND RECOVERY IN 2/3 STEAM GENERATORS	(SAME AS 9.6.1.3.1)	1/3 STEAM/FEED MISMATCH CHANNELS TRIPPED, 2/3 DECALIBRATED UP TO 7% AT REDUCED POWER, LOGIC BECOMES 1/2 (NO P-B)	(SAME AS 9.6.1.3.1)
9.6.1.3.04	REG SUPPL I (R10/R11)	VOLTS ZERO OR GROUNDED	PY 459B PP 459B	INPUT SHORT	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)
9.6.1.3.05	REG SUPPL I (R10/R11)	VOLTS ZERO OR GROUNDED	PY 459C PP 459C	INPUT SHORT	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)
9.6.1.3.06	REG SUPPL I (R10/R11)	VOLTS ZERO OR GROUNDED	PT 459 LOOP	LOW	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)
9.6.1.3.07	REG SUPPL I (R10/R11)	VOLTS ZERO OR GROUNDED	OPTIMAC THROWOVER					OPTIMAC AND THROWOVER CHASSIS HAVE BEEN DELETED
9.6.1.3.08	REG SUPPL I (R10/R11)	VOLTS ZERO OR GROUNDED	REG SUPPL II (R10/R11)	VOLTS ZERO OR GROUNDED	FEEDWATER FLOW CONTROL VALVES FAIL OPEN TO 2/3 STEAM GENERATORS (ON LOSS OF CONTROL POWER)	NONE REQUIRED (NO P-B) OR VARIABLE LOW PRESSURE, SEQ #1 OR #2 LOW PZR PRESSURE SCRAMS (P-B)	2/3 STEAM/FEED MISMATCH REACTOR SCRAM (NO P-B)	HIGH LEVEL TURBINE TRIP IN AFFECTED S/GS DISABLED BY LOSS OF POWER TO NR LEVEL TRIP RELAY, HOWEVER FEEDWATER IS ISOLATED BY SEQ #1/#2 AND TURBINE TRIP WILL OCCUR ON REACTOR SCRAM
9.6.1.3.09	REG SUPPL I (R10/R11)	VOLTS ZERO OR GROUNDED	REG SUPPL III (R10/R11)	VOLTS ZERO OR GROUNDED	(SAME AS 9.6.1.3.8)	(SAME AS 9.6.1.3.8)	(SAME AS 9.6.1.3.8)	(SAME AS 9.6.1.3.8)
9.6.1.4.01	REG SUPPL II (R10/R11)	VOLTS ZERO OR GROUNDED	FT 460 LOOP FT 456 LOOP	LOW* OR HIGH*, RESP.	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.1)
9.6.1.4.02	REG SUPPL II (R10/R11)	VOLTS ZERO OR GROUNDED	FT 452 LOOP FT 458 LOOP	LOW* OR HIGH*, RESP.	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.1)
9.6.1.4.03	REG SUPPL II (R10/R11)	VOLTS ZERO OR GROUNDED	PY 459A PP 459A	INPUT SHORT	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)
9.6.1.4.04	REG SUPPL II (R10/R11)	VOLTS ZERO OR GROUNDED	PY 459B PP 459B	INPUT SHORT	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)
9.6.1.4.05	REG SUPPL II (R10/R11)	VOLTS ZERO OR GROUNDED	PY 459C PP 459C	INPUT SHORT	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)
9.6.1.4.06	REG SUPPL II (R10/R11)	VOLTS ZERO OR GROUNDED	PT 459 LOOP	LOW	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)
9.6.1.4.07	REG SUPPL II (R10/R11)	VOLTS ZERO OR GROUNDED	OPTIMAC THROWOVER					OPTIMAC AND THROWOVER CHASSIS HAVE BEEN DELETED
9.6.1.4.08	REG SUPPL II (R10/R11)	VOLTS ZERO OR GROUNDED	REG SUPPL III (R10/R11)	VOLTS ZERO OR GROUNDED	(SAME AS 9.6.1.3.8)	(SAME AS 9.6.1.3.8)	(SAME AS 9.6.1.3.8)	(SAME AS 9.6.1.3.8)
9.6.1.5.01	REG SUPPL III (R10/R11)	VOLTS ZERO OR GROUNDED	FT 460 LOOP FT 456 LOOP	LOW* OR HIGH*, RESP.	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.1)
9.6.1.5.02	REG SUPPL III (R10/R11)	VOLTS ZERO OR GROUNDED	FT 461 LOOP FT 457 LOOP	LOW* OR HIGH*, RESP.	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.1)
9.6.1.5.03	REG SUPPL III (R10/R11)	VOLTS ZERO OR GROUNDED	PY 459A PP 459A	INPUT SHORT	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)
9.6.1.5.04	REG SUPPL III (R10/R11)	VOLTS ZERO OR GROUNDED	PY 459B PP 459B	INPUT SHORT	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)
9.6.1.5.05	REG SUPPL III (R10/R11)	VOLTS ZERO OR GROUNDED	PY 459C PP 459C	INPUT SHORT	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)
9.6.1.5.06	REG SUPPL III (R10/R11)	VOLTS ZERO OR GROUNDED	PT 459 LOOP	LOW	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)	(SAME AS 9.6.1.3.3)	(SAME AS 9.6.1.3.1)

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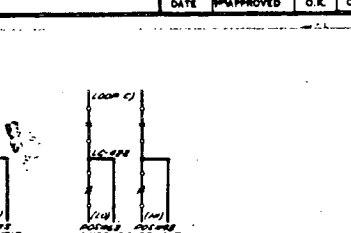
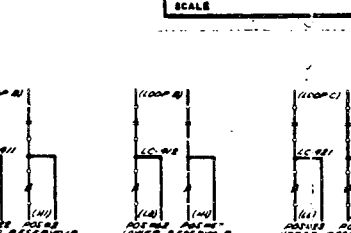
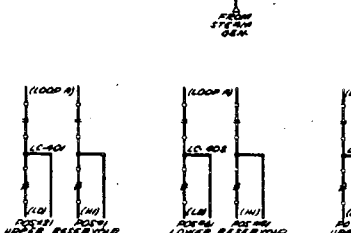
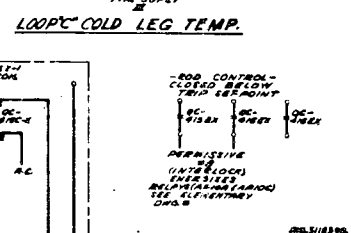
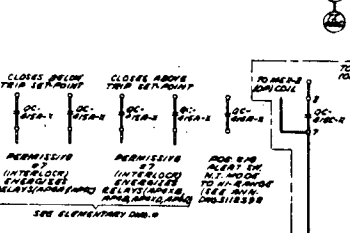
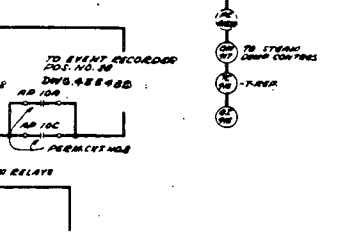
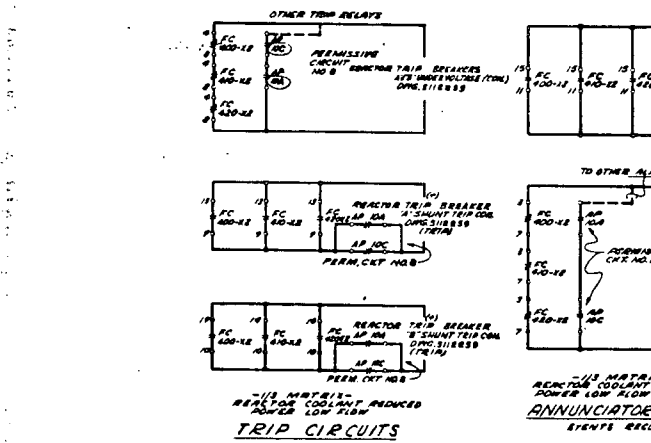
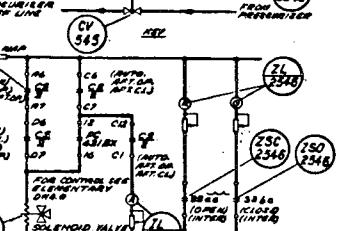
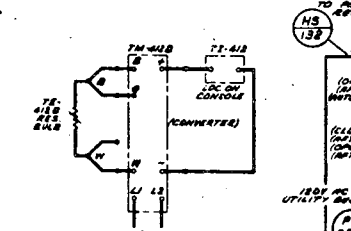
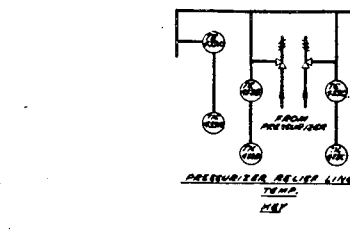
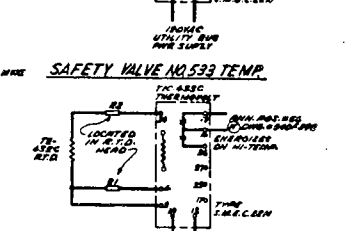
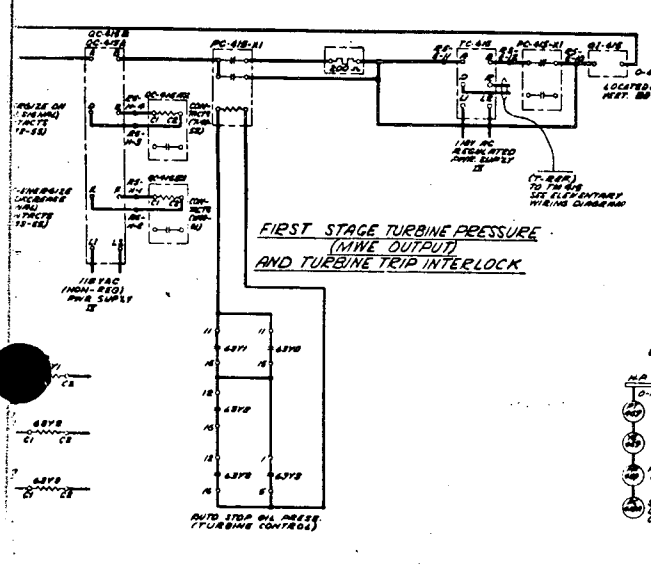
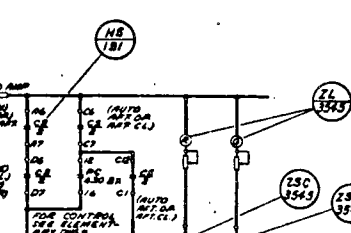
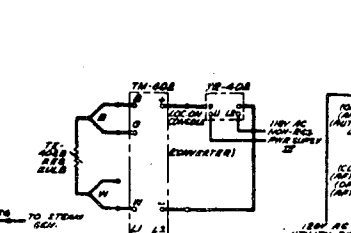
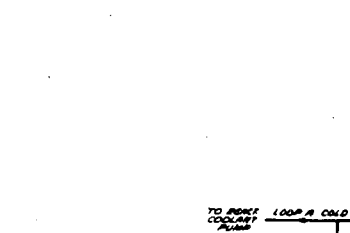
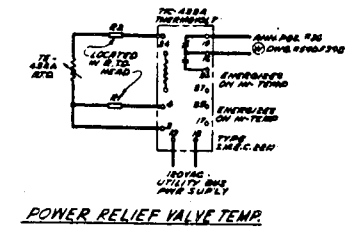
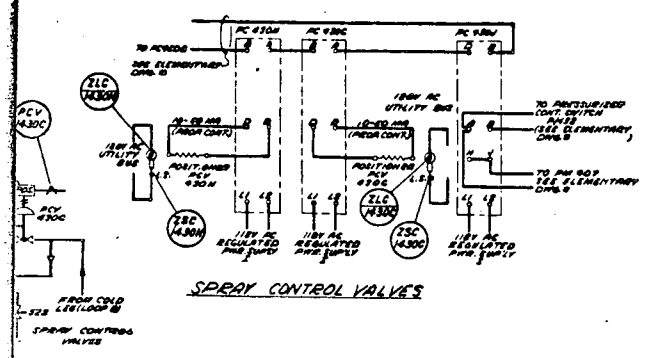
INITIATING ITEM #	FAILURE	CONCURRENT FAILURE	FAILURE MODE	CONTROL SYSTEM EFFECTS	INHERENT COMPENSATING PROVISIONS	PROTECTION SYSTEM EFFECTS	REMARKS
9.6.1.5.07	REG SUPL III (R10/R11)	OPTIMAC THROWOVER					OPTIMAC AND THROWOVER CHASSIS HAVE BEEN DELETED
9.6.1.6.01	PC 418A	N 1215 (COMPARATOR)	INPUTS GROUNDED	STEAM DUMP VALVES OPEN (PRESSURE CONTROL MODE ONLY) AND DOWNWARD LEVEL TRANSIENT WITH RECOVERY OCCURS IN 3/3 STEAM GENERATORS	NIS OVERPOWER, SUR OR VARIABLE LOW PRESSURE OR SEQ #1 OR #2 LOW PZR PRESSURE SCRAMS	3/3 STEAM/FEED MISMATCH CHANNELS DECALIBRATED UP TO 7% AT REDUCED POWER	BOUNDED BY STEAM LINE BREAK ANALYSES. STEAM DUMP PRESSURE CONTROL MODE APPLICABLE UP TO 20% POWER. STEAM/FEED MISMATCH SCRAM IS NOT CREDITED FOR STEAM FLOW PERTURBATION EVENTS
9.6.1.6.02	PC 418A	NCS 1200-1 (MODE SWITCH)	RANGE HIGH	(SAME AS 9.6.1.6.1)	VARIABLE LOW PRESSURE OR SEQ #1 OR #2 LOW PZR PRESSURE SCRAMS	3/3 STEAM/FEED MISMATCH CHANNELS DECALIBRATED UP TO 7% AT REDUCED POWER. OVERPOWER TRIP SETPOINT ON 4/4 NIS CHANNELS TOO HIGH FOR TRIP IF INITIATED FROM MID POWER RANGE	NIS RANGE ERROR PRECLUDED BY STRICT ADMINISTRATIVE CONTROL
9.6.1.6.03	PC 418A	NE 1205 LOOP	LOW	(SAME AS 9.6.1.6.1)	NIS OVERPOWER OR SUR SCRAM BY REDUNDANT CHANNELS OR VARIABLE LOW PRESSURE OR SEQ #1 OR #2 LOW PZR PRESSURE SCRAMS	3/3 STEAM/FEED MISMATCH CHANNELS DECALIBRATED UP TO 7% AT REDUCED POWER. 1/4 NIS CHANNELS DISABLED, LOGIC BECOMES 2/3 (OVERPOWER) AND 1/2 (SUR) ON REMAINING CHANNELS	
9.6.1.6.04	PC 418A	NE 1207 LOOP	LOW	(SAME AS 9.6.1.6.1)	(SAME AS 9.6.1.6.3)	(SAME AS 9.6.1.6.3)	
9.6.1.6.05	PC 418A	NE 1206 LOOP	LOW	(SAME AS 9.6.1.6.1)	NIS OVERPOWER SCRAM BY REDUNDANT CHANNELS OR VARIABLE LOW PRESSURE OR SEQ #1 OR #2 LOW PZR PRESSURE SCRAMS	3/3 STEAM/FEED MISMATCH CHANNELS DECALIBRATED UP TO 7% AT REDUCED POWER. 1/4 NIS CHANNELS DISABLED, LOGIC BECOMES 2/3 (OVERPOWER) ON REMAINING CHANNELS	
9.6.1.6.06	PC 418A	NE 1208 LOOP	LOW	(SAME AS 9.6.1.6.1)	(SAME AS 9.6.1.6.5)	(SAME AS 9.6.1.6.5)	
9.7				THERE ARE NO CONTROL INTERACTIONS WITHIN THE SCRAM MATRIX, BREAKERS, MANUAL OR RCP BREAKER SCRAMS. DUE TO INTERNAL SEPARATION, FAILURE OF THE SCRAM-INITIATING AUXILIARY CONTACTS IN THE RCP BREAKERS CANNOT CREDIBLY CAUSE A LOSS OF RCS FLOW			
9.8.1.1.01	REG BUS 1	REG SUPL II (R1/R2)	VOLTS LOW	PRESSURIZER HEATERS ENERGIZED, CONTROL RODS WITHDRAWN, FCV-1112 OPENS (INCREASING PRESSURIZER LEVEL) AND FEEDWATER FLOW CONTROL VALVE FAILS OPEN TO 1/3 STEAM GENERATORS	SEQ #1 OR #2 LOW PZR PRESSURE SCRAMS	2/3 VAR LO PRESS, 1/3 FIXED HI PRESS AND HI PZR LEVEL DISABLED. 1/3 SEQ #1, RCS LO FLO, STM/FEED MISMATCH AND 1/4 NIS OVERPOWER TRIPPED. SCRAM OCCURS (P-B OFF) OR LOGIC BECOMES 2/2 (PRESS OR LEVEL), 1/2 (SEQ #1, RCS LO FLOW, MISMATCH) AND 1/3 (NIS)	PROCEDURES REQUIRE MANUAL SCRAM IN RESPONSE TO A LOSS OF VITAL OR REGULATED BUS. HI LEVEL TURBINE TRIP IN AFFECTED S/S DISABLED BY LOSS OF POWER TO NR LEVEL TRIP RELAY, HOWEVER FW ISOLATED BY SEQ #1/#2 AND TURBINE TRIP OCCURS ON REACTOR SCRAM
9.8.1.1.02	REG BUS 1	REG SUPL II (R3/R4)	VOLTS LOW	(SAME AS 9.8.1.1.1)	VARIABLE LOW PRESSURE SCRAM BY REDUNDANT CHANNELS OR SEQ #1 OR #2 LOW PZR PRESSURE SCRAMS	2/3 HI PZR LEVEL, 1/3 FIXED HI PRESS AND VAR LO PRESS DISABLED. 1/3 SEQ #1, RCS LO FLO, STM/FEED MISMATCH AND 1/4 NIS OVERPOWER TRIPPED. SCRAM OCCURS (NO P-B) OR LOGIC BECOMES 2/2 (PRESS), 1/2 (SEQ #1, RCS LO FLOW, MISMATCH) AND 1/3 (NIS)	(SAME AS 9.8.1.1.1)

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
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 (MULTIPLE FAILURE ANALYSIS)

ITEM #	INITIATING FAILURE	FAILURE MODE	CONCURRENT FAILURE	FAILURE MODE	CONTROL SYSTEM EFFECTS	INHERENT COMPENSATING PROVISIONS	PROTECTION SYSTEM EFFECTS	REMARKS
9.8.1.1.03	REG BUS 1	VOLTS ZERO OR GROUND	REG SUPL II (R5)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	1/3 FIXED HI PRESS, VAR LO PRESS AND HI PZR LEVEL DISABLED. 1/3 SEQ #1 AND STM/FD MISMATCH, 2/3 RCS LO FLO AND 1/4 NIS OVERPOWER TRIPPED. SCRAM OCCURS (P-7 OFF) OR LOGIC BECOMES 1/2 (EXCEPT NIS) AND 1/3 (NIS)	(SAME AS 9.8.1.1.1)
9.8.1.1.04	REG BUS 1	VOLTS ZERO OR GROUND	REG SUPL II (R10/R11)	VOLTS LOW	PRESSURIZER HEATERS ENERGIZED, CONTROL RODS WITHDRAW, FCV-1112 OPENS (INCREASING PRESSURIZER LEVEL), AND FEEDWATER FLOW CONTROL VALVES FAIL OPEN TO 2/3 STEAM GENERATORS	(SAME AS 9.8.1.1.2)	1/3 FIXED HI PRESS, VAR LO PRESS AND HI PZR LEVEL DISABLED. 2/3 STM/FD MISMATCH, 1/3 SEQ #1, RCS LO FLO, 1/4 NIS TRIPPED. SCRAM OCCURS (P-8 OFF) OR LOGIC BECOMES 2/2 (FIXED HI PRESS, VAR LO PRESS, HI PZR LEVEL), 1/2 (SEQ #1, RCS LO FLO), 1/3 (NIS)	(SAME AS 9.8.1.1.1)
9.8.1.1.05	REG BUS 1	VOLTS ZERO OR GROUND	REG SUPL II (NIS)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	1/3 FIXED HI PRESS, VAR LO PRESS AND HI PZR LEVEL DISABLED. 1/3 SEQ #1, STM/FEED AND RCS LO FLO TRIPPED. SCRAM OCCURS ON 2/4 OVERPOWER (P-7 OFF) OR 2/2 HIGH SUR (P-7 ON)	(SAME AS 9.8.1.1.1)
9.8.1.1.06	REG BUS 1	VOLTS ZERO OR GROUND	REG SUPL III (R1/R2)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)
9.8.1.1.07	REG BUS 1	VOLTS ZERO OR GROUND	REG SUPL III (R3/R4)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.1)
9.8.1.1.08	REG BUS 1	VOLTS ZERO OR GROUND	REG SUPL III (R5)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.3)	(SAME AS 9.8.1.1.1)
9.8.1.1.09	REG BUS 1	VOLTS ZERO OR GROUND	REG SUPL III (R10/R11)	VOLTS LOW	(SAME AS 9.8.1.1.4)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.4)	(SAME AS 9.8.1.1.1)
9.8.1.1.10	REG BUS 1	VOLTS ZERO OR GROUND	REG SUPL III (NIS)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.5)	(SAME AS 9.8.1.1.1)
9.8.1.1.11	REG BUS 1	VOLTS ZERO OR GROUND	REG SUPL IV (R5)	VOLTS LOW	PRESSURIZER HEATERS ENERGIZED, CONTROL RODS WITHDRAW, FCV-1112 OPENS (INCREASING PZR LEVEL), STEAM DUMP VALVES OPEN, FEEDWATER FLOW CONTROL VALVE FAILS OPEN TO 1/3 STM GEN AND DOWNWARD LEVEL TRANSIENT WITH RECOVERY OCCURS IN 2/3 STM GEN	(SAME AS 9.8.1.1.2)	2/3 STM/FD MISMATCH CHNLS DECALIBRATED UP TO 7% AT REDUCED POWER. 1/3 VAR LO PRESS CHNLS DISABLED. 1/3 MISMATCH AND 1/4 NIS OVERPOWER CHNLS TRIPPED, LOGIC BECOMES 2/2 (VAR LO PRESS), 1/3 (OVERPOWER), 1/2 (MISMATCH) AND 2/3 FOR P-7 AND P-8 DEFEAT	(SAME AS 9.8.1.1.1)
9.8.1.1.12	REG BUS 1	VOLTS ZERO OR GROUND	REG BUS 4	VOLTS LOW	(SAME AS 9.8.1.1.11)	NONE REQUIRED	2/3 STM/FD MISMATCH CHNLS DECALIBRATED UP TO 7% AT REDUCED POWER. 1/3 MISMATCH, 1/2 SUR AND 2/4 OVERPOWER CHNLS TRIPPED. REACTOR SCRAM OCCURS ON OVERPOWER (NO P-7) OR SUR (P-7)	(SAME AS 9.8.1.1.1)
9.8.1.2.01	REG BUS 2	VOLTS ZERO OR GROUND	REG SUPL I (R1/R2)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)
9.8.1.2.02	REG BUS 2	VOLTS ZERO OR GROUND	REG SUPL I (R3/R4)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.1)
9.8.1.2.03	REG BUS 2	VOLTS ZERO OR GROUND	REG SUPL I (R5)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.3)	(SAME AS 9.8.1.1.1)

REACTOR PROTECTION SYSTEM SINGLE FAILURE ANALYSIS
SAN ONDFRE UNIT 1
SECTION 9: CONTROL/PROTECTION SYSTEM INTERACTIONS
(MULTIPLE FAILURE ANALYSIS)

ITEM #	INITIATING FAILURE	FAILURE MODE	CONCURRENT FAILURE	FAILURE MODE	CONTROL SYSTEM EFFECTS	INHERENT COMPENSATING PROVISIONS	PROTECTION SYSTEM EFFECTS	REMARKS
9.8.1.2.04	REG BUS 2	VOLTS ZERO OR GROUNDED	REG SUPL I (R10/R11)	VOLTS LOW	(SAME AS 9.8.1.1.4)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.4)	(SAME AS 9.8.1.1.1)
9.8.1.2.05	REG BUS 2	VOLTS ZERO OR GROUNDED	REG SUPL I (NIS)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.5)	(SAME AS 9.8.1.1.1)
9.8.1.2.06	REG BUS 2	VOLTS ZERO OR GROUNDED	REG SUPL III (R1/R2)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)
9.8.1.2.07	REG BUS 2	VOLTS ZERO OR GROUNDED	REG SUPL III (R3/R4)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.1)
9.8.1.2.08	REG BUS 2	VOLTS ZERO OR GROUNDED	REG SUPL III (R5)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.3)	(SAME AS 9.8.1.1.1)
9.8.1.2.09	REG BUS 2	VOLTS ZERO OR GROUNDED	REG SUPL III (R10/R11)	VOLTS LOW	(SAME AS 9.8.1.1.4)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.4)	(SAME AS 9.8.1.1.1)
9.8.1.2.10	REG BUS 2	VOLTS ZERO OR GROUNDED	REG SUPL III (NIS)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.3)	(SAME AS 9.8.1.1.1)
9.8.1.2.11	REG BUS 2	VOLTS ZERO OR GROUNDED	REG SUPL IV (R5)	VOLTS LOW	(SAME AS 9.8.1.1.11)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.11)	(SAME AS 9.8.1.1.1)
9.8.1.2.12	REG BUS 2	VOLTS ZERO OR GROUNDED	REG BUS 4	VOLTS LOW	(SAME AS 9.8.1.1.11)	(SAME AS 9.8.1.1.12)	(SAME AS 9.8.1.1.12)	(SAME AS 9.8.1.1.1)
9.8.1.3.01	REG BUS 3	VOLTS ZERO OR GROUNDED	REG SUPL I (R1/R2)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)
9.8.1.3.02	REG BUS 3	VOLTS ZERO OR GROUNDED	REG SUPL I (R3/R4)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.1)
9.8.1.3.03	REG BUS 3	VOLTS ZERO OR GROUNDED	REG SUPL I (R5)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.3)	(SAME AS 9.8.1.1.1)
9.8.1.3.04	REG BUS 3	VOLTS ZERO OR GROUNDED	REG SUPL I (R10/R11)	VOLTS LOW	(SAME AS 9.8.1.1.4)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.4)	(SAME AS 9.8.1.1.1)
9.8.1.3.05	REG BUS 3	VOLTS ZERO OR GROUNDED	REG SUPL I (NIS)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.5)	(SAME AS 9.8.1.1.1)
9.8.1.3.06	REG BUS 3	VOLTS ZERO OR GROUNDED	REG SUPL II (R1/R2)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.1)
9.8.1.3.07	REG BUS 3	VOLTS ZERO OR GROUNDED	REG SUPL II (R3/R4)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.1)
9.8.1.3.08	REG BUS 3	VOLTS ZERO OR GROUNDED	REG SUPL II (R5)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.3)	(SAME AS 9.8.1.1.1)
9.8.1.3.09	REG BUS 3	VOLTS ZERO OR GROUNDED	REG SUPL II (R10/R11)	VOLTS LOW	(SAME AS 9.8.1.1.4)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.4)	(SAME AS 9.8.1.1.1)
9.8.1.3.10	REG BUS 3	VOLTS ZERO OR GROUNDED	REG SUPL II (NIS)	VOLTS LOW	(SAME AS 9.8.1.1.1)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.5)	(SAME AS 9.8.1.1.1)
9.8.1.3.11	REG BUS 3	VOLTS ZERO OR GROUNDED	REG SUPL IV (R5)	VOLTS LOW	(SAME AS 9.8.1.1.11)	(SAME AS 9.8.1.1.2)	(SAME AS 9.8.1.1.11)	(SAME AS 9.8.1.1.1)
9.8.1.3.12	REG BUS 3	VOLTS ZERO OR GROUNDED	REG BUS 4	VOLTS LOW	(SAME AS 9.8.1.1.11)	(SAME AS 9.8.1.1.2)	2/3 STM/FD MISMATCH CHNLS DECALIBRATED UP TO 7% AT REDUCED PWR. 1/3 MISMATCH, RCS LO FLO, VAR LO PRESS AND SEQ #1, 2/4 OVRPWR CHNLS TRIPPED, 1/3 HI PZR LVL AND FIXED HI PRESS DISABLED. REACTOR SCRAM OCCURS (NO P-7) OR LOGIC BECOMES 1/2 (VAR LO, SEQ)	(SAME AS 9.8.1.1.1)



SI APERTURE CARD

Also Available On Aperture Card

5	AS BUILT - INCORP DCN 9	7-28-76	WJA	ASG	BY	EAC	3083
4	AS BUILT - INCORP DCN 8	8-11-75	WJA	ASG	BY	GJ	3083
3	REACTOR COOLANT SYSTEMS (INCORP DCN 5 & 6)	5-6-75	WJA	ASG	BY	GJ	3083
6	AS BUILT - INCORP DCN #10	8/1/77		CG	H	WJA	3083
NO. REVISIONS		DATE	APPROVED	O.K.	O.K.	CHECKED	MADE I.O. NO.

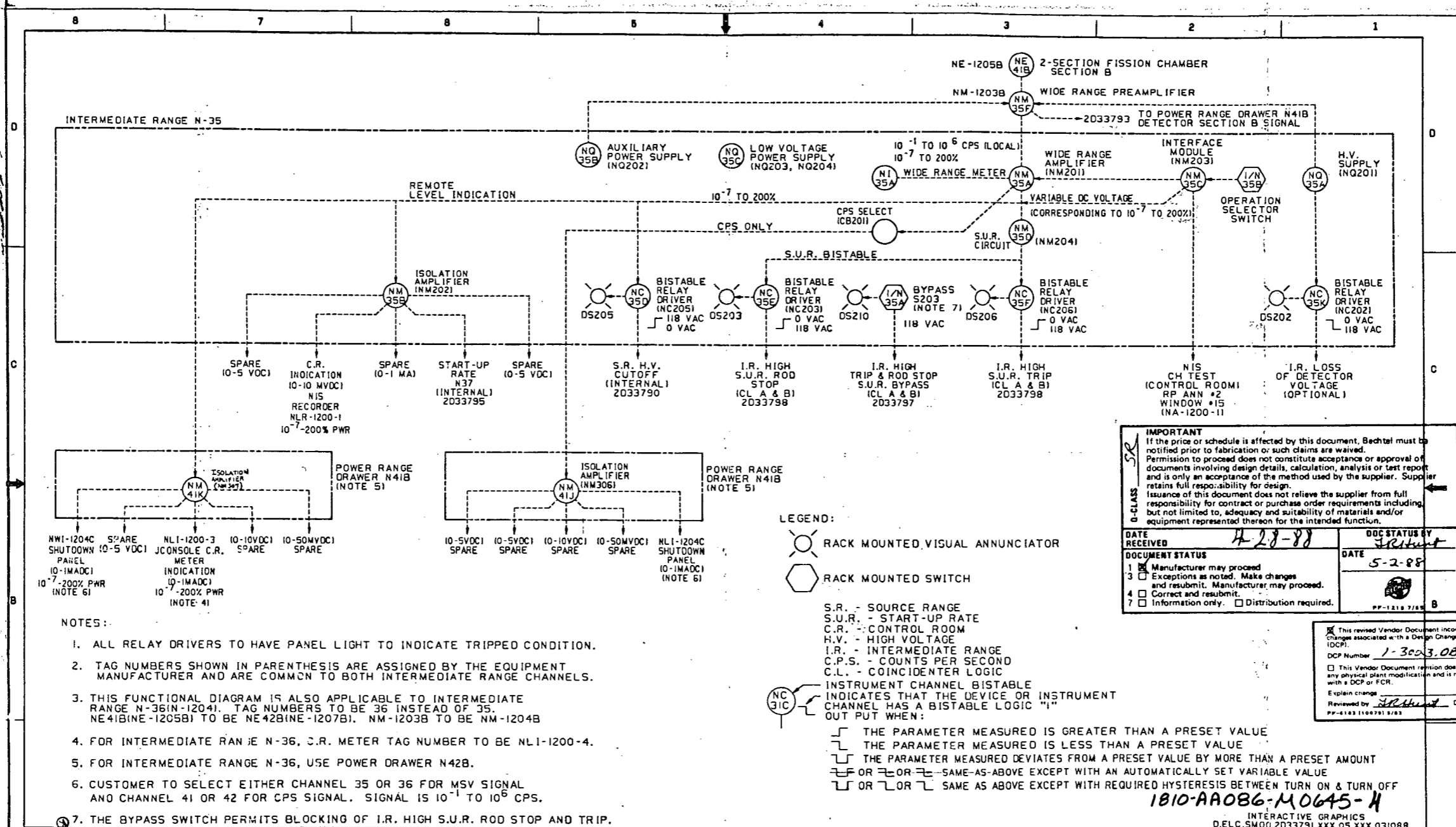
N1542 SH.132.

SAFETY RELATED EXCEPT AS NOTED

LOCATION SAN ONOFRE NUCLEAR GEN. STATION
REACTOR COOLANT SYSTEM
 ELEMENTARY SHEET NO. 1
 Southern California Edison Company **SC**

63714-6





- NOTES:
1. ALL RELAY DRIVERS TO HAVE PANEL LIGHT TO INDICATE TRIPPED CONDITION.
 2. TAG NUMBERS SHOWN IN PARENTHESIS ARE ASSIGNED BY THE EQUIPMENT MANUFACTURER AND ARE COMMON TO BOTH INTERMEDIATE RANGE CHANNELS.
 3. THIS FUNCTIONAL DIAGRAM IS ALSO APPLICABLE TO INTERMEDIATE RANGE N-36 (N-1204). TAG NUMBERS TO BE 36 INSTEAD OF 35. NE41B (NE-1205B) TO BE NE42B (NE-1207B). NM-1203B TO BE NM-1204B.
 4. FOR INTERMEDIATE RANGE N-36, C.R. METER TAG NUMBER TO BE NL1-1200-4.
 5. FOR INTERMEDIATE RANGE N-36, USE POWER DRAWER N42B.
 6. CUSTOMER TO SELECT EITHER CHANNEL 35 OR 36 FOR MSV SIGNAL AND CHANNEL 41 OR 42 FOR CPS SIGNAL. SIGNAL IS 10^{-1} TO 10^6 CPS.
 7. THE BYPASS SWITCH PERMITS BLOCKING OF I.R. HIGH S.U.R. ROD STOP AND TRIP.

IMPORTANT
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ISSUE 52

DATE RECEIVED	4-28-88	DOC STATUS BY	JRH/mt
DATE	5-2-88	DATE	5-2-88
DOCUMENT STATUS		<input checked="" type="checkbox"/> Manufacturer may proceed <input type="checkbox"/> Exceptions as noted. Make changes and resubmit. Manufacturer may proceed. <input type="checkbox"/> Correct and resubmit. <input type="checkbox"/> Information only. <input type="checkbox"/> Distribution required.	

PP-1218 7/80 B

This revised Vendor Document incorporates changes associated with a Design Change Package (DCP).
DCP Number: 1-3003.08J

This Vendor Document revision does not reflect any physical plant modification and is not associated with a DCP or FCR.

Explain change:
Reviewed by: *JRH/mt* Date: 5-2-88
PP-1103 (10/79) 5/83

SO. SWP. 330	5
REV. 222A14	5
REV. 330	5
REV. 347B	5
REV. 3-10-88	5
REV. 3-10-88	5
REV. 3-10-88	5

SOUTHERN CALIFORNIA EDISON COMPANY
 PLANT: SAN ONOFRE NUCLEAR GENERATING STATION
 UNIT: SPIN: NIELCA
 STATUS: CERTIFIED FOR CONSTRUCTION
 CERTIFICATION LTR. NO. SCE-88-594
 AUTHORITY: L. E. ELDER
 ENGR. LTR. NO. IRST-6334

TOLERANCE & MACHINE NOTES
 UNLESS OTHERWISE SPECIFIED:
 DRAWING PRACTICES, GEOMETRIC SYMBOLS, DIMENSIONS, TOLERANCING & INTERPRETATION BASED ON ANSI Y14 SERIES STANDARD & 99 SERIES
 DIMENSIONS IN INCHES BASED ON 60° VEDIC RADIUS OR CHAMFER ALL EDGES .005-.030 FULLY RADIUS .005-.030 ANGULARITY CHAMFERS .005-.030
 MAXIMUM SURFACE ROUGHNESS: 250μ IN. LAAA
 DIM. REF. THIRD ANGLE PROJECTION

WESTINGHOUSE PROPRIETARY DATA
 THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF THE WESTINGHOUSE ELECTRIC CORPORATION WATER REACTOR DIVISION. IT IS TRANSMITTED TO YOU IN CONFIDENCE AND MUST BE RETURNED UPON REQUEST. ITS CONTENTS MAY NOT BE DISCLOSED IN WHOLE OR IN PART TO OTHERS OR USED FOR OTHER THAN THE PURPOSE FOR WHICH TRANSMITTED WITHOUT THE PRIOR WRITTEN PERMISSION OF THE WESTINGHOUSE WATER REACTOR DIVISION.

SMOODY

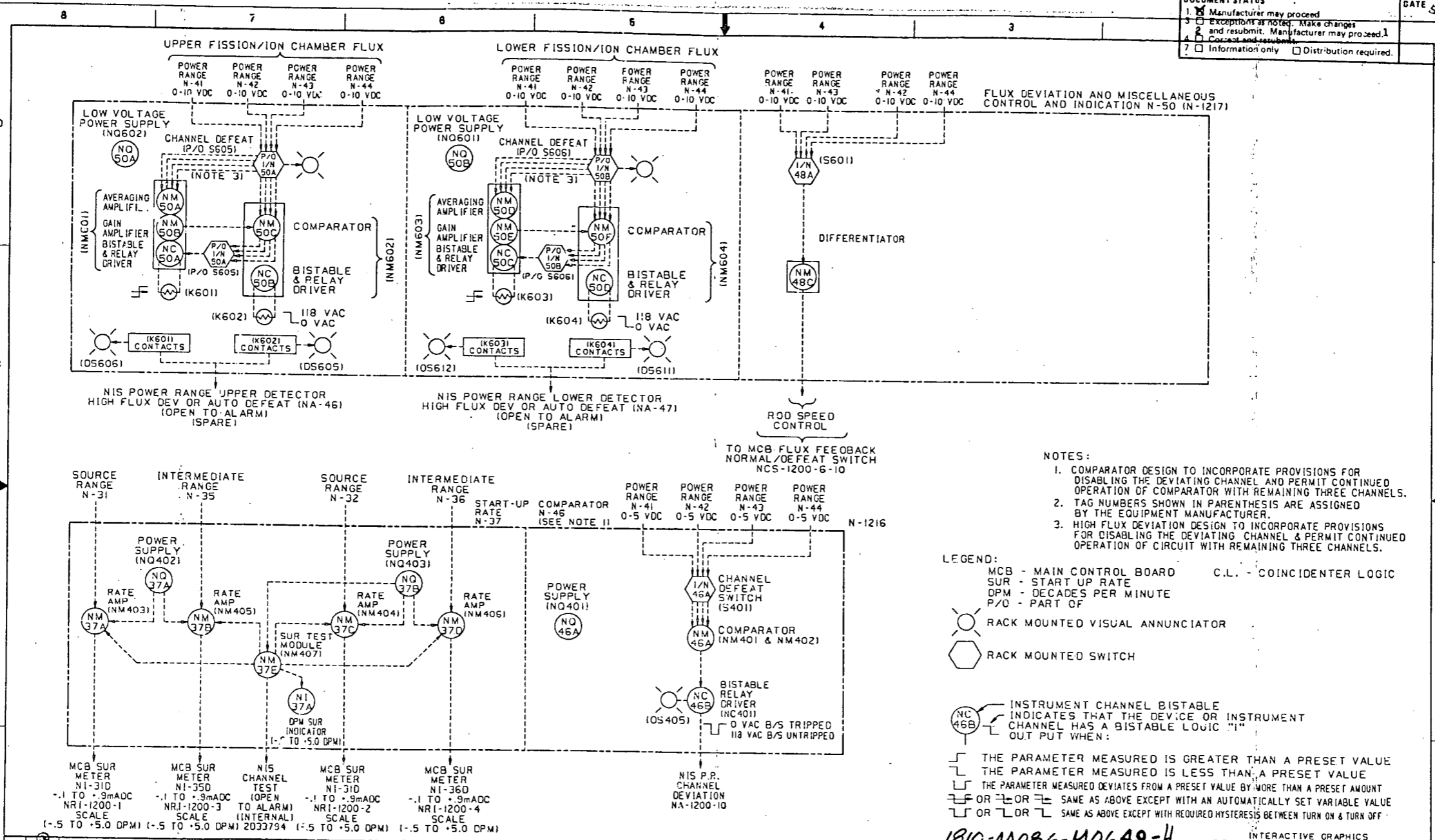
DATE	2033791	REV	5
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SI APERTURE CARD
 Also Available On Aperture Card

This revised Vendor Document incorporates changes associated with a Design Change Package (DCP).
 DCP Number 1-3003 DBJ
 This Vendor Document revision does not reflect any physical plant modification and is not associated with a DCP or FCR.
 Explain change
 Reviewed by [Signature] Date 5-2-88
 PP-6188 (10070) 8/83

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DATE RECEIVED	4-28-88	DCP STATUS BY	JR [Signature]
DOCUMENT STATUS		DATE	5-2-88
1	<input checked="" type="checkbox"/> Manufacturer may proceed		
2	<input type="checkbox"/> Exceptional notes. Make changes and resubmit. Manufacturer may proceed.		
3	<input type="checkbox"/> Correct and resubmit.		
4	<input type="checkbox"/> Information only		
5	<input type="checkbox"/> Distribution required.		



- NOTES:**
1. COMPARATOR DESIGN TO INCORPORATE PROVISIONS FOR DISABLING THE DEVIATING CHANNEL AND PERMIT CONTINUED OPERATION OF COMPARATOR WITH REMAINING THREE CHANNELS.
 2. TAG NUMBERS SHOWN IN PARENTHESES ARE ASSIGNED BY THE EQUIPMENT MANUFACTURER.
 3. HIGH FLUX DEVIATION DESIGN TO INCORPORATE PROVISIONS FOR DISABLING THE DEVIATING CHANNEL & PERMIT CONTINUED OPERATION OF CIRCUIT WITH REMAINING THREE CHANNELS.

- LEGEND:**
- MCB - MAIN CONTROL BOARD
 - SUR - START UP RATE
 - DPM - DECADES PER MINUTE
 - P/O - PART OF
 - C.L. - COINCIDENTER LOGIC
 - (Symbol: Sun) RACK MOUNTED VISUAL ANNUNCIATOR
 - (Symbol: Hexagon) RACK MOUNTED SWITCH
 - (Symbol: Circle with NC) INSTRUMENT CHANNEL BISTABLE INDICATES THAT THE DEVICE OR INSTRUMENT CHANNEL HAS A BISTABLE LOGIC "1" OUTPUT WHEN:

- (Symbol: Square with top line) THE PARAMETER MEASURED IS GREATER THAN A PRESET VALUE
- (Symbol: Square with bottom line) THE PARAMETER MEASURED IS LESS THAN A PRESET VALUE
- (Symbol: Square with left line) THE PARAMETER MEASURED DEVIATES FROM A PRESET VALUE BY MORE THAN A PRESET AMOUNT
- (Symbol: Square with right line) SAME AS ABOVE EXCEPT WITH AN AUTOMATICALLY SET VARIABLE VALUE
- (Symbol: Square with diagonal line) SAME AS ABOVE EXCEPT WITH REQUIRED HYSTERESIS BETWEEN TURN ON & TURN OFF

REV. 1	REVISED PER ECH	DATE	BY
1	ECN-34178	3-10-88	[Signature]
2	DC-10014	3-10-88	[Signature]

SOUTHERN CALIFORNIA EDISON COMPANY
 PLANT: SAN ONOFRE NUCLEAR GENERATING STATION
 UNIT: SPIN: NIELCA
 STATUS: CERTIFIED FOR CONSTRUCTION
 CERTIFICATION LTR. NO. SCE-88-594
 AUTHORITY: L. E. ELDER
 ENGR. LTR. NO. IRST-6334

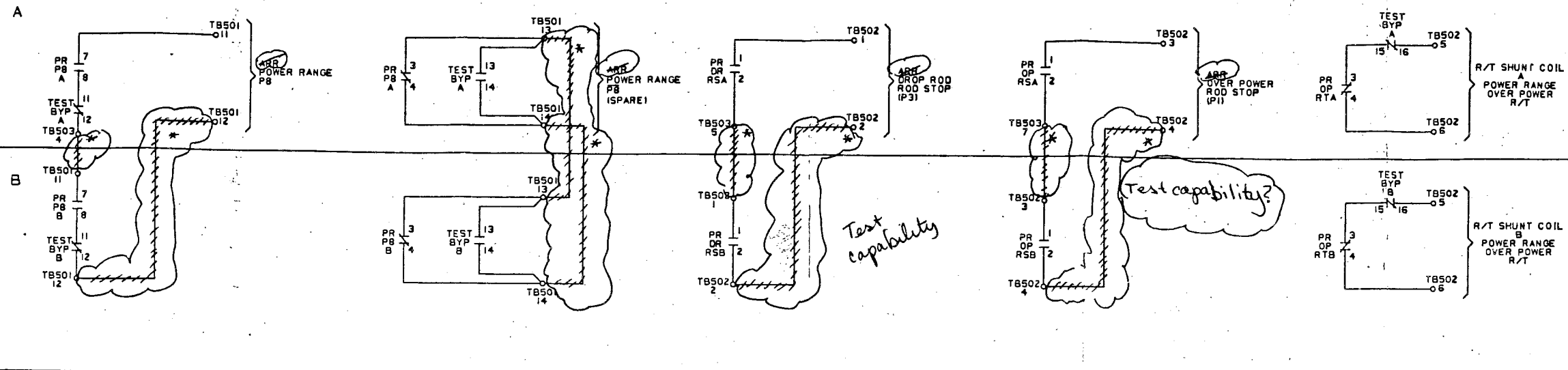
TOLERANCE & MACHINE NOTES
 UNLESS OTHERWISE SPECIFIED
 DRAWING PRACTICES, DIMENSIONAL SYMBOLS, INTERPRETATION, TOLERANCES & STANDARDS AS PER ANSI Y14.5-1974
 DIMENSIONS IN INCHES BASED ON 60° F/120° C
 RADIUS OR CHAMFER ALL EDGES - .005" DIA
 HOLE POSITION TOLERANCE - .010" DIA
 MAXIMUM SURFACE ROUGHNESS - 250 IN. WAA
 DIMENSIONS IN MILLIMETERS BASED ON 60° F/120° C
 RADIUS OR CHAMFER ALL EDGES - .005" DIA
 HOLE POSITION TOLERANCE - .010" DIA
 MAXIMUM SURFACE ROUGHNESS - 250 IN. WAA

WESTINGHOUSE PROPRIETARY DATA	INTERACTIVE GRAPHICS
W. SMOODY	DEL. SM70.2033795.XXX.CS.XXX.031688
WESTINGHOUSE ELECTRIC CORPORATION	WESTINGHOUSE ELECTRIC CORPORATION
WATER REACTOR DIVISIONS - MONROEVILLE, PA. U.S.A.	WATER REACTOR DIVISIONS - MONROEVILLE, PA. U.S.A.
SAN ONOFRE UNIT 1	SAN ONOFRE UNIT 1
NUCLEAR INSTRUMENTATION SYSTEMS	NUCLEAR INSTRUMENTATION SYSTEMS
AUXILIARY CHANNELS	AUXILIARY CHANNELS
FUNCTIONAL BLOCK DIAGRAM	FUNCTIONAL BLOCK DIAGRAM
2033795	2033795
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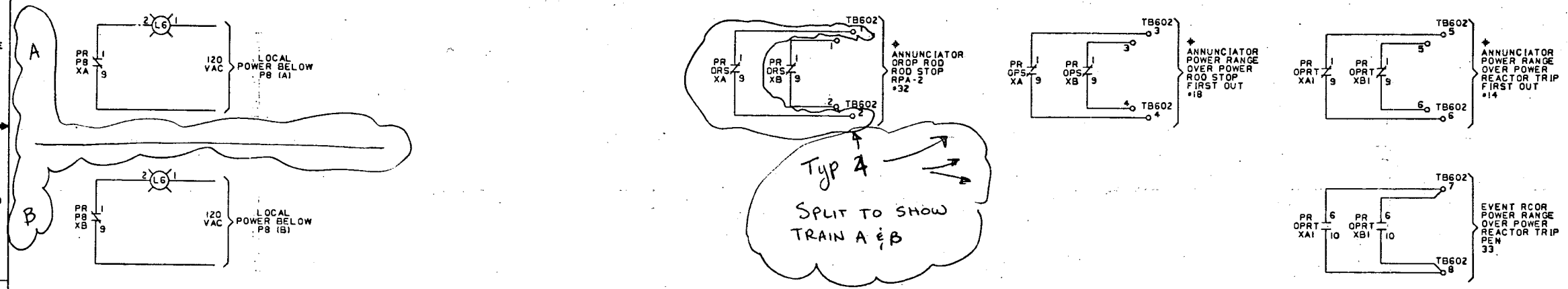
SI APERTURE CARD
 Also Available On Aperture Card

8902270311-06

SAFETY OUTPUTS TB501



NON SAFETY OUTPUTS TB601



* TRAIN B NON SAFETY SHOWN INSIDE TRAIN A
 * ANNUNCIATOR SERIES CIRCUIT DESIGN DONE BY BECHTEL - WEST COAST

ADD * NOTE: TRAIN A/B INTERCONNECTING WIRING PROVIDED BY OTHERS PLEASE SHOW AS DASHED LINES EG. -----

This revised Vendor Document incorporates changes associated with a Design Change Package (DCP).
 DCP Number 1-3003.0BT
 This Vendor Document revision does not reflect any physical plant modification and is not associated with a DCP or FCR.
 Explain change
 Reviewed by *Handwritten Signature* Date 3-10-88
 PP-6123 (REVISED) 5/85

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DATE RECEIVED 2-17-88
 DATE 5-10-88
 DOC STATUS BY *Handwritten Signature*
 DATE 5-10-88

1 Manufacturer may proceed
 3 Exceptions as noted. Make changes and resubmit. Manufacturer may proceed.
 4 Correct and resubmit.
 7 Information only. Distribution required.

1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4

SOUTHERN CALIFORNIA EDISON COMPANY
 PLANT: SAN ONOFRE NUCLEAR GENERATING STATION
 UNIT: SPIN: XTELN1
 STATUS: APPROVED FIELD MODIFICATION
 CERTIFICATION LTR. NO. SCE-88-520
 AUTHORITY: L. E. ELDER
 ENGR. LTR. NO. IRST-6021

TOLERANCE & MACHINE NOTES
 WESTINGHOUSE PROPRIETARY DATA
 1810-AA 086-M 1096-3

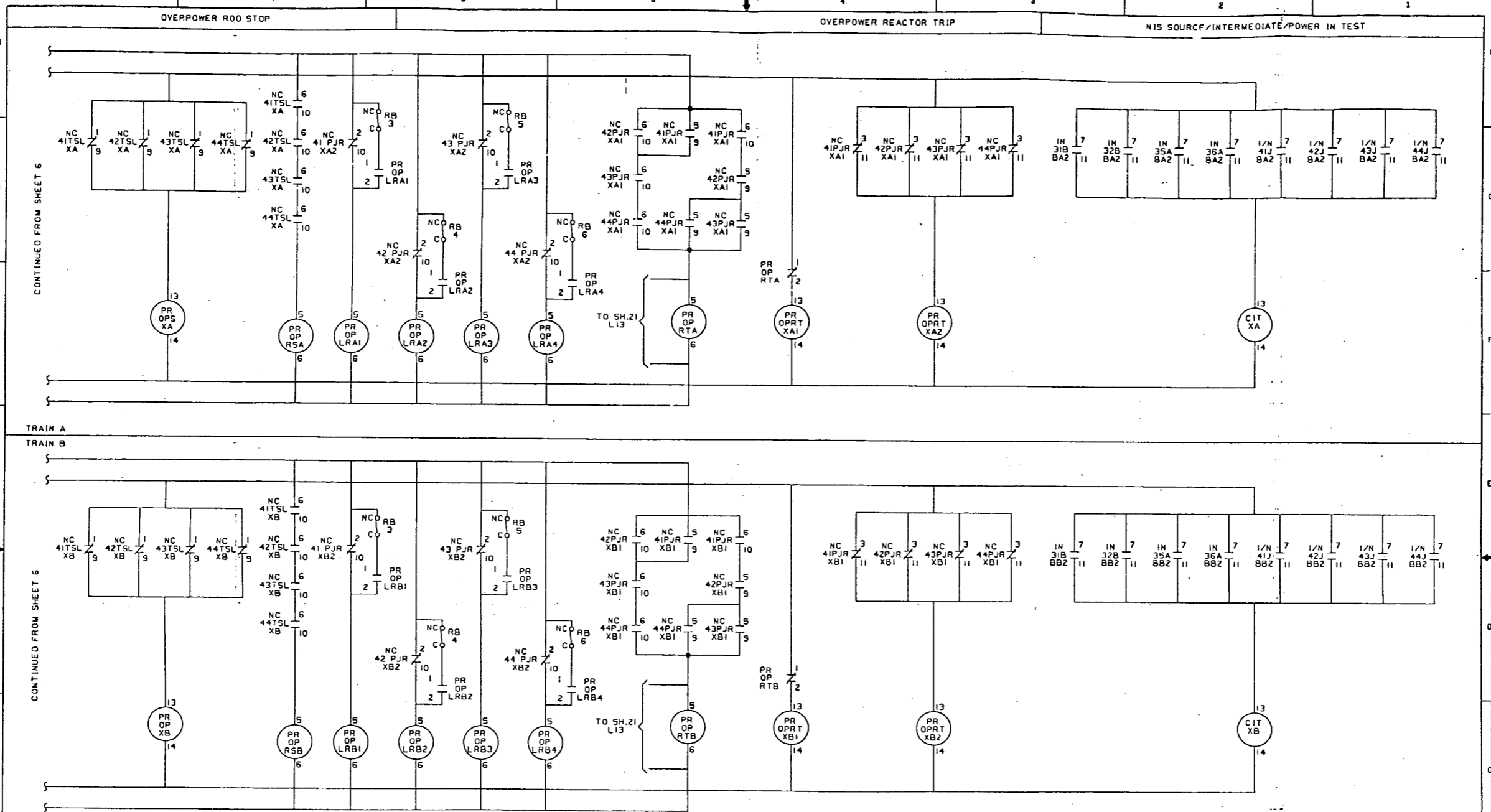
OUTPUT WIRING TRAIN A/B
 INTERACTIVE GRAPHICS
 WESTINGHOUSE ELECTRIC CORPORATION
 SAN ONOFRE UNIT I
 COINCIDENTOR LOGIC RELAY
 CONFIGURATION - WIRING DIAGRAM
 1872E50

SI APERTURE CARD

Also Available On Aperture Card

MICROFILMED FROM

890227.0311-07



CONTINUED FROM SHEET 6

CONTINUED FROM SHEET 6

This revised Vendor Document incorporates changes associated with a Design Change Package (DCP).
 DCP Number 1-3003.08J
 This Vendor Document revision does not reflect any physical plant modification and is not associated with a DCP or FCR.
 Explain change
 Reviewed by J. H. Hunt Date 5-2-88
 PP-4182 (10078) 8/82

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DATE RECEIVED 4-28-88 DOC STATUS BY Retrust
 DATE 5-2-88

Manufacturer may proceed
 Exceptions as noted. Make changes and resubmit. Manufacturer may proceed.
 Correct and resubmit.
 Information only. Distribution required.

1B10-AA086-M1094-3

RELAY MATRICES
 TRAIN A/B
 INTERACTIVE GRAPHICS
 DELC 5M00 1872E50 XXX 04 007 03 288
 Westinghouse Electric Corporation
 WATER REACTOR DIVISION - HONOLULU, HA, U.S.A.
 SAN ONOFRE UNIT 1
 COINCIDENTOR LOGIC RELAY
 CONFIGURATION - WIRING DIAGRAM
 1872E50

SOUTHERN CALIFORNIA EDISON COMPANY
 PLANT: SAN ONOFRE NUCLEAR GENERATING STATION
 UNIT: SPIN: ESELSP
 STATUS: CERTIFIED FOR CONSTRUCTION
 CERTIFICATION LTR. NO. SCE-88-594
 AUTHORITY: L. E. ELDER
 ENGR. LTR. NO. IRST-6334

1	REVISION	DATE
1	ISSUED FOR CONSTRUCTION	5-2-88

TOLERANCE & MACHINE NOTES
 UNLESS OTHERWISE SPECIFIED
 DIMENSIONS SHALL BE IN MILLIMETERS
 DECIMALS SHALL BE TO TWO PLACES
 FRACTIONS SHALL BE TO SIXTEENTHS OF AN INCH
 UNLESS OTHERWISE SPECIFIED
 DIMENSIONS SHALL BE IN MILLIMETERS
 DECIMALS SHALL BE TO TWO PLACES
 FRACTIONS SHALL BE TO SIXTEENTHS OF AN INCH
 UNLESS OTHERWISE SPECIFIED
 DIMENSIONS SHALL BE IN MILLIMETERS
 DECIMALS SHALL BE TO TWO PLACES
 FRACTIONS SHALL BE TO SIXTEENTHS OF AN INCH

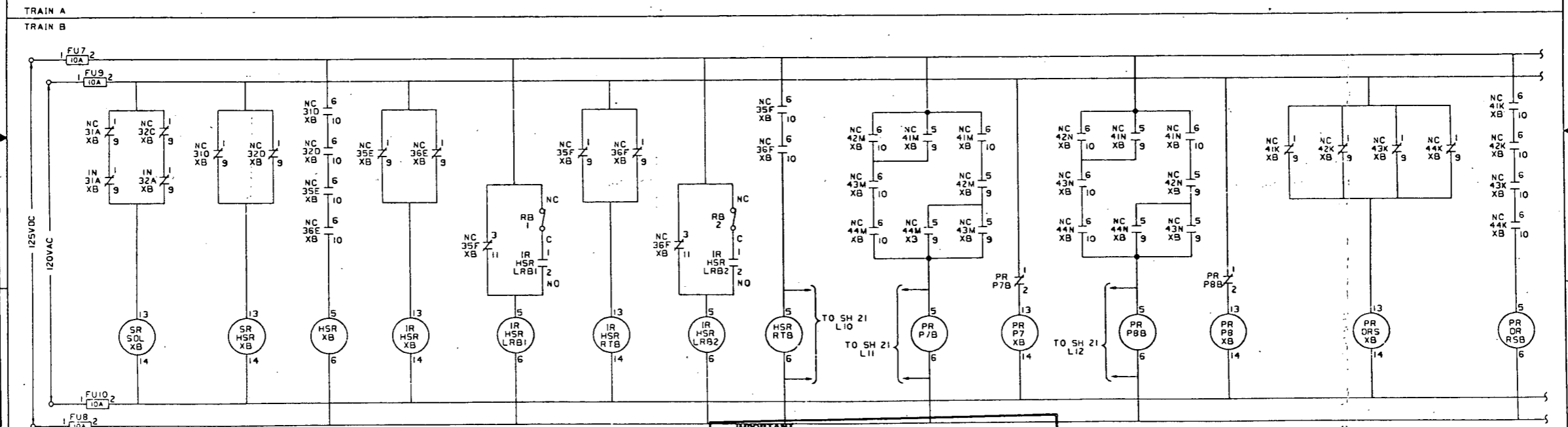
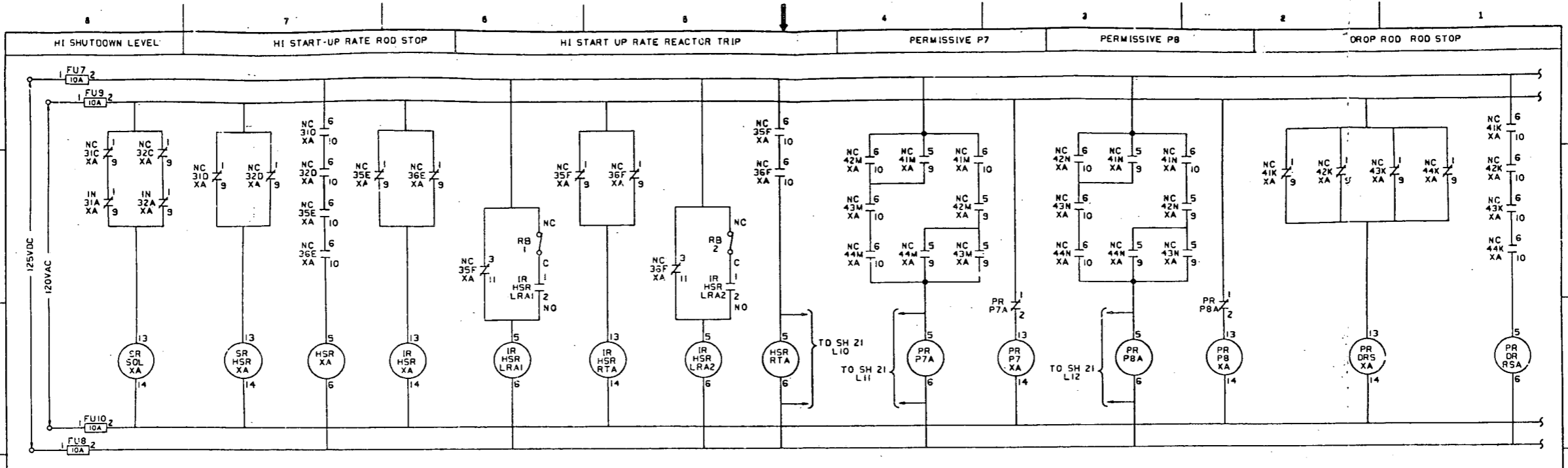
SI
 APERTURE
 CARD

Also Available On
 Aperture Card

MICROFILMED FROM

8902270311-09

17X



This revised Vendor Document incorporates changes associated with a Design Change Package (DCP).
 DCP Number: 1-3003.OBJ
 This Vendor Document revision does not reflect any physical plant modification and is not associated with a DCP or FCR.
 Explain change:
 Reviewed by: JRHunt Date: 5-2-88
 PP-6183 (100791) 7/83

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 Issuance of this document does not relieve the supplier from full responsibility for contract or purchase order requirements including, but not limited to, adequacy and suitability of materials and/or equipment represented thereon for the intended function.

DATE RECEIVED: H-27-88
 DATE: 5-2-88
 DOC STATUS BY: JRHunt
 DATE: 5-2-88
 PP-1118 7/83

1810-AA086-M1093-3

SOUTHERN CALIFORNIA EDISON COMPANY
 PLANT: SAN ONOFRE NUCLEAR GENERATING STATION
 UNIT: SPIN: ESELSP
 STATUS: CERTIFIED FOR CONSTRUCTION
 CERTIFICATION LTR. NO. SCE-88-594
 AUTHORITY: L. E. ELDER
 ENGR. LTR. NO. IRST-6334

TOLERANCE & MACHINE NOTES
 WESTINGHOUSE PROPRIETARY DATA
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RELAY MATRICES
 TRAIN A/B
 INTERACTIVE GRAPHICS
 DELC 5M00.1872E50 XXX.02.006.031288
 Westinghouse Electric Corporation
 SAN ONOFRE UNIT I
 COINCIDENTOR LOGIC RELAY
 CONFIGURATION - WIRING DIAGRAM
 1872E50

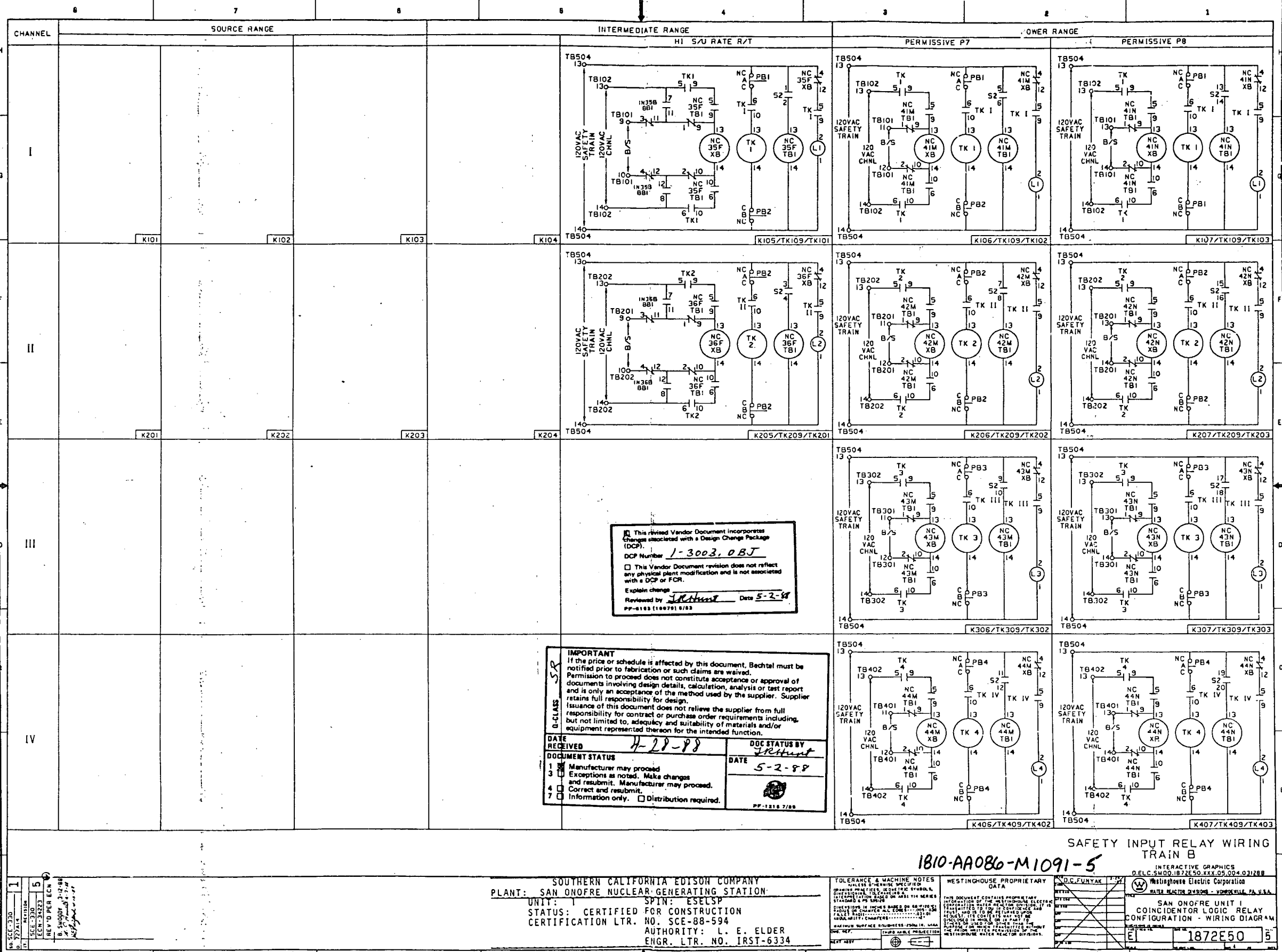
SI
 APERTURE
 CARD

Also Available On
 Aperture Card

17X

MICROFILMED FROM

8902270311-10



This revised Vendor Document incorporates changes stipulated with a Design Change Package (DCP).
 DCP Number: 1-3003, 0BJ
 This Vendor Document revision does not reflect any physical plant modification and is not associated with a DCP or FCR.
 Explain change: _____ Date: 5-2-88
 Reviewed by: [Signature]
 PP-1216 7/88

IMPORTANT
 If the price or schedule is affected by this document, Bechtel must be notified prior to fabrication or such claims are waived. Permission to proceed does not constitute acceptance or approval of documents involving design details, calculation, analysis or test report and is only an acceptance of the method used by the supplier. Supplier retains full responsibility for design.
 This document does not relieve the supplier from full responsibility for contract or purchase order requirements including, but not limited to, adequacy and suitability of materials and/or equipment represented thereon for the intended function.

DATE RECEIVED: 4-28-88 DDC STATUS BY: [Signature]
 DATE: 5-2-88

1 Manufacturer may proceed
 2 Exceptions as noted. Make changes and resubmit. Manufacturer may proceed.
 3 Correct and resubmit.
 4 Information only. Distribution required.

PP-1216 7/88

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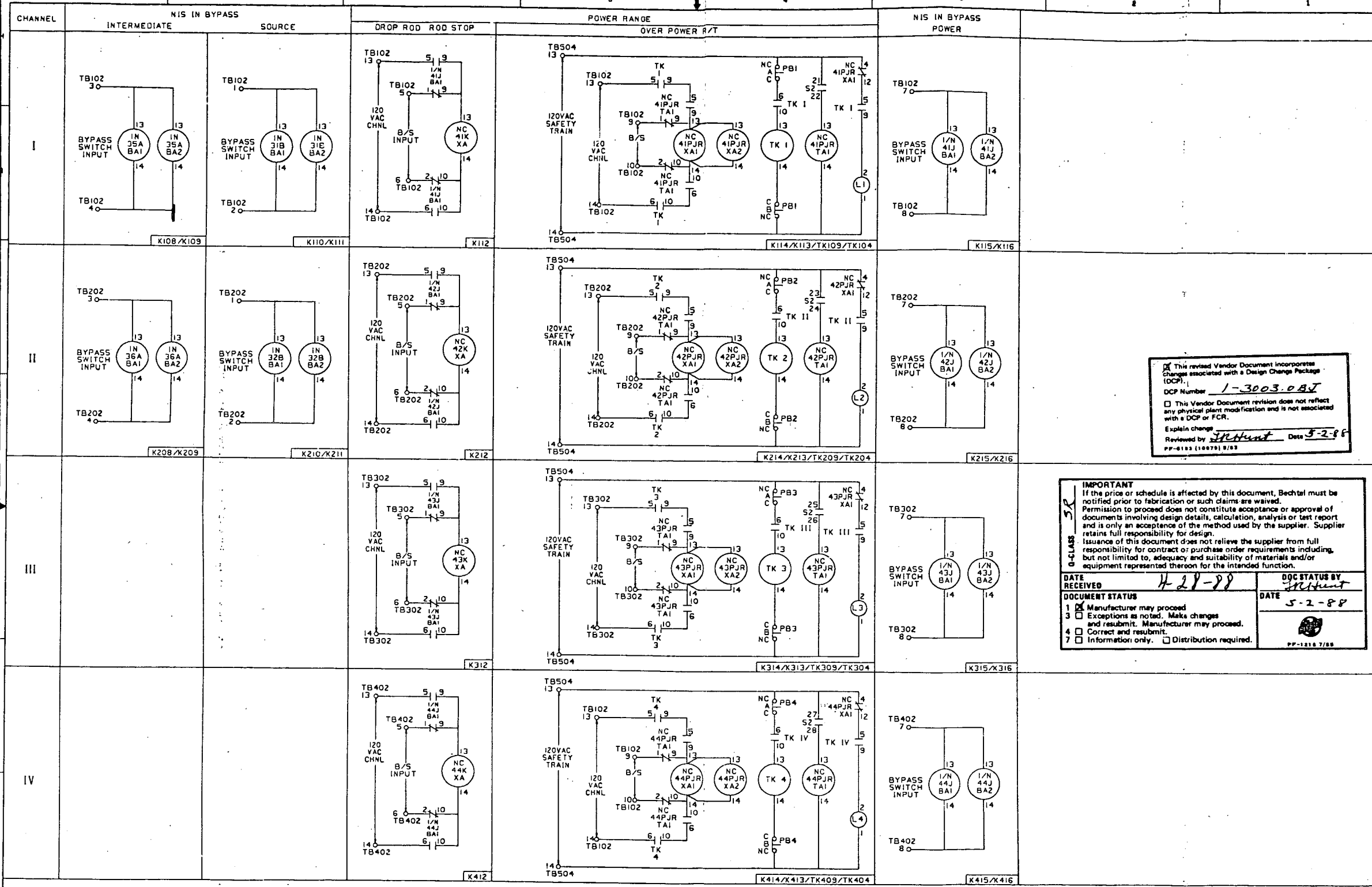
Also Available On
 Aperture Card

REV	DATE	BY	DESCRIPTION
1	07/27/84		ISSUE
2	08/21/84		REVISED PER ECR
3	08/21/84		REVISED PER ECR
4	08/21/84		REVISED PER ECR
5	08/21/84		REVISED PER ECR

SOUTHERN CALIFORNIA EDISON COMPANY
 PLANT: SAN ONOFRE NUCLEAR GENERATING STATION
 UNIT: ESELSP
 STATUS: CERTIFIED FOR CONSTRUCTION
 CERTIFICATION LTR. NO. SCE-88-594
 AUTHORITY: L. E. ELDER
 ENGR. LTR. NO. IRST-6334

TOLERANCE & MACHINE NOTES
 WESTINGHOUSE PROPRIETARY DATA
 THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF THE WESTINGHOUSE ELECTRIC CORPORATION. IT IS TO BE KEPT CONFIDENTIAL AND NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM. THIS DOCUMENT IS THE PROPERTY OF WESTINGHOUSE ELECTRIC CORPORATION AND IS TO BE RETURNED TO THE COMPANY UPON COMPLETION OF THE PROJECT FOR WHICH IT WAS PREPARED.

INTERACTIVE GRAPHICS
 DELC.SMOO.1872E50.XXX.05.004.021288
 Westinghouse Electric Corporation
 SAN ONOFRE UNIT I
 COINCIDENTOR LOGIC RELAY
 CONFIGURATION - WIRING DIAGRAM
 1872E50



This revised Vendor Document incorporates changes associated with a Design Change Package (DCP).
 DCP Number: 1-3003-087
 This Vendor Document revision does not reflect any physical plant modification and is not associated with a DCP or FCR.
 Explain change: [Signature]
 Reviewed by: [Signature] Date: 5-2-88
 PP-6183 (10879) 9/83

IMPORTANT
 If the price or schedule is affected by this document, Bechtel must be notified prior to fabrication or such claims are waived. Permission to proceed does not constitute acceptance or approval of documents involving design details, calculation, analysis or test report and is only an acceptance of the method used by the supplier. Supplier retains full responsibility for design. Issuance of this document does not relieve the supplier from full responsibility for contract or purchase order requirements including, but not limited to, adequacy and suitability of materials and/or equipment represented thereon for the intended function.

DATE RECEIVED: 4-28-88
 DOCUMENT STATUS: 1 Manufacturer may proceed
 3 Exceptions as noted. Make changes and resubmit. Manufacturer may proceed.
 4 Correct and resubmit.
 7 Information only. Distribution required.

DATE: 5-2-88
 DDC STATUS BY: [Signature]
 PP-1218 7/83

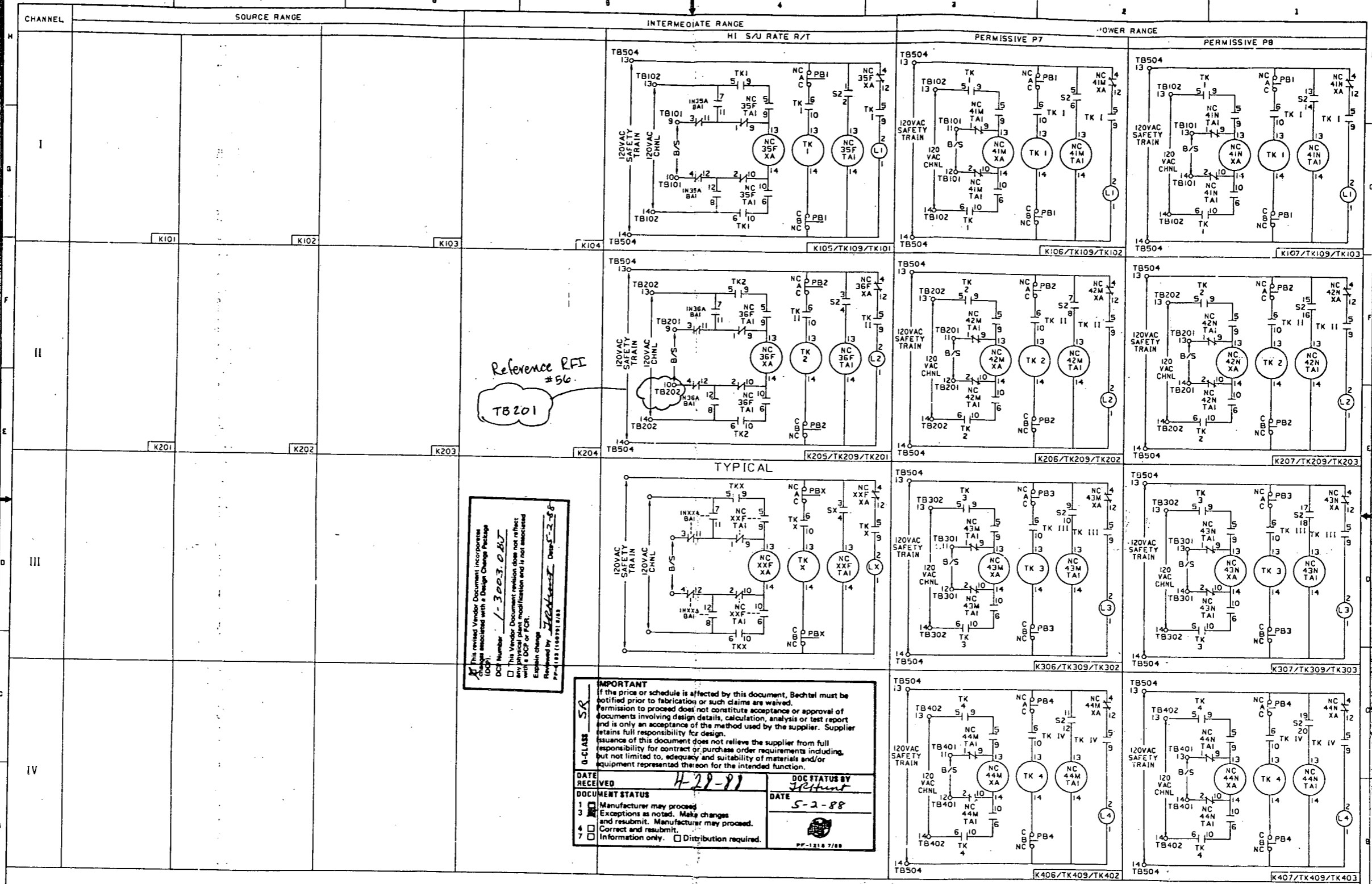
REVISED PER ECN 34223
 B. SHRODY
 10/2/88

SOUTHERN CALIFORNIA EDISON COMPANY
 PLANT: SAN ONOFRE NUCLEAR GENERATING STATION
 UNIT: 1 SPIN: ESELSP
 STATUS: CERTIFIED FOR CONSTRUCTION
 CERTIFICATION LTR. NO. SCE-88-594
 AUTHORITY: L. E. ELDER
 ENGR. LTR. NO. IRST-6334

TOLERANCE & MACHINE NOTES
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 DIMENSIONS IN BRACKETED PARENTHESIS ARE FOR INFORMATION ONLY

SAFETY INPUT RELAY WIRING TRAIN A
 1810-AA086-M1090-5
 INTERACTIVE GRAPHICS
 DELC 5400.1872E50 XXX 05.003 01/288
 Westinghouse Electric Corporation
 WESTINGHOUSE ELECTRIC CORPORATION
 PITTSBURGH, PA 15224-0001 U.S.A.
 SAN ONOFRE UNIT 1
 COINCIDENTOR LOGIC RELAY
 CONFIGURATION - WIRING DIAGRAM
 1872E50 5

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Reference RFI #56
TB201

This revised Vendor Document incorporates (DCP) associated with a Design Change Package
DCP Number: 1-3003, 0.8U
This Vendor Document revision does not reflect with a DCP or FCR.
Elastic change
Reviewed by: J. B. Johnson Date: 5-2-88
PP-1218 7/88

IMPORTANT
If the price or schedule is affected by this document, Bechtel must be notified prior to fabrication or such claims are waived. Permission to proceed does not constitute acceptance or approval of documents involving design details, calculation, analysis or test report and is only an acceptance of the method used by the supplier. Supplier retains full responsibility for design. Issuance of this document does not relieve the supplier from full responsibility for contract or purchase order requirements including, but not limited to, adequacy and suitability of materials and/or equipment represented thereon for the intended function.

DATE RECEIVED: 4-28-87
DOC STATUS BY: J. B. Johnson
DATE: 5-2-88

DOCUMENT STATUS:
 1 Manufacturer may proceed
 2 Exceptions as noted. Make changes and resubmit. Manufacturer may proceed.
 4 Correct and resubmit.
 7 Information only. Distribution required.

REVISED PER ECR
REVISED PER ECR
REVISED PER ECR

SOUTHERN CALIFORNIA EDISON COMPANY
 PLANT: SAN ONOFRE NUCLEAR GENERATING STATION
 UNIT: SPIN; ESELSP
 STATUS: CERTIFIED FOR CONSTRUCTION
 CERTIFICATION LTR. NO. SCE-88-594
 AUTHORITY: L. E. ELDER
 ENGR. LTR. NO. IRST-6334

TOLERANCE & MACHINE NOTES
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INTERACTIVE GRAPHICS
 DELC 5400.1872C30 MAX 05.002.01288
 Westinghouse Electric Corporation
 DATA REVISION: 05/08/88 - 05/08/88
 SAN ONOFRE UNIT I
 COINCIDENTOR LOGIC RELAY
 CONFIGURATION - WIRING DIAGRAM
 1872E50

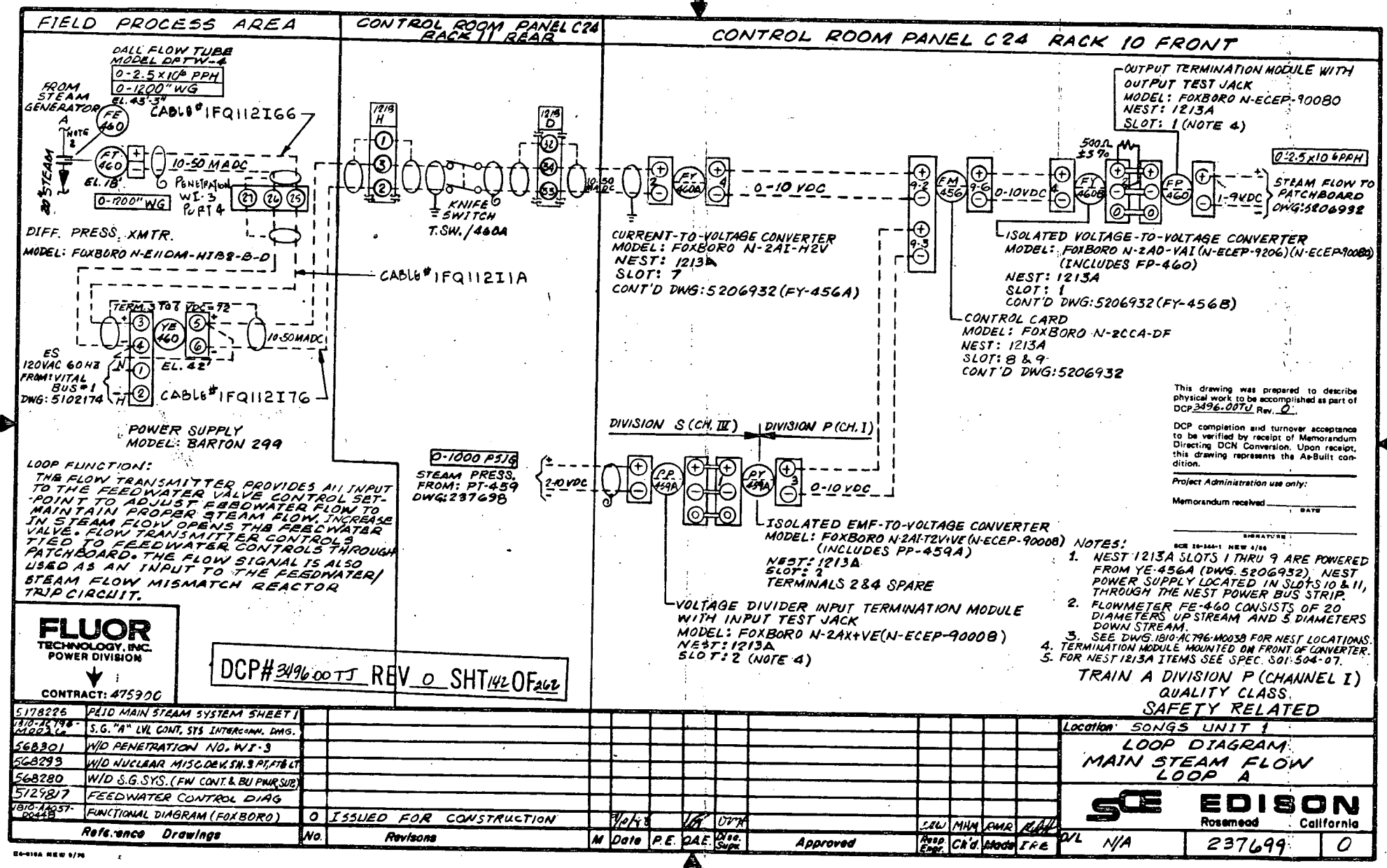
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Reference Drawings	No.	Revisions	M	Date	P.E.	DAE	Sup	Approved	CRW	MHM	EMR	REB	W/L	N/A
5178226		PLID MAIN STEAM SYSTEM SHEET I												
5178226		S.G. "A" LVL CONT. SYS INTERCOMM. DWG.												
568301		W/D PENETRATION NO. WI-3												
568293		W/D NUCLEAR MISC. DEK. SN. 3 P/F/BLT												
568280		W/D S.G. SYS. (FW CONT. & BU PWR SUB)												
5129217		FEEDWATER CONTROL DIAG												
1810-AC796-M003B		FUNCTIONAL DIAGRAM (FOXBORO)	0					ISSUED FOR CONSTRUCTION						

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INTERIM DCN NO. _____ PAGE 1 OF 3

SCE Southern California Edison Company

FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
(For SONGS 2 & 3)

FORM NO. J-2014
DOCUMENT NO. 237699 REV. NO. 0

PROJECT NO. 1-88-3496.0 R-0
DCN NO. 3496.007J
REV. NO. 0

1. ORIGINATOR: **M. GUECIA** PAR: **87362** DATE: **12-8-88**
DOCUMENT TITLE: **LOOP DIAGRAM MAIN STEAM FLOW LOOP A** DRAWING: **IC-16 SR**

DESCRIPTION OF CHANGE:
THIS FIELD REVISES THE LOOP WIRING DIAGRAM TO MAKE SHIELD GROUNDING CONSISTENT WITH RELATED DRAWINGS. THIS IS AN EDITORIAL CHANGE ONLY.

(2c) REF: RPR-1750

PE WAIVER REQUIRED YES NO
PFC REVISION REQUIRED YES NO

2. Other Affected Documents
 None
 Specific affected documents are listed on this CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document:

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3. Affected Systems **MSS**

4. SCE Design Approvals:

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/RES & L	
ENGINEER	DATE	ENGINEER	DATE
INDEPENDENT REVIEW ENGR.	DATE	INDEPENDENT REVIEW ENGR.	DATE
		<i>[Signature]</i>	12-12-88
RESPONSIBLE ENGINEER	DATE	RESPONSIBLE ENGINEER	DATE
		<i>A. K...</i>	12-16-88
LOOP OPERATIONS ENGINEER	DATE	LOOP OPERATIONS ENGINEER	DATE
		<i>[Signature]</i>	12/12/88
SUPERVISION ENGINEER	DATE	PROJECT ENGINEER	DATE
MANAGER, STATION VEGETATION	DATE	STEELWORK ENGINEER	DATE
QUALITY ASSURANCE	DATE	QUALITY ASSURANCE	DATE
		<i>[Signature]</i>	12/13/88

Conversion to DCN Date: _____

SCE PROJECT ADMINISTRATION

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FIELD INTERIM DESIGN CHANGE
 NOTICE (IDCN)/DESIGN
 CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

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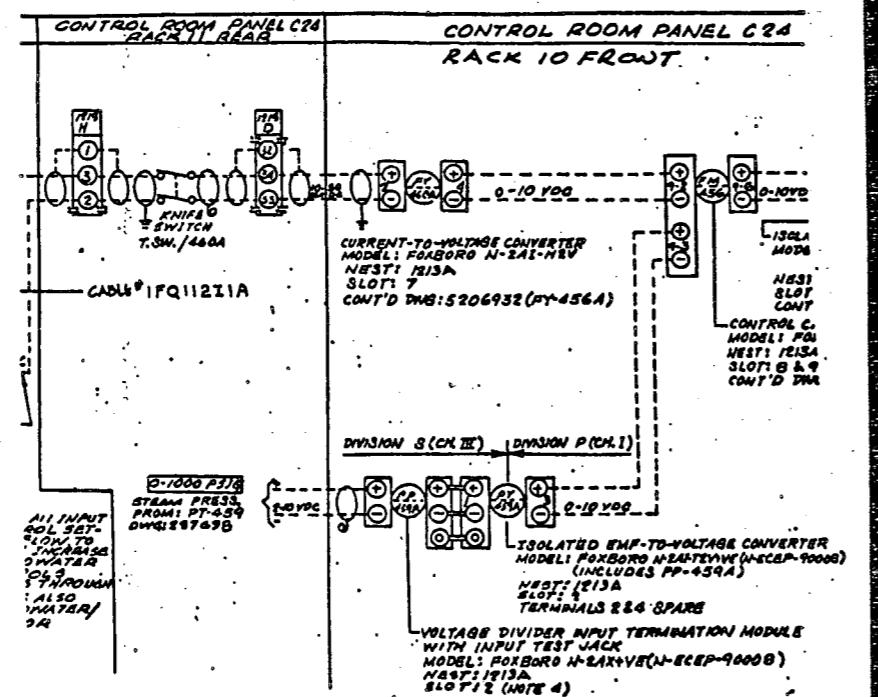
INTERIM DCN NO.

FIDCN NUMBER J-2014					
DRAWING NO.	REV. NO.	REV. DATE	REV. BY	REV. DATE	REV. BY
237699	- 0				SR

Date 12-8-88 Page 2 of 3
 By M. GUECIA

DESCRIPTION OF CHANGE

BEFORE



FIELD INTERIM DESIGN CHANGE
 NOTICE (IDCN)/DESIGN
 CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

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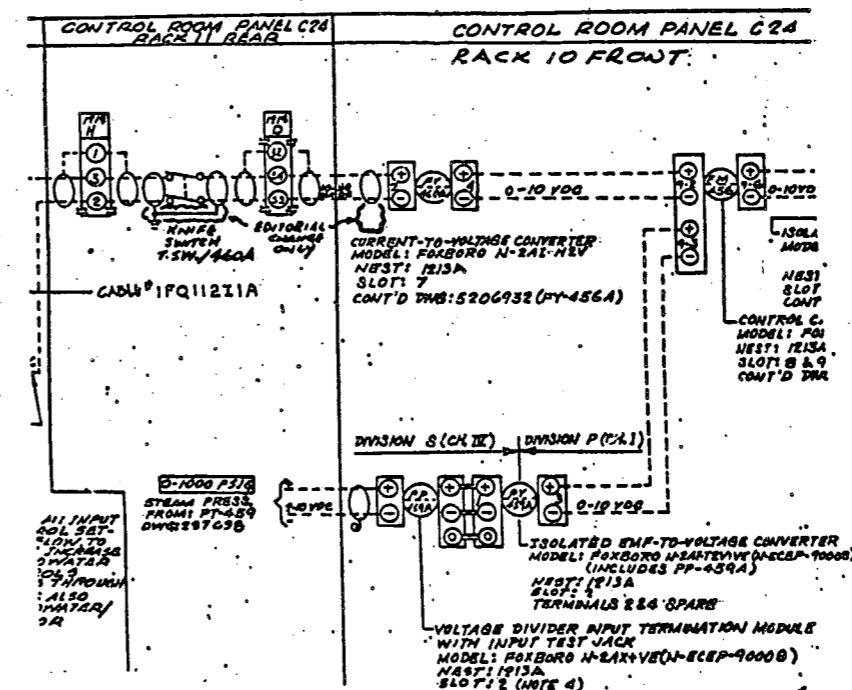
INTERIM DCN NO.

FIDCN NUMBER J-2014					
DRAWING NO.	REV. NO.	REV. DATE	REV. BY	REV. DATE	REV. BY
237699	- 0				SR

Date 12-8-88 Page 3 of 3
 By M. GUECIA

DESCRIPTION OF CHANGE

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INTERIM DCN NO. _____ PAGE 1 OF 3

SCE Southern California Edison Company

FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
(For SONGS 2 & 3)

JOB NO. **J-2015** PFA NO. **1-88-3496.0 R-0**

DOCUMENT NO. **237701** REV. NO. **0** DEP. NO. **3496.0073**

REV. NO. **0**

1. ORIGINATOR **M. GUECIA** FAX **87362** DATE **12-8-88**

DOCUMENT TYPE **LOOP DIAGRAM** DRAWING NO. **IC-16** SR

DESCRIPTION OF CHANGE **MAIN STEAM FLOW LOOP'S**

THIS FIELD REVISES THE LOOP WIRING DIAGRAM TO MAKE SHIELD GROUNDING CONSISTENT WITH RELATED DRAWINGS. THIS IS AN EDITORIAL CHANGE ONLY.

2c

PE WAIVER REQUIRED YES NO

PFC REVISION REQUIRED YES NO

REF: RPR-1750

2. Other Affected Documents

None

Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:

This DCP (Forms CC(123) 103 and CC(123) 104 attached)

This FIDC/DCN (Forms CC(123) 183 and CC(123) 184 attached)

The following document:

3. Affected Systems **MSS**

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/HES & L	
OTHER	DATE	OTHER	DATE
INDEPENDENT REVIEW ENGINEER	DATE	INDEPENDENT REVIEW ENGINEER	DATE
		<i>[Signature]</i>	12-12-88
TYPECHECK ENGINEER	DATE	TYPECHECK ENGINEER	DATE
		<i>A. Kipomuly</i>	12-12-1988
GROUP SUPERVISING ENGINEER	DATE	GROUP SUPERVISING ENGINEER	DATE
		<i>[Signature]</i>	12/12/88
INTEGRATING ENGINEER 1	DATE	INTEGRATING ENGINEER	DATE
MANAGER, STATION VEGETATION	DATE	MANAGER, STATION VEGETATION	DATE
QUALITY ASSURANCE	DATE	QUALITY ASSURANCE	DATE
		<i>[Signature]</i>	12/13/88

Conversion to DCN Date: _____

SCE 88-1704 REV 000

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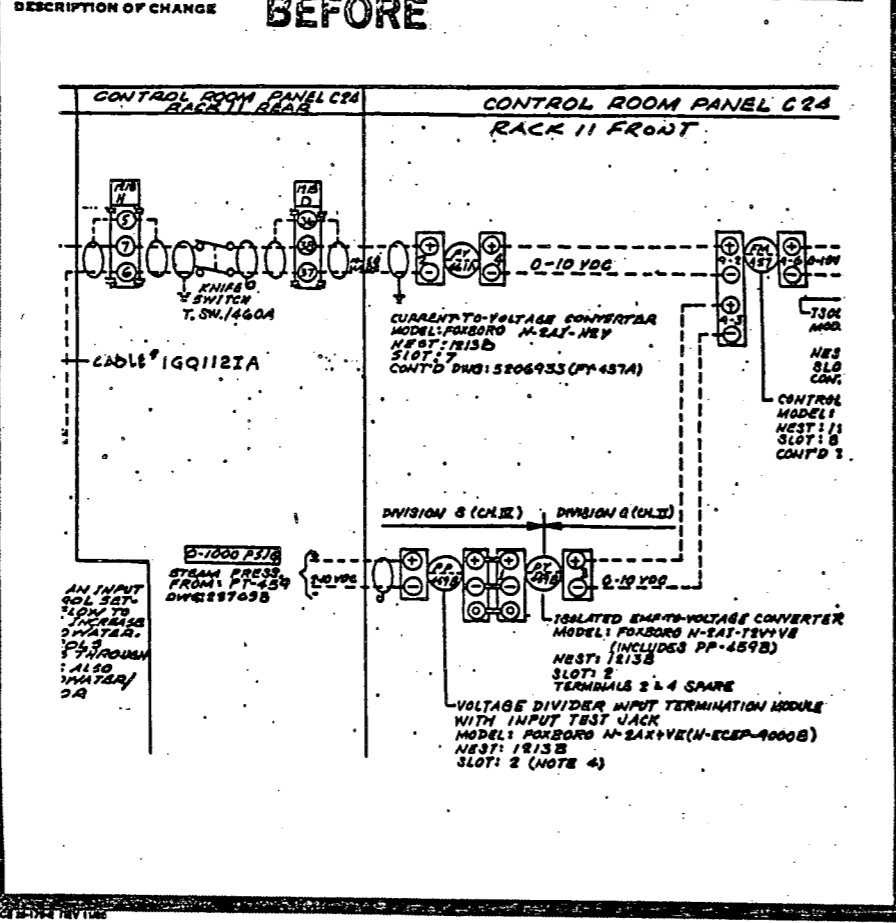
Southern California Edison Company
 FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
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INTERIM DCN NO. []

FIGCH NUMBER **J-2015**

DRAWING NO.	REV. NO.	REV. DATE	REV. DESCRIPTION		QUALITY CLASST
			DATE	BY	
237701	-	0			SR

Date **12-8-88** Page **2** of **3**
 By **M. GUECIA**



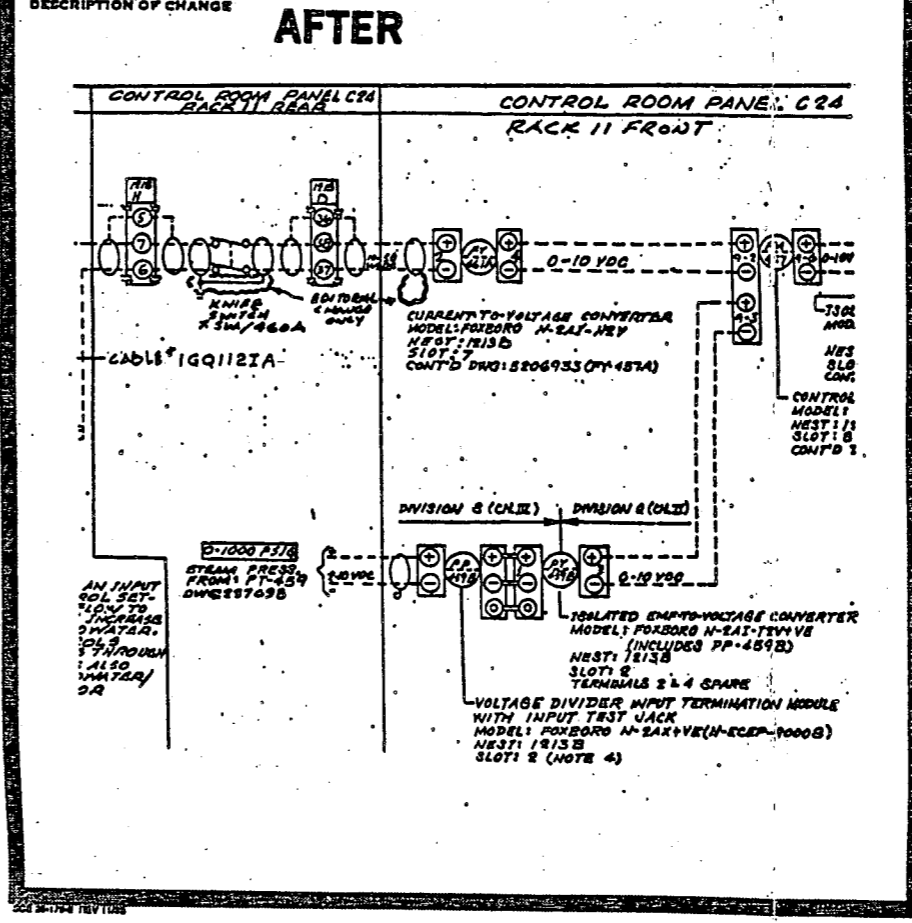
Southern California Edison Company
 FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
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INTERIM DCN NO. []

FIGCH NUMBER **J-2015**

DRAWING NO.	REV. NO.	REV. DATE	REV. DESCRIPTION		QUALITY CLASST
			DATE	BY	
237701	-	0			SR

Date **12-8-88** Page **3** of **3**
 By **M. GUECIA**



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PAGE 1 OF 2

Southern California Edison Company
FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
 (For SONGS 2.2-0)

FORM/DCN USE ONLY
 DCN NO. **J-1924**
 DOCUMENT NO. **237701-0**
 SHEET **1**

FIG. NO. **1-88-3496.00 REV 0**
 DEP. NO. **3496.00TJ**
 REV. NO. **0**
 VERSION NO.

ORIGINATOR **BURHAN AHMAD** PAR **28487** DATE **10/15/88**

DOCUMENT TITLE **LOOP DIAGRAM - MAIN STEAM FLOW - LOOP-B, IC-20** DRAWN **SR**

DESCRIPTION OF CHANGE
REVISED KNIFE SWITCH TAG NUMBER TO AGREE WITH LOOP NUMBER. (EDITORIAL ONLY)

PE WAIVER REQUIRED - NO
 PFC REVISION REQUIRED - NO

2. Other Affected Documents:
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document:

3. Affected Systems **FWS**

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/NE&L	
OTHER	DATE	OTHER	DATE
OTHER	DATE	ENGINEER	DATE
CHECKER	DATE	INDEPENDENT REVIEW ENGR.	DATE
INDEPENDENT REVIEW ENGR.	DATE	DESIGN ENGINEER	DATE
RESPONSIBLE ENGINEER	DATE	SITE/PLANT LEAD	DATE
GROUP SUPERVISING ENGINEER	DATE	DISCIPLINE SUPERVISOR	DATE
SUPERVISING ENGINEER I	DATE	PROJECT ENGINEER	DATE
MANAGER, STATION TECHNICAL	DATE	DISCIPLINE ENGR.	DATE
QUALITY ASSURANCE	DATE	BY B.A. Shukla	DATE 10/20/88

Conversion to DCN Date _____
 SEE PROJECT ADMINISTRATION

Southern California Edison Company
 Song 2.2-0

FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SUPPLEMENTAL PAGE

INTERIM DCN NO. _____

FIDCN NUMBER **J-1924**

DRAWING NO.	SHEET NO.	REV. NO.	DATE		QUALITY CHECKER
			DCN REV.	DCN NO.	
237701-0	-	0			SR

Date **10/15/88** Page **2** of **2**
 By **BURHAN AHMAD**

DESCRIPTION OF CHANGE **BEFORE**

CONTROL ROOM PANEL C24
 PAGE 11 REAR
 KNIFE SWITCH
 T.S.W.1460A

AFTER

CONTROL ROOM PANEL C24
 PAGE 11 REAR
 KNIFE SWITCH
 T.S.W.1461A

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Southern California Edison Company
Song 1-2-3

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

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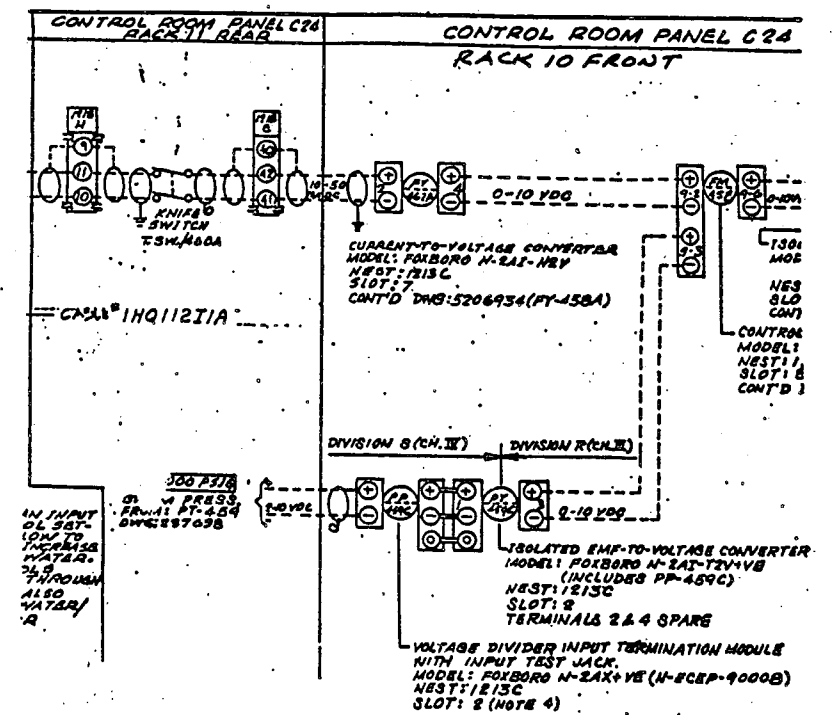
INTERIM DCN NO.

FIDCH NUMBER 7-2016					
DRAWING NO.	REV. NO.	REV. DATE	REV. BY	REV. NO.	QUANTITY
237703	-	0			SR

Date 12-8-88 Page 2 of 3
By M. GUECIA

DESCRIPTION OF CHANGE

BEFORE



Southern California Edison Company
Song 1-2-3

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

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DEC 13 1989
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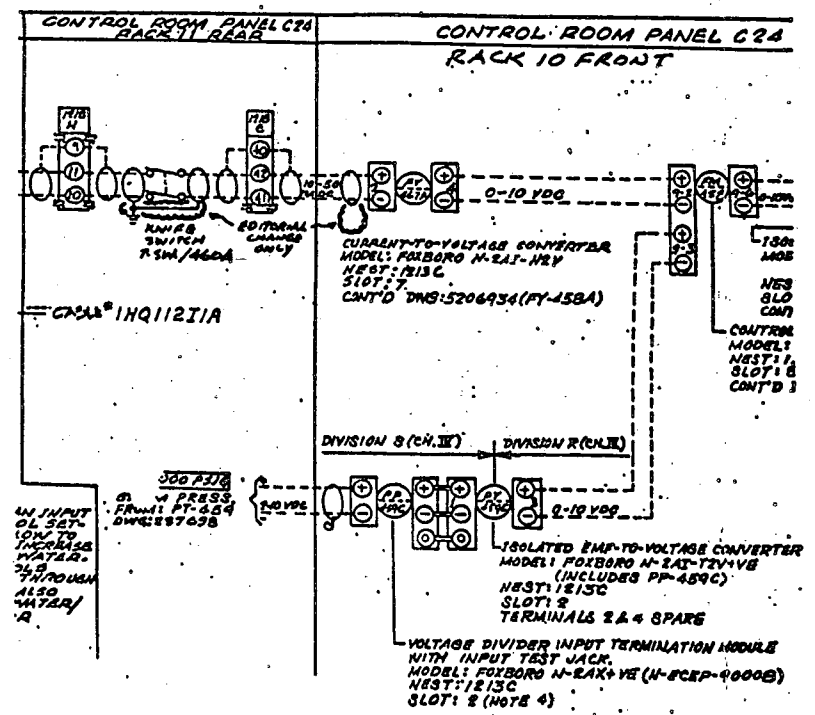
INTERIM DCN NO.

FIDCH NUMBER 7-2016					
DRAWING NO.	REV. NO.	REV. DATE	REV. BY	REV. NO.	QUANTITY
237703	-	0			SR

Date 12-8-88 Page 3 of 3
By M. GUECIA

DESCRIPTION OF CHANGE

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INTERIM DCN NO. _____ PAGE 1 OF 2

Southern California Edison Company
FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
 (For SONGS) 2.2-89

EDCN NO. **J-1922** PFC NO. **3496.00TT**
 DOCUMENT NO. **237703** REV. NO. **0**
 SHEET _____

ORIGINATOR: **BURHAN AHMAD** PAR: **28487** DATE: **10/15/88**
 SUBJECT TITLE: **LOOP DIAGRAM MAIN STEAM FLOW LOOP-C** GRADE: **IC-20** SR: **SR**

DESCRIPTION OF CHANGE:
REVISED KNIFE SWITCH TAG NUMBER TO AGREE WITH THE INSTRUMENT LOOP NUMBER. (EDITORIAL ONLY)

PE WAIVER REQUIRED - **NO**
 PFC REVISION REQUIRED - **NO**

2. Other Affected Documents
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document:

3. Affected Systems **FWS.**

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/NE&L	
OTHER	DATE	OTHER	DATE
CHECKER	DATE	CHECKER	DATE
INDEPENDENT REVIEW ENGR.	DATE	INDEPENDENT REVIEW ENGR.	DATE
RESPONSIBLE ENGINEER	DATE	RESPONSIBLE ENGINEER	DATE
GROUP SUPERVISING ENGINEER	DATE	DISCIPLINE SUPERVISOR	DATE
SUPERVISING ENGINEER	DATE	PROJECT ENGINEER	DATE
MANAGER, STATION TECHNICAL	DATE	DISCIPLINE CHIEF	DATE
QUALITY ASSURANCE	DATE	QUALITY ASSURANCE	DATE

Conversion to DCN Date _____

SCS 10-1794 REV 8/90 SCE PROJECT ADMINISTRATION

Southern California Edison Company
FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

INTERIM DCN NO. _____

EDCN NUMBER **J-1922**

DRAWING NO.	SHEET NO.	REV. NO.	DATE		DCN NO.	"DCN"
			EDN REV.	DCN NO.		
237703	-	0				SR

Date **10/15/88** Page **2** of **2**
 By **BURHAN AHMAD**

DESCRIPTION OF CHANGE **BEFORE**

CONTROL ROOM PANEL C28
BACK 11 REAR

AFTER

CONTROL ROOM PANEL C28
BACK 11 REAR

RECEIVED CDM
 OCT 21 1988
 SITE FILE COPY

RECEIVED CDM
 OCT 21 1988
 SITE FILE COPY

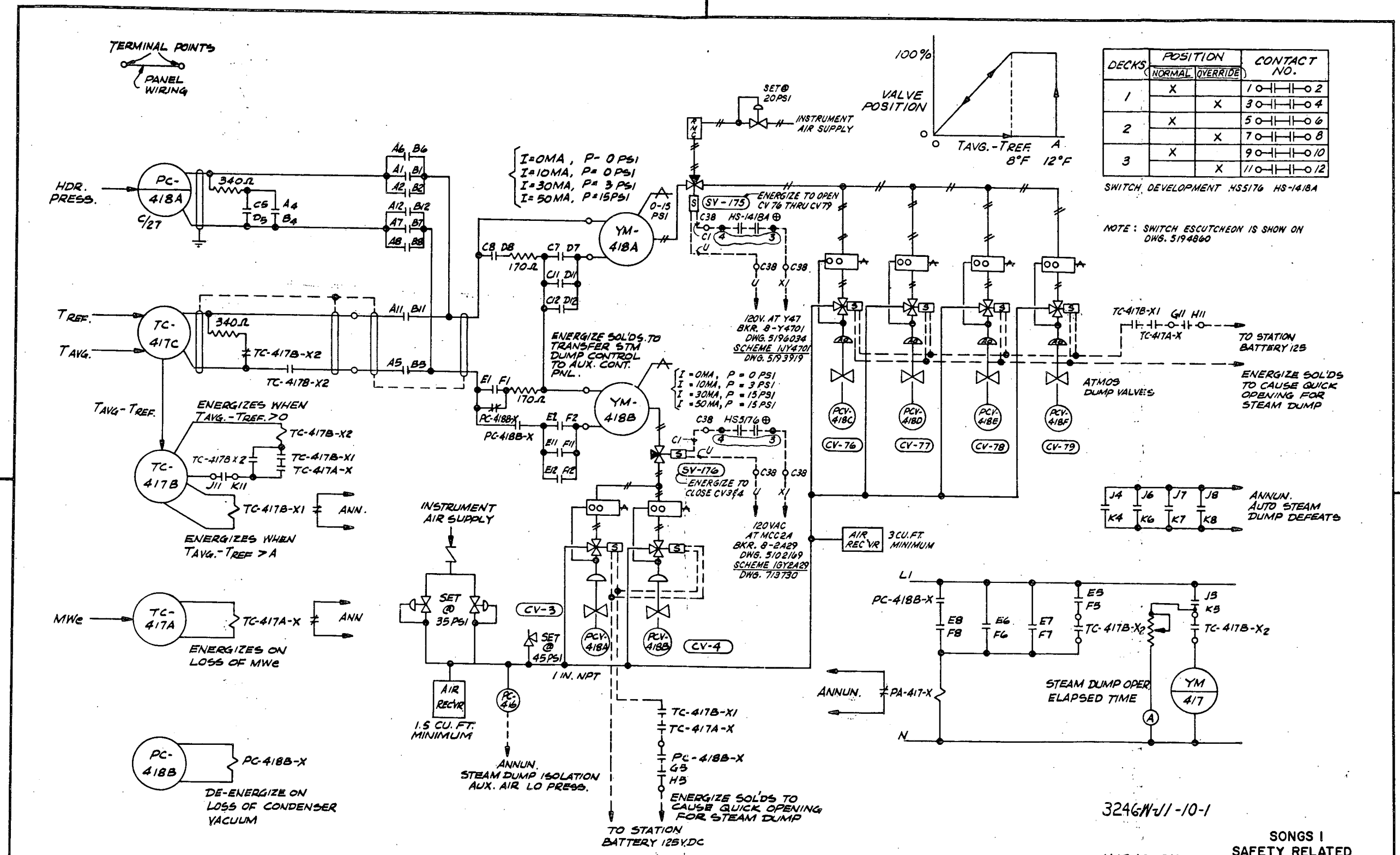
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DECKS	POSITION		CONTACT NO.
	NORMAL	OVERRIDE	
1	X		10-1-02
		X	30-1-04
2	X		50-1-06
		X	70-1-08
3	X		90-1-10
		X	110-1-12

SWITCH DEVELOPMENT H55176 HS-1418A
 NOTE: SWITCH ESCUTCHEON IS SHOWN ON DWG. 5194860

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 Also Available On Aperture Card

3246W-11-10-1

SONGS I SAFETY RELATED AS NOTED ⊕
 N1543 SH. 25B
 Location SAN ONOFRE NUCLEAR GEN. STATION
ELEMENTARY DIAGRAM MAIN STEAM DUMP TO COND. & ATMOSPHERE
 Southern California Edison Company SCE

No.	Revisions	Date	Approved	O.K.	O.K.	Cl'd.	Made	J.O.No.	Scale	Date	Approved	O.K.	O.K.	Cl'd.	Made	J.O.No.
4	REC REV. REVISED TITLE	11-10-77														
3	REC. REV. - ADDED STA. FILE NO.	9-15-77														
2	RECORD REVISION	9-5-75														
1	RECORD REVISION	8-8-75														
0	RECORD ASSIGNED SCE FILING NUMBER	11-12-74														

8902270311-27

455116-7

DWG. LIST M-25234 SH. 44A

SDCS

E

INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (Per SDMS 0.8 & 3)

Southern California Edison Company
 INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
 Form No. 1-2215-001E
 5-3
 5102173
 22
 23
 SA
 DATE: 9/14/89
 BY: T. HONG

PROJECT: ONE LINE CAGRAM 25.2KVI DC SYSTEM 1
 SHEET NO. 17-3337
 DATE: 9/14/89
 SA

ADVISE POWER SUPPLY TO BATTERY CHARGER 0 FROM SHEET 2 TO SHEET 1.

1. DESIGN CALCULATION/REGISTRATION NUMBER: 1/1

2. Other Affected Documents

3. Affected Systems: E/E

4. SCE Design Approval

5. APPROVED BY: [Signature]

6. SCE Design Approval

7. APPROVED BY: [Signature]

8. APPROVED BY: [Signature]

9. APPROVED BY: [Signature]

10. APPROVED BY: [Signature]

11. APPROVED BY: [Signature]

12. APPROVED BY: [Signature]

13. APPROVED BY: [Signature]

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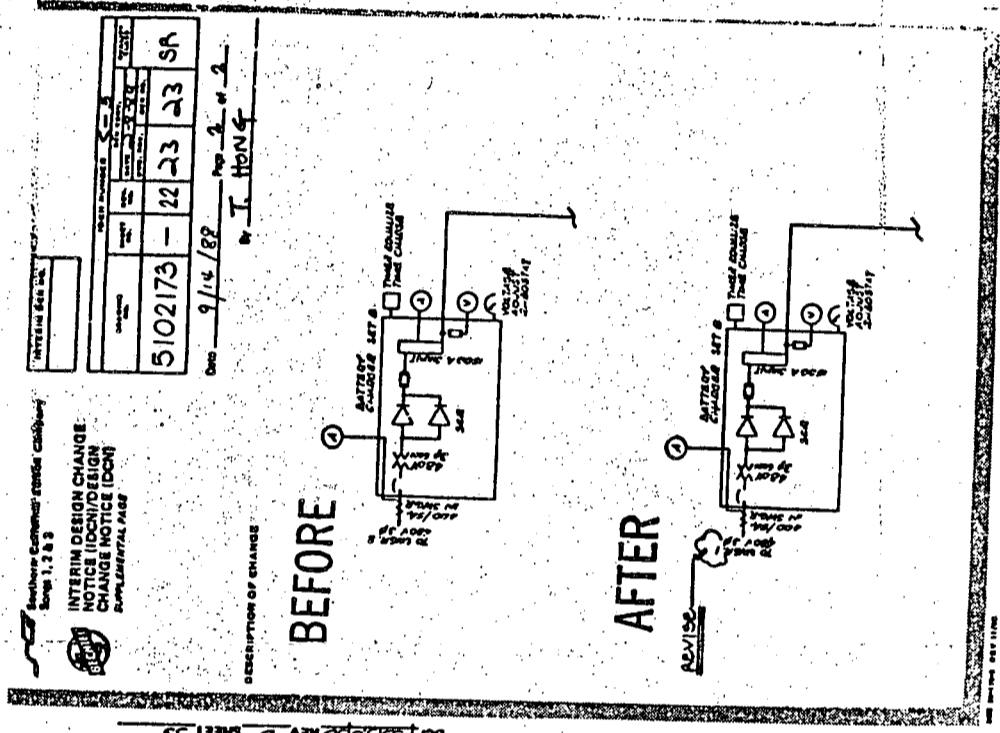
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Conversion to DCN Date: 2-8-89

DCP-5515.07E REV 0 SHEET 52



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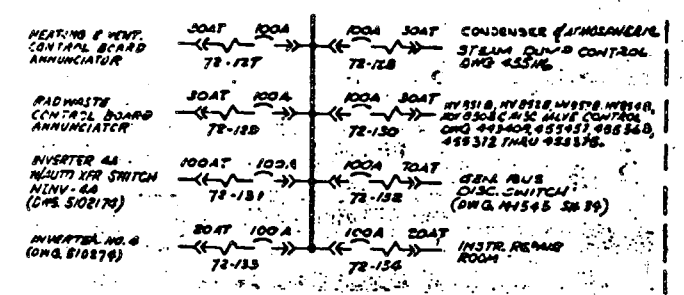
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FLUOR ENGINEERS, INC. POWER DIVISION		INTERIM DCN NO. PFC NO. 1-88-3501.02	
INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3		DCN NO./REV. NO. 3501.02TJ/0 DCN CONVERSION NO.	
CDM/DDC USE ONLY CIG		IDCN NO. S-4 DOCUMENT NO. 8102173 - 22 Page 1 of 2	
1. Originator W. FRENCH		Tel (914) 975-2230 Date 9-27-88	
Document Title ONE LINE DIAGRAM 12.5 VOLT D.C. SYSTEM I		DRADM I.D. CC E-06 SR	
DESCRIPTION OF CHANGE EDITORIAL ONLY ADD SH. 1 TO DRAWING 449408 REF.			
DCP#3501.02TJ REV 0 SHT 1 OF 295			
2. Other Affected Documents	3. Affected Systems	4. Design Approvals	
NONE	FWS	CHECKER <i>[Signature]</i> DATE 9/20/88 INDEPENDENT REVIEWER <i>[Signature]</i> DATE 10/20/88 RESPONSIBLE ENGINEER <i>[Signature]</i> DATE 10/23/88 LEAD DESIGNER/ENGINEER <i>[Signature]</i> DATE 10/23/88 OTHER <i>[Signature]</i> DATE 10-24-88 OTHER <i>[Signature]</i> DATE	
5. SCE/Contractor Project Administration			
Conversion to DCN Date _____ <small>SCE/CONTRACTOR PROJECT ADMINISTRATION</small>			

FLUOR ENGINEERS, INC.
POWER DIVISION
 INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
 SONGS 1, 2 & 3
 SUPPLEMENTAL PAGE

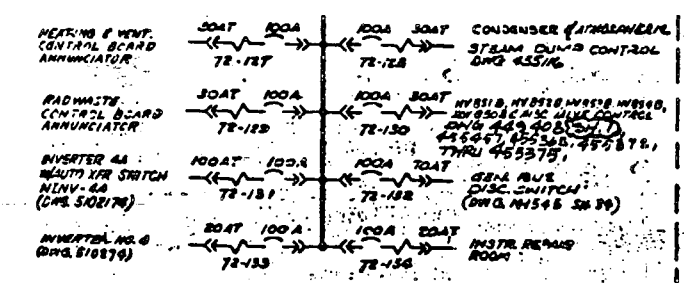
INTERIM DCN NO.				
IDCN NUMBER S-4				
DRAWING NO.	SHEET NO.	REV. NO.	DCN CONV. DATE	QUALITY CLASS
8102173	-	22		SR
Date 9-27-88 Page 2 of 2				
By W. FRENCH				

DESCRIPTION OF CHANGE **BEFORE**



DCP#3501.02TJ REV 0 SHT 1 OF 295

AFTER



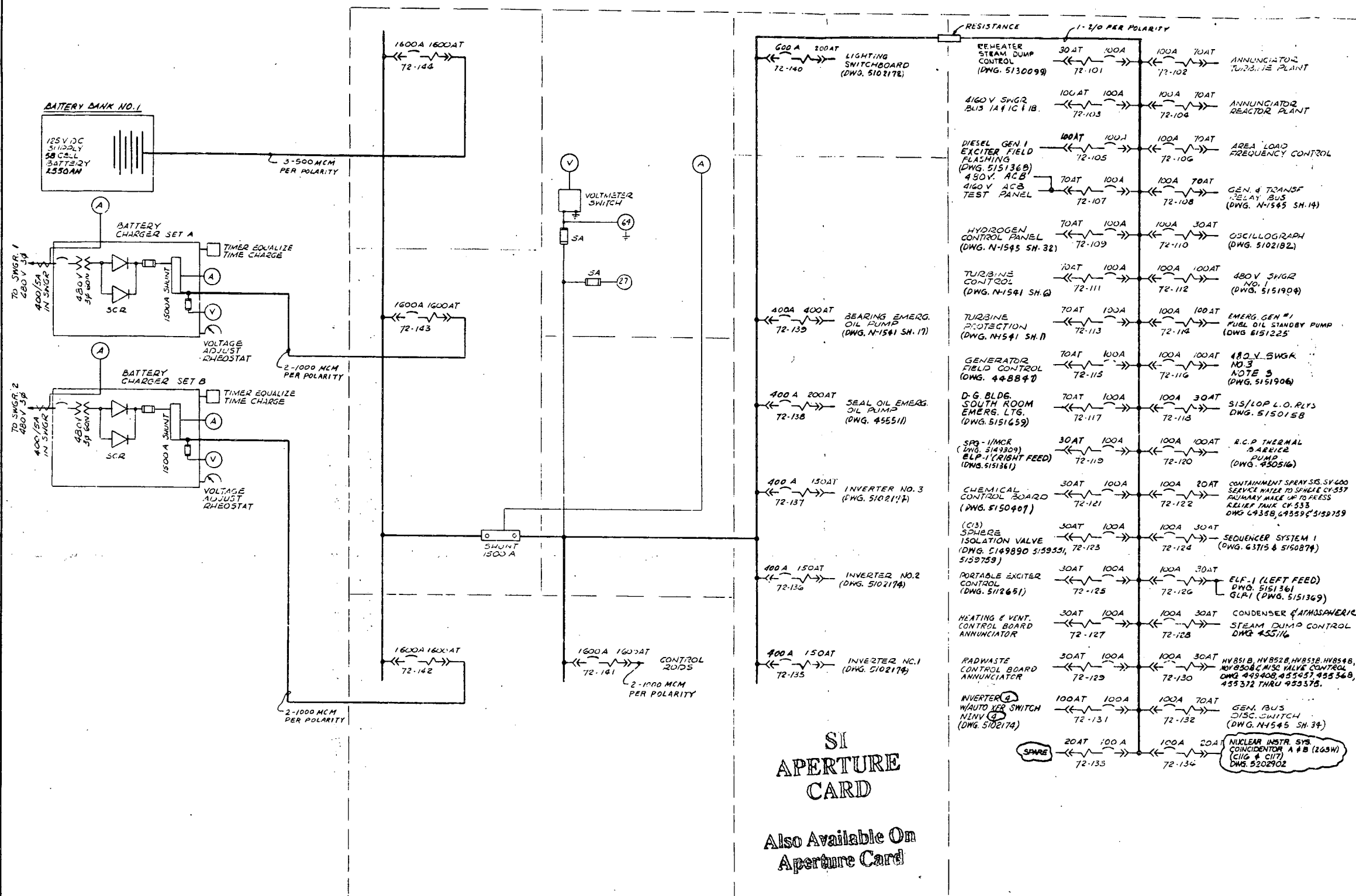
SI APERTURE CARD

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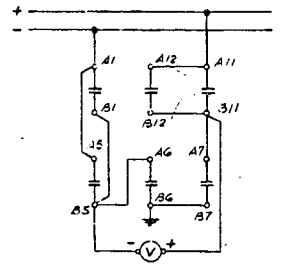


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CONTACT	POSITION		
	OFF	1	2
A11-B11	X		
A12-B12		X	
A1-B1			X
A5-B5	X		
A6-B6		X	
A7-B7			X

VOLTMETER
POS TO GND
BATT - NEG TO GND
OFF - GND
WESTINGHOUSE

TYPE W-2
ROUND FIXED HANDLE
SWITCH 5# S05A22G05



- LEGEND
- AIR CIRCUIT BREAKER WITH THERMAL-MAGNETIC TRIP
 - DC INSTRUMENT SHUNT
 - AMMETER
 - VOLTMETER
 - RELAY (SEE DEVICE NO INSIDE CIRCLE FOR RELAY FUNCTION)
 - ACB AMP TRIP
 - FUSE

DEVICE NO.	DESCRIPTION	MFG. & TYPE	FUNCTION
64	DC GROUND RELAY	GUMDIAN ELECT. VM 3407-1D	ALARM
72	DC LINE CIRCUIT BREAKERS		
27	UNDERVOLTAGE RELAY	STRUTHER DUNN	ALARM
27F	DC FEEDER UNDERVOLTAGE RELAY	STRUTHER DUNN 210X8XP	ALARM

- NOTES:
- D.C. FEEDER UNDERVOLTAGE RELAY (27F) PROVIDES AN ALARM FOR ITS PROTECTIVE BREAKER ON TRIP POSITION. BREAKERS MARKED WITH AN ASTERISK DO NOT HAVE UNDERVOLTAGE RELAY.
 - CIRCUIT BREAKERS CARRYING INPUT POWER FROM BATTERY AND CHARGER DO NOT HAVE UNDERVOLTAGE RELAYS.
 - 480V SWGR 3 D.C. CONTROL POWER IS SERVED FROM EITHER 125V D.C. SYSTEM 1 OR 2 THROUGH AN INTERLOCKING DEVICE TO AVOID BOTH D.C. SYSTEMS BEING PARALLELED.

890227031I-30

BECHTEL CORPORATION
ENGINEERS & CONSTRUCTORS
LOS ANGELES, CALIF.

NO.	DATE	APPROVED
3246	6.18.65	[Signature]

NO.	DATE	APPROVED	DESCRIPTION
21	AS BUILT - INCORP DCN 19 & 20		
20	AS BUILT - INCORP DCN 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100		

NO.	DATE	APPROVED	DESCRIPTION
22	AS BUILT BY FLUOR, INC DCN 21 (AB-7602)		

NO.	DATE	APPROVED	DESCRIPTION
23	AS BUILT BY FLUOR, INC DCN 21 (AB-7602)		

SUNGS I
SAFETY RELATED
ONE LINE DIAGRAM
125 VOLT D.C. SYSTEM I
SOUTHERN CALIFORNIA EDISON COMPANY
SCALE: N=1/8" = 1'-0"
LOS ANGELES, CALIF.

E17 N-1540 SH.17 5102173-23

INTERIM DCN NO. _____ PAGE 1 OF 4

Southern California Edison Company
FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
 (For Songas) 2.8-87

PROJECT NO. 1-88-3344
 DRAWING NO. E-7302
 SHEET NO. 5102174
 REV. NO. 40

ORIGINATOR R. ABADA DATE 1-10-89
 REVIEWER Vital Bus One Line Diagram DATE 1-10-89
 DESCRIPTION OF CHANGE Replacing Steam Generator Line Indicators From Lightning Surge To Line Losses

RECEIVED CDN JAN 22 1989 SITE FILE COPY

1. Other Affected Documents

None
 Specific affected documents are listed on the CCI(123) 184 associated with the source document checked below:
 This DCP (Forms CCI(123) 183 and CCI(123) 184 attached)
 This FIDCN/DCN (Forms CCI(123) 183 and CCI(123) 184 attached)
 The following document: FIDCN M-6502

2. Affected Systems MES

4. SCE Design Approvals

ENGINEERING AND CONSTRUCTION DEPARTMENT/NESS L	DATE
James M. Edg	1-19-89
John M. Edg	1-12-89
John M. Edg	1-12-89
John M. Edg	1-12-89
John M. Edg	1-17-89
John M. Edg	1-17-89
John M. Edg	1-17-89
John M. Edg	1-17-89
John M. Edg	1-17-89
John M. Edg	1-17-89

Conversion to DCN Date: _____

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Southern California Edison Company
FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

BEFORE

DESCRIPTION OF CHANGE

Y1101 PRESSURIZER INST. RACK R3 & R4 (C29)
 Y1103 REACT. CONT. & PROT. SYS. RACK R1 & R2
 Y1102 SYSTEM PRESS. RECORDER (C12)

100A MAIN ACB
 2A)
 8-1101V 8-1102V
 8-1101V 8-1102V
 8-1101V 8-1102V
 VITAL BUS #1

SPURIES FIRE LOOP SPRAY VALVE CM-78
 COOL DRG 455645
 SYSTEM PRESS. RECORDER (C12)

100A MAIN ACB
 2P)
 8-1201V 8-1202V
 VITAL BUS #2

Y1201 PRESSURIZER INST. RACK R3 & R4 (C29)
 Y1202 SYSTEM PRESS. RECORDER (C12)

TO RECORDERS NLR1200-1 (C07) TEMP FEED TO FT.2004A,B & C
 R-204 & NLR-1200-2 (C03)
 DRG N1542 SH 98
 DRG 5159563

DATE 1-12-89 Page 2 of 4
 By ROY ABADA

DATE	BY	REVISION
5102174	-	40
		SR
		BA

FIDCN NUMBER E-7302

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Southern California Edison Company
 FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SUPPLEMENTAL PAGE

INTERIM DCN NO. _____

FIGEN NUMBER B-7502

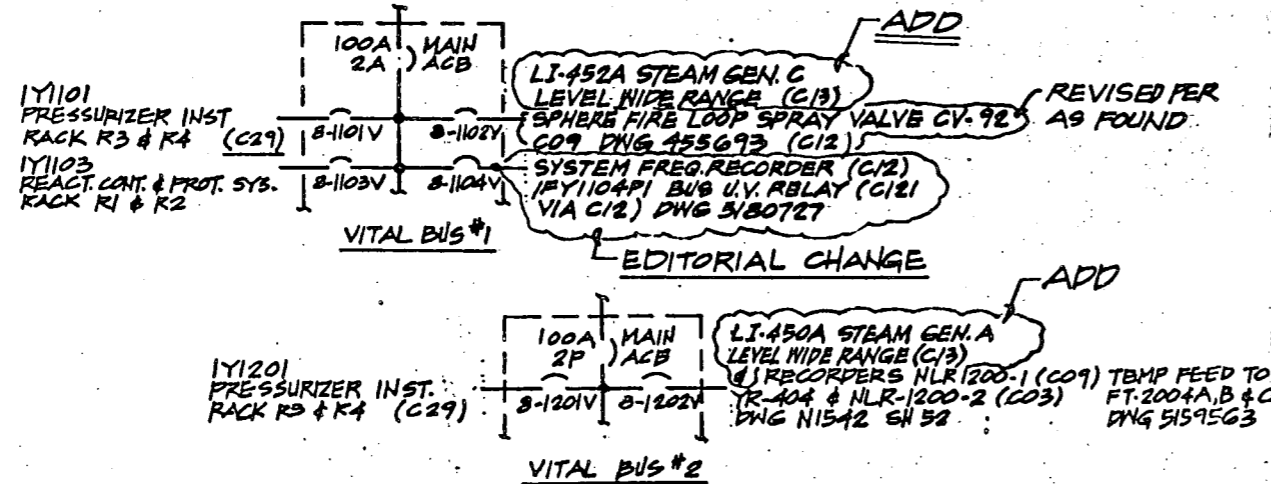
DRAWING NO.	SHEET NO.	REV. NO.	DATE	BY	CHKD.	QUALITY CLERK
5102174	-	40				SR EAN

Date 1-12-89 Page 3 of 4
 By ROY ABADA

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 JAN 22 1989
 SITE FILE COPY

AFTER

DESCRIPTION OF CHANGE



Southern California Edison Company
 FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SUPPLEMENTAL PAGE

INTERIM DCN NO. _____

FIGEN NUMBER B-7502

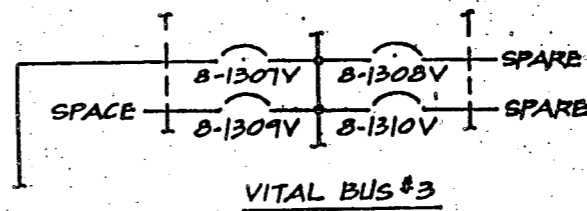
DRAWING NO.	SHEET NO.	REV. NO.	DATE	BY	CHKD.	QUALITY CLERK
5102174	-	40				SR EAN

Date 1-12-89 Page 4 of 4
 By ROY ABADA

RECEIVED COPY
 JAN 22 1989
 SITE FILE COPY

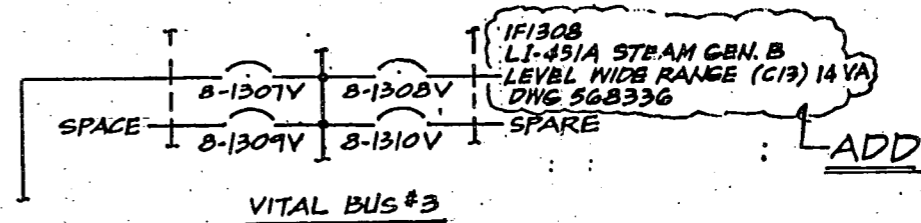
BEFORE

DESCRIPTION OF CHANGE



SI APERTURE CARD
 Also Available On Aperture Card

AFTER



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INTERIM DCN NO. _____ PAGE 1 of 2

Southern California Edison Company

FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
(For SONGS 1, 2 & 3)

DCN/DCN NO. ONLY: **E-6834** FIDCN NO.: **1-88-3003.0**

PROJECT: **5102174** REV. NO.: **40** SUPP. NO.: **1-3003, 08J**

ORIGINATOR: **B. N. CASTRO (BLEC)** DATE: **10-25-88**

DESCRIPTION OF CHANGE: **O/L DIAG. 120V. AC SYSTEM** **8-86** **GREEN**

- PROVIDE POWER SUPPLY TO AXIAL OFFSET CALCULATOR, NY1210 AT. C37.

RECEIVED CDM NOV 17 1988 SITE FILE COPY

PE Waiver Required Yes No
PE Approval: *[Signature]*

PFC Change Required Yes No
PFC Reference: **1-88-3003.0**

- SEE SUPPLEMENTAL PAGE -

REF - RPR NO. 1704

2. Other Affected Documents
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached) FIDCN# E-6891 THRU E-6899.
 The following document:

3. Affected Systems: **NIS**

4. Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/NER&L	
DATE	DATE	DATE	DATE
DESIGNED		DESIGNED	11/9/88
CHANGED		CHANGED	11/9/88
INDEPENDENT REVIEW ENGINEER		INDEPENDENT REVIEW ENGINEER	11-1-88
RESPONSIBLE ENGINEER	<i>[Signature]</i> 11/9/88	RESPONSIBLE ENGINEER	10-27-88
GROUP SUPERVISOR	<i>[Signature]</i> 11-10-88	GROUP SUPERVISOR	11/2/88
INTEGRATION ENGINEER		INTEGRATION ENGINEER	11-1-88
NUCLEAR SYSTEM TECHNICAL	<i>[Signature]</i> 11/9/88	NUCLEAR SYSTEM TECHNICAL	11/8/88
QUALITY ASSURANCE		QUALITY ASSURANCE	11/8/88

Conversion to DCN Date: _____

INTERIM DCN NO. _____

Southern California Edison Company
Songs 1, 2 & 3

FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

FIDCN NO.: **E-6834**

DRAWING NO.	QWRY NO.	REV. NO.	DATE	REV. DATE	REV. NO.	QUALITY CLASS
5102174	-	40				SR EAN

Date: **10-25-88** Page **2** of **2**
By: **B. N. CASTRO**

DESCRIPTION OF CHANGE

BEFORE

1Y14R10
ROD DEVIATION RACK (C36)

8-14R10

REG. BUS #4

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AFTER

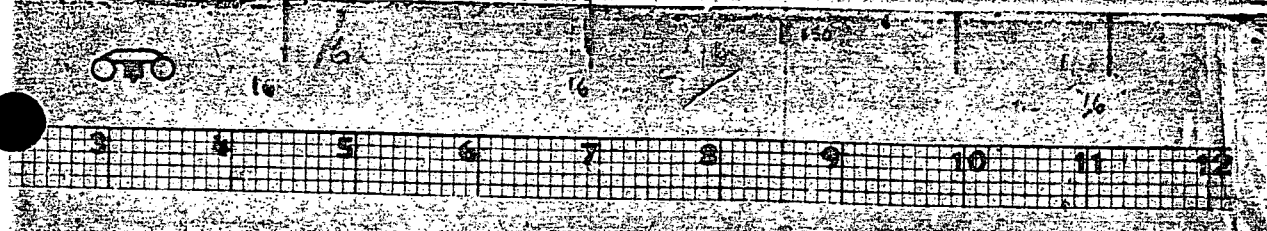
1Y14R10
ROD DEVIATION RACK (C36) &
AXIAL OFFSET CALCULATOR, NY1210
AT C37 VIA C36.

8-14R10

REG. BUS #4

ADD

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FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3	CDM/DDC USE ONLY CIG	PFC NO. 1-88-3501.02
	IDCN NO. 5-10	DCP NO./REV. NO. 3501.02TJ/0
	DOCUMENT B102174 - 40	DCN CONVERSION NO.
	Page 1 of 2	
1. Originator W. FRENCH		Tel: (914) 915-2230 Date 9-27-88
Document Title 2B LINE DIAGRAM 120V. AC SYSTEM		DRADM I.D. E-06 QC SPEAN
DESCRIPTION OF CHANGE EDITORIAL ONLY ADD SH. 1 TO DRAWING 449408 REF. SHT. 1. REF		
DCP#3501.02TJ REV 0 SHT 00 OF 295		
2. Other Affected Documents NONE	3. Affected Systems FWS	4. Design Approvals
		CHECKED: <i>[Signature]</i> DATE: 9/28/88 INTERIM DESIGN CHANGE NOTICE (IDCN) DATE: 10/20/88 RESPONSIBLE ENGINEER: <i>[Signature]</i> DATE: 10/20/88 LEAD DESIGN ENGINEER: <i>[Signature]</i> DATE: 10/29/88 OTHER: <i>[Signature]</i> DATE: 10/24/88 QUALITY ASSURANCE: <i>[Signature]</i> DATE: 10/29/88
5. SCE/Contractor Project Administration		
Conversion to DCN Date		

FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3 SUPPLEMENTAL PAGE					
INTERIM DCN NO.					
IDCN NUMBER 5-10					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DCN CONV. DATE	QUALITY CLASS
B102174	-	40			SR EAN
Date 9-27-88 Page 2 of 2					
By W. FRENCH					

DESCRIPTION OF CHANGE **BEFORE**

17-107 (RANGE)	0-N07V	0-N00V	17-110	0-N07V	0-N00V
17-108 (RANGE)	0-N07V	0-N00V	17-111	0-N07V	0-N00V
17-109 (RANGE)	0-N07V	0-N00V	17-112	0-N07V	0-N00V
17-110 (RANGE)	0-N07V	0-N00V	17-113	0-N07V	0-N00V
17-111 (RANGE)	0-N07V	0-N00V	17-114	0-N07V	0-N00V
17-112 (RANGE)	0-N07V	0-N00V	17-115	0-N07V	0-N00V
17-113 (RANGE)	0-N07V	0-N00V	17-116	0-N07V	0-N00V
17-114 (RANGE)	0-N07V	0-N00V	17-117	0-N07V	0-N00V
17-115 (RANGE)	0-N07V	0-N00V	17-118	0-N07V	0-N00V
17-116 (RANGE)	0-N07V	0-N00V	17-119	0-N07V	0-N00V
17-117 (RANGE)	0-N07V	0-N00V	17-120	0-N07V	0-N00V
17-118 (RANGE)	0-N07V	0-N00V	17-121	0-N07V	0-N00V
17-119 (RANGE)	0-N07V	0-N00V	17-122	0-N07V	0-N00V
17-120 (RANGE)	0-N07V	0-N00V	17-123	0-N07V	0-N00V
17-121 (RANGE)	0-N07V	0-N00V	17-124	0-N07V	0-N00V
17-122 (RANGE)	0-N07V	0-N00V	17-125	0-N07V	0-N00V
17-123 (RANGE)	0-N07V	0-N00V	17-126	0-N07V	0-N00V
17-124 (RANGE)	0-N07V	0-N00V	17-127	0-N07V	0-N00V
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17-151 (RANGE)	0-N07V	0-N00V	17-154	0-N07V	0-N00V
17-152 (RANGE)	0-N07V	0-N00V	17-155	0-N07V	0-N00V
17-153 (RANGE)	0-N07V	0-N00V	17-156	0-N07V	0-N00V
17-154 (RANGE)	0-N07V	0-N00V	17-157	0-N07V	0-N00V
17-155 (RANGE)	0-N07V	0-N00V	17-158	0-N07V	0-N00V
17-156 (RANGE)	0-N07V	0-N00V	17-159	0-N07V	0-N00V
17-157 (RANGE)	0-N07V	0-N00V	17-160	0-N07V	0-N00V
17-158 (RANGE)	0-N07V	0-N00V	17-161	0-N07V	0-N00V
17-159 (RANGE)	0-N07V	0-N00V	17-162	0-N07V	0-N00V
17-160 (RANGE)	0-N07V	0-N00V	17-163	0-N07V	0-N00V
17-161 (RANGE)	0-N07V	0-N00V	17-164	0-N07V	0-N00V
17-162 (RANGE)	0-N07V	0-N00V	17-165	0-N07V	0-N00V
17-163 (RANGE)	0-N07V	0-N00V	17-166	0-N07V	0-N00V
17-164 (RANGE)	0-N07V	0-N00V	17-167	0-N07V	0-N00V
17-165 (RANGE)	0-N07V	0-N00V	17-168	0-N07V	0-N00V
17-166 (RANGE)	0-N07V	0-N00V	17-169	0-N07V	0-N00V
17-167 (RANGE)	0-N07V	0-N00V	17-170	0-N07V	0-N00V
17-168 (RANGE)	0-N07V	0-N00V	17-171	0-N07V	0-N00V
17-169 (RANGE)	0-N07V	0-N00V	17-172	0-N07V	0-N00V
17-170 (RANGE)	0-N07V	0-N00V	17-173	0-N07V	0-N00V
17-171 (RANGE)	0-N07V	0-N00V	17-174	0-N07V	0-N00V
17-172 (RANGE)	0-N07V	0-N00V	17-175	0-N07V	0-N00V
17-173 (RANGE)	0-N07V	0-N00V	17-176	0-N07V	0-N00V
17-174 (RANGE)	0-N07V	0-N00V	17-177	0-N07V	0-N00V
17-175 (RANGE)	0-N07V	0-N00V	17-178	0-N07V	0-N00V
17-176 (RANGE)	0-N07V	0-N00V	17-179	0-N07V	0-N00V
17-177 (RANGE)	0-N07V	0-N00V	17-180	0-N07V	0-N00V
17-178 (RANGE)	0-N07V	0-N00V	17-181	0-N07V	0-N00V
17-179 (RANGE)	0-N07V	0-N00V	17-182	0-N07V	0-N00V
17-180 (RANGE)	0-N07V	0-N00V	17-183	0-N07V	0-N00V
17-181 (RANGE)	0-N07V	0-N00V	17-184	0-N07V	0-N00V
17-182 (RANGE)	0-N07V	0-N00V	17-185	0-N07V	0-N00V
17-183 (RANGE)	0-N07V	0-N00V	17-186	0-N07V	0-N00V
17-184 (RANGE)	0-N07V	0-N00V	17-187	0-N07V	0-N00V
17-185 (RANGE)	0-N07V	0-N00V	17-188	0-N07V	0-N00V
17-186 (RANGE)	0-N07V	0-N00V	17-189	0-N07V	0-N00V
17-187 (RANGE)	0-N07V	0-N00V	17-190	0-N07V	0-N00V
17-188 (RANGE)	0-N07V	0-N00V	17-191	0-N07V	0-N00V
17-189 (RANGE)	0-N07V	0-N00V	17-192	0-N07V	0-N00V
17-190 (RANGE)	0-N07V	0-N00V	17-193	0-N07V	0-N00V
17-191 (RANGE)	0-N07V	0-N00V	17-194	0-N07V	0-N00V
17-192 (RANGE)	0-N07V	0-N00V	17-195	0-N07V	0-N00V
17-193 (RANGE)	0-N07V	0-N00V	17-196	0-N07V	0-N00V
17-194 (RANGE)	0-N07V	0-N00V	17-197	0-N07V	0-N00V
17-195 (RANGE)	0-N07V	0-N00V	17-198	0-N07V	0-N00V
17-196 (RANGE)	0-N07V	0-N00V	17-199	0-N07V	0-N00V
17-197 (RANGE)	0-N07V	0-N00V	17-200	0-N07V	0-N00V
17-198 (RANGE)	0-N07V	0-N00V	17-201	0-N07V	0-N00V
17-199 (RANGE)	0-N07V	0-N00V	17-202	0-N07V	0-N00V
17-200 (RANGE)	0-N07V	0-N00V	17-203	0-N07V	0-N00V
17-201 (RANGE)	0-N07V	0-N00V	17-204	0-N07V	0-N00V
17-202 (RANGE)	0-N07V	0-N00V	17-205	0-N07V	0-N00V
17-203 (RANGE)	0-N07V	0-N00V	17-206	0-N07V	0-N00V
17-204 (RANGE)	0-N07V	0-N00V	17-207	0-N07V	0-N00V
17-205 (RANGE)	0-N07V	0-N00V	17-208	0-N07V	0-N00V
17-206 (RANGE)	0-N07V	0-N00V	17-209	0-N07V	0-N00V
17-207 (RANGE)	0-N07V	0-N00V	17-210	0-N07V	0-N00V
17-208 (RANGE)	0-N07V	0-N00V	17-211	0-N07V	0-N00V
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17-210 (RANGE)	0-N07V	0-N00V	17-213	0-N07V	0-N00V
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17-215 (RANGE)	0-N07V	0-N00V	17-218	0-N07V	0-N00V
17-216 (RANGE)	0-N07V	0-N00V	17-219	0-N07V	0-N00V
17-217 (RANGE)	0-N07V	0-N00V	17-220	0-N07V	0-N00V
17-218 (RANGE)	0-N07V	0-N00V	17-221	0-N07V	0-N00V
17-219 (RANGE)	0-N07V	0-N00V	17-222	0-N07V	0-N00V
17-220 (RANGE)	0-N07V	0-N00V	17-223	0-N07V	0-N00V
17-221 (RANGE)	0-N07V	0-N00V	17-224	0-N07V	0-N00V
17-222 (RANGE)	0-N07V	0-N00V	17-225	0-N07V	0-N00V
17-223 (RANGE)	0-N07V	0-N00V	17-226	0-N07V	0-N00V
17-224 (RANGE)	0-N07V	0-N00V	17-227	0-N07V	0-N00V
17-225 (RANGE)	0-N07V	0-N00V	17-228	0-N07V	0-N00V
17-226 (RANGE)	0-N07V	0-N00V	17-229	0-N07V	0-N00V
17-227 (RANGE)	0-N07V	0-N00V	17-230	0-N07V	0-N00V
17-228 (RANGE)	0-N07V	0-N00V	17-231	0-N07V	0-N00V
17-229 (RANGE)	0-N07V	0-N00V	17-232	0-N07V	0-N00V
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17-231 (RANGE)	0-N07V	0-N00V	17-234	0-N07V	0-N00V
17-232 (RANGE)	0-N07V	0-N00V	17-235	0-N07V	0-N00V
17-233 (RANGE)	0-N07V	0-N00V	17-236	0-N07V	0-N00V
17-234 (RANGE)	0-N07V	0-N00V	17-237	0-N07V	0-N00V
17-235 (RANGE)	0-N07V	0-N00V	17-238	0-N07V	0-N00V
17-236 (RANGE)	0-N07V	0-N00V	17-239	0-N07V	0-N00V
17-237 (RANGE)	0-N07V	0-N00V	17-240	0-N07V	0-N00V
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17-241 (RANGE)	0-N07V	0-N00V	17-244	0-N07V	0-N00V
17-242 (RANGE)	0-N07V	0-N00V	17-245	0-N07V	0-N00V
17-243 (RANGE)	0-N07V	0-N00V	17-246	0-N07V	0-N00V
17-244 (RANGE)	0-N07V	0-N00V	17-247	0-N07V	0-N00V
17-245 (RANGE)	0-N07V	0-N00V	17-248	0-N07V	0-N00V
17-246 (RANGE)	0-N07V	0-N00V	17-249	0-N07V	0-N00V
17-247 (RANGE)	0-N07V	0-N00V	17-250	0-N07V	0-N00V
17-248 (RANGE)	0-N07V	0-N00V	17-251	0-N07V	0-N00V
17-249 (RANGE)	0-N07V	0-N00V	17-252	0-N07V	0-N00V
1					

Southern California Edison Company FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS 1, 2 & 3)	CON/DOC USE ONLY	PPS NO.
	ISSN NO.	1-88-3003.00
	DOCUMENT NO.	REV. NO.
	5108174	41

ORIGINATOR	PAR	DATE
1. F. FEICHLER	87629	2-13-89
DOCUMENT TITLE	REVISION	DATE
ONE LINE DIAGRAM 120 V AC SYSTEM	E-06	SREAN

DESCRIPTION OF CHANGE

- ADD NOTE REGARDING SEPARATION REQUIREMENT AT JUNCTION BOXES.

8 REF: ENGINEERING REQUEST RPR # 2501

PE WAIVER REQUIRED	<input type="checkbox"/> YES
	<input checked="" type="checkbox"/> NO
PFO REVISION REQUIRED	<input type="checkbox"/> YES
	<input checked="" type="checkbox"/> NO

2. Other Affected Documents

None

Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:

This DCP (Forms CC(123) 183 and CC(123) 184 attached)

This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)

The following document: FIDCN J-2327 TO DCP #1-3003.00B3

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3. Affected Systems

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/NEB & L	
OTHER	DATE	OTHER	DATE
CHECKER	DATE	ENGINEER	DATE
CHECKER	DATE	INDEPENDENT REVIEW ENGR.	DATE
INDEPENDENT REVIEW ENGR.	DATE	RESPONSIBLE ENGINEER	DATE
RESPONSIBLE ENGINEER	DATE	SUPVISING ENGINEER	DATE
GROUP SUPERVISING ENGINEER	DATE	DISCIPLINE SUPERVISOR	DATE
SUPERVISING ENGINEER	DATE	PROJECT ENGINEER	DATE
MANAGER, STATION TECHNICAL	DATE	DISCIPLINE CHIEF	DATE
QUALITY ASSURANCE	DATE	QUALITY ASSURANCE	DATE

Conversion to DCN Date _____ SEE PROJECT ADMINISTRATOR

16X

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FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

BEFORE

INTERIM DCN NO.

FIELD NUMBER E-769P					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	BY	CLASS
5102174	-	41			SR-EAN

Date 2-13-89 Page 2 of 11

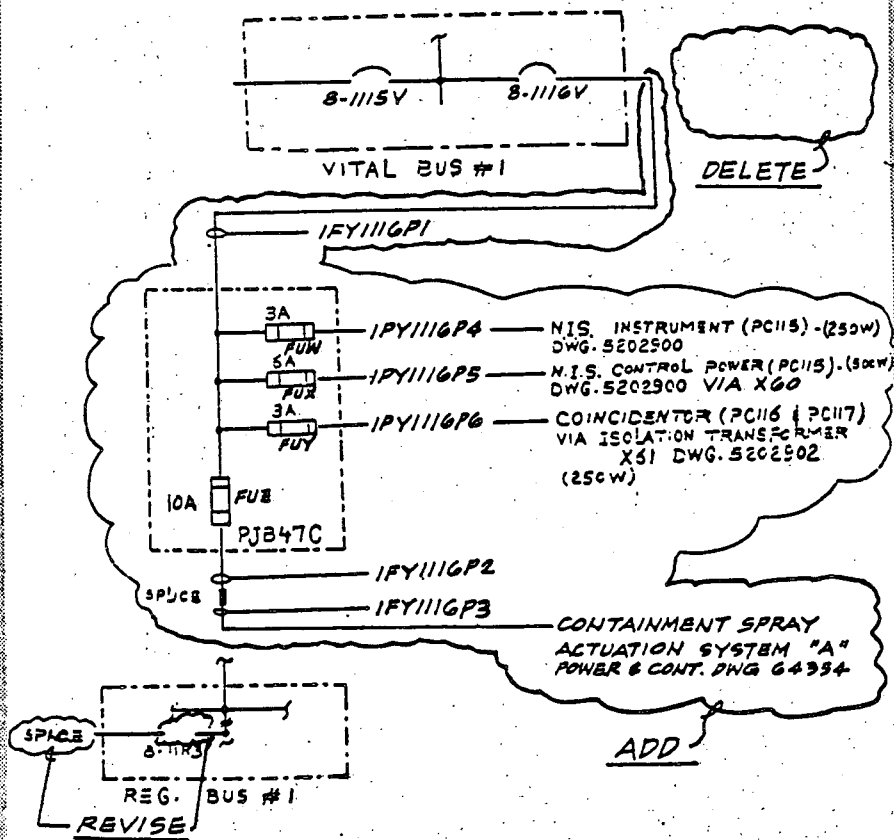
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OF FIDCN #E-766 PAGE 3 OF 10

RECEIVED CDM By F.E. EICHLER

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DESCRIPTION OF CHANGE

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SCED 26-1193 REV 1145

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

AFTER

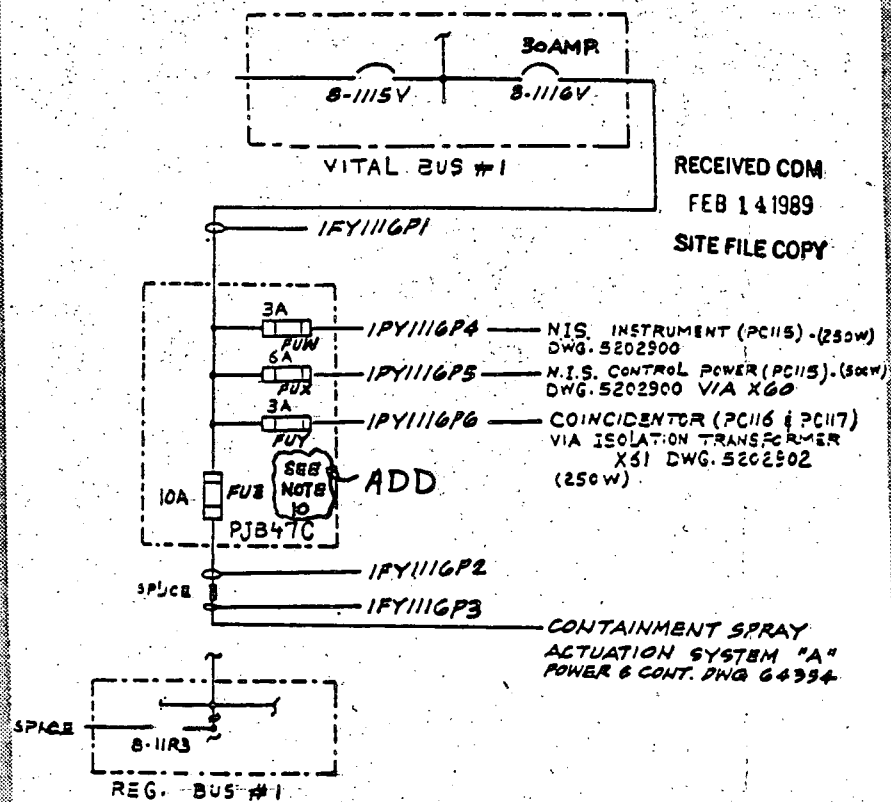
INTERIM DCN NO.

FIELD NUMBER E-769P					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	BY	CLASS
5102174	-	41			SR-EAN

Date 2-13-89 Page 3 of 11

By F.E. EICHLER

DESCRIPTION OF CHANGE



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SCED 26-1193 REV 1145

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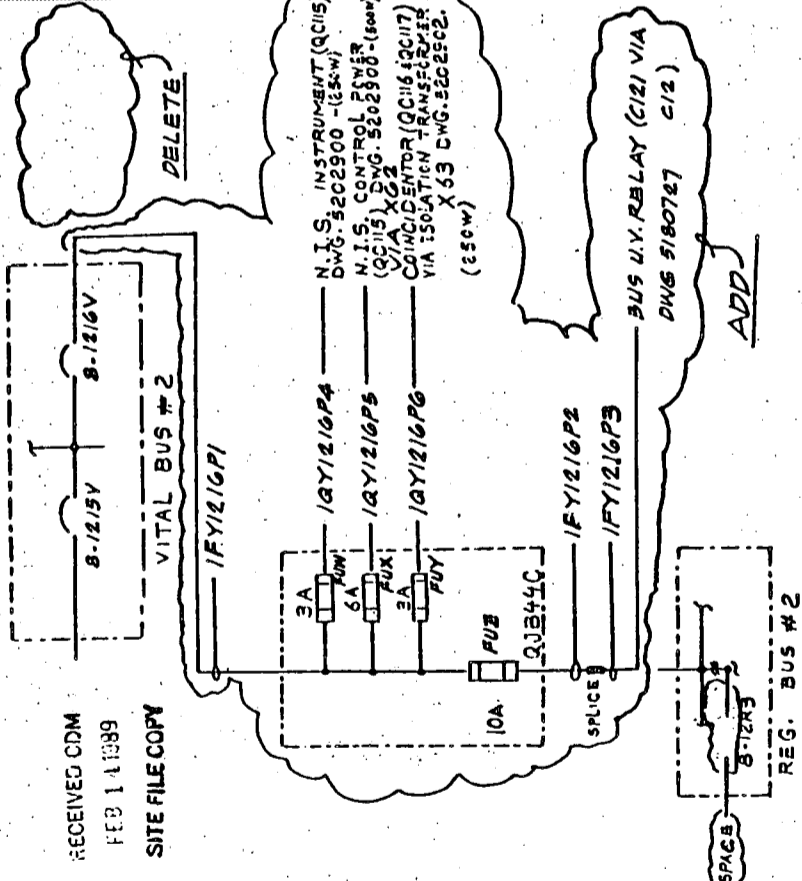
FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

BEFORE

INTERIM DEN. NO.	
PROJECT NO.	5102174 - 41
DATE	2-13-89
BY	FE. EICHLER
SR-#	SR-5AN

THIS 'BEFORE' IS THE 'AFTER' OF PDCN #E-7466 PAGE 5 OF 10.

DESCRIPTION OF CHANGE



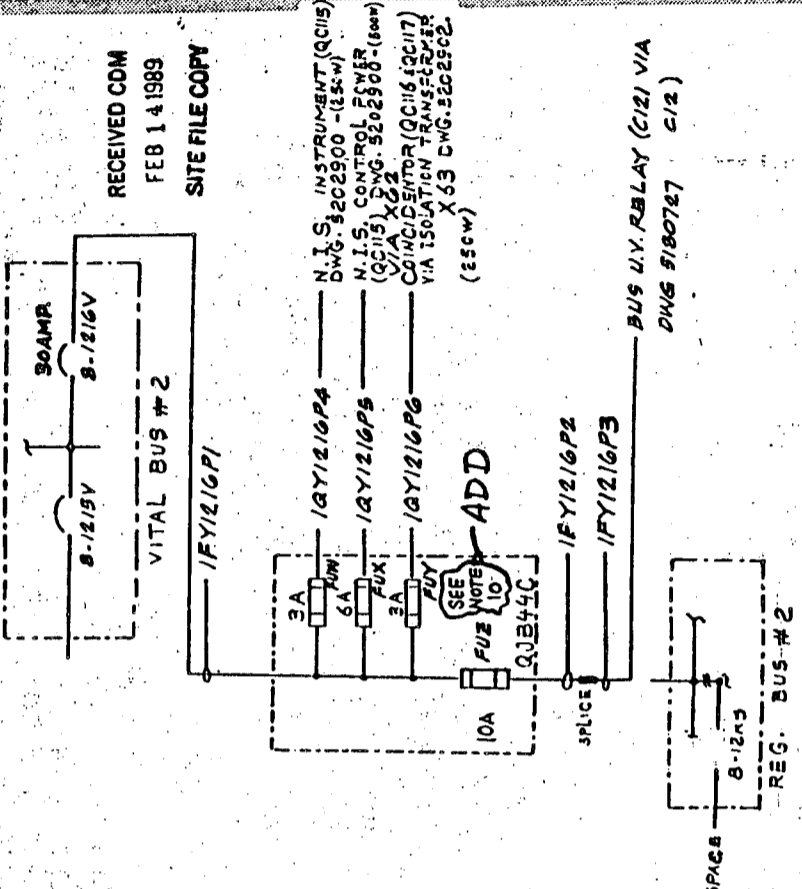
FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

AFTER

INTERIM DEN. NO.	
PROJECT NO.	5102174 - 41
DATE	2-13-89
BY	FE. EICHLER
SR-#	SR-5AN

THIS 'AFTER' IS THE 'AFTER' OF PDCN #E-7466 PAGE 5 OF 10.

DESCRIPTION OF CHANGE



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FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

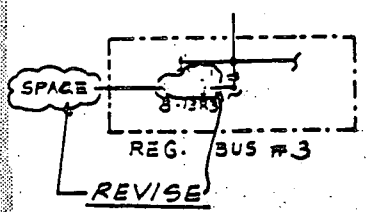
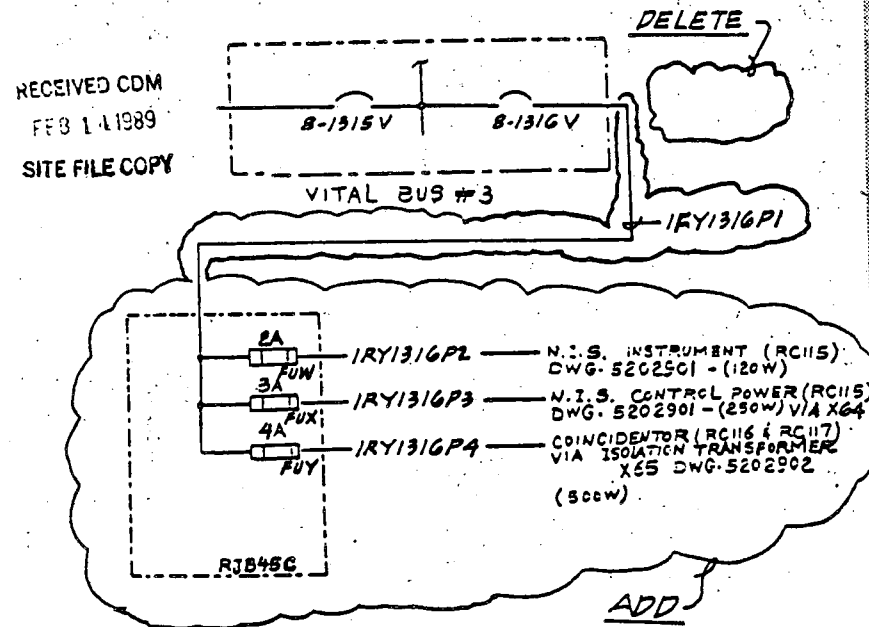
BEFORE

INTERIM DCN NO.

FIELD NUMBER E-7528					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	REV. NO.	DATE
5102174	-	41			

Date 2-13-89 Page 6 of 11
By F.E. EICHLER

THIS "BEFORE" IS THE "AFTER"
OF FIDCN #E-7466 PAGE 7 OF 10
DESCRIPTION OF CHANGE



FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

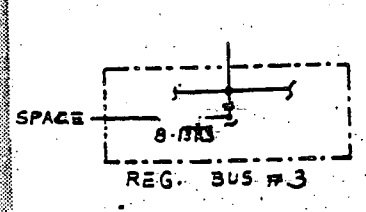
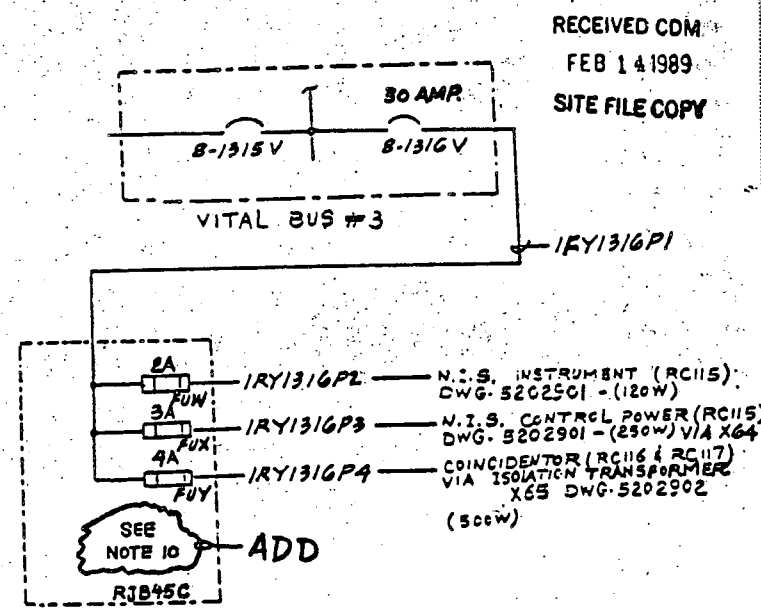
AFTER

INTERIM DCN NO.

FIELD NUMBER E-7528					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	REV. NO.	DATE
5102174	-	41			

Date 2-13-89 Page 7 of 11
By F.E. EICHLER

DESCRIPTION OF CHANGE



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FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

BEFORE

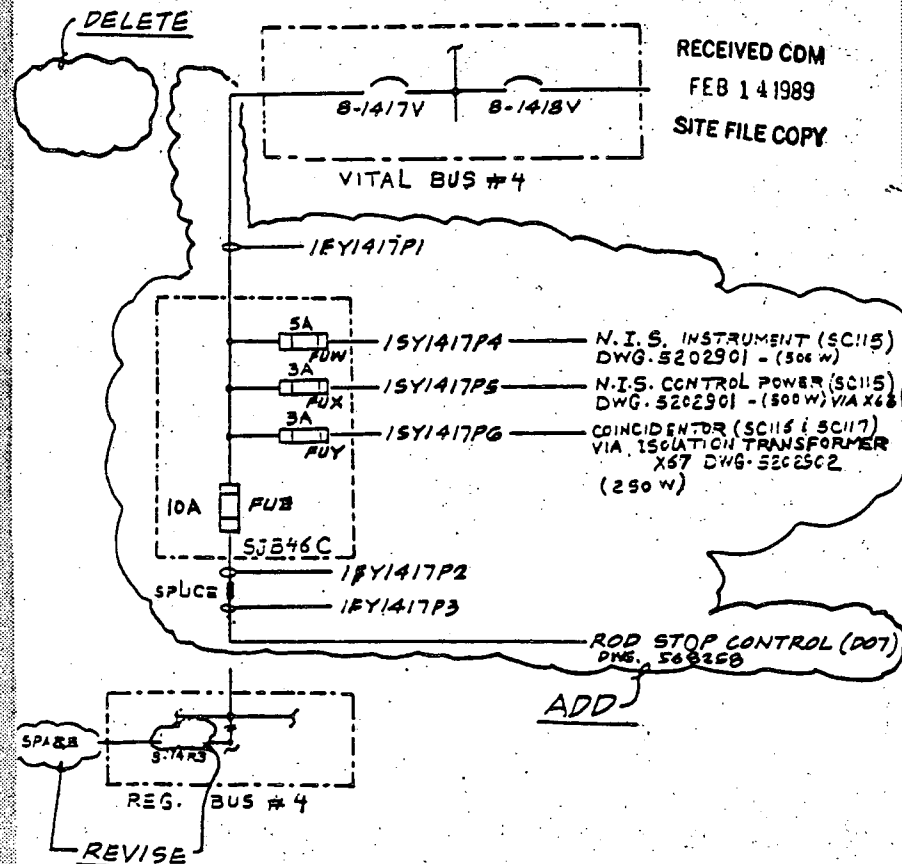
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OF FIDCN #E-7466 PAGE 9 OF 10
DESCRIPTION OF CHANGE:

INTERIM DCN NO.

FIDCN NUMBER E-7466					
DRAWING NO.	INSERT NO.	REV. NO.	DATE	BY	QUALITY
5102174	-	41			SR-EAN

Date 2-13-89 Page 8 of 11

By F.E. EICHLER



FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

AFTER

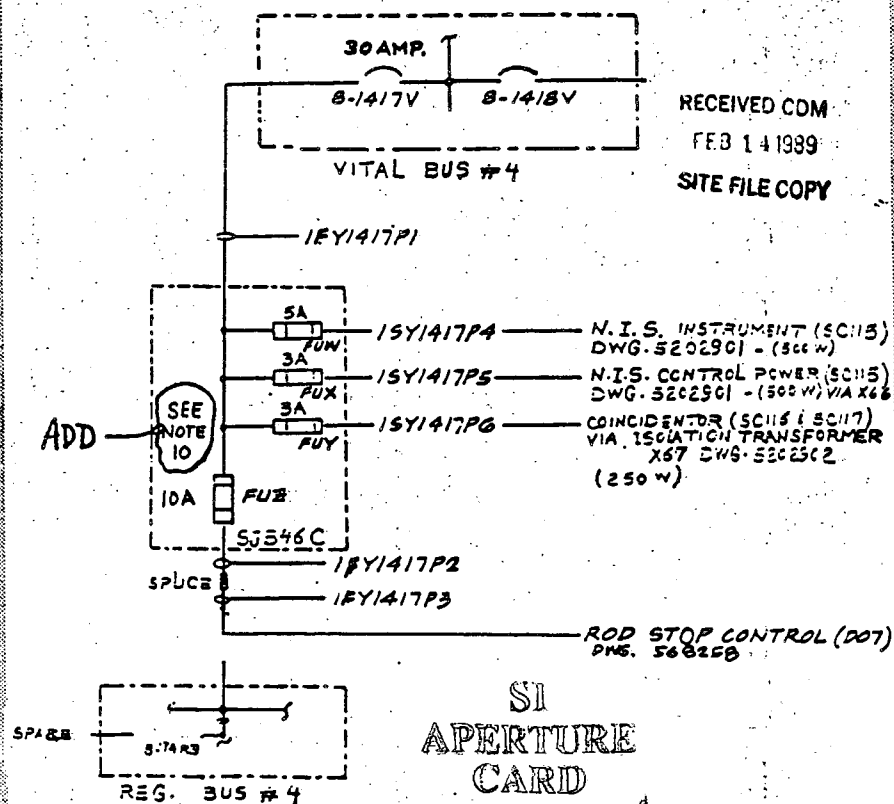
DESCRIPTION OF CHANGE

INTERIM DCN NO.

FIDCN NUMBER E-7466					
DRAWING NO.	INSERT NO.	REV. NO.	DATE	BY	QUALITY
5102174	-	41			SR-EAN

Date 2-13-89 Page 9 of 11

By F.E. EICHLER



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FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE
BEFORE

INTERIM DCN NO.					
FIDCN NUMBER E-759P					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DESIGNER	REVISOR
5102174	-	41			
					SR-EAN

THIS "BEFORE" IS THE "AFTER"
OF FIDCN #E-7466 PAGE 10 OF 10
DESCRIPTION OF CHANGE

Date 2-13-89 Page 10 of 11
RECEIVED CDM By F.E. EICHLER
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- NOTE**
- 7 - FUSES IDENTIFIED IN JUNCTION BOXES PJB47C, QJB44C, RJB45C, SJ245C ARE BUSSMANN TYPE 'KTK'; RATING AS MARKED, WITH FUSE HOLDER RATED 30 A, TYPE BM6Q31-SQ
 8. FUSE SIZE (AS NOTED) AND TYPE (BUSSMANN TYPE KTK) ARE PER ENGINEERING DESIGN. REVISION REQUIRES PROJECT ENGINEERING OR STATION TECH. APPROVAL
 9. THE FOLLOWING LAMICOID TAGS ARE SECURED TO THE LOAD (BOTTOM) WIRE AT THE FUSE BLOCK OF EACH FUSE. ENGRAVING i.e. "BUSSMANN FUSE KTK-2 ONLY" FOR 2 AMP FUSE, KTK-3 FOR 3AMP FUSE, KTK-4 FOR 4AMP FUSE, KTK-5 FOR 5AMP FUSE, KTK-6 FOR 6AMP FUSE & KTK-10 FOR 10 AMP FUSE.
2/17/89

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.					
FIDCN NUMBER E-749P					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DESIGNER	REVISOR
5102174	-	41			
					SR-EAN

Date 2-13-89 Page 11 of 11
RECEIVED CDM By F.E. EICHLER
FEB 14 1989
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- NOTE**
- 7 - FUSES IDENTIFIED IN JUNCTION BOXES PJB47C, QJB44C, RJB45C, SJ245C ARE BUSSMANN TYPE 'KTK'; RATING AS MARKED, WITH FUSE HOLDER RATED 30 A, TYPE BM6Q31-SQ
 8. FUSE SIZE (AS NOTED) AND TYPE (BUSSMANN TYPE KTK) ARE PER ENGINEERING DESIGN. REVISION REQUIRES PROJECT ENGINEERING OR STATION TECH. APPROVAL
 9. THE FOLLOWING LAMICOID TAGS ARE SECURED TO THE LOAD (BOTTOM) WIRE AT THE FUSE BLOCK OF EACH FUSE. ENGRAVING i.e. "BUSSMANN FUSE KTK-2 ONLY" FOR 2 AMP FUSE, KTK-3 FOR 3AMP FUSE, KTK-4 FOR 4AMP FUSE, KTK-5 FOR 5AMP FUSE, KTK-6 FOR 6AMP FUSE & KTK-10 FOR 10 AMP FUSE.
 10. REGULATORY GUIDE 1.75 ELECTRICAL SEPARATION IS NOT REQUIRED WITHIN JUNCTION BOX BETWEEN DIVISION F AND NIS ^{DIVISIONS} P, Q, R & S SINCE DIVISION F AND THE NIS DIVISIONS SHARE COMMON SOURCE OF POWER FROM VITAL BUS NO. 1, 2, 3 & 4 RESPECTIVELY.

ADD

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INTERIM DCN NO. _____ PAGE 1 OF 10

SC Southern California Edison Company
 FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
 (For SONGS) 1-87

PROJECT NO. E-7596 DRAWING NO. 5102174 SHEET NO. 41

ISSUANCE NO. 87365 DATE 2/12/89

1. A.B. SAMANTA BY SR-EAN

ONE LINE DIAGRAM, 120 VOLT AC SYSTEM, E-25

EDITORIAL CHANGE TO PROVIDE BREAKER RATINGS AND NOTE 2.

REF: CALC. DC-3131 REV.0

PE WAIVER REQUIRED YES NO
 PPO REVISION REQUIRED YES NO

2. Other Affected Documents

None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document:
 3. Affected Systems NIS
 4. SCE Design Approval

ENGINEERING AND CONSTRUCTION DEPARTMENT/AREA	DATE	BY
DESIGNER		
CHECKER		
INDEPENDENT REVIEW ENGINEER		
PERFORMANCE ENGINEER		
GROUP SUPERVISING ENGINEER		
SUPERVISING ENGINEER		
MANAGER, SYSTEMS VERIFICATION		
GROUP SUPERVISOR		
Conversion to DCN Data		

RECEIVED CDM FEB 12 1989 SITE FILE COPY

INTERIM DCN NO. _____

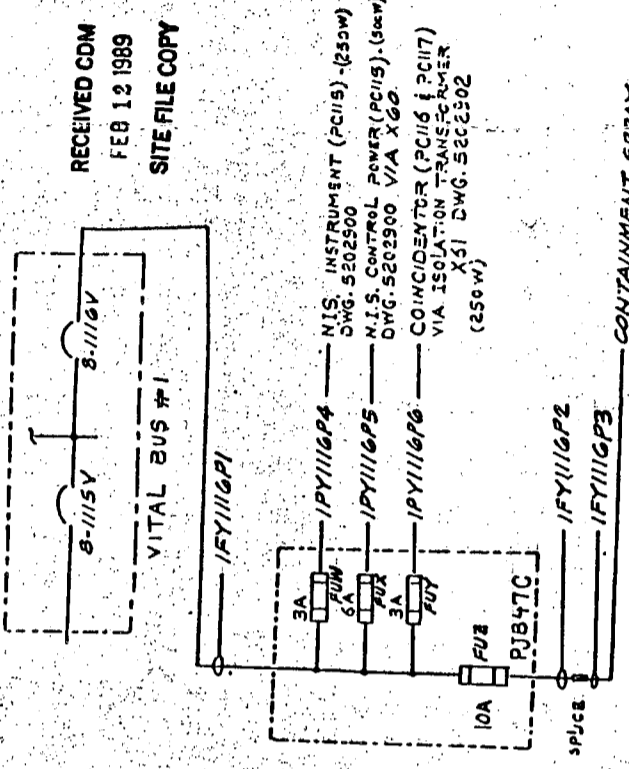
SC Southern California Edison Company
 INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

PROJECT NO. 5102174 DRAWING NO. 5102174 SHEET NO. 41

ISSUANCE NO. 87365 DATE 2/12/89

1. A.B. SAMANTA BY SR-EAN

DESCRIPTION OF CHANGE
 THE BEFORE CONDITION OF THIS FIDCN REFLECTS THE AFTER CONDITION OF FIDCN E 7466, PAGE 3 OF 10.



RECEIVED CDM FEB 12 1989 SITE FILE COPY

CONTAINMENT SPRAY ACTUATION SYSTEM "A" POWER & CONT. PNG 6494

8902270311-41

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SE Southern California Edison Company
Songs (1) 2-4-3

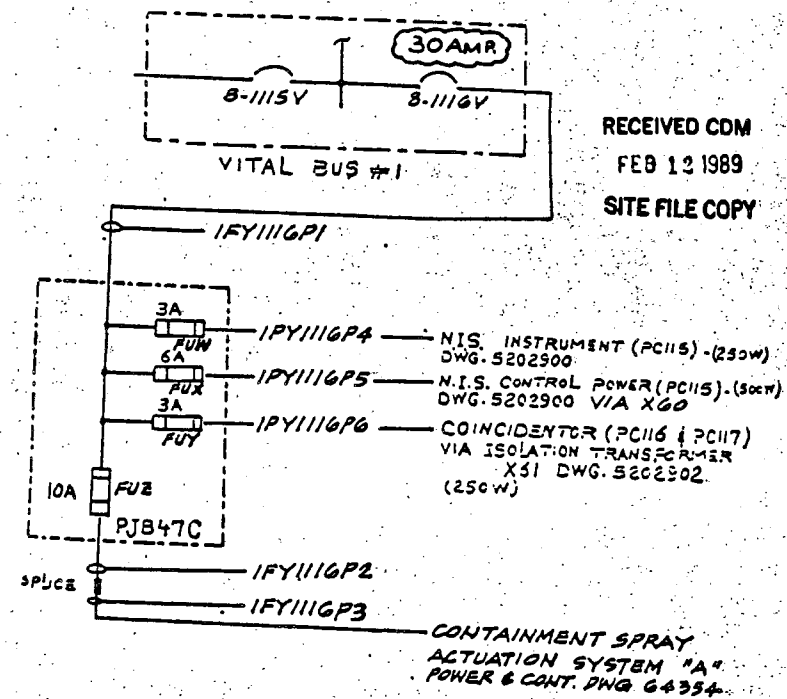
INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.					
FIDCN NUMBER: E-7526					
DRAWING NO.	SHEET NO.	REV. NO.	DATE		QUALITY CLASS
			DCN REV.	DCN NO.	
5102174		41			SR-EAN

Date 2/12/89 Page 3 of 10
By A.B. SAMANTA

AFTER

DESCRIPTION OF CHANGE:



SE Southern California Edison Company
Songs (1) 2-4-3

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

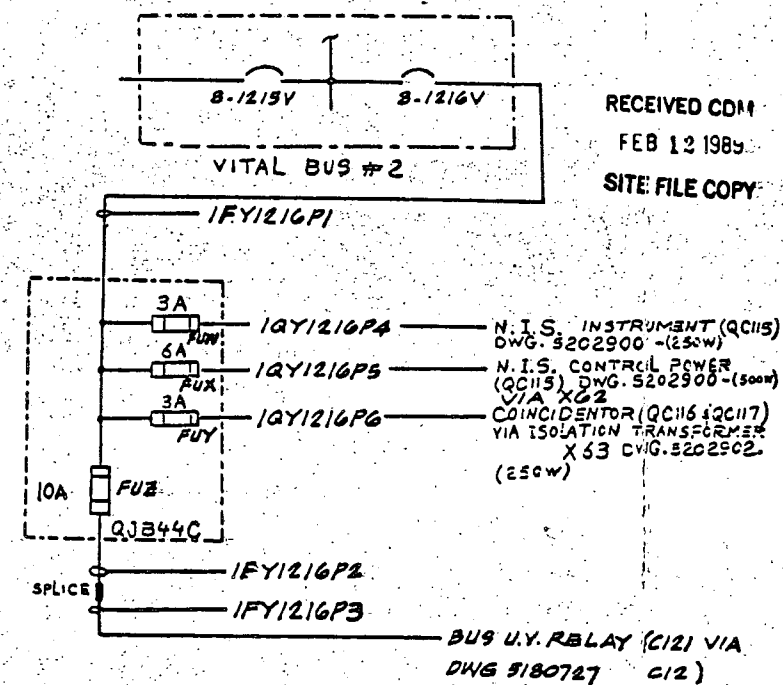
INTERIM DCN NO.					
FIDCN NUMBER: E-7526					
DRAWING NO.	SHEET NO.	REV. NO.	DATE		QUALITY CLASS
			DCN REV.	DCN NO.	
5102174		41			SR-EAN

Date 2/12/89 Page 4 of 10
By A.B. SAMANTA

BEFORE

DESCRIPTION OF CHANGE:

THE BEFORE CONDITION OF THIS FIDCN REFLECTS THE
AFTER CONDITION OF FIDCN # E 7466, PAGE 3 OF 10.



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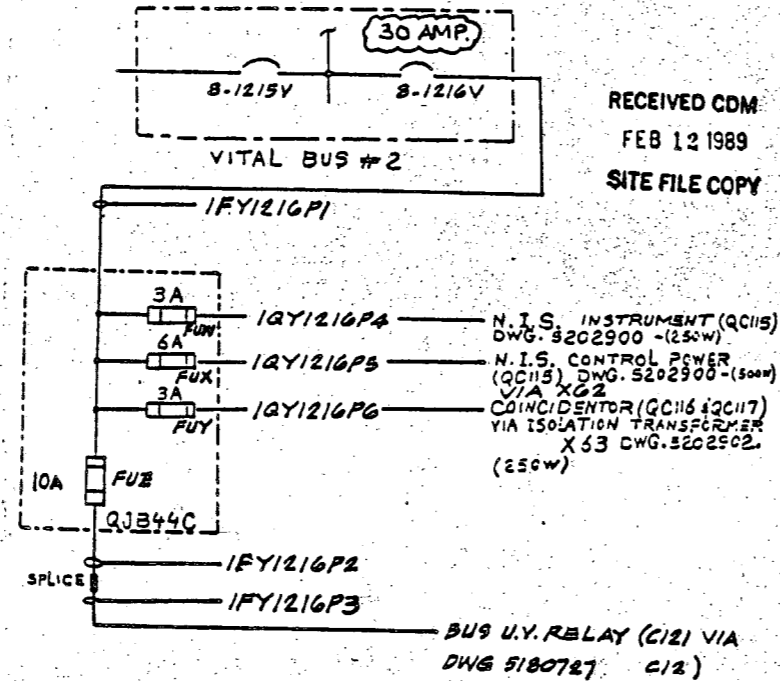
INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.						
F IDCN NUMBER E-2596						
DRAWING NO.	SHEET NO.	REV. NO.	DATE	REV. NO.	DATE	QUALITY CHECKED
5102174		41				SR-EAN

Date 2/12/89 Page 5 of 10
By A.B. SAMANTA

AFTER

DESCRIPTION OF CHANGE



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INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

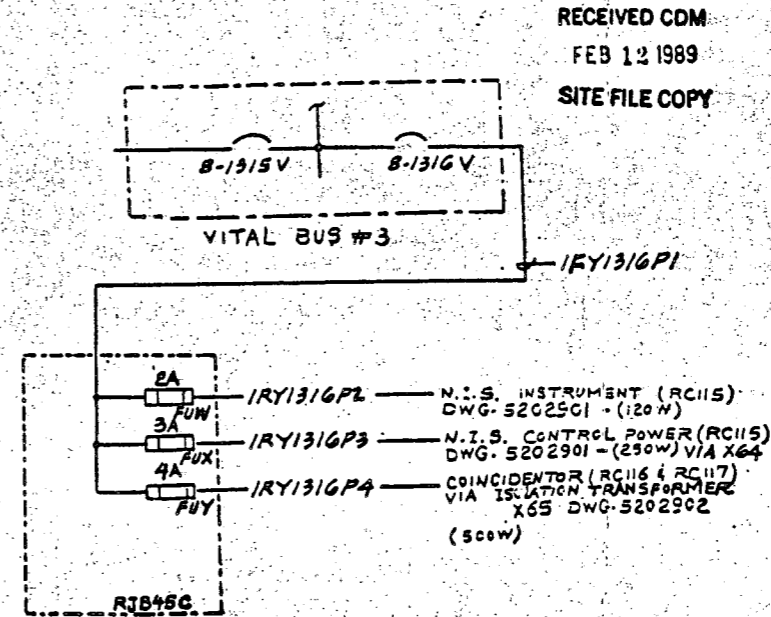
INTERIM DCN NO.						
F IDCN NUMBER E-2596						
DRAWING NO.	SHEET NO.	REV. NO.	DATE	REV. NO.	DATE	QUALITY CHECKED
5102174		41				SR-EAN

Date 2/12/89 Page 6 of 10
By A.B. SAMANTA

BEFORE

DESCRIPTION OF CHANGE

THE BEFORE CONDITION OF THIS FIDCN REFLECTS THE AFTER CONDITION OF FIDCN # E 7466, PAGE 7 OF 10.



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INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.

FIDCN NUMBER E-7596					
DRAWING NO.	ISSUE NO.	REV. NO.	DATE	REV. CLASS.	QUALITY CLASS
5102174		41			SR-EAN

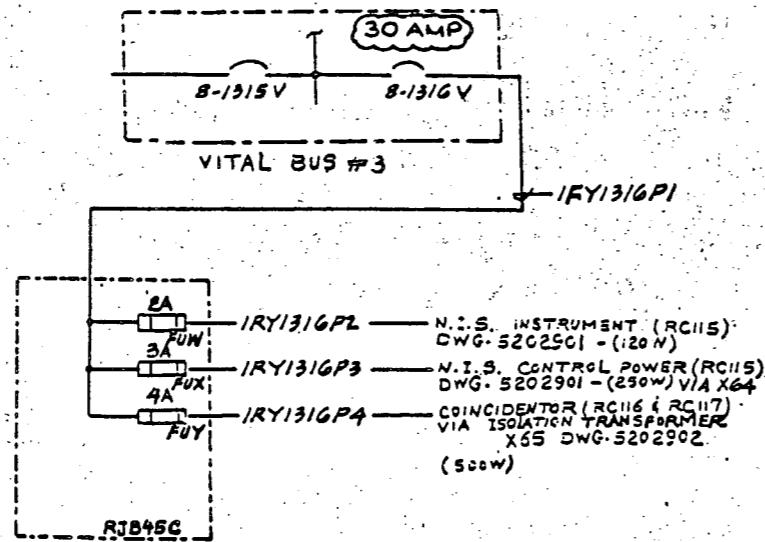
Date 2/12/89 Page 7 of 10

By A.B. SAMANTA

AFTER

DESCRIPTION OF CHANGE

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INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.

FIDCN NUMBER E-7596					
DRAWING NO.	ISSUE NO.	REV. NO.	DATE	REV. CLASS.	QUALITY CLASS
5102174		41			SR-EAN

Date 2/12/89 Page 8 of 10

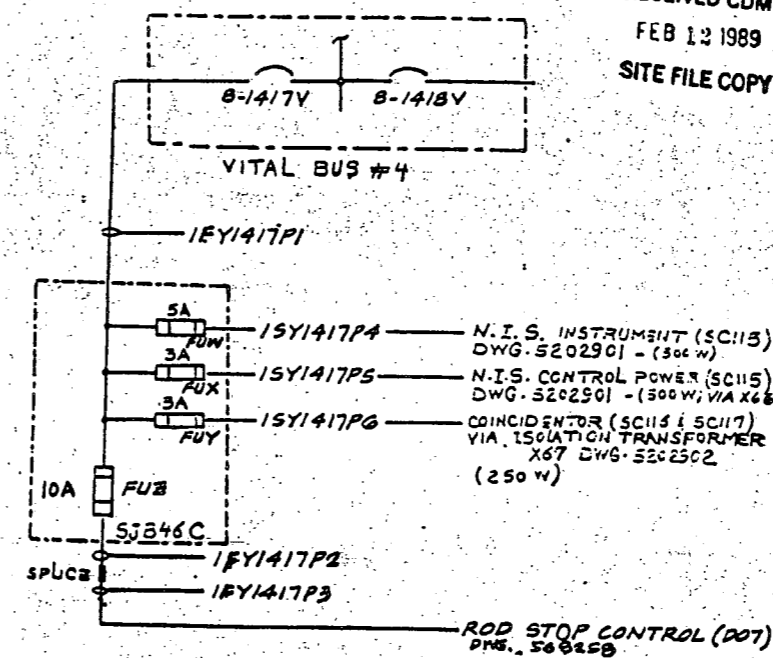
By A.B. SAMANTA

BEFORE

DESCRIPTION OF CHANGE

THE BEFORE CONDITION OF THIS FIDCN REFLECTS THE
AFTER CONDITION OF FIDCN # E 7466, PAGE 9 OF 10.

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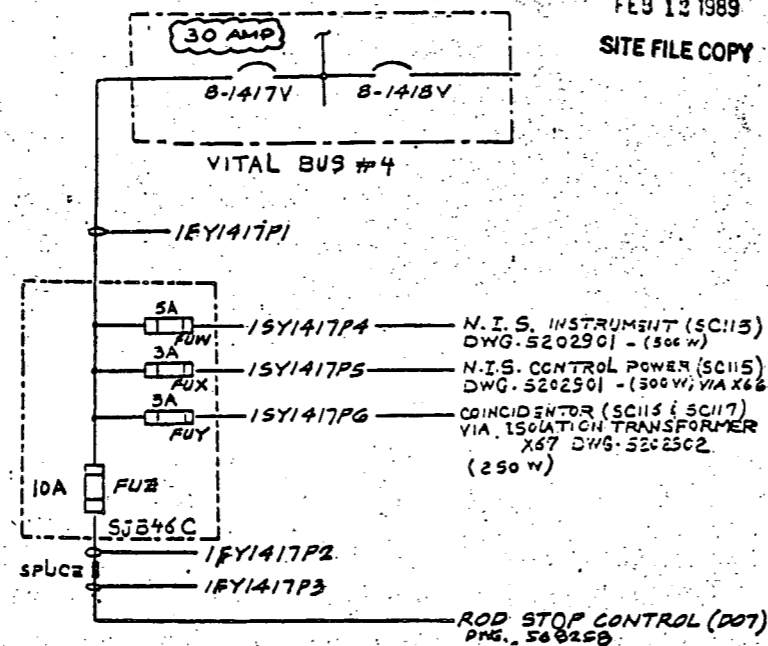
INTERIM DESIGN CHANGE
 NOTICE (IDCN)/DESIGN
 CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

INTERIM DCN NO.					
FIGURE NUMBER 6-2526					
DRAWING NO.	SHEET NO.	REV. NO.	DATE		QUALITY CLERK
			DCN CONV.	DCN NO.	
5102174		41			SR-EAN

Date 2/12/89 Page 9 of 10
 By A.B. SAMANTA

AFTER

DESCRIPTION OF CHANGE



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INTERIM DESIGN CHANGE
 NOTICE (IDCN)/DESIGN
 CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

INTERIM DCN NO.					
FIGURE NUMBER 6-2526					
DRAWING NO.	SHEET NO.	REV. NO.	DATE		QUALITY CLERK
			DCN CONV.	DCN NO.	
5102174		41			SR-EAN

Date 2/12/89 Page 10 of 10
 By A.B. SAMANTA

DESCRIPTION OF CHANGE

BEFORE

NOTE

2. ALL EXISTING BRANCH CKT. BKR. ON VITAL BUS 1, 2, 3 & 4 ARE RATED 15 AMPS.

AFTER

NOTE

2. ALL EXISTING BRANCH CKT. BKR. ON VITAL BUS 1, 2, 3 & 4 ARE RATED 15 AMPS **EXCEPT AS NOTED.**

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PAGE 1 OF 10

Southern California Edison Company FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS 1, 2 & 3)		FORM/DOC USE ONLY FORM NO. E7466 DOCUMENT NO. 5102174 CHECKED [Signature]	PFE NO. 1-88-3003.00 REV. NO. 3003.00B1 REV. NO. 0 REV. NO. 0 REV. NO. 0
ORIGINATOR 1. G. H. MOLAYEM		PAX NO. 87623	DATE 1/30/89
DOCUMENT TITLE ONE LINE DIAGRAM, 120 VOLT AC SYSTEM		REVISION E-06	DRAWN BY SREAN
DESCRIPTION OF CHANGE THE BEFORE CONDITION OF THIS FIDCN REFLECTS THE AFTER CONDITION OF IDCN S-5 (PAGE 3 OF 3) TO DRAWING 5102174 - REVISE POWER SUPPLY TO NIS & COINCIDENTOR.			
RECEIVED CDM FEB 07 1989 SITE FILE COPY			
REF: 8 ENGINEERING REQUEST RPR 2297			
2. Other Affected Documents: <input type="checkbox"/> None <input checked="" type="checkbox"/> Specific affected documents are listed on the CC(123) 184 associated with the source document checked below: <input type="checkbox"/> This DCP (Forms CC(123) 183 and CC(123) 184 attached) <input checked="" type="checkbox"/> This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached) E-7467 THRU E-7470, E-7486 THRU E-7490, E-7500, E-7505 THRU E-7510, E-7512, J-2245 THRU J-2252 <input type="checkbox"/> The following document:			
3. Affected Systems NIS			
4. SCE Design Approvals			
NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/RES & L	
OTHER	DATE	OTHER	DATE
OTHER	DATE	CHECKED	DATE
CHECKER	DATE	INDEPENDENT REVIEW DATE	DATE
INDEPENDENT REVIEW ENGR.	DATE	DATE	DATE
RESPONSIBLE ENGINEER	DATE	DATE	DATE
GROUP SUPERVISING ENGINEER	DATE	DATE	DATE
SUPERVISING ENGINEER	DATE	DATE	DATE
DESIGN APPROVAL	DATE	DATE	DATE
QUALITY ASSURANCE	DATE	DATE	DATE

PAGE 2 OF 10

Southern California Edison Company Songs 1, 2 & 3		INTERIM DCN NO. _____ FIDCN NUMBER E7466
FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SUPPLEMENTAL PAGE		DRAWING NO. 5102174 - 40 / 41 SR-EAN
BEFORE		DATE 1/30/89 By G. H. MOLAYEM
DESCRIPTION OF CHANGE 		
RECEIVED CDM FEB 07 1989 SITE FILE COPY		
REG. BUS #1 		

SCE 20-1762 REV 11/88

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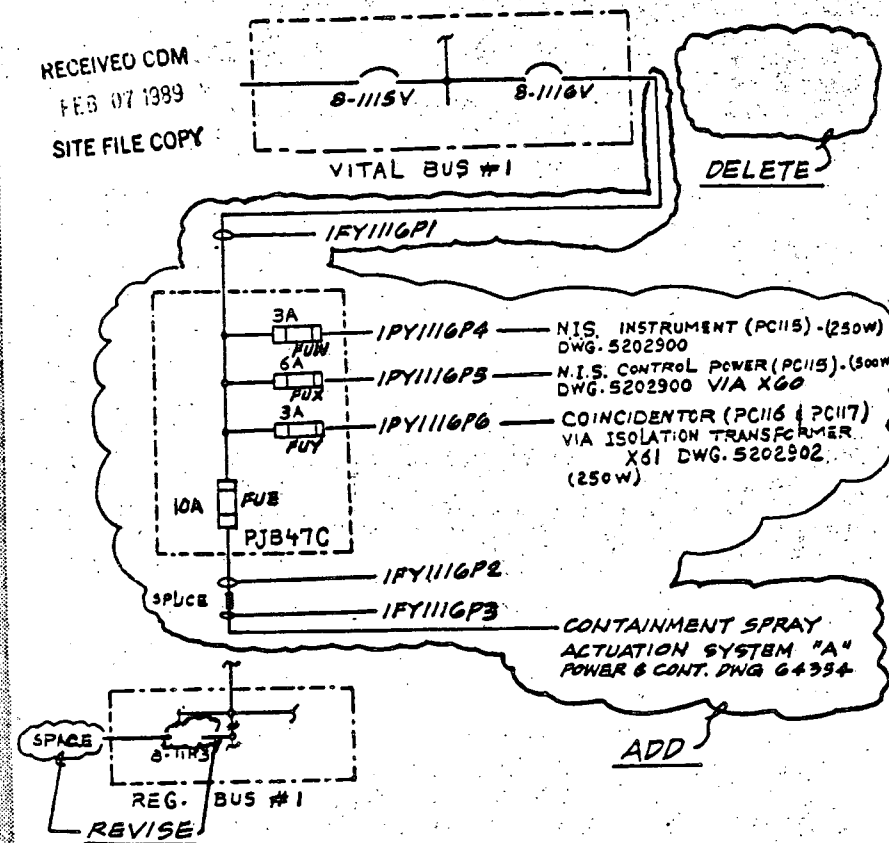
8902270311-46

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

AFTER

PROJECT NO.	5102174	REV.	40	DATE	1/30/89	BY	G.H. MOLAYEM
DWG. NO.		DWG. REV.		DWG. DATE		DWG. BY	
SR-EAN							

DESCRIPTION OF CHANGE



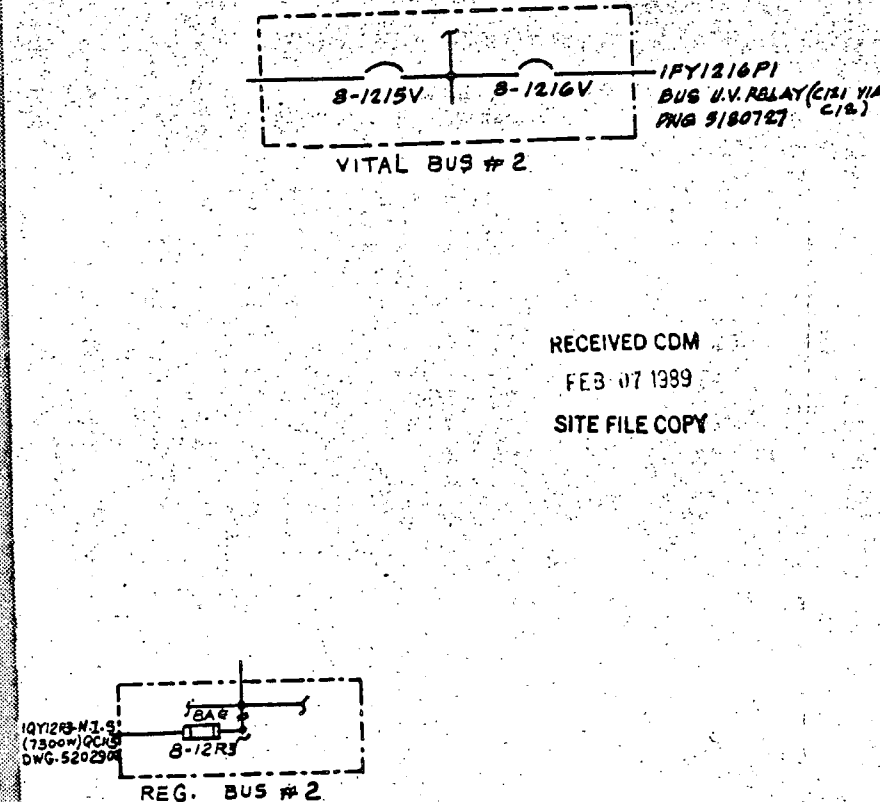
SCS 20-1752 REV 11/88

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

BEFORE

PROJECT NO.	5102174	REV.	40	DATE	1/30/89	BY	G.H. MOLAYEM
DWG. NO.		DWG. REV.		DWG. DATE		DWG. BY	
SR-EAN							

DESCRIPTION OF CHANGE



SCS 20-1752 REV 11/88

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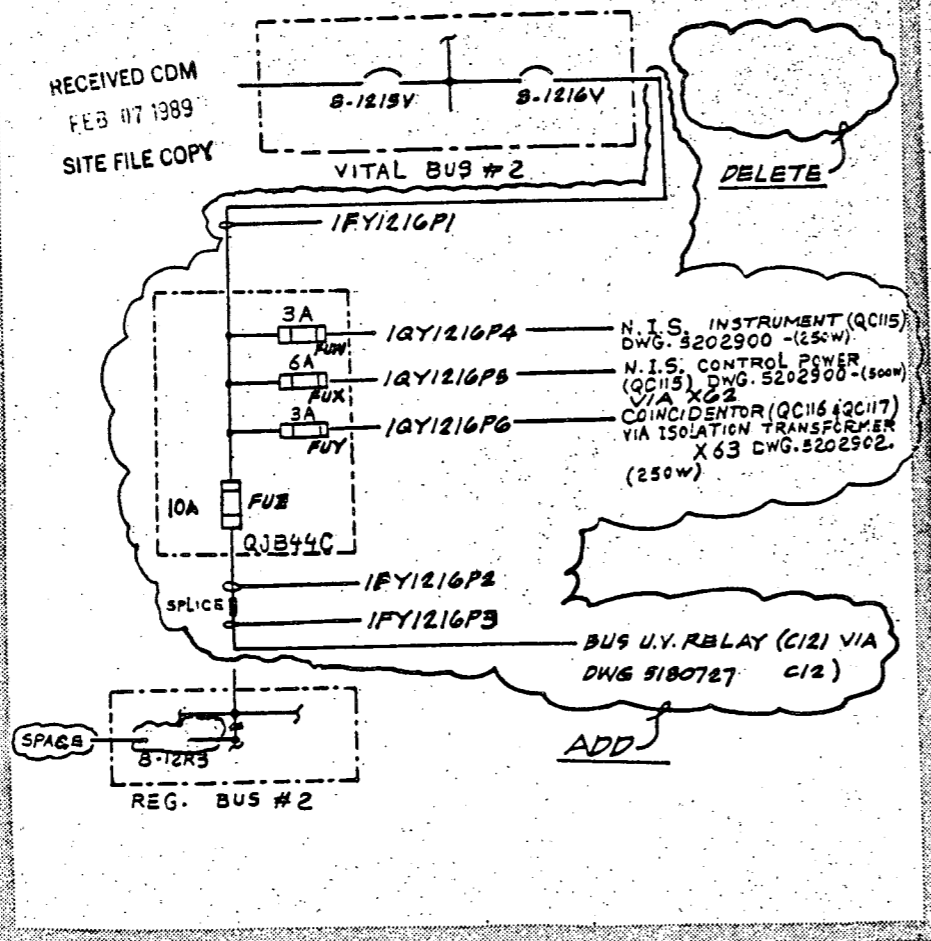
8902270311-47

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

AFTER

INTERIM DESIGN NO.					
FIELD NUMBER 67466					
DRAWING NO.	ISSUE NO.	REV.	DATE	REV. DATE	REV. NO.
5102174	-	40	41		
					SR-EAN
Date <u>1/30/89</u> Page <u>5</u> of <u>10</u>					
By <u>G.H. MOLAYEM</u>					

DESCRIPTION OF CHANGE



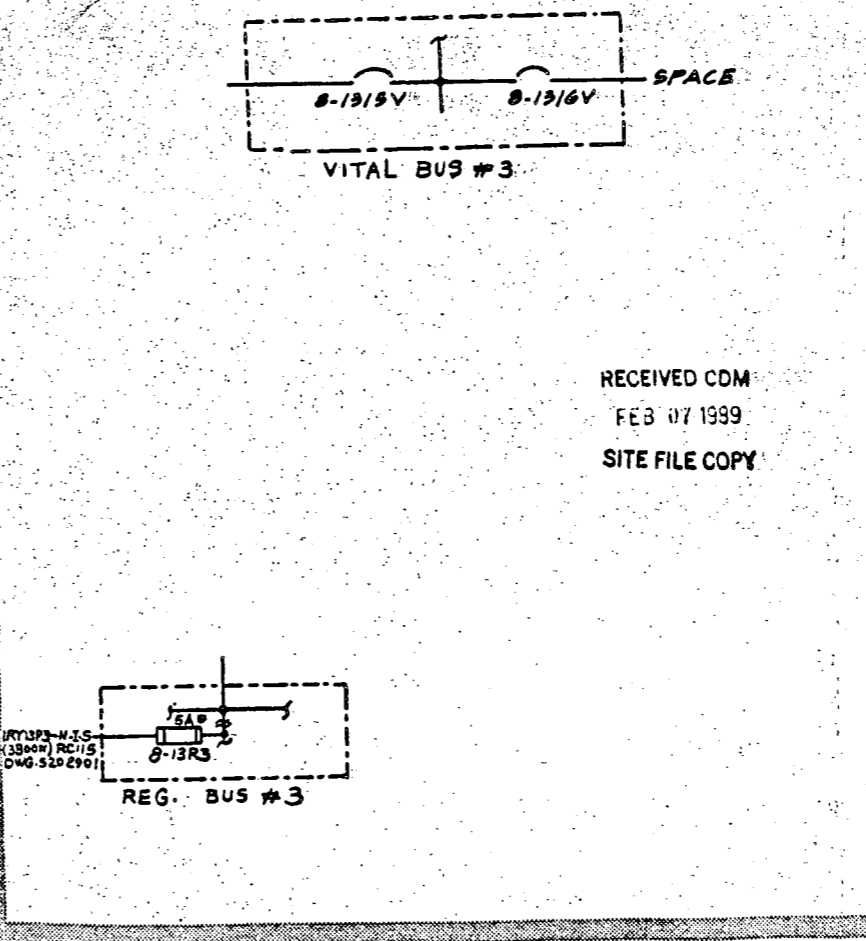
SCS 26-1762 REV 11/85

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

BEFORE

INTERIM DESIGN NO.					
FIELD NUMBER 67466					
DRAWING NO.	ISSUE NO.	REV.	DATE	REV. DATE	REV. NO.
5102174	-	40	41		
					SR-EAN
Date <u>1/30/89</u> Page <u>6</u> of <u>10</u>					
By <u>G.H. MOLAYEM</u>					

DESCRIPTION OF CHANGE



SCS 26-1762 REV 11/85

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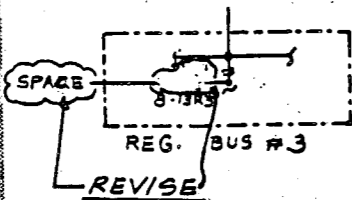
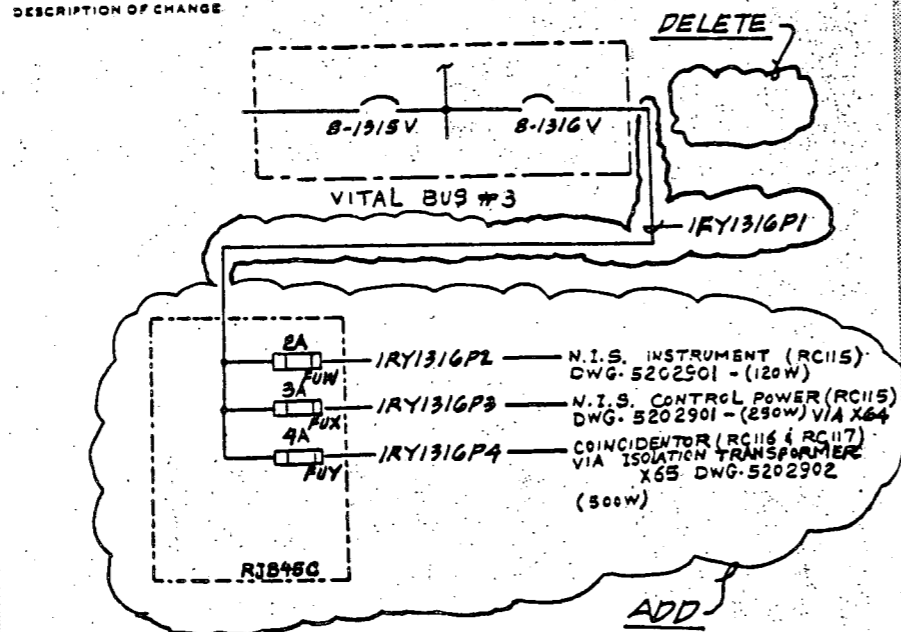
8902270311-48

FIELD INTERIM DESIGN CHANGE
 NOTICE (IDCN) DESIGN
 CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

AFTER

FIELD NUMBER 87466				
DRAWING NO.	ISSUE NO.	REV.	DATE	STATUS
5102174	-	40	1/30/89	SR-EAN
DATE 1/30/89 BY G.H. MOLAYEM Page 7 of 10				

DESCRIPTION OF CHANGE



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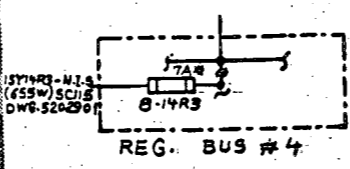
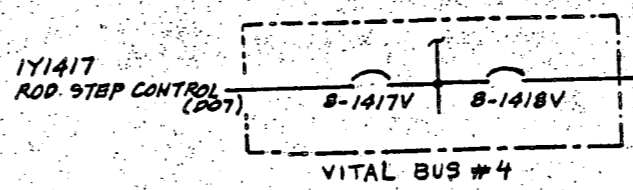
SCE 26-1744 REV 1148

FIELD INTERIM DESIGN CHANGE
 NOTICE (IDCN) DESIGN
 CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

BEFORE

FIELD NUMBER 87466				
DRAWING NO.	ISSUE NO.	REV.	DATE	STATUS
5102174	-	40	1/30/89	SR-EAN
DATE 1/30/89 BY G.H. MOLAYEM Page 8 of 10				

DESCRIPTION OF CHANGE



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SCE 26-1744 REV 1148

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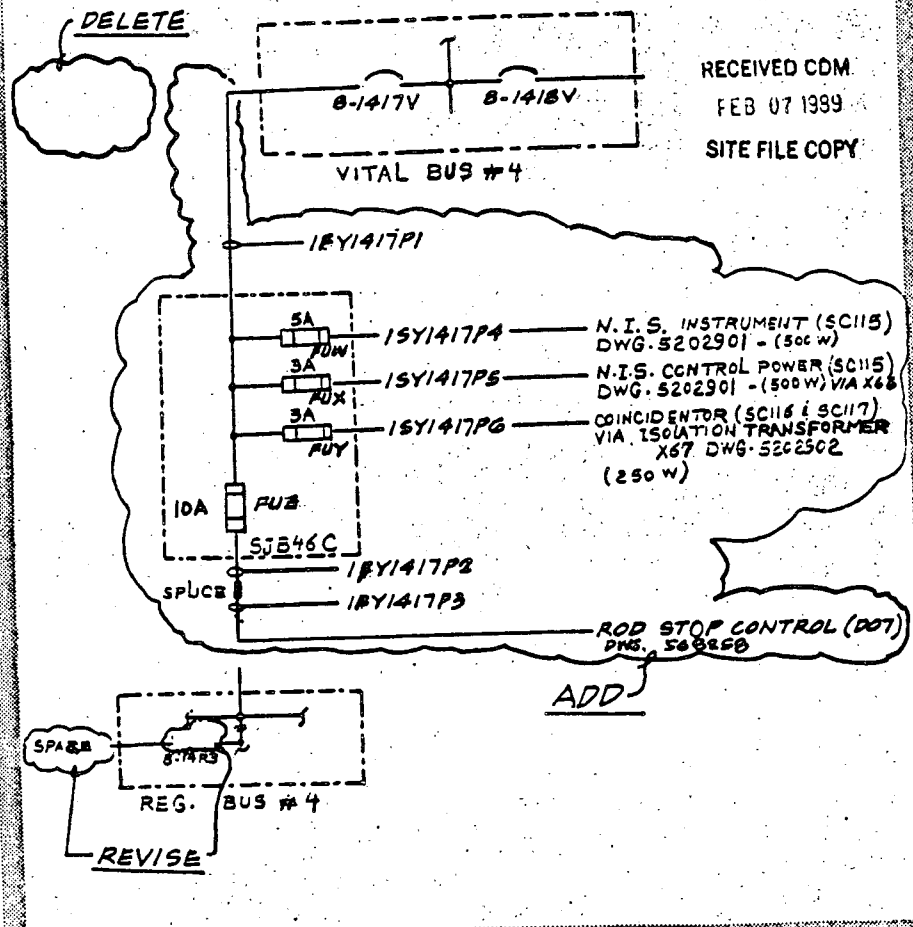
8902270311-49

FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SUPPLEMENTAL PAGE

AFTER

PROJECT NO.		DRAWING NO.	
5102174		E7466	
DATE	BY	DATE	BY
1/30/89	G.H. MOLAYEM		
Page 9 of 10		SR-EAN	

DESCRIPTION OF CHANGE



FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SUPPLEMENTAL PAGE

THIS CHANGE IS AN ADDITION ONLY. 'BEFORE' CONDITION DOES NOT EXIST.

AFTER

PROJECT NO.		DRAWING NO.	
5102174		E7466	
DATE	BY	DATE	BY
1/30/89	G.H. MOLAYEM		
Page 10 of 10		SR-EAN	

DESCRIPTION OF CHANGE

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NOTE

7 - FUSES IDENTIFIED IN JUNCTION BOXES PJB47C, QJB44C, RJB45C, SJ246C ARE BUSSMANN TYPE 'KTK', RATING AS MARKED, WITH FUSE HOLDER RATED 30 A, TYPE BM6Q31-SQ

8 FUSE SIZE (AS NOTED) AND TYPE (BUSSMANN TYPE KTK) ARE PER ENGINEERING DESIGN. REVISION REQUIRES PROJECT ENGINEERING OR STATION TECH. APPROVAL

9. THE FOLLOWING LAMICOID TAGS ARE SECURED TO THE LOAD (BOTTOM) WIRE AT THE FUSE BLOCK OF EACH FUSE ENGRAVING i.e. "BUSSMANN FUSE KTK-2 ONLY" FOR 2 AMP FUSE, KTK-3 FOR 3AMP FUSE, KTK-4 FOR 4AMP FUSE, KTK-5 FOR 5AMP FUSE, KTK-6 FOR 6AMP FUSE & KTK-10 FOR 10AMP FUSE.

ADD
FIELD NOTE: (DO NOT INC. ON DOC)

FIELD TO REMOVE FUSES AND LAMICOID TAGS FROM REGULATORS PREVIOUSLY USE FOR NIS.

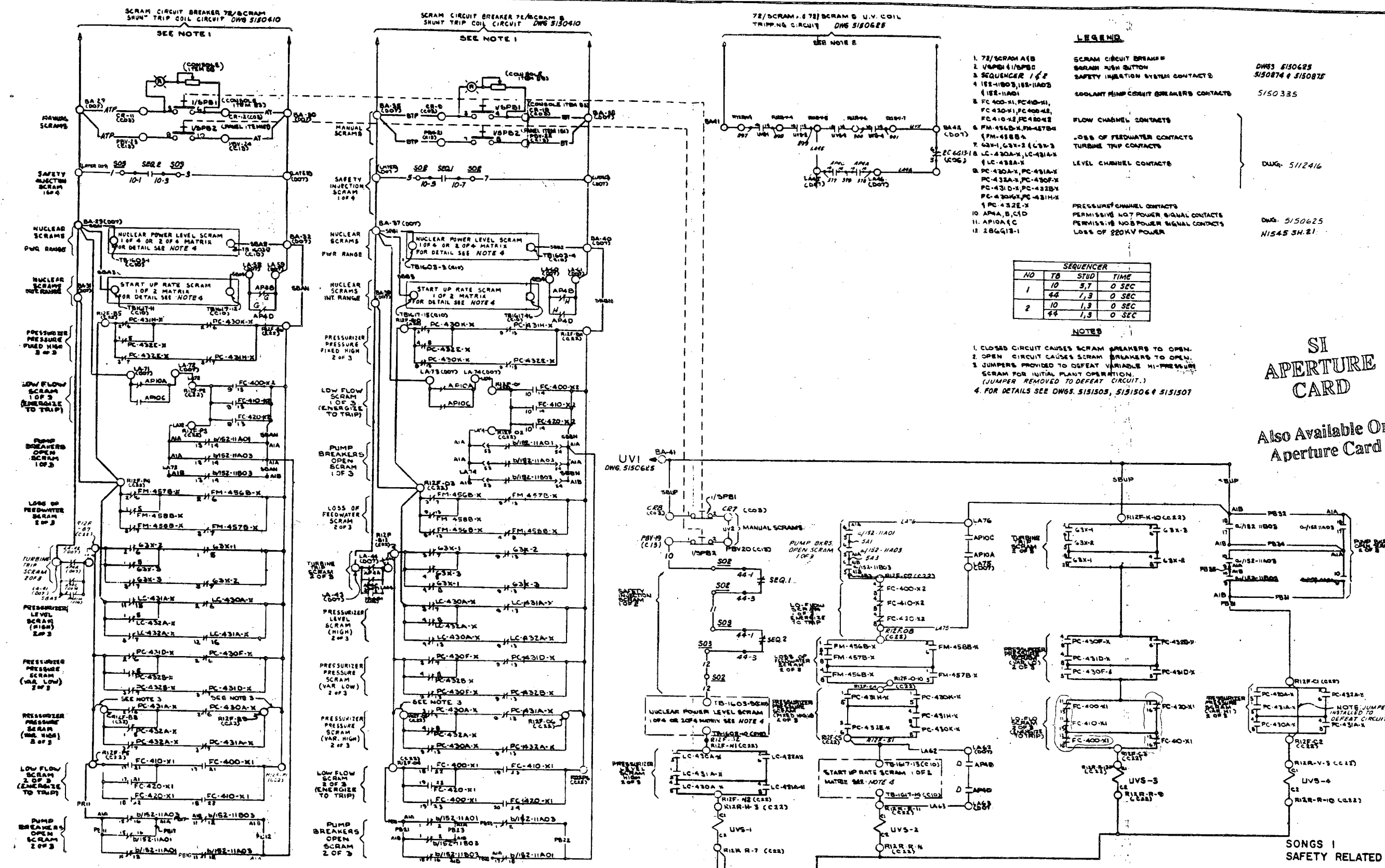
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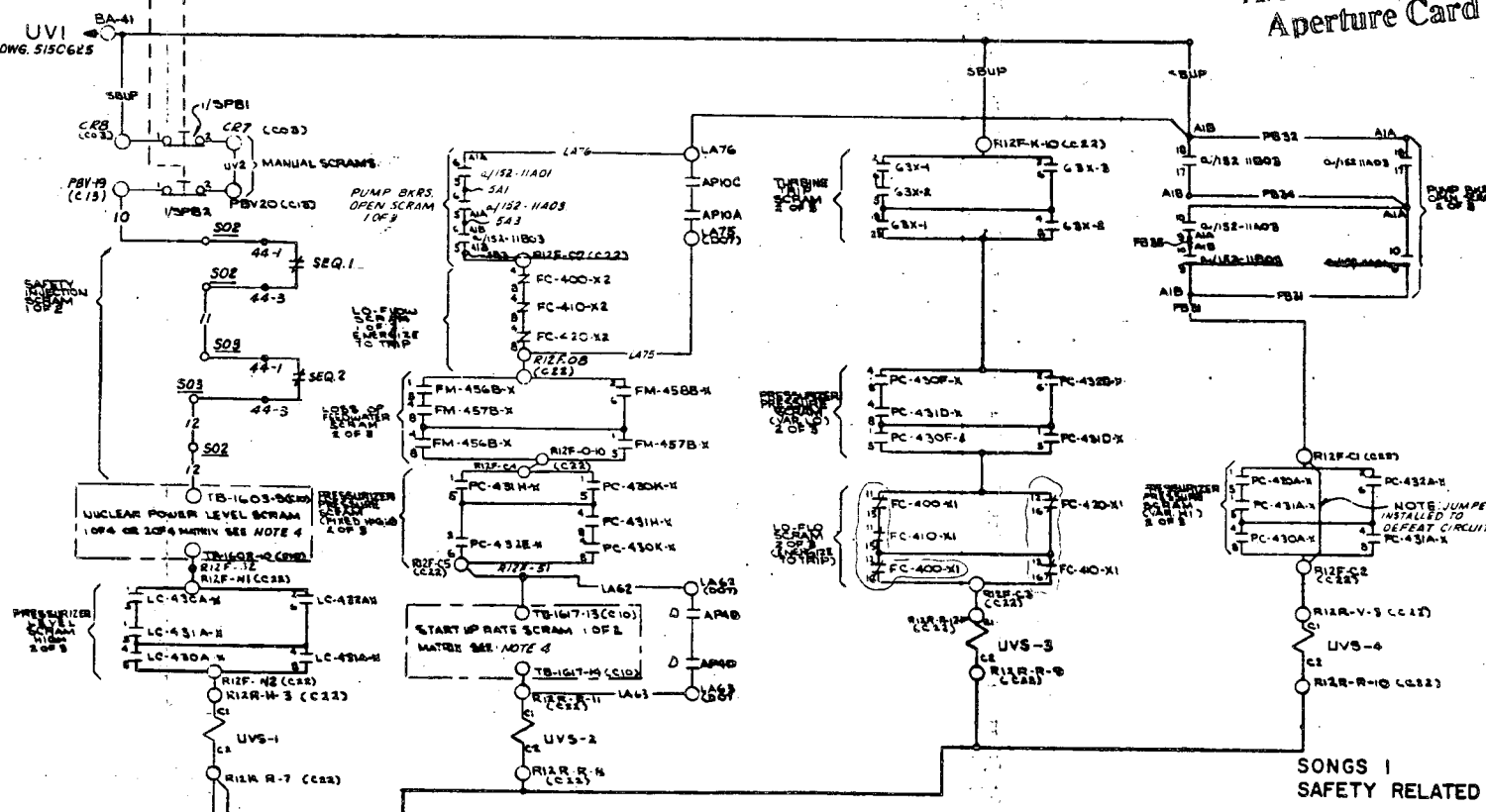
- LEGEND**
- 1. 72/SCRAM A (B)
 - 2. V/SPB 4 (I/P) (P/B)
 - 3. SEQUENCER 1 (S)
 - 4. I/SE-11A03, I/SE-11A03
 - 5. I/SE-11A01
 - 6. PC 400-X1, PC 400-X1, PC 410-X1, PC 400-X2, PC 410-X2, PC 420-X1
 - 7. FM-456B-X, FM-457B-X, FM-458B-X
 - 8. G3X-1, G3X-2 (C3X-3)
 - 9. PC 430A-X, PC 431A-X, PC 432A-X, PC 430F-X, PC 431F-X, PC 432F-X, PC 430A-X, PC 431A-X, PC 432A-X
 - 10. AP10A, B, C, D
 - 11. AP10A (C)
 - 12. 28G418-1

SEQUENCER

NO	TO	STUD	TIME
1	10	5, 7	0 SEC
2	44	1, 3	0 SEC
2	10	1, 3	0 SEC
2	44	1, 3	0 SEC

- NOTES**
1. CLOSED CIRCUIT CAUSES SCRAM BREAKERS TO OPEN.
 2. OPEN CIRCUIT CAUSES SCRAM BREAKERS TO OPEN.
 3. JUMPERS PROVIDED TO DEFEAT VARIABLE HI-PRESSURE SCRAM FOR INITIAL OPERATION. (JUMPER REMOVED TO DEFEAT CIRCUIT.)
 4. FOR DETAILS SEE DWGS. 515103, 515106 & 515107

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8902270311-52

N1542 SH. 10 A
SUPERSEDES WESTINGHOUSE DWG. 540F763

NO	REV	DESCRIPTION	DATE	BY	CHKD	APP'D	REVISION
1	1	AS BUILT - INCOOP DGN #3	6/1/76	...	...	...	...
2	2	AS BUILT - INCOOP DGN #3	6/1/76	...	...	...	...
3	3	AS BUILT - INCOOP DGN #3	6/1/76	...	...	...	...
4	4	AS BUILT - INCOOP DGN #3	6/1/76	...	...	...	...
5	5	AS BUILT - INCOOP DGN #3	6/1/76	...	...	...	...
6	6	AS BUILT - INCOOP DGN #3	6/1/76	...	...	...	...
7	7	AS BUILT - INCOOP DGN #3	6/1/76	...	...	...	...
8	8	AS BUILT - INCOOP DGN #3	6/1/76	...	...	...	...
9	9	AS BUILT - INCOOP DGN #3	6/1/76	...	...	...	...
10	10	AS BUILT - INCOOP DGN #3	6/1/76	...	...	...	...

PAGE 1 of 9

Southern California Edison Company
INTERIM DESIGN CHANGE NOTICE (IDCN)
 (For SONGS 2 & 3)

CDN/DCN USE ONLY
 IDCN NO. S-2
 DOCUMENT 5112259
 SHEET 8

PPE NO.
 DCP NO. 1-3003.OBS
 REV. NO. 0
 ESN VERSION NO.
 REV. NO.

ORIGINATOR: 1. B.N. CASTRO (ELEC) FAX: 807-5270 DATE: 8-4-88

DOCUMENT TITLE: SCHEMATIC DIA. REACTOR PROTEC. SYS. SC. SIB. SHEET: SR

DESCRIPTION OF CHANGE:
 - REVISE CIRCUIT TO N.I.S. OVERPOWER REACTOR TRIP,
 HI START-UP RATE REACTOR TRIP & UV COIL
 REACTOR TRIP.

- SEE SUPPLEMENTAL PAGES -

2. Other Affected Documents
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document:

3. Affected Systems: NIS

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/NES&L	
OTHER	DATE	CHECKER	DATE
		W. A. B. B.	8/21/88
CHECKER	DATE	INDEPENDENT REVIEW ENGR.	DATE
		To the site	8/21/88
INDEPENDENT REVIEW ENGR.	DATE	RESPONSIBLE ENGINEER	DATE
		William Stewart	8/5/88
RESPONSIBLE ENGINEER	DATE	GROUP SUPERVISING ENGINEER	DATE
			8/31/88
GROUP SUPERVISING ENGINEER	DATE	SUPERVISING ENGINEER I	DATE
SUPERVISING ENGINEER I	DATE	MANAGER, STATION TECHNICAL	DATE
MANAGER, STATION TECHNICAL	DATE	QUALITY ASSURANCE	DATE
QUALITY ASSURANCE	DATE	Conversion to DCN Date	DATE
		9-10-88	

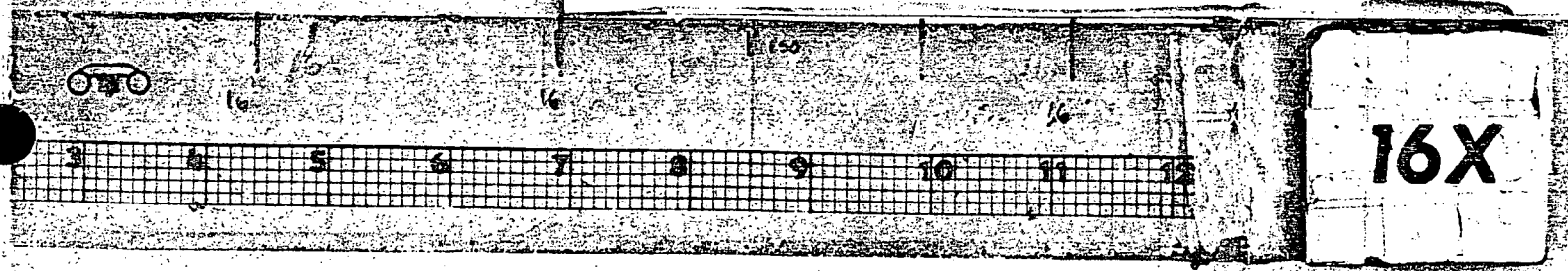
SEE PROJECT ADMINISTRATION

DCP 1-3003.OBS REV 0 SHEET 642

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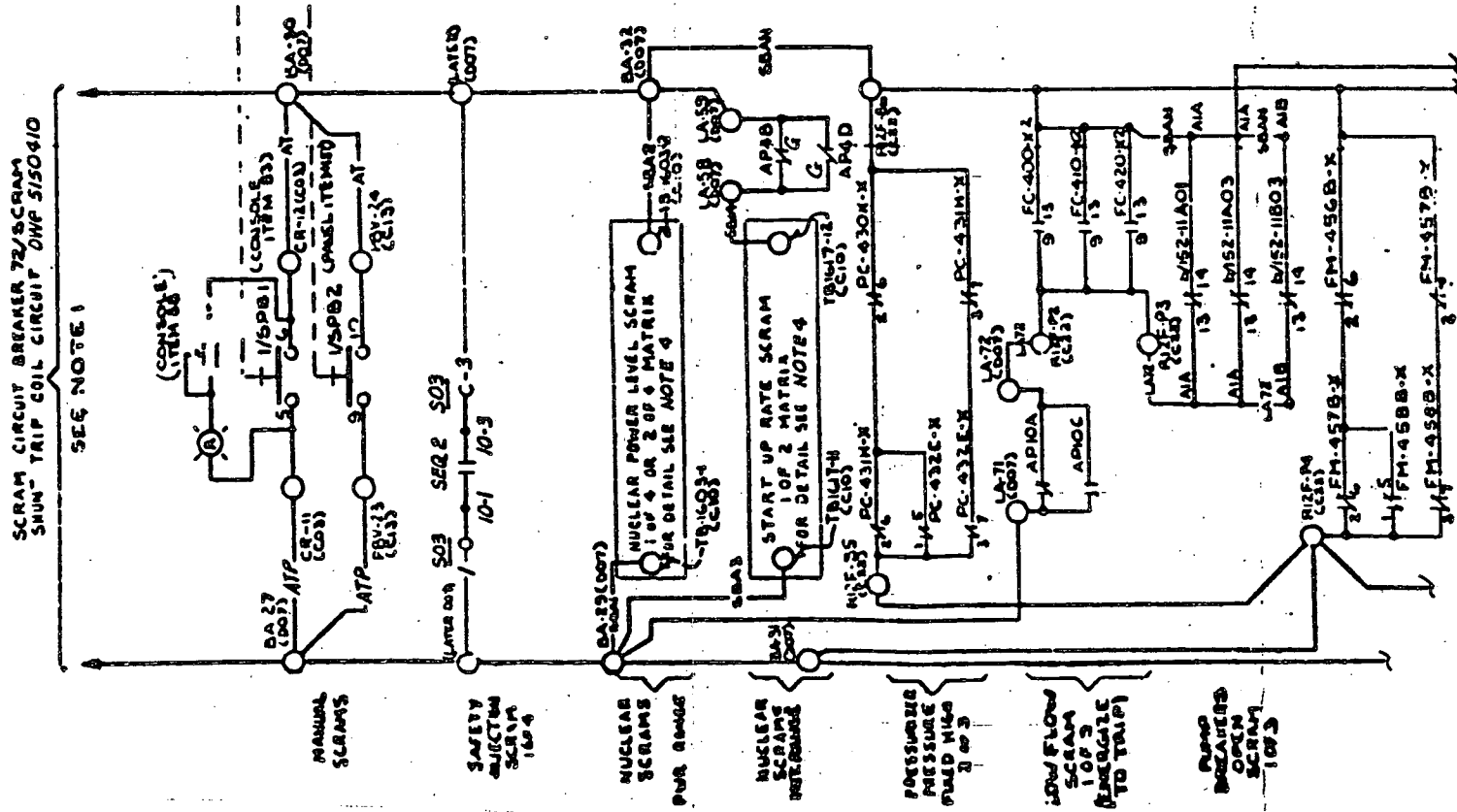
INTERIM DESIGN CHANGE
NOTICE (IDCN) DESIGN
5112259-8 (IDCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.
5112259-8

IDCN NUMBER		5-2		"X" UNIT
REV. NO.	DATE	REV. NO.	DATE	
8	8-4-88			SR

Date 8-4-88 Page 2 of 9
By B.N. CASTRO

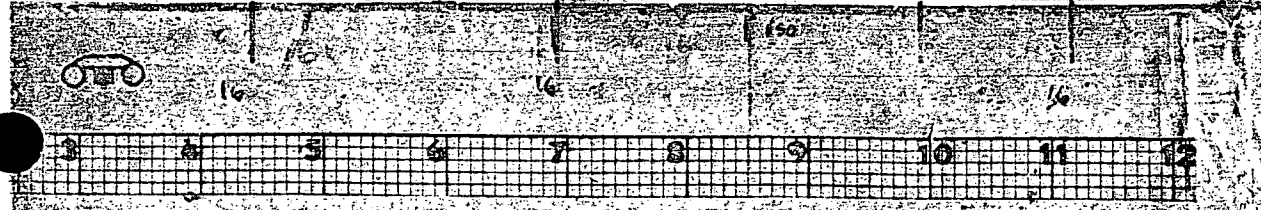
DESCRIPTION OF CHANGE



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Singer 2 & 3

INTERIM DESIGN CHANGE NOTICE (IDCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.

IDCN NUMBER					
DRAWING NO.	SHEET NO.	REV.	DATE	BY	STATUS
5112259	-	8			SR

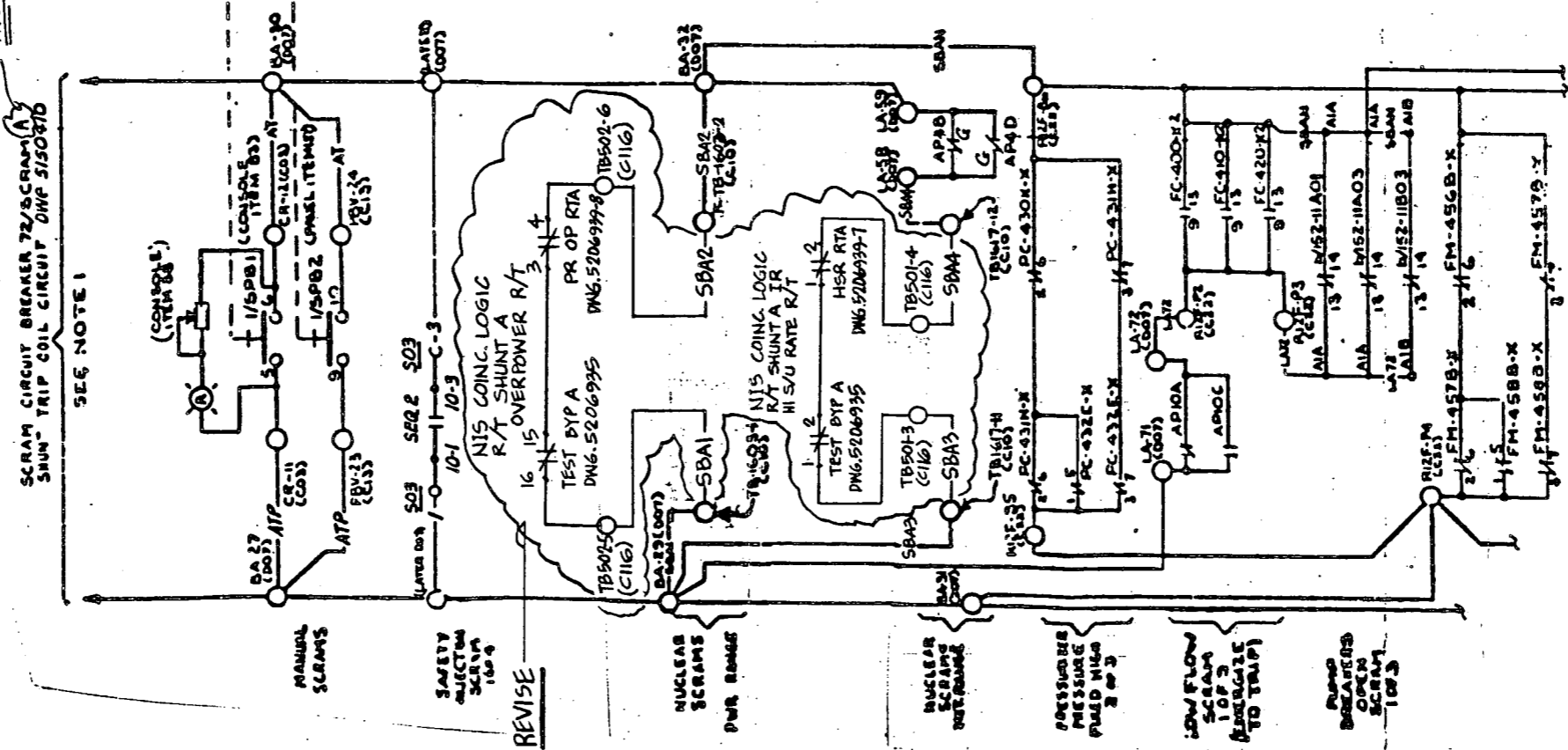
Date 8-4-88 Page 3 of 9

By B.N. CASTRO

DESCRIPTION OF CHANGE

DCP 1-2003 DBT REV. 0 SHEET 648

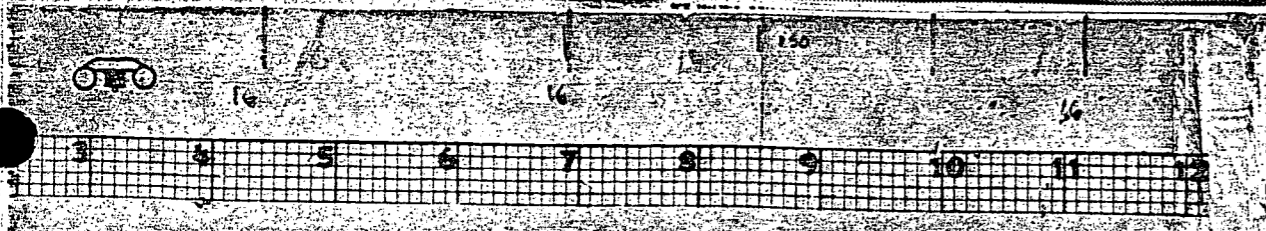
ADD



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Southern California Edison Company
Songs 2 & 3

INTERIM DESIGN CHANGE
NOTICE (IDCN)
SUPPLEMENTAL PAGE

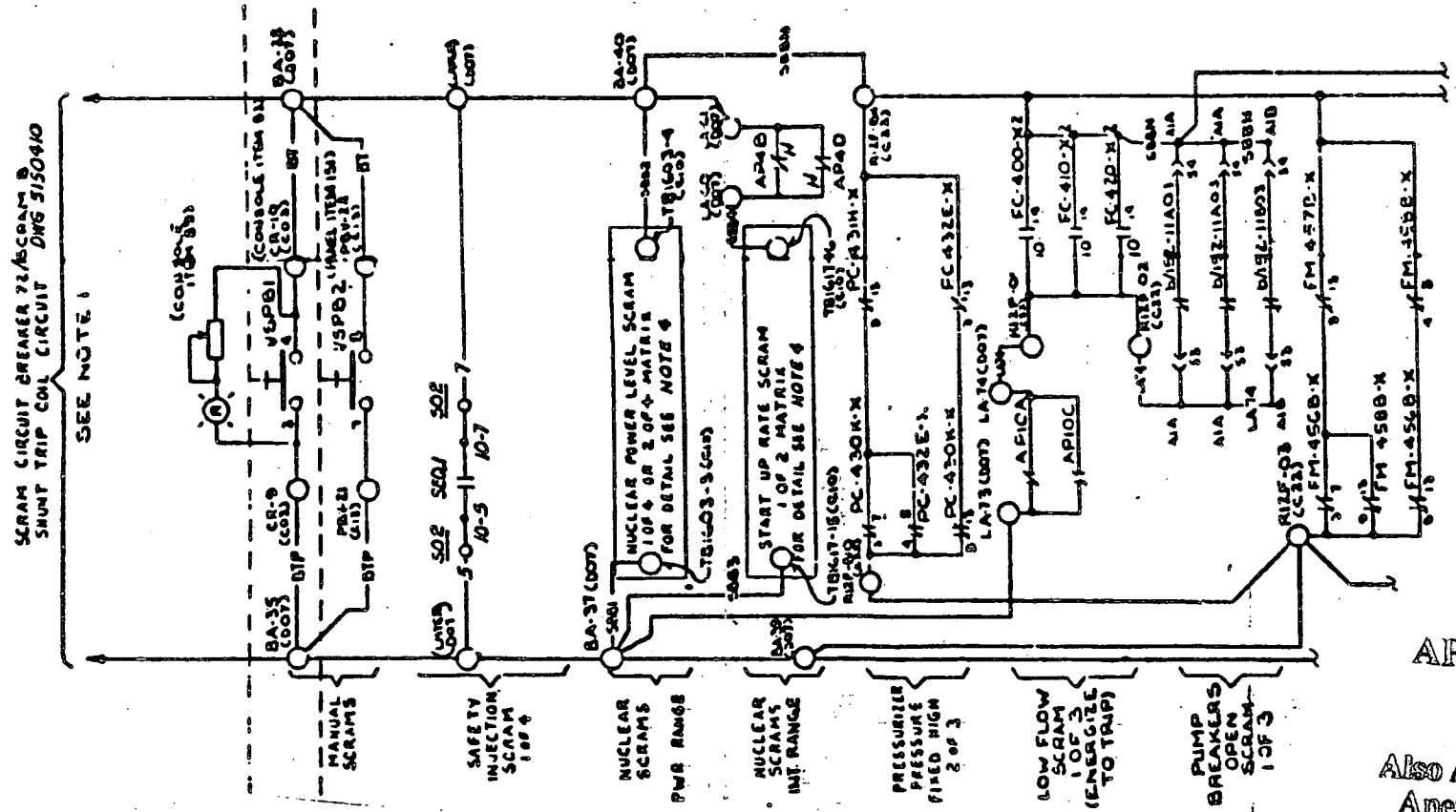
INTERIM DCN NO.

DRAWING NO.	REV. NO.	REV. DATE	DCN NUMBER		REV. DATE	REV. NO.	CLASS.
			DCN NO.	DCN REV.			
5112259	-	8		S-2			SR

Date 8-4-88 Page 4 of 9
By B.N. CASTRO

DCP 1-2005.081 REV 0 SHEET 649

DESCRIPTION OF CHANGE



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Southern California Edison Company
Simp. 2 & 3

INTERIM DESIGN CHANGE
NOTICE (IDCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.

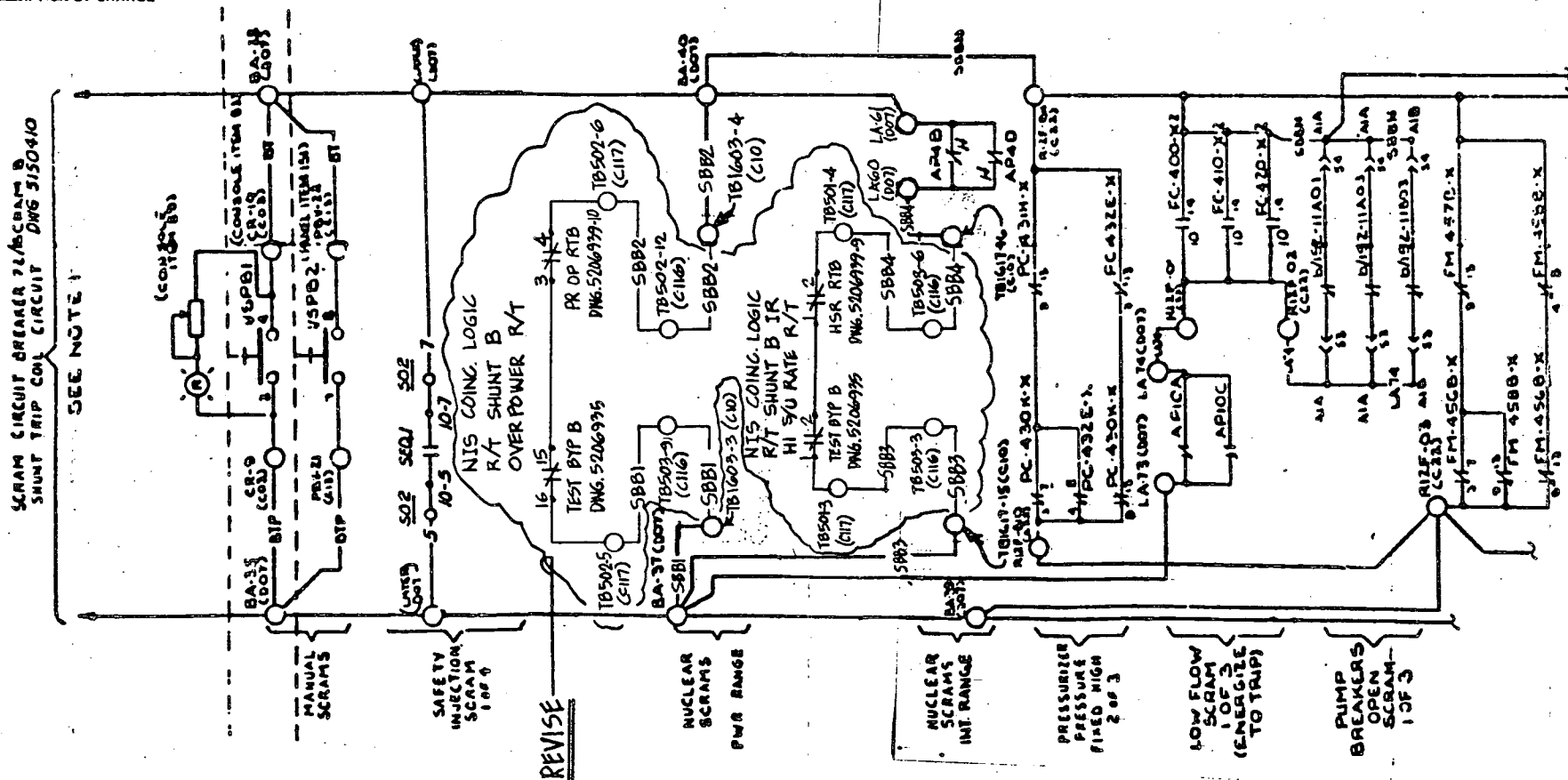
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DRAWING NO.	SHEET NO.	REV. NO.	REV. DATE		CLASS
			DOB. REV.	DCN NO.	
5112259	-	8			SR

Date 8-4-88 Page 5 of 9

By B.N. CASTRO

DESCRIPTION OF CHANGE

DWP 1-3003.08J REV 0 SHEET 670



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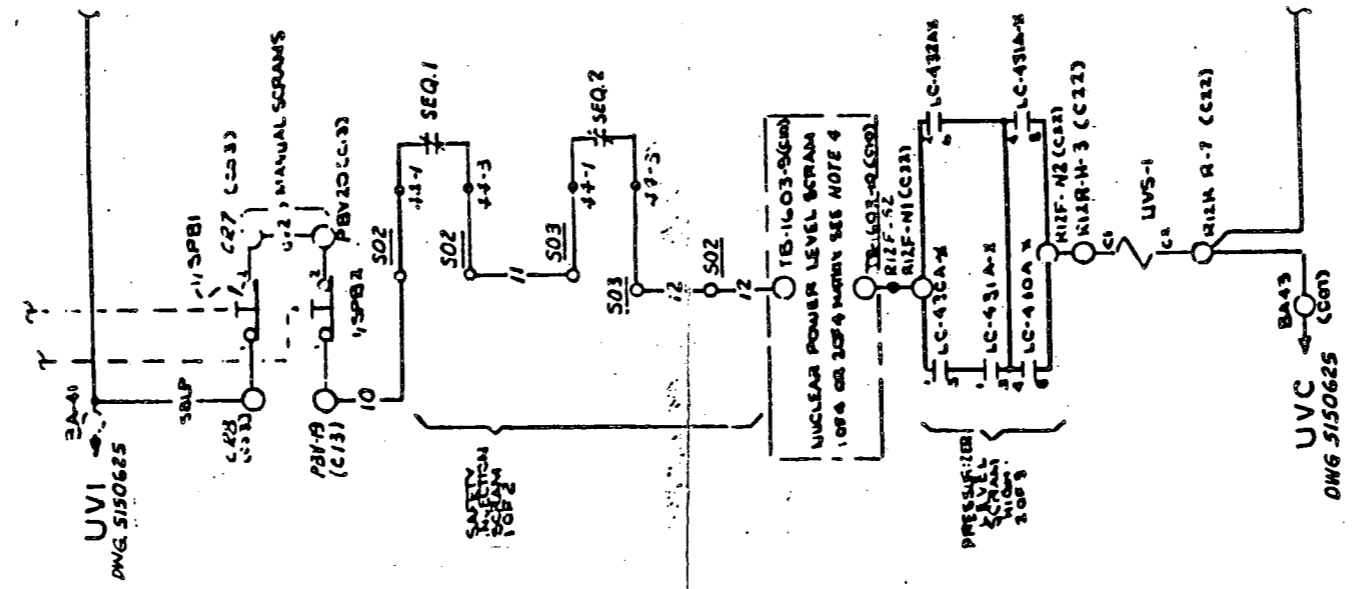
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NOTICE (IDCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.					
IDCN NUMBER 5-2					
DATE	BY	CHKD.	APP'D.	REV.	DESCRIPTION
5/12/59	-	8			SR

Date 8-4-88 Page 6 of 9
By B.N. CASTRO

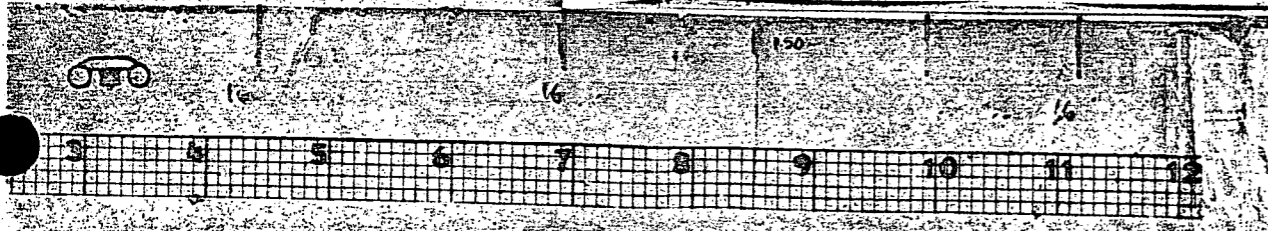
DCP 1-3005.00 REV 0 SHEET 651

DESCRIPTION OF CHANGE



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INTERIM DESIGN CHANGE
NOTICE (IDCN) ~~5112259~~
SUPPLEMENTAL PAGE

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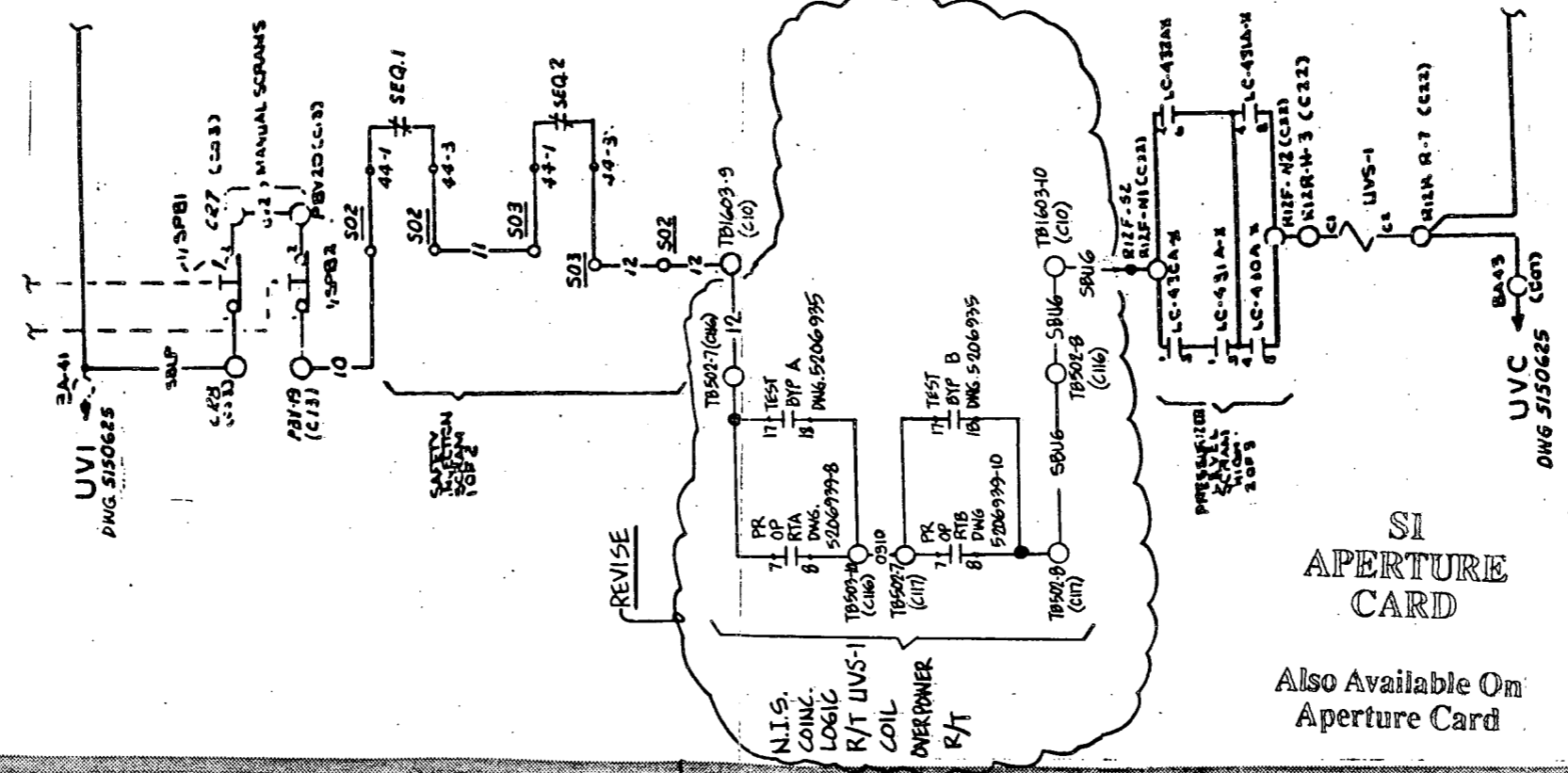
IDCN NUMBER				
5-2				
DRAWING NO.	REV. NO.	DATE	BY	CLASS
5112259	- 8			SR

Date 8-4-88 Page 7 of 9

By B.N. CASTRO

DESCRIPTION OF CHANGE

DCP 1-3003-08J REV 0 SHEET 652



AFTER

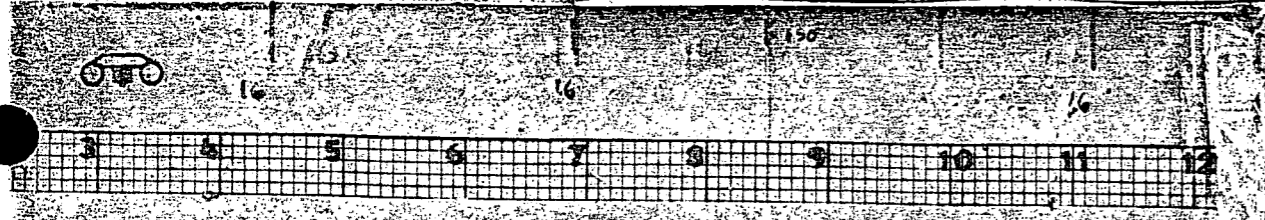
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Southern California Edison Company
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INTERIM DESIGN CHANGE
NOTICE (IDCN)
SUPPLEMENTAL PAGE

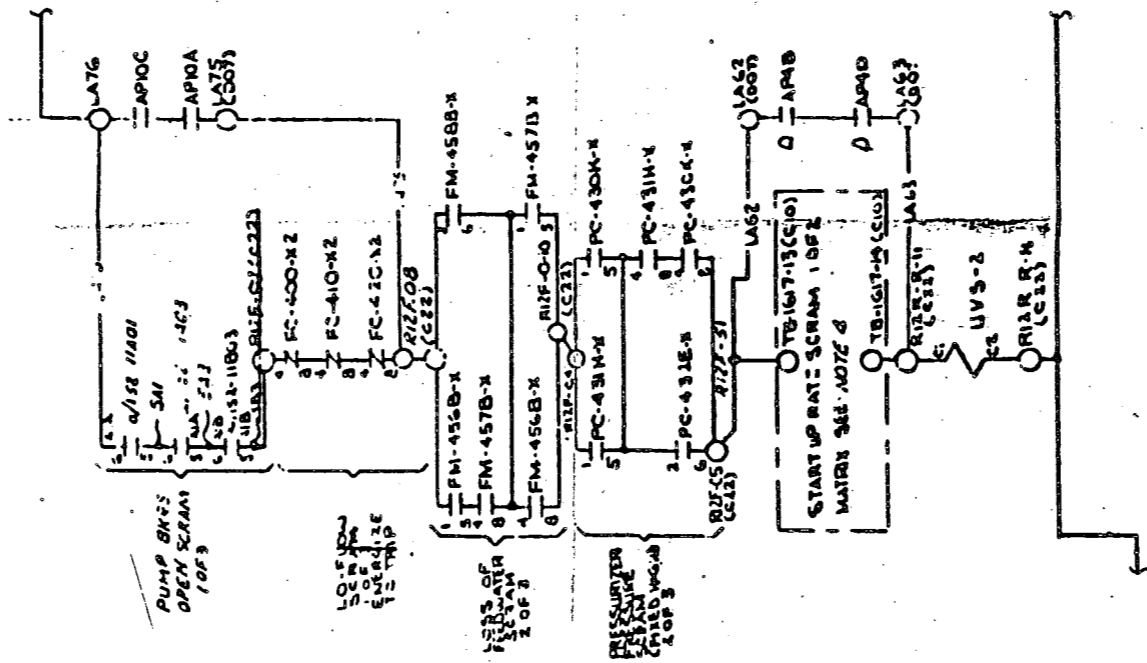
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5-2					
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5112259	-	8			SR

Date 8-4-88 Page 8 of 9
By B.N. CASTRO

DESCRIPTION OF CHANGE

DCP 1-2003 DBJ REV. 0 SHEET 653



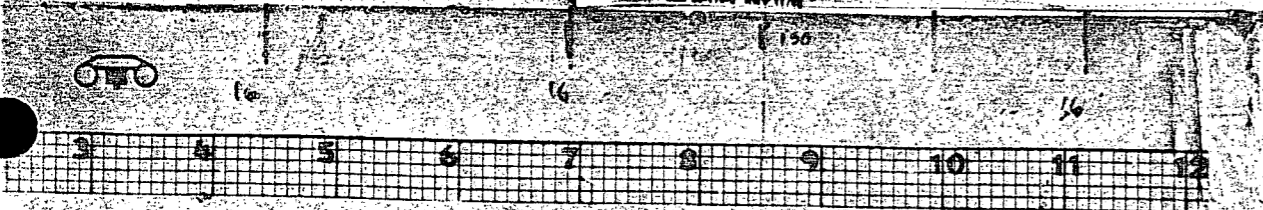
BEFORE

NOTES:

4. FOR DETAILS SEE
DNG. 5151505, 5151506
& 5151507.

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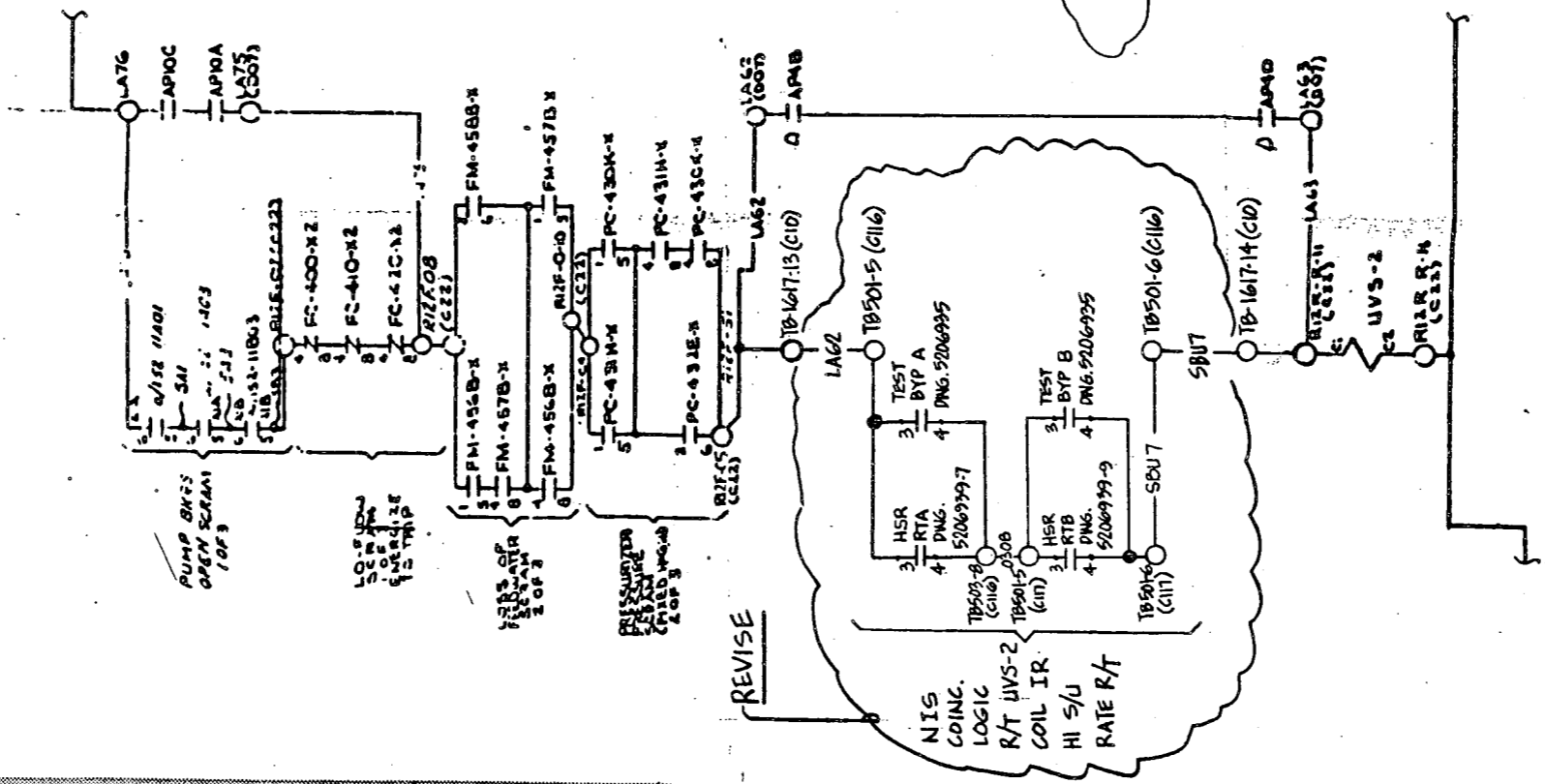
Southern California Edison Company
 Songs 2 & 3
INTERIM DESIGN CHANGE NOTICE (IDCN)
 SUPPLEMENTAL PAGE

INTERIM DCN NO.					
IDCN NUMBER S-2					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	BY	CHKD.
5112259	-	B			SR

Date **8-4-88** Page **9** of **9**
 By **B.N. CASTRO**

DCP 1-3003.08J REV 0 SHEET 654

DESCRIPTION OF CHANGE



AFTER

NOTES:
 DELETE NOTE 4.

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FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3	CDM/DDC USE ONLY CIG	INTERIM DCN NO.
	IDCN NO. S-1	PFC NO.
	DOCUMENT 5112259 Shl. Rev. - B	DCP NO./REV. NO. 3496.00TJ/0
	Page 1 of 7	DCN CONVERSION NO.
1. Originator KAYOKO WARNER Tel: 714-975-9316 Date 1-15-88		
Document Title SCHEMATIC DIAG. REACTOR PROTECTION SYSTEM SCRAM SIGNALS		DRADM I.D. QC E09 SR
DESCRIPTION OF CHANGE REVISE SCRAM A & B SHUNT & UV TRIP COIL CIRCUIT.		
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> DCP#3496-00TJ REV 0 SHT 52 OF 122 </div>		
2. Other Affected Documents	3. Affected Systems	4. Design Approvals
S151651	FWS RPI-RPS	CHECKED <i>[Signature]</i> DATE 5/25/88 INDEPENDENT REVIEW ENGR. <i>[Signature]</i> DATE 5/23/88 RESPONSIBLE ENGINEER <i>[Signature]</i> DATE 5-20-88 LEAD DESIGNER <i>[Signature]</i> DATE 5/10/88 OTHER _____ DATE _____ OTHER _____ DATE _____ OTHER _____ DATE _____
5. SCE/Contractor Project Administration		
Conversion to DCN Date _____		

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CARD

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Aperture Card

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FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

SUPPLEMENTAL PAGE

INTERIM DCN NO.				
IDCN NUMBER S-1				
DRAWING NO.	SHEET NO.	REV. NO.	DATE	QUALITY CLASS
5112259	-	8		SR

Date 1-15-88 Page 2 of 7

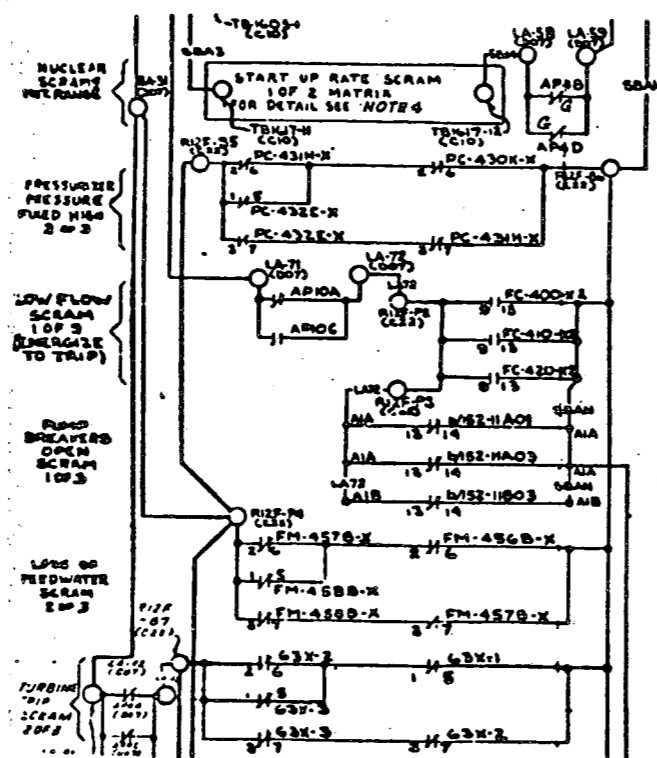
By KAYOKO WARNER

DESCRIPTION OF CHANGE

BEFORE

SCRAM CIRCUIT BREAKER 72/SCRAM
SHUNT TRIP COIL CIRCUIT DWG. 5150410

SEE NOTE 1



DCP#3496.00TJ REV 0 SHT 60 OF 62

DE-5006-2 1/87

FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

SUPPLEMENTAL PAGE

INTERIM DCN NO.				
IDCN NUMBER S-1				
DRAWING NO.	SHEET NO.	REV. NO.	DATE	QUALITY CLASS
5112259	-	8		SR

Date 1-15-88 Page 3 of 7

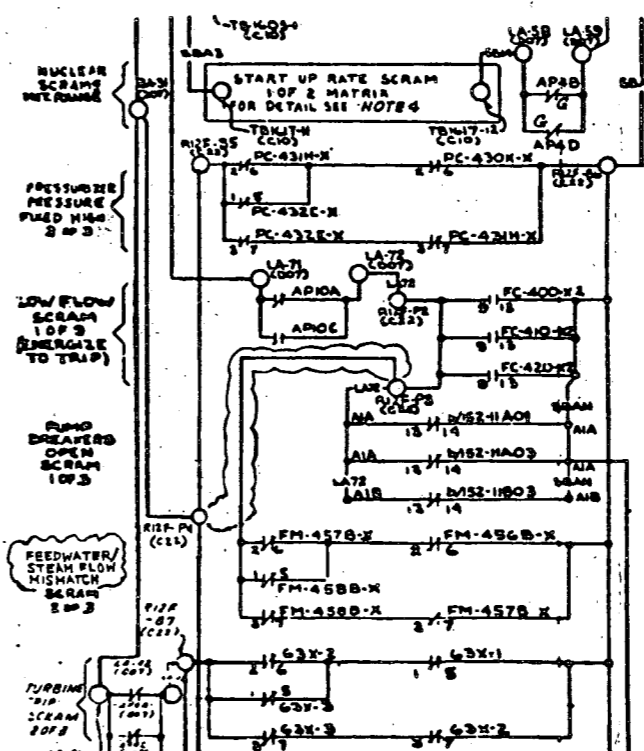
By KAYOKO WARNER

DESCRIPTION OF CHANGE

AFTER

SCRAM CIRCUIT BREAKER 72/SCRAM (A)
SHUNT TRIP COIL CIRCUIT DWG. 5150410

SEE NOTE 1



DCP#3496.00TJ REV 0 SHT 61 OF 62

DE-5006-2 1/87

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FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

SUPPLEMENTAL PAGE

INTERIM DCN NO.				
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DRAWING NO.	SHEET NO.	REV.	DATE	QUALITY CLASS
5112259	-	8		SR

Date 1-15-88 Page 4 of 7

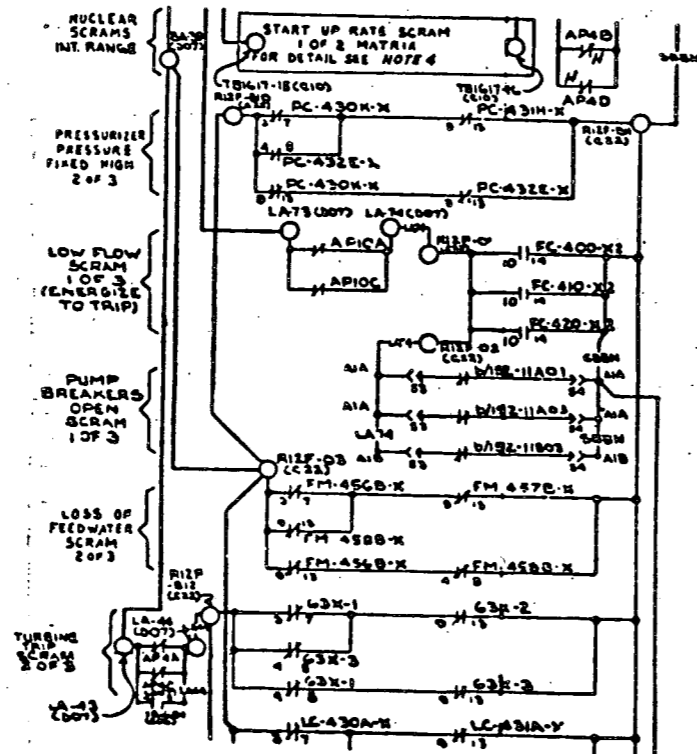
By KAYOKO WARNER

DESCRIPTION OF CHANGE

BEFORE

SCRAM CIRCUIT BREAKER 72/SCRAM B
SHUNT TRIP COIL CIRCUIT DWG. 5150410

SEE NOTE 1



DCP# 3496.001 REV 0 SHT 2 OF 2

16X

FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

SUPPLEMENTAL PAGE

INTERIM DCN NO.				
IDCN NUMBER S-1				
DRAWING NO.	SHEET NO.	REV.	DATE	QUALITY CLASS
5112259	-	8		SR

Date 1-15-88 Page 5 of 7

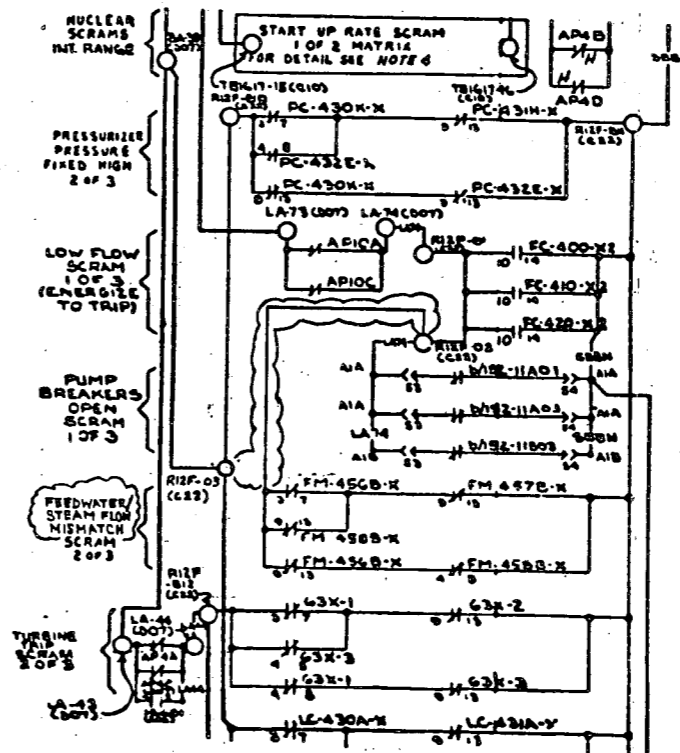
By KAYOKO WARNER

DESCRIPTION OF CHANGE

AFTER

SCRAM CIRCUIT BREAKER 72/SCRAM B
SHUNT TRIP COIL CIRCUIT DWG. 5150410

SEE NOTE 1



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FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

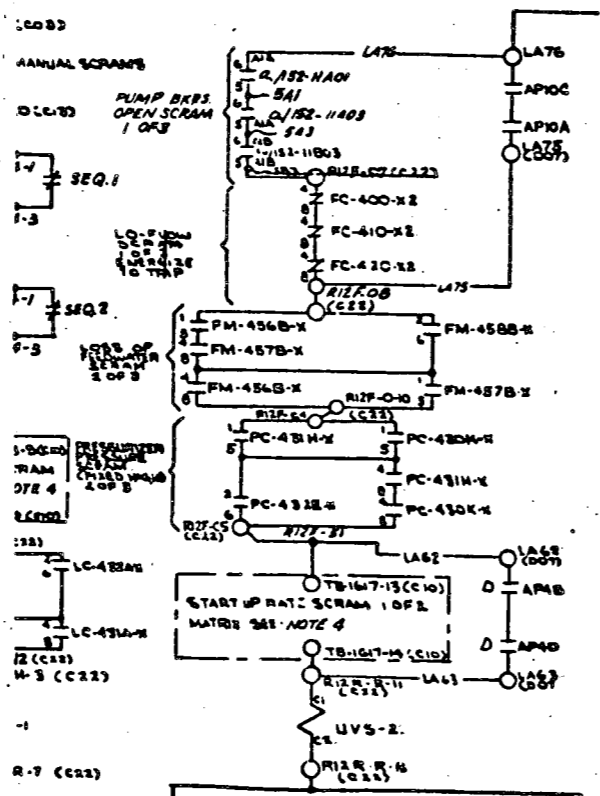
SUPPLEMENTAL PAGE

INTERIM DCN NO.					
IDCN NUMBER S-1					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DCN CONV. DATE	QUALITY CLASS
5112259	-	8			SR

Date 1-15-88 Page 6 of 7

By KAYOKO WARNER

DESCRIPTION OF CHANGE **BEFORE**



DCP#3496.00TJ REV 0 SHT 6 OF 6

FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

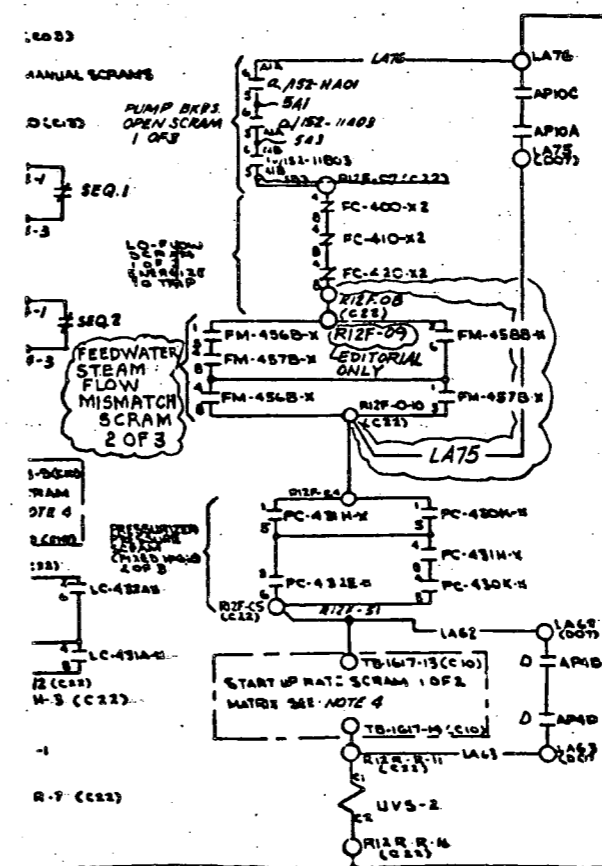
SUPPLEMENTAL PAGE

INTERIM DCN NO.					
IDCN NUMBER S-1					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DCN CONV. DATE	QUALITY CLASS
5112259	-	8			SR

Date 1-15-88 Page 7 of 7

By KAYOKO WARNER

DESCRIPTION OF CHANGE **AFTER**



DCP#3496.00TJ REV 0 SHT 6 OF 6

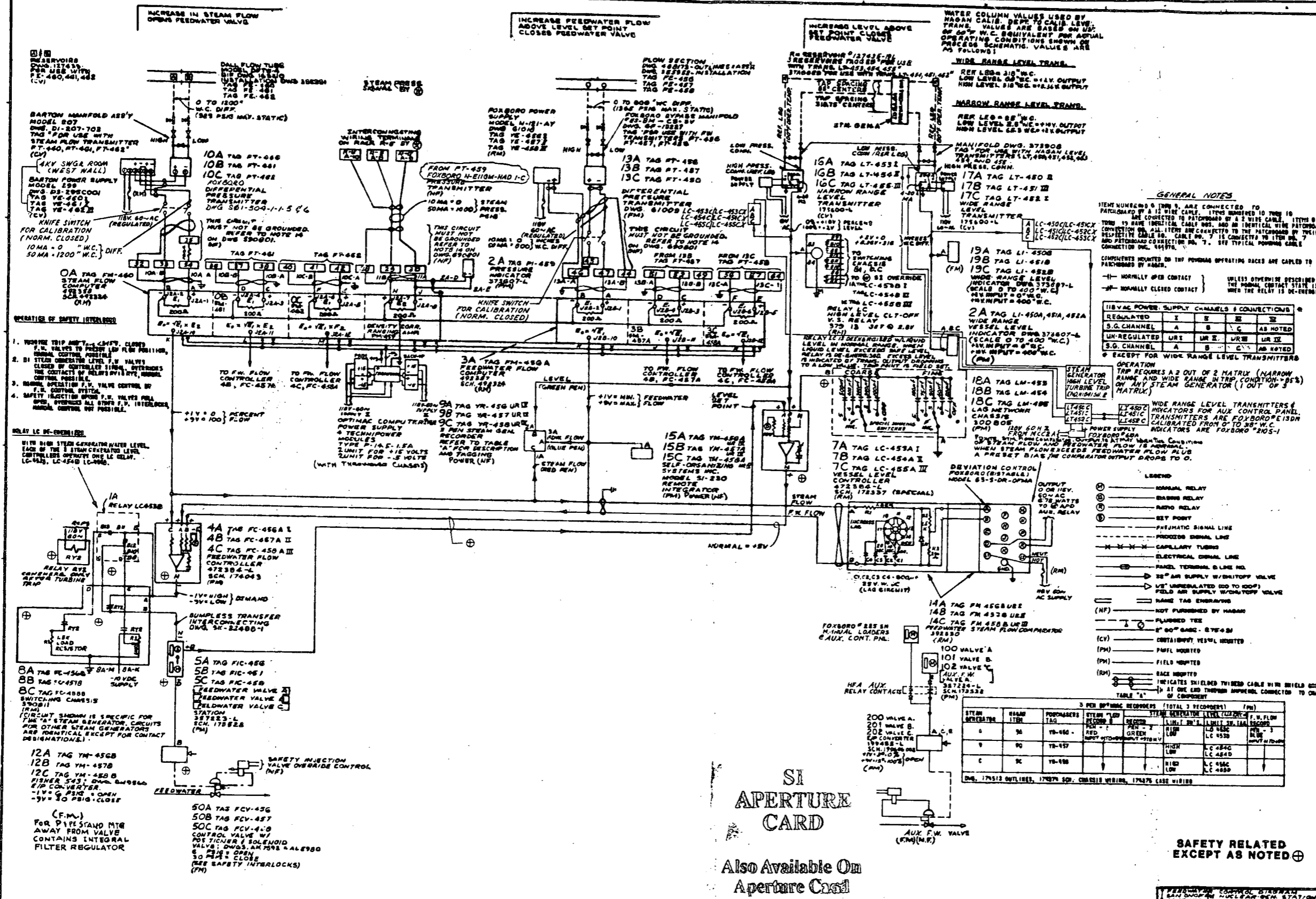
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REVISIONS

U	11-17-66	REVISED FOR UNIT 1
T	9-27-66	REVISED FOR UNIT 1
R	8-16-66	REVISED FOR UNIT 1
S	12-7-66	REVISED FOR UNIT 1
Q	9-16-66	REVISED FOR UNIT 1
P	8-8-66	REVISED FOR UNIT 1
N	11-9-65	REVISED FOR UNIT 1
M	10-12-65	REVISED FOR UNIT 1
L	9-2-65	REVISED FOR UNIT 1
K	8-25-65	REVISED FOR UNIT 1
J	9-1-65	REVISED FOR UNIT 1
I	7-1-65	REVISED FOR UNIT 1
H	7-21-65	REVISED FOR UNIT 1
G	6-21-65	REVISED FOR UNIT 1
F	6-10-65	REVISED FOR UNIT 1
E	6-10-65	REVISED FOR UNIT 1
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C	6-10-65	REVISED FOR UNIT 1
B	6-10-65	REVISED FOR UNIT 1
A	6-10-65	REVISED FOR UNIT 1

190436

BECHTEL NO. 3246-W-11-7-B



UNIT 1

Location	SAN ONOFRE NUCLEAR GEN. STA.	
Diagram Title	FEEDWATER CONTROL DIAGRAM	
Reference Drawings	No.	Revisions
3	45 BUILT - INCORP DCN 3	1-30-71
4	45 BUILT INCORP DCN 2	4-11-70
5	REC. REV. - REPRODUCED FROM REV. 2	11-14-70
6	REVISED FOR UNIT 1	11-17-66
7	REVISED FOR UNIT 1	9-27-66
8	REVISED FOR UNIT 1	8-16-66
9	REVISED FOR UNIT 1	12-7-66
10	REVISED FOR UNIT 1	9-16-66
11	REVISED FOR UNIT 1	8-8-66
12	REVISED FOR UNIT 1	11-9-65
13	REVISED FOR UNIT 1	10-12-65
14	REVISED FOR UNIT 1	9-2-65
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SAFETY RELATED EXCEPT AS NOTED

HARGREAVES CONTROL SYSTEMS
SOUTHERN CALIFORNIA Edison CO.
HARGREAVES
190436

 Southern California Edison Company FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONG )	EDM/SEA USE ONLY	FORM NO. 1-88-3364.0 Rev 2
	DCN NO. J-2265	REV. NO. 1-3364.00738
	DOCUMENT NO. 5129817	REV. NO. 5
	ISSUE	VERSION NO.

1. ORIGINATOR **M. GUECIA** DATE **87362** DATE **2-2-89**
 DOCUMENT TITLE **FEEDWATER CONTROL DIAGRAM** GRADE **IC-16** **SREAN**

DESCRIPTION OF CHANGE
 THIS FIDCN REVISES INPUTS TO LI-450A, 451A & 452A FROM 0-10VDC TO 2-10VDC SINCE ACTUAL INPUT TO INDICATORS IS 2-10VDC.

THE 'BEFORE' OF THIS FIDCN REFLECTS THE 'AFTER' STATUS IN FIDCN J-2224, PAGE 5

54

REF: RPR-2442

PE WAIVER REQUIRED	<input type="checkbox"/> YES
	<input checked="" type="checkbox"/> NO
PFC REVISION REQUIRED	<input type="checkbox"/> YES
	<input checked="" type="checkbox"/> NO

2. Other Affected Documents
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document:

RECEIVED CDM
 FEB 03 1989
 SITE FILE COPY

3. Affected Systems **MSS**

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/RES & L	
OTHER	DATE	OTHER	DATE
OTHER	DATE	ENGINEER	DATE
ENGINEER	DATE	INDEPENDENT REVIEW ENGR.	DATE
INDEPENDENT REVIEW ENGR.	DATE	TECHNICAL ENGINEER	DATE
TECHNICAL ENGINEER	DATE	GROUP SUPERVISING ENGINEER	DATE
GROUP SUPERVISING ENGINEER	DATE	SUPERVISING ENGINEER	DATE
SUPERVISING ENGINEER	DATE	MANAGER, SVAYIN TECHNICAL	DATE
MANAGER, SVAYIN TECHNICAL	DATE	QUALITY ASSURANCE	DATE
QUALITY ASSURANCE	DATE	CONVERSION TO DCN DATE	DATE

Conversion to DCN Date: _____ DATE: **2/3/89**

 Southern California Edison Company
 INTERIM DCN NO. _____

FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

F IDCN NUMBER J-2265					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DES. ENGR.	QUALITY CLASS
5129817	-	5			SR EAN

Date **2-2-89** Page **2** of **2**
 By **M. GUECIA**

DESCRIPTION OF CHANGE **BEFORE**

2A TAG LI-450A, 451A, 452A
 WIDE RANGE VESSEL LEVEL INDICATOR
 PWG. M41282 SH.3 (SCALE 0 TO 318" W.C.)
 + 0 V INPUT = 0" W.C.
 + 10 V INPUT = 318" W.C.

AFTER

2A TAG LI-450A, 451A, 452A
 WIDE RANGE VESSEL LEVEL INDICATOR
 PWG. M41282 SH.3 (SCALE 0 TO 318" W.C.)
 + 2 V INPUT = 0" W.C.
 + 10 V INPUT = 318" W.C.

RECEIVED CDM
 FEB 03 1989
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INTERIM DCN NO. _____ PAGE 1 of 5

Southern California Edison Company

FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
(For SONGS 2 & 3)

CDM/DCN USE ONLY
 IDCN NO. J-2224
 DOCUMENT NO. 5129817
 SHEET 3

PPC NO. 1-88-3364.00 REV. 2
 DEP. NO. 1-3364.00137
 REV. NO. 2
 ECU VERSION NO. _____
 REV. NO. _____

1. K. LY DATE 1/24/89
 FEEDWATER CONTROL DIAGRAM
 IC-16 GREEN

DESCRIPTION OF CHANGE

- REVISE SCALES FOR LI-450A, LI-451A, LI-452A, LI-450B, LI-451B & LI-452B FROM 0-400" W.C. TO 0-318" W.C.
- REVISE INPUT SIGNALS TO THE ABOVE LEVEL INDICATORS.
- REVISE LI-450C, LI-451C & LI-462C MANUFACTURER & MODEL NO. FROM FOXBORO MODEL # 2105-1 TO SIGMA MODEL NO. 9270 TO REFLECT PLANT-AS-BUILT CONDITION.

8 REF: STATION REQUEST
NCR 501-P-6813

PE WAIVER REQUIRED YES NO
 PPO REVISION REQUIRED YES NO

2. Other Affected Documents
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached).
 The following document: M-6543

RECEIVED CDM
 JAN 27 1989
 SITE FILE COPY

3. Affected Systems MSS

4. SCE Design Approvals

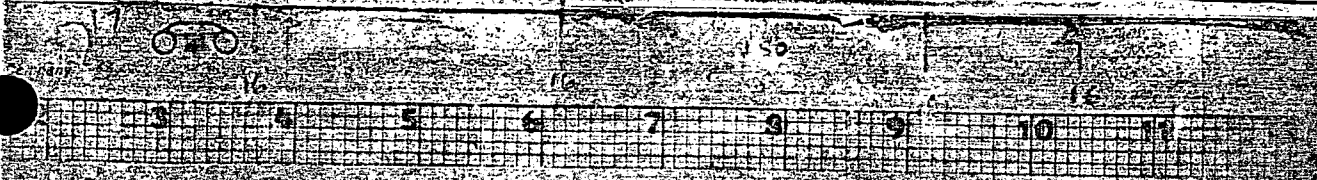
NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/NE&L	
OTHER	DATE	OTHER	DATE
<u>Jan M. Fyke</u>	<u>1-27-89</u>		
CHECKER	DATE	CHECKER	DATE
INDEPENDENT REVIEW ENG.	DATE	INDEPENDENT REVIEW ENG.	DATE
		<u>Edwards</u>	<u>1/24/89</u>
RESPONSIBLE ENGINEER	DATE	RESPONSIBLE ENGINEER	DATE
		<u>R. Ly</u>	<u>1/24/89</u>
DISCIPLINE SUPERVISOR	DATE	DISCIPLINE SUPERVISOR	DATE
<u>D. Williams</u>	<u>1/24/89</u>	<u>Edwards</u>	<u>1/26/89</u>
SUPERVISING ENGINEER	DATE	PROJECT ENGINEER	DATE
MANAGER, SYSTEMS ENGINEER	DATE	DISCIPLINE ENGINEER	DATE
QUALITY ASSURANCE	DATE	QUALITY ASSURANCE	DATE
		<u>C.K. Hilly</u>	<u>1-27-89 1630</u>

Conversion to DCN Date _____

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Songs 1, 2 & 3

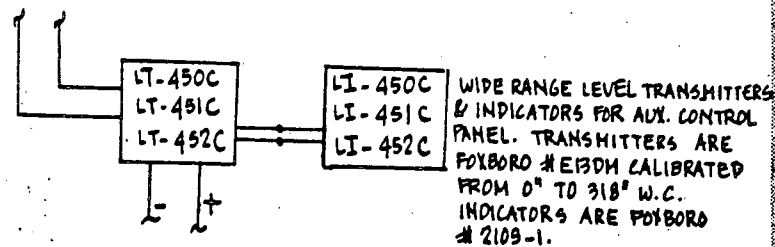
FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

BEFORE

INTERIM DCN NO.					
DRAWING NO. 5129817					
SHEET NO. -					
REV. NO. 5					
DATE					
SUB. REV.					
SER. NO.					
BY K. J. [Signature]					

Date 1/24/89 Page 2 of 5
By K. J. [Signature]

DESCRIPTION OF CHANGE



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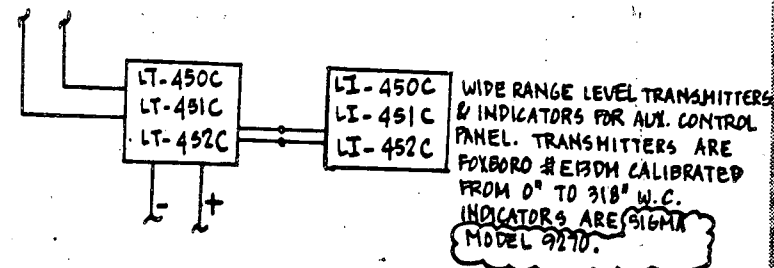
FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

AFTER

INTERIM DCN NO.					
DRAWING NO. 5129817					
SHEET NO. -					
REV. NO. 5					
DATE					
SUB. REV.					
SER. NO.					
BY K. J. [Signature]					

Date 1/24/89 Page 3 of 5
By K. J. [Signature]

DESCRIPTION OF CHANGE



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FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

BEFORE

INTERIM DCN NO.
[]

DRAWING NO.	SHEET NO.	REV. NO.	DCN NUMBER		QUALITY CLASS
			DATE	REV. NO.	
512987	-	5			PREP

Date 1/24/89 Page 4 of 5
By K. Ly

DESCRIPTION OF CHANGE

19A TAG LI-450B
19B TAG LI-451B
19C TAG LI-452B
WIDE RANGE LEVEL INDICATOR
DWG. 373607-L (SCALE 0 TO 400" W.C.)
+ 2V INPUT = 0"
+ 10V INPUT = 400" W.C.

RECEIVED CDM
JAN 27 1989
SITE FILE COPY

2A TAG LI-450A, 451A, 452A
WIDE RANGE VESSEL LEVEL INDICATOR
DWG. 373607-L (SCALE 0 TO 400" W.C.)
+ 2V INPUT = 0" W.C.
+ 10V INPUT = 400" W.C.

REFERENCE DRAWINGS

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

AFTER

INTERIM DCN NO.
[]

DRAWING NO.	SHEET NO.	REV. NO.	DCN NUMBER		QUALITY CLASS
			DATE	REV. NO.	
512987	-	5			PREP

Date 1/24/89 Page 5 of 5
By K. Ly

DESCRIPTION OF CHANGE

19A TAG LI-450B
19B TAG LI-451B
19C TAG LI-452B
WIDE RANGE LEVEL INDICATOR
DWG. ~~451421~~ (SCALE 0 TO 318" W.C.)
+ 2V INPUT = 0"
+ 10V INPUT = 318" W.C.

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2A TAG LI-450A, 451A, 452A
WIDE RANGE VESSEL LEVEL INDICATOR
DWG. ~~M41202 SH.3~~ (SCALE 0 TO 318" W.C.)
+ 0V INPUT = 0" W.C.
+ 10V INPUT = 318" W.C.

ADD

5123403
REFERENCE DRAWINGS

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Southern California Edison Company
FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
 (For SONGS 1-3-89)

PROJECT NO. **J-2135** DCN NO. **3496.007J**
 DOCUMENT NO. **5129817** REV. NO. **5**

ORIGINATOR: **M. GUECIA** DATE: **1-16-89**
 DRAWING TITLE: **FEEDWATER CONTROL DIAGRAM** SHEET NO. **1C-20** OF **2**
 DESCRIPTION OF CHANGE: **CHANGED FE-456, FE-457, AND FE-458 OUTPUT RANGES TO AGREE WITH FIDCN J-2023 Page 5 of 7.**

DOCUMENT QC WAS REVISED PER IDCN 5-2 FROM SREAN TO SR. THE 'BEFORE' OF THIS FIDCN REFLECTS THE 'AFTER' STATUS IN IDCN 5-2, DCP 3496.007J, REV. 0, SHT 152.

REF. CALC. DC-2476 REV 2 FOR CHANGE BASIS

PE WAIVER REQUIRED YES NO
 PFC REVISION REQUIRED YES NO

2. Other Affected Documents:
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document: **FEEDWATER CONTROL DIAGRAM**

3. Affected Systems: **FWS**

4. SCE Design Approvals:

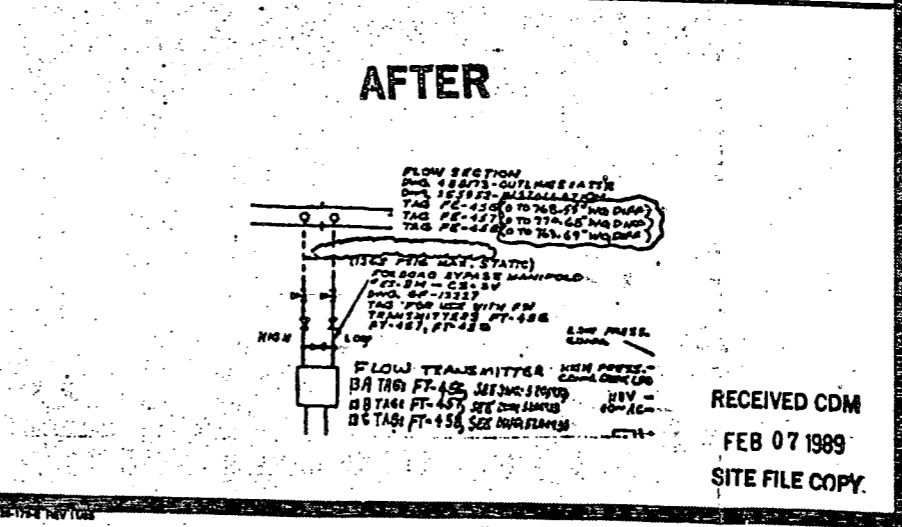
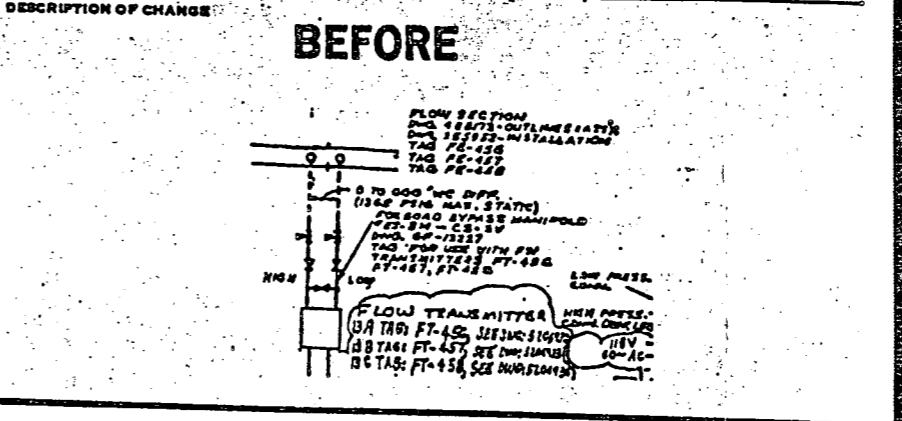
NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/HES & L	
OTHER	DATE	OTHER	DATE
CHIEF		CHIEF	
ENGINEER		ENGINEER	
INDEPENDENT REVIEW ENGINEER		INDEPENDENT REVIEW ENGINEER	
RESPONSIBLE ENGINEER		RESPONSIBLE ENGINEER	
GROUP SUPERVISOR/ENGINEER		GROUP SUPERVISOR/ENGINEER	
SUPERVISOR/ENGINEER I		PROJECT ENGINEER	
MANAGER, STATION TECHNICAL		MANAGER, STATION	
QUALITY ASSURANCE		QUALITY ASSURANCE	

Conversion to DCN Date: _____

INTERIM DCN NO. _____
 FIDCN NUMBER: **J-2135**

DRAWING NO.	SHEET NO.	REV. NO.	DATE	DCN NO.	STATUS
5129817	-	5			SR

Date: **1-16-89** Page **2** of **2**
 By: **M. GUECIA**



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REFERENCE: 80123-7-4.00

ENCLOSURE: 1A-01
SO 1
(When Form Filled Out)

INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)

SCE Southern California Edison Company		FORM/DOC USE ONLY	FORM NO.
INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)		TITLE: <i>5-17</i>	DATE: <i>5-17-84</i>
1. WATCHING ORGANIZATION		DRAWN: <i>37298/P</i>	DATE: <i>4/17/84</i>
RESPONSIBLE ENGINEER		SHEET: <i>1</i> OF <i>3</i>	DATE: <i>5-9-84</i>
PROJECTING ORGANIZATION		DATE: <i>5-9-84</i>	DATE: <i>5-9-84</i>
DESCRIPTION OF CHANGE		DATE: <i>5-9-84</i>	
<p>THE SCALING ON THE STEAM GENERATOR NARROW RANGE LEVEL TRANSMITTERS IS MODIFIED SO THAT THE STEAM PRESSURE/TEMPERATURE ASSUMPTION CORRESPONDS TO LATEST VALUES AT 50% POWER I.E. 50%²/705PSI.</p>			
<p>RECEIVED MAY 11 1984 CDM SITE</p>			
2. OTHER AFFECTED DOCUMENTS		3. AFFECTED SYSTEMS	
<p><i>451775 (DCN-1-1A)</i> <i>451776 (DCN-1-1A)</i> <i>451775 (DCN-1-1A)</i> <i>NER-501-P-1704</i></p>			
4. DESIGN APPROVALS			
DESIGNED BY: <i>[Signature]</i> DATE: <i>4-17-84</i>		CHECKED BY: <i>[Signature]</i> DATE: <i>5-10-84</i>	
DRAWN BY: <i>[Signature]</i> DATE: <i>5/1/84</i>		DESIGNED BY: <i>[Signature]</i> DATE: <i>5-9-84</i>	
PROJECTING ORGANIZATION: <i>[Signature]</i> DATE: <i>5-9-84</i>		CIVIL/STRUCTURAL: <i>N/A</i> DATE: <i>N/A</i>	
MECHANICAL: <i>N/A</i> DATE: <i>N/A</i>		ELECTRICAL: <i>N/A</i> DATE: <i>N/A</i>	
PLUMBING: <i>N/A</i> DATE: <i>N/A</i>		MECHANICAL: <i>N/A</i> DATE: <i>N/A</i>	
OTHER: <i>N/A</i> DATE: <i>N/A</i>		MECHANICAL: <i>N/A</i> DATE: <i>N/A</i>	
OTHER: <i>[Signature]</i> DATE: <i>5/1/84</i>		MECHANICAL: <i>N/A</i> DATE: <i>N/A</i>	
STATION TECHNICAL NUMBER (SCE USE ONLY)		DEPENDENT ORGANIZATION	
5. BY ENGINEERING GROUP ONLY (INTERFACE REVIEW ONLY)		DATE	
6. CONSTRUCTION COMPLETE? DOCUMENTATION		DATE	
7. DATE CONVERTED TO DCN		DATE	

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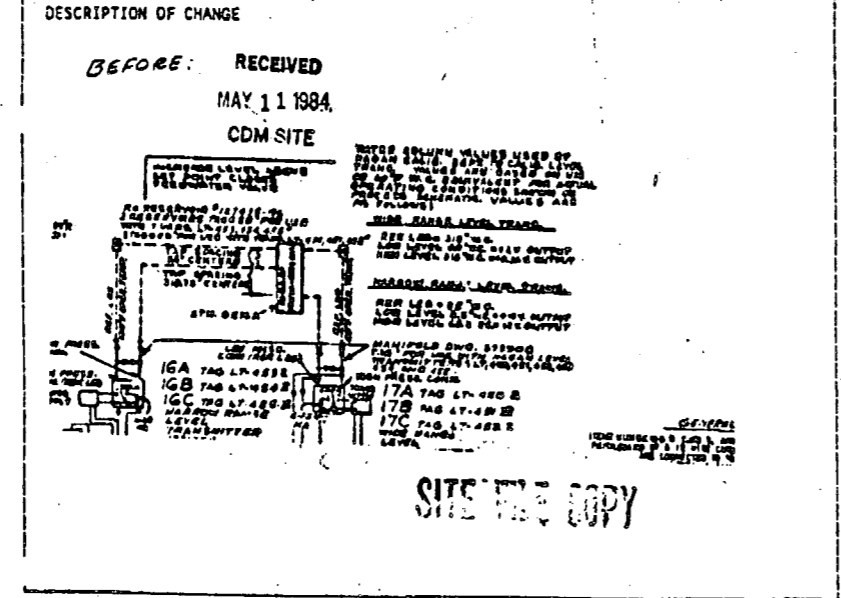
8902270311-72

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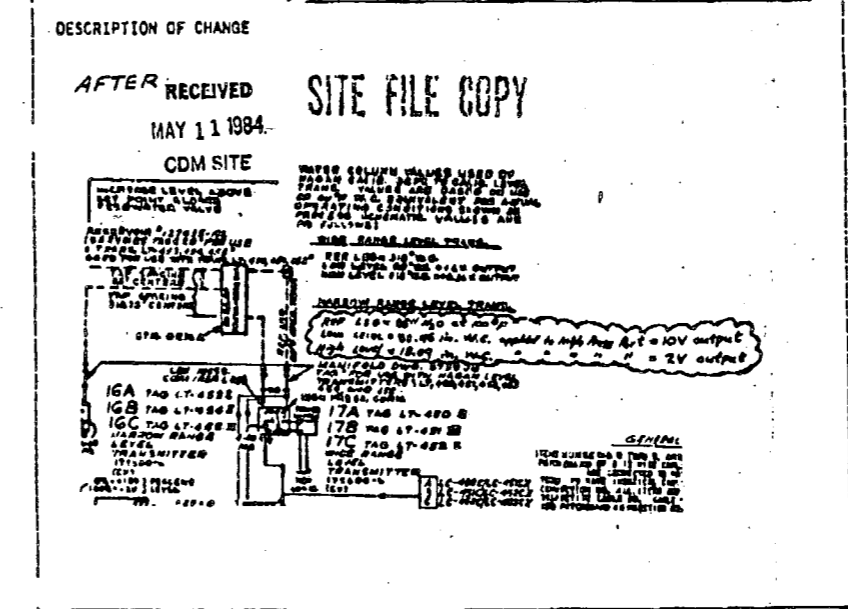
INTERIM DESIGN CHANGE NOTICE (IDCN)	IDCN NUMBER <i>468 C-43 J-17</i>					
	Drawing No.	Sheet No.	Rev. No.	DCN CONV.		Quality Class
				DWG REV	SUB NO.	
5129817			3			NSR

Date 4/27/84 Page 2 of 3 Pages
 By LARRY HEBERT



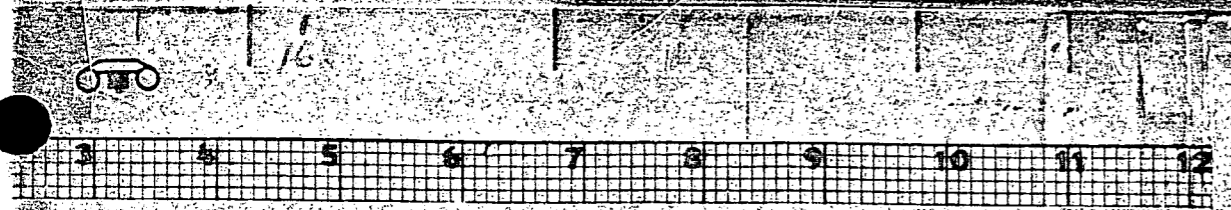
INTERIM DESIGN CHANGE NOTICE (IDCN)	IDCN NUMBER <i>468 C-43 J-17</i>					
	Drawing No.	Sheet No.	Rev. No.	DCN CONV.		Quality Class
				DWG REV	SUB NO.	
5129817			3			NSR

Date 4/27/84 Page 3 of 3 Pages
 By LARRY HEBERT



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FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3	CDM/DDC USE ONLY CIG		INTERIM DCN NO.
	IDCN NO. <u>5-2</u>		PFC NO.
	DOCUMENT <u>5129817</u>	Sht. <u>-</u> Rev. <u>5</u>	DCP NO./REV. NO. <u>3496.00TJ/0</u>
	Page <u>1</u> of <u>3</u>		DCN CONVERSION NO.
1. Originator <u>MARK MURPHY</u>		Tel: <u>975-3283</u>	Date <u>09/09/88</u>
Document Title <u>FEEDWATER CONTROL DIAGRAM</u>		DRAWM I.D. <u>IC-16</u>	QC <u>SR</u>
DESCRIPTION OF CHANGE <ul style="list-style-type: none"> - DELETE EXISTING FEEDWATER AND STEAM FLOW COMPUTERS AND COMPARATORS. - ADD REFERENCES TO LOOP DIAGRAMS, WHERE NEW COMPUTERS/COMPARATORS ARE SHOWN. - CHANGE DOCUMENT QC TO SR FROM SREAN. - NOTE THAT THIS DOCUMENT SUPERSEDES 1810-AC796-M0002, Hagan Dwg. 490436. 			
DCP#3496.00TJ REV 0 SHT 02 OF 02			
2. Other Affected Documents	3. Affected Systems	4. Design Approvals	
<u>M-37351</u>	<u>FWLS</u>	CHECKED <u>Mark Murphy</u> <u>9/9/88</u> INDEPENDENT REVIEW ENG. <u>[Signature]</u> <u>9/10/88</u> RESPONSIBLE ENGINEER <u>E. H. [Signature]</u> <u>09/09/88</u> LEAD ENGINEER <u>[Signature]</u> <u>9/11/88</u> OTHER <u>[Signature]</u> <u>9/11/88</u> DATE	
<u>1810-AC796-M0005, M0029, M0030, M0031, M0032, M0033, M0035, M0036</u>		QUALITY CONTROL <u>[Signature]</u> <u>9/14/88</u> DATE	
5. SCE/Contractor Project Administration			
Conversion to DCN Date _____			

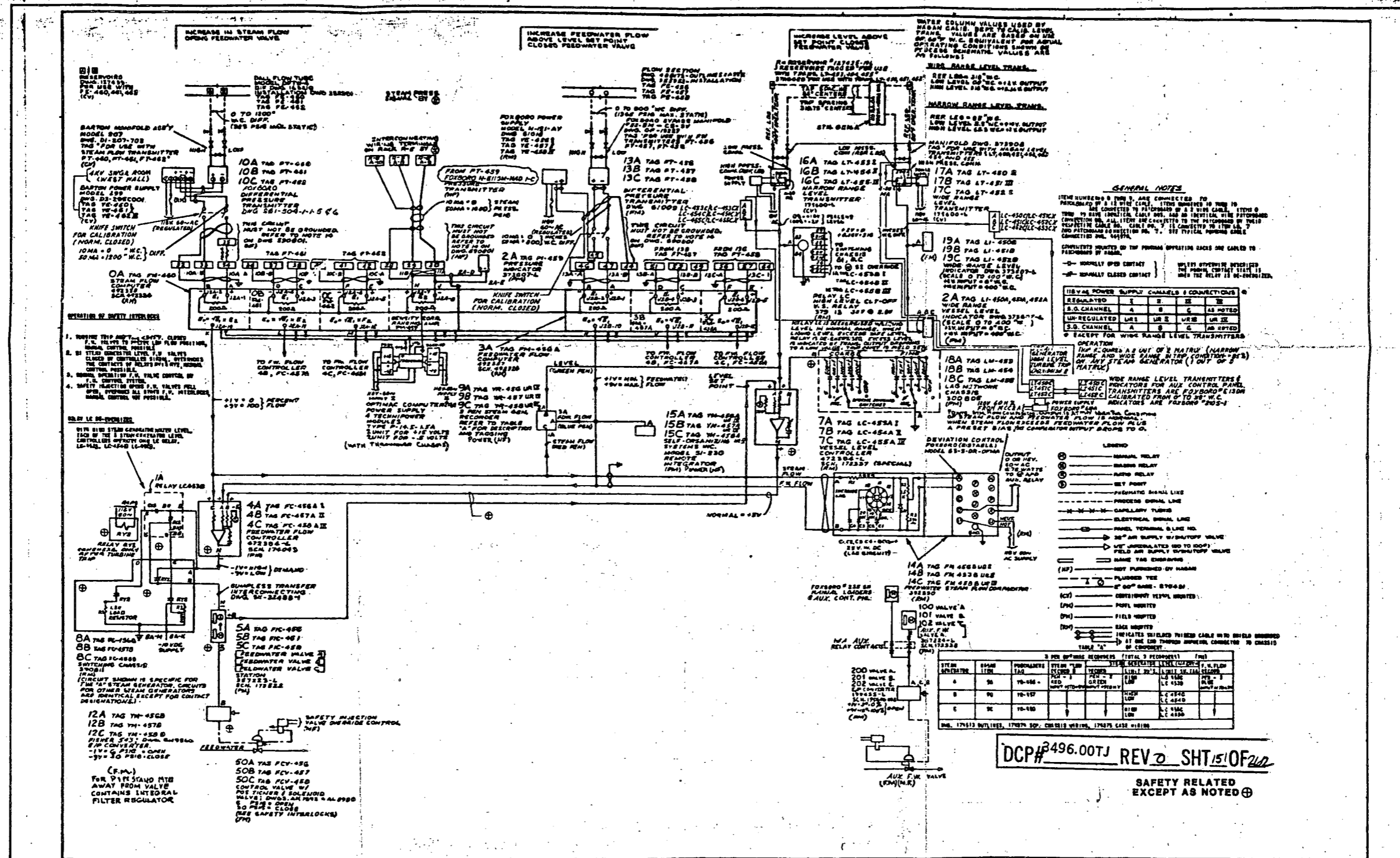
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DCP# 8496.00TJ REV 0 SHT 15 OF 210
SAFETY RELATED
EXCEPT AS NOTED

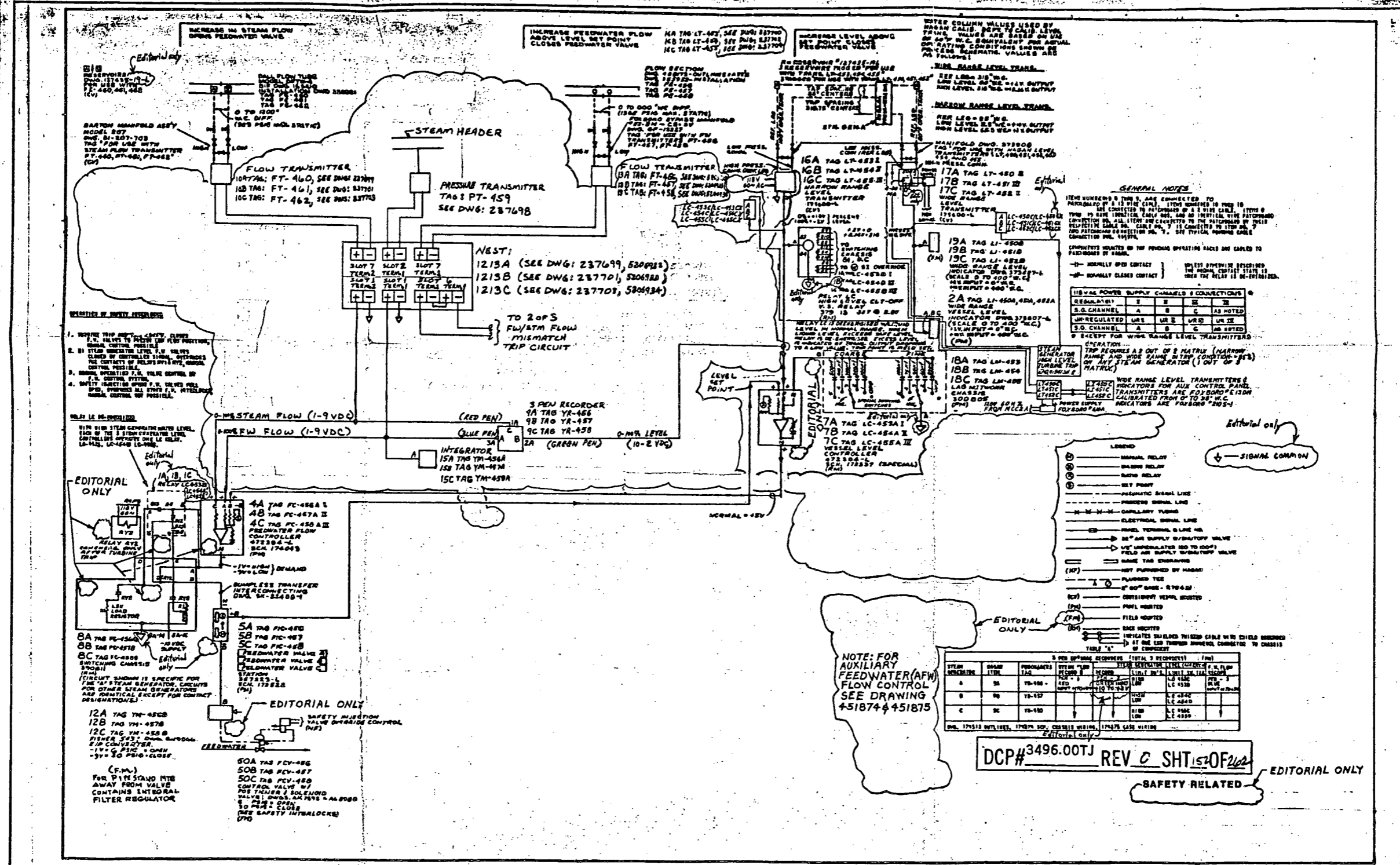
FLUOR ENGINEERS, INC.
POWER DIVISION
INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SONGS 1, 2 & 3
SUPPLEMENTAL PAGE

INTERIM DCN NO.		5-2	
DRAWING NO.	SHEET NO.	REV. NO.	DATE
5129817	-	5	
DCN CONV. DATE		QUALITY CLASS	
		(SR)	

Date 1-21-88 Page 2 of 3
By MARK MURPHY

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DCP# 3496.00TJ REV C SHT 12 OF 26

EDITORIAL ONLY SAFETY RELATED

FLUOR ENGINEERS, INC. POWER DIVISION

INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)

SONGS 1, 2 & 3 SUPPLEMENTAL PAGE

INTERIM DCN NO.		5-2	
IDCN NUMBER		5-2	
DRIVING NO.	SHEET NO.	REV. NO.	DATE
5129817	-5		
DWS.REV. SUB. NO.		QUALITY CHECKER	DATE
		SR	

Date 1-21-88 Page 3 of 3

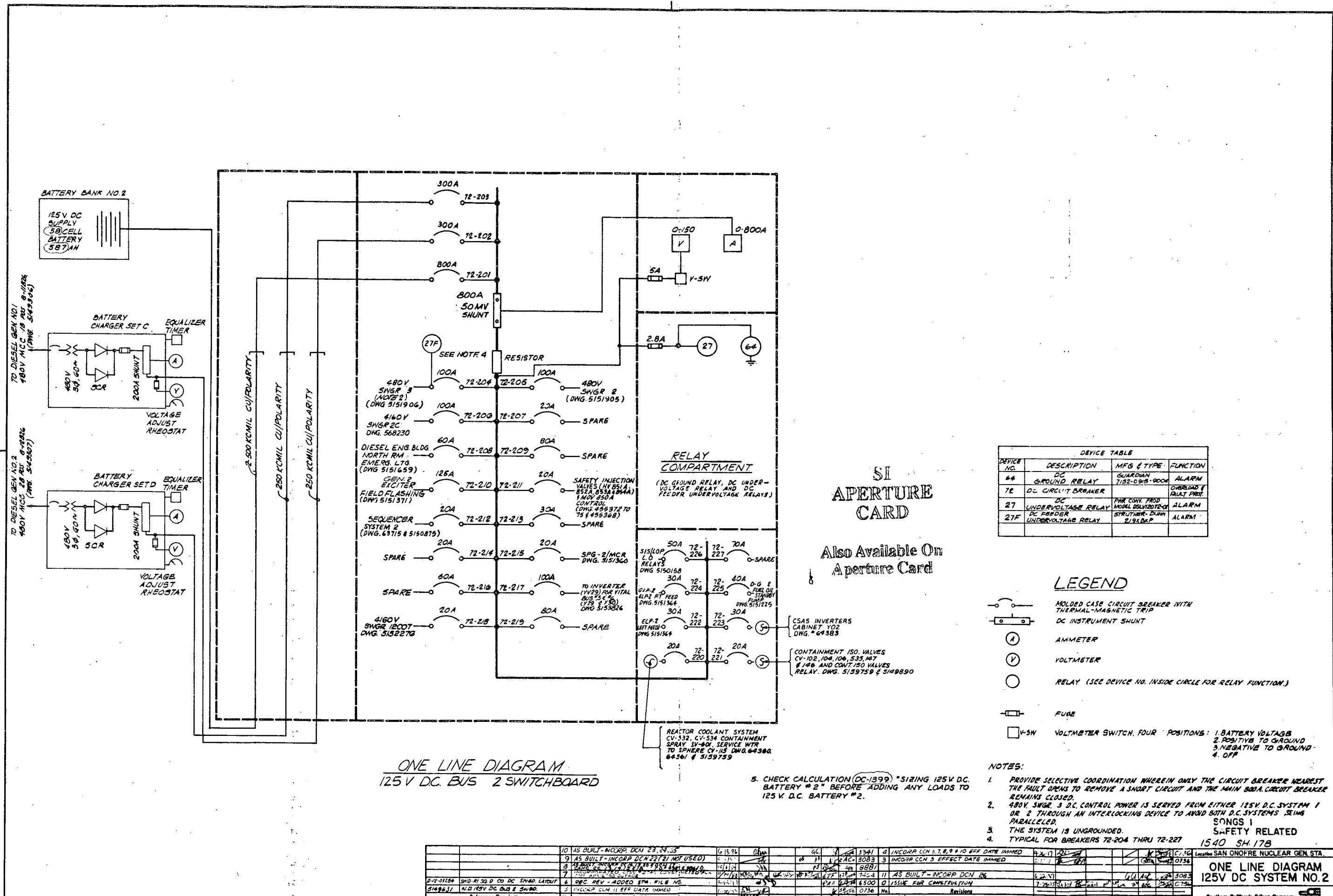
By Mark Murphy

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DESCRIPTION OF CHANGE AFTER

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8902270311-76



DEVICE TABLE

DEVICE NO.	DESCRIPTION	MFG & TYPE	FUNCTION
64	DC GROUND RELAY	GUARDIAN 7132-0915-9004	ALARM
7E	DC CIRCUIT BREAKER		OVERLOAD / FAULT PROT.
27	DC UNDERVOLTAGE RELAY	PWR CONY. PROD. MODEL 05L12027-01	ALARM
27F	DC FEEDER UNDERVOLTAGE RELAY	STRUTHR-DUNN 219X&P	ALARM

LEGEND

- MOLDED CASE CIRCUIT BREAKER WITH THERMAL-MAGNETIC TRIP
- DC INSTRUMENT SHUNT
- AMMETER
- VOLTMETER
- RELAY (SEE DEVICE NO. INSIDE CIRCLE FOR RELAY FUNCTION.)
- FUSE
- VOLTMETER SWITCH, FOUR POSITIONS: 1. BATTERY VOLTAGE, 2. POSITIVE TO GROUND, 3. NEGATIVE TO GROUND, 4. OFF

- NOTES:**
- PROVIDE SELECTIVE COORDINATION WHEREIN ONLY THE CIRCUIT BREAKER NEAREST THE FAULT OPENS TO REMOVE A SHORT CIRCUIT AND THE MAIN 800A CIRCUIT BREAKER REMAINS CLOSED.
 - 480V SWGR 3 DC CONTROL POWER IS SERVED FROM EITHER 125V D.C. SYSTEM 1 OR 2 THROUGH AN INTERLOCKING DEVICE TO AVOID BOTH D.C. SYSTEMS BEING PARALLELED.
 - THE SYSTEM IS UNGROUNDED.
 - TYPICAL FOR BREAKERS 72-204 THRU 72-227

**ONE LINE DIAGRAM
125 V DC BUS 2 SWITCHBOARD**

5. CHECK CALCULATION (DC-1399) *SIZING 125V DC BATTERY #2 BEFORE ADDING ANY LOADS TO 125 V. D.C. BATTERY #2.

Reference Drawings	No.	Revisions	Date	By	Chk.	Appr.	Scale	Notes
10	AS BUILT - INCORP. DCN 23, 24, 25		6/18/96					
9	AS BUILT - INCORP. DCN 23, 24, 25 (NOT USED)		6/18/96					
8	AS BUILT - INCORP. DCN 23, 24, 25 (NOT USED)		6/18/96					
7	AS BUILT - INCORP. DCN 23, 24, 25 (NOT USED)		6/18/96					
6	DC REV - ADDED 5TH FILE NO.		6/18/96					
5	INCORP. CLN 11 EFF. DATE IMMED.		6/18/96					
4	INCORP. CLN 5, 7, 8, 9 & 10 EFF. DATE IMMED.		6/18/96					
3	INCORP. CLN 3 EFFECT DATE IMMED.		6/18/96					
2	AS BUILT - INCORP. DCN 26		6/21/91					
1	ISSUE FOR CONSTRUCTION		7/20/88					

**ONE LINE DIAGRAM
125V DC SYSTEM NO. 2**

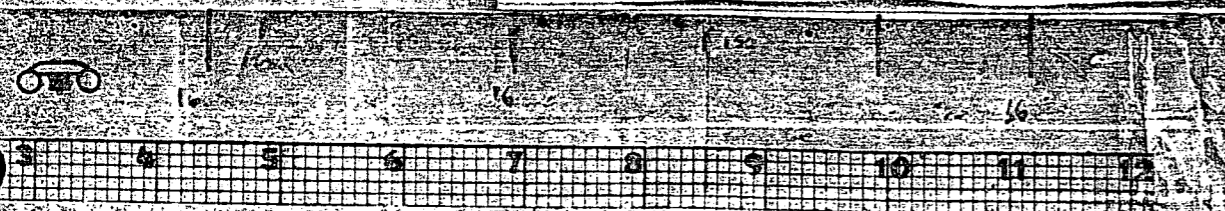
8902270311-77
514934811

FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3	CDM/DDC USE ONLY CIG	INTERIM DCN NO. PFC NO. 1-88-3501.02
	IDCN NO. S-2	DCP NO./REV. NO. 3501.02TJ/O
	DOCUMENT 514934B	DCN CONVERSION NO.
Page 1 of 3	1. Originator N. FRENCH	Tel: (114) 975-2230 Date 9-27-88
Document Title ONE LINE DIAGRAM 13KV DC SYSTEM N^o. 2	DRADM I.D. E-06	QC SP
DESCRIPTION OF CHANGE EDITORIAL ONLY - THE "BEFORE" OF THIS IDCN IS THE "AFTER" OF IDCN # S.2 FOR DCP # 3364.01TJ, REV. 0 - ADD "SH.1 TO DRAWING 5202910 REF.		
DCP# 3501.02TJ REV 0 SHT 43 OF 295		
2. Other Affected Documents NONE	3. Affected Systems FWS	4. Design Approvals CHECKER [Signature] DATE 9/28/88 INDEPENDENT ENGINEER [Signature] DATE 10/20/88 RESPONSIBLE ENGINEER [Signature] DATE 10/28/88 LEAD DESIGNER [Signature] DATE 10/18/88 OTHER [Signature] DATE 10-24-88 OTHER [Signature] DATE 10/24/88 QUALITY ASSURANCE [Signature] DATE 10/20/88
5. SCE/Contractor Project Administration Conversion to DCN Date _____		

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INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

SUPPLEMENTAL PAGE

INTERIM DCN NO.				
IDCN NUMBER 5-3				
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DCN CONV. QUALITY CLASS
514934B	-	11		SP

Date **9-27-88** Page **2** of **3**

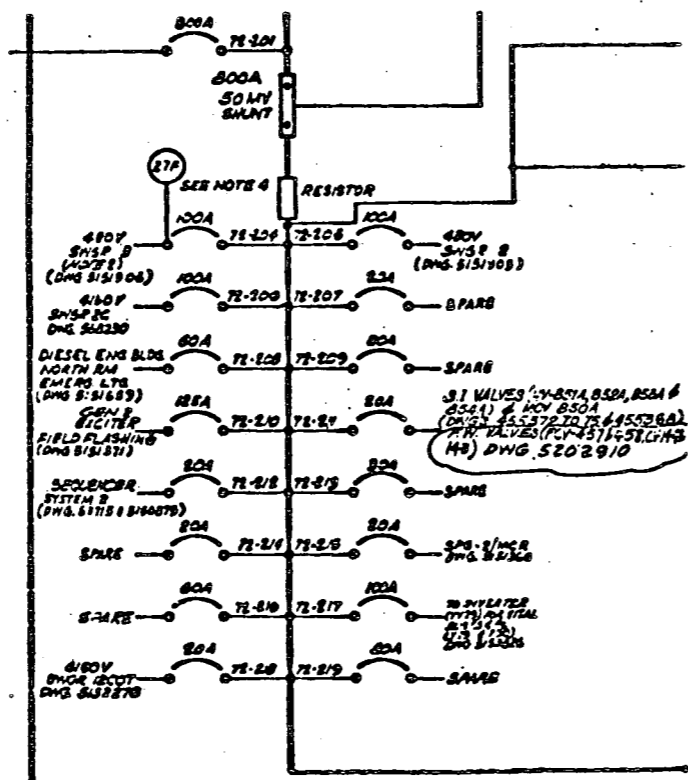
By **W. FRENCH**

DESCRIPTION OF CHANGE

BEFORE

DCP#3501.02TJ REV 0 SHT 4 OF 296

THE "BEFORE" OF THIS IDCN IS THE "AFTER" OF IDCN#-2 FOR DCP#3364.01TJ, REV 0.



FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

SUPPLEMENTAL PAGE

INTERIM DCN NO.				
IDCN NUMBER 5-3				
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DCN CONV. QUALITY CLASS
514934B	-	11		SP

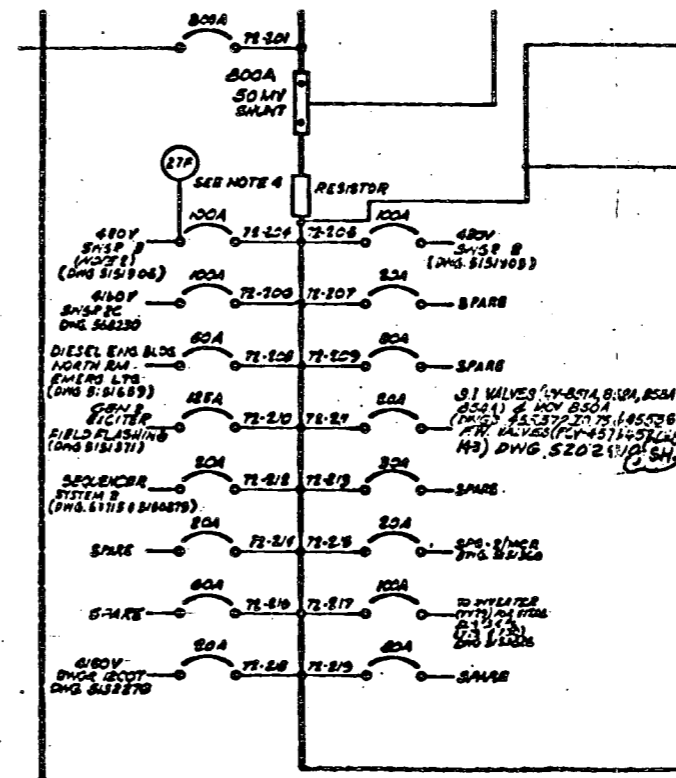
Date **9-27-88** Page **3** of **3**

By **W. FRENCH**

DESCRIPTION OF CHANGE

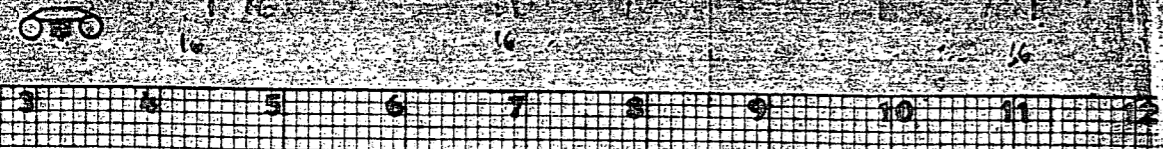
AFTER

DCP#3501.02TJ REV 0 SHT 4 OF 296



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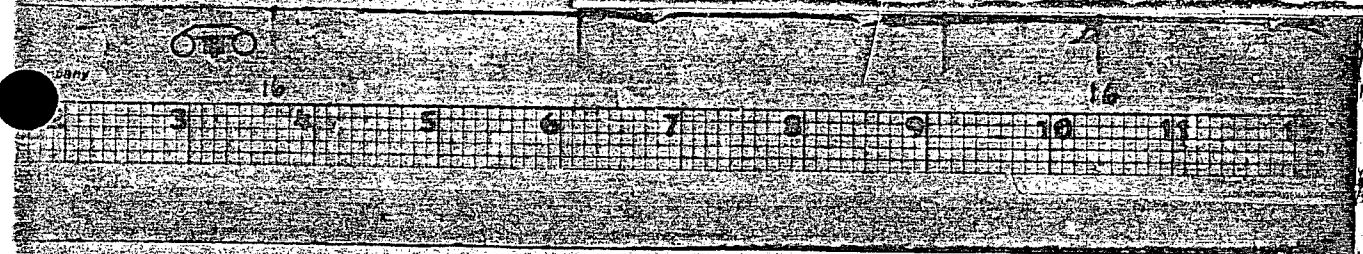
8902270311-79

FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3	CDM/DDC USE ONLY CIG		INTERIM DCN NO.
	IDCN NO. E-2		PFC NO.
	DOCUMENT NO. 5149348	Sht. - Rev. 11	DCP NO./REV. NO. 3364.01TJ/0
	Page 1 of 3		DCN CONVERSION NO.
1. Originator KIM-CAO		Tel: (714) 975-4790 Date 12-9-87	
Document Title ONE LINE DIAGRAM 125V DC SYSTEM NO. 2		DRADM I.D. E-06	QC JR
DESCRIPTION OF CHANGE			
<p>-ADD FEEDWATER VALVES TO LOAD ON BREAKER 72-211.</p>			
<p>DCP# 3364.01TJ REV 0 SHT 162 OF 219</p>			
2. Other Affected Documents	3. Affected Systems	4. Design Approvals	
5202910	FWS	CHECKER E. J. Malcom DATE 12/17/87 INDEPENDENT REVIEW ENGINEER E. J. Malcom DATE 02/08/88 RESPONSIBLE ENGINEER S. H. G. [unclear] DATE 2-6-88 LEAD DESIGNING ENGINEER David T. Halverson DATE 2-9-88 OTHER _____ DATE _____ OTHER _____ DATE _____ QUALITY ASSURANCE [unclear] DATE 2-7-88	
5. SCE/Contractor Project Administration			
Conversion to DCN Date _____			

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POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3
SUPPLEMENTAL PAGE

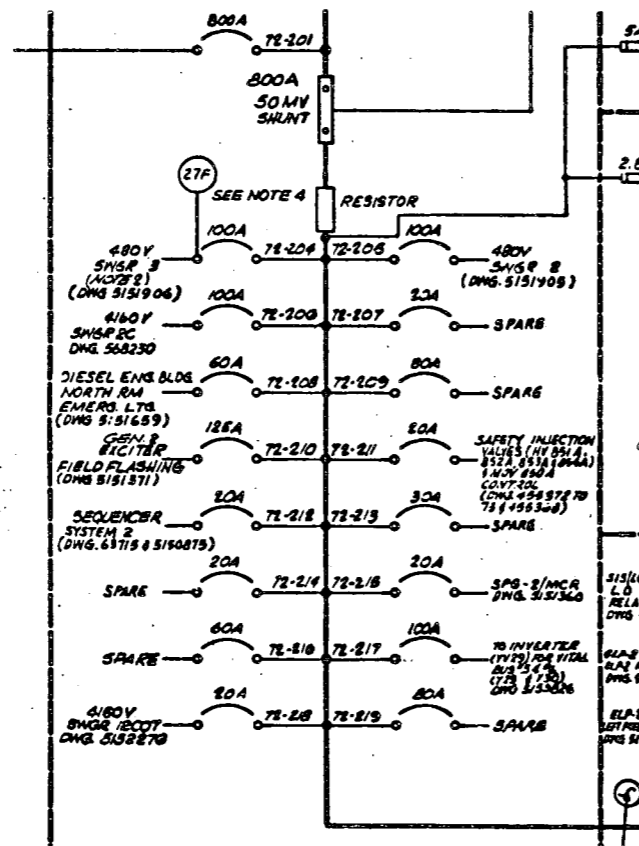
INTERIM DCN NO.					
IDCN NUMBER 5-2					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DCN CONV. DWG. REV.	QUALITY CLASS
5749348	-	11			SR

Date 12-9-87 Page 2 of 3
By KIM-CAO

DCPH 3364-01TJ REV 0 SHT 12 OF 1230

DESCRIPTION OF CHANGE

BEFORE



FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3
SUPPLEMENTAL PAGE

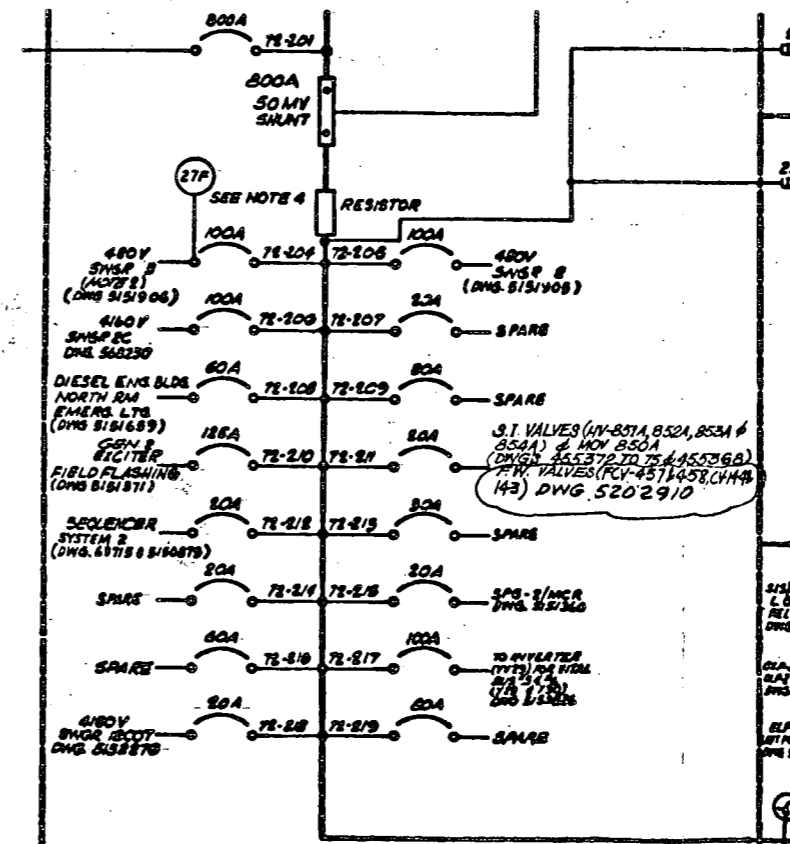
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IDCN NUMBER 5-2					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DCN CONV. DWG. REV.	QUALITY CLASS
5749348	-	11			SR

Date 12-9-87 Page 3 of 3
By KIM-CAO

DCPH 3364-01TJ REV 0 SHT 14 OF 147

DESCRIPTION OF CHANGE

AFTER



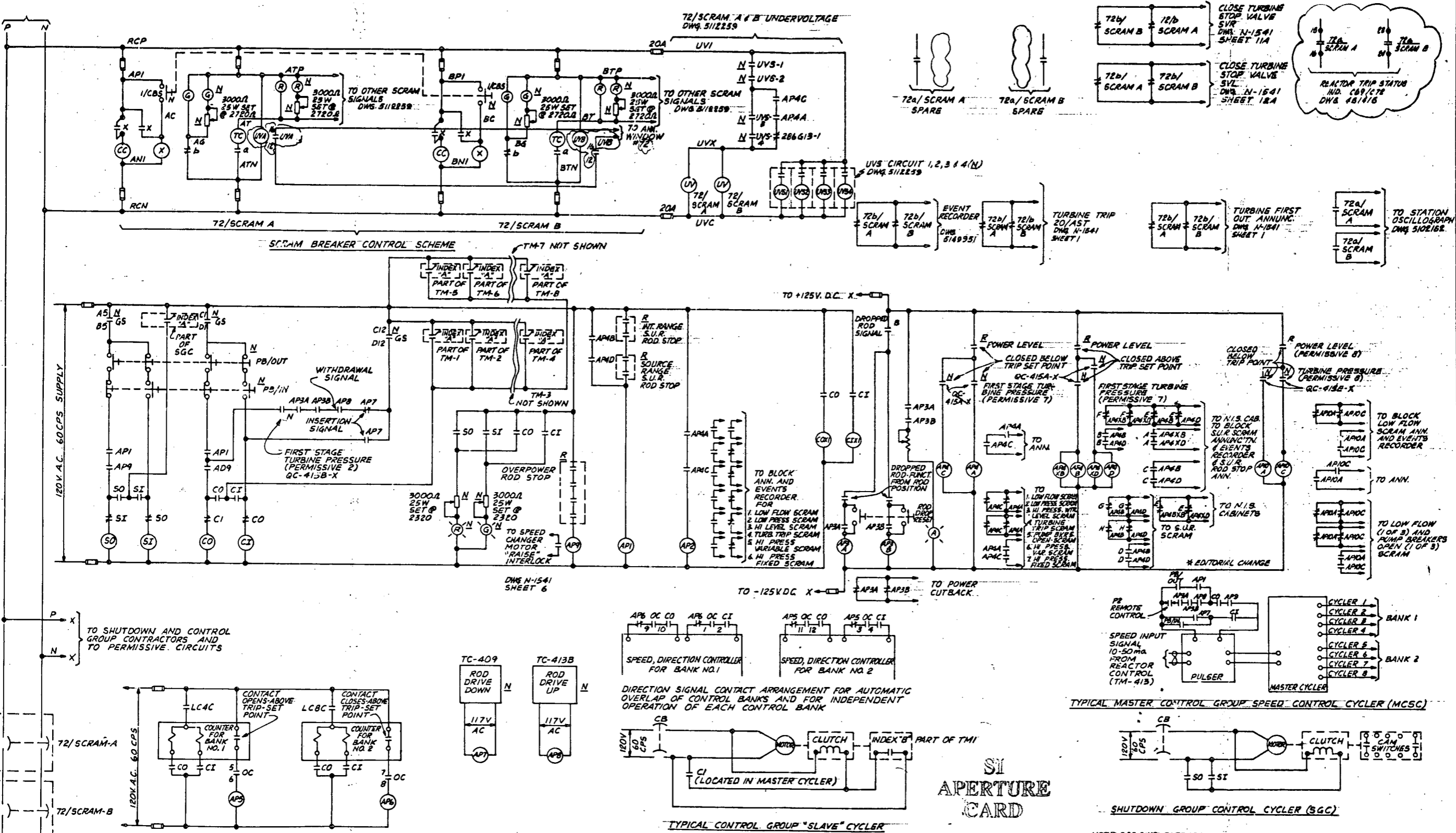
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CONT. ON DWG. 540F717 SH. 3

Reference Drawings	No.	Revisions	Date	Approved	O.E.	O.E.	CLY.	Mod.	I.D. No.	Rev.	Revisions	Date	Approved	O.E.	O.E.	CLY.	Mod.	I.D. No.	Rev.	
514154A E.D. STOP & GOV. VALVES																				
514154B E.D. STOP & GOV. VALVES																				
514154C E.D. TURBINE TRIPPING																				
514154D SCH. DIAG. OSCILLOGRAPH																				
5149951 E.D. EVENT RECORDER																				
5172559 SCHEMATIC DIAGRAM																				
AS BUILT INCORP. DEN. AC. REC. 073																				
AS BUILT INLCORP. CC #4 & DCN #5																				
REV. REV. - ADDED STA. FILE NO.																				
REV. REV. - TRG. G13-1 CLOSED CONTACT																				
REV. REV. - REDRAWN FROM MTR. DWG																				

TMI-1 W.P. 2.2.2b
SAFETY RELATED
SONGS #1

N/542 SH. 10.3B BECHTEL No. 324-W-J4-2-G

REDRAWN FROM WESTINGHOUSE ELECT. CORP. DWG. 540F717 SH. 2

ELEMENTARY DIAGRAM
ROD DRIVE MECHANISM
CONTROL SYSTEM SH. 2

5150625-5

8902270311-82

INTERIM DCN NO. _____ PAGE 1 OF 2

SC Edison Company

FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS 1, 2 & 3)

DCN/DCN USE ONLY
 IDCN NO. **E-7244**
 DOCUMENT NO. **5150625** REV. NO. **5**

PFC NO. **1-88-3496.00**
 DEP. NO. **1-2496.00TJ**
 REV. NO. **0**
 ISSUANCE NO. _____
 REV. NO. _____

ORIGINATOR
NOEL M BASILIO PAR **87376** DATE **1-6-89**
 DOCUMENT TYPE **E/D ROD DRIVE MECH.** SPAN **E-25** SR **3R**

DESCRIPTION OF CHANGE
 - ADD DWG. REFERENCE FOR CONTACT APIOAX & APIOCX
 - EDITORIAL CHANGE ONLY.

PE WAIVER REQUIRED YES NO
 PFC REVISION REQUIRED YES NO

2c RPR# 2244

2. Other Affected Documents
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document:

RECEIVED CDM
 JAN 8 1989
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3. Affected Systems **FWS**

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/NEE & L	
OTHER	DATE	OTHER	DATE
OTHER	DATE	CHECKED	DATE
ENGINEER	DATE	DESIGNED BY/REV. ENGR.	DATE
INDEPENDENT REVIEW ENGR.	DATE	RESPONSIBLE ENGINEER	DATE
RESPONSIBLE ENGINEER	DATE	DESIGNER/DRY-CHECKER	DATE
GROUP SUPERVISING ENGINEER	DATE	DESIGN CHECK ENGINEER	DATE
SUPERVISING ENGINEER 1	DATE	PROJECT ENGINEER	DATE
MANAGER, PLANT TECHNICAL	DATE	FOR B. CARUSLE	DATE 1-8-89
QUALITY ASSURANCE	DATE	QUALITY ASSURANCE	DATE 1-8-89 1020

Conversion to DCN Date _____

SEE PROJECT ADMINISTRATION

SC Edison Company

Songs 1, 2 & 3

FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SUPPLEMENTAL PAGE

INTERIM DCN NO. _____

IDCN NUMBER **E-7244**

DRAWING NO.	SHEET NO.	REV. NO.	DATE	DES. ENGR.	QUALITY ENGINEER
5150625	-	5			SR

Date **1-6-89** Page **2** of **2**
 By **NMBASILIO**

BEFORE

DESCRIPTION OF CHANGE:

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 JAN 8 1989
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AFTER

RECEIVED CDM
 JAN 8 1989
 SITE FILE COPY

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PAGE 1 OF 3

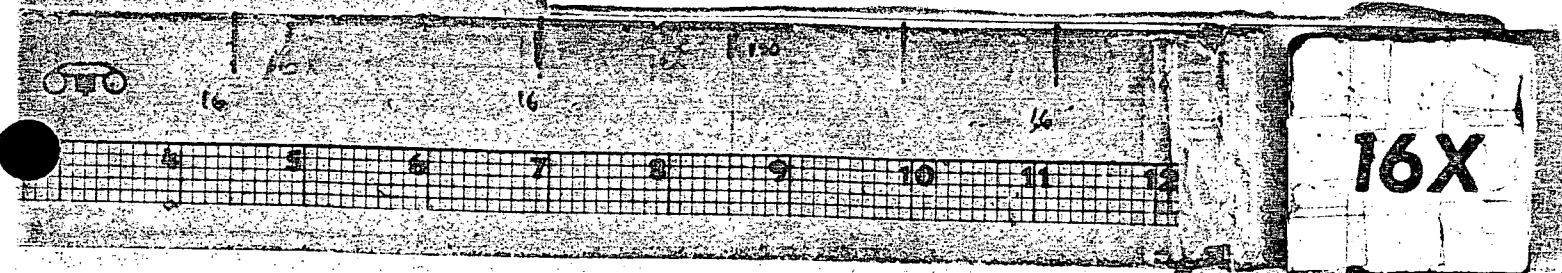
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<small>ORIGINATOR</small> 1. NOEL M BASILIO (ELEC)		<small>PAR</small> 807-4542 <small>DATE</small> 8.8.88	<small>DESCRIPTION OF CHANGE</small> E/D ROD DRIVE MECH. Control Sys. SR.2 E-10 SR
<p>- REVISE NIS INPUT CONTACT CONFIGURATION.</p> <p>- ADD NOTE 2.</p> <p style="text-align: center;">- SEE SUPPLEMENTAL PAGES -</p>			
2. Other Affected Documents <input type="checkbox"/> None <input checked="" type="checkbox"/> Specific affected documents are listed on the CC(123) 184 associated with the source document checked below: <input checked="" type="checkbox"/> This DCP (Forms CC(123) 183 and CC(123) 184 attached) <input type="checkbox"/> This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached) <input type="checkbox"/> The following document:			
3. Affected Systems NIS			
4. SCE Design Approvals			
<small>NUCLEAR GENERATION SITE DEPARTMENT</small>		<small>ENGINEERING AND CONSTRUCTION DEPARTMENT/RES & L</small>	
<small>OTHER</small>	<small>DATE</small>	<small>OTHER</small>	<small>DATE</small>
<small>CHECKED</small>	<small>DATE</small>	<i>William K. ...</i>	8/21/88
<small>INDEPENDENT REVIEW ENGR.</small>	<small>DATE</small>	<i>To ...</i>	8/21/88
<small>RESPONSIBLE ENGINEER</small>	<small>DATE</small>	<i>...</i>	8/21/88
<small>GROUP SUPERVISING ENGINEER</small>	<small>DATE</small>	<i>...</i>	8/21/88
<small>SUPERVISING ENGINEER I</small>	<small>DATE</small>	<i>...</i>	7/11/88
<small>MANAGER, STATION TECHNICAL</small>	<small>DATE</small>	<i>...</i>	
<small>QUALITY ASSURANCE</small>	<small>DATE</small>	<i>Montgomery D. Carson</i>	9-10-88
<small>Conversion to DCN Date</small>		<small>SCE PROJECT ADMINISTRATION</small>	

DCP-3003.0BJ REV. 0 SHEET 66

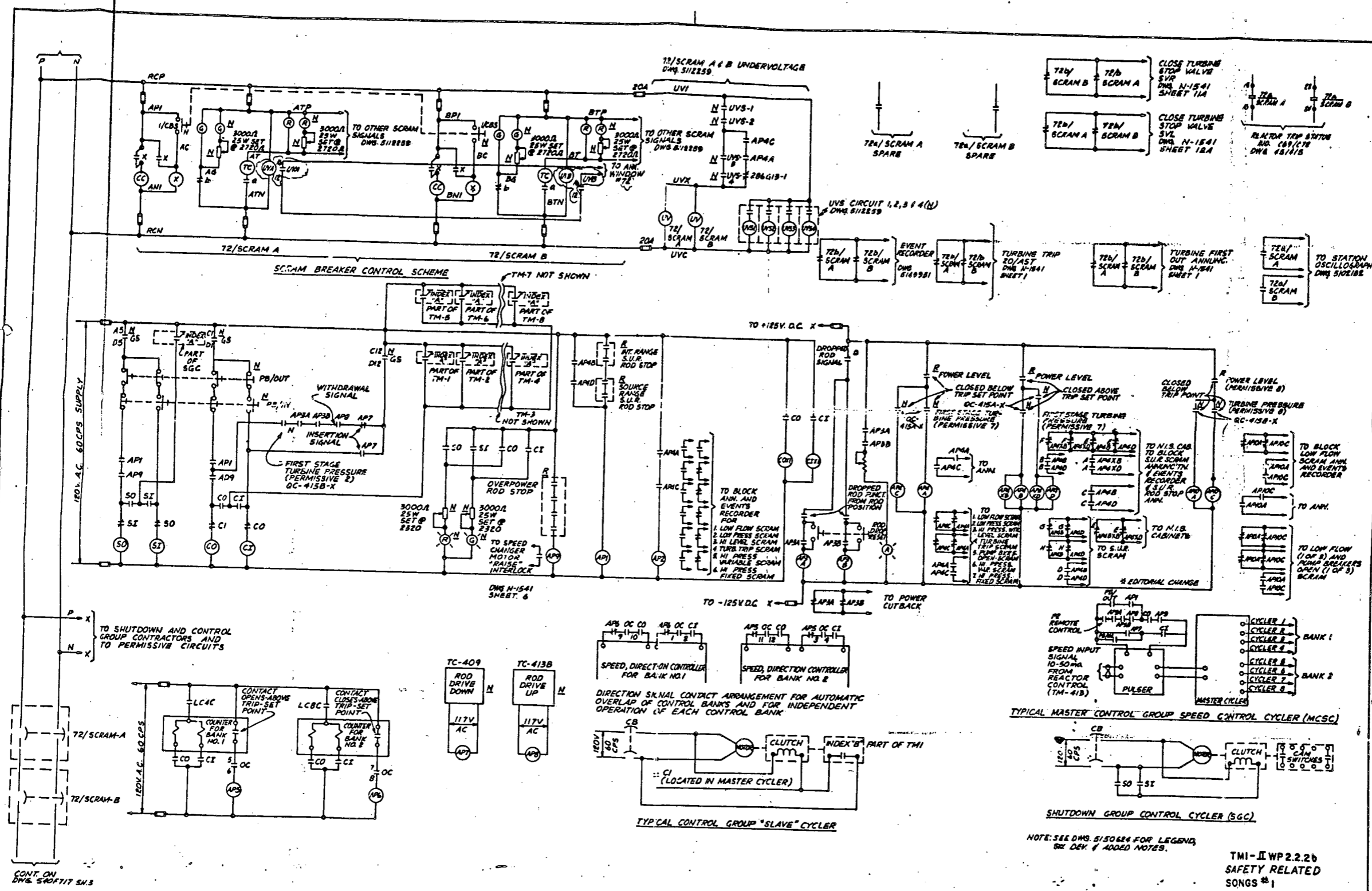
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5150625-5	ED STOP	OCY	WLVTS
5150625-5	WLVTS	STOP	STOP
5150625-5	STOP	STOP	STOP
5150625-5	STOP	STOP	STOP
5150625-5	STOP	STOP	STOP
5150625-5	STOP	STOP	STOP
5150625-5	STOP	STOP	STOP
5150625-5	STOP	STOP	STOP
5150625-5	STOP	STOP	STOP
5150625-5	STOP	STOP	STOP

Southern California Edison Company
Songs 2 & 3

INTERIM DESIGN CHANGE
NOTICE (IDCN)
SUPPLEMENTAL PAGE
BEFORE

INTERIM DCN NO.	
IDCN NUMBER 3-2	
DRAWING NO.	REV.
5150625-5	5
DATE	
DWN. REV.	
DCN NO.	
QUALITY	
CHECKED	
SR	

TMI-IWP 2.2.26
SAFETY RELATED
SONGS #1

N/542 SH.102B

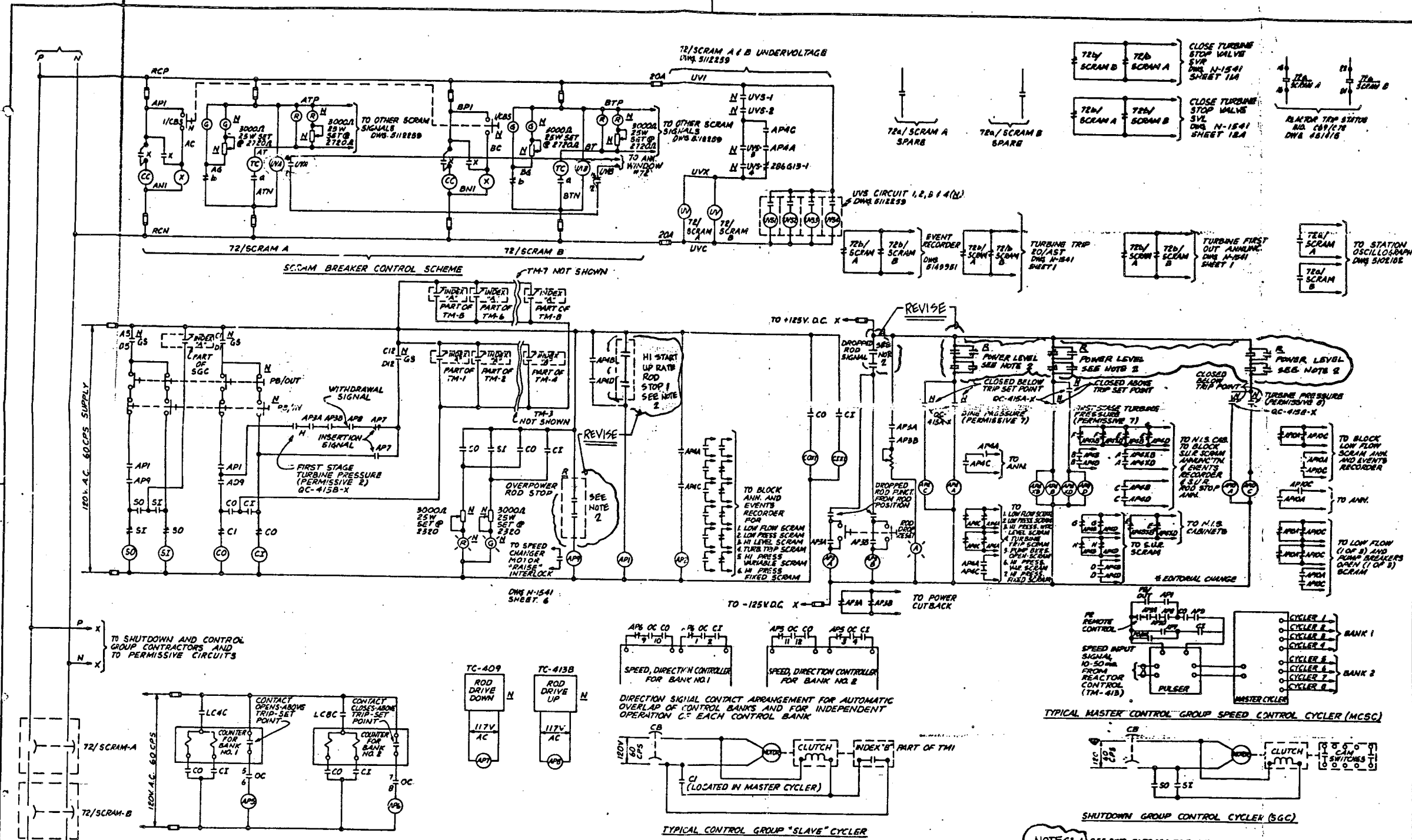
BECHTEL No. 3246-W-14-2-G
ECT CORR DWS 540717 SH2
SAN ONOFRE NUCLEAR GEN. STA.
ELEMENTARY DIAGRAM
ROD DRIVE MECHANISM
CONTROL SYSTEM SH.2
Southern California Edison Company

5150625-5

8902270311-85

Date 8-8-88 Page 2 of 3
By MBASILIO
DCP 1-3009.0BJ REV 0 SHEET 669

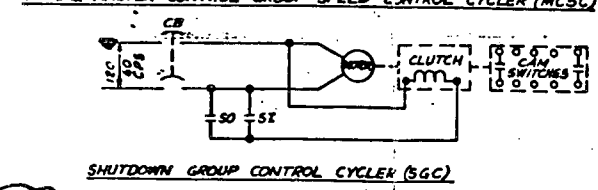
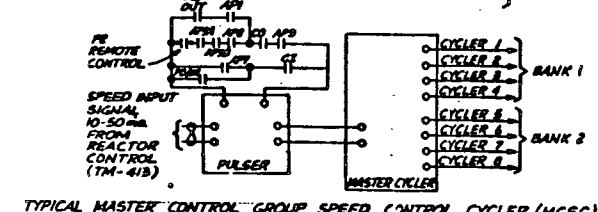
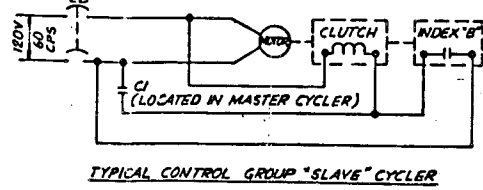
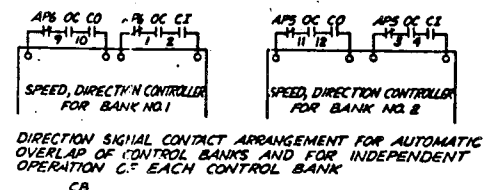
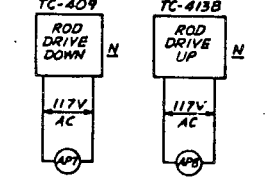
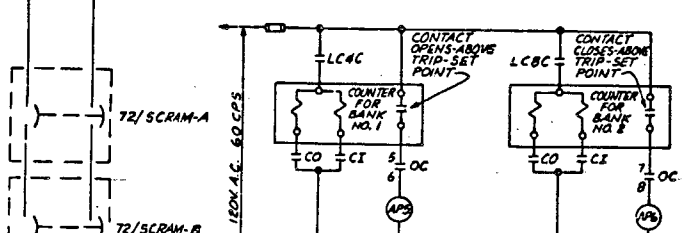
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TO SHUTDOWN AND CONTROL
GROUP CONTRACTORS AND
TO PERMISSIVE CIRCUITS



NOTES: 1. SEE DWS 5150624 FOR LEGENDS
OR DEF. 1 ADDED NOTES.
2. FOR DETAIL LOCATION
SEE DWG. 5107716.

TMI-IWP2.2.2b
SAFETY RELATED
SONGS #1

5150625-5	5150625-5	5150625-5	5150625-5
5150625-5	5150625-5	5150625-5	5150625-5
5150625-5	5150625-5	5150625-5	5150625-5
5150625-5	5150625-5	5150625-5	5150625-5

Southern California Edison Company
Songs #2 & 3

INTERIM DESIGN CHANGE
NOTICE (IDCN)

SUPPLEMENTAL PAGE
AFTER

INTERIM DCN NO.	
IDCN NUMBER	5-2
BRANCH NO.	5150625-5
SHEET NO.	5
REV. NO.	
DATE	
REV. DATE	
DCN NO.	
QUALITY	SR

Date 8-8-88 Page 3 of 3
By NBASILIO

DCP 1-3003 DBJ REV. 0 SHEET 670

5150625-5

8902270311-86

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FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3	CDM/DDC USE ONLY CIG		INTERIM DCN NO.																								
	IDCN NO. S-1		PFC NO.																								
	DOCUMENT 5150625	SHL -	REV. 5	DCP NO./REV. NO. 3496.00TJ/0																							
	Page 1 of 3		DCN CONVERSION NO.																								
1. Originator KAYOKO WARNER		Tel: 714-975-9316 Date 9-05-88																									
Document Title E/D ROD DRIVE MECHANISM CONTROL SYSTEM SH. 2		DRAOM I.D. E-09	QC SR																								
DESCRIPTION OF CHANGE																											
<p>— ADD CONTACTS OF RELAY API0AX AND API0CX FOR MISMATCH SCRAM ANN. AND EVENTS RECORDER</p> <p>— ADD MISMATCH TO LIST OF LOW FLOW AND PUMP BREAKERS OPEN SCRAM BLOCK INTERLOCKS.</p>																											
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> DCP# 3496.00TJ REV 0 SHT 19 OF 22 </div>																											
2. Other Affected Documents	3. Affected Systems	4. Design Approvals																									
5107776	FWS	<table border="0"> <tr> <td><i>[Signature]</i></td> <td>DATE</td> </tr> <tr> <td>9-9-88</td> <td></td> </tr> <tr> <td><i>[Signature]</i></td> <td>DATE</td> </tr> <tr> <td>9/10/88</td> <td></td> </tr> <tr> <td><i>[Signature]</i></td> <td>DATE</td> </tr> <tr> <td>09/09/88</td> <td></td> </tr> <tr> <td><i>[Signature]</i></td> <td>DATE</td> </tr> <tr> <td>9/10/88</td> <td></td> </tr> <tr> <td>OTHER</td> <td>DATE</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>QUALITY CONTROL</td> <td>DATE</td> </tr> <tr> <td><i>[Signature]</i></td> <td>9/14/88</td> </tr> </table>		<i>[Signature]</i>	DATE	9-9-88		<i>[Signature]</i>	DATE	9/10/88		<i>[Signature]</i>	DATE	09/09/88		<i>[Signature]</i>	DATE	9/10/88		OTHER	DATE			QUALITY CONTROL	DATE	<i>[Signature]</i>	9/14/88
<i>[Signature]</i>	DATE																										
9-9-88																											
<i>[Signature]</i>	DATE																										
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OTHER	DATE																										
QUALITY CONTROL	DATE																										
<i>[Signature]</i>	9/14/88																										
5151820	RPI-RPS																										
5. SCE/Contractor Project Administration																											
Conversion to DCN Date _____																											

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FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

SUPPLEMENTAL PAGE

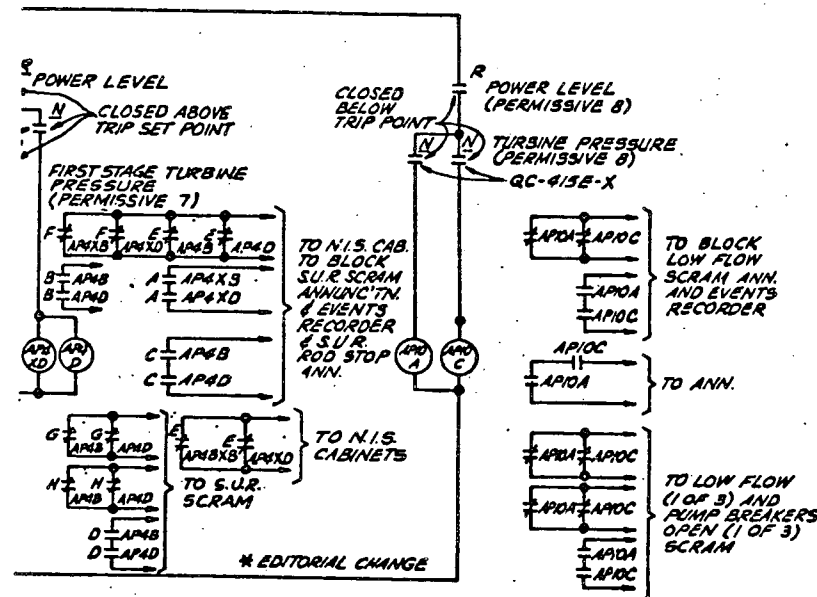
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IDCN NUMBER S-1				
DRAWING NO.	SHEET NO.	REV. NO.	DCN CONV. DATE	QUALITY CLASS
5150625	-	5		SR

Date 1-15-88 Page 2 of 3

By KAYOKO WARNER

DESCRIPTION OF CHANGE

BEFORE



DCP#3496.001L REV 0 SHT 80 OF 112

DR-4008-2 1/87

FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

SUPPLEMENTAL PAGE

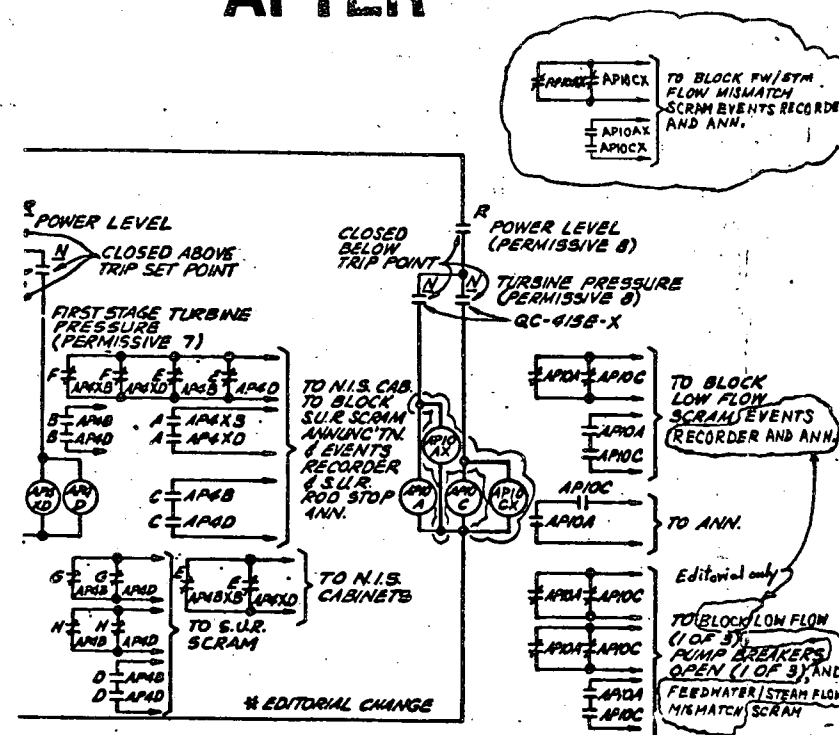
INTERIM DCN NO.				
IDCN NUMBER S-1				
DRAWING NO.	SHEET NO.	REV. NO.	DCN CONV. DATE	QUALITY CLASS
5150625	-	5		SR

Date 09-05-88 Page 3 of 3

By KAYOKO WARNER

DESCRIPTION OF CHANGE

AFTER



DCP#3496.001J REV 0 SHT 81 OF 112

8902270311-88

DR-4008-2 1/87

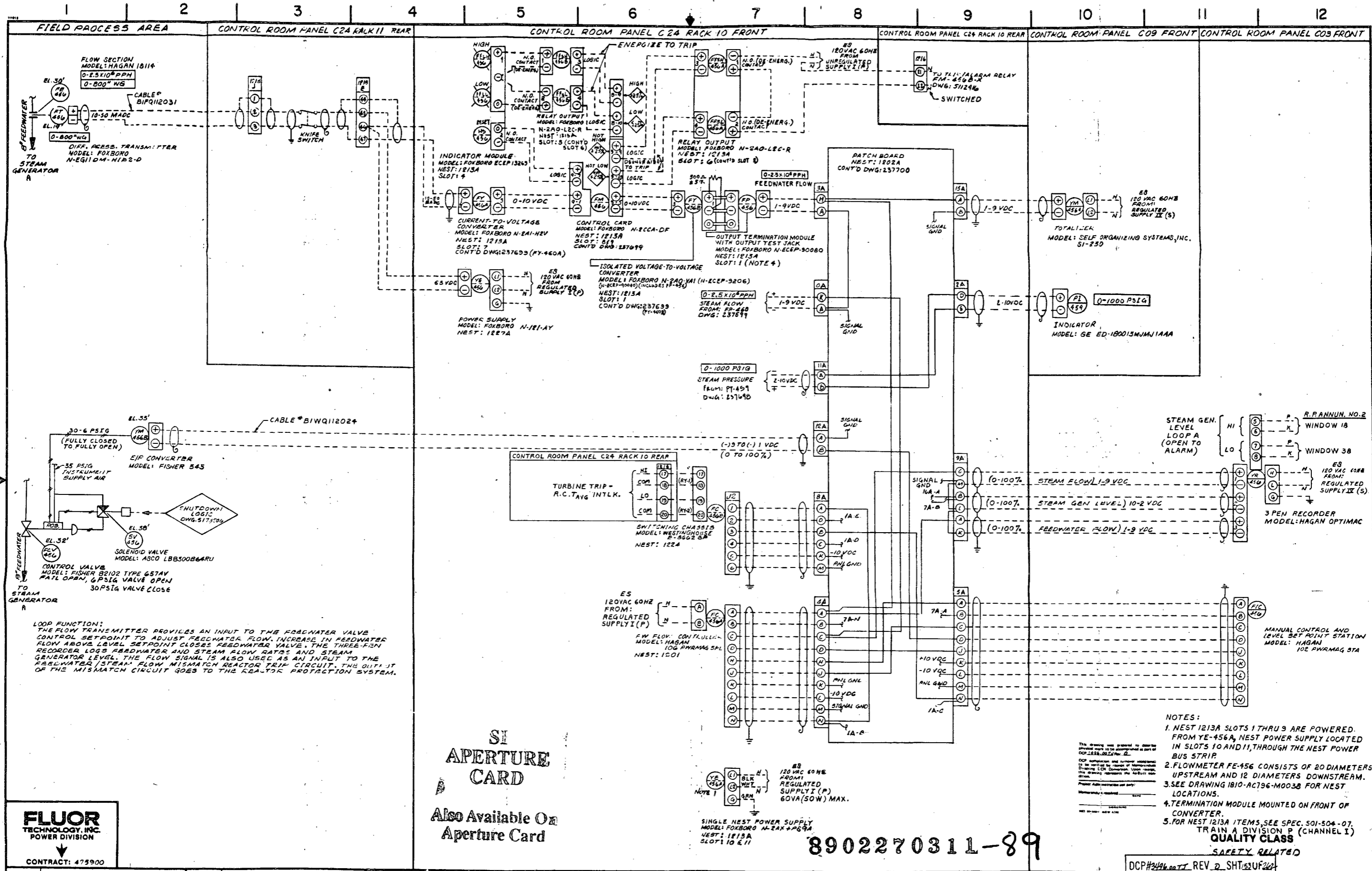
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FLUOR TECHNOLOGY, INC.
 POWER DIVISION

CONTRACT: 473900

NO.	DATE	REV.	BY	CHKD.	APP.	DESCRIPTION
5178206						FEEDWATER SYSTEM
508293						WD NUC. MISC. DEV. SH. 3 PRESS. FROM ELEV. TRANS.
180-AC-786						STEAM GEN. A' VAL. CONT. SYS. INSTR. COMM. DIAG.
180-AC-264						RACE WIRING
511981						FEEDWATER CONTROL DIAGRAM
511982						FUNCTIONAL DIAGRAM (FOXBORO)

NO.	DATE	REV.	BY	CHKD.	APP.	DESCRIPTION
0						ISSUED FOR CONSTRUCTION

LOCATION: SAN Geronimo NUCLEAR GENERATION STATION UNIT 1
 SHEET NO. 5206932-0
 Southern California Edison

8902270311-89

5206932-0

PAGE 1 OF 2

Southern California Edison Company
FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
 (For SONGS) 2-8-89

FORM NO. **J-2255** IDCN NUMBER **J-2255**
 DOCUMENT NO. **5206932** REV. NO. **0** SHEET **0** TOTAL SHEETS **0**

ORIGINATOR **F. G. WILLINGHAM** DATE **1-30-1989**

DESCRIPTION OF CHANGE
LOOP DIAGRAM - FEEDWATER FLOW CONTROL LOOP A IC-16 SR

THIS FIDCN REVISES THE FEEDWATER FLOW CONTROL LOOP A DIAGRAM AS SHOWN ON THE SUPPLEMENTAL PAGE, BECAUSE OF REVERSAL OF INDICATOR LOGIC.

NOTE: FIDCN J-2136 changes LOW setpoint to "5MR", from "525%".

5f REP: RPR * 2404

PE WAIVER REQUIRED YES NO
 PFC REVISION REQUIRED YES NO

2. Other Affected Documents:
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document:

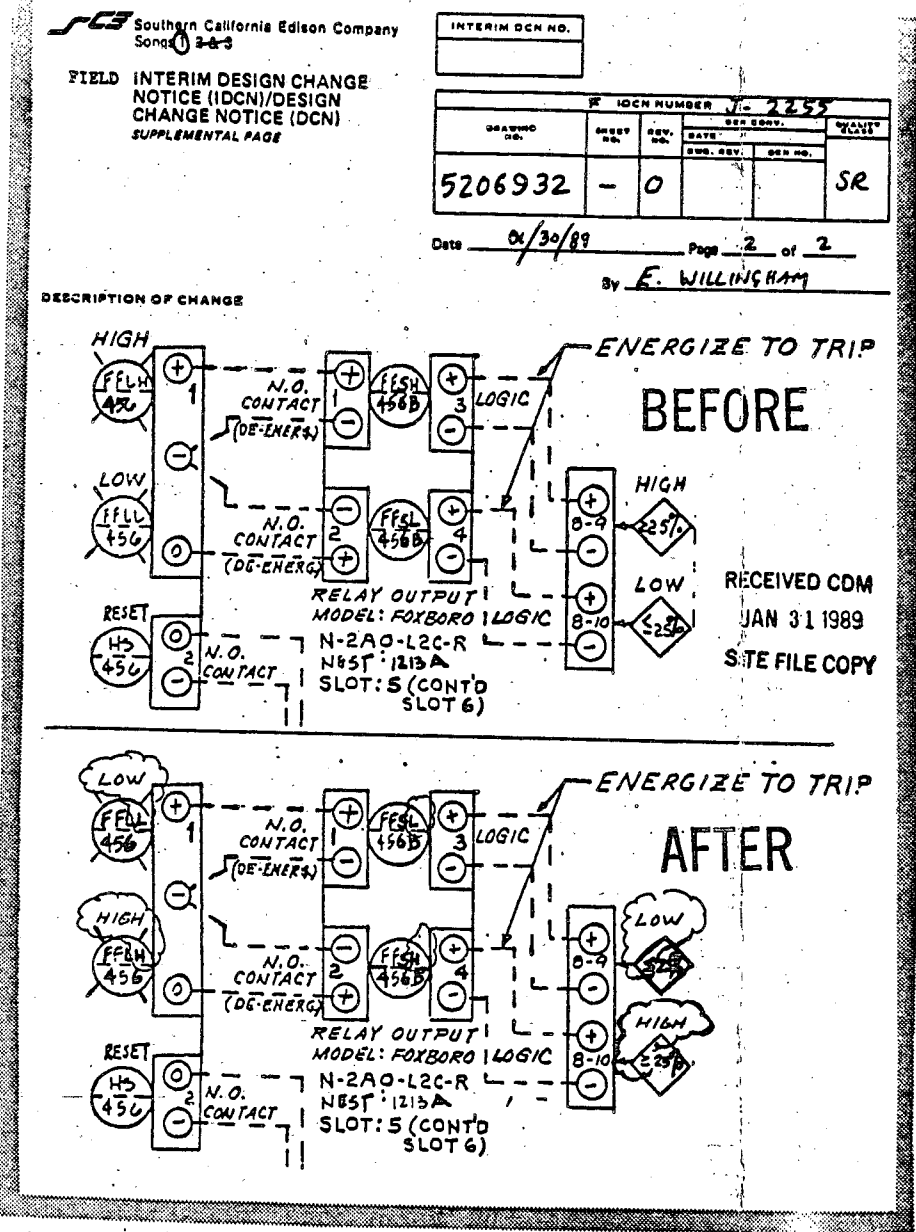
3. Affected Systems **FWS**

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/RES & L	
OTHER	DATE	OTHER	DATE
ENGINEER	DATE	INDEPENDENT REVIEW ENGR.	DATE
RESPONSIBLE ENGINEER	DATE	RESPONSIBLE ENGINEER	DATE
GROUP SUPERVISING ENGINEER	DATE	DISCIPLINE SUPERVISOR	DATE
SUPERVISING ENGINEER I	DATE	PROJECT ENGINEER	DATE
MANAGER, STATION TECHNICAL	DATE	DISCIPLINE CHIEF	DATE
QUALITY ASSURANCE	DATE	QUALITY ASSURANCE	DATE

Conversion to DCN Date: **1-31-89 1989**

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<p>Southern California Edison Company FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS (2708))</p>	EDM/DCN USE ONLY	PDF NO.
	ISSN NO. <u>J-2084</u>	DEF. NO. <u>1-3496.00TF</u>
	DOCUMENT NO. <u>5206932 0</u>	REV. NO. <u>0</u>
	SHEET	ISS VERSION NO.

1. ORIGINATOR A. A. MOLINA PAR 87434 DATE 1-4-89

DOCUMENT TITLE LOOP DIAGRAM-LOOP A SCALE IC-70 " SR

DESCRIPTION OF CHANGE
16 in diam
ADD SHIELD TO THE CABLE .

REF: 2C RPR 2223

PE WAIVER REQUIRED	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
PRO REVISION REQUIRED	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO

2. Other Affected Documents
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document:

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3. Affected Systems FWS

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/RES & L	
OTHER	DATE	OTHER	DATE
ENGINEER	DATE	INDEPENDENT REVIEW ENG.	DATE
INDEPENDENT REVIEW ENGR.	DATE	DESIGNER'S ENGINEER	DATE
MUTUAL/LOCAL ENGINEER	DATE	GROUP SUPERVISING ENGINEER	DATE
GROUP SUPERVISING ENGINEER	DATE	SUPERVISING ENGINEER I	DATE
SUPERVISING ENGINEER I	DATE	MANAGER, DIVISION/DEPARTMENT	DATE
MANAGER, DIVISION/DEPARTMENT	DATE	QUALITY ASSURANCE	DATE
QUALITY ASSURANCE	DATE	CONVERSION TO DCN DATE	

Conversion to DCN Date _____

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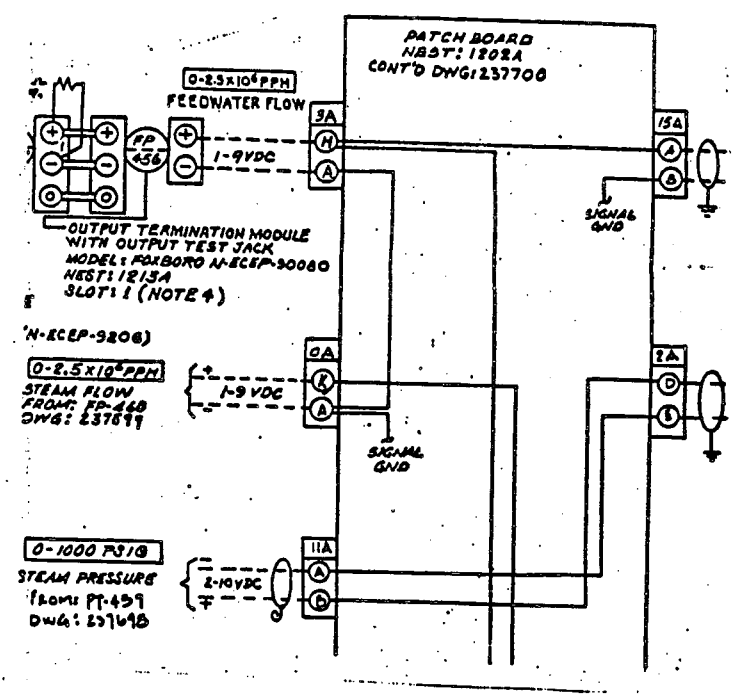
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Southern California Edison Company
FLD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SUPPLEMENTAL PAGE

INTERIM DCN NO.				
DCN NUMBER J-1019				
DRAWING NO.	ISSUE NO.	REV. NO.	DATE	BY
5206932	-	0		SR

Date 1-4-89 Page 2 of 3
 By A. A. MOLINA

BEFORE
 DESCRIPTION OF CHANGE RECEIVED CDM
 JAN 4 1989
 SITE FILE COPY

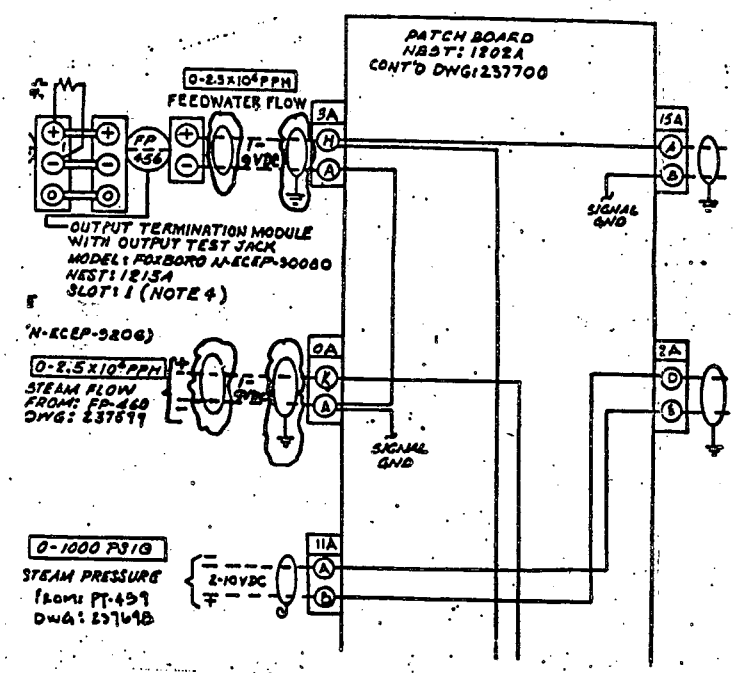


Southern California Edison Company
FLD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SUPPLEMENTAL PAGE

INTERIM DCN NO.				
DCN NUMBER J-1019				
DRAWING NO.	ISSUE NO.	REV. NO.	DATE	BY
5206932	-	0		SR

Date 1-4-89 Page 2 of 3
 By A. A. MOLINA

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PAGE 1 OF 3

SC Southern California Edison Company
FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
 (For SONGS 2 & 3)

PROJECT NO. **J-2017** PFC NO. **1-88-3496.0 R.0**
 DRAWING NO. **5206932** REV. NO. **0** REV. NO. **3496.00TJ**
 SHEET **-** SHEET NO. **0** SHEET NO. **0**

1. ORIGINATOR **M. GUECIA** PFC NO. **87762** DATE **12-8-88**
 DOCUMENT TITLE **LOOP DIAGRAM** DRAWING NO. **IC-16** REV. NO. **SR**
 DESCRIPTION OF CHANGE **FEEDWATER FLOW CONTROL LOOP 'A'**

THIS FIELD REVISES THE LOOP WIRING DIAGRAM TO MAKE SHIELD GROUNDING CONSISTENT WITH RELATED DRAWINGS. THIS IS AN EDITORIAL CHANGE ONLY.

(2c) REF: RPR-1750

PE WAIVER REQUIRED YES NO
 PFC REVISION REQUIRED YES NO

2. Other Affected Documents
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document:

RECEIVED CDM
 DEC 13 1989
 SITE FILE COPY

3. Affected Systems **FWS**

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/RES & L	
OTHER	DATE	OTHER	DATE
ENGINEER		ENGINEER	
ENGINEER		INDEPENDENT REVIEW ENGR.	
INDEPENDENT REVIEW ENGR.		RESPONSIBLE ENGINEER	12-13-1988
RESPONSIBLE ENGINEER		GROUP SUPERVISING ENGINEER	12-2-1988
GROUP SUPERVISING ENGINEER		DISCIPLINE SUPERVISOR	12/15/88
SUPERVISING ENGINEER I		PROJECT ENGINEER	
MANAGER, STATION VERIFICATION		INTERIM CHIEF	
QUALITY ASSURANCE		QUALITY ENGINEER	12-13-88

Conversion to DCN Date _____ DATE **12-13-88**

SCE 25470-1 REV 8/85 SEE PROJECT ADMINISTRATION

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Southern California Edison Company
 Song 1-2-3

FIELD INTERIM DESIGN CHANGE
 NOTICE (IDCN)/DESIGN
 CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

RECEIVED CDM
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INTERIM DCN NO.

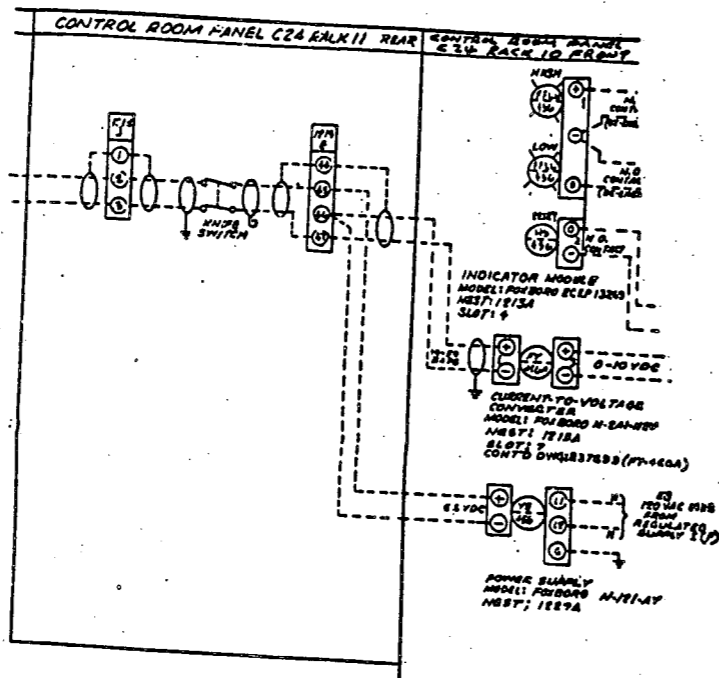
FIGCH NUMBER J-2017				
DRAWING NO.	ISSUE NO.	REV. NO.	DATE	QUANTITY
5206932	-	0		SR

Date 12-8-88 Page 2 of 3

By M. GUECIA

DESCRIPTION OF CHANGE

BEFORE



Southern California Edison Company
 Song 1-2-3

FIELD INTERIM DESIGN CHANGE
 NOTICE (IDCN)/DESIGN
 CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

RECEIVED CDM
 DEC 13 1989
 SITE FILE COPY

INTERIM DCN NO.

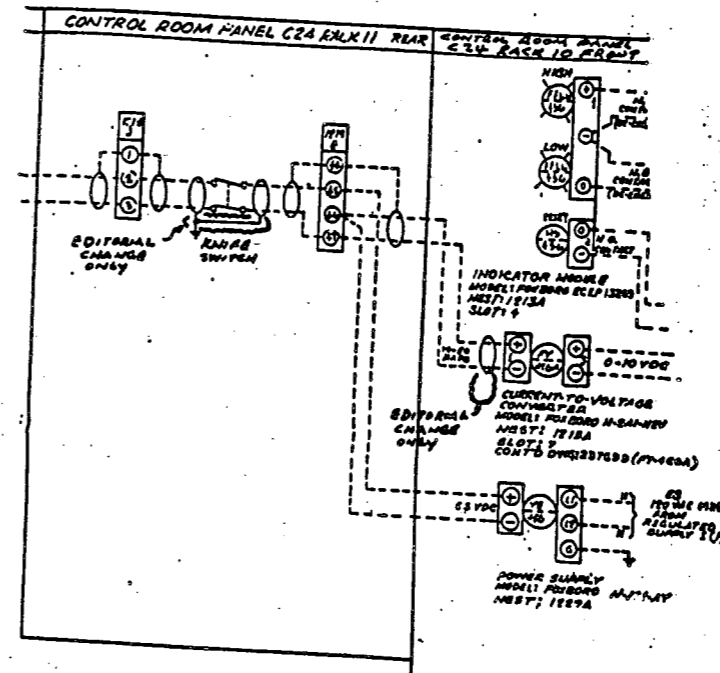
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DRAWING NO.	ISSUE NO.	REV. NO.	DATE	QUANTITY
5206932	-	0		SR

Date 12-8-88 Page 3 of 3

By M. GUECIA

DESCRIPTION OF CHANGE

AFTER



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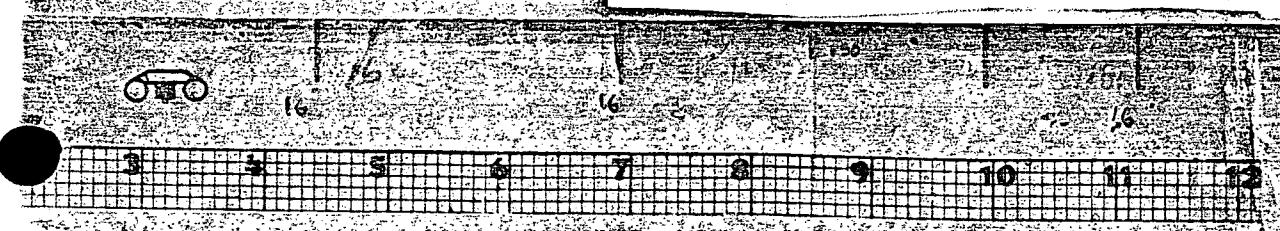
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FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3	CDM/DDC USE ONLY C/G		INTERIM DCN NO.																												
	TECH NO. S-1		PPC NO. 1-88-3501-02																												
	DOCUMENT 5206932	Sht. - Rev. 0	DCP NO./REV. NO. 3501.02 TJ/0																												
	Page 1 of 3		DCN CONVERSION NO.																												
1. Originator K. WILDERMANN		Tel: (714) 975-4190	Date 9/21/88																												
Document Title LOOP DIAGRAM FEEDWATER FLOW CONTROL LOOP A		DRADM I.D. IC-16	QC 09/23/88 SR																												
DESCRIPTION OF CHANGE <p align="center">-ADD SNUBBER BYPASS SOLENOID VALVE SV-2456.</p>																															
NOTE: ^(2/6) BASE DRAWING ISSUED FOR CONSTRUCTION IN DCP #3496.00 TJ.86 <div style="border: 1px solid black; padding: 5px; display: inline-block;"> DCP#3501.02TJ_REV 0_SHT²39_OF₂₉₅ </div>																															
2. Other Affected Documents:	3. Affected Systems	4. Design Approvals																													
451284	FWS	<table border="0"> <tr> <td>CHECKED</td> <td><i>[Signature]</i></td> <td>DATE</td> <td>9-22-88</td> </tr> <tr> <td>INDEPENDENT VER. ENG.</td> <td><i>[Signature]</i></td> <td>DATE</td> <td>10/20/88</td> </tr> <tr> <td>REGISTERED ENGINEER</td> <td><i>[Signature]</i></td> <td>DATE</td> <td>10/27/88</td> </tr> <tr> <td>LEAD DESIGN ENGINEER</td> <td><i>[Signature]</i></td> <td>DATE</td> <td>10/27/88</td> </tr> <tr> <td>OTHER</td> <td></td> <td>DATE</td> <td></td> </tr> <tr> <td>OTHER</td> <td></td> <td>DATE</td> <td></td> </tr> <tr> <td>QUAL. ADMINISTRATION</td> <td></td> <td>DATE</td> <td>10/18/88</td> </tr> </table>		CHECKED	<i>[Signature]</i>	DATE	9-22-88	INDEPENDENT VER. ENG.	<i>[Signature]</i>	DATE	10/20/88	REGISTERED ENGINEER	<i>[Signature]</i>	DATE	10/27/88	LEAD DESIGN ENGINEER	<i>[Signature]</i>	DATE	10/27/88	OTHER		DATE		OTHER		DATE		QUAL. ADMINISTRATION		DATE	10/18/88
CHECKED	<i>[Signature]</i>	DATE	9-22-88																												
INDEPENDENT VER. ENG.	<i>[Signature]</i>	DATE	10/20/88																												
REGISTERED ENGINEER	<i>[Signature]</i>	DATE	10/27/88																												
LEAD DESIGN ENGINEER	<i>[Signature]</i>	DATE	10/27/88																												
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QUAL. ADMINISTRATION		DATE	10/18/88																												
449408																															
M-37351																															
5129817																															
5. SCE/Contractor Project Administration																															
Conversion to DCN Date _____																															

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POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

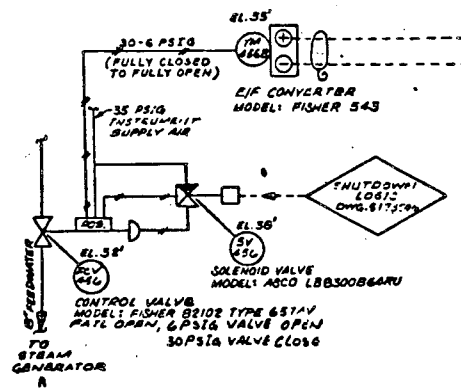
SUPPLEMENTAL PAGE

INTERIM DCN NO.				
IDCN NUMBER <u>S-1</u>				
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DCN CONV. QUALITY CLASS
5206932	-	0		SR

Date 9/21/88 Page 2 of 3
By K. WILDERMANN

DESCRIPTION OF CHANGE

BEFORE



DCP# 3501.02TJ REV 0 SHT 24 OF 295

FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

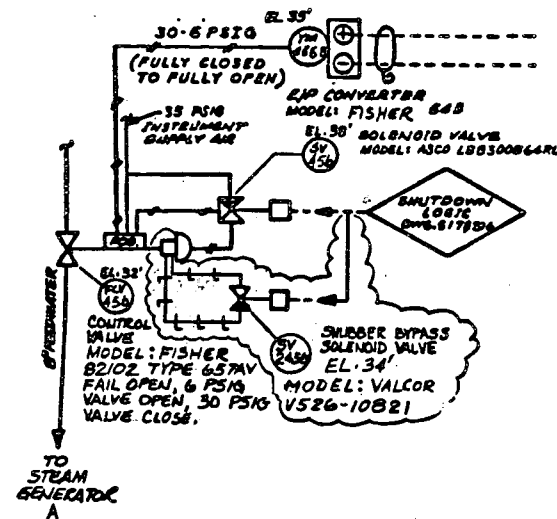
SUPPLEMENTAL PAGE

INTERIM DCN NO.				
IDCN NUMBER <u>S-1</u>				
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DCN CONV. QUALITY CLASS
5206932	-	0		SR

Date 9/21/88 Page 3 of 3
By K. WILDERMANN

DESCRIPTION OF CHANGE

AFTER



DCP# 3501.02TJ REV 0 SHT 24 OF 295

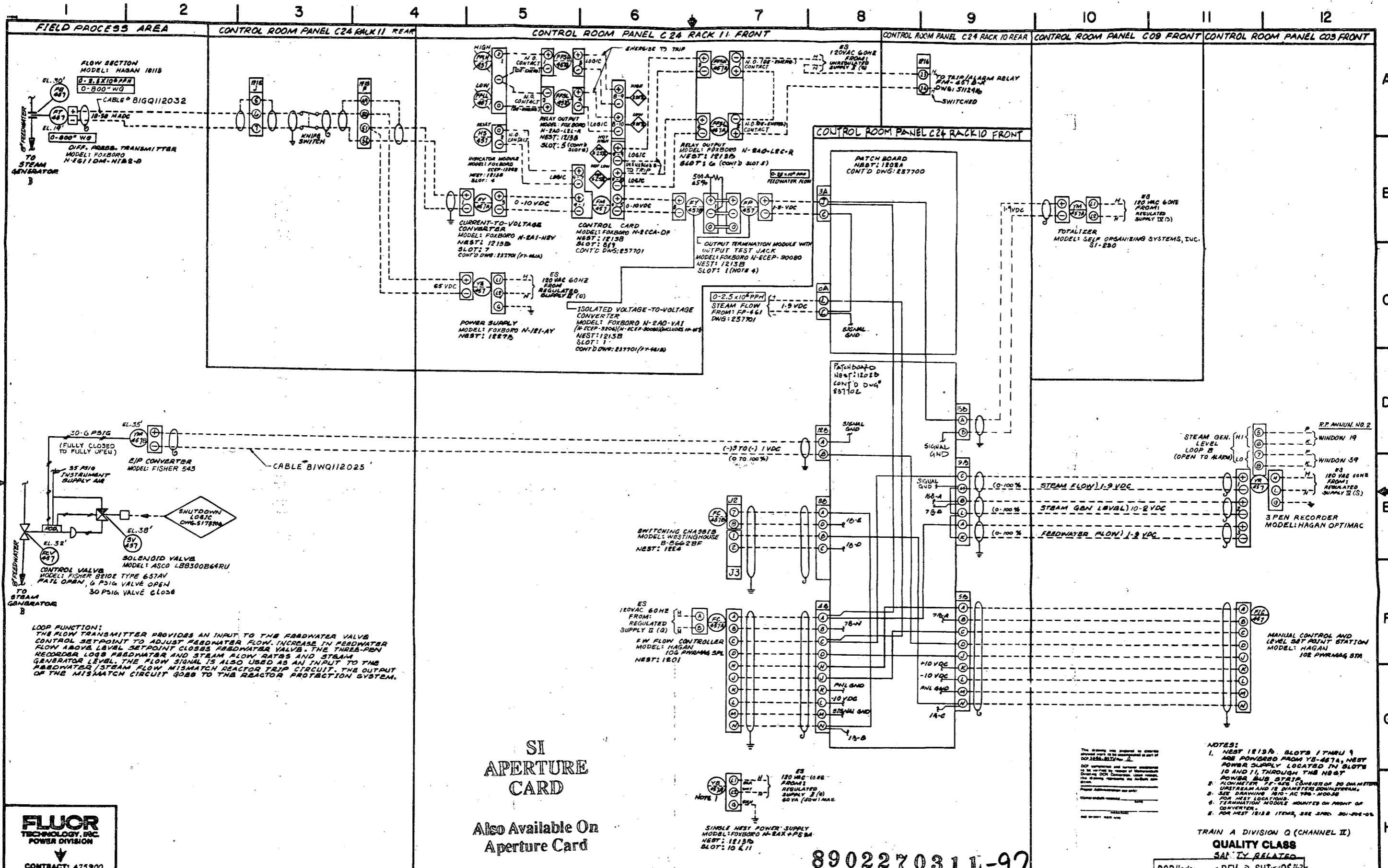
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NO.	REVISIONS	DATE	BY	CHK'D	MADE	NO.	REVISIONS	DATE	BY	CHK'D	MADE
						0	ISSUED FOR CONSTRUCTION				

5206933-0

PAGE 1 OF 2

Southern California Edison Company
FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
 (For SONGS) 2-8-81

FORM NO. 1-88-3496-00 REV. 0
 IDCN NO. **J-2256**
 DOCUMENT NO. **5206933**
 REV. NO. **0**

ORIGINATOR: **E. G. WILLINGHAM**
 DATE: **1-30-1989**
 DRAWING NO.: **IC-16**
 REV. NO.: **SR**

LOOP DIAGRAM - FEEDWATER FLOW CONTROL LOOP B

THIS FIDCN REVISES THE FEEDWATER FLOW CONTROL LOOP B DIAGRAM AS SHOWN ON THE SUPPLEMENTAL PAGE, BECAUSE OF REVERSAL OF INDICATOR LOGIC.

NOTE: FIDCN J-2137 changes LOW setpoint to "51%", from "52%".

5f REP: RPR # 2404

PE WAIVER REQUIRED YES NO
 PFC REVISION REQUIRED YES NO

2. Other Affected Documents
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document:

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 JAN 31 1989
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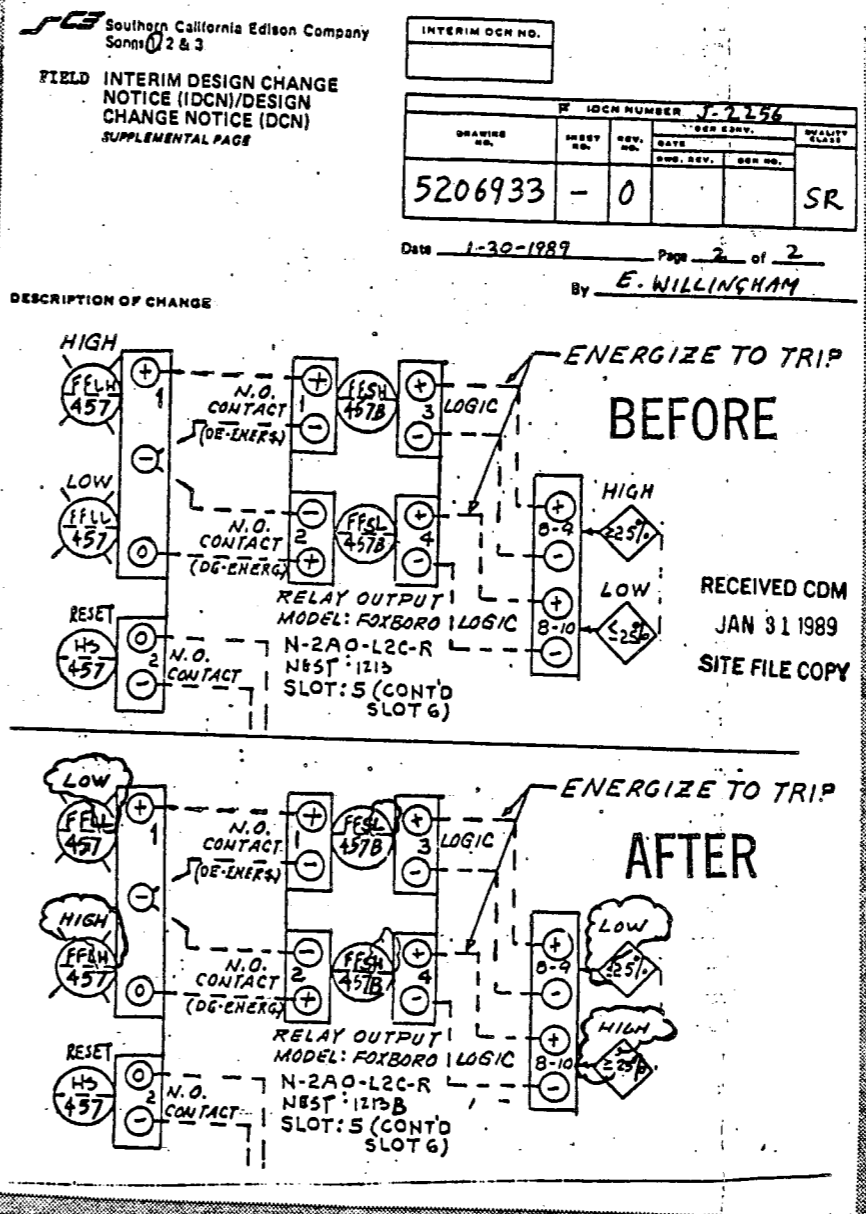
3. Affected Systems **FWS**

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/RES & L	
OTHER	DATE	OTHER	DATE
INDEPENDENT REVIEW ENGR.	DATE	INDEPENDENT REVIEW ENGR.	DATE
			1-30-1989
RESPONSIBLE ENGINEER	DATE	RESPONSIBLE ENGINEER	DATE
		E. G. Willingham	01/30/89
GROUP SUPERVISING ENGINEER	DATE	GROUP SUPERVISING ENGINEER	DATE
			1/31/89
SUPERVISING ENGINEER	DATE	PROJECT ENGINEER	DATE
MANAGER, SYSTEMS/TECHNICAL	DATE	DISCIPLINE CHIEF	DATE
QUALITY ASSURANCE	DATE	QUALITY ASSURANCE	DATE
		R. K. Hill / C. BRAND	1-31-89 1989

Conversion to DCN Date: _____


SCE 20-170-1 REV 000



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 Southern California Edison Company FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS 0-3-81)		CON/DCN USE ONLY DCN NO. J-2085 DOCUMENT NO. 5206933 0 SHEET	PPE NO. DCP NO. 3496.007J REV. NO. 0 SCS VERBODEN NO. REV. NO.
---	--	---	--

1. ORIGINATOR **A. A. MOLINA** PAR **87434** DATE **1-4-89**
 ASSIGNED TO **LOOP DIAGRAM - LOOP B** SEARCH **IC-28** SR **16** 1/4

DESCRIPTION OF CHANGE
ADD SHIELD TO CABLE

20 REF: **RPR # 2223**

PE WAIVER REQUIRED	<input type="checkbox"/> YES
	<input checked="" type="checkbox"/> NO
PFO REVISION REQUIRED	<input type="checkbox"/> YES
	<input checked="" type="checkbox"/> NO

2. Other Affected Documents
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document:

RECEIVED CDM
 JAN 4 1989
 SITE FILE COPY

3. Affected Systems **FWS**

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/NEE & L	
OTHER	DATE	OTHER	DATE
OTHER	DATE	CHECKED	DATE
CHECKED	DATE	INDEPENDENT REVIEW ENGR.	DATE
INDEPENDENT REVIEW ENGR.	DATE	RESPONSIBLE ENGINEER	DATE
RESPONSIBLE ENGINEER	DATE	GROUP SUPERVISING ENGINEER	DATE
GROUP SUPERVISING ENGINEER	DATE	SUPERVISING ENGINEER I	DATE
SUPERVISING ENGINEER I	DATE	MANAGER, STATION VERIFICATION	DATE
MANAGER, STATION VERIFICATION	DATE	STATION VERIFICATION	DATE
STATION VERIFICATION	DATE	QUALITY ASSURANCE	DATE
QUALITY ASSURANCE	DATE	CONVERSION TO DCN DATA	DATE

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Songs 0-2-3

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.

IDCN NUMBER 1-208					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	REV. DATE	REV. NO.
5206933	-	0			
					SR

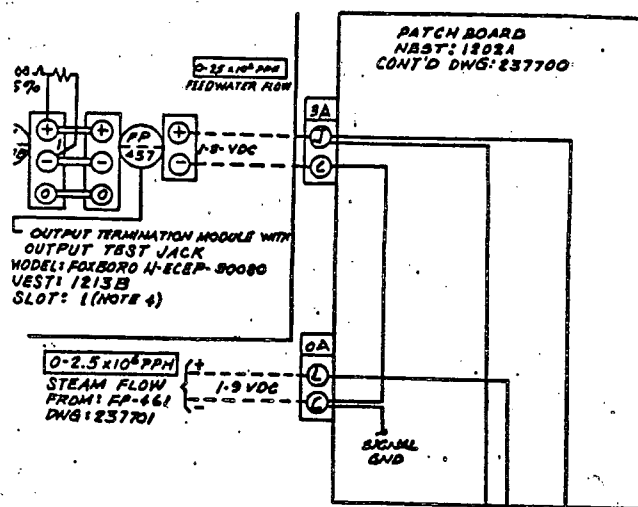
BEFORE

Date 1-4-89 Page 2 of 3

By A.A. MOLINA

DESCRIPTION OF CHANGE

RECEIVED CDM
JAN 4 1989
SITE FILE COPY



Southern California Edison Company
Songs 0-2-3

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.

IDCN NUMBER 1-208					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	REV. DATE	REV. NO.
5206933	-	0			
					SR

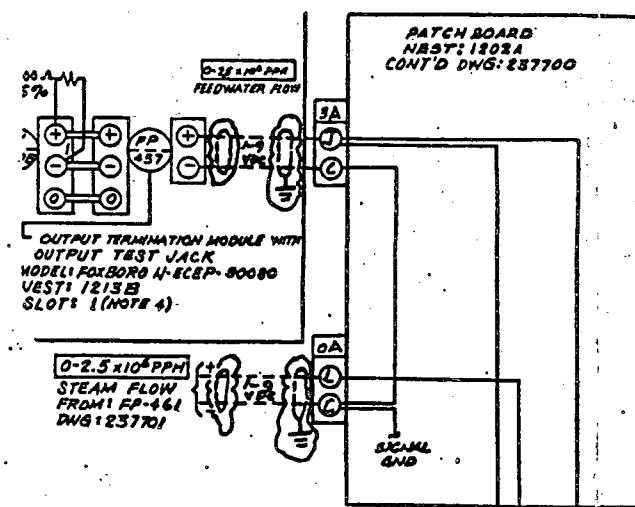
AFTER

Date 1-4-89 Page 3 of 3

By A.A. MOLINA

DESCRIPTION OF CHANGE

RECEIVED CDM
JAN 4 1989
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SCE Southern California Edison Company FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS 2 & 3)	SUB/DWG. USE ONLY ISSUE NO. J-2018	PFC NO. 1-88-3496.0 R-0
	DOCUMENT NO. 5206933 REV. NO. 0	DCN NO. 3496.007J
	SHEET NO. _____	REV. NO. 0
	_____	_____

1. ORIGINATOR **M. GUECIA** PFC NO. **87762** DATE **12-8-88**

DOCUMENT TITLE **LOOP DIAGRAM FEEDWATER FLOW CONTROL LOOP 'B'** DRAWING NO. **IC-16** REV. NO. **SR**

DESCRIPTION OF CHANGE
THIS FIELD REVISES THE LOOP WIRING DIAGRAM TO MAKE SHIELD GROUNDING CONSISTENT WITH RELATED DRAWINGS. THIS IS AN EDITORIAL CHANGE ONLY.

2c

REF: RPR-1750

PE WAIVER REQUIRED	<input type="checkbox"/> YES
	<input checked="" type="checkbox"/> NO
PFC REVISION REQUIRED	<input type="checkbox"/> YES
	<input checked="" type="checkbox"/> NO

2. Other Affected Documents

None

Specific affected documents are listed on the CC(123) 104 associated with the source document checked below:

This DCP (Forms CC(123) 103 and CC(123) 104 attached)

This FIDCN/DCN (Forms CC(123) 103 and CC(123) 104 attached)

The following document:

RECEIVED CDM
DEC 13 1988
SITE FILE COPY

3. Affected Systems **FWS**

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/RES & L	
OTHER	DATE	OTHER	DATE
OTHER	DATE	OTHER	DATE
ENGINEER	DATE	INDEPENDENT REVIEW ENG.	DATE
INDEPENDENT REVIEW ENG.	DATE	RESPONSIBLE ENGINEER	DATE
RESPONSIBLE ENGINEER	DATE	GROUP SUPERVISING ENGINEER	DATE
GROUP SUPERVISING ENGINEER	DATE	SUPERVISING ENGINEER 1	DATE
SUPERVISING ENGINEER 1	DATE	SUPERVISING ENGINEER 2	DATE
SUPERVISING ENGINEER 2	DATE	QUALITY ASSURANCE	DATE
QUALITY ASSURANCE	DATE		

Conversion to DCN Date: _____

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FIELD INTERIM DESIGN CHANGE
 NOTICE (IDCN)/DESIGN
 CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

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 DEC 13 1989
 SITE FILE COPY

INTERIM DCN NO.

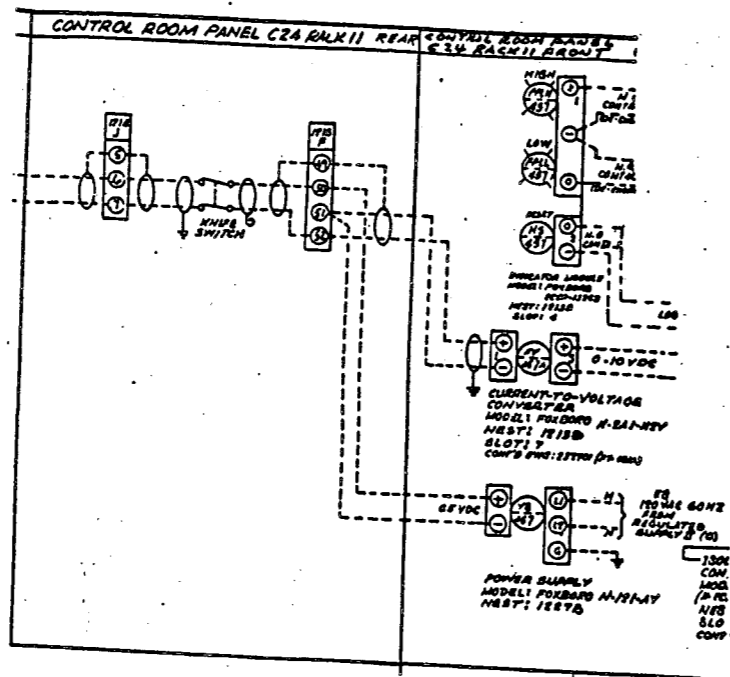
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DRAWING NO.	SHEET NO.	REV. NO.	DATE	DES. CONVL.	QUALITY CHECK
5206933	-	0			SR

Date 12-8-88 Page 2 of 3

By M. GUECIA

DESCRIPTION OF CHANGE

BEFORE



Southern California Edison Company
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FIELD INTERIM DESIGN CHANGE
 NOTICE (IDCN)/DESIGN
 CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

RECEIVED COM
 DEC 13 1989
 SITE FILE COPY

INTERIM DCN NO.

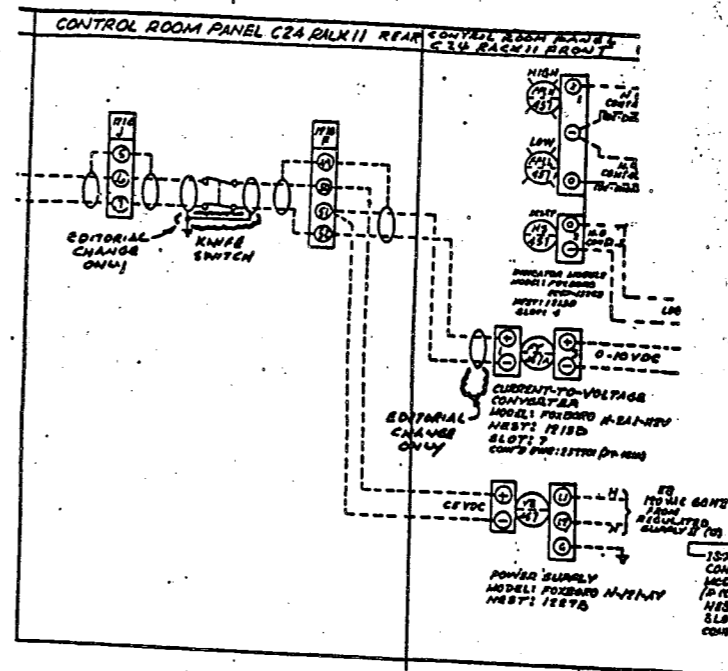
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DRAWING NO.	SHEET NO.	REV. NO.	DATE	DES. CONVL.	QUALITY CHECK
5206933	-	0			SR

Date 12-8-88 Page 3 of 3

By M. GUECIA

DESCRIPTION OF CHANGE

AFTER



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FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3	INTERIM DCN NO. 1-88-3501.02														
	CDM/DDC USE ONLY CIG TRUCK NO. 5-1 DOCUMENT NO. 5206933 Page 1 of 3	PFC NO. 1-88-3501.02 DCP NO./REV. NO. 3501.02 T J / 0 DCN CONVERSION NO.													
1. Originator K. WILDERMANN Document Title LOOP DIAGRAM FEEDWATER FLOW CONTROL LOOP B <small>DESCRIPTION OF CHANGE</small>	Tol: 7/19/75-4790 Date 9/21/88 DRADM I.D. 1C-16 DC SR														
- ADD SNUBBER BYPASS SOLENOID VALVE SV-3457.															
NOTE: (Ab) BASE DRAWING ISSUED FOR CONSTRUCTION IN DCP# 3496.00T.J.R/O <div style="border: 1px solid black; padding: 2px; display: inline-block;"> DCP# 3501.02 REV 0 SHI 20 Fe 95 </div>															
2. Other Affected Documents 45/284 5202910 M-37357 5129817	3. Affected Systems FWS														
4. Design Approvals <table border="1"> <thead> <tr> <th>NAME</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td><i>[Signature]</i></td> <td>9.22.88</td> </tr> <tr> <td><i>[Signature]</i></td> <td>10/29/88</td> </tr> <tr> <td><i>[Signature]</i></td> <td>10/22/89</td> </tr> <tr> <td><i>[Signature]</i></td> <td>10/29/81</td> </tr> <tr> <td>OTHER</td> <td>DATE</td> </tr> <tr> <td><i>[Signature]</i></td> <td>10/28/88</td> </tr> </tbody> </table>		NAME	DATE	<i>[Signature]</i>	9.22.88	<i>[Signature]</i>	10/29/88	<i>[Signature]</i>	10/22/89	<i>[Signature]</i>	10/29/81	OTHER	DATE	<i>[Signature]</i>	10/28/88
NAME	DATE														
<i>[Signature]</i>	9.22.88														
<i>[Signature]</i>	10/29/88														
<i>[Signature]</i>	10/22/89														
<i>[Signature]</i>	10/29/81														
OTHER	DATE														
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5. SCE/Contractor Project Administration Convention to DCN Date															

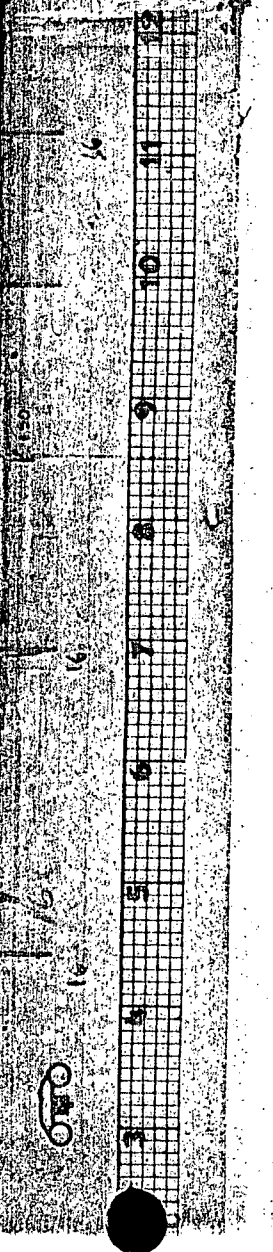
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FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

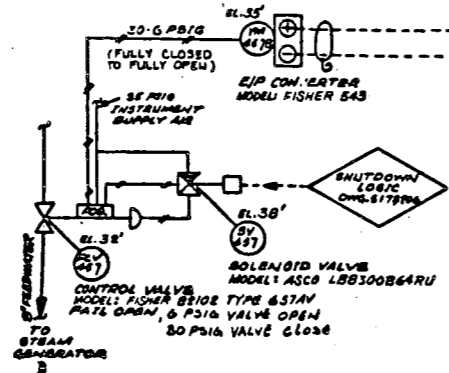
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IDCN NUMBER <u>S</u>					
DRAWING NO.	SHEET NO.	REV. NO.	DCN CONV.		QUALITY CLASS
			DATE	SUB. NO.	
<u>5206933</u>	<u>-</u>	<u>0</u>			<u>SR</u>

Date 9/21/88 Page 2 of 3
By K. WILDERMANN

DESCRIPTION OF CHANGE

BEFORE



DCP#3501.02TJ REV 0 SHT 43 OF 295

FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

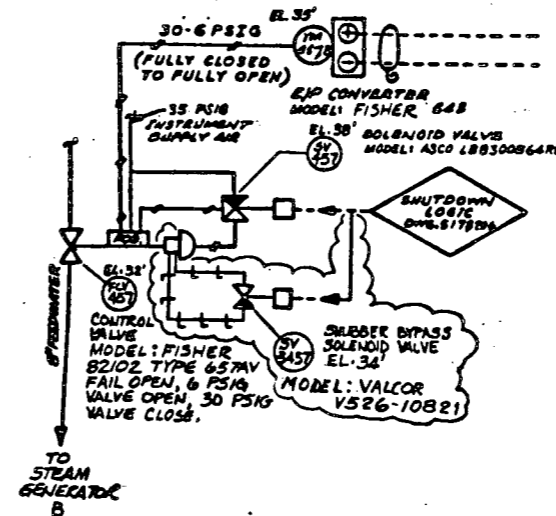
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INTERIM DCN NO.					
IDCN NUMBER <u>S-1</u>					
DRAWING NO.	SHEET NO.	REV. NO.	DCN CONV.		QUALITY CLASS
			DATE	SUB. NO.	
<u>5206933</u>	<u>-</u>	<u>0</u>			<u>SR</u>

Date 9/21/88 Page 3 of 3
By K. WILDERMANN

DESCRIPTION OF CHANGE

AFTER



DCP#3501.02TJ REV 0 SHT 44 OF 295

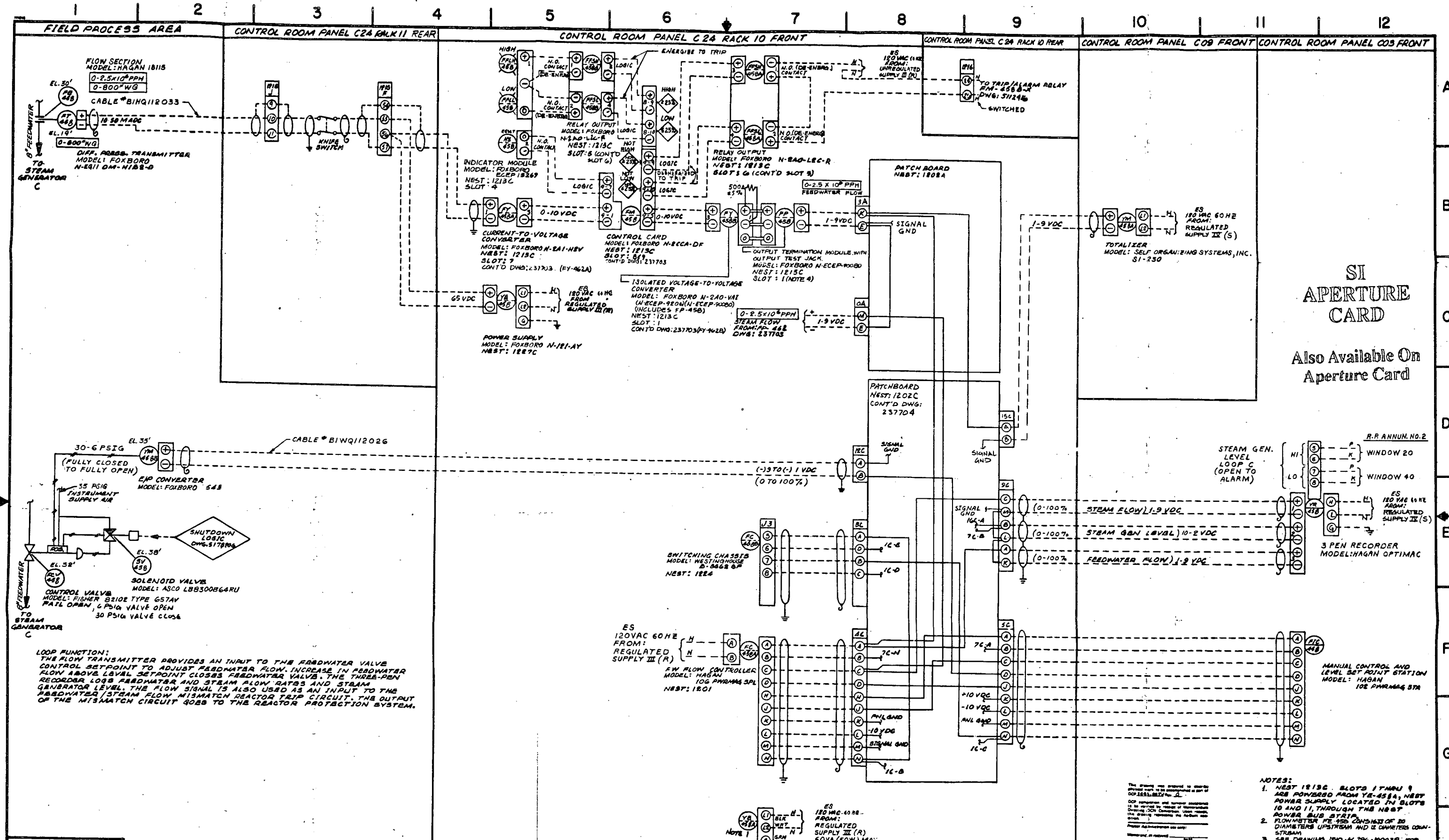
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LOOP FUNCTION:
 THE FLOW TRANSMITTER PROVIDES AN INPUT TO THE FEEDWATER VALVE CONTROL SETPOINT TO ADJUST FEEDWATER FLOW. INCREASE IN FEEDWATER FLOW ABOVE LEVEL SETPOINT CLOSERS FEEDWATER VALVE. THE THREE-PEN RECORDER LOGS FEEDWATER AND STEAM FLOW RATES AND STEAM GENERATOR LEVEL. THE FLOW SIGNAL IS ALSO USED AS AN INPUT TO THE FEEDWATER/STEAM FLOW MISMATCH REACTOR TRIP CIRCUIT. THE OUTPUT OF THE MISMATCH CIRCUIT GOES TO THE REACTOR PROTECTION SYSTEM.

- NOTES:**
- NEST 1213C SLOTS 1 THRU 9 ARE POWERED FROM YE-458A, NEST POWER SUPPLY LOCATED IN SLOTS 10 AND 11, THROUGH THE NEST POWER BUS STRIP.
 - FLOWMETER FE-1220 CONSISTS OF 20 DIAMETERS UPSTREAM AND 2 DIAMETERS DOWNSTREAM. SEE DRAWINGS 1210-AL796-M0038 FOR NEST LOCATIONS.
 - TERMINATION MODULE MOUNTED ON FRONT OF CONVERTER FOR NEST 1213C ITEMS SET 3001-3004-07 TRAIN.
 - DIVISION R (CHANNEL III)



CONTRACT: 475900

5178206	FEEDWATER SYSTEM
518273	W/DWG. MISC. DEV. SH. 3 PREL. FLOW ELV. TRAYS
518274	5000 GAL. C. VLV. CONT. SYS. INTERCONN. DIAG.
518275	RAKE WIRING
518277	FEEDWATER CONTROL DIAGRAM
518278	FUNCTIONAL DIAGRAM (FOXBORO)

NO.	REVISIONS	DATE	BY	CHKD.	APPROVED	NO.	REVISIONS	DATE	BY	CHKD.	APPROVED
0	ISSUED FOR CONSTRUCTION										

QUALITY CLASS
 SAFETY RELATED

DCPH 246.0011 REV. 2. SHT. 1 OF 2

LOCATION: SAN DIEGO NUCLEAR GENERATING STATION UNIT 1

**LOOP DIAGRAM
 FEEDWATER FLOW CONTROL
 LOOP C**

SHEET NO. _____ OF _____ SHTS.

Southern California Edison

8902270311-105

5206934-0

Southern California Edison Company
FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
 (For SONGS) 2-2-88

FORM NO. **J-2257** REV. NO. **0**
 DOCUMENT NO. **5206934** SHEET _____
 I.D.C.N. NO. **1-88-3496-00** REV. 0
 D.C.N. NO. **3496-00TJ** REV. NO. **0**

1. ORIGINATOR: **F. G. WILLINGHAM** FAX: **87328** DATE: **1-30-1989**
 DOCUMENT TITLE: **LOOP DIAGRAM - FEEDWATER FLOW CONTROL LOOP C** DRAWING NO. **IC-16** OR **SR**

DESCRIPTION OF CHANGE:
 THIS PIDCN REVISES THE FEEDWATER FLOW CONTROL LOOP DIAGRAM AS SHOWN ON THE SUPPLEMENTAL PAGE, BECAUSE OF REVERSAL OF INDICATOR LOGIC.

NOTE: PIDCN J-2138 changes LOW setpoint to '≤11%', from '≤25%'.

5f

REF: RPR # 2404

PE WAIVER REQUIRED YES NO
 PFC REVISION REQUIRED YES NO

2. Other Affected Documents:
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document:

RECEIVED CDM
 JAN 31 1989
 SITE FILE COPY

3. Affected Systems **FWS**

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/HES & L	
OTHER	DATE	OTHER	DATE
OTHER	DATE	CHECKER	DATE
CHECKER	DATE	INDEPENDENT REVIEW ENGR.	DATE
INDEPENDENT REVIEW ENGR.	DATE	RESPONSIBLE ENGINEER	DATE
RESPONSIBLE ENGINEER	DATE	DISCIPLINE SUPERVISOR	DATE
GROUP SUPERVISING ENGINEER	DATE	DISCIPLINE SUPERVISOR	DATE
SUPERVISING ENGINEER 1	DATE	PROJECT ENGINEER	DATE
MANAGER, SYSTEMS/VEHICULAR	DATE	DISCIPLINE ENGR.	DATE
QUALITY ASSURANCE	DATE	QUALITY ASSURANCE	DATE

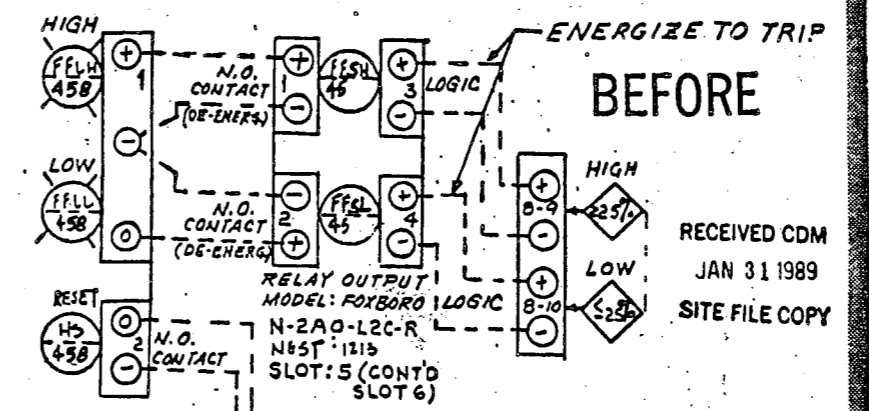
Conversion to DCN Date: **1-31-89** BY: **C. BARNES**

FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

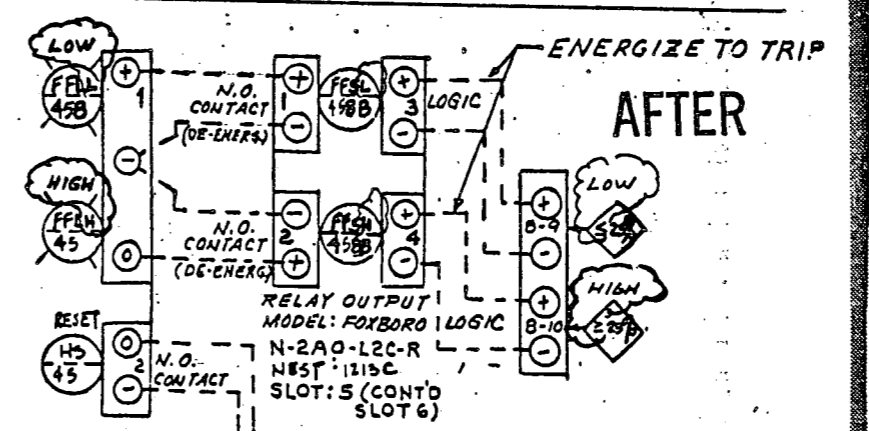
INTERIM DCN NO. _____
 I.D.C.N. NUMBER **J-2257**
 DRAWING NO. **5206934** SHEET NO. **- 0** REV. NO. **0** DATE **1-30-1989** SUB. REV. _____ DEN. NO. _____ QUALITY CLASS **SR**

Date **1-30-1989** Page **2** of **2**
 By **E. WILLINGHAM**

DESCRIPTION OF CHANGE:



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8902270311-106

Southern California Edison Company
FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
 (For SONGS(1) 2-6-8)

FORM NO. J-2086	DCN NO. 3496-00TJ
DOCUMENT NO. 5206934 0	REV. NO. 0
CHECK NO. _____	VERSION NO. _____
REV. NO. _____	REV. NO. _____

1. ORIGINATOR **A. A. MOLINA** FAX **87434** DATE **1-9-89**
 DOCUMENT TITLE **LOOP DIAGRAM - LOOP C** SERIAL **IC-88** IN **SR**
 DESCRIPTION OF CHANGE **16 1/4"**

ADD SHIELD TO CABLE

2c REF: RPR # 2223

PE WAIVER REQUIRED	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
PFO REVISION REQUIRED	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

2. Other Affected Documents
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached).
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached).
 The following document:

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 JAN 4 1989
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3. Affected Systems **FWS**

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/HES & L	
OTHER	DATE	OTHER	DATE
CHECKER	DATE	CHECKER	DATE
CHECKER	DATE	INDEPENDENT REVIEW ENGINEER	DATE
INDEPENDENT REVIEW ENGR.	DATE	RESPONSIBLE ENGINEER	DATE
RESPONSIBLE ENGINEER	DATE	DESIGN GROUP LEADER	DATE
GROUP SUPERVISING ENGINEER	DATE	DISTRICT SUPERVISOR	DATE
SUPERVISING ENGINEER I	DATE	PLANT ENGINEER	DATE
MANAGER, EVALUATION VERIFICATION	DATE	INSPECTOR ENGR	DATE
QUALITY ASSURANCE	DATE	QUALITY ASSURANCE	DATE

Conversion to DCN Date _____

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Southern California Edison Company
Songs 1, 2 & 3

PLP INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.					
IDCN NUMBER <u>7-2086</u>					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DCN REV.	SCALE
5206934	-	0			SR

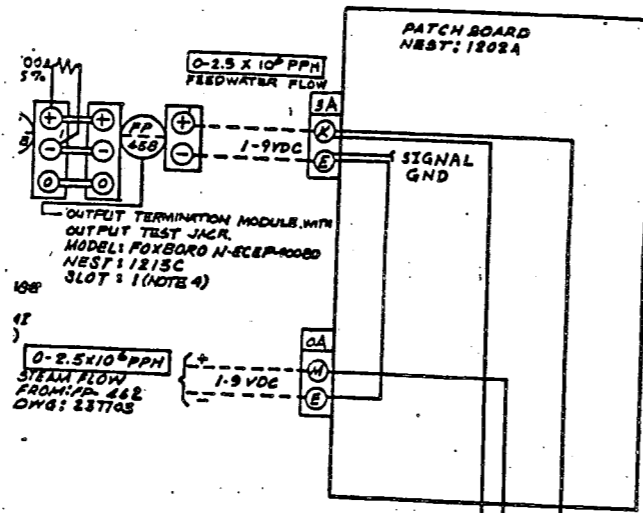
Date 1-4-89 Page 2 of 3

By A. A. MOLINA

BEFORE

DESCRIPTION OF CHANGE

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JAN 4 1989
SITE FILE COPY



Southern California Edison Company
Songs 1, 2 & 3

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.					
IDCN NUMBER <u>7-2086</u>					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DCN REV.	SCALE
5206934	-	0			SR

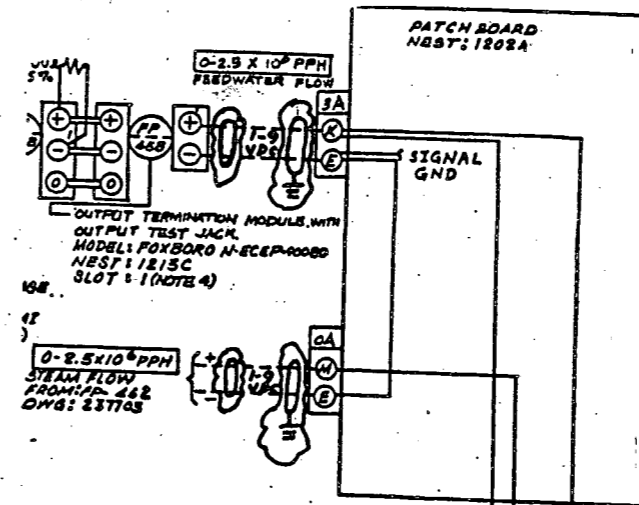
Date 1-4-89 Page 3 of 3

By A. A. MOLINA

AFTER

DESCRIPTION OF CHANGE

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SCE Southern California Edison Company
 FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN)
 (For SONGS 2 & 3)

FORM/DOC USE ONLY
 PFC NO. 1-88-3496.0 R-0
 ORDER NO. J-2019
 DOC. NO. 3496.007J
 DOCUMENT 5206934 REV. NO. 0
 REV. NO. 0
 REVISION NO. _____
 DATE _____

1. ORIGINATOR **M. GUECIA** PAR 87762 DATE 12-8-88
 DOCUMENT TITLE **LOOP DIAGRAM FEEDWATER FLOW CONTROL LOOP 'C'** STATION **IC-16 SR**

DESCRIPTION OF CHANGE
THIS FIELD REVISES THE LOOP WIRING DIAGRAM TO MAKE SHIELD GROUNDING CONSISTENT WITH RELATED DRAWINGS. THIS IS AN EDITORIAL CHANGE ONLY.

2c

REF: RPR-1750

PE WAIVER REQUIRED YES NO
 PFC REVISION REQUIRED YES NO

2. Other Affected Documents
 None
 Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:
 This DCP (Forms CC(123) 183 and CC(123) 184 attached)
 This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)
 The following document:

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 DEC 13 1989
 SITE FILE COPY

3. Affected Systems **FWS**

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/RES & L	
DATE	DATE	DATE	DATE
DESIGN	DATE	DESIGN	DATE
CHECK	DATE	CHECK	DATE
INDEPENDENT REVIEW ENGINEER	DATE	INDEPENDENT REVIEW ENGINEER	DATE
RESPONSIBLE ENGINEER	DATE	RESPONSIBLE ENGINEER	DATE
GROUP SUPERVISING ENGINEER	DATE	GROUP SUPERVISING ENGINEER	DATE
SUPERVISING ENGINEER 1	DATE	PROJECT ENGINEER	DATE
MANAGER, SYSTEM VERIFICATION	DATE	DISCIPLINE CHIEF	DATE
QUALITY ASSURANCE	DATE	QUALITY ASSURANCE	DATE

Conversion to DCN Date _____

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FIELD INTERIM DESIGN CHANGE
 NOTICE (IDCN)/DESIGN
 CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

INTERIM DCN NO.

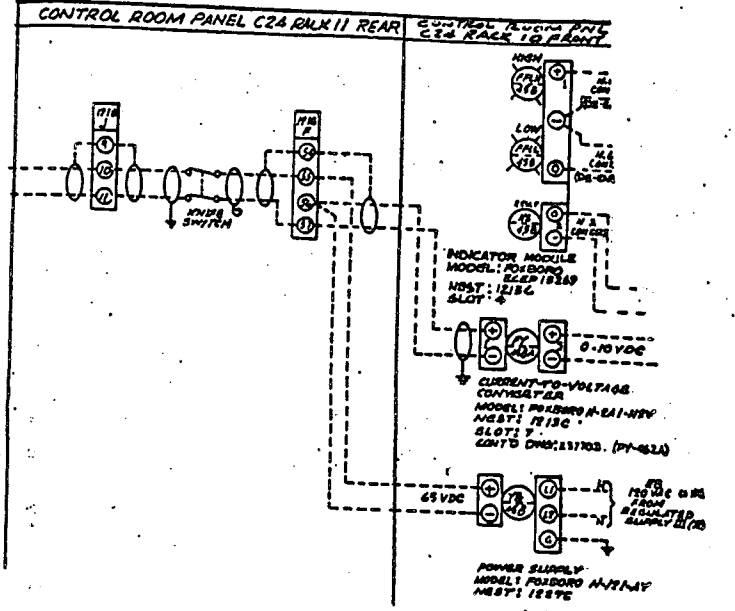
FIELD NUMBER 7-2019					
DRAWING NO.	REV. NO.	REV. DATE	REV. BY	REV. NO.	REV. DATE
5206934	-	0			

Date 12-8-88 Page 2 of 5
 By M. GUCCIA

DESCRIPTION OF CHANGE

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FIELD INTERIM DESIGN CHANGE
 NOTICE (IDCN)/DESIGN
 CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

INTERIM DCN NO.

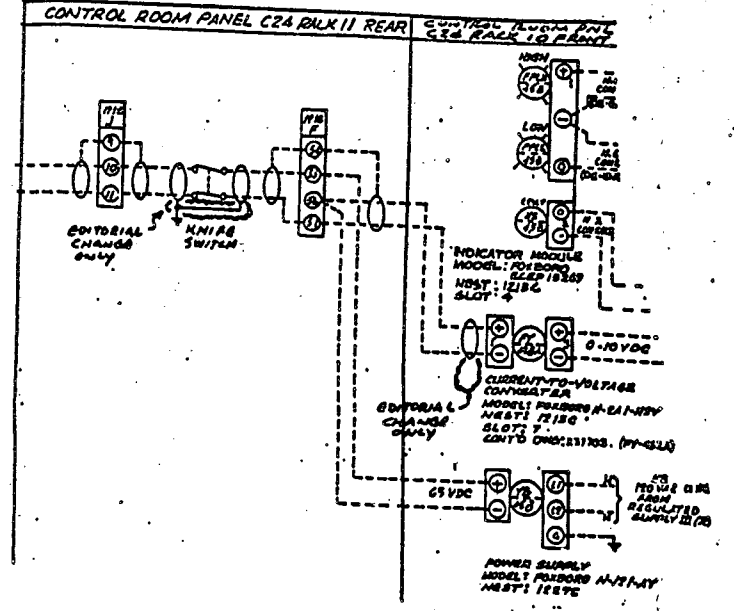
FIELD NUMBER 7-2019					
DRAWING NO.	REV. NO.	REV. DATE	REV. BY	REV. NO.	REV. DATE
5206934	-	0			

Date 12-8-88 Page 3 of 5
 By M. GUCCIA

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SE Southern California Edison Company
Song 3-8-8

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

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DEC 13 1989

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DESCRIPTION OF CHANGE

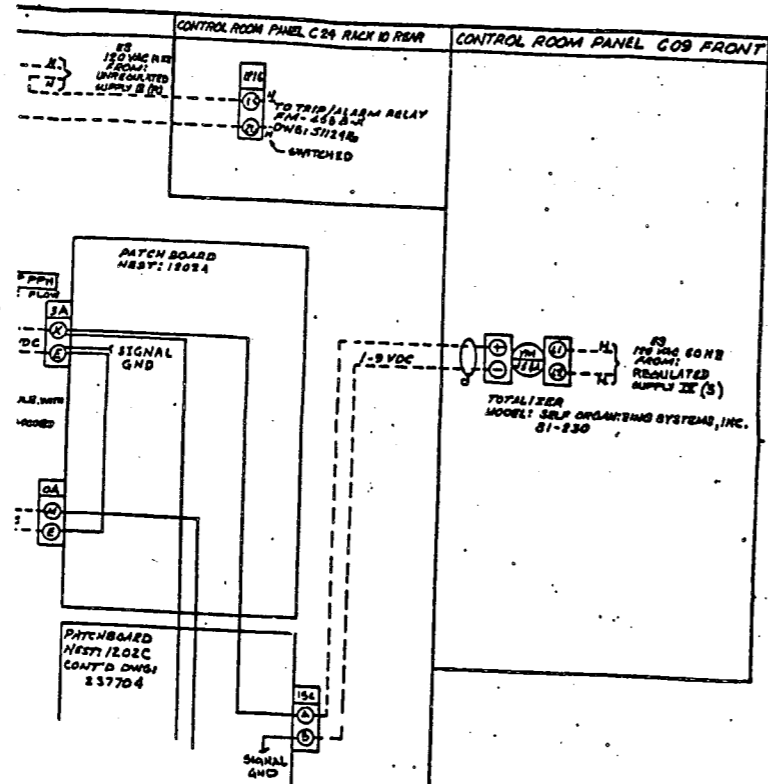
INTERIM DCN NO.

FIGCH NUMBER J-2019					
DRAWING NO.	SHEET NO.	REV. NO.	DATE		QUALITY CHECK
			ISS. REV.	DES. REV.	
5206934	-	0			SR

Date 12-8-88 Page 4 of 5

By M. GUECIA

BEFORE



SE Southern California Edison Company
Song 3-8-8

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

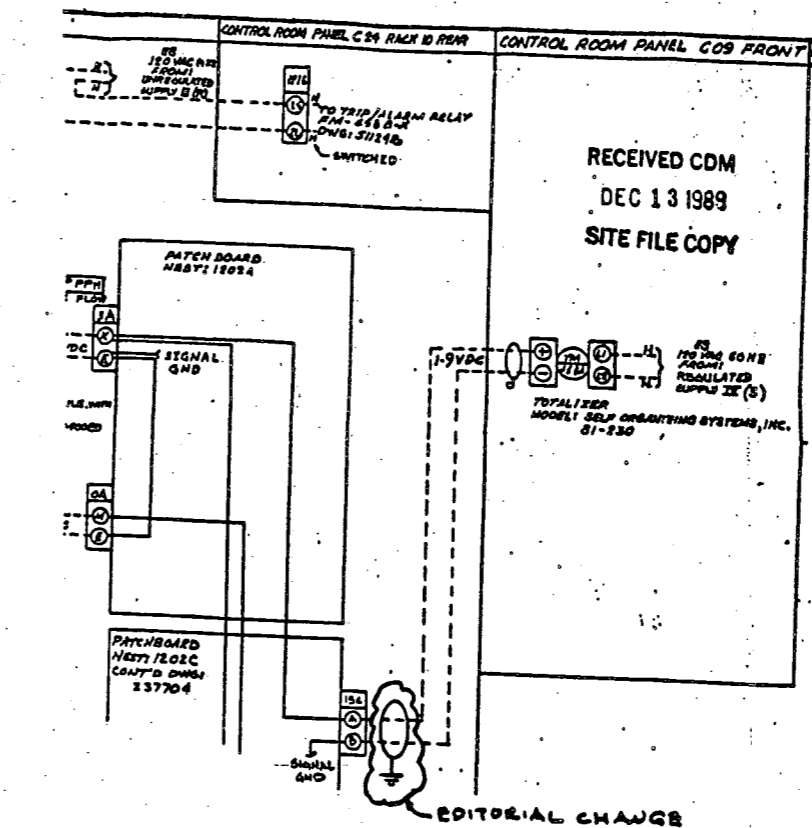
INTERIM DCN NO.

FIGCH NUMBER J-2019					
DRAWING NO.	SHEET NO.	REV. NO.	DATE		QUALITY CHECK
			ISS. REV.	DES. REV.	
5206934	-	0			SR

Date 12-8-88 Page 5 of 5

By M. GUECIA

AFTER



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DEC 13 1989

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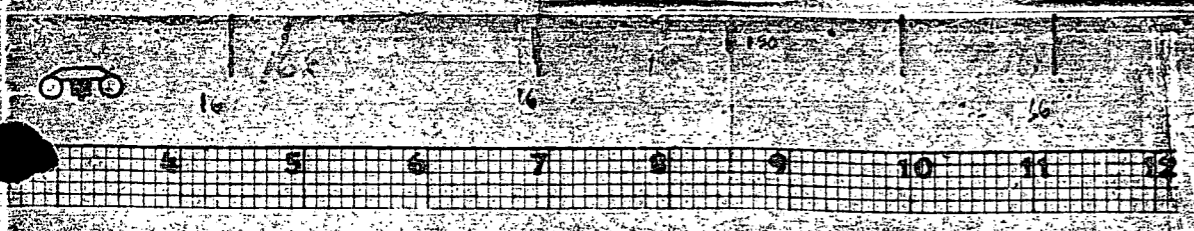
8902270311-111

FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3	CDM/DDC USE ONLY CIG		FFC NO. 1-88-3501-02
	IDCN NO. S-1		DCP NO./REV. NO. 3501.02TJ/0
	DOCUMENT 5206934	SHT -	REV. 0	DCN CONVERSION NO.
Page 1 of 3			
1. Originator K. WILDERMANN		Tel: (714) 975-4770	Date 9/21/88
Document Title LOOP DIAGRAM		DRADM I.D.	QC SR
FEEDWATER FLOW CONTROL LOOP		IC-16	
DESCRIPTION OF CHANGE			
<p>- ADD SNUBBER BYPASS SOLENOID VALVE SV-345B.</p>			
<p>NOTE: (R6) BASE DRAWING ISSUED FOR CONSTRUCTION IN DCP#3496.00TJ.R/0</p>			
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> DCP# 3501.02TJ REV 0 SHT 45 OF 205 </div>			
2. Other Affected Documents	3. Affected Systems	4. Design Approvals	
451284	FWS	CHECKED <i>[Signature]</i>	DATE 9-22-88
449408 9/10/88		INDEPENDENT CHECKER <i>[Signature]</i>	DATE 9/23/88
5202910		RESPONSIBLE ENGINEER <i>[Signature]</i>	DATE 9/23/88
M-37351		LEAD DESIGNING ENGINEER <i>[Signature]</i>	DATE 10/29/88
5129817		OTHER	DATE
		OTHER	DATE
		QUALITY ASSURANCE <i>[Signature]</i>	DATE 10/28/88
5. SCE/Contractor Project Administration			
Conversion to DCN Date _____			

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FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

SUPPLEMENTAL PAGE

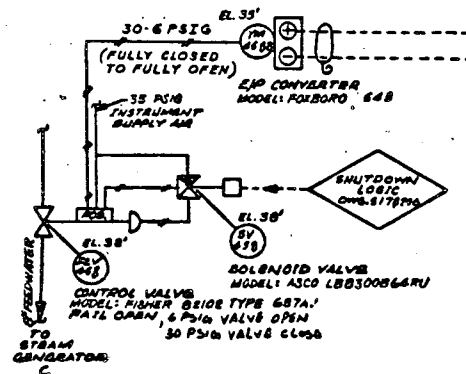
INTERIM DCN NO.					
IDCN NUMBER S-1					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DCN CONV. DWG. REV. SUB. NO.	QUALITY CLASS
5206934	-	0			SR

Date **9/21/88** Page **2** of **3**

By **K. WILDERMANN**

DESCRIPTION OF CHANGE

BEFORE



DCP#3501.02TJ REV 0 SHT 2 OF 2

FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

SONGS 1, 2 & 3

SUPPLEMENTAL PAGE

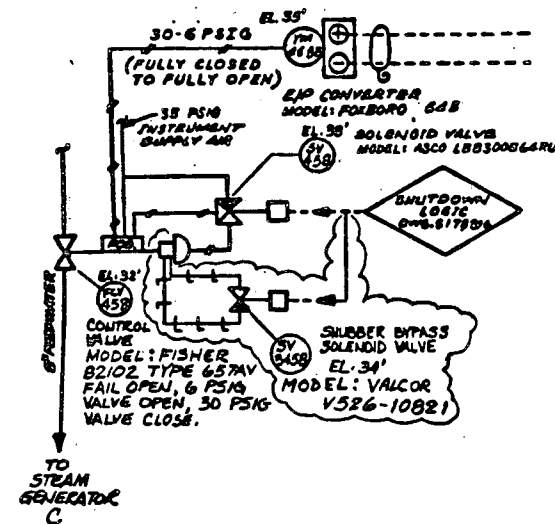
INTERIM DCN NO.					
IDCN NUMBER S-1					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	DCN CONV. DWG. REV. SUB. NO.	QUALITY CLASS
5206934	-	0			SR

Date **9/21/88** Page **3** of **3**

By **K. WILDERMANN**

DESCRIPTION OF CHANGE

AFTER



DCP#3501.02TJ REV 0 SHT 3 OF 3

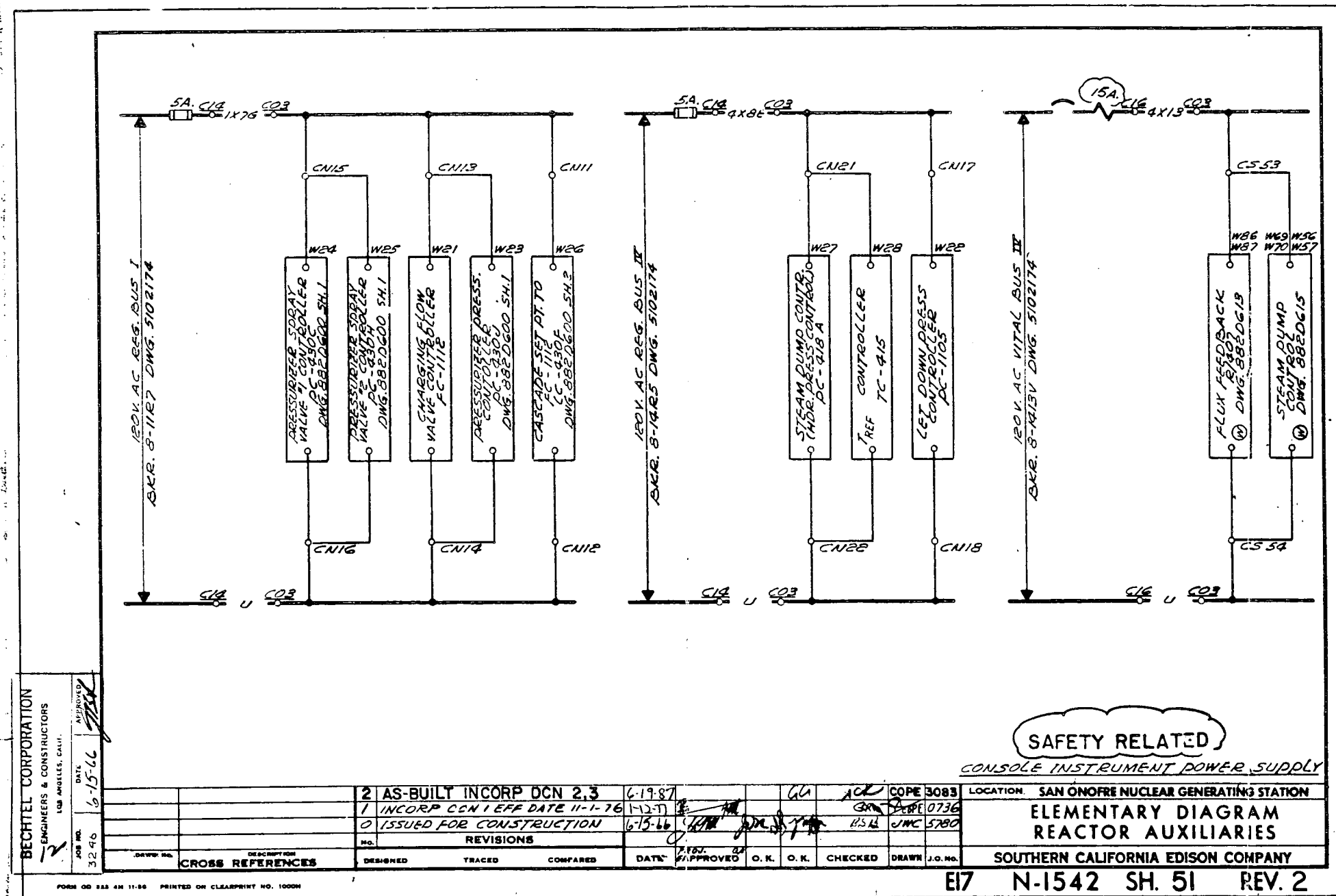
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8902270311-113



SAFETY RELATED

CONSOLE INSTRUMENT POWER SUPPLY

SA
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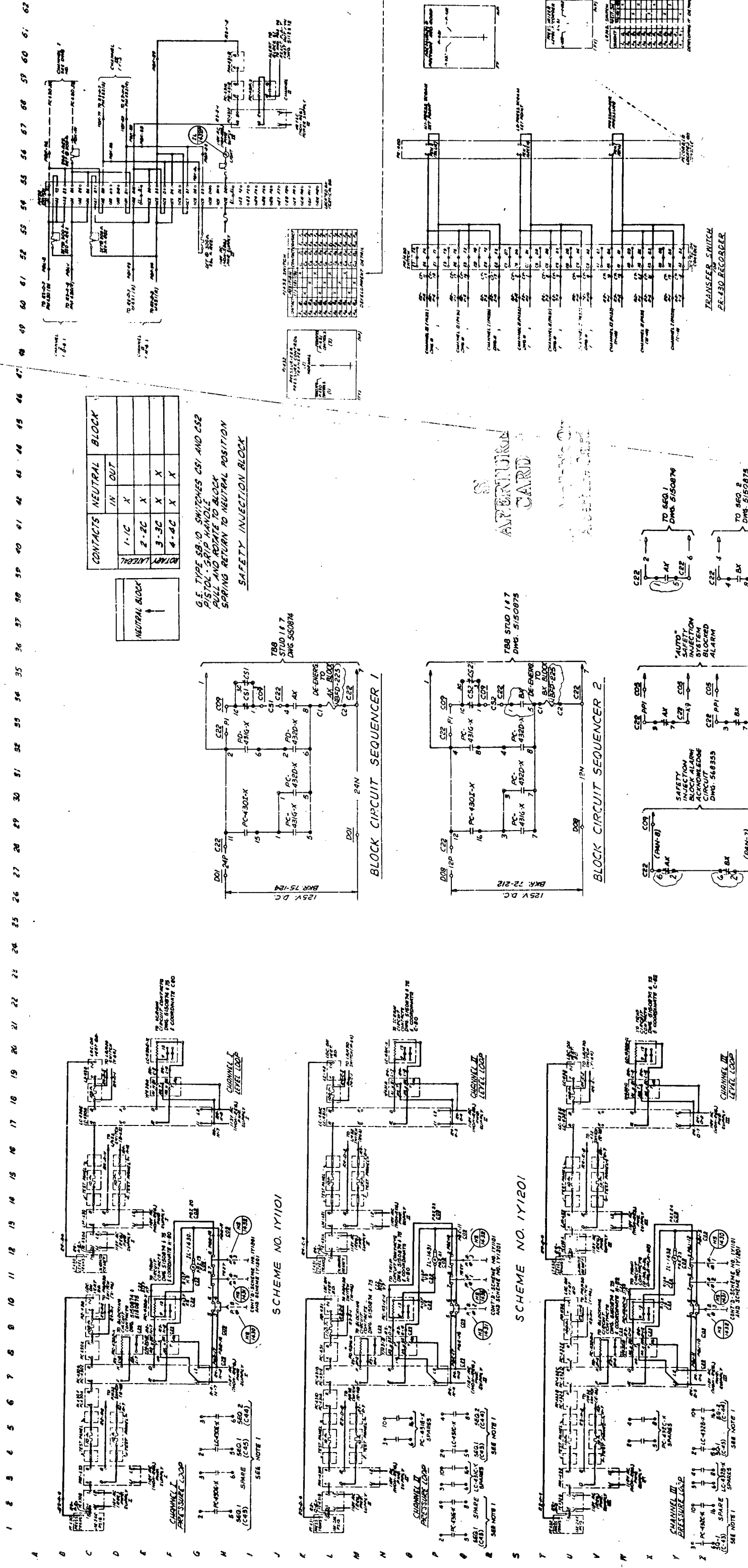
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8902270311 -114

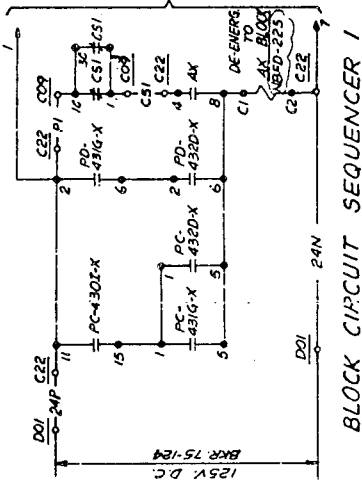


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62

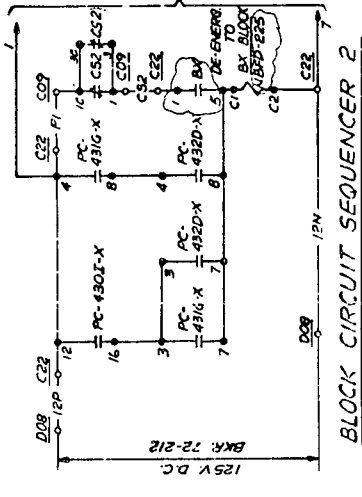
CONTACTS	NEUTRAL BLOCK	
	IN	OUT
1-1C	X	
2-2C	X	
3-3C	X	X
4-4C	X	X

NEUTRAL BLOCK

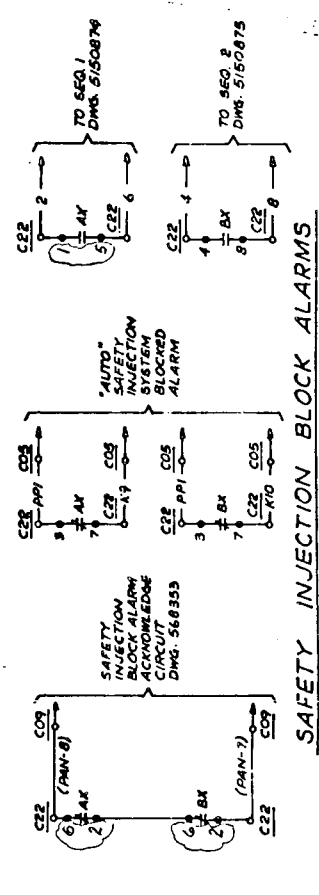
G.E. TYPE SB-10 SWITCHES CS1 AND CS2
PISTOL GRIP HANDLE
PULL AND ROTATE TO BLOCK
SPRING RETURN TO NEUTRAL POSITION
SAFETY INJECTION BLOCK



BLOCK CIRCUIT SEQUENCER 1



BLOCK CIRCUIT SEQUENCER 2



SAFETY INJECTION BLOCK ALARMS

SCHEME NO. 1Y101

SCHEME NO. 1Y1201

SCHEME NO. 1Y1301

APERTURE CARD

8902270311-115

1 OF 63715-9

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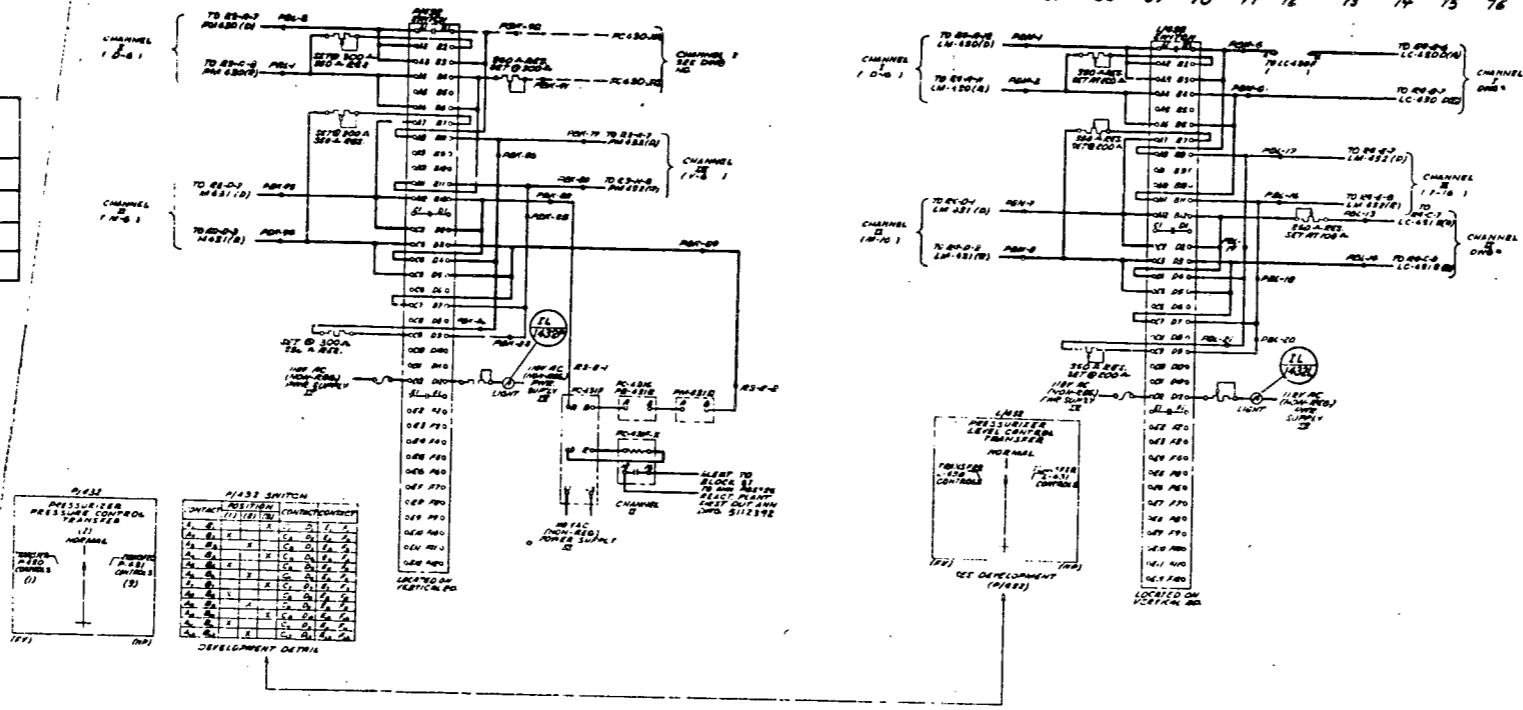
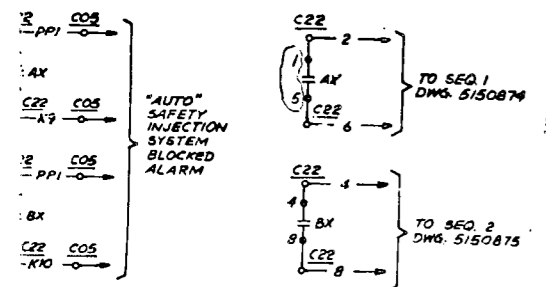
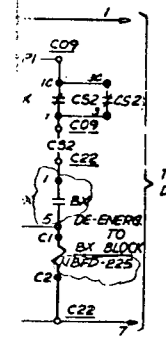
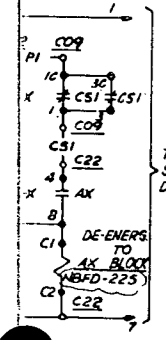
24X



35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92

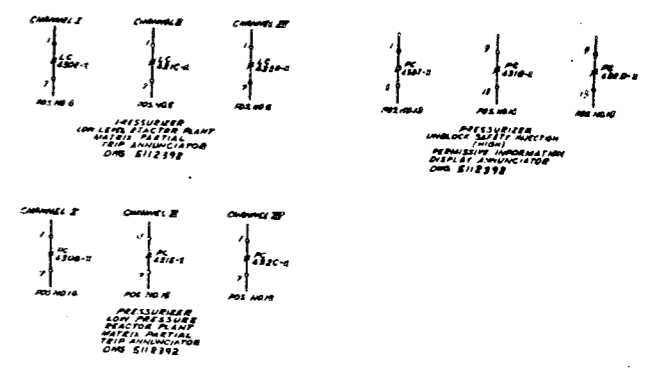
CONTACTS	NEUTRAL		BLOCK
	IN	OUT	
1-1C	X		
2-2C	X		
3-3C	X	X	
4-4C	X	X	

G.E. TYPE SB-10 SWITCHES CS1 AND CS2
PISTOL-GRIP HANDLE
PULL AND ROTATE TO BLOCK
SPRING RETURN TO NEUTRAL POSITION
SAFETY INJECTION BLOCK

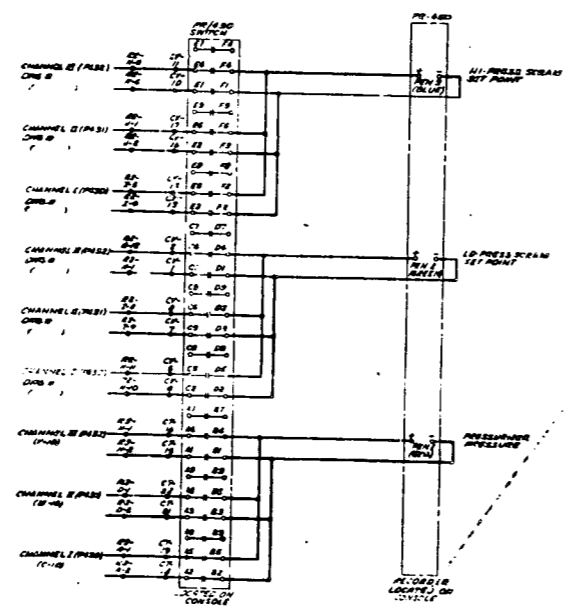


DEVELOPMENT DATA

CONTACT	FUNCTION	LOCATION
1-1C
2-2C
3-3C
4-4C



SAFETY INJECTION SYSTEM
APERTURE CARD
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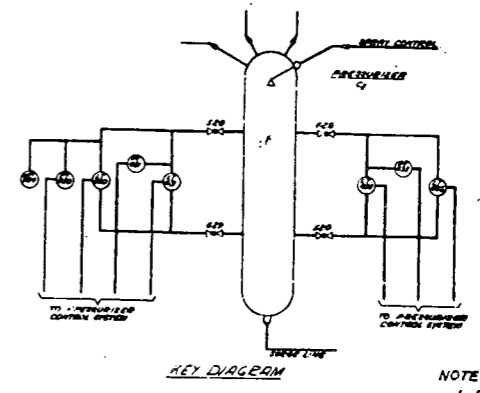
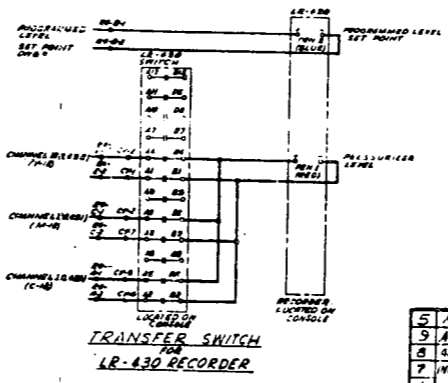


TRANSFER SWITCH PR-430 RECORDER

CONTACTS	FUNCTION	LOCATION
1-1C
2-2C
3-3C
4-4C

DEVELOPMENT DATA

CONTACT	FUNCTION	LOCATION
1-1C
2-2C
3-3C
4-4C



NOTE: SEE DWG 5150874 & 5150875 FOR DETAILS OF SAFETY SYSTEM SEQUENCERS 1 & 2

SONGS I SAFETY RELATED
N1542 SH137B

REV	REV	DATE	BY	CHKD	APP'D	REASON
1	REC REV	ADDED	STA FILE NO			
2	AS BUILT	INCORP	DON 12			
3	AS BUILT	W/PTD	4300 (INCORP CC #1)			
4	INSTRUC	10.0.0	1/11/81	JWA/ETK		
5	INSTRUC	10.0.0	5/13/81	JWA/ETK		
6	INSTRUC	10.0.0	5/13/81	JWA/ETK		

LOCATION: SAN ONOFRE NUCLEAR GEN. STATION
SAFETY INJECTION SYSTEM
ELEMENTARY SHEET NO. 2

DUPLICATE ORIGINAL REPORTED LOST

63715-9

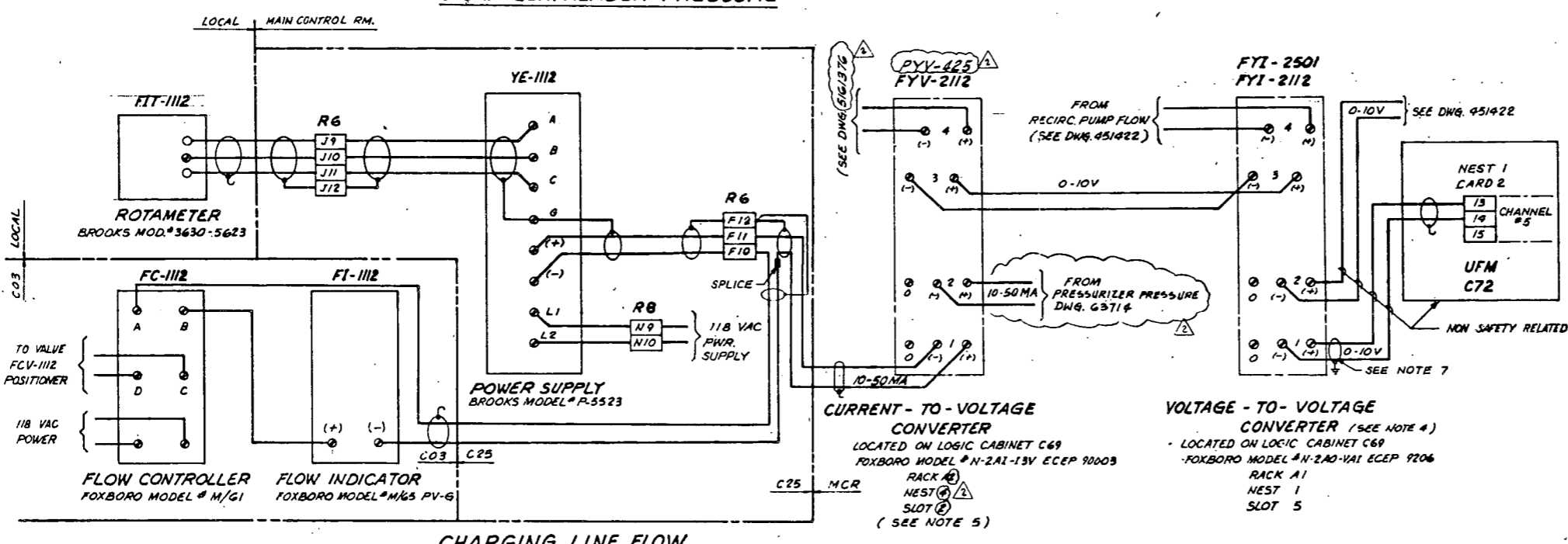
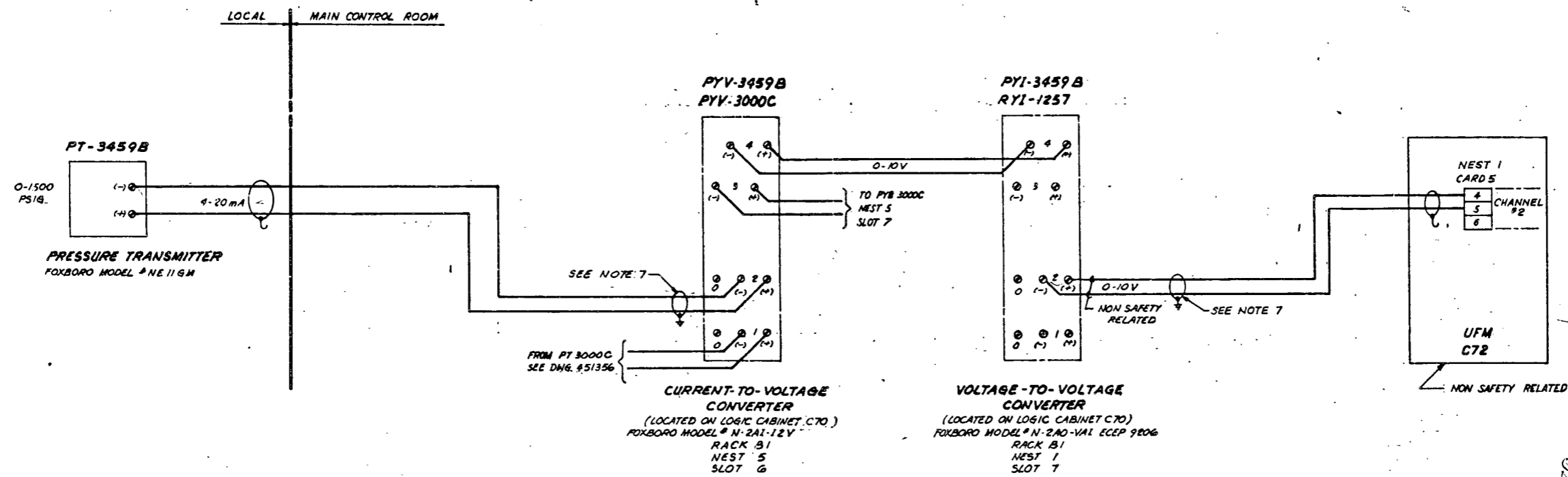


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2 of 2

8902270311-116



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- NOTES:
- THE POLARITY OF THESE CONDUCTORS MUST BE VERIFIED BY A TEST MAN BEFORE THE PHYSICAL CONNECTION IS MADE.
 - POWER IS DISTRIBUTED TO EACH COMPONENT, FROM A +15 AND -15 VOLT DC POWER SUPPLY VIA A PREFABRICATED DISTRIBUTION BUS ASSEMBLY AND SYSTEM CABLE.
 - VOLTAGE-TO-CURRENT CONVERTER: CUSTOM MODEL # N-2A0-VAI-ECEP 9206 HAS BEEN MODIFIED TO FUNCTION AS A VOLTAGE-TO-VOLTAGE CONVERTER WITH 0 TO 10 VOLT NON-1/E OUTPUTS.
 - CIRCUIT BOARD JUMPERS FOR BOTH OF THE CHANNELS OF THE CURRENT-TO-VOLTAGE CONVERTER (PYV-425/FYV-2112) TO RECEIVE SIGNALS FROM EXTERNALLY POWERED CIRCUITS.
 - PRESSURE TRANSMITTER PT-3459B (4-20 mA DC) IS POWERED BY THE CURRENT-TO-VOLTAGE CONVERTER CHANNEL (PYV-3459B).
 - FIELD TO TERMINATE SHIELD WIRE AT AN INSTRUMENT GROUNDING BUS LOCATED AT THE BOTTOM OF THE PANEL.

Reference Drawings	Reference Drawings	No.	Revisions	M Date	P.E.	D.A.E.	Approved	Rev. No.	Revisions	M Date	P.E.	D.A.E.	Approved	Rev. No.	Revisions	Location
5101374	TSC BLOCK DIAGRAM	5161271	AFW RACK MODULE ARRMT.													Location SAN ON OFRE NUC GEN STA UNIT 1
M-34502	DATA SHEET-PT 3459B															CONTROL LOOP DIAGRAM STM GEN. HDR. PRESS./CHG. LINE FLOW TSC COMPUTER SYSTEM
5161370	INSTRUMENT INSTALLATION DET.															
5178225	P & I DIAGRAM MSS															
568285	WIRING DIAGRAM RACK R5 #R6															
568340	WIRING DIAGRAM CONSOLE															
5178135	P & I DIAGRAM VOL. CTL. SYS.															
<p>2 AS BUILT - INCORP DCM 10 & 11</p> <p>1 AS BUILT - UPTD MODS (REWORK CCM 10 & 11)</p> <p>0 ISSUED FOR CONSTRUCTION</p>																
<p>451408 2</p>																

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Southern California Edison Company

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8902270311-117

8902220311-118

ALSO AVAILABLE ON
MICROFILM
CARD

1577
21877
SH37

INFORM DCM NO. _____ PAGE 1 OF 1

DATE NO.	REV. NO.	DESCRIPTION
87434	0	FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (FOR SONOSQ) (2-88)
49408	0	
87434	1	

1. DESIGNER: **A. A. MOLINA** DATE: **12-6-88** DRAWING FILE: **ELEMENTARY DIAGRAM E-25 SR**

THIS FIDCN VOIDS IDCN S-1 OF DCP 3364.00TJ2, REV. 0

REASON: IDCN IS PART OF DCP 350102TI REV. 0

RECEIVED CDM DEC 10 1988

SITE FILE COPY YES NO

② REF. RPR # 1863

PE WAIVER REQUIRED YES NO

PFC REVISION REQUIRED YES NO

2. Other Affected Documents

None

Specific affected documents are listed on the CCI(23) 184 associated with the source document checked below:

This DCP (Forms CCI(23) 183 and CCI(23) 184 attached)

This FIDCN/DCN (Forms CCI(23) 183 and CCI(23) 184 attached)

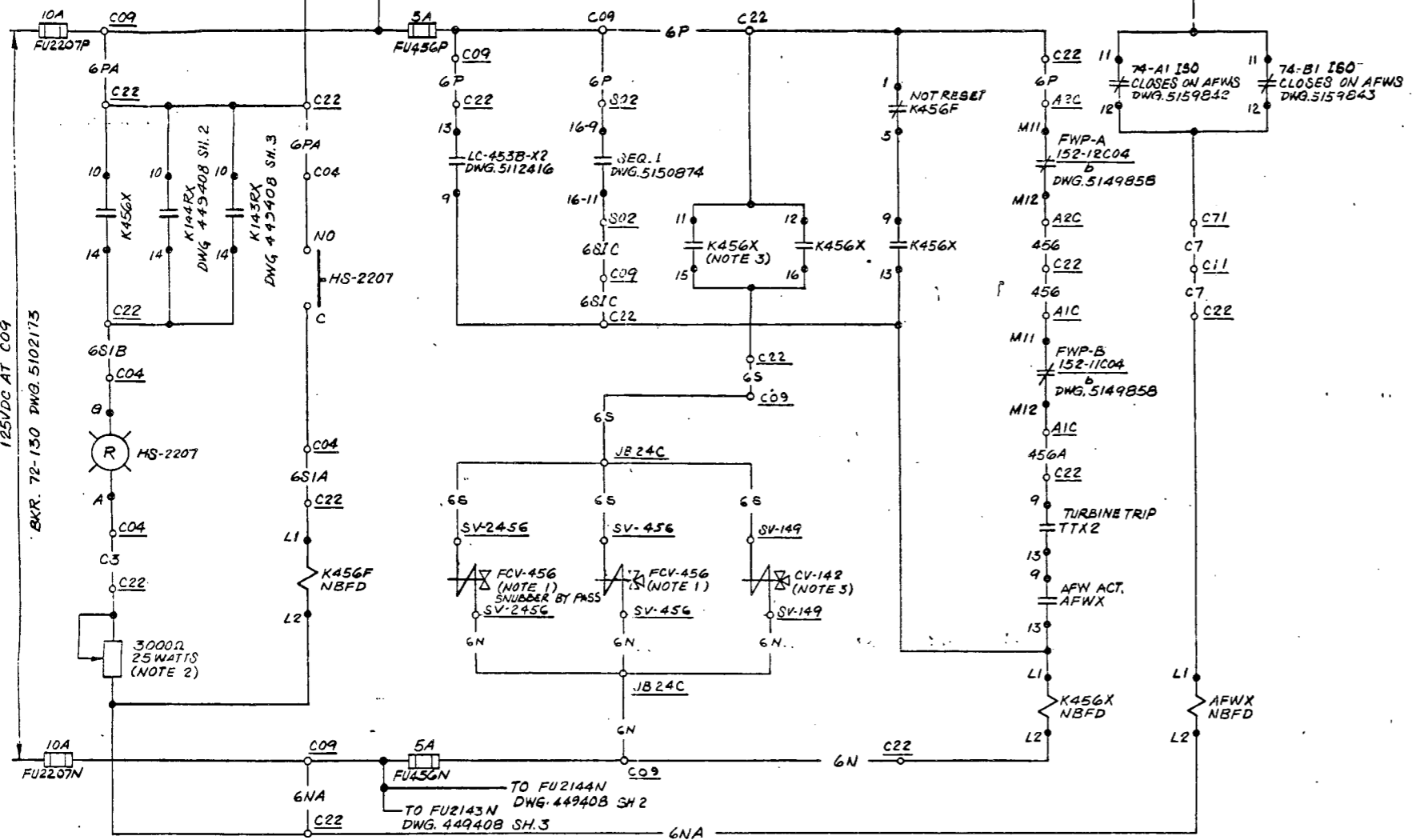
3. Affected Systems **APW**

4. SCE Design Approval

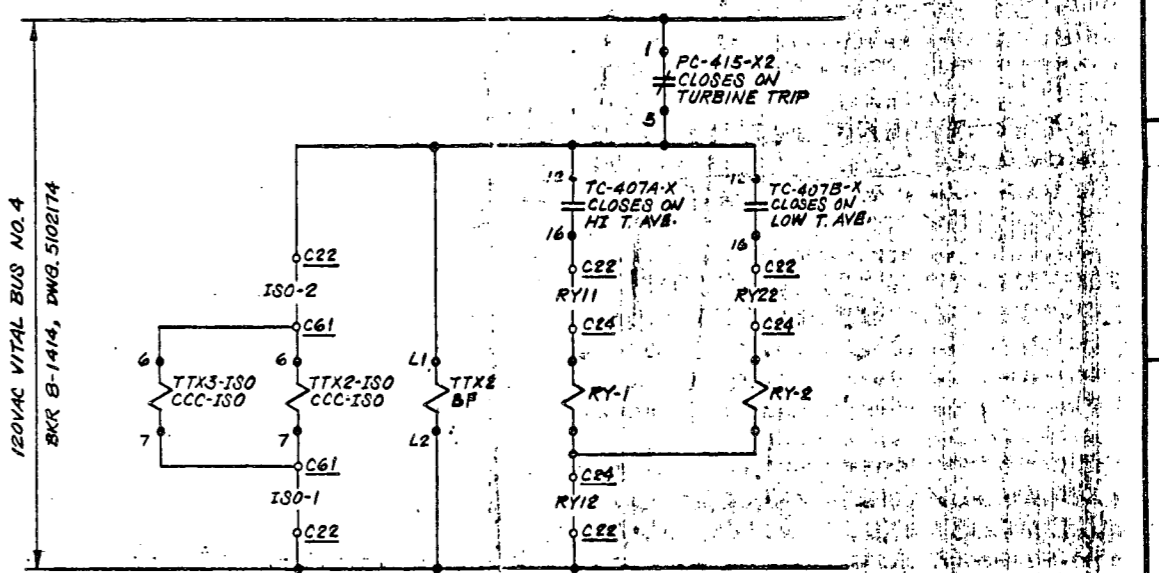
NUCLEAR GENERATION SITE DEPARTMENT
ENGINEERING AND CONSTRUCTION ORGANIZATION/RES R.L.

DATE	NAME	DESCRIPTION
12-9-88	W. J. ...	DESIGNER
12-9-88	...	DESIGN CHECKER
12-9-88	...	GROUP SUPERVISING ENGINEER
12/9/88	...	PROJECT MANAGER
DATE	NAME	DESCRIPTION
12-9-88	...	CONSTRUCTION SUPERVISOR
DATE	NAME	DESCRIPTION
12-9-88	...	CONTRACTOR
DATE	NAME	DESCRIPTION
12-9-88	...	CONSTRUCTION SUPERVISOR
DATE	NAME	DESCRIPTION
12-9-88	...	CONTRACTOR
DATE	NAME	DESCRIPTION
12-9-88	...	CONSTRUCTION SUPERVISOR
DATE	NAME	DESCRIPTION
12-9-88	...	CONTRACTOR

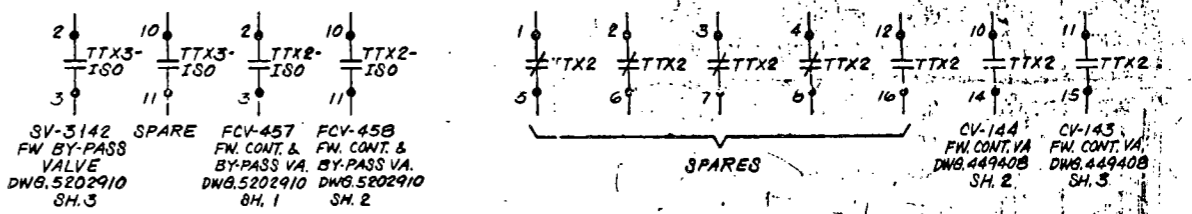
CONVERSION TO DCN DATE: **1-9-89** BY: **N. OLSON**



SCHEME NO. 1FW102



SCHEME 1FG112
(REF. STATION MANUAL VOL. I PAGE 39D)
SEE FEEDWATER CONTROL DIAG. DWG. 5129817
FOR COMPLETE SCHEMATIC.



- NOTES:**
- SOLENOID VALVES ENERGIZED TO CLOSE MAIN VALVE / OPEN SHUTTER BY PASS.
 - VARIABLE RESISTOR FOR 25V. LAMP, ADJUST RESISTOR FOR NORMAL ILLUMINATION.
 - CONTACTS ARE PARALLELED TO OBTAIN SUFFICIENT AMPACITY RATING.
 - FUSE SIZE (AS NOTED) AND TYPE (BUSS TYPE FRN) ARE PER ENGINEERING DESIGN. REVISION REQUIRES PROJECT ENGINEERING OR STATION TECH. APPROVAL.
 - ENERGIZATION OF SOLENOID VENTS: AIR FROM DIAPHRAGM AND CLOSURE OF THE-BYPASS VALVE.
 - LAMICOID TAGS WITH THE FUSE NUMBERS AND THE FOLLOWING ENGRAVING: BUSSMANN FUSE FRN-10 ONLY. FOR 10A FUSES BUSSMANN FUSE FRN-5 ONLY. FOR 5A FUSE ARE SECURED TO THE LOAD (BOTH) WIRE AT THE FUSE BLOCK OF EACH FUSE. COLOR OF LAMICOID TAG IS RED.

APERTURE CARD

Also Available in Aperture Card

The drawing was prepared to describe physical work to be accomplished as part of DCP-3501.02TJ Rev. 0.

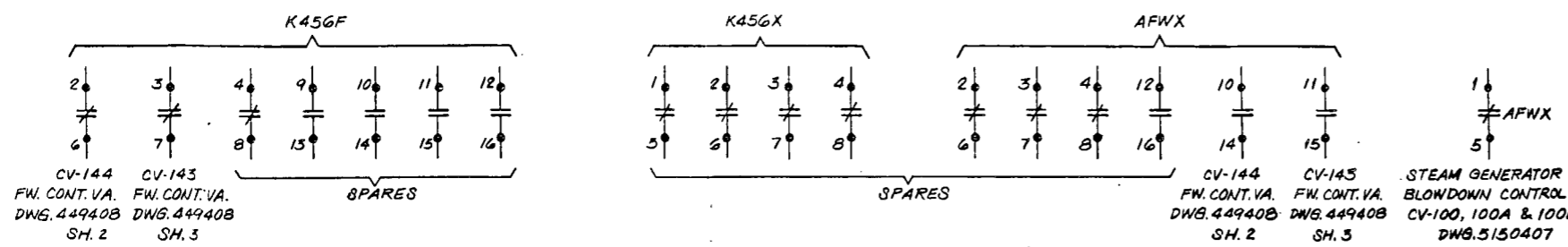
DCP completion and number assignment to be verified by receipt of Memorandum Directing DCP Completion. Upon receipt, this drawing represents the As-Built condition.

Project Administration use only:
Memorandum received: _____
Date: _____

DCP# 3501.02TJ REV. 0 SHT. 8 OF 15

QUALITY CLASS: SAFETY RELATED

THIS DWG. & DWGS 449408 SH. 2 & 3 SUPERSEDE DWG. 449408 UNIT 1

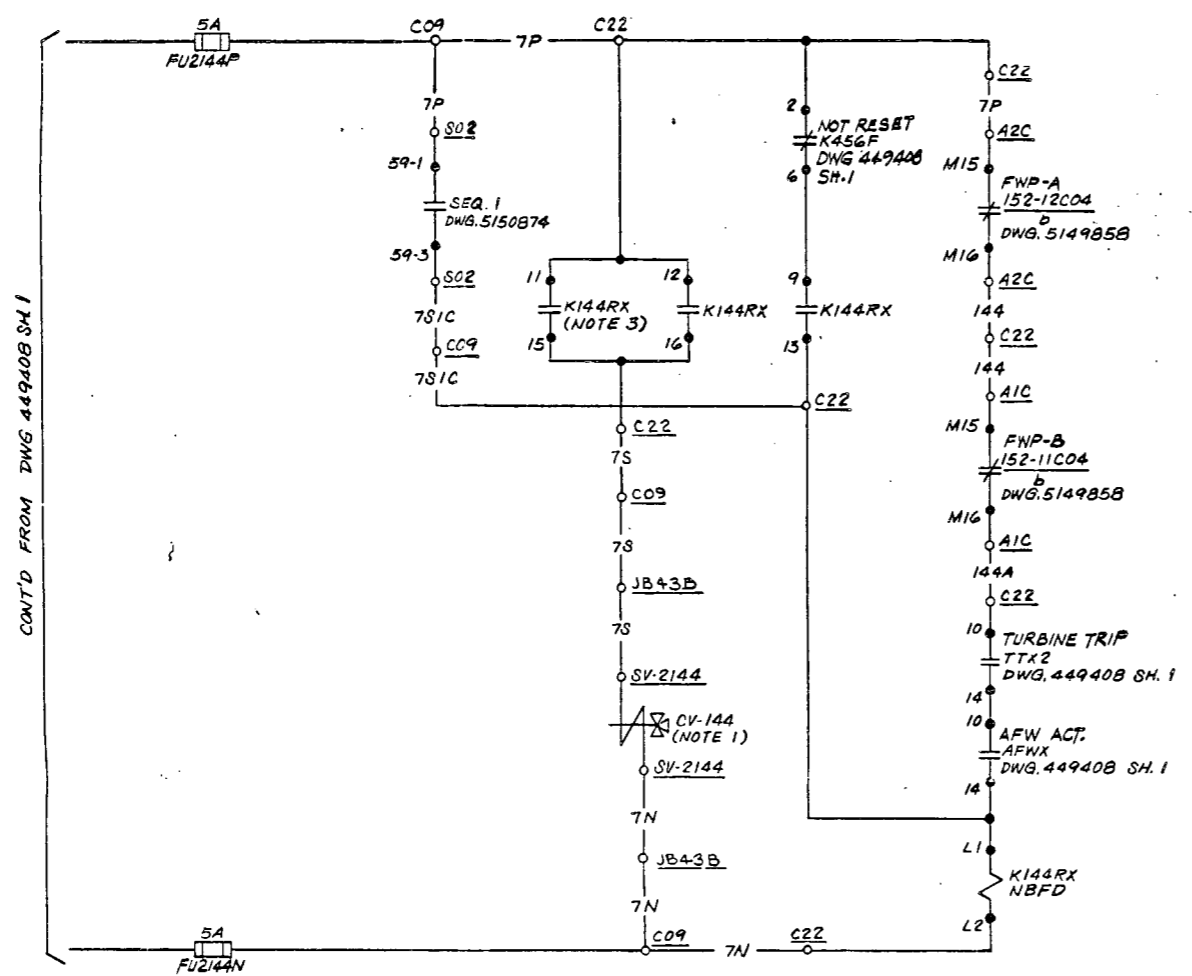


Reference Drawings	Reference Drawings	No.	Revisions	M	Date	PE	QA	EC	Approved	Issued For	Rev.	No.	Revisions	M	Date	PE	QA	EC	Approved
5206932	LOOP DIAGRAM FW FLOW CTRL-1000A	568252	W/D NUCLEAR MISC DEVICES																
5151668	W/D MISC AUX RELAYS (RACK R13)	5128338	W/D 4KV SWGR (152-11C04)																
5112416	S.D. AUX. RELAY RACK R12	5128339	W/D 4KV SWGR (152-12C04)																
5112417	S.D. AUX. RELAY RACK R12	5112685	W/D MISC AUX RELAYS (RACK R13)																
5173206	P & I DIAG. FW. SYS. SH. 2	5202910 SH. 3	E/D CV-142 FW. BY PASS																
512824	DEVICE FUNCTION NOS & SYMBOLS	5202910 SH. 2	E/D FCV-458 & CV-145 FW. CONT. & BY PASS																
449408	EQUIP. LOCATION INDEX	5202910 SH. 1	E/D FCV-457 & CV-144 FW. CONT. & BY PASS																

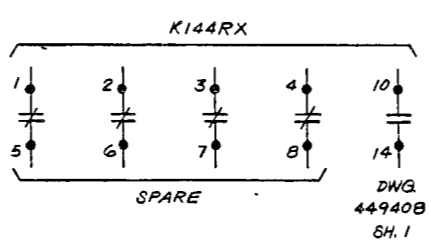
Location: SAN ONOFRE NUCLEAR GENERATING STATION
ELEMENTARY DIAGRAM
FCV-456/8, CV-142
FEEDWATER CONTROL & BYPASS

Southern California Edison Company
Rosemead, California

449408 SH. 1



SCHEME 1FW102



- NOTES:**
1. ENERGIZATION OF SOLENOID VENTS AIR FROM DIAPHRAGM AND CLOSES THE BYPASS VALVE.
 2. VARIABLE RESISTOR FOR 28V. LAMP, ADJUST RESISTOR FOR NORMAL ILLUMINATION.
 3. CONTACTS ARE PARALLELED TO OBTAIN SUFFICIENT AMPACITY RATING.
 4. FUSE SIZE (AS NOTED) AND TYPE (BUSS TYPE FRN) ARE PER ENGINEERING DESIGN. REVISION REQUIRES PROJECT ENGINEERING OR STATION TECH. APPROVAL.
 5. LAMICOID TAGS WITH THE FUSE NUMBERS AND THE FOLLOWING ENGRAVING "BOSSMANN FUSE FRN-10" ONLY FOR 10A FUSE AND "BUSSMANN FUSE FRN-5" ONLY FOR 5A FUSE ARE SECURED TO THE LOAD (BOTTOM) WIRE AT THE FUSE BLOCK OF EACH FUSE. COLOR OF LAMICOID TAG IS RED!

FLUOR
TECHNOLOGY, INC.
POWER DIVISION
CONTRACT: 469700

No.	Reference Drawings	No.	Reference Drawings	No.	Reference Drawings	No.	Reference Drawings	No.	Reference Drawings	No.	Reference Drawings	No.	Reference Drawings	No.	Reference Drawings	No.	Reference Drawings	No.	Reference Drawings		
568252	W/D NUCLEAR MISC DEVICE	5128338	W/D 4 KV SWGR (152-11C04)	5128339	W/D 4 KV SWGR (152-12C04)	512417	S. D. AUX. RELAY RACK R12	512417	S. D. AUX. RELAY RACK R12	5178206	P & I DIAG. FW. SYS. SH. 2	5202910	E/D CV-142 FW. BY PASS	5149926	EQUIP. LOCATION INDEX	5202910	E/D CV-142 FW. BY PASS	5202910	E/D CV-142 FW. BY PASS	5202910	E/D CV-142 FW. BY PASS

ADMINISTRATIVE CARD
Not Available On
Engineering Co. 40

DCP#3501.02J REV 0 SHT 20 of 25

QUALITY CLASS SAFETY RELATED
THIS DWG & DWGS 44940B SH. 1 & 3 SUPERSEDE DWG. 44940B.

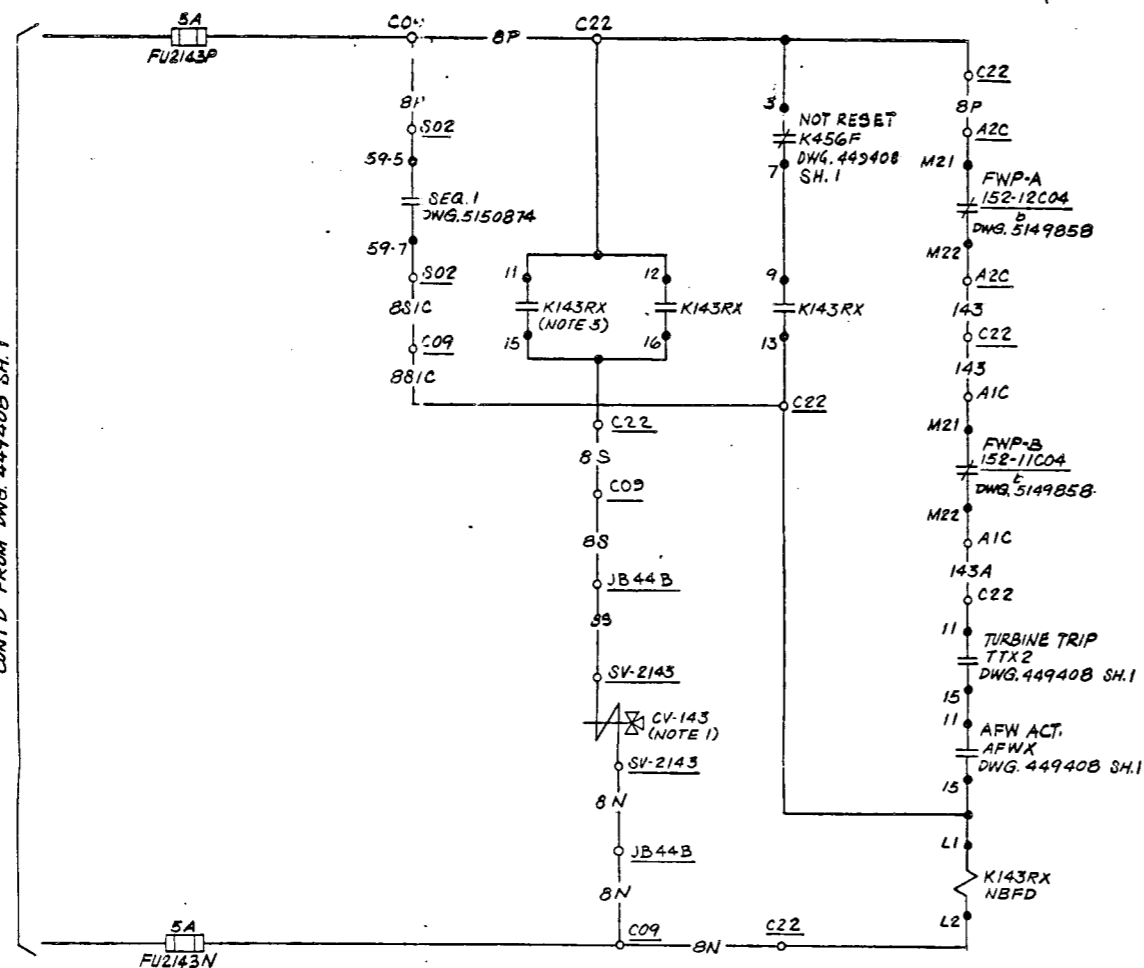
Location: SAN ONOFRE NUCLEAR GENERATING STATION
ELEMENTARY DIAGRAM
CV-144
FEEDWATER BYPASS

Southern California Edison Company
Rosemead, California

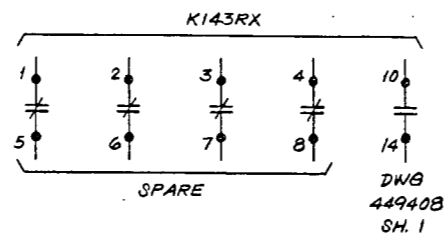
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21X



SCHEME 1FW102



NOTES:

1. ENERGIZATION OF SOLENOID VENTS AIR FROM DIAPHRAGM AND CLOSES THE BYPASS VALVE.
2. VARIABLE RESISTOR FOR 28V. LAMP, ADJUST RESISTOR FOR NORMAL ILLUMINATION.
3. CONTACTS ARE PARALLELED TO OBTAIN SUFFICIENT AMPACITY RATING.
4. FUSE SIZE (AS NOTED) AND TYPE (BUSS TYPE FRN) ARE PER ENGINEERING DESIGN. REVISION REQUIRES PROJECT ENGINEERING OR STATION TECH. APPROVAL.
5. LAMICOID TAGS WITH THE FUSE NUMBERS AND THE FOLLOWING ENGRAVING, "BUSSMANN FUSE FRN-10" ONLY FOR 10A FUSE AND "BUSSMANN FUSE FRN-5" ONLY FOR 5A FUSE. ARE SECURED TO THE LOAD (BOTTOM) WIRE AT THE FUSE BLOCK OF EACH FUSE. COLOR OF LAMICOID TAG IS RED.

FLUOR
TECHNOLOGY, INC.
POWER DIVISION

CONTRACT: 469700

APPROVED FOR CONSTRUCTION
DATE

Also Available On
Approved Copy

This drawing was prepared to describe physical work to be accomplished as part of DCP 3501.02TJ Rev. 0.
DCP completion and to ensure assistance to be verified by member of Management Drawing (DCP) Control. Upon receipt, the drawing represents the As-built condition.
Please Administration use only.
Management required.

DCP#3501.02TJ REV. 0. SH. 3 OF 5

QUALITY CLASS: SAFETY RELATED

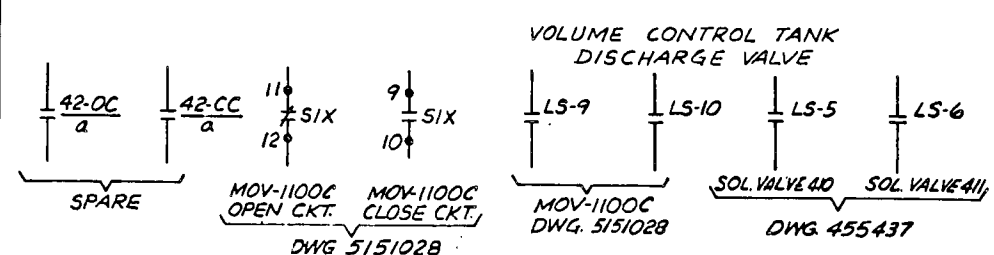
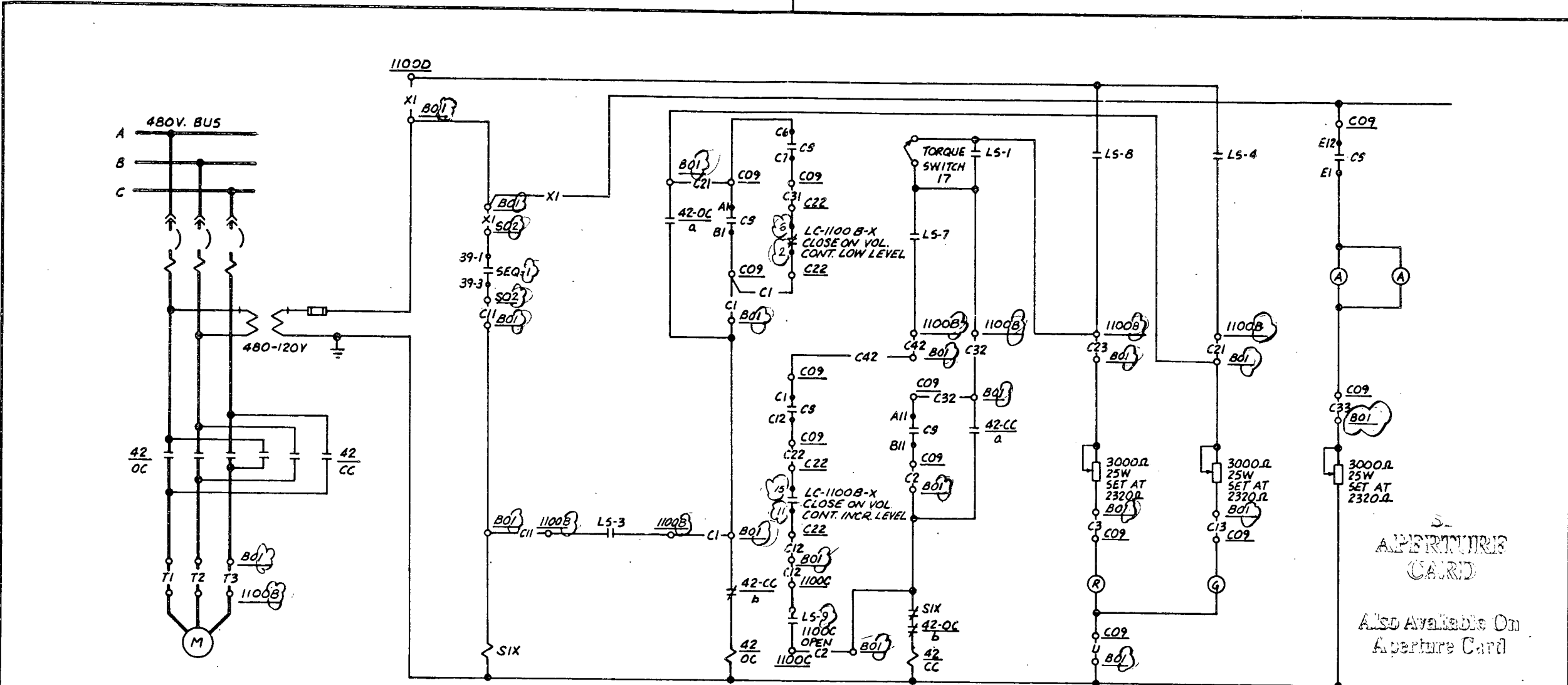
THIS DWG & DWGS: 449408 SH. 1 & 2 SUPERSEDE DWG. 449408 SH. 1

No.	Revisions	Date	PE	QA	Sup	Approved	Issued For Construction	Date	PE	QA	Sup	Approved	Location
5151668													SAN ONOFRE NUCLEAR GENERATING STATION
5112416													ELEMENTARY DIAGRAM
5112417													CV-143
5178206													FEEDWATER BYPASS
5144624													
5144624													

449408 SH. 3 OF 5

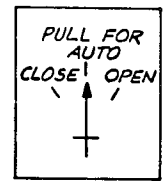
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8902270311-121



SCHEME NO. 18147

CONTACT	POSITION		
	CLOSE	OFF	AUTO OPEN
A11-B11	X		
A12-B12		X	X
A1-B1			X
A5-B5	X		
A6-B6		X	X
A7-B7			X
C12-C1			X
D12-D1	X	X	X
C6-C7			X
D6-D7	X	X	X
E12-E1			X
F12-F1	X	X	X
E6-E7			X
F6-F7	X	X	X



CONTROL SWITCH CS
WEST TYPE "W-2"
SPRING RETURN
GREEN OVAL FIXED
HANDLE

W.P. 82-016 (82297)
SONGS I
SAFETY RELATED
REACTOR AUXILIARIES

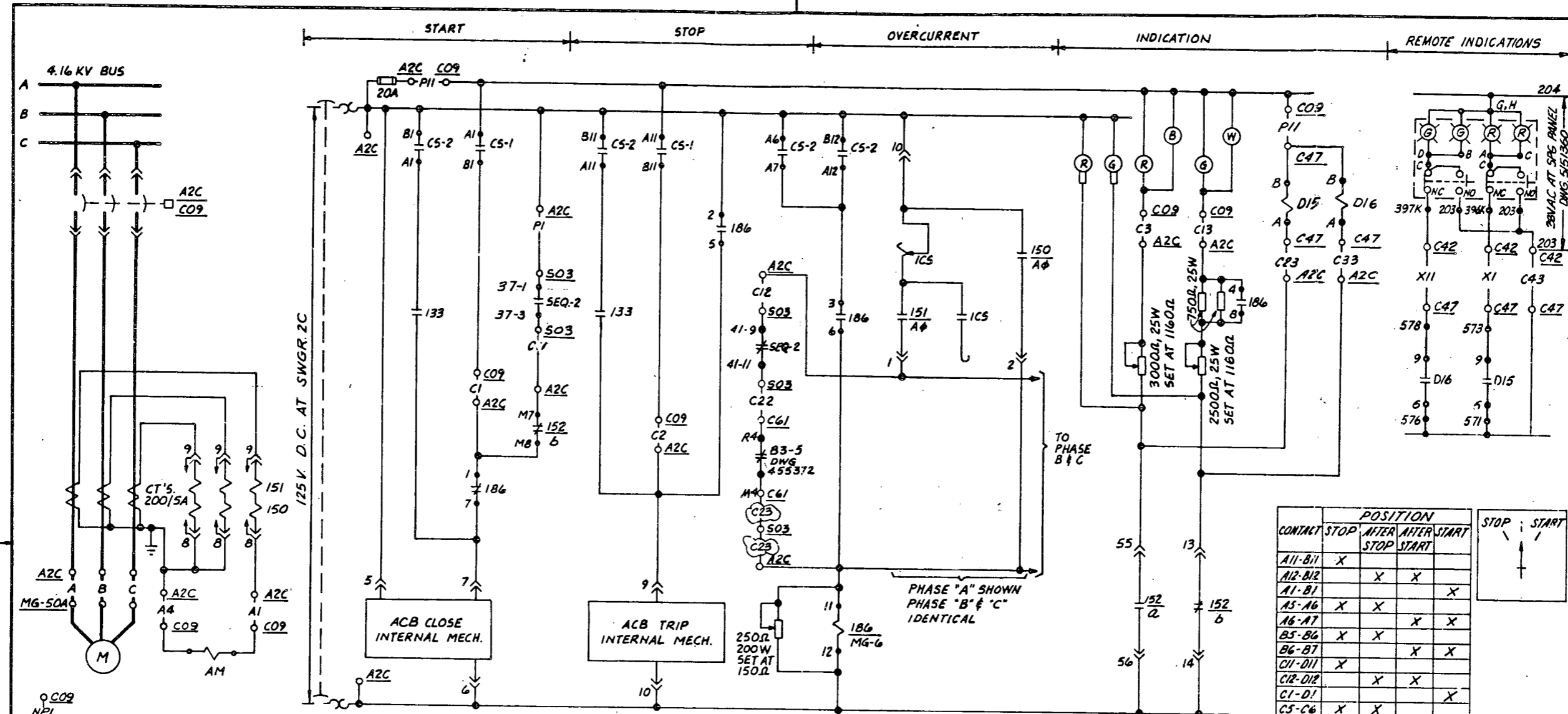
ROTOR	CONTACT	CONTACT DEVELOPMENT		
		OPEN	INTERMEDIATE	CLOSE
1	LS-1			
	LS-2			
	LS-3			
	LS-4			
2	LS-5			
	LS-6			
	LS-7			
	LS-8			
3	LS-9			
	LS-10			
	LS-11			
	LS-12			
4	LS-13			
	LS-14			
	LS-15			
	LS-16			
TORQUE SW. 17	OPENS ON MECHANICAL OVERLOAD DURING CLOSING CYCLE		SET @ 1 TO 1 1/4	
TORQUE SW. 18	OPENS ON MECHANICAL OVERLOAD DURING OPENING CYCLE		SPARE	

NOTE: SOLID LINE DENOTES CONTACT IS CLOSED

EQUIPMENT	SCHEME NO.	STARTER NO.	INTERLOCKS	LOC	SEQUENCE				TORQUE SW. SETTINGS		
					NO.	T.B.	STUD	TIME	DWG. NO.	TS 17	TS 18
RECIR. TO CHG. PUMPS-MOV-LCV-1100B	18147	42-1147	LS-9 (1100C)	BO1	SEQ. 1	39	1.3	10+SEC	5150874	1 TO 1 1/2	SPARE

No.	Revisions	Date	Approved	O.K.	O.K.	Ch'd.	Made	J.O. No.	Scale	Revisions	Date	Approved	O.K.	O.K.	Ch'd.	Made	J.O. No.
5102165	MOTOR CONTROL CENTER 1									4	AS BUILT-INCORP DCN #7	7-29-77					
5102171	MOTOR CONTROL CENTER 3									3	AS BUILT INCORP CFC CANG CC #3, 4	8/20/84					
568249	WIRING DIAGRAM									2	REC. REV. - REVISED TITLE	11-10-77					
5202909	EIO MOV-LCV-1100B									1	INCORP CCN 1 EFFECT DATE 10-1-76	11-10-77					
63715	SAFETY INJECTION SYSTEM, SH-2									5	ISSUED FOR CONSTRUCTION. REVISED W/ RELAY CONTACTS. ADDED SEQ. CONTACTS.	12-4-76					

REDRAWN FROM N-1542 SH. 8
Location SAN ONOFRE NUCLEAR GEN. STA.
ELEMENTARY DIAGRAM
MOV-LCV-1100B
RECIR. TO CHARGING PUMPS
Southern California Edison Company SCE



SCHEME NO. 1A2C05 SHOWN

CONTACT	POSITION			
	STOP	AFTER STOP	AFTER START	START
A11-B11	X			
A12-B12		X	X	
A1-B1				X
A5-A6	X	X		
A6-A7			X	X
B5-B6	X	X		
B6-B7			X	X
C1-D11	X			
C12-D12		X	X	
C1-D1				X
C5-C6	X	X		
C6-C7			X	X
D5-D6	X	X		
D6-D7			X	X

CONTROL SWITCH CS-1
WEST TYPE "W-2" SPRING RETURN
TAN OVAL FIXED HANDLE

CONTACT	POSITION	
	TRIP	TRIP CLOSE
A11-B11	X	X
A12-B12		X
A1-B1		X
A5-A6	X	X
A6-A7		X
B5-B6	X	X
B6-B7		X

CONTROL SWITCH CS-2
WEST TYPE "W-2" SPRING RETURN
TAN OVAL FIXED HANDLE

EQUIPMENT	SCHEME NO.	BREAKER NO.	LOCATION	SEQUENCE		ANNUNCIATOR	REMOTE INDICATION
				NO.	TIME		
SAFETY INJEC. PUMP G50A (EAST)	1A2C05	152-12C05	A2C MG-50A C47 C42 C61	2	37	WIRE NO. 5150875 EPI, K4-G 568365 XVII, C1C43 5151360	WIRE NO. XVII, C1, C43 549309
SAFETY INJEC. PUMP G50B (WEST)	1A1C05	152-11C05	A2C MG-50B C46 C41 C60	1	37	WIRE NO. 5150874 EPI, K4-T 568333 XVII, C1, C43 549309	

NO.	REVISIONS	DATE	APPROVED	O.K.	O.K.	CH'D.	MADE	I.O. NO.	SCALE	REVISIONS	DATE	APPROVED	O.K.	O.K.	CH'D.	MADE	I.O. NO.
3	AS BUILT INCORP CC'S TO #1435-4/13	6-11-83							NONE								
2	INCORP CC'S TO #1435-4/13	5-1-81															
1	INCORP CCIE 2-EFF DATE 10-1-76	10-1-76															

APPROPRIATE CARD

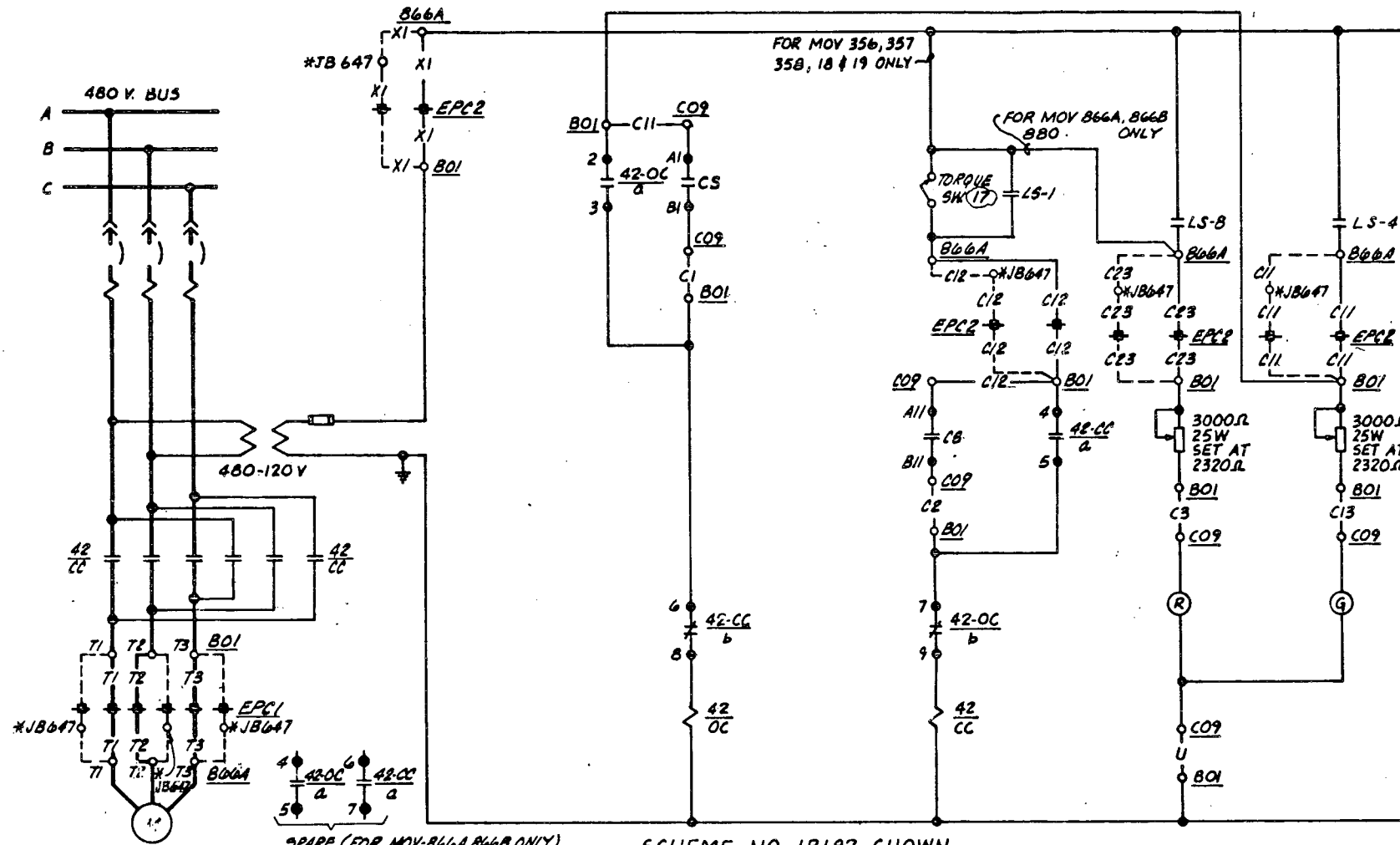
Also Available On

SONGS I
SAFETY RELATED
REACTOR AUXILIARIES
REDRAWN FROM N-1542 CH 11

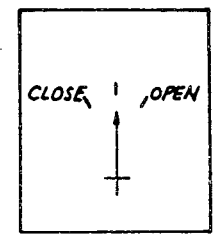
Location SAN ONOFRE NUCLEAR GEN. STA.
ELEMENTARY DIAGRAM
SAFETY INJECTION PUMPS
G50A & G50B

Southern California Edison Company

SDCS



CONTACT	POSITION	
	CLOSE AFTER CLOSE	AFTER OPEN
A11-B11	X	
A12-B12		X
A1-B1		X
A5-A6	X	X
A6-A7		X
B5-B6	X	X
B6-B7		X

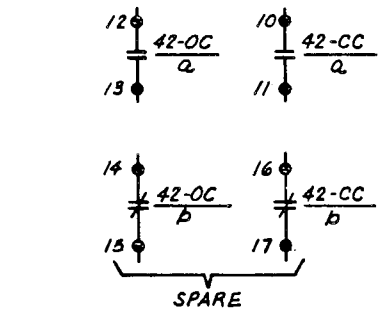


CONTROL SWITCH
WEST TYPE "W-2" SPRING RETURN
GREEN OVAL FIXED HANDLE

ROTOR	CONTACT	CONTACT DEVELOPMENT		
		OPEN	INTERMEDIATE	CLOSE
1	LS-1			SP
	LS-2			SP
	LS-3			SP
	LS-4			SP
2	LS-5			SP
	LS-6			SP
	LS-7			SP
	LS-8			SP
3	LS-9			SP
	LS-10			SP
	LS-11			SP
	LS-12			SP
4	LS-13			SP
	LS-14			SP
	LS-15			SP
	LS-16			SP

TORQUE SW	17	OPENS ON MECHANICAL OVERLOAD DURING CLOSING CYCLE	SET @ 2 TO 2 1/4
TORQUE SW	18	OPENS ON MECHANICAL OVERLOAD DURING OPENING CYCLE	SPARE

NOTE: SOLID LINE DENOTES CONTACT IS CLOSED



SCHEME NO. 1B182 SHOWN

EQUIPMENT	SCHEME NO.	STARTER NO.	LOCATION	X J.B.	TORQUE SWITCH SETTINGS
SAFETY INJECTION RECIRCULATION MOV-866A	1B182	42-1182	B66A BO1 CO9 EPC1 EPC2	647	2 TO 2 1/4 SPARE
RC PUMP INJECTION FILTER MOV-18	1B294	42-1294	18 BO2 CO9		6500 LB MIN 11800 LB MAX SPARE
RC PUMP INJECTION FILTER MOV-19	1B146	42-1146	19 BO1 CO9		6500 LB MIN 11800 LB MAX SPARE
SAFETY INJECTION RECIRCULATION MOV-866B	1B278	42-1278	B66B BO2 CO9 WPC9 WPC3	648	2 TO 2 1/4 SPARE
S.I. RECIRCULATION TO LOOP A MOV-356	1B158	42-1158	356 BO1 CO9 WPC5 WPC4		5500 LB MIN 11800 LB MAX SPARE
S.I. RECIRCULATION TO LOOP B MOV-357	1B243	42-1243	357 BO2 CO9 WPC7 WPC3		5500 LB MIN 11800 LB MAX SPARE
S.I. RECIRCULATION TO LOOP C MOV-358	1B385	42-1385	358 BO3 CO9 EPC4 EPC2		5500 LB MIN 11800 LB MAX SPARE
CROSS-TIE FROM REFUELING WTR. PUMP MOV-880	1B262	42-1262	880 BO2 CO9		1 1/4 TO 3 SPARE

* FOR MOV'S 866A & 866B ONLY, WIRE TO VALVES THRU JB'S 647 & 648 (DASH LINES) AND NOT DIRECTLY (SOLID LINES)

SONGS I
SAFETY RELATED (MOV'S 866A, 866B, 356, 357, 358, 18, 19 ONLY)
REACTOR AUXILIARIES

REDRAWN FROM N-1542 SH 31

5149454	ED SAFETY INJECTION CIRCUITRY
5149429	DEVICE FUNC. NOS & SYMBOLS
5149964	EQUIP. LOCATION INDEX
5102165	MOTOR CONTROL CENTER 1
5102167	MOTOR CONTROL CENTER 2
5102170	MOTOR CONTROL CENTER 3
568250	WIRING DIAGRAM
64374	E.D. MOV 883
63715	SAFETY INJECTION SYSTEM, SH 2

No.	Revisions	Date	Approved	O.K.	O.K.	Ch'd.	Made	I.O. No.	Scale	Revisions	Date	Approved	O.K.	O.K.	Ch'd.	Made	I.O. No.
4	AS BUILT-INCORP DCN 5																
3	AS BUILT-INCORP. CC 4																
2	INCORP DCN 3 EFF DATE 10-1-76																
1	INCORP DCN 1 & CCN 2 EFF DATE 11-76, 10-1-76																
0	REVISION FOR CONTACTS, WTR. RELAY CONTACTS, MOVING MOV'S TO MCC 3																

Location SAN ONOFRE NUCLEAR GEN. STA.
ELEMENTARY DIAGRAM
MOV- 866A, B, 880
356, 357, 358, 18 & 19
Southern California Edison Company SCE

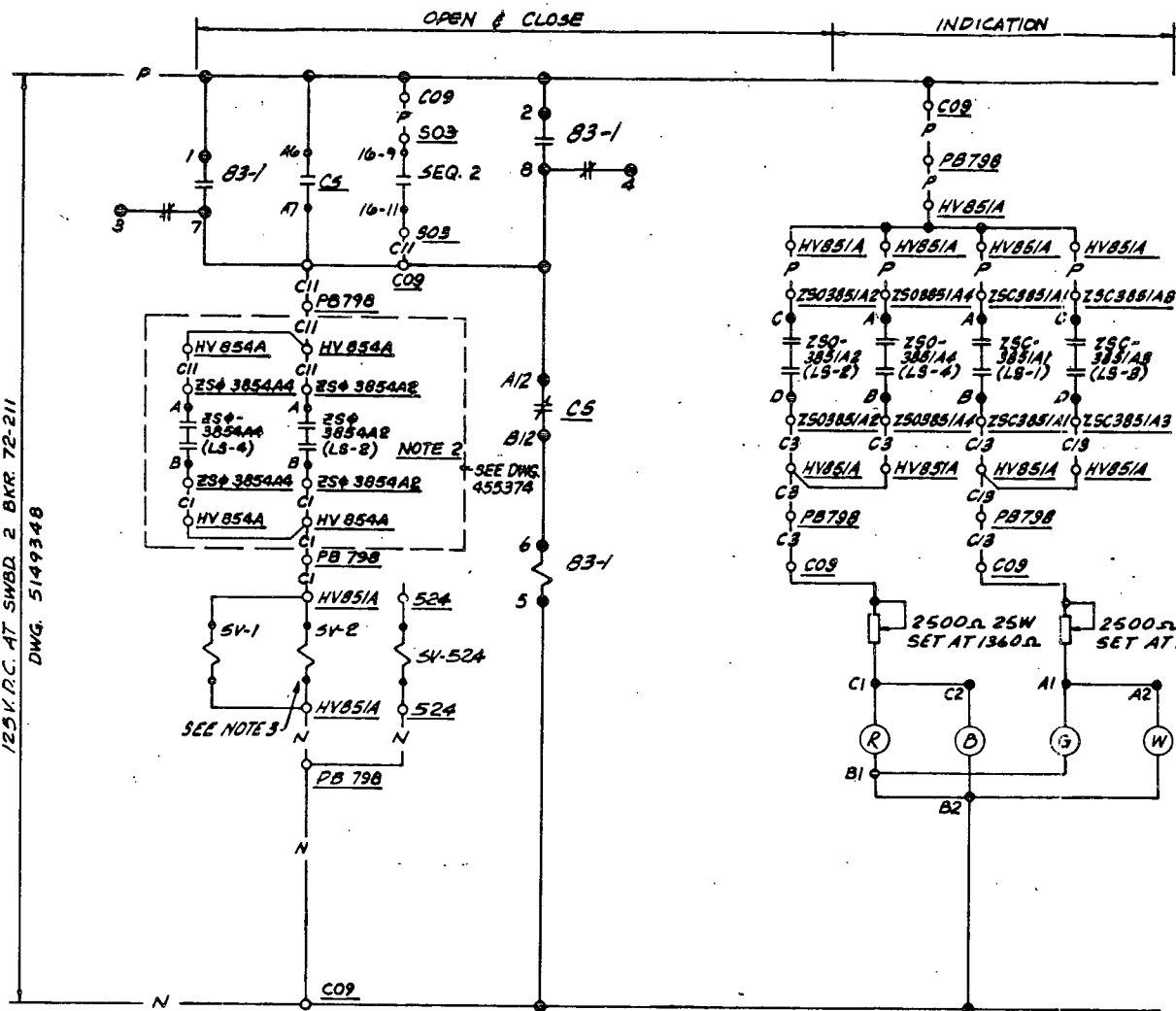
APERTURE CARD
Also Available On Aperture Card.

455371-5

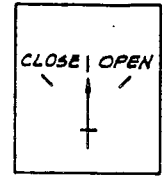
8902270311-124

MICROFILMED FROM

20X



CONTACT	POSITION		
	CLOSE	AFTER CLOSE	AFTER OPEN
A11-B11	X		
A12-B12		X	X
A1-B1			X
A5-A6	Y	X	
A6-A7		X	X
A5-B6	X	X	
B6-B7		Y	Y



CONTACT	CONTACT DEVELOPMENT		
	OPEN	INTERMEDIATE	CLOSE
A-B			
C-D			
E-F			
G-H			

LIMIT SWITCH 2 CW

CONTACT	CONTACT DEVELOPMENT		
	OPEN	INTERMEDIATE	CLOSE
A-B			
C-D			
E-F			
G-H			

LIMIT SWITCH 1 CCW

CONTROL SWITCH CS
NBST. TYPE 'N-E' SPRING RETURN
GREEN OVAL FIXED HANDLE

CONTACT	CONTACT DEVELOPMENT		
	OPEN	INTERMEDIATE	CLOSE
A-B			
C-D			
E-F			
G-H			

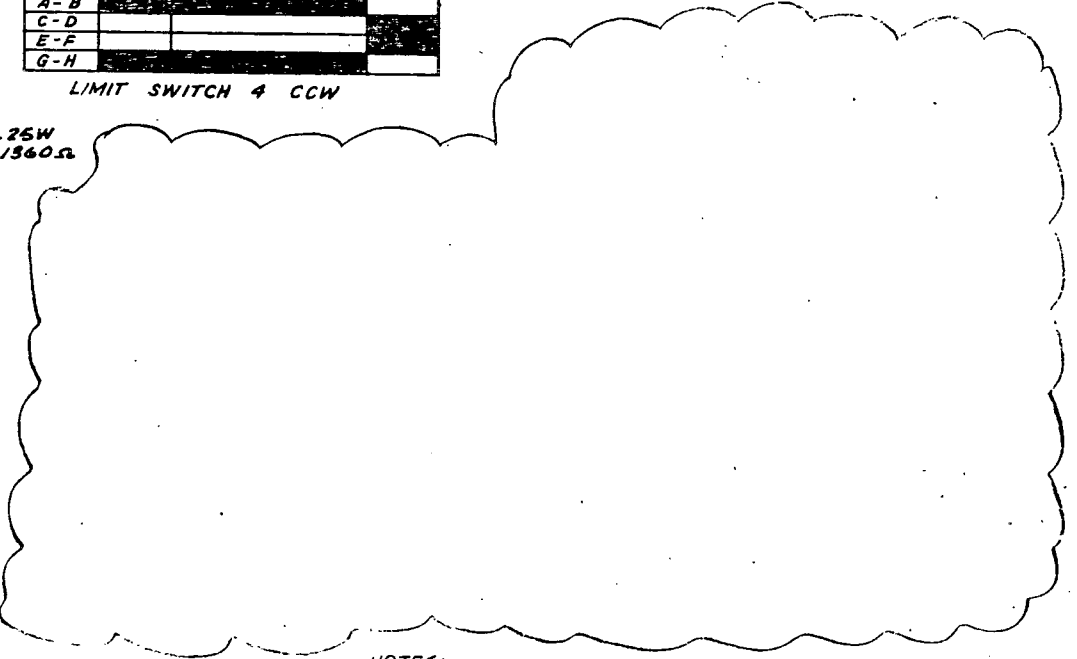
DEVICE TABLE		
DEVICE	TYPE	DESCRIPTION
83-1	GE. HGA M 6379 SH. 614	125V. D.C. AUXILIARY RELAY

LIMIT SWITCH 3 CW

CONTACT	CONTACT DEVELOPMENT		
	OPEN	INTERMEDIATE	CLOSE
A-B			
C-D			
E-F			
G-H			

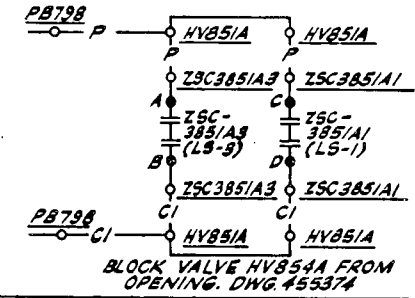
LIMIT SWITCH 4 CCW

CONTACT	CONTACT DEVELOPMENT		
	OPEN	INTERMEDIATE	CLOSE
A-B			
C-D			
E-F			
G-H			



125V. D.C. AT SWBD. 2 BKR 72-211
DWG. 5149348

SCHEME NO 1GDO251A SHOWN



- NOTES:
- ALARM CIRCUIT COMMON TO VALVES HV-851A, HV-852A, HV-853A & HV-854A. SEE DWG. 5151800
 - CONTACT CLOSED WHEN HV 854A OR HV854B RESPECTIVELY IS CLOSED.
 - ENERGIZATION OF SV-1, SV-2 AND SV-524 WILL OPEN HV851A HV851B & B ARE NORMALLY CLOSED.

DESCRIPTION	SCHEME	DEVICE	SEQUENCE	DC. DIST. SWBD BKR. NO.	INTERLOCKS	PULL BOX	LIMIT SWITCHES TAG NO.			
							LS-1	LS-2	LS-3	LS-4
SAFETY INJECTION DISCHARGE VALVE HV-851A	1GDO251A	SV-524	NO. T.B. STUD TIME DWG. NO.	72-211	4V-854A	798	ZSC-385/A1	ZSO-385/A2	ZSC-385/A3	ZSO-385/A4
SAFETY INJECTION DISCHARGE VALVE HV-851B	1FDO151B	SV-528	1 17 1.3 0*SEC 5150874	72-130	HV-854B	799	ZSC-285/B1	ZSO-285/B2	ZSC-285/B3	ZSO-285/B4

NO.	REVISIONS	DATE	APPROVED	O.K.	O.K.	CL'D.	MADE	I.O. NO.	SCALE	REVISED	DATE	APPROVED	O.K.	O.K.	CL'D.	MADE	I.O. NO.
5102173	125V. D.C. NO. 1 - ONE LINE DIAG.	10	AS BUILT - INCORP DCN 19	7-23-56													
5149265	PLT FOR RECHARGING S.S. RELATED VALVES	9	AS BUILT - INCORP DCN 17 & 15	7-30-56													
232834	LOGIC DIAGRAM	8	AS BUILT - INCORP DCN # 15, 16	4-14-56													
5149629	DEVICE FUNC. NOS & SYMBOLS	7	AS BUILT - INCORP DCN # 17	5-14-56													
5149964	EQUIP. LOCATION INDEX	6	AS BUILT - INCORP DCN # 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100	5-14-56													
	Reference Drawings	5	REC. REV. CHANGED TITLE NAME	12-2-71													

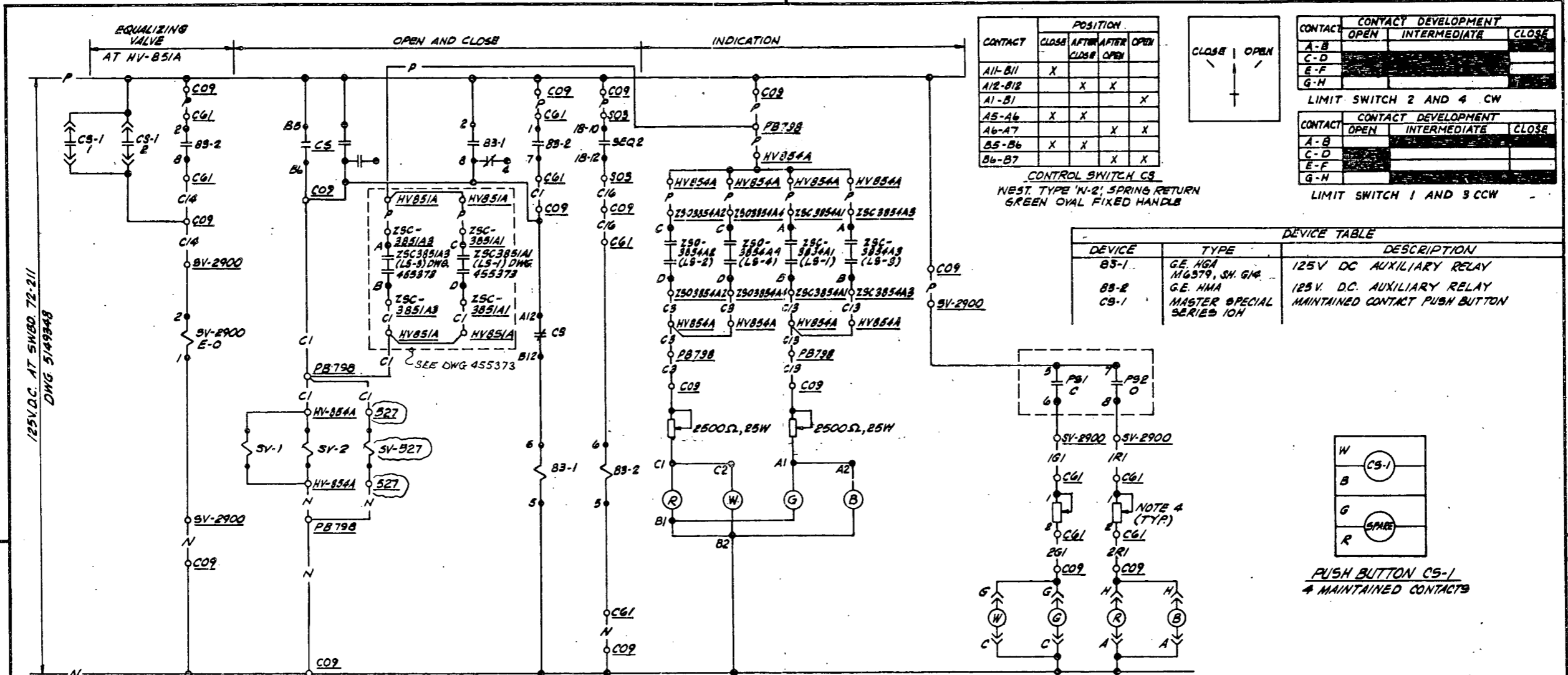
SONGS 1
SAFETY RELATED
N1542 SH. 34
Location SAN ONOFRE NUCLEAR EN. STA.
ELEMENTARY DIAGRAM
HV-851 A & B
SAFETY INJECTION VALVES

8902270311-125 455373-11

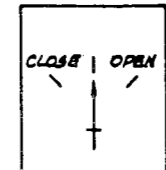
APERTURE CARD

Available On Request

FORM NO. 100-100



CONTACT	POSITION			
	CLOSE	AFTER CLOSE	AFTER OPEN	OPEN
A11-B11	X			
A12-B12		X	X	
A1-B1				X
A5-A6	X	X		
A6-A7			X	X
B5-B6	X	X		
B6-B7			X	X



CONTACT	CONTACT DEVELOPMENT		
	OPEN	INTERMEDIATE	CLOSE
A-B			
C-D			
E-F			
G-H			

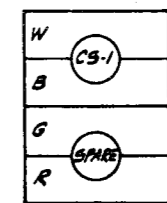
LIMIT SWITCH 2 AND 4 CW

CONTACT	CONTACT DEVELOPMENT		
	OPEN	INTERMEDIATE	CLOSE
A-B			
C-D			
E-F			
G-H			

LIMIT SWITCH 1 AND 3 CCW

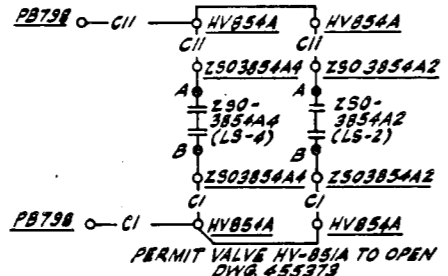
CONTROL SWITCH C9
NEST TYPE 'N-2', SPRING RETURN
GREEN OVAL FIXED HANDLE

DEVICE TABLE		
DEVICE	TYPE	DESCRIPTION
B5-1	GE. NGA M6579, SH. G/4	125V DC AUXILIARY RELAY
B5-2	GE. NMA	125V. DC. AUXILIARY RELAY
C9-1	MASTER SPECIAL SERIES 10H	MAINTAINED CONTACT PUSH BUTTON



PUSH BUTTON C9-1
* MAINTAINED CONTACTS

SCHEME NO. 1GDO254A SHOWN



SW.	CONTACT	OPEN	CLOSE
1	C NC	X	
1	C NO		X
2	C NC	X	
2	C NO		X
3	C NC	X	
3	C NO		X
4	C NC	X	
4	C NO		X

PUSH BUTTON C9-1
SWITCH DEVELOPMENT

890227031L-126

- NOTES:
- ALARM CIRCUIT COMMON TO VALVES HV-851A, HV-852A, HV-853A & HV-854A. SEE DWG. 5151800
 - FOR NITROGEN/AIR CHARGING SYSTEM SEE DWG. 455373
 - ENERGIZATION OF SV-1, SV-2 AND (SV-527) WILL CLOSE HV-854A. HV-854A AND HV-854B ARE NORMALLY OPEN.
 - RESISTORS ARE 2500Ω, 25W. SET AT PROPER LAMP BRIGHTNESS AS REQUIRED.

DESCRIPTION	SCHEME	DEVICE	SEQUENCE	NO.	T.B.	STUD	TIME	DWG. NO.	DC. DIST. SWBD BKR. NO.	INTERLOCKS	PULL BOX	DEVICE	LIMIT SWITCHES TAG NO.				
													LS-1	LS-2	LS-3	LS-4	
FEEDWATER SUCTION VALVE HV-854A	1GDO254A	SV-527	W54A	2	18	10/2	0 SEC.	5150875	72-211	HV-851A	798	SV-2900	C61	Z5C-3854A1	Z50-3854A2	Z5C-3854A3	Z50-3854A4
FEEDWATER SUCTION VALVE HV-854B	1FDO154B	SV-531	W54B	1	20	5/7	0 SEC.	5150874	72-130	HV-851B	799	SV-2900	C60	Z5C-3854B1	Z50-3854B2	Z5C-3854B3	Z50-3854B4

NO.	DESCRIPTION	DATE	APPROVED	BY	REVISIONS	DATE	APPROVED	BY	REVISIONS	DATE	APPROVED	BY	REVISIONS
5108173	125V. DC. N.O.I. ONE-LINE DIAG.	9-23-76			00	3083			4	INCORP. CCN 546 EFF. DATE IMMED.	3-29-77		
5149265	PLD FOR RECHARGING S.Y. RELAY VALVE	9-30-76			06	3066			3	INCORP. CCN 4, EFF. DATE IMMEDIATELY	3-7-77		
5149269	LOGIC DIAGRAM	1-17-76			06	3066			2	INCORP. CCN 3, EFFECT DATE IMMED.	3-8-77		
5149279	DEVICE FUNC. NO'S & SYMBOLS	2/23/74			06	8881			1	INCORP. CCN 1, EFFECT DATE 10-1-76	11/17/76		
5149964	EQUIP. LOCATION INDEX	9-10-77			12	6500			0	ISSUED FOR CONSTRUCTION	3/23/78		

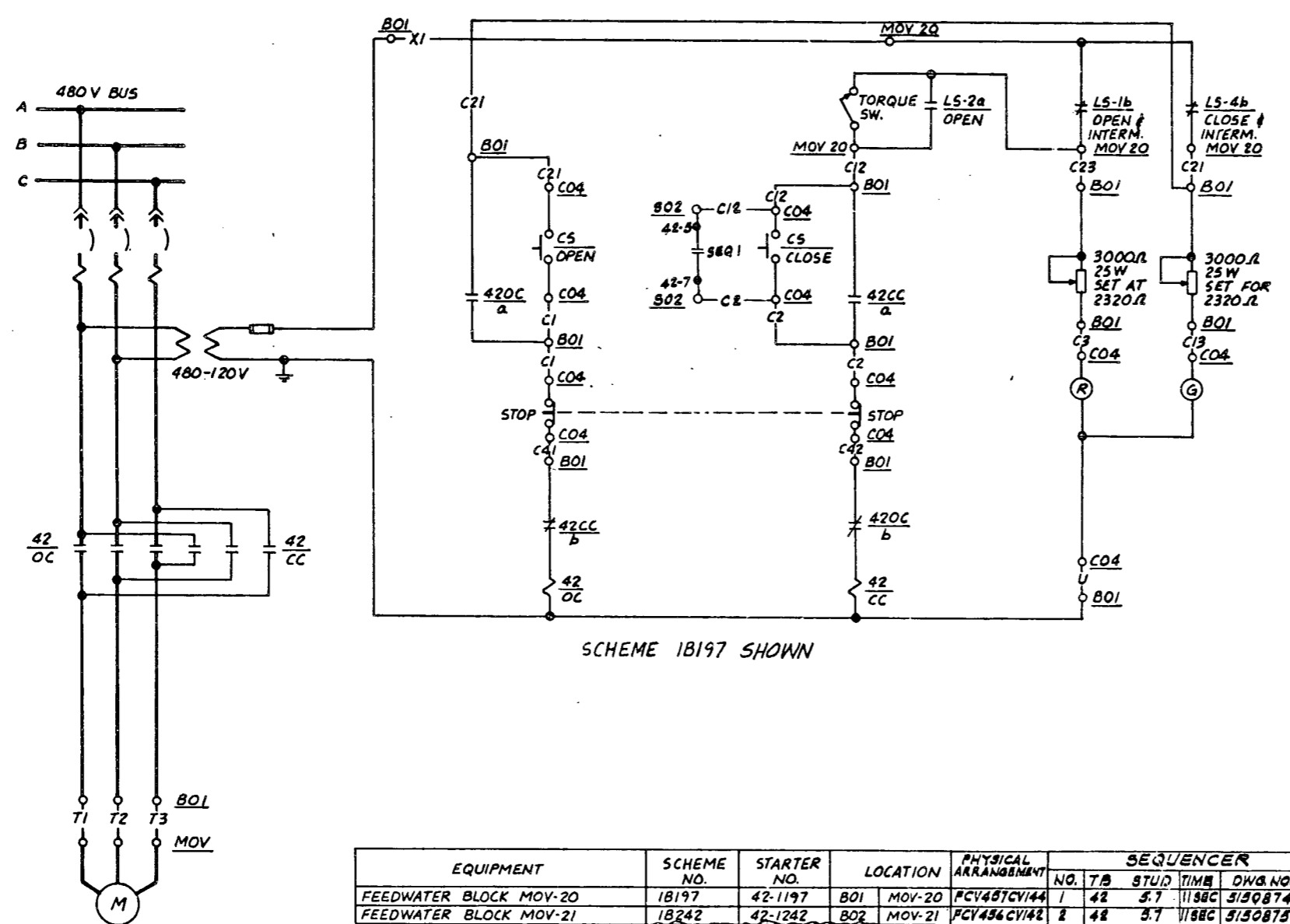
455374-9

APERTURE CARD

Also Available On Aperture Card

DWG. LIST NO. 3066 SH. 0110

Southern California Edison Company



SCHEME 18197 SHOWN

CONTACT NO.	CONTACT DEVELOPMENT
LS-1	b
	a
LS-2	b
	a
LS-3	b
	a
LS-4	b
	a
LS-5	b
	a
LS-6	b
	a
LS-7	b
	a
LS-8	b
	a

VALVE POSITION
 OPEN INTERMEDIATE CLOSE
 CONTACT CLOSED
 a - N.O.-NORMALLY OPEN CONTACT
 b - N.C.-NORMALLY CLOSED CONTACT
 LIMIT SWITCH ARRANGEMENT FOR
 MOV-20
 MOV-21
 MOV-22

EQUIPMENT	SCHEME NO.	STARTER NO.	LOCATION	PHYSICAL ARRANGEMENT	SEQUENCER				EQUIVALENT SCHEME #		
					NO.	T/S	STUD TIME	DWG. NO.		CONT. DWG.	POR TMI
FEEDWATER BLOCK MOV-20	18197	42-1197	BO1	MOV-20	1	42	5.7	1198C	5130874	5149179	1F80197
FEEDWATER BLOCK MOV-21	18242	42-1242	BO2	MOV-21	2	42	5.7	1198C	5150875	5149182	1F80242
FEEDWATER BLOCK MOV-22	18183	42-1183	BO1	MOV-22	1	58	1.3	1198C	5130874	5149179	1F80183

APERTURE CARD

Also Available On Aperture Card

SONGS I
SAFETY RELATED
FEEDWATER & CONDENSATE
REDRAWN FROM N-1543 SH20

Reference Drawings	No.
5149029	DEVICE PLING. NO. & SYMBOLS
5149964	EQUIPMENT LOCATION INDEX
5102166	1-LINE-MCC#1
5102170	1-LINE-MCC#3
5102167	1-LINE-MCC#2
5102165	1-LINE-MCC#1

No.	Revisions	Date	Approved	O.K.	O.K.	Cl'd.	Made	I.O. No.	Scale	Revisions	Date	Approved	O.K.	O.K.	Cl'd.	Made	I.O. No.
4	AS BUILT BY FLUOR INC DGN # 4 (S&B DOT I R-0)	5-3-88							NONE								
3	INCRP. CCN 1-EFFECT DATE 6-14-76	6-11-76															
2	REC. REV. - REVISED TITLE	11-10-77															
1	INCRP. CCN 1-EFFECT DATE 6-14-76	11-27-76															
0	ADDED SEQUENCER INTLK.	1-9-76															

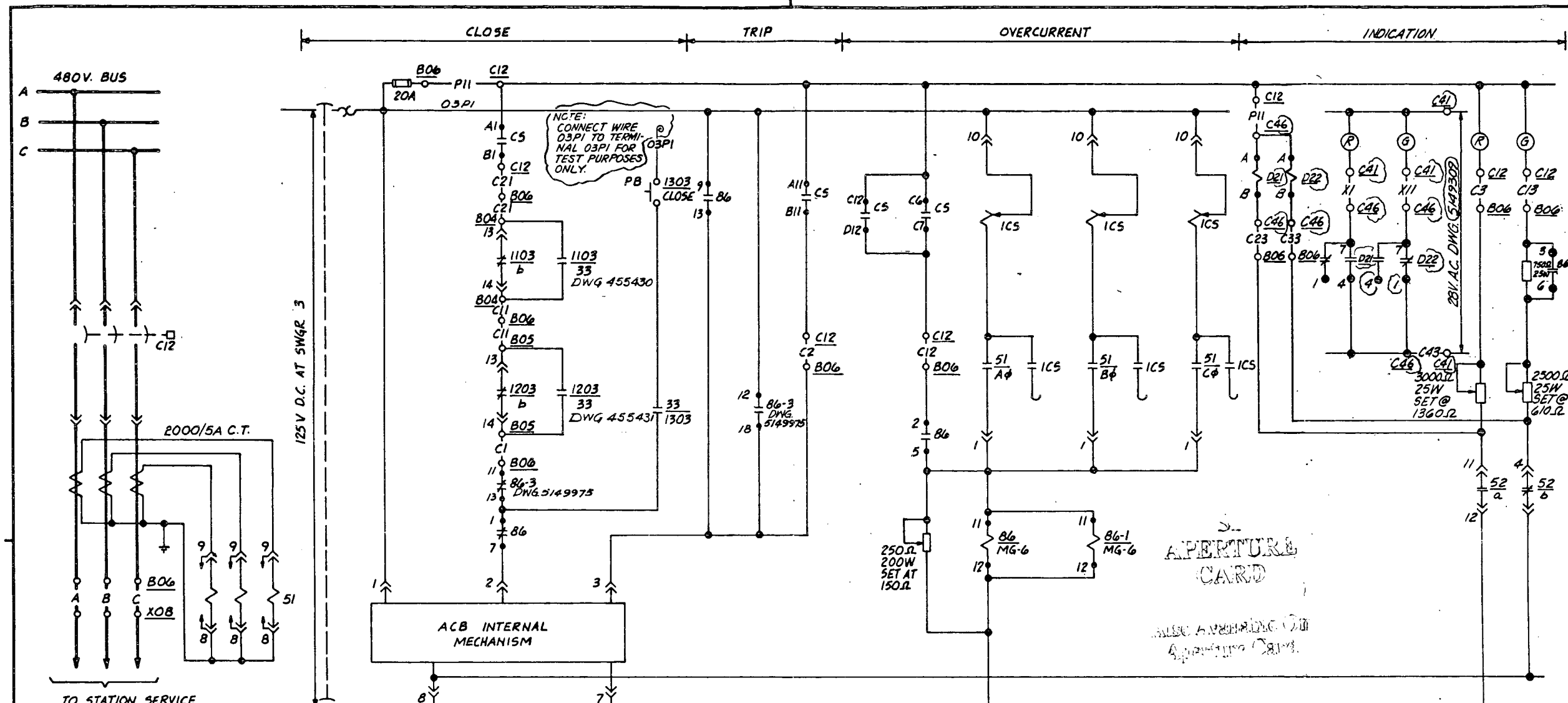
Location SAN ONOFRE NUCLEAR GEN. STA.
ELEMENTARY DIAGRAM
FEEDWATER MOV-20, 21 & 22
FEEDWATER BLOCK VALVES

Southern California Edison Company SCE

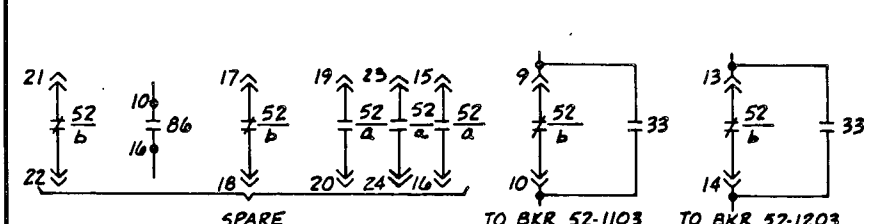
DWS LIST M-5537 44C

8902270311-127

455379-4

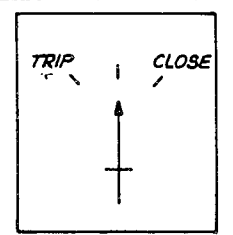


SCHEME NO. 1B303



- B04 C5/A
- B06
- 86-1
- B06
- C4/A
- B04
- K01 EPI
- B06
- 86
- B06
- K3-10
- K01
- B05 C5/B
- B06
- 86-1
- B06
- C4/B
- B05

CONTACT	POSITION		
	TRIP	AFTER TRIP	AFTER CLOSE
A11-B11	X		
A12-B12		X	X
A1-B1			X
A5-A6	X	X	
A6-A7		X	X
B5-B6	X	X	X
B6-B7		X	X
C11-D11	X		
C12-D12		X	X
C1-D1			X
C5-C6	X	X	
C6-C7		X	X
D5-D6	X	X	
D6-D7		X	X



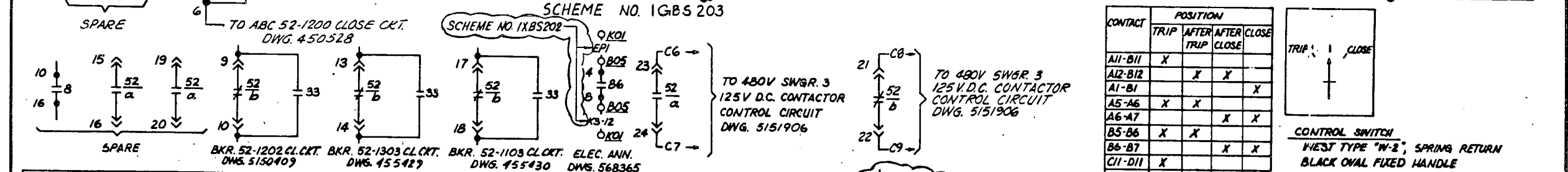
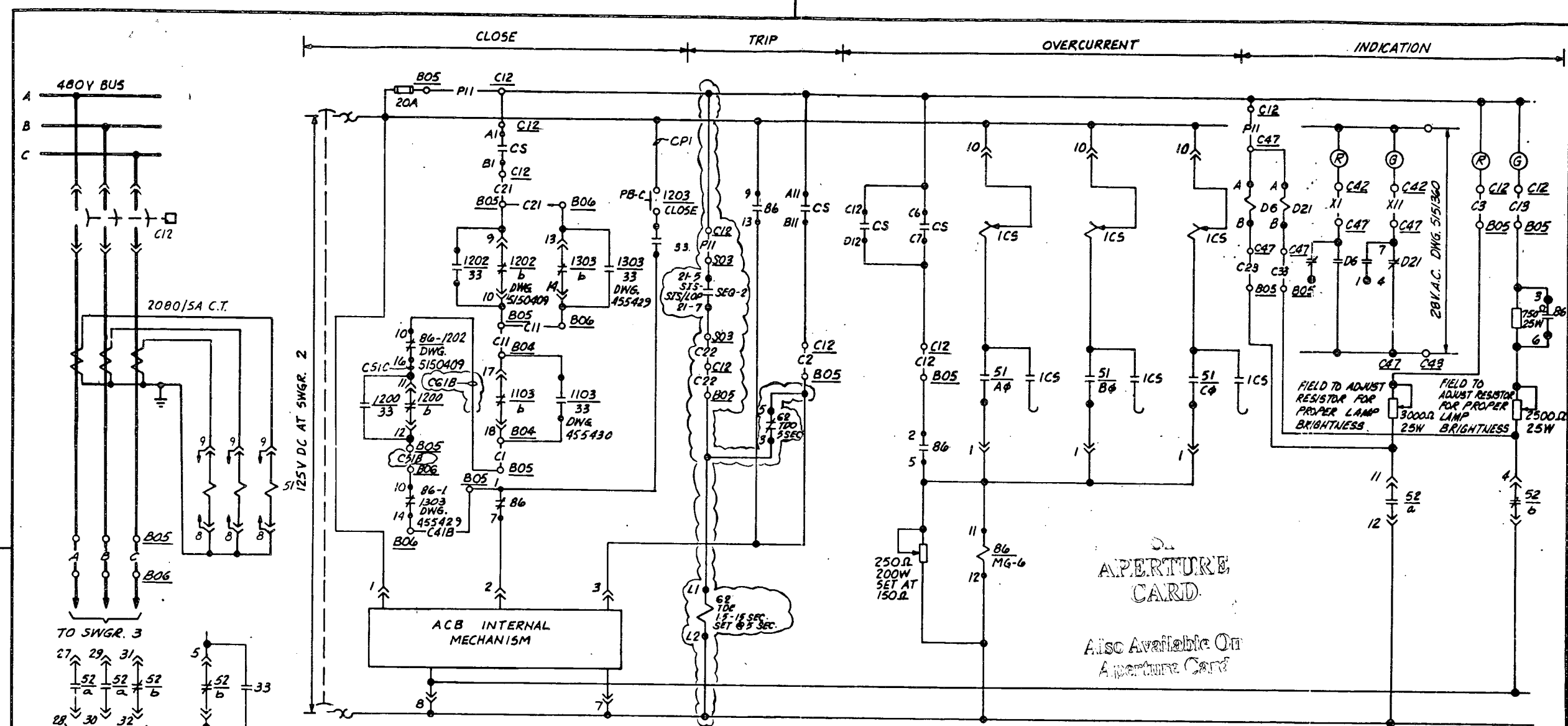
EQUIPMENT	SCHEME NO.	BREAKER NO.	INTERLOCKS
STATION SERVICE TRANS. NO. 3	1B303	52-1303	52-1103/b, 52-1103/33, 52-1203/b, 52-1203/33, 86-3, 71-13

CONTROL SWITCH C9
WEST TYPE "W-2" SPRING RETURN
BLACK OVAL FIXED HANDLE
REDRAWN FROM N-1546 SH.18.

Reference Drawings	No.	Revisions	Date	Approved	O.K.	O.K.	Cl'd.	Made	I.O. No.	Scale
5149629	DEVICE FUNC. NO. & SYMBOLS									
5149964	EQUIP. LOCATION INDEX									
5146828	MAIN ONE-LINE DIAGRAM									
5108065	ONE-LINE SWGR 213									
5151906	ED. 480V SWGR. 3, 125V DC. CONTROL									

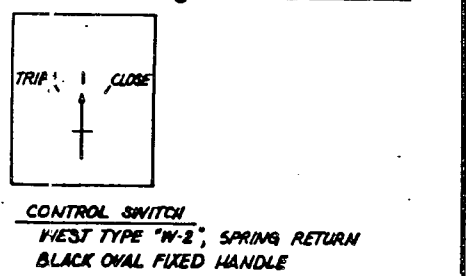
No.	Revisions	Date	Approved	O.K.	O.K.	Cl'd.	Made	I.O. No.	Scale
4	AS BUILT - INCORP DCN #9	10-3-86							
3	AS BUILT INCORP G, B CANC CC 5 (*NOT USED)	11-2-85							
2	REC. REV. - REVISED TITLE	11-10-77							
1	INCORP CON 1 EFF DATE 9-15-76, CON 2 & 3 EFF DATE 11-1-77	1-1-77							
0	REVISED LOCKOUT CKTS	1-28-76							

SONGS I
SAFETY RELATED
ELEMNTARY DIAGRAM
STA. SERVICE TRANS. NO. 3
480V ACB
Southern California Edison Company



EQUIPMENT	SCHEME NO.	BREAKER NO.	INTERLOCKS
TIE BREAKER BUS NO. 2 - BUS NO. 3	1885203 / 1885203	52-1203	52-1202/b, 52-1202/33, 52-1303/b, 52-1303/33, 52-1103/b, 52-1103/33

CONTACT	POSITION		
	TRIP	AFTER TRIP	AFTER CLOSE
A11-B11	X		
A12-B12		X	X
A1-B1			X
A5-A6	X	X	
A6-A7			X
B5-B6	X	X	
B6-B7			X
C11-D11	X		
C12-D12		X	X
C1-D1			X
C5-C6	X	X	
C6-C7			X
D5-D6	X	X	
D6-D7			X

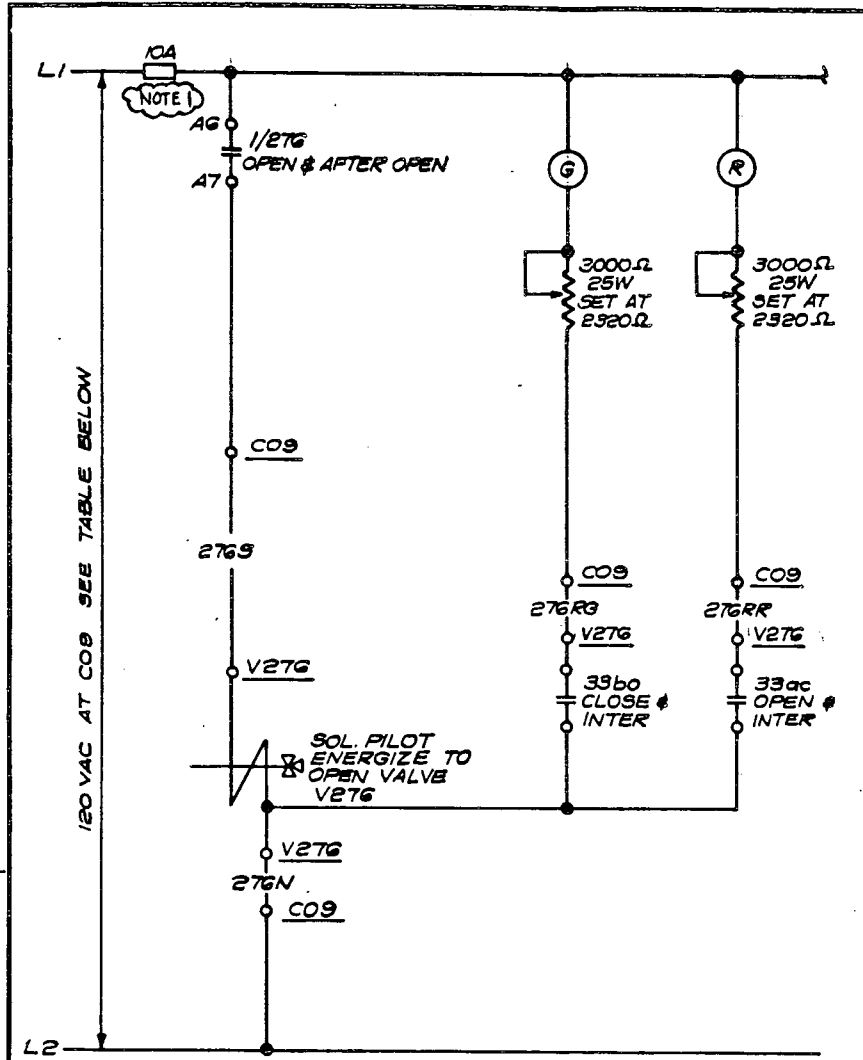


SONGS I SAFETY RELATED REDRAWN FROM N-1546 SH 20

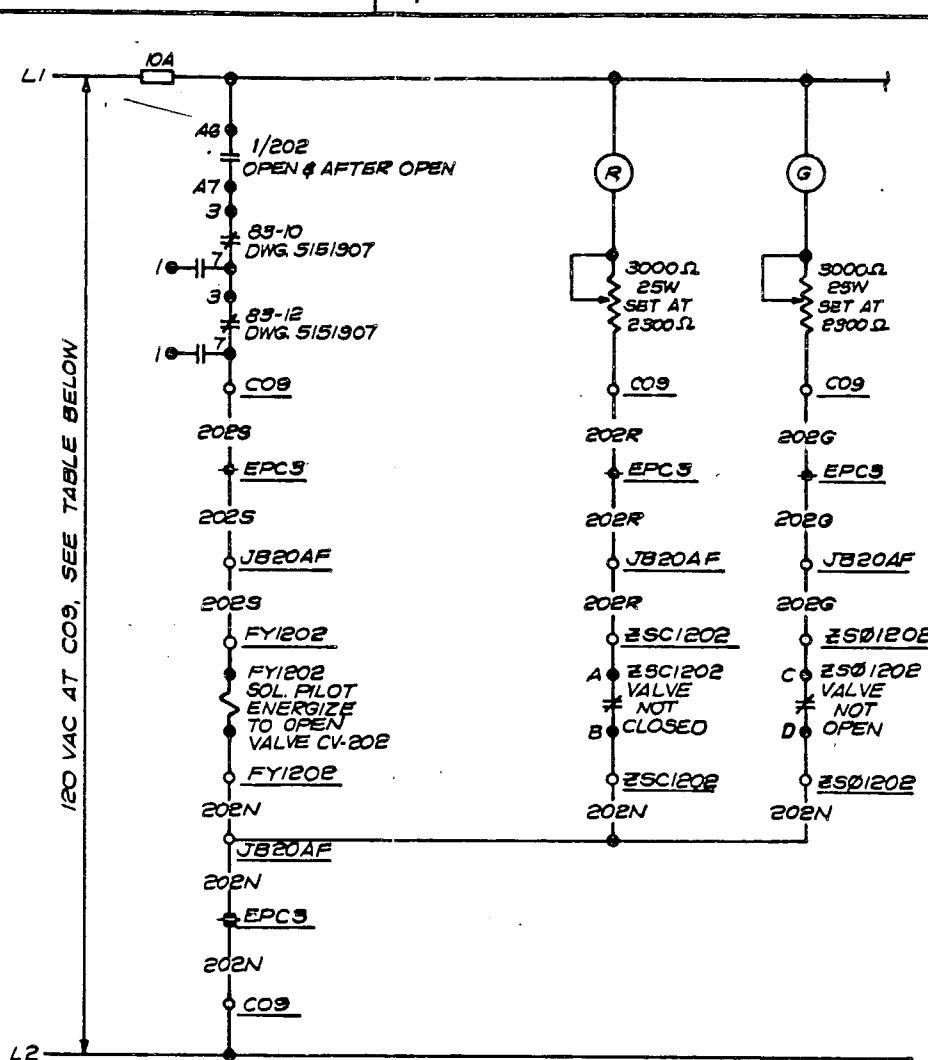
No.	Revisions	Date	Appr.	O.K.	Cl'd.	Made	I.O. No.	Scale	Revisions	Date	Appr.	O.K.	Cl'd.	Made	I.O. No.
3151905	ED. 480V SWGR. 2, 125V D.C. CONTROL								3	INCORP CON #6 EFFECT IMMED.	5-1-79				
5150874	ED. SAFETY INJECTION SEQ. 1								2	REC REV - REVISED TITLE	11-18-77				
63715	SAFETY INJECTION SYSTEM								1	INCORP CON 1, 2, 3, 4 EFF DATE 6-14-10-1-76 IMMED.	1-2-77				
5142828	MAIN-1-LINE DIAGRAM	6	AS BUILT BY FLUOR, INC. DCN'S 11/12 (DCR 1-5113 280)	1-15-77	JS	JGG	RR	SJR	0	ISSUED FOR CONSTRUCTION, ADD'D SEQUENCE CONTACT, REMOVED 36-3 CONTACT	2-7-76				
5149629	DEVICE FUNC. NOS & SYMBOLS	5	AS BUILT BY FLUOR, INC. DCN (NCR 501-P-6539)	6/1/77	JS	KAT	MM	D.T.							
5149964	EQUIP. LOCATION INDEX	3	AS BUILT - INCORP DRN B, 9 (#7 NOT USED)	7/2/75	JS	W.C.	W.C.	EAG	3083						

Location SAN ONOFRE NUCLEAR GEN. STA.
ELEMENTARY DIAGRAM BUSTIE 2-3 480V ACB
 Southern California Edison Company

8902270311-129 455431-6



MANUAL CONTROL
(SEE TABLE 1)



MANUAL CONTROL
(SEE TABLE 2)

DEVICE TABLE		
DEVICE	TYPE	DESCRIPTION
83-10; 83-11	G.E. TYPE HGA. SIMILAR TO M6379 SHT. G14	125 V.A.C. AUXI. RELAY
83-12; 83-13	G.E. TYPE HGA. SIMILAR TO M6379 SHT. G14	125 V.A.C. AUXI. RELAY

CONTROL SWITCH DEVELOP "A"

CONTACT	POSITION			DWG. NO.
	CLOSE	AFTER CLOSE	OPEN	
A1-B1			X	SPARE
A3-A6	X	X		SPARE
A6-A7		X	X	THIS DWG.
A11-B11	X			SPARE
A12-B12		X	X	5151907
B5-B6	X	X		SPARE
B6-B7			X	SPARE

CONTROL SWITCH
WEST TYPE "W-2", SPRING RETURN TO OFF,
GREEN OVAL FIXED HANDLE

NOTE:
1. FOR VALVE SY 276, SY 288, SY 413, SY 414 FUSE 512-
AS SHOWN IS PER ENGINEERING DESIGN. CHANGES
IN FUSE SPECIFICATION REQUIRE PROJECT ENGINEERING
OR STATION TECHNICAL APPROVAL. FOR SY 276, SY 413 & SY 414
FUSE SHALL BE GUSSEMAN MODEL NOM 10 ONLY FOR
SY 288, FUSE SHALL BE SHAWMUT MODEL OT10 RATED
10A ONLY.

APERTURE
CARD
Aperture Card

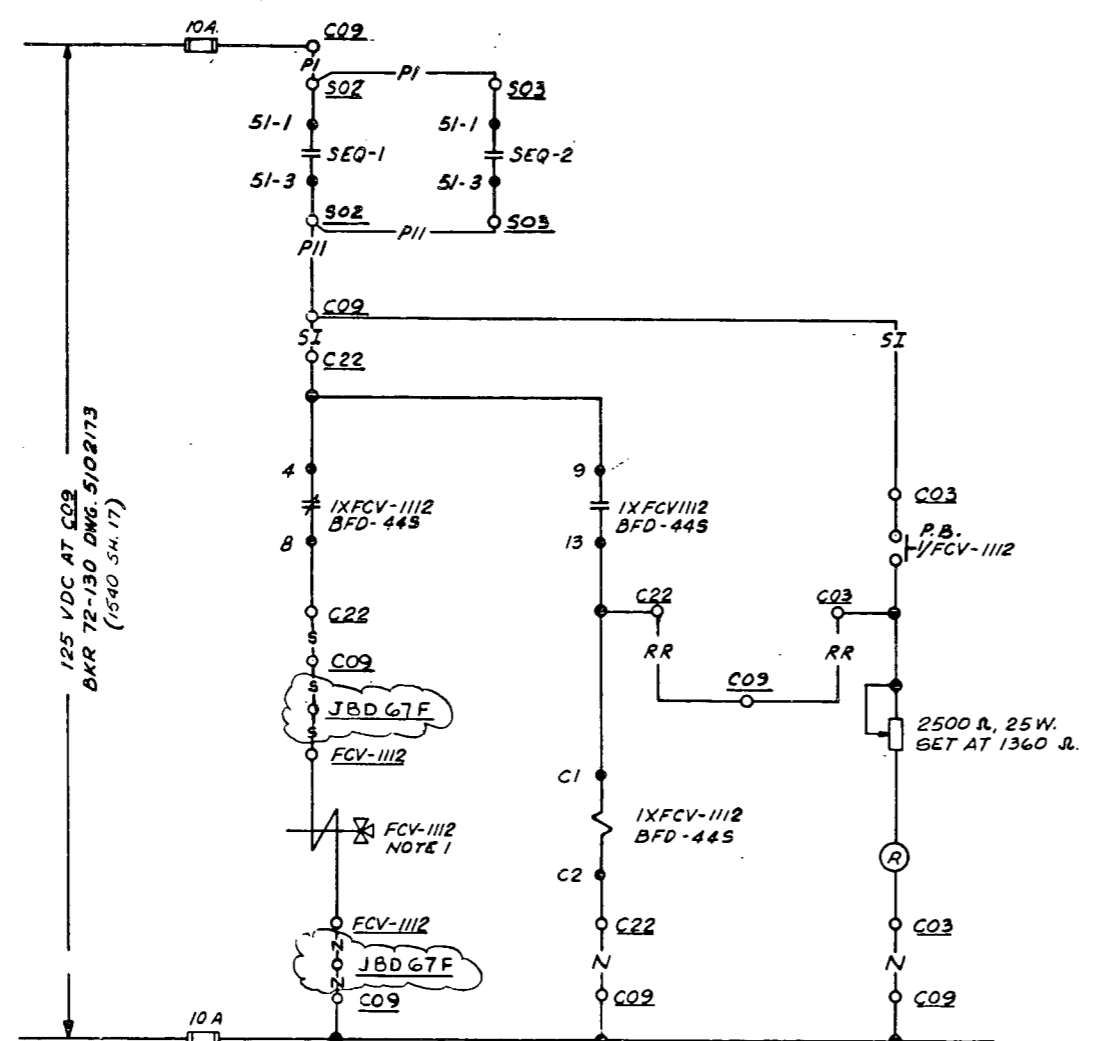
VALVE	FUNCTION	CONT. SW	LOCATION	POWER SOURCE
276	RC PUMP VENT# CONT. LEAK OFF	DEV. "A"	CO9	8-1508 N-1542 SH. 55
288	EXCESS LETDOWN FLOW SELECTOR			8-1508 N-1542 SH. 55
413	EXCESS LETDOWN RES. BYPASS STOP			8-1402V N-1542 SH. 53
414	EXCESS LETDOWN RES. BYPASS STOP			8-1402V N-1542 SH. 53

VALVE	FUNCTION	SCHEME	WIRE NO.	LOCATION								CONT. SW	POWER SOURCE	DEVICES		
				PENTR.	J.B.	Z30	Z3C	FNL	SOL. VLV.	RELAY	CONT.			RELAY	CONT.	
CV202	ORIFICE ISOLATION	1FQ107	2029	202N	202R	202G	FEP3	JB20AF	1202	1202	CO9	FY120E	DEV. "A"	8-1518 N-1542 SH. 56	83-10; 3-7	83-12; 3-7
CV203	ORIFICE ISOLATION	1GQ107	2039	203N	203R	203G	FEP3	JB21AG	1203	1203	CO9	FY1203		8-1518 N-1542 SH. 56	83-10; 4-8	83-12; 4-8
CV204	ORIFICE ISOLATION	1HQ107	2049	204N	204R	204G	GWPC4	JB22AH	1204	1204	CO9	FY1204		8-1518 N-1542 SH. 56	83-11; 3-7	83-13; 3-7
CV287	EXCESS LETDOWN ISOL.	1WQ107	2879	287N	287R	287G	FEP3	JB23AW	1287	1287	CO9	WHY1287		8-1518 N-1542 SH. 56		
CV304	CHARGING LINE	1FB107	3049	304N	304R	304G	FEP3	JB24AW	1304	1304	CO9	HY1304		8-1508 N-1542 SH. 55		
CV305	PRESS. AUX. SPRAY	1FQ107	3059	305N	305R	305G	FEP3	JB25AW	1305	1305	CO9	HY1305		8-1508 N-1542 SH. 55		

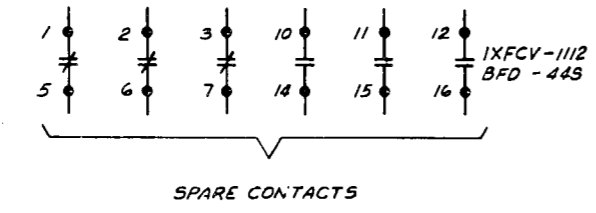
SONGS NO. 1
SAFETY RELATED
1542 SH. 74
REDRAWN FROM WESTINGHOUSE DWG. 323139-B SH. 4

Reference Drawings	No.	Revisions	Date	Approved	O.K.	O.K.	Cl'd.	Made	I.O. No.	Scale	Notes	Date	Approved	O.K.	O.K.	Cl'd.	Made	I.O. No.
AS BUILT BY FLUOR; INC. D.C.N. 11 (F.N. F-3900E)	10		7-15-88								4	INCORP. CCN. 5 EFF. DATE IMMED.	5-9-17					
AS BUILT - INCORP. DCN 10	9		7-5-86															
AS BUILT - INCORP. DCN 8, 9	8		7-29-86															
AS BUILT - INCORP. DCN 7	7		7-29-86															
EQUIP. LOCATION INDEX	6		6-11-81															
RECORD - REVISION - REVISED TITLE	5		11-10-77															

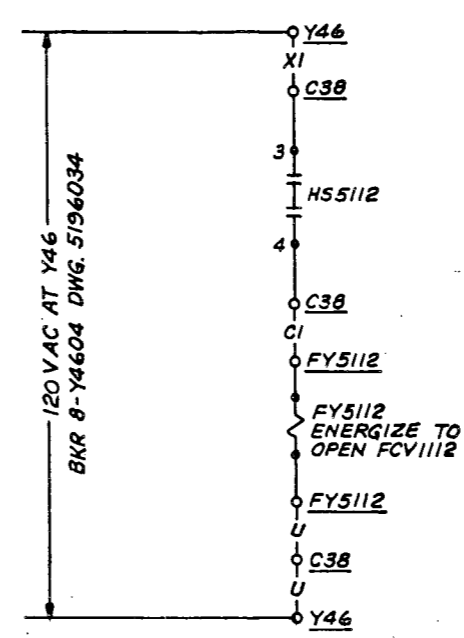
Location SAN ONOFRE NUCLEAR GEN. STA.
ELEMENTARY DIAGRAM
CV'S 276, 202, 203, 204,
287, 288, 304, 305, 413 & 414
Southern California Edison Company SCE



SCHEME NO. IFQ 107



SPARE CONTACTS



SCHEME 1JY4604

H55112 SWITCH DEVELOPMENT

DECK	POSITION	CONTACTS
1	X	10-1-02
	X	30-1-04
2	X	50-1-06
	X	70-1-08
3	X	90-1-10
	X	110-1-12

NOTE: SWITCH ESCUTCHEON IS SHOWN ON DWG. 5194860 & LOOP DIAG. IS DWG. 5193919

NOTE: 1. SOLENOID PILOT ENERGIZED TO OPEN VALVE.

SCHEME NO.	VALVE	FUNCTION	LOCATION	SEQUENCE				
				NO.	T. B.	STUD. NO.	TIME	DWG. NO.
IFQ 107	FCV-1112	CHARGING LINE FLOW CONTROL	FCV-1112	1	SI	1, 3	10+SEC	5150874
				2	SI	1, 3	10+SEC	5150875

1542 SH. 125
SONGS I
SAFETY RELATED

REDRAWN FROM ED SK 323139-B-SK 13

Reference Drawings	No.	Revisions	Date	Approved	O.K.	O.K.	Ch'd.	Made	I.O. No.	Scale	None	Date	Approved	O.K.	O.K.	Ch'd.	Made	I.O. No.
5149151	7	AS BUILT BY FLUOR, INC. DCN 7 (FLN-F-3540E)	5-10-88	SNOG			DDH	B.R.	RJS			5-22-84						
5149629	6	AS BUILT - INCORP DCN 6	4-27-57				GG		COPE	3009		11-10-77						
5149964	3	AS BUILT - INCORP DCN 3	8-23-56				G.M.		COPE	3009		10-4-76						

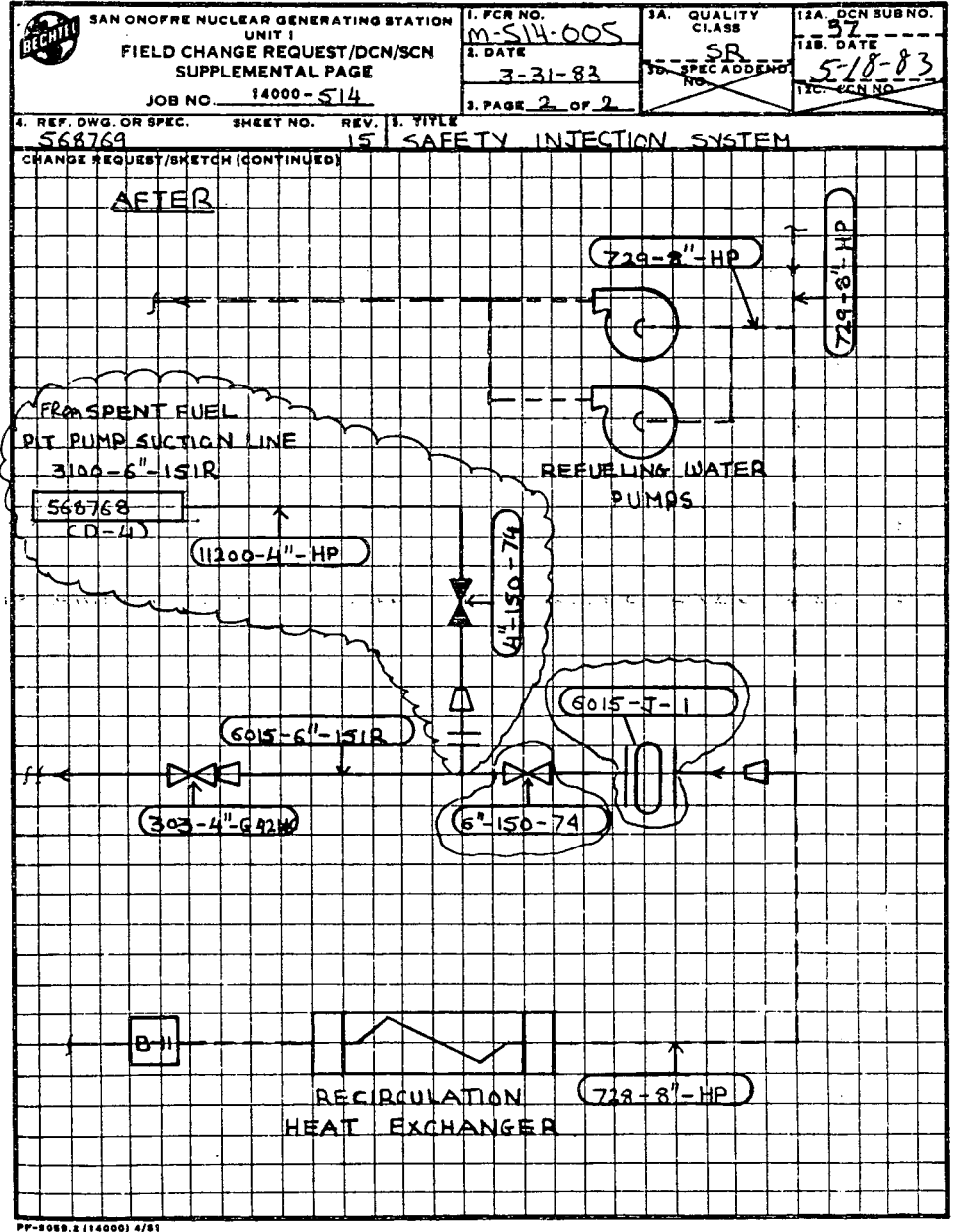
Location SAN ONOFRE NUCLEAR GEN. STA.
ELEMNTARY DIAGRAM
SOLENOID VALVE FCV-1112
CHARGING LINE FLOW CONT.

Southern California Edison Company

D.T.H-1383 M DD 42883

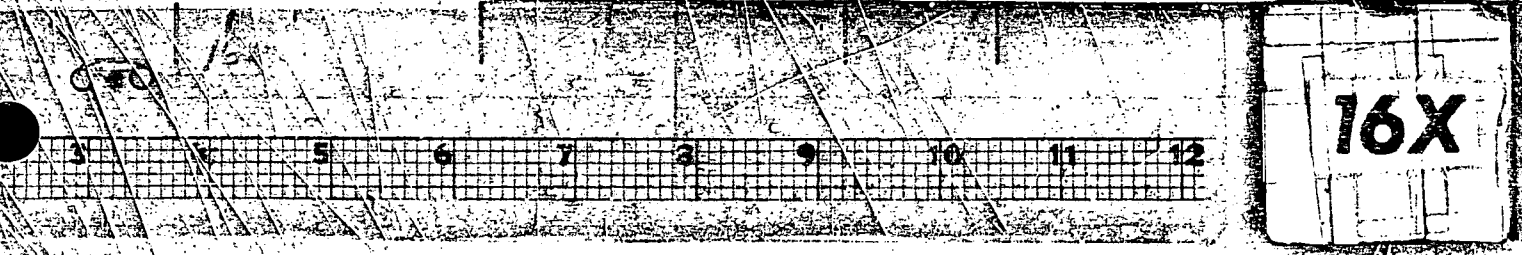
BECHTEL SAN ONOFRE NUCLEAR GENERATING STATION UNIT 1 FIELD CHANGE REQUEST/DCN/SCN		1. FCR NO. M-514-005	3A. QUALITY CLASS SR	12A. DCN SUBNO. 57
2. DATE 3-29-83		3B. SPEC ADDEND. NO. 5-18-83	12B. DATE 5-18-83	
3. PAGE 1 OF 2		12C. DCN NO.		
4. REF. DWG. OR SPEC. SHEET NO. REV. 3. TITLE 568769 15 SAFETY INJECTION SYSTEM				
5. DESIGN ORIGIN: ENGRG <input checked="" type="checkbox"/> VENDOR <input type="checkbox"/> (IDENTIFY) NAME				
7. EXISTING CONDITION: REFUELING WATER STORAGE TANK PROVIDES BOBATED WATER FOR VOLUME SHRINKAGE ON SHUTDOWN.				
8. CHANGE REQUEST/SKETCH PROVIDE TIE LINE AND VALVING TO DELIVER WATER FROM THE SPENT FUEL PIT PUMP SUCTION LINE 3100-6"-151R TO THE CHARGING PUMP SUCTION, VIA LINE 6015-6"-151R. REVISE DWG: ① ADD 4" TIE LINE. (11200-4"-HP). ② ADD 4" GATE VALVE (4"-150-74) IN ABOVE TIE LINE. ③ ADD 6"x6"x6" TEE IN LINE 6015-6"-151R } OR 6"x6"x4" REDUCING TEE ④ ADD 6"x4" REDUCER FOR TIE LINE } ⑤ ADD 6" GATE VALVE (6"-150-74) IN LINE 6015-6"-151R				
SEE SHEET 2A FOR BEFORE CONDITION. SEE SHEET 2 FOR AFTER CONDITION.				
ISSUED FOR CONSTRUCTION				
10. REVIEWED BY DATE CIVIL N/A _____ ELEC N/A _____ MECH N/A _____ WELD N/A _____		PREPARED BY J.C. PATEL (M) PROJECT FIELD ENGINEER DATE 4/11/83		
11. APPROVAL OF FLD DISPOSITION _____ DATE 4/11/83				
12. PROJECT ENGRG APPROVAL: YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> EGS <input type="checkbox"/> REMARKS: CONVERT TO DCN				
13. QUALITY ASSURANCE ENGINEER (FIELD): <u>P. Sherman</u> DATE 4/14/83				
14. SCE ENGINEERING APPROVAL: <u>P.S.</u> DATE _____				
15. BECHTEL QUALITY ENGINEER/QUALITY ASSURANCE: <u>Cheswood</u> DATE 5/9/83				
16. ADDITIONAL DISTRIBUTION				

BWP #2-II-E W.P.# 83-027



SI
 MASTER
 6/1/83

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8902270311-132



DRAWING CHANGE NOTICE (DCN)

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN DUB NO.
568769		15	35

PAID
Safety Injection System

JOB NO. 14000-395 PAGE 1 OF 3 PAGE

DATE: 11-18-82 BY: K. BUHLER

CHANGE REQUESTED BY: CLIENT ENG'G FIELD SUPPLIER/CONTRACTOR

REASON FOR CHANGE: TO ADD N₂ BACKUP SYSTEM TO THE PNEUMATIC SUPPLIED VALVES CV 875A & CV 875B

DESCRIPTION OF CHANGE:

SEE SHEET 2a and 3a FOR BEFORE CONDITION

SEE SHEET 2 and 3 FOR AFTER CONDITION

BWP # 2-II-E

SCE-HP # 82-225

SAFETY RELATED

MATERIAL PROCUREMENT RESPONSIBILITY	AFFECTED PURCHASE ORDERS	REVISED FOR DCN CHANGE	
		YES	NO
<input checked="" type="checkbox"/> BECHTEL OFFICE			
<input type="checkbox"/> BECHTEL FIELD	NONE		<input checked="" type="checkbox"/>
<input type="checkbox"/> SCE			

APPROVAL SIGNATURES: _____ DATE _____

BECHTEL ENGINEERING C.P. M... / J... / 12-29-82

SCE ENGINEERING APPROVAL _____ DATE _____

BECHTEL QUALITY ENGINEER _____ DATE _____

BECHTEL QUALITY ASSURANCE J... / 12-29-82

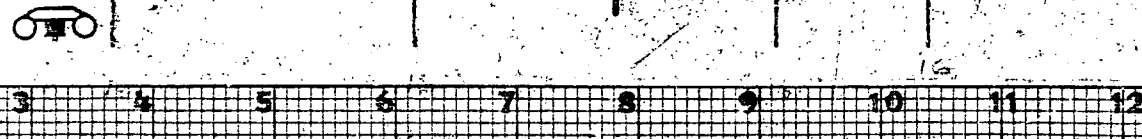
ADDITIONAL DISTRIBUTION: _____

PP-640 (11000) 8/80

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CARD

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DRAWING CHANGE NOTICE (DCN)

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	35

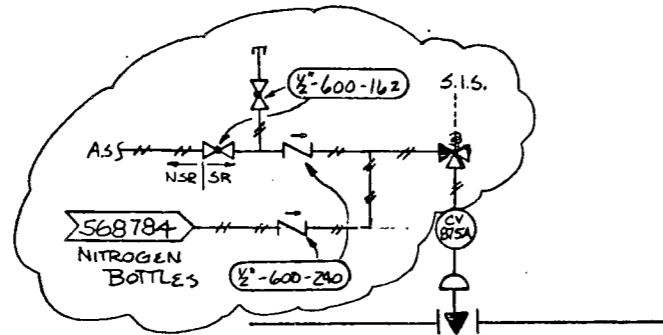
PAID
Safety Injection System

SUPPLEMENTAL PAGE

JOB NO. 14000-395 PAGE 2 OF 3 PAGE
DATE: 11-18-82 BY: K. Buhler

DESCRIPTION OF CHANGE

AFTER



LAD-0070 11/78



DRAWING CHANGE NOTICE (DCN)

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	35

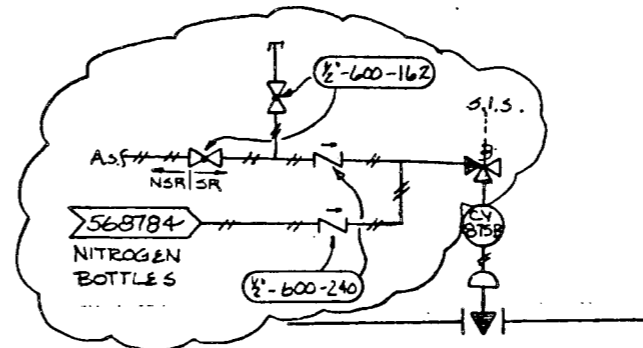
PAID
Safety Injection System

SUPPLEMENTAL PAGE

JOB NO. 14000-395 PAGE 3 OF 3 PAGE
DATE: 11-18-82 BY: K. BUHLER

DESCRIPTION OF CHANGE

AFTER



LAD-0070 11/78

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LOS ANGELES
POWER DIVISION

DRAWING CHANGE NOTICE (DCN)

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	34

*P&I Diagram
Safety Injection System*

JOB NO. 14000-226 PAGE 1 OF 3 PAGE

DATE: 7/22/82 BY: G. Goessmann

CHANGE REQUESTED BY: CLIENT ENG'R'S FIELD SUPPLIER/CONTRACTOR

REASON FOR CHANGE: *Safeguard against accidental closure of the manual vent valves which relieve pressure from the bonnet of valves HV 853 A & B.*
DESCRIPTION OF CHANGE:

Addition of the lock-open feature to these manual valves requires installation of:

- ① lock plate
- ② lock pin
- ③ handle to accomodate lock pin
- ④ lock nut
- ⑤ lock chain.

SEE SHEETS : 2a & 3a for BEFORE CONDITION
2 & 3 for AFTER CONDITION

SAFETY RELATED

MATERIAL PROCUREMENT RESPONSIBILITY	AFFECTED PURCHASE ORDERS	REVISED FOR DCN CHANGE	
		YES	NO
<input checked="" type="checkbox"/> BECHTEL OFFICE	NONE		
<input type="checkbox"/> BECHTEL FIELD			X
<input type="checkbox"/> SCE			

APPROVAL SIGNATURES:

BECHTEL ENGINEERING: *[Signature]* DATE: 9/17/82

SCE ENGINEERING APPROVAL: _____ DATE: _____

BECHTEL QUALITY ENGINEER: _____ DATE: _____

BECHTEL QUALITY ASSURANCE: *[Signature]* DATE: 9/21/82

ADDITIONAL DISTRIBUTION: _____

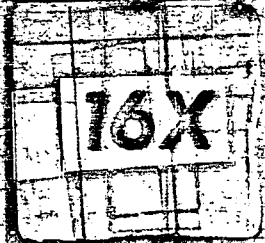
PP-480 (14000) 2/80

GWP 28 II-E

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DRAWING CHANGE NOTICE (DCN)

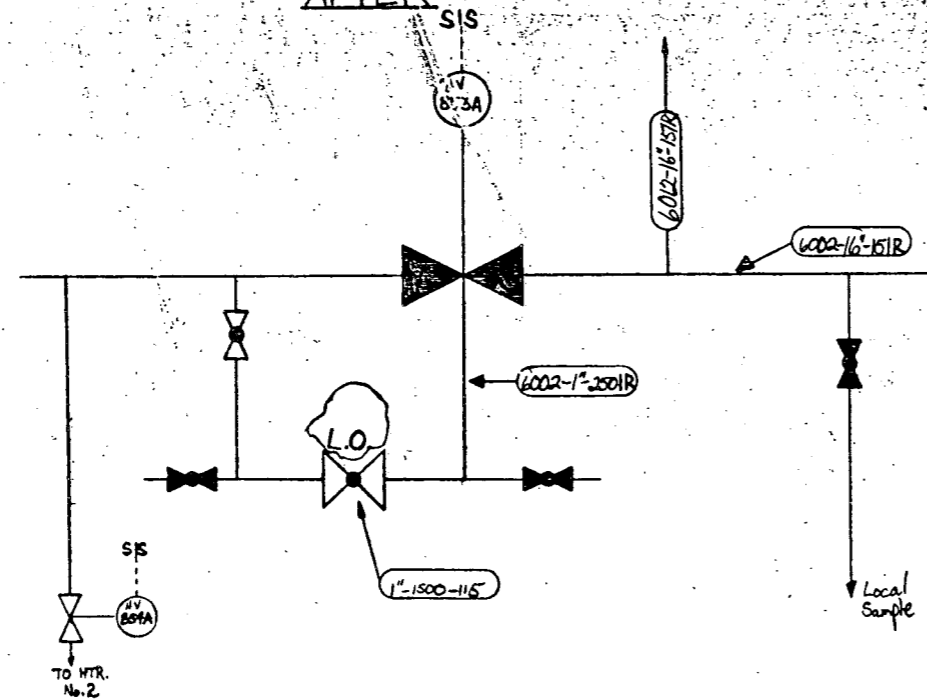
DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	34

SUPPLEMENTAL PAGE

P&I Diagram
Safety Injection System

JOB NO. 14000-226 PAGE 2 OF 3 PAGE
DATE: 7-22-82 BY: G. Goessmann

DESCRIPTION OF CHANGE AFTER



LAO-8874 11/78



DRAWING CHANGE NOTICE (DCN)

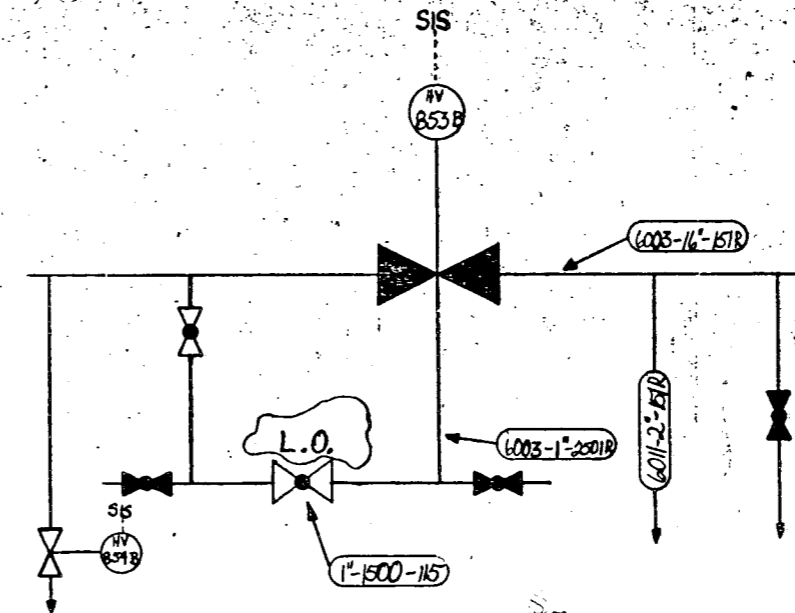
DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	34

SUPPLEMENTAL PAGE

P&I Diagram
Safety Injection System

JOB NO. 14000-226 PAGE 3 OF 3 PAGE
DATE: 7-22-82 BY: G. Goessmann

DESCRIPTION OF CHANGE AFTER



LAO-8874 11/78

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DRDM # M-22
CONFIGURATION CHANGE
 SHEET 1 of 2
 EDM USE ONLY
 CC No. 33
 DATE 5/29/82

REQUESTED BY **LARRY JEW**
 NUMBER **568769**
 REVISION **15** CLASS **S.R.**
 TITLE **P&I DIAGRAM SAFETY INJECTION SYSTEM**
 SUPPLIER BECHTEL EDISON
 J.O. NO. **8194**
 W.O. NO.

DESCRIPTION OF CHANGE
1. INCORPORATED DCN #20 CC'S #31 & 32 & ADDED QUALITY CLASS (SNT 2)

THIS CC CANCELS DCN #20 & CC #31 & 32.
EFFECTIVE DATE: IMMEDIATELY
 WP 9, IIE (DCN 20)
 WP B194 (CC 31)
 (NO WP # FOR CC 32)

JUSTIFICATION
THIS COMPOSITE CC IS REQUIRED TO RECORD AS-BUILT INFORMATION AND TO SHOW WORK PACKAGE BOUNDARIES.

EVALUATION **Jelt**
 OTHER AFFECTED DOCUMENTS / DRAWINGS: **NONE**
 DOCUMENT CHANGE REQUIRED FOR:
 CONSTRUCTION AS BUILT OTHER **8194 # 2**

FIELD APPROVALS				DESIGN APPROVALS			
<i>[Signature]</i> ENGR. / DISCIPLINE	<i>[Signature]</i> DATE	<i>[Signature]</i> CONSTR. SUPER.	<i>[Signature]</i> DATE	<i>[Signature]</i> RESPONSIBLE ENGR.	<i>[Signature]</i> DATE	<i>[Signature]</i> INDEPENDENT REVIEW ENGR.	<i>[Signature]</i> DATE
<i>[Signature]</i> ENGR. / DISCIPLINE	<i>[Signature]</i> DATE	<i>[Signature]</i> S.A. REA	<i>[Signature]</i> DATE	<i>[Signature]</i> DATE	<i>[Signature]</i> DATE	<i>[Signature]</i> DATE	<i>[Signature]</i> DATE
<i>[Signature]</i> ENGR. / DISCIPLINE	<i>[Signature]</i> DATE	<i>[Signature]</i> STATION SUPT. POWER SUPPLY (RECORD REV.)	<i>[Signature]</i> DATE	<i>[Signature]</i> DATE	<i>[Signature]</i> DATE	<i>[Signature]</i> DATE	<i>[Signature]</i> DATE

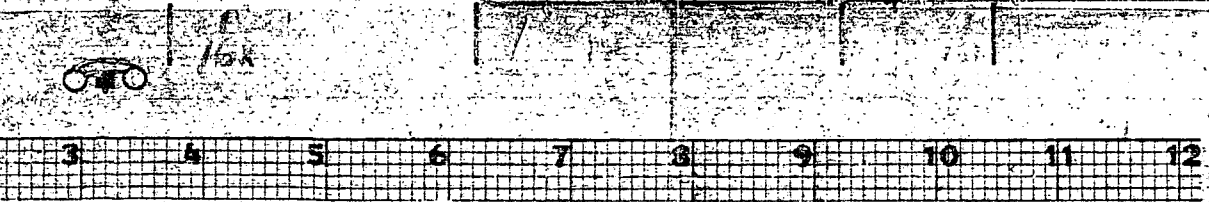
NOTE HERE
 (CARD)

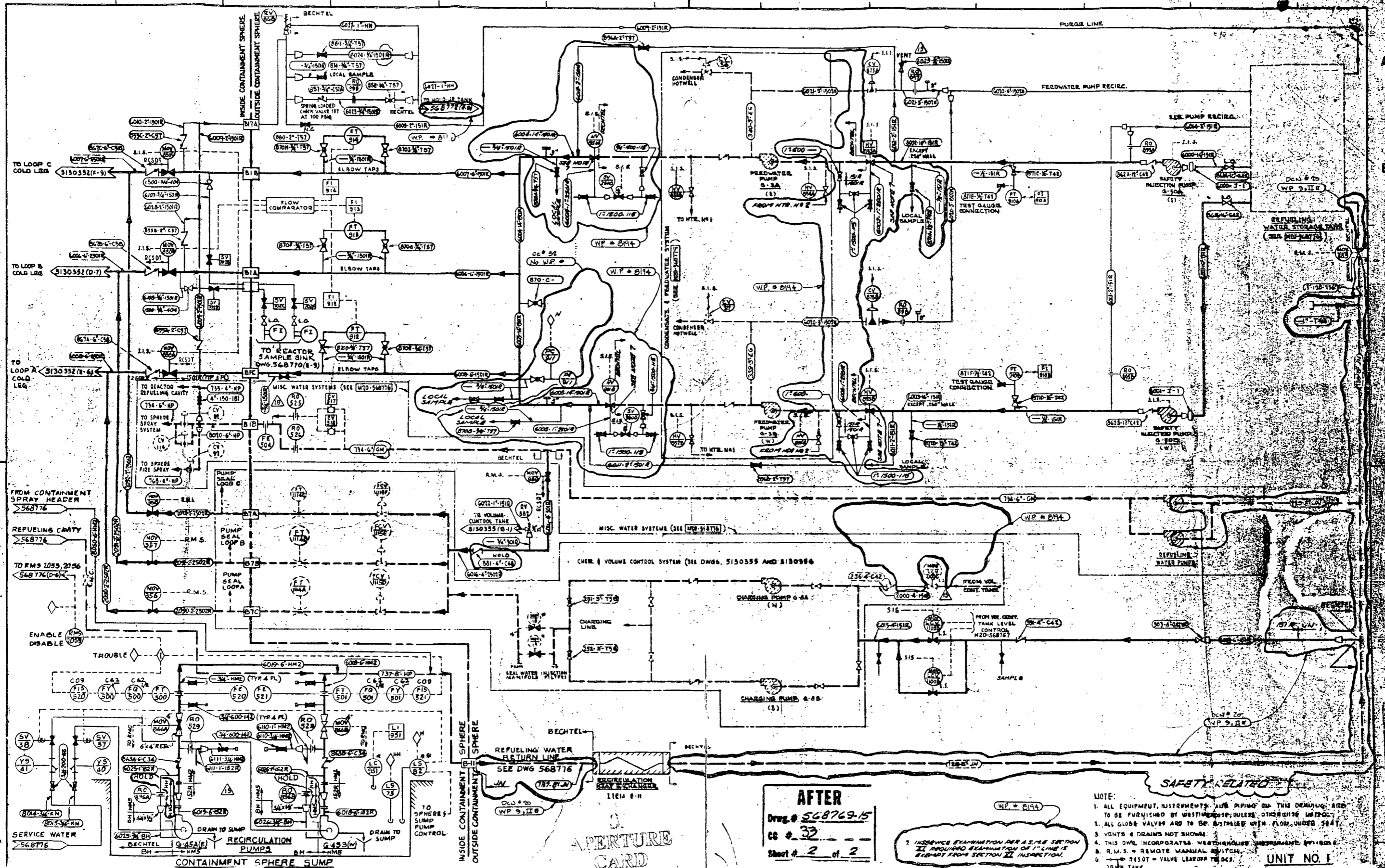
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AFTER
 Dwg. # 568769-15
 CC # 32
 Sheet # 2 of 2

NOTE:
 1. ALL EQUIPMENT, INSTRUMENTS, AND PIPING ON THIS DRAWING ARE TO BE FURNISHED BY WESTINGHOUSE, UNLESS OTHERWISE NOTED.
 2. ALL GLOBE VALVES ARE TO BE INSTALLED WITH FLOW UNIDIRECTIONAL.
 3. VENTS & DRAINS NOT SHOWN.
 4. THIS DWG. INCORPORATES REVISIONS 1 THROUGH 10.
 5. R.M.S. = REMOTE MANUAL SWITCH.
 6. RESLT = VALVE LEADOFF TESTS.
 7. INSURANCE EXAMINATION PER A.S.E. SECTION II REQUIRING EXAMINATION OF 1" LINE IS ELIMINATED FROM SECTION II INSPECTION.

UNIT NO. 1
 120 MIN. TANK

Also Available On Aperture Card

8902270311-138

26716

CONFIGURATION CHANGE

SHEET 1 of 2	EDM USE ONLY
	CC No. 32
	DATE 1-27-88

REQUESTED BY P. SCHOFIELD	<input type="checkbox"/> SPECIFICATION	<input checked="" type="checkbox"/> DRAWING	<input type="checkbox"/> PROCEDURE	<input type="checkbox"/> INSTRUCTION
NUMBER 568769	REVISION 15		CLASS SR	
TITLE FIELD SAFETY INJECTION SYSTEM		SUPPLIER <input type="checkbox"/> BECHTEL <input checked="" type="checkbox"/> EDISON		
DESCRIPTION OF CHANGE		A.G. NO. NA		
		W.O. NO. NA		

1. ADDS LOCAL SAMPLE LINE
2. CHANGED LOCATION OF PRESSURE TAP FOR PI-911

JUSTIFICATION
Shows SYSTEM AS IT ACTUALLY IS.

EVALUATION

OTHER AFFECTED DOCUMENTS / DRAWINGS:
DOCUMENT CHANGE REQUIRED FOR:
 CONSTRUCTION AS BUILT OTHER

FIELD APPROVALS		DESIGN APPROVALS	
P. Schofield ENGR./DISCIPLINE	1/5/82 DATE	P. Schofield RESPONSIBLE ENGR.	1/5/82 DATE
	CONSTR. SUPER. DATE	<input type="checkbox"/> ARCHITECTURAL	DATE
P. Schofield ENGR./DISCIPLINE	1-14-82 DATE	<input type="checkbox"/> CIVIL STRUCTURAL	DATE
	G.A. PER. DATE	<input type="checkbox"/> CONTROLS	DATE
x	1/12/82 DATE	<input type="checkbox"/> ELECTRICAL	DATE
	STATION SUPT. POWER SUPPLY (RECORD REV.) DATE	<input type="checkbox"/> CHEMISTRY	DATE
		<input type="checkbox"/> DISC. SUPERVISOR ENGR.	DATE
		<input type="checkbox"/> MECHANICAL	DATE
		<input type="checkbox"/> NUCLEAR	DATE
		<input type="checkbox"/> QUALITY ASSURANCE	DATE
		<input type="checkbox"/> PROJECT ENGINEER	DATE
		<input type="checkbox"/> CHECKER (AS APPROPRIATE)	DATE
		<input type="checkbox"/> STA. SUPT. - P.S.	DATE

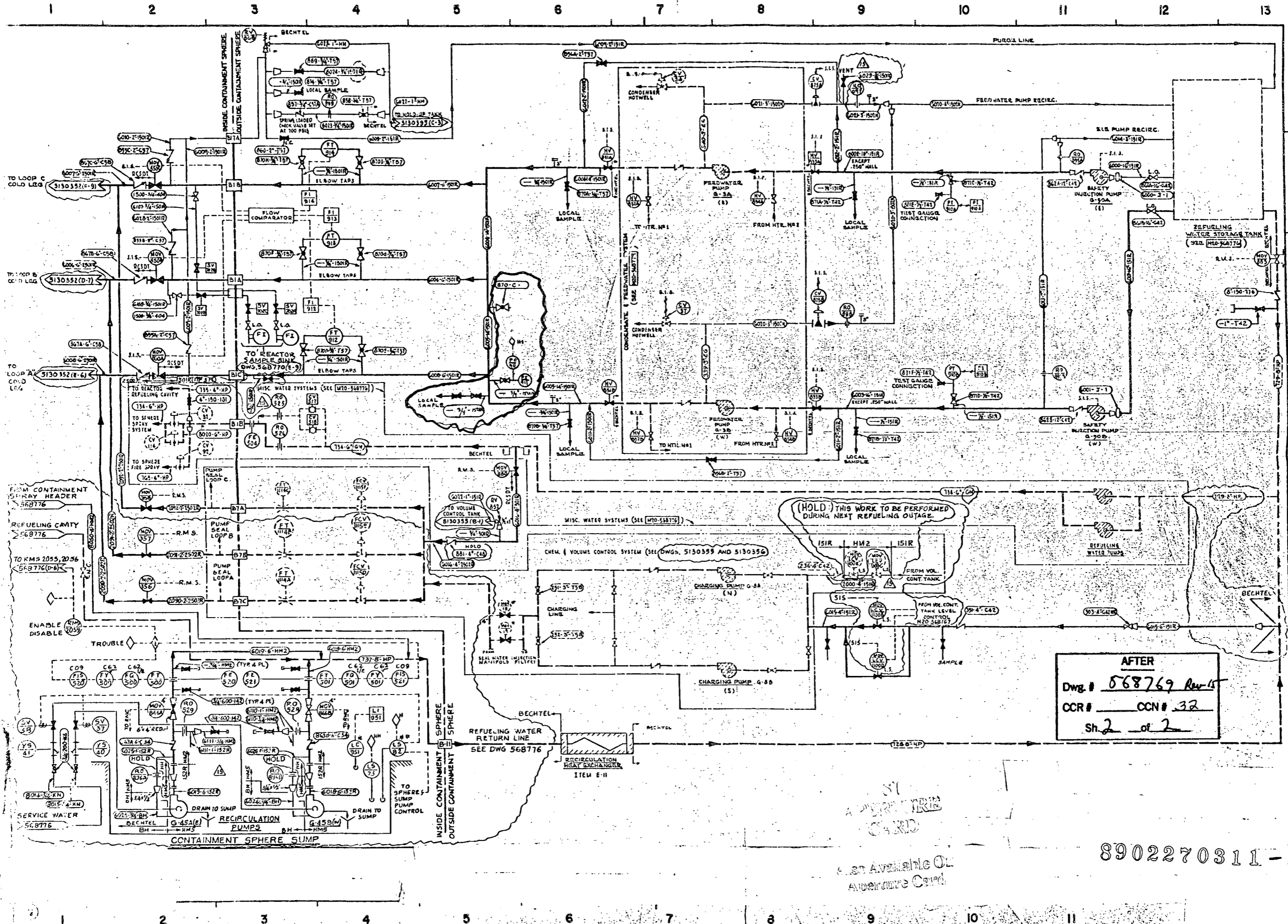
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AFTER
 Dwg # 568769 Rev 15
 CCR # _____ CCN # 32
 Sh. 2 of 2

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CONFIGURATION CHANGE

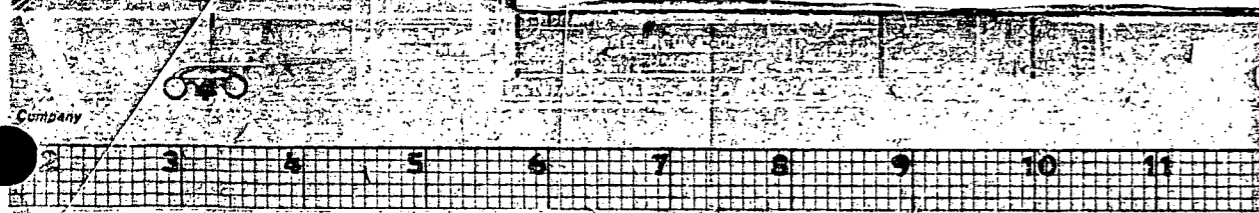
SHEET 1 of 2	EDM USE ONLY
	CC No. 31
	DATE 10/26/81

REQUESTED BY M. H. OGAWA	<input type="checkbox"/> SPECIFICATION <input checked="" type="checkbox"/> DRAWING <input type="checkbox"/> PROCEDURE <input type="checkbox"/> INSTRUCTION																																		
NUMBER 568769	REVISION 15 CLASS SR																																		
TITLE P-3 DIAPHRAM SAFETY INJECTION SYSTEM	SUPPLIER <input type="checkbox"/> BECHTEL <input checked="" type="checkbox"/> EDISON																																		
DESCRIPTION OF CHANGE 1. INCORPORATE DCN #24, 25, 26, 28, 29, 30. 2. CANCEL DCN # 21, 22, 23, CCN # 27. 3. DID NOT INCORPORATE DCN # 20.																																			
THIS CCN SUPERSEDES DCN #24, 25, 26, 28, 29, 30.																																			
JUSTIFICATION 1. INCORPORATE AS CONSTRUCTION CHANGES 2. CHANGES NO LONGER REQUIRED 3. FUTURE WORK																																			
EVALUATION																																			
OTHER AFFECTED DOCUMENTS / DRAWINGS: NONE																																			
DOCUMENT CHANGE REQUIRED FOR <input type="checkbox"/> CONSTRUCTION <input checked="" type="checkbox"/> AS BUILT <input type="checkbox"/> OTHER 8194#1																																			
FIELD APPROVALS	DESIGN APPROVALS																																		
<table border="1"> <tr> <td>M. Ogawa ENGR./DISCIPLINE</td> <td>DATE</td> <td>CONSTR./SUPER</td> <td>DATE</td> </tr> <tr> <td>Wm. Shueh ENGR./DISCIPLINE</td> <td>DATE</td> <td>G.A. REP.</td> <td>DATE</td> </tr> <tr> <td>ENGR./DISCIPLINE</td> <td>DATE</td> <td>STATION SUPT. POWER SUPPLY (RECORD REV.)</td> <td>DATE</td> </tr> </table>	M. Ogawa ENGR./DISCIPLINE	DATE	CONSTR./SUPER	DATE	Wm. Shueh ENGR./DISCIPLINE	DATE	G.A. REP.	DATE	ENGR./DISCIPLINE	DATE	STATION SUPT. POWER SUPPLY (RECORD REV.)	DATE	<table border="1"> <tr> <td>M. Ogawa RESPONSIBLE ENGR.</td> <td>DATE</td> </tr> <tr> <td><input type="checkbox"/> ARCHITECTURAL</td> <td>DATE</td> </tr> <tr> <td><input type="checkbox"/> CIVIL STRUCTURAL</td> <td>DATE</td> </tr> <tr> <td><input type="checkbox"/> CONTROL</td> <td>DATE</td> </tr> <tr> <td><input checked="" type="checkbox"/> ELECTRICAL</td> <td>DATE</td> </tr> <tr> <td><input type="checkbox"/> MECHANICAL</td> <td>DATE</td> </tr> <tr> <td><input type="checkbox"/> CHEMICAL</td> <td>DATE</td> </tr> <tr> <td><input type="checkbox"/> QUALITY ASSURANCE</td> <td>DATE</td> </tr> <tr> <td><input type="checkbox"/> PROJECT ENGINEER</td> <td>DATE</td> </tr> <tr> <td><input type="checkbox"/> CHECKER (AS APPROPRIATE)</td> <td>DATE</td> </tr> <tr> <td>STA. Supt. - P.E.</td> <td>DATE</td> </tr> </table>	M. Ogawa RESPONSIBLE ENGR.	DATE	<input type="checkbox"/> ARCHITECTURAL	DATE	<input type="checkbox"/> CIVIL STRUCTURAL	DATE	<input type="checkbox"/> CONTROL	DATE	<input checked="" type="checkbox"/> ELECTRICAL	DATE	<input type="checkbox"/> MECHANICAL	DATE	<input type="checkbox"/> CHEMICAL	DATE	<input type="checkbox"/> QUALITY ASSURANCE	DATE	<input type="checkbox"/> PROJECT ENGINEER	DATE	<input type="checkbox"/> CHECKER (AS APPROPRIATE)	DATE	STA. Supt. - P.E.	DATE
M. Ogawa ENGR./DISCIPLINE	DATE	CONSTR./SUPER	DATE																																
Wm. Shueh ENGR./DISCIPLINE	DATE	G.A. REP.	DATE																																
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M. Ogawa RESPONSIBLE ENGR.	DATE																																		
<input type="checkbox"/> ARCHITECTURAL	DATE																																		
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<input type="checkbox"/> CHECKER (AS APPROPRIATE)	DATE																																		
STA. Supt. - P.E.	DATE																																		

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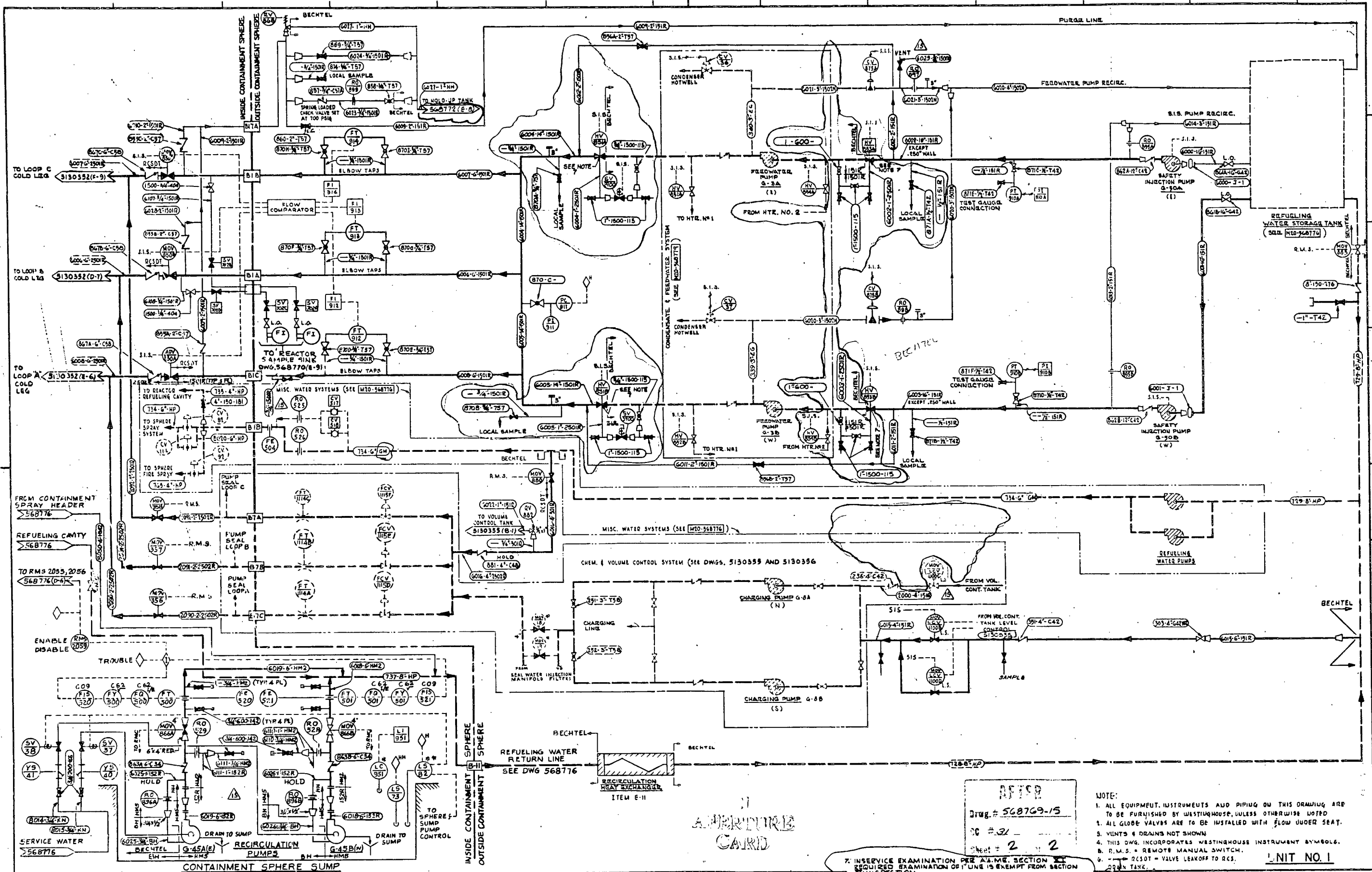
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DWG # 56876-15
 SHEET # 2 OF 2
 UNIT NO. 1

- NOTE:
1. ALL EQUIPMENT, INSTRUMENTS AND PIPING ON THIS DRAWING ARE TO BE FURNISHED BY WESTINGHOUSE, UNLESS OTHERWISE NOTED.
 2. ALL GLOBE VALVES ARE TO BE INSTALLED WITH FLOW UNDER SEAT.
 3. VENTS & DRAINS NOT SHOWN.
 4. THIS DWG. INCORPORATES WESTINGHOUSE INSTRUMENT SYMBOLS.
 5. R.M.S. = REMOTE MANUAL SWITCH.
 6. RCSOT = VALVE LEAKOFF TO RCS.

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BECHTEL CORPORATION
 ENGINEERS & CONSTRUCTORS
 LOS ANGELES, CALIF.

CROSS REFERENCES	NO.	REVISIONS	DATE	APPROVED	D.E.	C.K.	CHECKED	MADE	DATE	APPROVED	D.E.	C.K.	CHECKED	MADE	DATE	APPROVED	D.E.	C.K.	CHECKED	MADE	DATE

SOUTHERN CALIFORNIA EDISON COMPANY
SCALE NONE
LOS ANGELES, CALIF.

8902270311-142

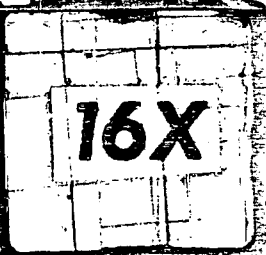
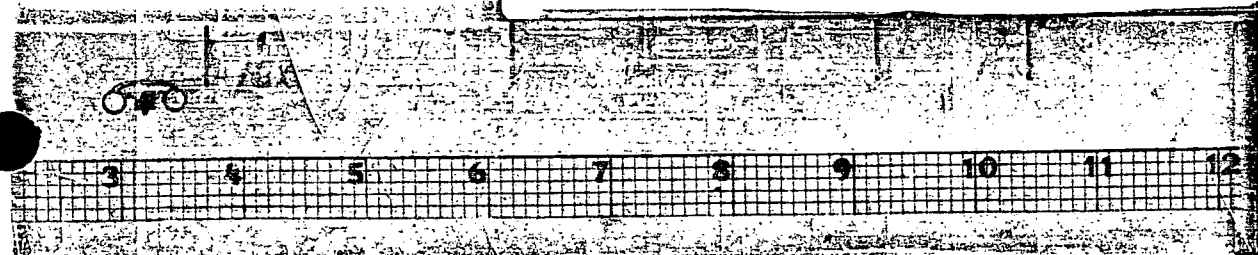
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SAN ONOFRE NUCLEAR GENERATING STATION UNIT 1 FIELD CHANGE REQUEST/DCN/SCN		1. FCR NO. M-226-003	12A. SAFETY CLASS SR	12C. DCN SUBNO. 30
JOB NO. 14000-226		DATE 9-25-81	12B. SPEC ADDEND NO.	12D. DATE 9/29/81
4. REF. DWG. OR SPEC. SHEET NO. 15		5. TITLE P&I DIAGRAM SIS		
6. DESIGN ORIGIN: ENGRG <input checked="" type="checkbox"/> VENDOR <input type="checkbox"/> (IDENTIFY)		NAME		
7. EXISTING CONDITION:				
1. NO PRESSURE BOUNDARY INDICATED				
2. ADD NOTE #7				
8. CHANGE REQUEST/SKETCH				
AFTER				
PROJECT ENGINEERING APPROVAL PER				
10. REVIEWED BY	DATE	11. APPROVED BY	DATE	
CIVIL		PREPARED BY		
ELEC		INSTR		
MECH		NUC		
WELD		QAE		
12. PROJECT ENGRG APPROVAL: YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> EGS		DATE 9-25-81		
REMARKS:				
13. QUALITY ASSURANCE ENGINEER		DATE 9-25-81		
14. SCE ENGINEERING APPROVAL		DATE 10/5/81		
15. BECHTEL QUALITY ENGINEER/QUALITY ASSURANCE				
16. ADDITIONAL DISTRIBUTION				

BWP 20-II-E

BWP 20-II-E

SAN ONOFRE NUCLEAR GENERATING STATION UNIT 1 FIELD CHANGE REQUEST/DCN/SCN SUPPLEMENTAL PAGE		1. FCR NO. M-226-003	3A. QUALITY CLASS SR	12A. DCN SUBNO. 30
JOB NO. 14000-226		DATE 9-25-81	12B. SPEC ADDEND NO.	12D. DATE 9/29/81
4. REF. DWG. OR SPEC. SHEET NO. 15		5. TITLE P&I DIAGRAM SIS		
6. DESIGN ORIGIN: ENGRG <input checked="" type="checkbox"/> VENDOR <input type="checkbox"/> (IDENTIFY)		NAME		
7. EXISTING CONDITION:				
CHANGE REQUEST/SKETCH (CONTINUED)				
AFTER				
NOTE 7: INSERVICE EXAMINATION PER A.S.M.E. SECTION XI REQUIRED. EXAMINATION OF 1" LINE IS EXEMPT FROM SECTION XI INSPECTION.				



APERTURE CARD

8902270311-143

Also Available On Aperture Card

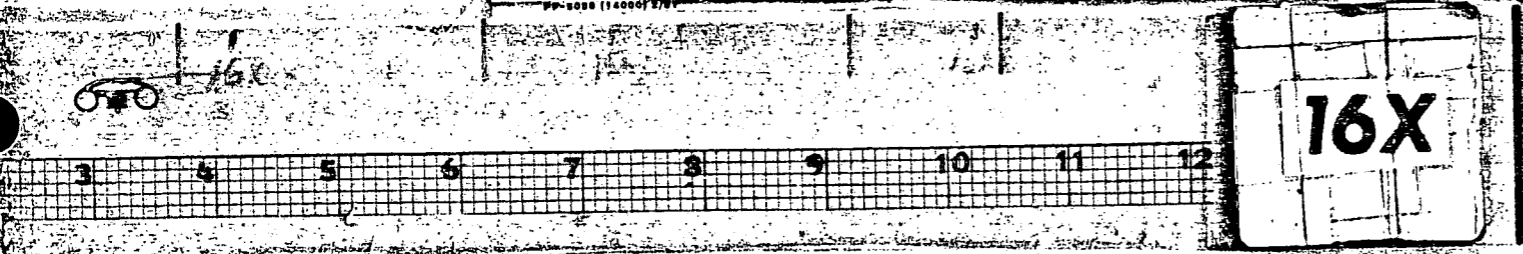
SAN ONOFRE NUCLEAR GENERATING STATION UNIT 1 FIELD CHANGE REQUEST/DCN/SCN		1. FCR NO. M-226-004	3A. QUALITY CLASS SR	12A. DCN SUB NO. 29
JOB NO. 14000-226		2. DATE 9-25-81	3B. SPEC ADDEND NO.	12B. DATE 9/29/81
4. REF. DWG. OR SPEC. SHEET NO. REV. 5. TITLE 568769 15 P&I DIAGRAM SIS		3. PAGE 1 of 2		
6. DESIGN ORIGIN: ENGRG <input checked="" type="checkbox"/> VENDOR <input type="checkbox"/> (IDENTIFY)				
7. EXISTING CONDITION:				
1. NO PRESS. BOUNDRY INDICATED				
2. ADD NOTE # 7				
8. CHANGE REQUEST/SKETCH				
AFTER				
THIS FCR CANCELS FCR # M-226-002				
10. REVIEWED BY DATE		PREPARED BY		
CIVIL _____ DATE 9-25-81		H. COUPE		
ELEC _____ INSTR _____		APPROVAL OF FLD DISPOSITION		
MECH _____ NUC _____		DATE 9/25/81		
WELD _____		PROJECT ENGINEER		
12. PROJECT ENGRG APPROVAL: YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> EGS <input type="checkbox"/> DATE 9-25-81				
REMARKS: Correct to DCN.				
13. QUALITY ASSURANCE ENGINEER (FIELD) DATE 9-25-81				
14. SCE ENGINEERING APPROVAL DATE 10/5/81				
15. BECHTEL QUALITY ENGINEER/QUALITY ASSURANCE DATE 10/5/81				
16. ADDITIONAL DISTRIBUTION				

BWP 20-II-E

BWP 20-II-E

SAN ONOFRE NUCLEAR GENERATING STATION UNIT 1 FIELD CHANGE REQUEST/DCN/SCN SUPPLEMENTAL PAGE		1. FCR NO. M-226-004	3A. QUALITY CLASS SR	12A. DCN SUB NO. 29
JOB NO. 14000-226		2. DATE 9-25-81	3B. SPEC ADDEND NO.	12B. DATE 9/29/81
4. REF. DWG. OR SPEC. SHEET NO. REV. 5. TITLE 568769 15 P&I DIAGRAM SIS		3. PAGE 2 of 2		
CHANGE REQUEST/SKETCH (CONTINUED)				
AFTER				
<p>NOTE 7: INSERVICE EXAMINATION PER A.S.M.E. SECTION XI REQUIRED. EXAMINATION OF 1" LINE IS EXEMPT FROM SECTION XI INSPECTION.</p>				

PP-8089.8 (14000) 4/81



APERTURE CARD
Also Available On Aperture Card 8902270311-144

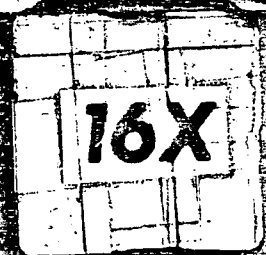
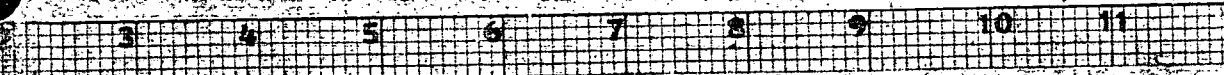
SAN ONOFRE NUCLEAR GENERATING STATION UNIT 1 FIELD CHANGE REQUEST/DCN/SCN		1. FCR NO. M-226-001	3A. QUALITY CLASS SR	12A. DCN SUBNO. 22																		
JOB NO. 14000-226		2. DATE 9-24-81	12B. DATE 9/29/81	12C. SCN NO.																		
4. REF. DWG. OR SPEC. SHEET NO. REV. 3. TITLE 568769 15 P&ID DIAGRAM SAFETY DIAGRAM		3. PAGE 1 OF 3																				
6. DESIGN ORIGIN: ENGRG <input checked="" type="checkbox"/> VENDOR <input type="checkbox"/> (IDENTIFY) NAME																						
7. EXISTING CONDITION: CHANGE LINE NO CALL OUTS																						
8. CHANGE REQUEST/SKETCH SEE SHEET 2A FOR BEFORE CONDITION <table border="1"> <tr> <td>"</td> <td>"</td> <td>2</td> <td>"</td> <td>"</td> <td>"</td> </tr> <tr> <td>"</td> <td>"</td> <td>3A</td> <td>"</td> <td>"</td> <td>"</td> </tr> <tr> <td>"</td> <td>"</td> <td>3</td> <td>"</td> <td>"</td> <td>"</td> </tr> </table>					"	"	2	"	"	"	"	"	3A	"	"	"	"	"	3	"	"	"
"	"	2	"	"	"																	
"	"	3A	"	"	"																	
"	"	3	"	"	"																	
10. REVIEWED BY DATE CIVIL _____ DATE 9/24/81 ELEC _____ INSTR. _____ MECH _____ NUC _____ WELD _____		9. PREPARED BY BILL NEWTON PROJECT FIELD ENGINEER DATE 9-24-81																				
11. APPROVAL OF FLD DISPOSITION APPROVED BY: [Signature] DATE 9-24-81																						
12. PROJECT ENGRG APPROVAL: YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> EGS [Signature] DATE 9-24-81 REMARKS: Moved to DCN																						
13. QUALITY ASSURANCE ENGINEER (FIELD): [Signature] DATE 9-24-81																						
14. SCE ENGINEERING APPROVAL: [Signature] DATE 10/1/81																						
15. BECHTEL QUALITY ENGINEER/QUALITY ASSURANCE: [Signature] DATE 10/1/81																						
16. ADDITIONAL DISTRIBUTION																						

BWP 20-71-E

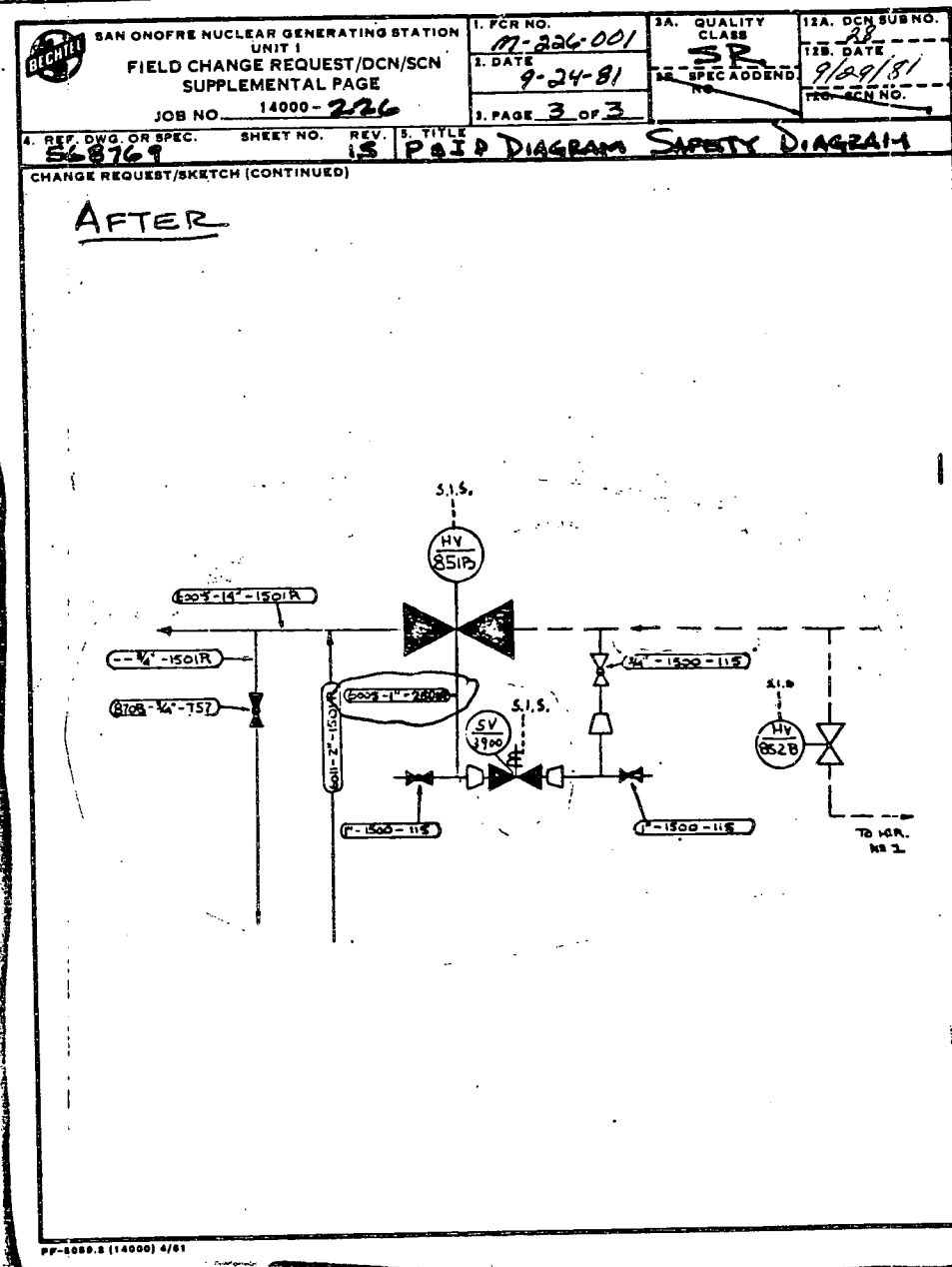
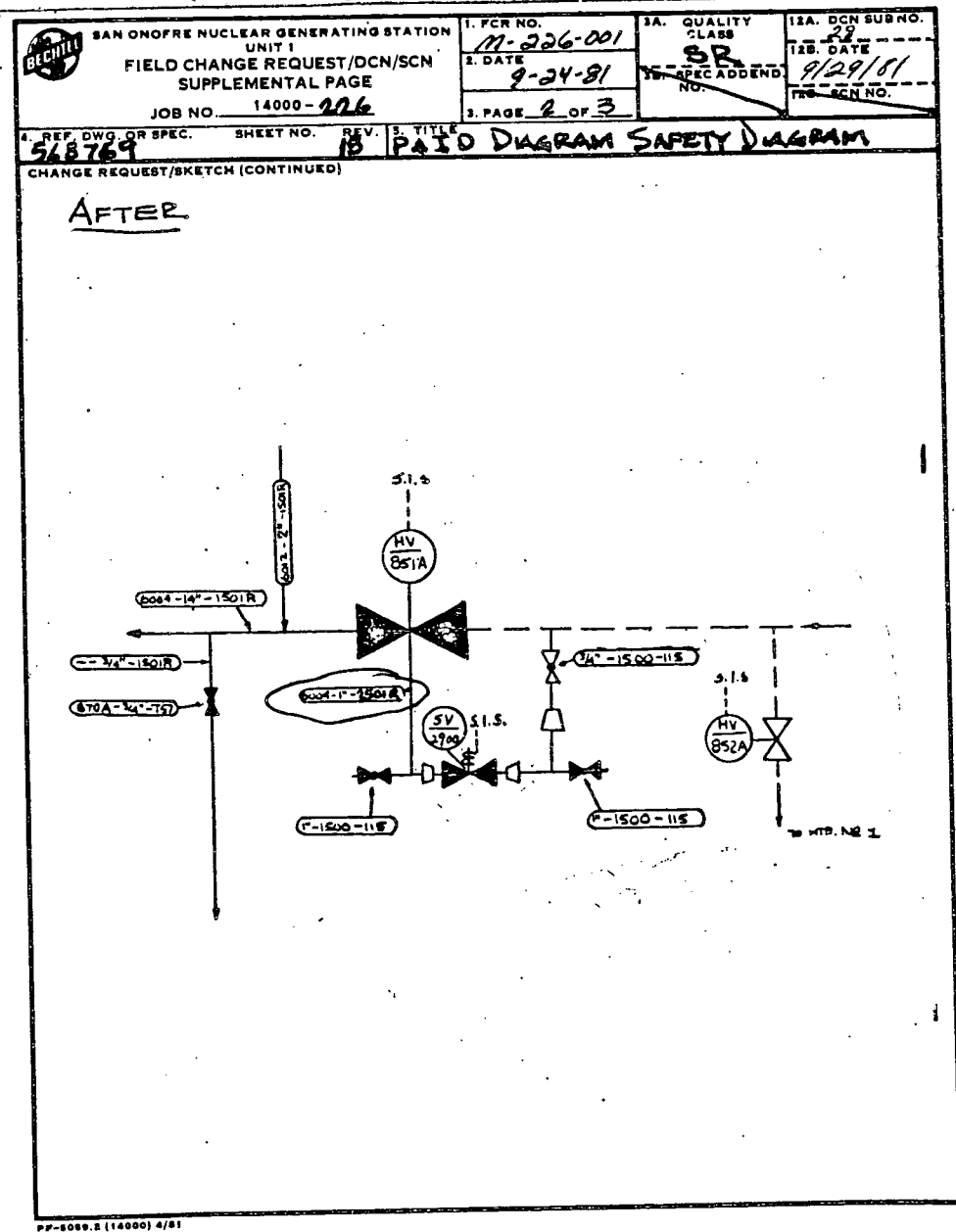
APERTURE CARD

Also Available On Aperture Card

8902270311-145

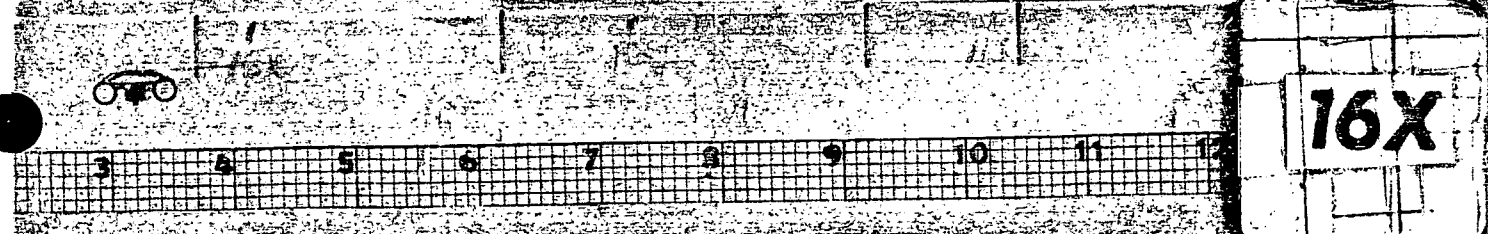


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8902270311-146



LOS ANGELES POWER DIVISION

DRAWING CHANGE NOTICE (DCN)

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	26

P&I DIAGRAM
SAFETY INJECTION SYSTEM

JOB NO. 14000 - 226 PAGE 1 OF 3 PAGE

DATE: 9/19/81 BY: K. BUHLER

CHANGE REQUESTED BY: CLIENT ENG'R'G. FIELD SUPPLIER/CONTRACTOR

REASON FOR CHANGE: TO REDUCE THE PRESSURE INSIDE THE VALVE HV 853 A & B TO ALLOW THE VALVE TO OPEN

- DESCRIPTION OF CHANGE:
1. ADD VENT LINES AND ISOLATION VALVES
 2. SEE SHEETS 2a & 3a FOR BEFORE CONDITION
SEE SHEETS 2 & 3 FOR AFTER CONDITION

BWP 20-II-E

SAFETY RELATED

MATERIAL PROCUREMENT RESPONSIBILITY	AFFECTED PURCHASE ORDERS	REVISED FOR DCN CHANGE	
		YES	NO
<input checked="" type="checkbox"/> BECHTEL OFFICE	NONE		X
<input type="checkbox"/> BECHTEL FIELD			
<input type="checkbox"/> SCE			

APPROVAL SIGNATURES: _____ DATE _____

BECHTEL ENGINEERING Bruce Martin _____ PE _____ DATE _____

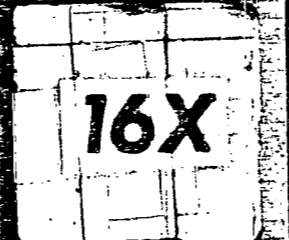
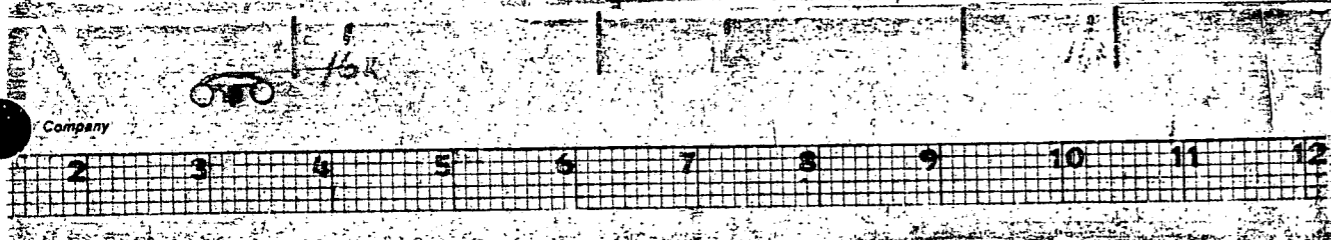
SCE ENGINEERING APPROVAL _____ PE _____ DATE _____

BECHTEL QUALITY ENGINEER _____ DATE _____

BECHTEL QUALITY ASSURANCE Bernie L. Roberts _____ DATE 9/19/81

ADDITIONAL DISTRIBUTION: _____

PP-460 (14000) 2/80





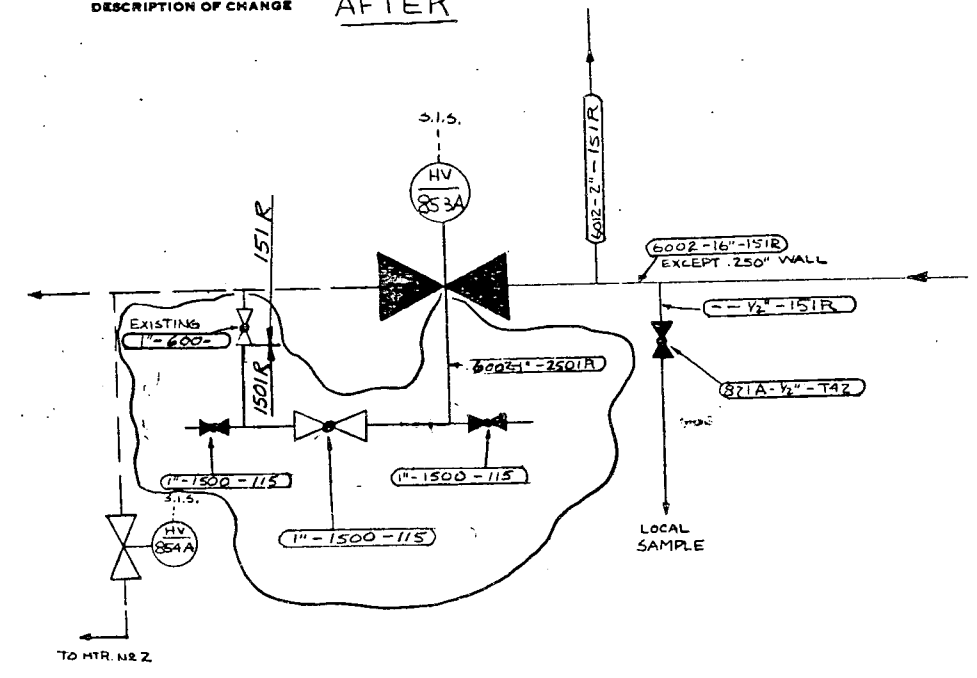
DRAWING CHANGE NOTICE (DCN)

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	26 -

P & I DIAGRAM SUPPLEMENTAL PAGE
SAFETY INJECTION SYSTEM

JOB NO. 14000-226 PAGE 2 OF 3 PAGE
DATE: 9/19/81 BY: K. BUHLER

DESCRIPTION OF CHANGE AFTER



LAO-6874 11/78



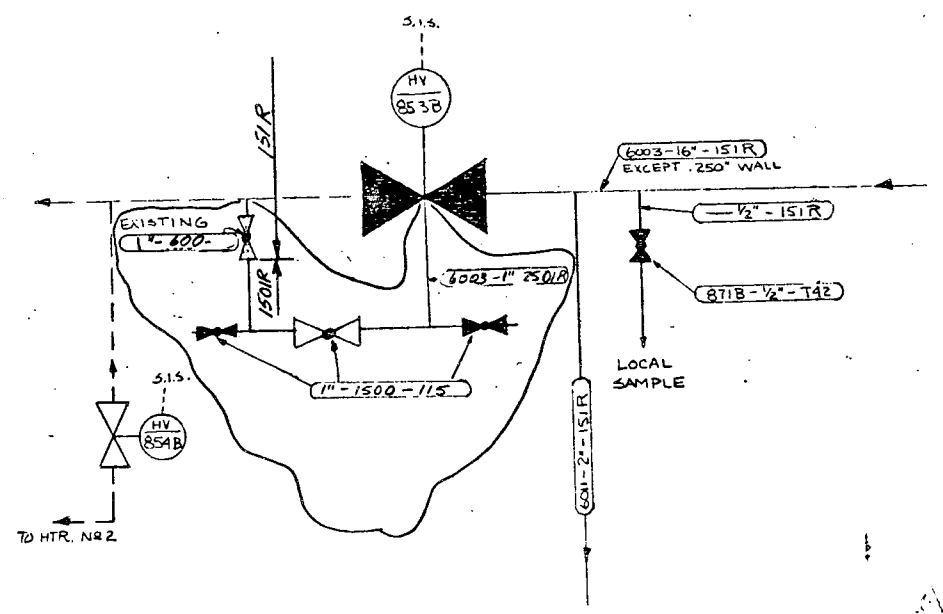
DRAWING CHANGE NOTICE (DCN)

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	26

P & I DIAGRAM SUPPLEMENTAL PAGE
SAFETY INJECTION SYSTEM

JOB NO. 14000-226 PAGE 3 OF 3 PAGE
DATE: 9/19/81 BY: K. BUHLER

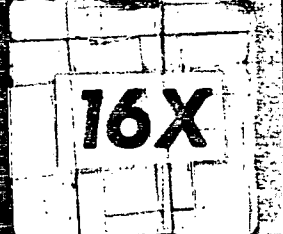
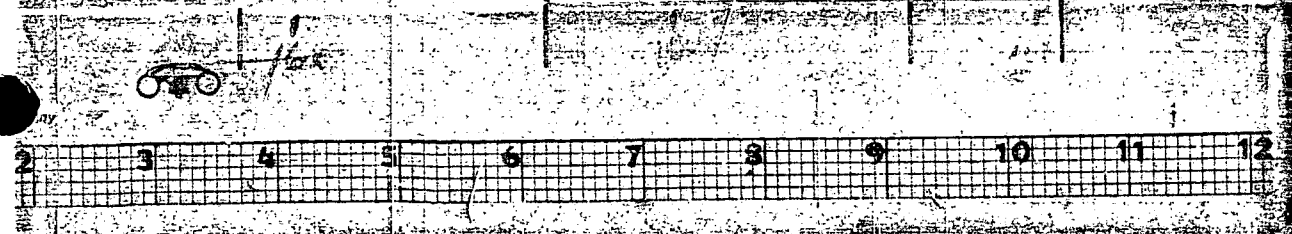
DESCRIPTION OF CHANGE AFTER



LAO-6874 11/78

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8902270311-147



LOS ANGELES POWER DIVISION

DRAWING CHANGE NOTICE (DCN)

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	25

P & I DIAGRAM

SAFETY INJECTION SYSTEM

JOB NO. 14000-226 PAGE 1 OF 3 PAGE

DATE: 9/17/81 BY: K. BUHLER

CHANGE REQUESTED BY: CLIENT ENG'R'S FIELD SUPPLIER/CONTRACTOR

REASON FOR CHANGE: REPLACE THE CHECK VALVES THAT CANNOT BE READILY PURCHASED WITH SOLENOID VALVES.

DESCRIPTION OF CHANGE:

1. REMOVE CHECK VALVES AND ADD SOLENOID VALVES
2. DELETE THE WORD "EXISTING"
3. SEE SHEETS 2a & 3a FOR BEFORE CONDITION.
SEE SHEETS 2 & 3 FOR AFTER CONDITION.

BWP 20-II-E

(SAFETY RELATED)

MATERIAL PROCUREMENT RESPONSIBILITY	AFFECTED PURCHASE ORDERS	REVISED FOR DCN CHANGE	
		YES	NO
<input checked="" type="checkbox"/> BECHTEL OFFICE	NONE		
<input type="checkbox"/> BECHTEL FIELD			X
<input type="checkbox"/> SCE			

APPROVAL SIGNATURES:

BECHTEL ENGINEERING: Paul W. Koss DATE: 9/18/81

SCE ENGINEERING APPROVAL: _____ DATE: _____

BECHTEL QUALITY ENGINEER: _____ DATE: _____

BECHTEL QUALITY ASSURANCE: Bessie L. DeBorja DATE: 9/18/81

ADDITIONAL DISTRIBUTION: _____

PP-480 (14000) 2/80

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REVISION
CARD

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Microfilm

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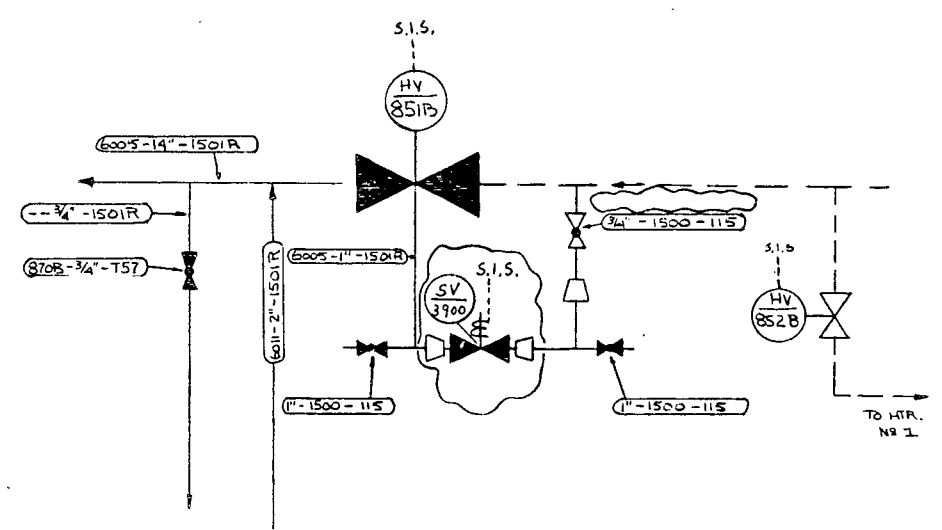
DRAWING CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	25

P&I DIAGRAM
 SAFETY INJECTION SYSTEM

JOB NO. 14000-226 PAGE 2 OF 3 PAGE
 DATE: 9/17/81 BY: K. BUHLER

DESCRIPTION OF CHANGE
 AFTER



LAO-0074 11/75



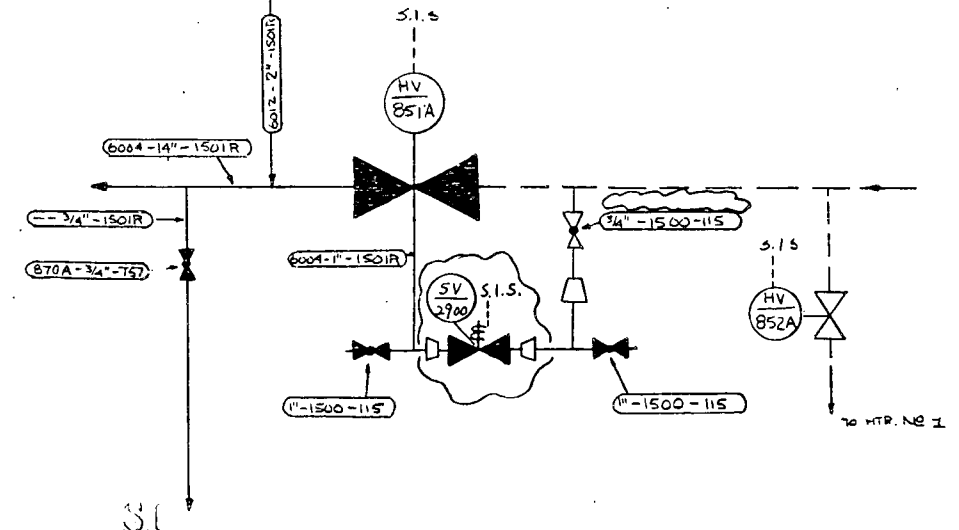
DRAWING CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	25

P&I DIAGRAM
 SAFETY INJECTION SYSTEM

JOB NO. 14000-226 PAGE 3 OF 3 PAGE
 DATE: 9/17/81 BY: K. BUHLER

DESCRIPTION OF CHANGE
 AFTER



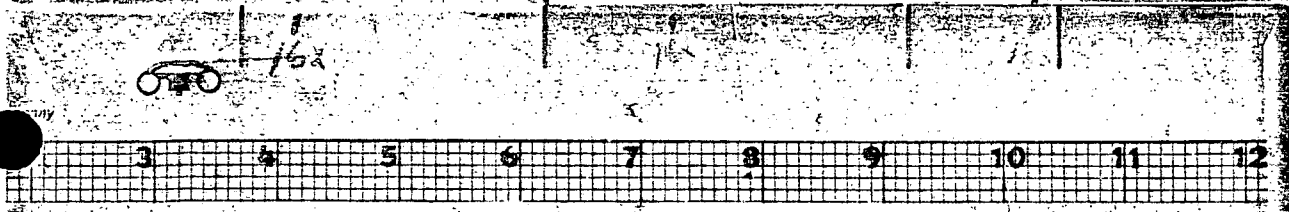
LAO-0070 11/75

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LOS ANGELES
POWER DIVISION

DRAWING CHANGE NOTICE (DCN)

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	24

P & I DIAGRAM
SAFETY INJECTION SYSTEM

JOB NO. 14000 - 226 PAGE 1 OF 3 PAGE

DATE: 9/14/01 BY: K. BUHLER

CHANGE REQUESTED BY: CLIENT ENG'R'G FIELD SUPPLIER/CONTRACTOR

REASON FOR CHANGE: THE VALVES HV B51 A & B ARE LOCKED SHUT DUE TO HYDRAULIC FORCE BUILD UP IN THE BONNET OF THE VALVES. THE SYSTEM CHANGE IS DESIGNED TO RELIEVE THIS FORCE AND ALLOW THE VALVES TO OPERATE.
DESCRIPTION OF CHANGE:

- 1. ADD VALVES AND VENT LINES.
- SEE SHEETS 2 & 3a FOR BEFORE CONDITION
SEE SHEETS 2 & 3 FOR AFTER CONDITION

BWP 20-II-E

SAFETY RELATED

MATERIAL PROCUREMENT RESPONSIBILITY	AFFECTED PURCHASE ORDERS	REVISED FOR DCN CHANGE
<input checked="" type="checkbox"/> BECHTEL OFFICE <input type="checkbox"/> BECHTEL FIELD <input type="checkbox"/> SCE	NONE	YES NO X

APPROVAL SIGNATURES:

BECHTEL ENGINEERING	<i>J. G. ...</i>	<i>Paul W. ...</i>	DATE 9/15/01
SCE ENGINEERING APPROVAL			DATE
BECHTEL QUALITY ENGINEER			DATE
BECHTEL QUALITY ASSURANCE	<i>Bernice L. ...</i>		DATE 9/15/01

ADDITIONAL DISTRIBUTION: _____

PP-440 (14000) 2/00





LOS ANGELES POWER DIVISION

DRAWING CHANGE NOTICE (DCN)

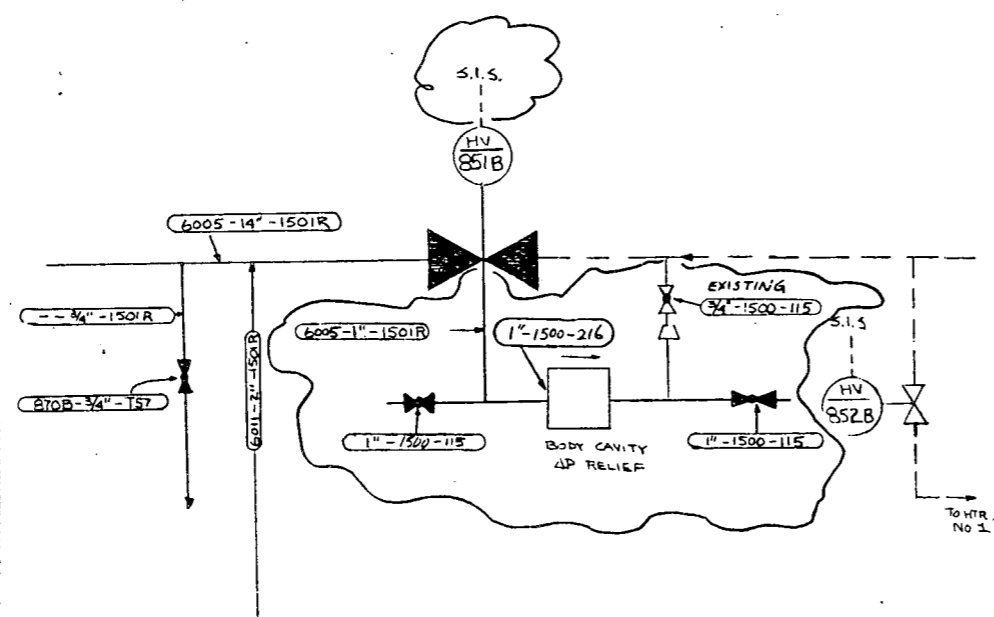
DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	24

P&I DIAGRAM SAFETY INJECTION SYSTEM

SUPPLEMENTAL PAGE

JOB NO. 14000-226 PAGE 2 OF 3 PAGE DATE: 9/14/81 BY: K. BUHLER

DESCRIPTION OF CHANGE AFTER



LAO-0876 11/78



LOS ANGELES POWER DIVISION

DRAWING CHANGE NOTICE (DCN)

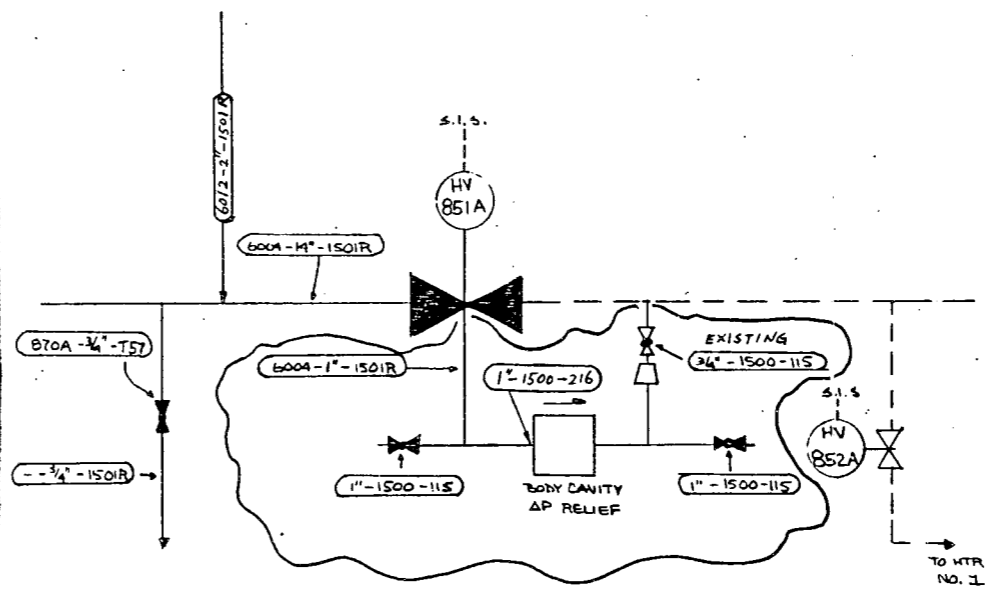
DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	24

P&I DIAGRAM SAFETY INJECTION SYSTEM

SUPPLEMENTAL PAGE

JOB NO. 14000-226 PAGE 3 OF 3 PAGE DATE: 9/14/81 BY: K. BUHLER

DESCRIPTION OF CHANGE AFTER



LAO-0876 11/78

SI APERTURE

Also Available On Aperture Card

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8902270311-150



DRAWING CHANGE NOTICE (DCN)

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	23

PFID SAFETY INJECTION SYSTEM JOB NO. 14000-131 PAGE 1 OF 3 PAGE

DATE: 3-25-81 BY: L.J. SANCHEZ

CHANGE REQUESTED BY: CLIENT ENG'R'G FIELD SUPPLIER/CONTRACTOR

REASON FOR CHANGE: JOB 14000-131 "SIS VALVE LEAKAGE DETECTION" HAS BEEN PUT ON HOLD FOR THIS OUTAGE

DESCRIPTION OF CHANGE:

THIS DCN PUTS ON HOLD CHANGES MADE PER DCN NO. 22

SAFETY RELATED

REFS. 568568, 5163802, 334581, 334582, 334583

MATERIAL PROCUREMENT RESPONSIBILITY	AFFECTED PURCHASE ORDERS	REVISED FOR DCN CHANGE
<input type="checkbox"/> BECHTEL OFFICE	NONE	YES
<input checked="" type="checkbox"/> BECHTEL FIELD		NO
<input type="checkbox"/> SCE		

APPROVAL SIGNATURES:

BECHTEL ENGINEERING: J. Bennett Morton (ECC) Paul W. Koss (PE) DATE: 4/6/81

SCE ENGINEERING APPROVAL: _____ DATE: _____

BECHTEL QUALITY ENGINEER: _____ DATE: _____

BECHTEL QUALITY ASSURANCE: Bruce J. DeBartolo DATE: 4/7/81

ADDITIONAL DISTRIBUTION: _____

PF-480 (14000) 2/80



DRAWING CHANGE NOTICE (DCN)

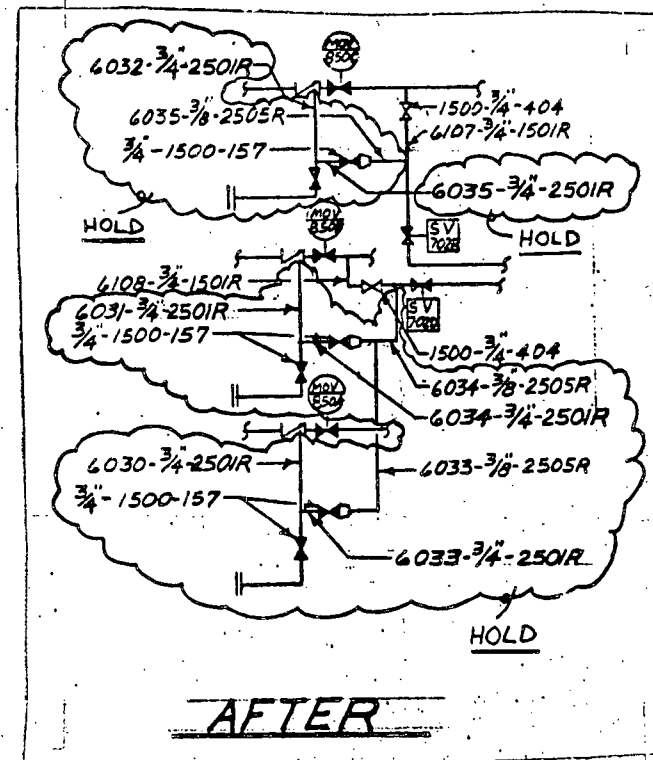
DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	23

SUPPLEMENTAL PAGE

JOB NO. 14000-131 PAGE 2 OF 2 PAGE

DATE: 3-25-81 BY: L.J. SANCHEZ

DESCRIPTION OF CHANGE



SIS APERTURE CARD

Also Available On Aperture Card

LAD-0876 11/79

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8902270311-151



DRAWING CHANGE NOTICE (DCN)

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	22

P.F.I.D.
 SAFETY INJECTION SYSTEM JOB NO. 14000-131 PAGE 1 OF 2 PAGE
 DATE: 1-27-81 BY: R. BOLICEK

CHANGE REQUESTED BY: CLIENT ENG'R'G FIELD SUPPLIER/CONTRACTOR

REASON FOR CHANGE: CHECK FOR LEAKAGE AT CHECK VALVES 867A, B, & C.

DESCRIPTION OF CHANGE: SEE ATTACHED SHEET #2.

SAFETY RELATED

THIS DCN SUPERCEDES DCN NO. 21

REFS: 568568, 5163802, 334581, 334582, 334583

MATERIAL PROCUREMENT RESPONSIBILITY	AFFECTED PURCHASE ORDERS	REVISED FOR DCN CHANGE	
		YES	NO
<input type="checkbox"/> BECHTEL OFFICE	NONE		
<input checked="" type="checkbox"/> BECHTEL FIELD			<input checked="" type="checkbox"/>
<input type="checkbox"/> SCE			

APPROVAL SIGNATURES:

BECHTEL ENGINEERING	<i>Bruce O'Mooney</i>	<i>Paul W. Korn</i>	2-12-81
SCE ENGINEERING APPROVAL			
BECHTEL QUALITY ENGINEER	NA		
BECHTEL QUALITY ASSURANCE	<i>Bessie L. Whitney</i>		2/11/81

ADDITIONAL DISTRIBUTION:

B.W.P. #12-II-E

PP-440 (11/80) 2/80



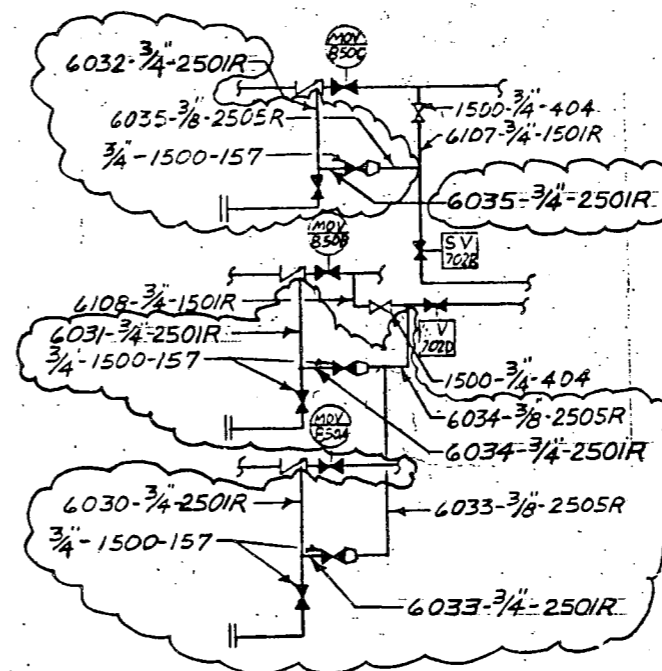
DRAWING CHANGE NOTICE (DCN)

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	22

SUPPLEMENTAL PAGE

JOB NO. 14000-131 PAGE 2 OF 2 PAGE
 DATE: 1-27-81 BY: R. BOLICEK

DESCRIPTION OF CHANGE



AFTER

LAD-4074 11/78

ON APERTURE CARD

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DRAWING CHANGE NOTICE (DCN)

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	21

P&I DIAGRAM SAFETY INJECTION SYSTEM JOB NO. 14000-131 PAGE 1 OF 2 PAGE

DATE: 12-1-80 BY: R. BOLICEK

CHANGE REQUESTED BY: CLIENT ENG'R'S FIELD SUPPLIER/CONTRACTOR

REASON FOR CHANGE: CHECK FOR LEAKAGE AT CHECK VALVE 867A, B, & C.

DESCRIPTION OF CHANGE:

SEE SHEET 2 OF 2

CANCELED
On 11/13/81

SAFETY RELATED

REF. ORTHO. 568568

MATERIAL PROCUREMENT RESPONSIBILITY	AFFECTED PURCHASE ORDERS	REVISED FOR DCN CHANGE
	YES	NO
<input checked="" type="checkbox"/> BECHTEL OFFICE		
<input type="checkbox"/> BECHTEL FIELD	NONE	
<input type="checkbox"/> SCE		

APPROVAL SIGNATURES: BECHTEL ENGINEERING *R. D. Norton* *J. Sanders* 11/8/81 DATE

SCE ENGINEERING APPROVAL _____ DATE

BECHTEL QUALITY ENGINEER _____ DATE

BECHTEL QUALITY ASSURANCE *B. L. White* 11/4/81 DATE

ADDITIONAL DISTRIBUTION: _____

PP-440 (14000) 2/00



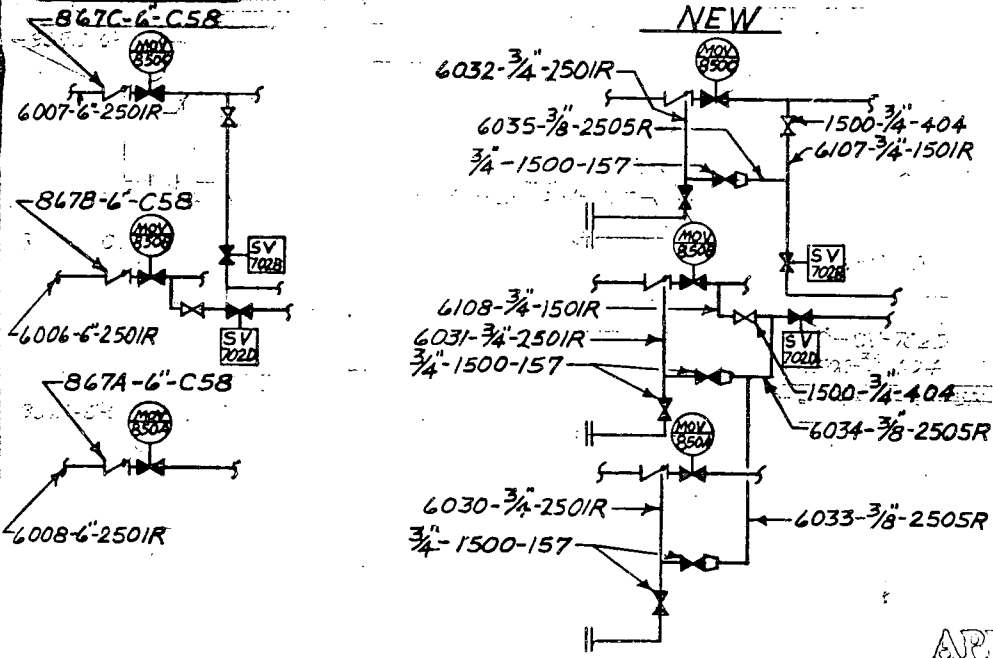
DRAWING CHANGE NOTICE (DCN)

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769		15	21

P&I DIAGRAM SAFETY INJECTION SYSTEM JOB NO. 14000-131 PAGE 2 OF 2 PAGE

DATE: 12-1-80 BY: R. BOLICEK

DESCRIPTION OF CHANGE



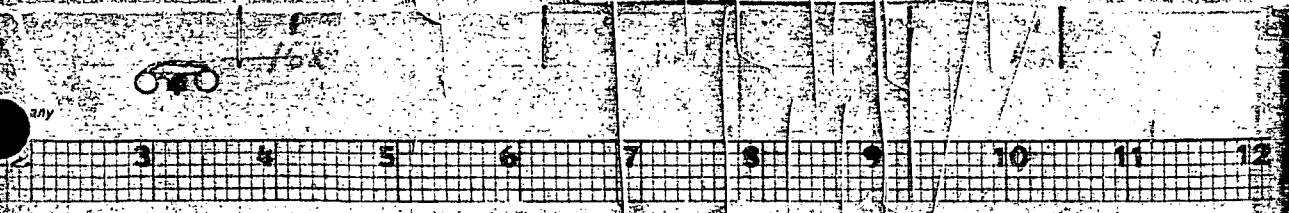
SAFETY RELATED

SI APERTURE CARD

Also Available On Aperture Card

8902270311-153

LAO-8674 11/70



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M7
DRAWING CHANGE NOTICE
(DCN)

LOS ANGELES POWER DIVISION
 P/E DIAGRAM
 SAFETY INJECTION SYSTEM

DCN NUMBER			
DRAWING NO.	SHEET NO.	REV.	DCN SUB NO.
568769	-	15	20

JOB NO. 14000-054 PAGE 1 OF 3 PAGE
 DATE: 7-17-80 BY: W. CHUNG

CHANGE REQUESTED BY: CLIENT ENG'G FIELD SUPPLIER/CONTRACTOR

REASON FOR CHANGE: TO REFLECT THE LINE SPEC CHANGE OF LINE NOS. 728-B"-HP, 729-B"-HP, AND A PORTION OF 737-B"-HP.

DESCRIPTION OF CHANGE:
 (1) CHANGE LINE NOS. 728-B"-HP AND 729-B"-HP TO 728-B"-JN AND 729-B"-JN, RESPECTIVELY.
 (2) CHANGE LINE NO 737-B"-HP (OUTSIDE SPHERE) TO 737-B"-JN.
 SEE SHEET 2a & 3a FOR BEFORE CONDITION.
 SEE SHEET 2 & 3 FOR AFTER CONDITION.

<input type="checkbox"/> 1 APPROVED-SUBMIT ORIGINAL FOR SCE SIGNATURE
<input type="checkbox"/> 2 APPROVED-SUBMIT CERTIFIED DRAWING-MFG. MAY PROCEED
<input type="checkbox"/> 3 APPROVED EXCEPT AS NOTED-MAKE CHANGES AND SUBMIT CERTIFIED DWG.-MFG. MAY PROCEED
<input type="checkbox"/> 4 NOT APPROVED-CORRECT AND RESUBMIT FOR REVIEW
SOUTHERN CALIFORNIA EDISON CO.
DRAWINGS ARE REVIEWED AND APPROVED ONLY AS TO ARRANGEMENTS AND CONFORMANCE TO SPECIFICATION. APPROVAL DOES NOT RELIEVE THE SUBMITTOR FROM THE RESPONSIBILITY OF ADEQUACY AND SUITABILITY OF MATERIALS AND/OR EQUIPMENT REPRESENTED.
SIGNED _____
DATE _____
E.D.M. _____

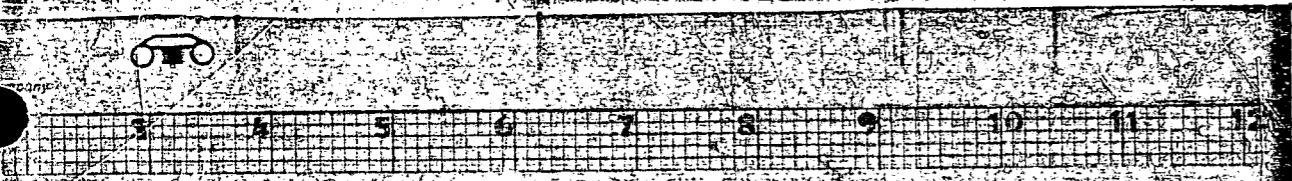
SAFETY RELATED

MATERIAL PROCUREMENT RESPONSIBILITY <input type="checkbox"/> BECTEL OFFICE <input type="checkbox"/> BECTEL FIELD <input type="checkbox"/> SCE <u>N/A</u>	AFFECTED PURCHASE ORDERS <u>N/A</u>	REVISED FOR DCN CHANGE YES NO <u>N/A</u>
--	--	--

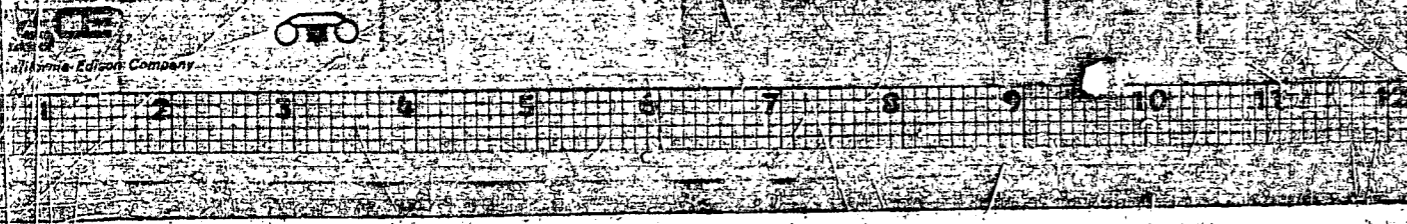
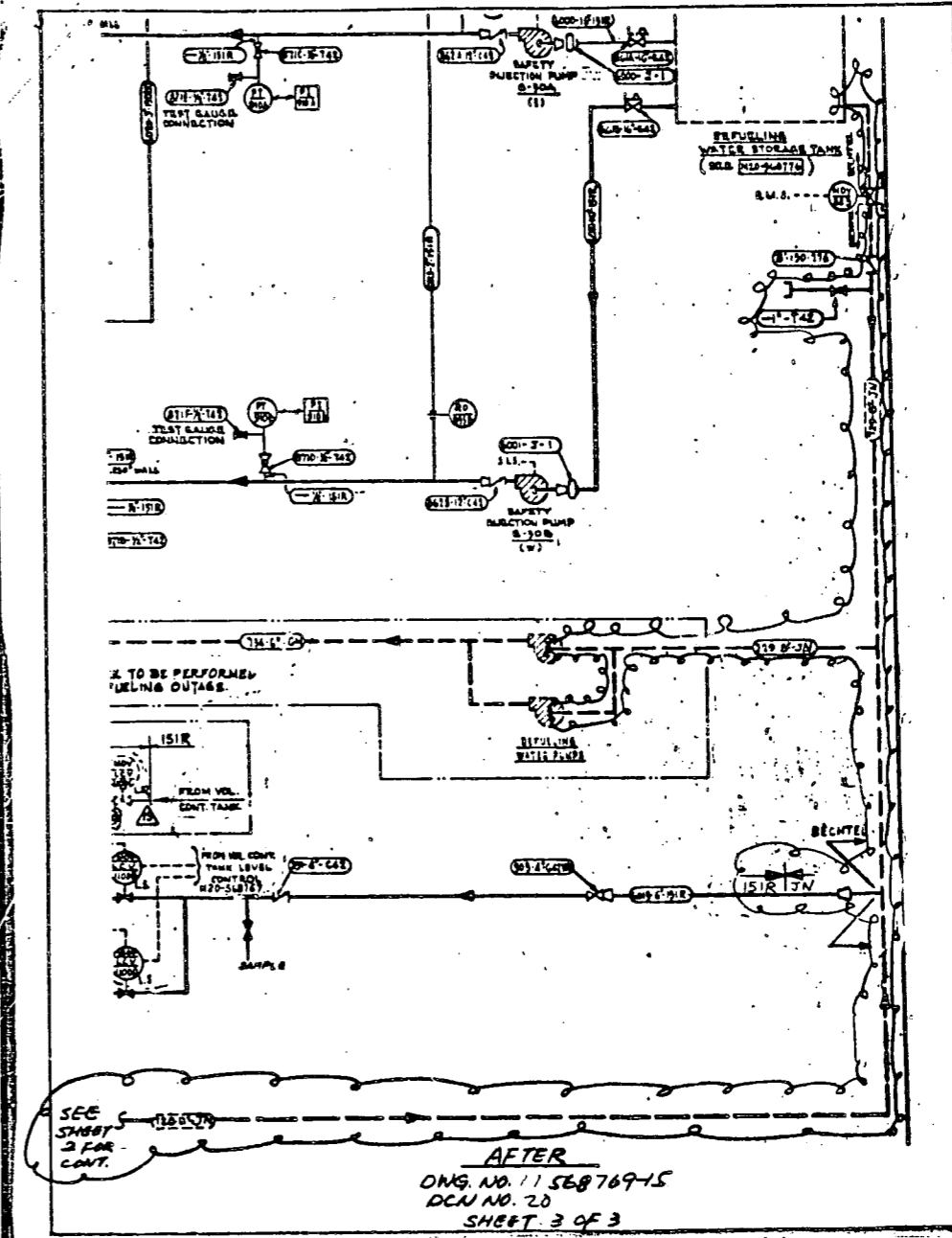
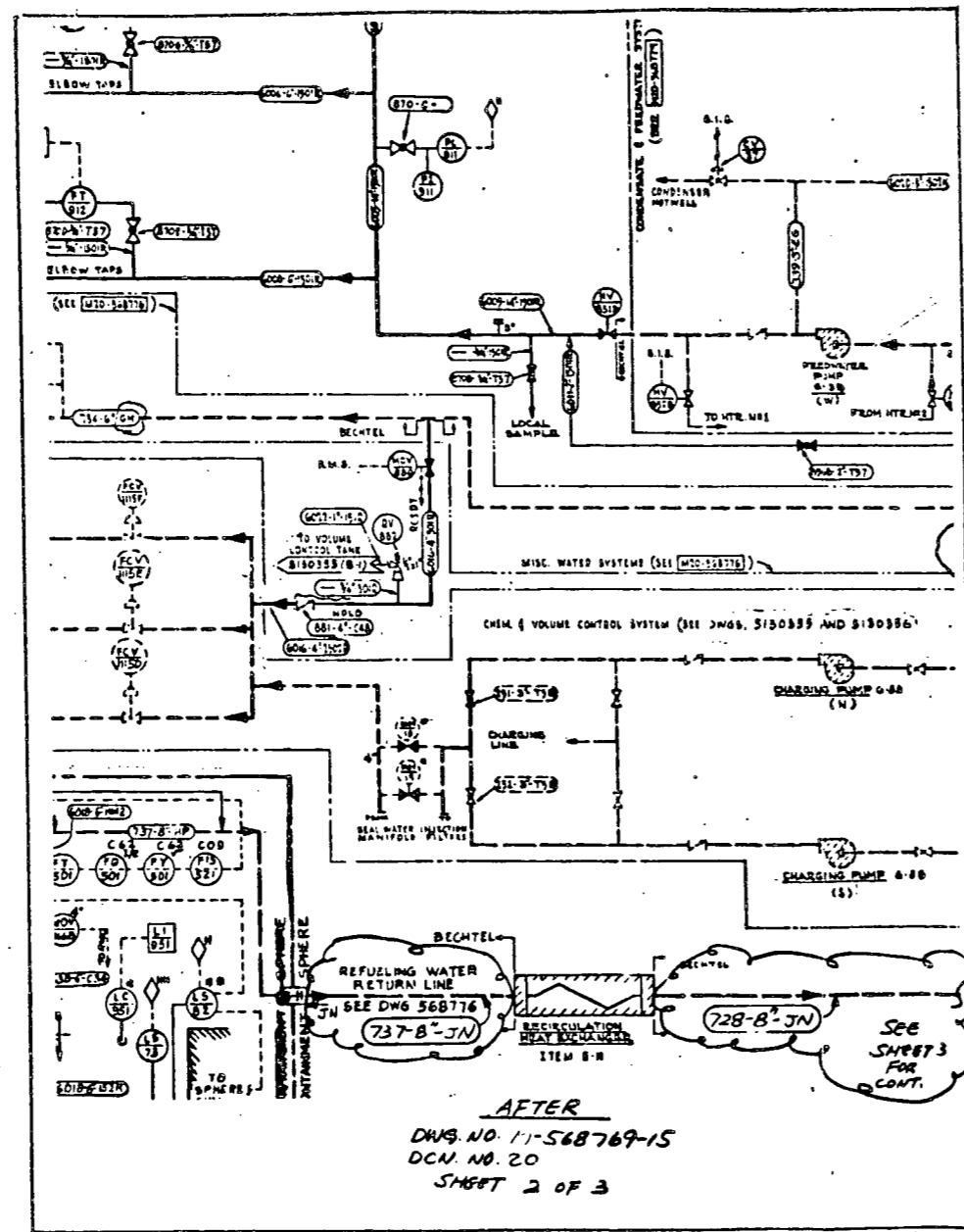
APPROVAL SIGNATURES: _____ DATE _____
 BECTEL ENGINEERING W.T. Brown Paul W. Kern 10/2/80
 SCE ENGINEERING APPROVAL _____ DATE _____
 BECTEL QUALITY ENGINEER _____ DATE _____
 BECTEL QUALITY ASSURANCE B. J. Roberts 10/2/80
 ADDITIONAL DISTRIBUTION: _____

WORK PKG # 9, LINE II, E

PP-480 (14000) 2/80



16X

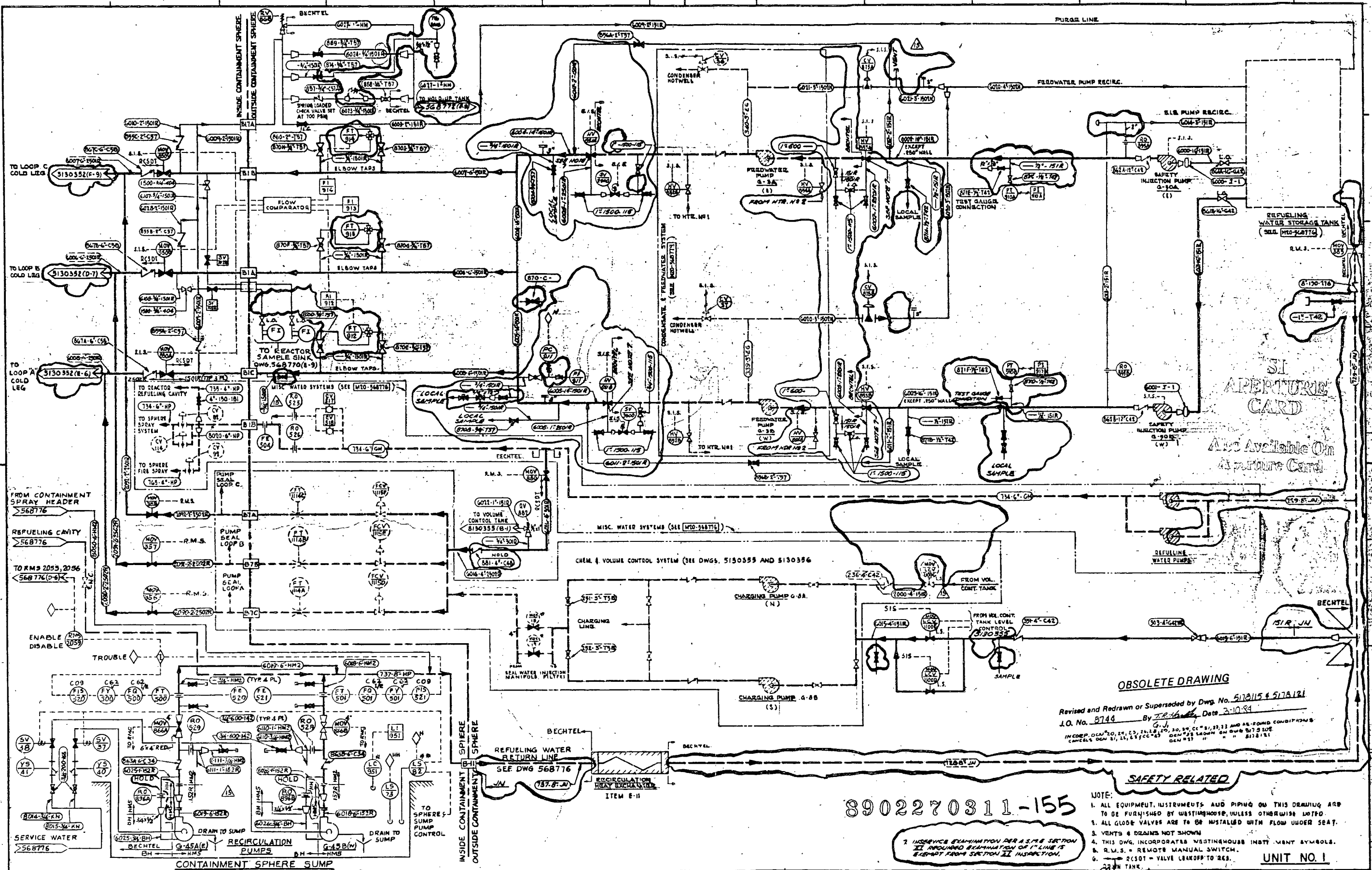


16X

8902270311-154

SI APERTURE CARD

Also Available On Aperture Card



SI APERTURE CARD
 Also Available On Aperture Card

OBsolete DRAWING

Revised and Redrawn or Superseded by Dwg. No. 517815 & 517814
 J.O. No. 8748 By J.R. [Signature] Date 3-10-84
 INCORP. DCN 20, 24, 25, 26, 28, 29, 30, 31, 32 AND AS-SOUND CONDITIONS
 CHECKED DCN 21, 22, 23, 27, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

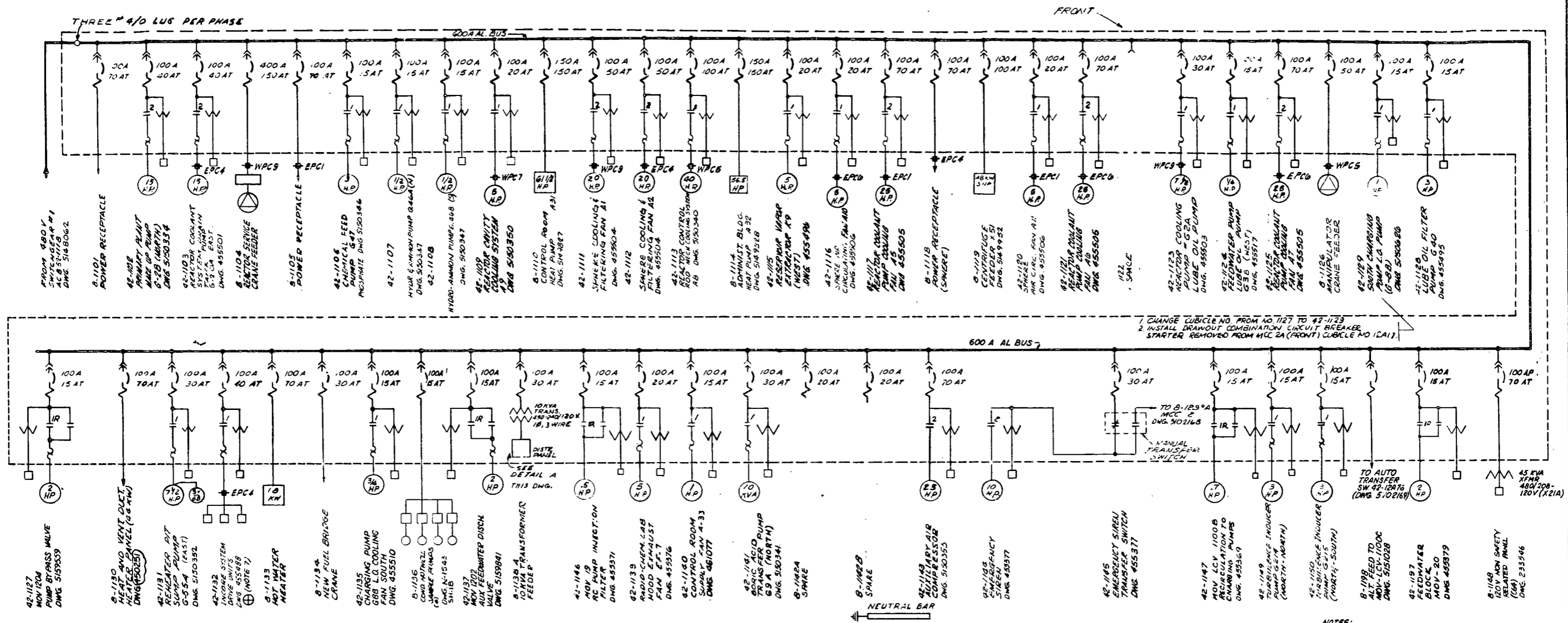
8902270311-155

- SAFETY RELATED**
- NOTE:
1. ALL EQUIPMENT, INSTRUMENTS, AND PIPING ON THIS DRAWING ARE TO BE FURNISHED BY WESTINGHOUSE, UNLESS OTHERWISE NOTED.
 2. ALL GLOBE VALVES ARE TO BE INSTALLED WITH FLOW UNDER SEAT.
 3. VENTS & DRAINS NOT SHOWN.
 4. THIS DWG. INCORPORATES WESTINGHOUSE INVENT. SYMBOLES.
 5. R.M.S. = REMOTE MANUAL SWITCH.
 6. V.L. = VALVE LEAKOFF TO RES. TANK.

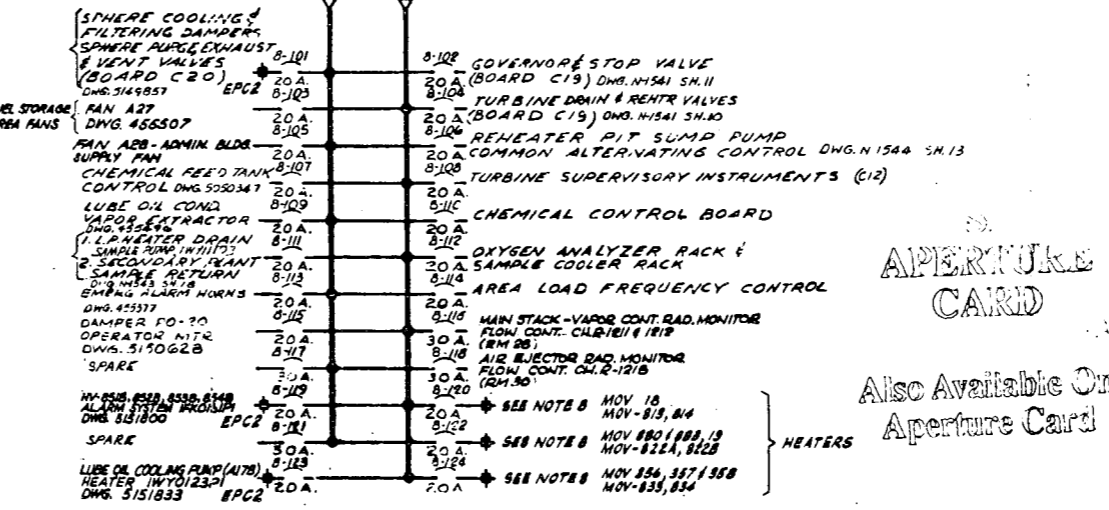
UNIT NO. 1

BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		REVISIONS		NO. 1		NO. 2		NO. 3		NO. 4		NO. 5		NO. 6		NO. 7		NO. 8		NO. 9		NO. 10		NO. 11		NO. 12		NO. 13	
3246	DATE	1	INCORPORATED DCN # 11	2	RECORD REVISION	3	RECORDED PER C.O. 13	4	REVISOR	5	REVISOR	6	REVISOR	7	REVISOR	8	REVISOR	9	REVISOR	10	REVISOR	11	REVISOR	12	REVISOR	13	REVISOR	14	REVISOR
		1	REVISOR	2	REVISOR	3	REVISOR	4	REVISOR	5	REVISOR	6	REVISOR	7	REVISOR	8	REVISOR	9	REVISOR	10	REVISOR	11	REVISOR	12	REVISOR	13	REVISOR	14	REVISOR
		1	DATE	2	DATE	3	DATE	4	DATE	5	DATE	6	DATE	7	DATE	8	DATE	9	DATE	10	DATE	11	DATE	12	DATE	13	DATE	14	DATE
		1	APPROVED	2	APPROVED	3	APPROVED	4	APPROVED	5	APPROVED	6	APPROVED	7	APPROVED	8	APPROVED	9	APPROVED	10	APPROVED	11	APPROVED	12	APPROVED	13	APPROVED	14	APPROVED

568769-15



WIRE WAY											
RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.
8-1101	42-1106	8-1110	8-1114	8-1118	8-1122	8-1126	8-1130	8-1134	8-1138A	42-1109	42-1129
42-1143	42-1102	42-1111	42-1115	8-1119	42-1123	42-1129	42-1131	42-1135	DISTRIBUTION PANEL 240-120V 1Ø-3 WIRE	42-1140	42-1130
42-1144	42-1103	42-1107	42-1112	42-1116	42-1120	42-1128	42-1132	8-1136	8-1148	42-1141	42-1197
8-1145	8-1104	42-1108	42-1113	42-1117	42-1146	42-1147	42-1127	8-1133	42-1137	42-1148	42-1198
		8-1108		42-1121				42-1125			



- NOTES:**
- ALL DISCONNECT SWITCHES ARE RATED 30 AMPS, UNLESS OTHERWISE NOTED.
 - CONTROL TRANSFORMERS WILL BE 100 VA UNLESS OTHERWISE NOTED.
 - STARTER SIZE IS SHOWN BESIDE CONTACT SYMBOL.
 - FUSES WILL BE FUSETRON TYPE FRS DUAL ELEMENT.
 - FOR MCC "A" ONE LINE DIAGRAM & FRONT VIEW SEE DWG. 5102160.
 - FOR DETAILS SEE DWG. 455872.
 - SOURCE IS "SAFETY RELATED", LOAD IS "NON-SAFETY RELATED".
- MOV SCHEME CABLE NO. PEN LOC NO.**
- | | | |
|------|-----------|------------|
| 18 | 1WY12001 | NO PEN LOC |
| 813 | 1WY1301A | EPC2 |
| 814 | 1WY1302A | WPC3 |
| 880 | 1WY12002 | NO PEN LOC |
| 883 | 1WY12003 | NO PEN LOC |
| 18 | 1WY12301 | NO PEN LOC |
| 822A | 1WY1210A | EPC3 |
| 822B | 1WY1202A | WPC3 |
| 356 | 1WY12403A | WPC3 |
| 337 | 1GB243C2A | WPC3 |
| 358 | 1WY12401A | EPC3 |
| 833 | 1WY12302A | EPC3 |
| 834 | 1WY12303A | WPC3 |

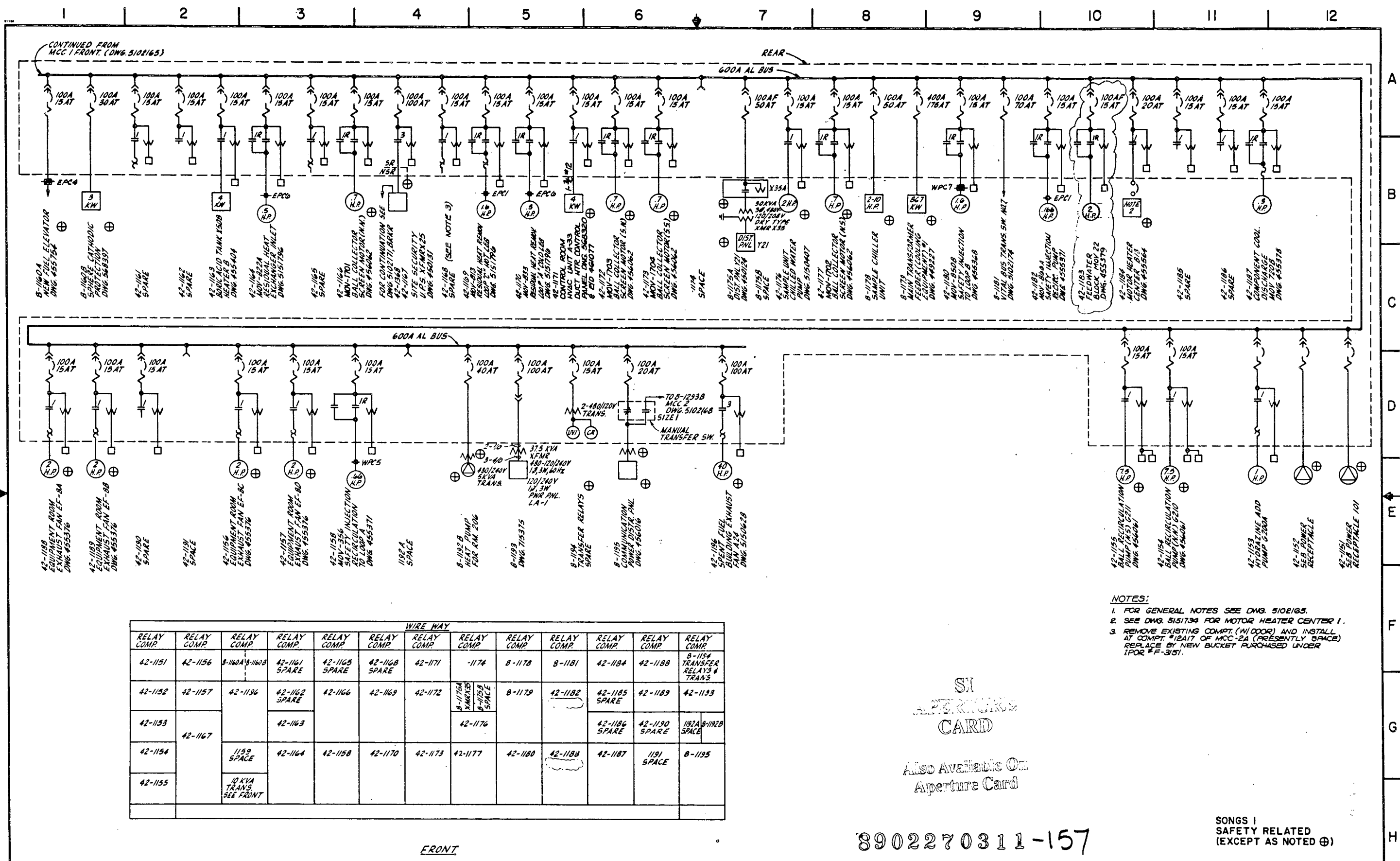
APERTURE CARD

Also Available On Aperture Card

DETAIL A
DISTRIBUTION PANEL
120-240 V, 1Ø, 3 WIRE 8902270311-156

NO.	DATE	APPROVED	BY	REVISIONS
3246	2.3.65	[Signature]		

NO.	DATE	APPROVED	BY	REVISIONS
3246	2.3.65	[Signature]		



- NOTES:
- FOR GENERAL NOTES SEE DWG. 5102165.
 - SEE DWG. 5151734 FOR MOTOR HEATER CENTER I.
 - REMOVE EXISTING COMP. (W/DOOR) AND INSTALL AT COMP. #12A17 OF MCC-2A (PRESENTLY SPACE) REPLACE BY NEW BUCKET PURCHASED UNDER I.POR #F-3151.

WIRE WAY												
RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.	RELAY COMP.
42-1151	42-1156	8-1160A 8-1160B	42-1161 SPARE	42-1165 SPARE	42-1168 SPARE	42-1171	-1174	8-1178	8-1181	42-1184	42-1188	8-1184 TRANSFER RELAYS & TRANS.
42-1152	42-1157	42-1196	42-1162 SPARE	42-1166	42-1169	42-1172	8-1175A XMR125 8-1175B SPARE	8-1179	42-1182	42-1185 SPARE	42-1189	42-1193
42-1153	42-1167		42-1163				42-1176			42-1186 SPARE	42-1190 SPARE	1192A 8-1192B SPARE
42-1154		1159 SPACE	42-1164	42-1158	42-1170	42-1173	42-1177	42-1180	42-1183	42-1187	1191 SPACE	8-1195
42-1155		10 KVA TRANS. SEE FRONT										

SI
APERTURE
CARD

Also Available On
Aperture Card

8902270311-157

SONGS I
SAFETY RELATED
(EXCEPT AS NOTED ⊕)

SUPERSEDES DWG. N1540, SH. 8

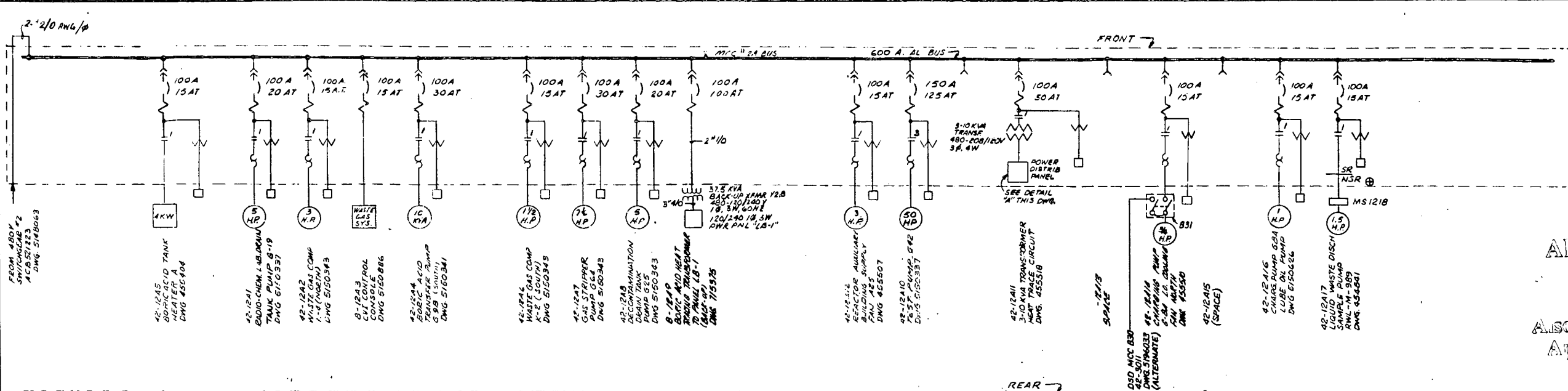
NO.	REVISIONS	DATE	P.E.	G.A.E.	SUPV.	APPROVED	ENGR.	CR'D.	MADE	NO.	REVISIONS	DATE	P.E.	G.A.E.	SUPV.	APPROVED	ENGR.	CR'D.	MADE
31	AS BUILT - INCORP. DCN 34, 35																		
30	AS BUILT - INCORP. DCN 33																		
29	AS BUILT - INCORP. DCN 31, 32																		
28	AS BUILT - INCORP. DCN 30																		
27	REPAIRMAN DUE TO POOR LEGIBILITY AS BUILT - INCORP. DCN 28, 29, 30, 31, 32, 33 CAME OUT THRU 11, 004 25 (NOT USED)																		

REFERENCE DRAWINGS	NO.	REVISIONS	DATE	P.E.	G.A.E.	SUPV.	APPROVED	ENGR.	CR'D.	MADE
5148062		ONE LINE DIAGRAM SWGR 1								
5148228		MAIN ONE LINE DIAGRAM								
5118200		ONE LINE DIAGRAM MCC 1A								
5149957		LOP - 515 - 515/LOP TRAN 1								

LOCATION	SHEET NO.
SAN ONOFRE NUCLEAR GEN. STATION	3083
ONE LINE DIAGRAM	3082
480V MCC-1 REAR	3080
	3083

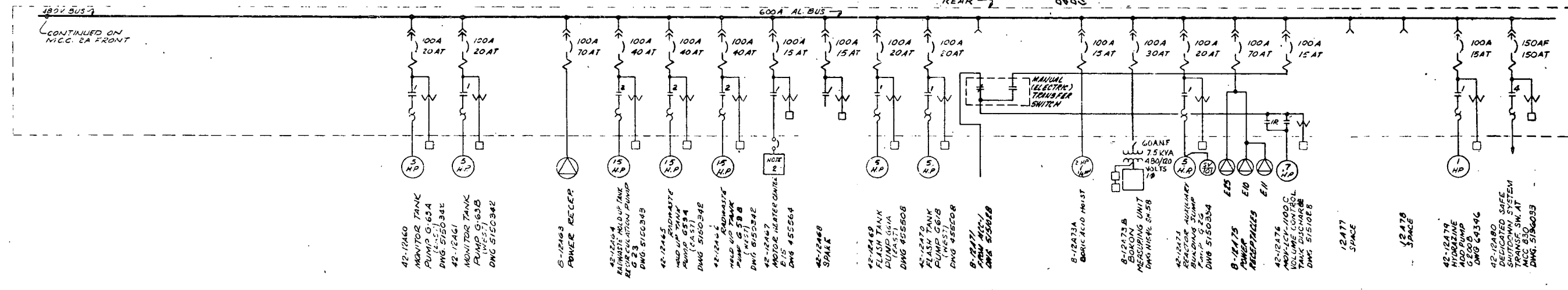
Southern California Edison

5102166-32



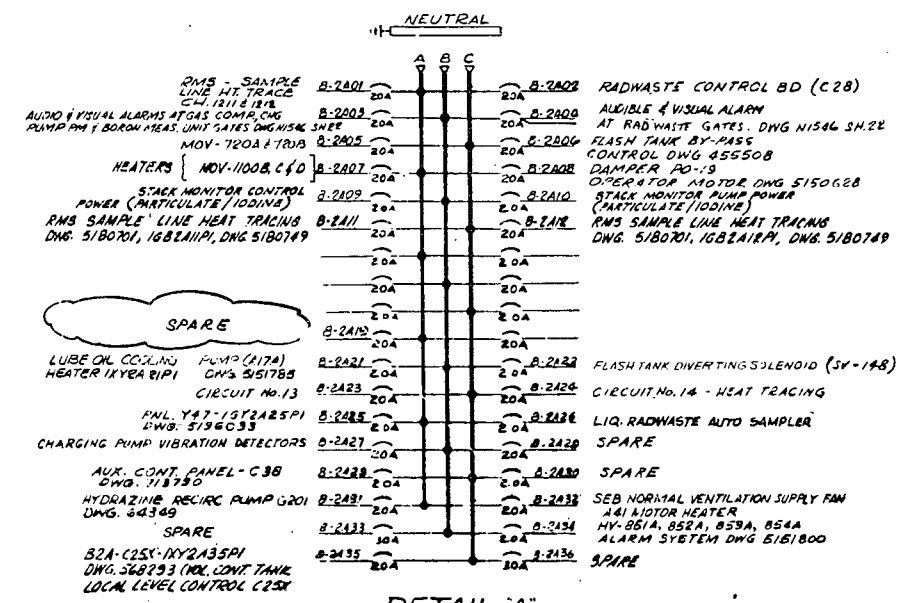
SI
APERTURE
CARD

Also Available On
Aperture Card



WIRE WAY				
RELAY COMP	RELAY COMP	RELAY COMP	RELAY COMP	RELAY COMP
42-12A1	42-12A2	DIST. PANEL	42-12A11	12A13 SPACE
42-12A2	42-12A7		42-12A12	42-12A14
B-12A3	42-12A8	3-10 KVA TRANS.	42-12A15	SPACE
42-12A4	B-12A9		42-12A10	42-12A16
42-12A5	SPACE		12A17	SPACE

WIRE WAY				
RELAY COMP	RELAY COMP	RELAY COMP	RELAY COMP	RELAY COMP
12A77	42-12A60	B-12A68	42-12A68	B-12A68
12A78	42-12A61	42-12A64	42-12A69	42-12A74
42-12A79		42-12A65	42-12A70	B-12A75
42-12A80	TRANS.	42-12A66		
			B-12A71	42-12A76
		42-12A67		



NOTE:

- FOR GENERAL NOTES SEE DWG. 5102165
- SEE DWG. 515653 FOR MOTOR HEATER CENTER 2A
- THE 100-100V DISTRIBUTION PANEL SHOWN IN DETAIL 'A' SHALL BE WIRED AS FOLLOWS: ALL WIRES IDENTIFIED AS 'U' SHALL BE TERMINATED AT THE NEUTRAL BUS. ALL OTHER WIRES SHALL BE TERMINATED AT THE BREAKER AS DESIGNATED BY THE LAST TWO DIGITS OF THE WIRE NUMBER. EXAMPLE: WIRE 211 TERMINATES AT BRK. '11' WIRE 212 TERMINATES AT BRK. '12'

SONGS I
SAFETY RELATED
(EXCEPT AS NOTED ⊕)

BECHTEL CORPORATION
ENGINEERS & CONSTRUCTORS
LOS ANGELES, CALIF.

JOB NO.	DATE	APPROVED
3246	2.3.65	[Signature]

NO.	CROSS REFERENCES	NO.	REVISIONS	DATE	BY	CHKD.	DATE	BY	CHKD.
33	15 BUILT-INCORP DCN #41	19-05							
32	INCORP FOR 31-001 AS BUILT	19-05							
31	INCORP DCN #148, #149, #150, #151, #152, #153, #154, #155, #156, #157, #158, #159, #160, #161, #162, #163, #164, #165, #166, #167, #168, #169, #170, #171, #172, #173, #174, #175, #176, #177, #178, #179, #180, #181, #182, #183, #184, #185, #186, #187, #188, #189, #190, #191, #192, #193, #194, #195, #196, #197, #198, #199, #200, #201, #202, #203, #204, #205, #206, #207, #208, #209, #210, #211, #212, #213, #214, #215, #216, #217, #218, #219, #220, #221, #222, #223, #224, #225, #226, #227, #228, #229, #230, #231, #232, #233, #234, #235, #236, #237, #238, #239, #240, #241, #242, #243, #244, #245, #246, #247, #248, #249, #250, #251, #252, #253, #254, #255, #256, #257, #258, #259, #260, #261, #262, #263, #264, #265, #266, #267, #268, #269, #270, #271, #272, #273, #274, #275, #276, #277, #278, #279, #280, #281, #282, #283, #284, #285, #286, #287, #288, #289, #290, #291, #292, #293, #294, #295, #296, #297, #298, #299, #300, #301, #302, #303, #304, #305, #306, #307, #308, #309, #310, #311, 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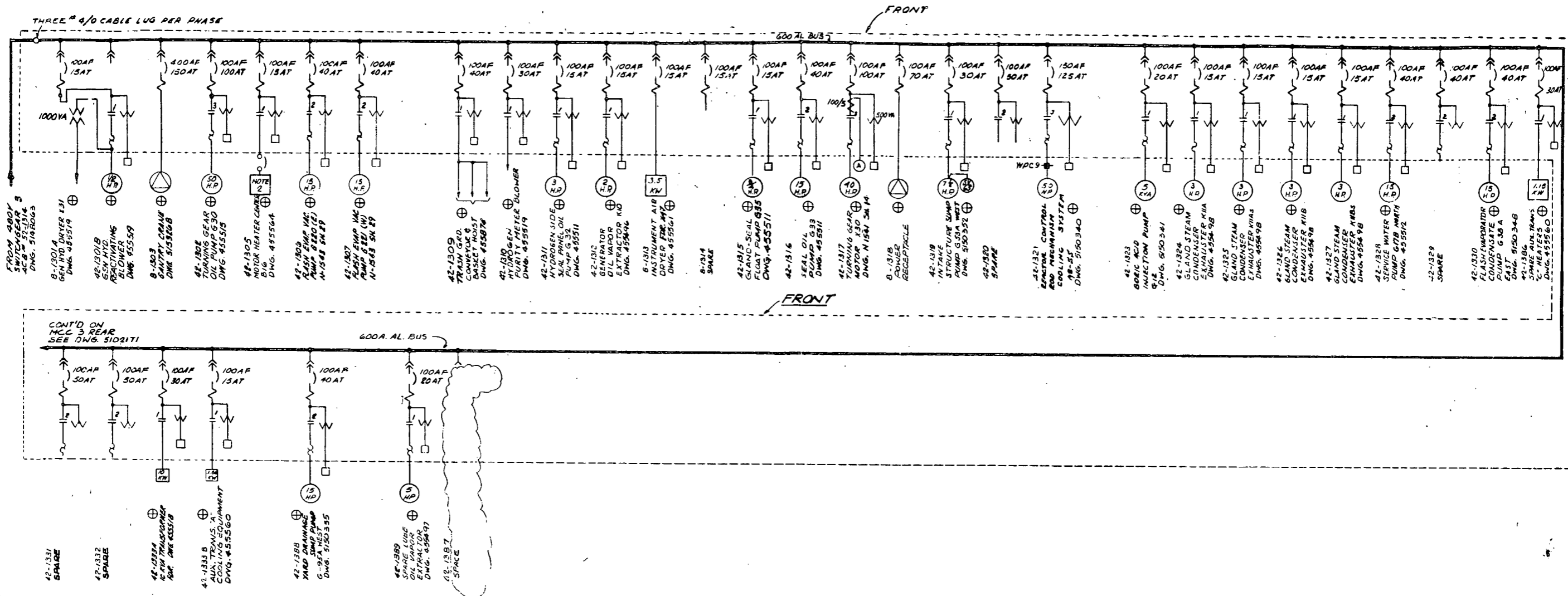
DETAIL 'A'
DISTRIBUTION PANEL
120-208V, 3 # 4 WIRES

SUPERSEDES DWG. N1540 SH. 11

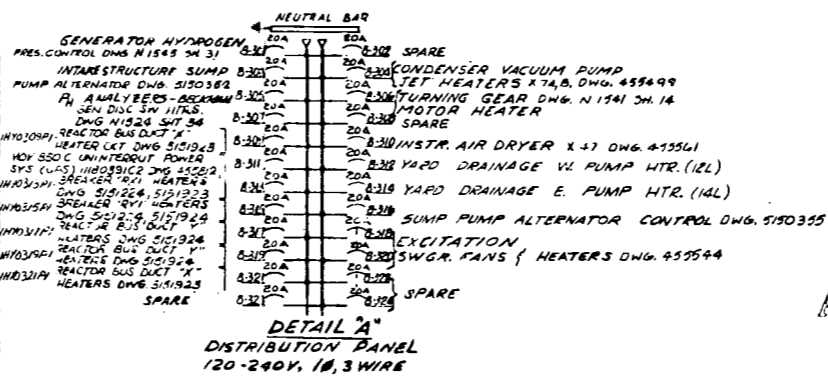
ONE LINE DIAGRAM
480V MCC - 2A
FRONT & REAR
SOUTHERN CALIFORNIA EDISON COMPANY
SCALE NONE
LOS ANGELES, CALIF.

5102169-38

MICROFILMED FROM



WIRE WAY								
RELAY COMP	RELAY COMP	RELAY COMP	RELAY COMP	RELAY COMP	RELAY COMP	RELAY COMP	RELAY COMP	RELAY COMP
42-1305	8-1301A	42-1301B	42-1309	8-1314	8-1318	42-1323	42-1328	42-1333B
				SPARE				
	42-1302	42-1305	42-1310	42-1315	42-1319	42-1324	42-1329	DISTRIBUTION PANEL 10-240V 1φ
42-1309		42-1306	42-1311	42-1316	42-1320	42-1325	42-1330	
				SPARE				
42-1307	8-1303	42-1307	42-1312			42-1326	42-1331	42-1306
				42-1317	42-1321			
		42-1331A	8-1313			42-1327	42-1332	10 KVA TRANSFORMER 480-240/120 V 1φ 3W



APERTURE CARD

Also Available On Aperture Card

NOTE:
1. FOR GENERAL NOTES SEE DWG 5102165
2. SEE DWG 511654 FOR MOTOR HEATER CENTER 3

8902270311-159

BECHTEL CORPORATION
ENGINEERS & CONSTRUCTORS
LOS ANGELES, CALIF.

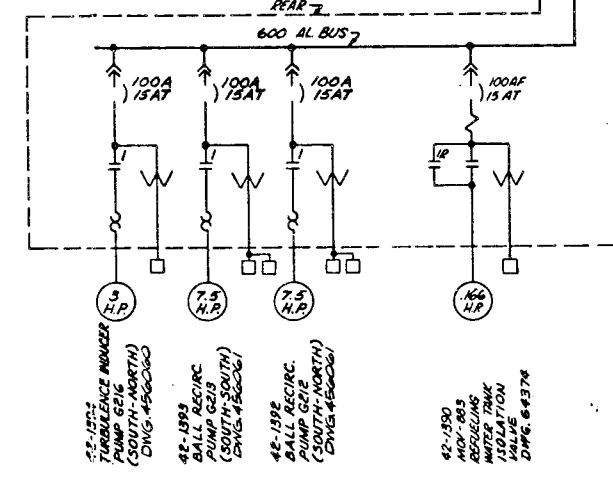
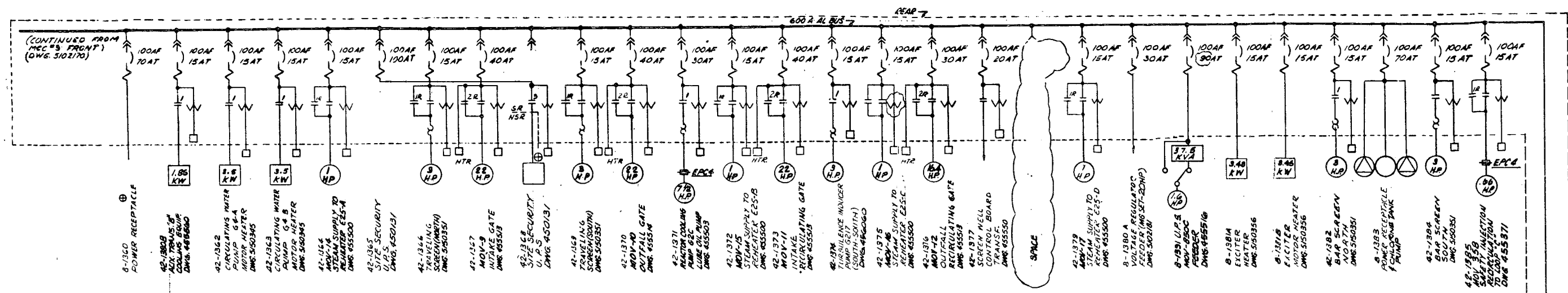
NO.	DATE	APPROVED
3246	2-3-66	[Signature]

NO.	DATE	DESCRIPTION	BY	CHKD	DATE	NO.	DATE	DESCRIPTION	BY	CHKD	DATE
31	AS BUILT - INCORP DCN 24					32	AS BUILT BY FLUOR, INC DCN 24 (DCN 3501 REV 10)				
30	AS BUILT - INCORP DCN 22, 23					31	AS BUILT - INCORP DCN 24				
29	AS BUILT - INCORP DCN 21					30	AS BUILT - INCORP DCN 22, 23				
28	AS BUILT - INCORP DCN 20					29	AS BUILT - INCORP DCN 21				
27	AS BUILT - INCORP DCN 19 TO 18 & 14					28	AS BUILT - INCORP DCN 20				
26	AS BUILT - INCORP DCN 17 TO 14 & 14					27	AS BUILT - INCORP DCN 19 TO 18 & 14				
25	AS BUILT - INCORP DCN 16 & 15					26	AS BUILT - INCORP DCN 17 TO 14 & 14				
24	AS BUILT - INCORP DCN 15					25	AS BUILT - INCORP DCN 16 & 15				
23	AS BUILT - INCORP DCN 14					24	AS BUILT - INCORP DCN 15				
22	AS BUILT - INCORP DCN 13					23	AS BUILT - INCORP DCN 14				
21	AS BUILT - INCORP DCN 12					22	AS BUILT - INCORP DCN 13				
20	AS BUILT - INCORP DCN 11					21	AS BUILT - INCORP DCN 12				
19	AS BUILT - INCORP DCN 10					20	AS BUILT - INCORP DCN 11				
18	AS BUILT - INCORP DCN 9					19	AS BUILT - INCORP DCN 10				
17	AS BUILT - INCORP DCN 8					18	AS BUILT - INCORP DCN 9				
16	AS BUILT - INCORP DCN 7					17	AS BUILT - INCORP DCN 8				
15	AS BUILT - INCORP DCN 6					16	AS BUILT - INCORP DCN 7				
14	AS BUILT - INCORP DCN 5					15	AS BUILT - INCORP DCN 6				
13	AS BUILT - INCORP DCN 4					14	AS BUILT - INCORP DCN 5				
12	AS BUILT - INCORP DCN 3					13	AS BUILT - INCORP DCN 4				
11	AS BUILT - INCORP DCN 2					12	AS BUILT - INCORP DCN 3				
10	AS BUILT - INCORP DCN 1					11	AS BUILT - INCORP DCN 2				

SONGS I SAFETY RELATED (EXCEPT AS NOTED ⊕)

SUPERIDES DWG. N1540 5A.13
LOCATION SAN ONOFRE NUCLEAR GENERATING STATION
ONE LINE DIAGRAM
480V MCC-3 FRONT
SOUTHERN CALIFORNIA EDISON COMPANY
SCALE NONE

5102170-32



				86-M3-4 (NOTE 2)	86-M3-3 (NOTE 2)	86-M3-2 (NOTE 2)	86-M3-1 (NOTE 2)
WIRE WAY							
RELAY COMR	RELAY COMR	RELAY COMR	RELAY COMR	RELAY COMR	RELAY COMR	RELAY COMR	RELAY COMR
42-1360	42-1362	42-1365	42-1368	42-1371	42-1374	42-1377	42-1390
	42-1363	42-1366	42-1369	42-1372	42-1375	42-1378 SPACE	42-1392
	42-1364	42-1367	42-1370	42-1373	42-1376	42-1379	42-1394

FRONT

SI
APERTURE
CARD

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NOTES:
1. FOR GENERAL NOTES
SEE DWG. 510265
2. FOR DETAILS SEE
DWG. 455872

8902270311-160

WP'S 82-016 & 82-169
(82-297)
SONGS I
SAFETY RELATED
(EXCEPT AS NOTED @)

BECHTEL CORPORATION
ENGINEERS & CONSTRUCTORS
LOS ANGELES, CALIF.
JOB NO. 3246
DATE 2-3-65
APPROVED [Signature]

510050	480V MCC-3 RELAY DATA	22	AS BUILT INCORP CCN 12, DNS 14M, TOP 16 9606	2/25/74						
510063	ONE LINE DIAGRAM SHGR 213	21	INCORP CCN 10 & 11 EFF DATE IMMED.	4-23-74						
510682	MAIN ONE LINE DIAGRAM	20	INCORP CCN 9 EFF DATE IMMEDIATE	3-21-78						
510270	ONE LINE DIAGRAM MCC 3 (FRONT)	18	INCORP CCN 8 EFF DATE IMMED.	4-11-77						
510958	TOP SIS - SIS/LOP TRAIN 2	17	INCORP CCN 7 EFF DATE IMMED.	2-10-77						

SUPERSEDES DMB. N1540 SH. N
LOCATION SAN ONOFRE NUCLEAR GENERATING STATION
ONE LINE DIAGRAM
480V MCC-3 REAR
SOUTHERN CALIFORNIA EDISON COMPANY
SCALE NONE
LOS ANGELES, CALIF.

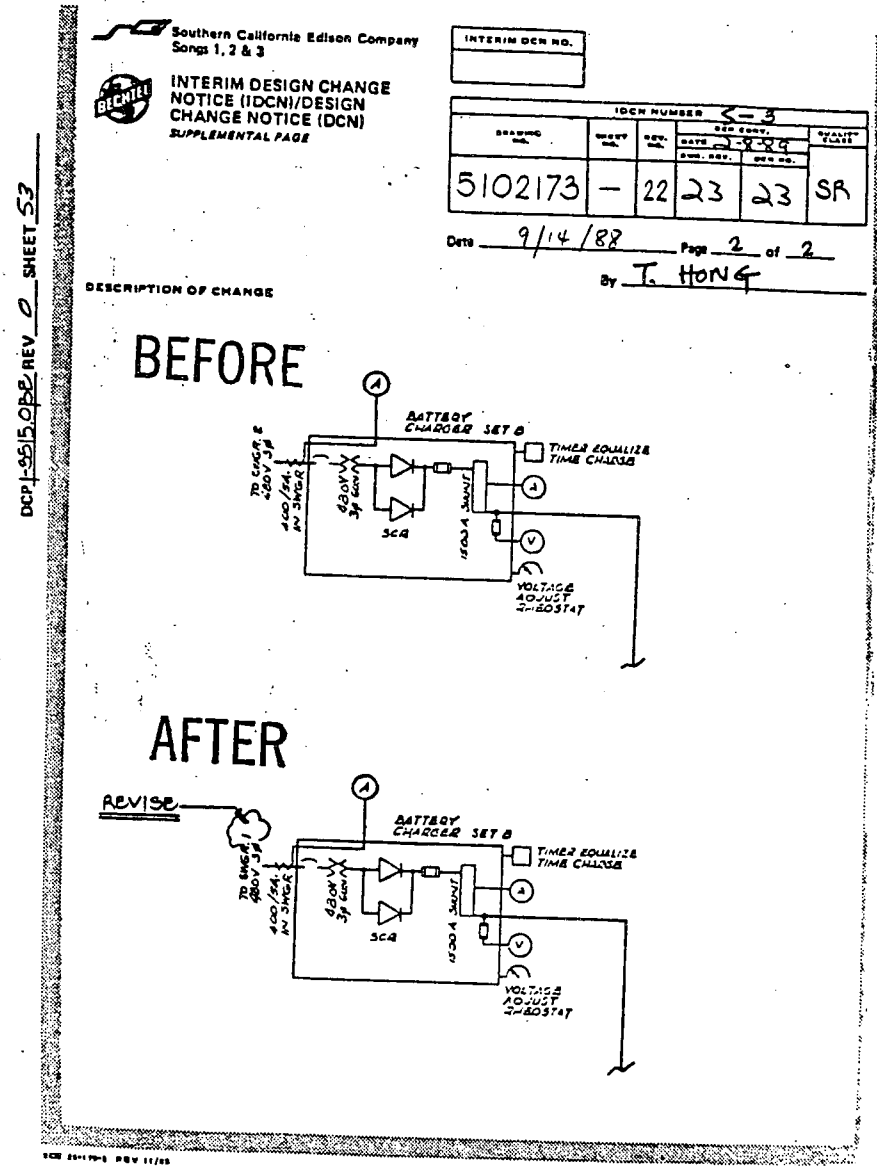
5102171-26

MICROFILMED FROM

PAGE 1 OF 2

Southern California Edison Company INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS 1, 2 & 3)		CON/DCN USE ONLY DCN NO. S-3 SHEET 5102173 REV. NO. 22	PPG NO. 1-88-3515 REF. NO. 1-9515.0BE REV. NO. 0 DCN VERSION NO. 23
1. ORIGINATOR T. HONG (ELEG) DATE 9/14/88 ONE LINE DIAGRAM 125 VOLT DC SYSTEM 1 DESCRIPTION OF CHANGE <p style="text-align: center;">REVISE POWER SUPPLY TO BATTERY CHARGER D FROM SWGR 2 TO SWGR 1.</p>		PPN 807-5237 SHEET E-06 DATE SR	
Ref: Design Calculation/Specification Numbers N/A Seismic Category N/A			
2. Other Affected Documents <input type="checkbox"/> None <input checked="" type="checkbox"/> Specific affected documents are listed on the CC(123) 184 associated with the source document checked below: <input checked="" type="checkbox"/> This DCP (Forms CC(123) 183 and CC(123) 184 attached) <input type="checkbox"/> This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached) <input type="checkbox"/> The following document:			
3. Affected Systems ELE			
4. SCE Design Approvals			
NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT, HES & L	
OTHER	DATE	OTHER	DATE
CHECKER	DATE	CHECKER	DATE
INDEPENDENT REVIEW ENGR.	DATE	INDEPENDENT REVIEW ENGR.	DATE
RESPONSIBLE ENGINEER	DATE	RESPONSIBLE ENGINEER	DATE
GROUP SUPERVISING ENGINEER	DATE	GROUP SUPERVISING ENGINEER	DATE
SUPERVISING ENGINEER 1	DATE	SUPERVISING ENGINEER 1	DATE
MANAGER, STATION TECHNICAL	DATE	MANAGER, STATION TECHNICAL	DATE
QUALITY ASSURANCE	DATE	QUALITY ASSURANCE	DATE
Conversion to DCN Date 2-8-89		SEE PROJECT ADMINISTRATION Sue Sides	

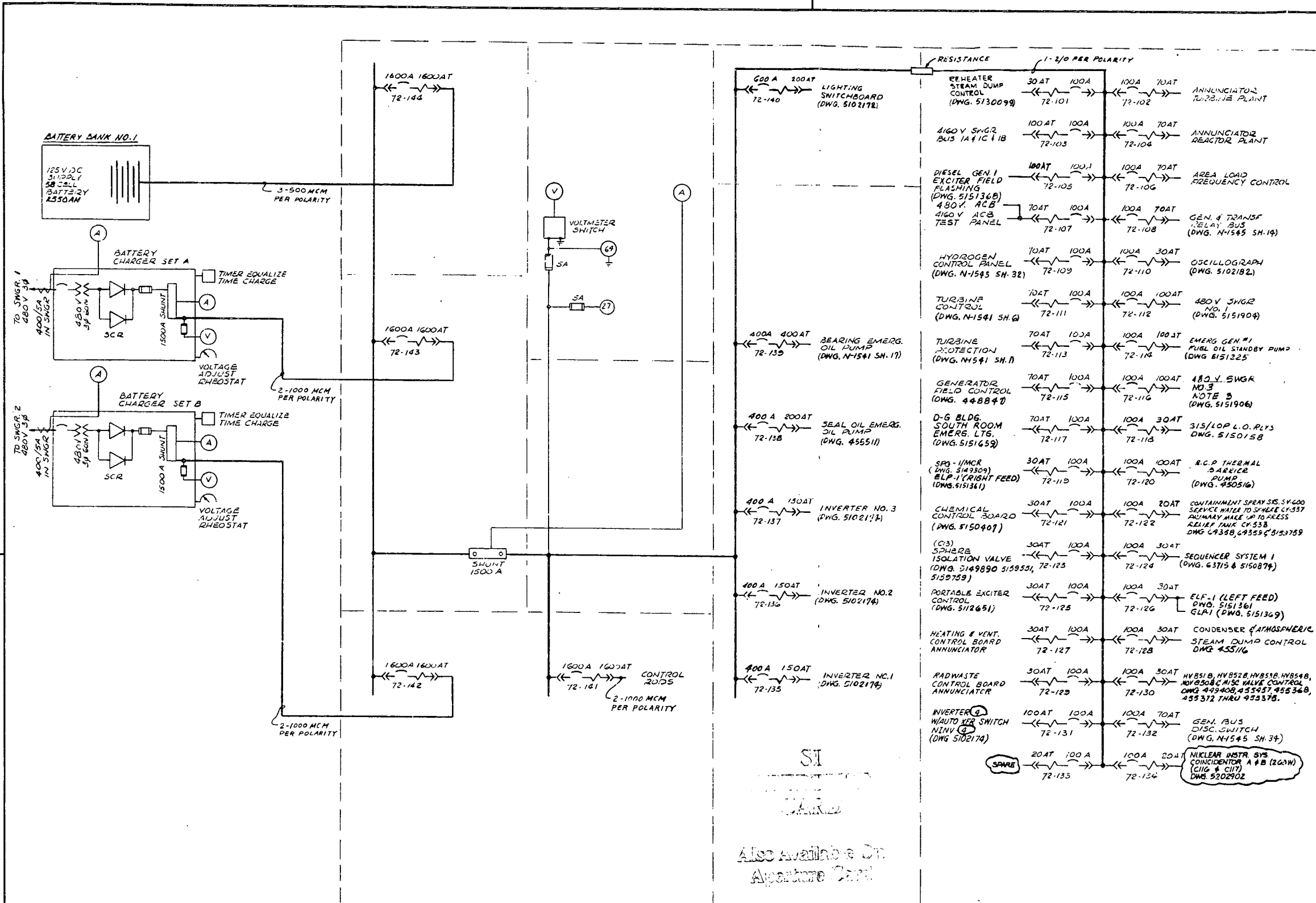
DCP 1-9515.0BE REV 0 SHEET 52



SX
APERTURE
CARD

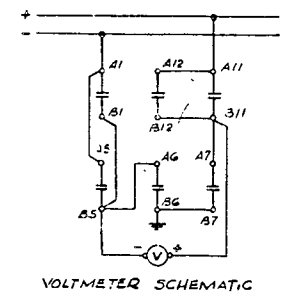
Also Available On
Aperture Card

8902270311-461



CONTACT	POSITION			
	OFF	1	2	3
A11-B11		X		
A12-B12			X	
A1-B1				X
A5-B5		X		
A6-B6			X	
A7-B7				X

TYPE W-2
ROUND FIXED HANDLE
SWITCH 3" 505A702G05



- LEGEND**
- AIR CIRCUIT BREAKER WITH THERMAL-MAGNETIC TRIP
 - DC INSTRUMENT SHUNT
 - AMMETER
 - VOLTMETER
 - RELAY (SEE DEVICE NO INSIDE CIRCLE FOR RELAY FUNCTION)
 - ACB AMP TRIP
 - FUSE

DEVICE TABLE			
DEVICE NO.	DESCRIPTION	MFG. # TYPE	FUNCTION
64	D.C. GROUND RELAY	GUNDAIN ELEC. SYN 9407-1D	ALARM
72	D.C. LINE CIRCUIT BREAKERS		
27	D.C. UNDERVOLTAGE RELAY	STRUTHER-DUNN	ALARM
27F	D.C. FEEDER UNDERVOLTAGE RELAY	STRUTHER-DUNN 219XBXP	ALARM

- NOTES:**
- D.C. FEEDER UNDERVOLTAGE RELAY (27F) PROVIDES AN ALARM FOR ITS PROTECTIVE BREAKER ON TRIP POSITION. BREAKERS MARKED WITH AN ASTERISK DO NOT HAVE UNDERVOLTAGE RELAY.
 - CIRCUIT BREAKERS CARRYING INPUT POWER FROM BATTERY AND CHARGER DO NOT HAVE UNDERVOLTAGE RELAYS.
 - 480V SWGR 3 D.C. CONTROL POWER IS SERVED FROM EITHER 125V D.C. SYSTEM 1 OR 2 THROUGH AN INTERLOCKING DEVICE TO AVOID BOTH D.C. SYSTEMS BEING PARALLELED.

SI
Also Available On
Aperture Card

8902270311-162

BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		CROSS REFERENCES		REVISIONS		REVISIONS	
JOB NO.	DATE	NO.	DATE	NO.	DATE	NO.	DATE
3246	6-18-65	1	6-18-65	1	6-18-65	1	6-18-65
APPROVED		APPROVED		APPROVED		APPROVED	
[Signature]		[Signature]		[Signature]		[Signature]	

E 17 N-1540 SH.17 5102173-23

SCNGS I
SAFETY RELATED
ONE LINE DIAGRAM
125 VOLT D.C. SYSTEM I
SOUTHERN CALIFORNIA EDISON COMPANY
LOS ANGELES, CALIF.

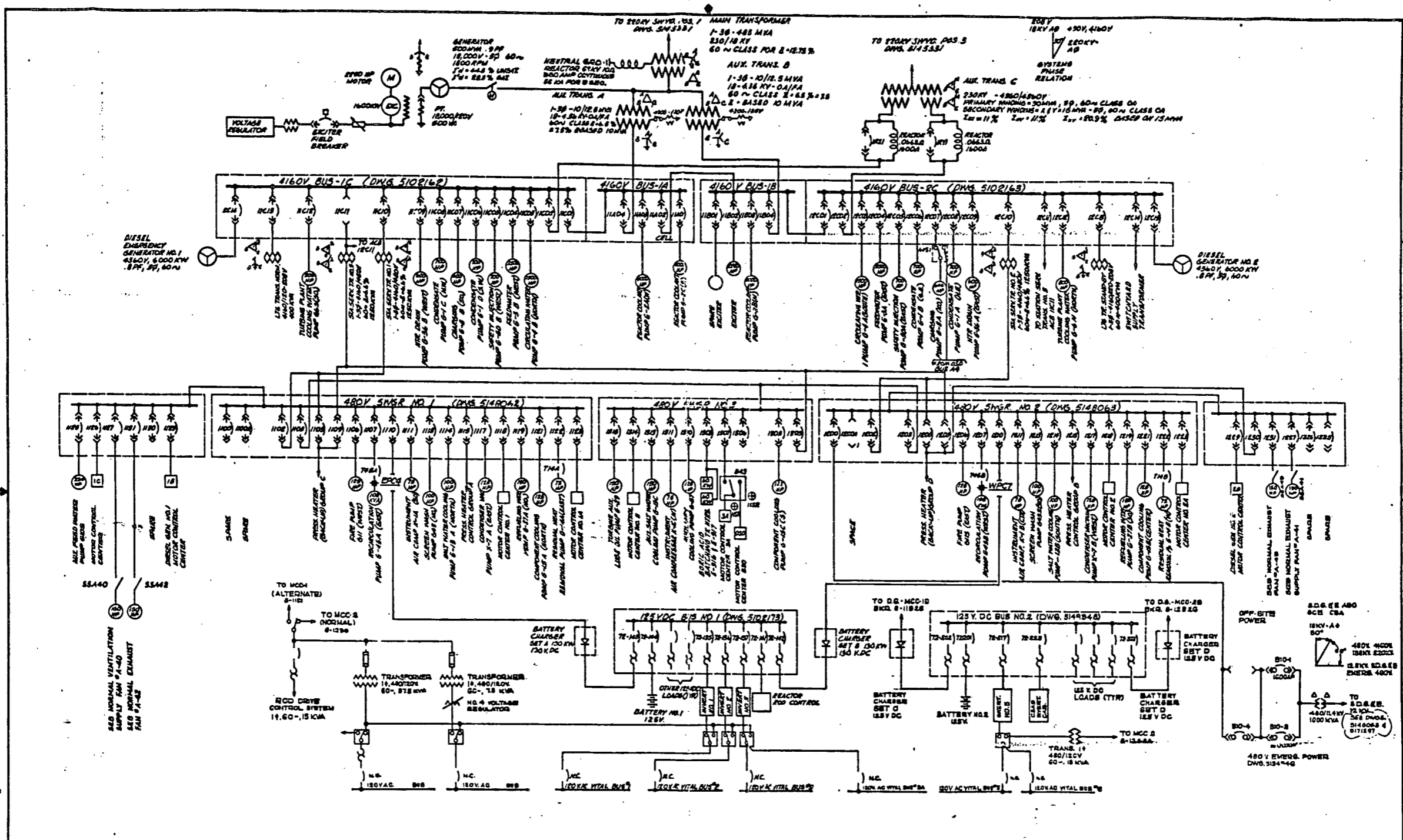
Southern California Edison Company INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS 1, 2 & 3)		EMPLOYEE USE ONLY IFC NO. 1-88-3515 IFC NO. 1-3515.0 BE REV. NO. 0 REV. NO. 38 REV. NO. 26
ORIGINATOR T. HONG (ELEC)	PROJECT NO. 5146828	DATE 807-5237 9/11/88
SUBJECT TITLE MAIN ONE LINE DIAG. E-06 SREAN		
DESCRIPTION OF CHANGE 1. RE-ALIGN BATTERY CHARGER B TO TRAIN A BY CONNECTING PWR FROM SWGR # 1130 INSTEAD OF # 1210 2. RE-ALIGN BATTERY CHARGER C TO TRAIN B BY CONNECTING PWR FROM BKR # 12B30 INSTEAD OF # 11B26 3. ADD REF. DWG TO SWGR # 3.		
SEE SUPPLEMENTAL PAGES		
N/A		N/A
Ref: Design Calculation/Specification Numbers		Seismic Category
2. Other Affected Documents <input type="checkbox"/> None <input checked="" type="checkbox"/> Specific affected documents are listed on the CC(123) 184 associated with the source document checked below: <input checked="" type="checkbox"/> This DCP (Forms CC(123) 183 and CC(123) 184 attached) <input type="checkbox"/> This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached) <input type="checkbox"/> The following document:		
3. Affected Systems ELE		
4. SCE Design Approvals		
NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/RES & L
OTHER	DATE	OTHER DATE
OTHER	DATE	CHECKER DATE
CHECKER	DATE	INDEPENDENT REVIEW ENG. DATE
INDEPENDENT REVIEW ENGR.	DATE	DATE
RESPONSIBLE ENGINEER	DATE	DATE
GROUP SUPERVISING ENGINEER	DATE	DATE
SUPERVISING ENGINEER 1	DATE	DATE
MANAGER, EVALUATION TECHNICAL	DATE	DATE
QUALITY ASSURANCE	DATE	DATE
Conversion to DCN Date 5-8-89		DATE 10/8/88

DCP 1-3515.00E-REV. 0 SHEET 54

APERTURE CARD

Also available on Aperture Card

8902270311-164



89.0227.0311-165

SONGS 1
SAFETY RELATED
EXCEPT AS NOTED

SUPERSEDES DWS# 5146820-15

NO.	DATE	BY	CHKD.



Southern California Edison Company
Songs 1, 2 & 3

INTERIM DCN NO.

INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

BEFORE

DCN NUMBER	5-3
DATE	7-25-88
BY	T. HONG
CHKD.	SR EAN
5146828	- 25 26 38

Date 7/1/88 Page 2 of 3

By T. HONG
DCP-3515.08E REV. 0 SHEET 55

SAN ONOFRE NUCLEAR GEN. STA.
MAIN
ONE LINE DIAGRAM

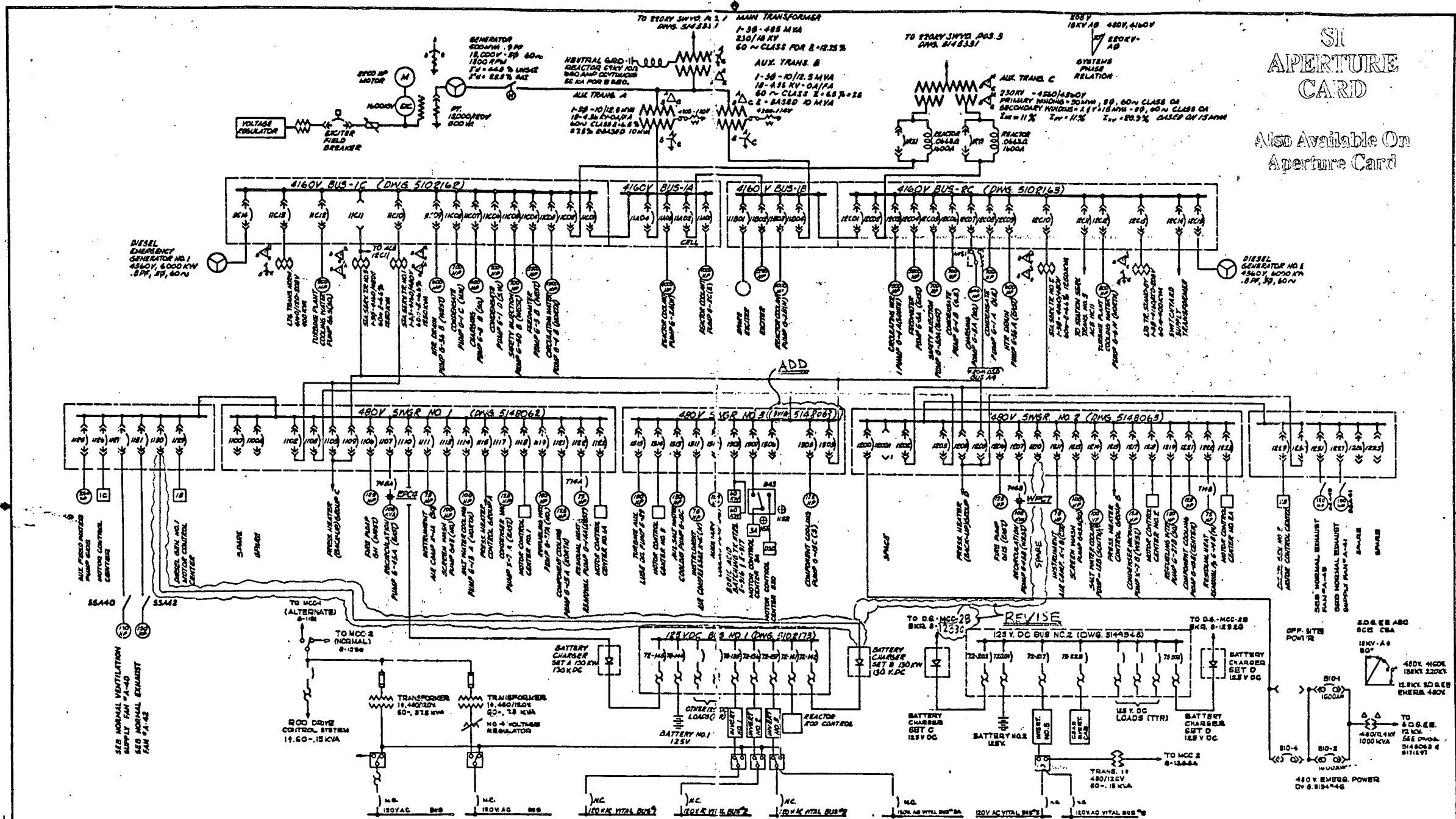
5146828-25

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APERTURE
CARD

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Aperture Card

26X

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SH
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CARD

Also Available On
Aperture Card

8902270311-166

SONGS 1
SAFETY RELATED
EXCEPT AS NOTED

125 Dwg # 5146828-13

Southern California Edison Company
Songs 1, 2 & 3

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

AFTER

INTERIM DCN NO.			
IDCN NUMBER 5-5			
DRAWING NO.	DATE	REV.	BY
5146828	25	26	38

Date 9/11/88 Page 3 of 3
By T. HONG

San Onofre Nuclear Gen. Sta.
MAIN
ONE LINE DIAGRAM

5146828-25

DCP-3515.0BE REV 2 SHEET 56

SC Southern California Edison Company INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (Per SONGS 1, 2 & 3)	EDN/DCN USE ONLY	FIG. NO. 1-88-5113.04
	IDCN NO. S-6	DCN NO. 5113.04SE
	DOCUMENT NO. 5146828	REV. NO. 25
	SHEET	CONVERSION NO. 37

1. ORIGINATOR ARTLAND C. KARI	87326	DATE 12-15-88
DESCRIPTION OF CHANGE MAIN ONE LINE DIAGRAM	6-06	BY SREAN

EDITORIAL CHANGE ONLY

Chg Normal Power Supply for Station Service TRANS #3 from 12011 to 11011 4KV Breaker.

DCP 5113.04SE REV 0 SHEET 4 of 25

2. Other Affected Documents

None

Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:

This DCP (Forms CC(123) 183 and CC(123) 184 attached)

This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)

The following document:

3. Affected Systems **ELE**

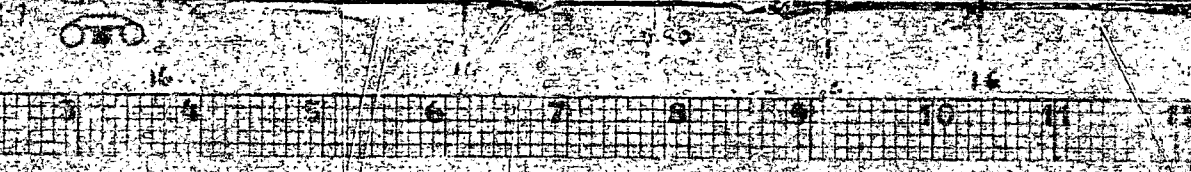
4. SCE Design Approvals:

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/NEE & L	
OTHER	DATE	NUCLEAR Jose Alvarez	DATE 12/23/88
CHECKER	DATE	INDEPENDENT REVIEW ENGR. [Signature]	DATE 12/23/88
INDEPENDENT REVIEW ENGR.	DATE	RESPONSIBLE ENGINEER [Signature]	DATE 12/15/88
RESPONSIBLE ENGINEER	DATE	SUPERVISING ENGINEER [Signature]	DATE 12/23/88
GROUP SUPERVISING ENGINEER	DATE	MANAGER, STATION TECHNICAL [Signature]	DATE 12/23/88
SUPERVISING ENGINEER I	DATE	QUALITY ASSURANCE [Signature]	DATE 12/27/88
MANAGER, STATION TECHNICAL	DATE	CONVERSION TO DCN DATE 2-7-89	
QUALITY ASSURANCE	DATE	PROJECT ADMINISTRATOR [Signature]	

APERTURE CARD

APERTURE CARD

8902270311-167



16X

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APPENDIX
 CANCEL
 Also Available in
 a separate Control

8902270311-168

Southern California Edison Company
 Songs 1, 2 & 3

INTERIM DESIGN CHANGE
 NOTICE (IDCN)/DESIGN
 CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

DCP 5113.04SE REV 0 SHEET 6 of 25

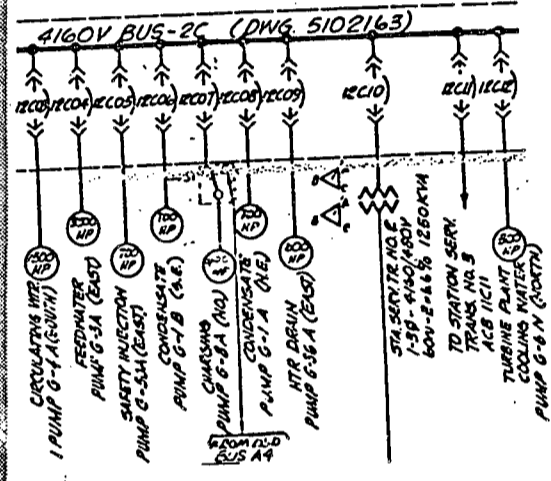
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DRAWING NO.		REV.	DATE	BY	QUALITY CLASS
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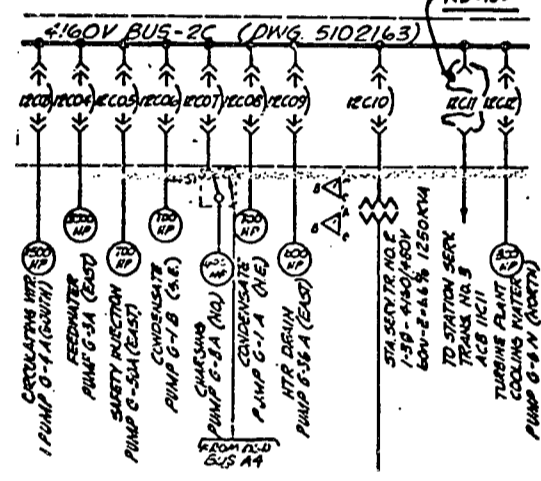
Date 12-15-88 Page 3 of 3
 By ARTLAND KAAI

DESCRIPTION OF CHANGE

BEFORE



AFTER



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Southern California Edison Company
 Songs 1, 2 & 3

INTERIM DESIGN CHANGE
 NOTICE (IDCN)/DESIGN
 CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

DCP 5113.04SE REV 0 SHEET 5 of 25

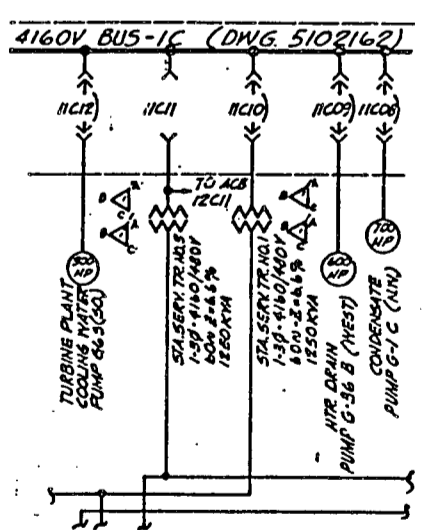
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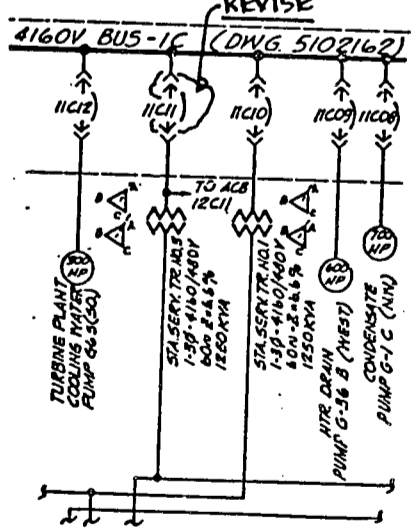
Date 12-15-88 Page 2 of 3
 By ARTLAND KAAI

DESCRIPTION OF CHANGE

BEFORE



AFTER



16X

FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (DCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3	INTERIM DCN NO. DCN NO. 0-2115	
	CDM/DDC USE ONLY CIG	DCN NO. S-4 DOCUMENT NO. 514682B SHEET NO. 1 OF 3
	DCN NO./REV. NO. 386A.00TJZ/0 DCN CONVERSION NO. 36	TRIC (714) 975-4790 DASH 9-7-88 DRADM I.D. OC SREAN

1. Originator **KAYOKO WARNER**

Document Title
MAIN ONELINE DIAGRAM

DESCRIPTION OF CHANGE
**AT 4.16KV BUS 2C BKR FEED 12C14,
 REMOVE SWYD SUPPLY TRANSFORMER & ADD
 TRANSFER SW "A4S2" & AFWP MOTOR 4-10W**

RECEIVED CDM
 JAN 25 1989
 SITE FILE COPY

8-28-11/16/81
 DCP# **3364** : 00TJZ REV 0 SHT 20 OF 35P

2. Other Affected Documents	3. Affected Systems	4. Design Approvals
51919T9	AFW ELE	DATE 9-7-88 [Signature] DATE 11/11/88 [Signature] DATE 5/8/88 [Signature] DATE 11/11/88 [Signature] DATE [Signature] DATE
		DATE 1/25/89 [Signature] DATE [Signature]

5. SCE/Contractor Project Administration
 Conversion to DCN Date **1/25/89**
C. Stocker
 REPRESENTATIVE PROJECT ADMINISTRATION

KISSAO
 SH 1

MICROFILMED FROM
 17X

FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

BOOKS 1, 2 & 3

SUPPLEMENTAL PAGE

INTERIM DCN NO.					
IDCN NUMBER S-4					
DRAWING NO.	SHEET NO.	REV.	DCN CONV.		QUALITY CLASS
			DATE	SUB. NO.	
5146828	-	25	26	36	SR EAN

Date 11-16-87 Page 2 of 3

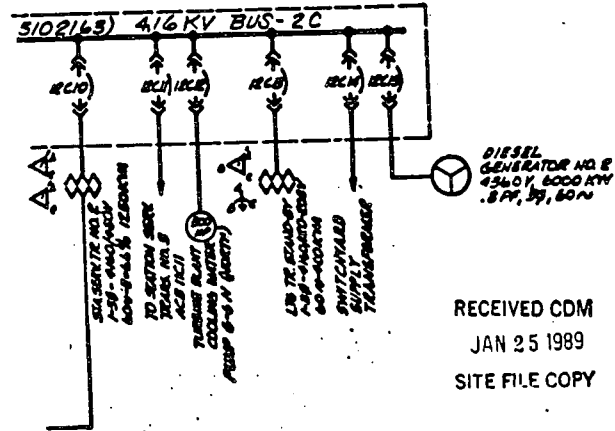
By K. WARNER

DESCRIPTION OF CHANGE

BEFORE

POOR QUALITY DOCUMENT
BEST AVAILABLE COPY

DCP# 3364.00TJZ REV 0 SHT 2 OF 3



DE 5008-2 5/87

FLUOR ENGINEERS, INC.
POWER DIVISION

INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)

BOOKS 1, 2 & 3

SUPPLEMENTAL PAGE

INTERIM DCN NO.					
IDCN NUMBER S-4					
DRAWING NO.	SHEET NO.	REV.	DCN CONV.		QUALITY CLASS
			DATE	SUB. NO.	
5146828	-	25	26	36	SR EAN

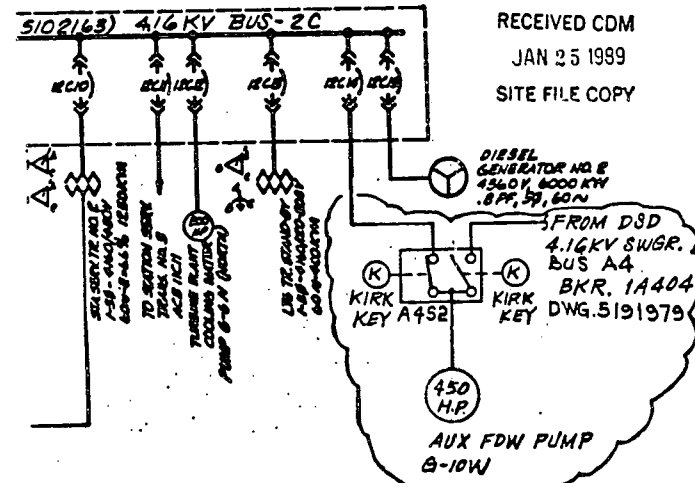
Date 11-16-87 Page 3 of 3

By K. WARNER

DESCRIPTION OF CHANGE

AFTER

DCP# 3364.00TJZ REV 0 SHT 3 OF 3



DE 5008-2 5/87

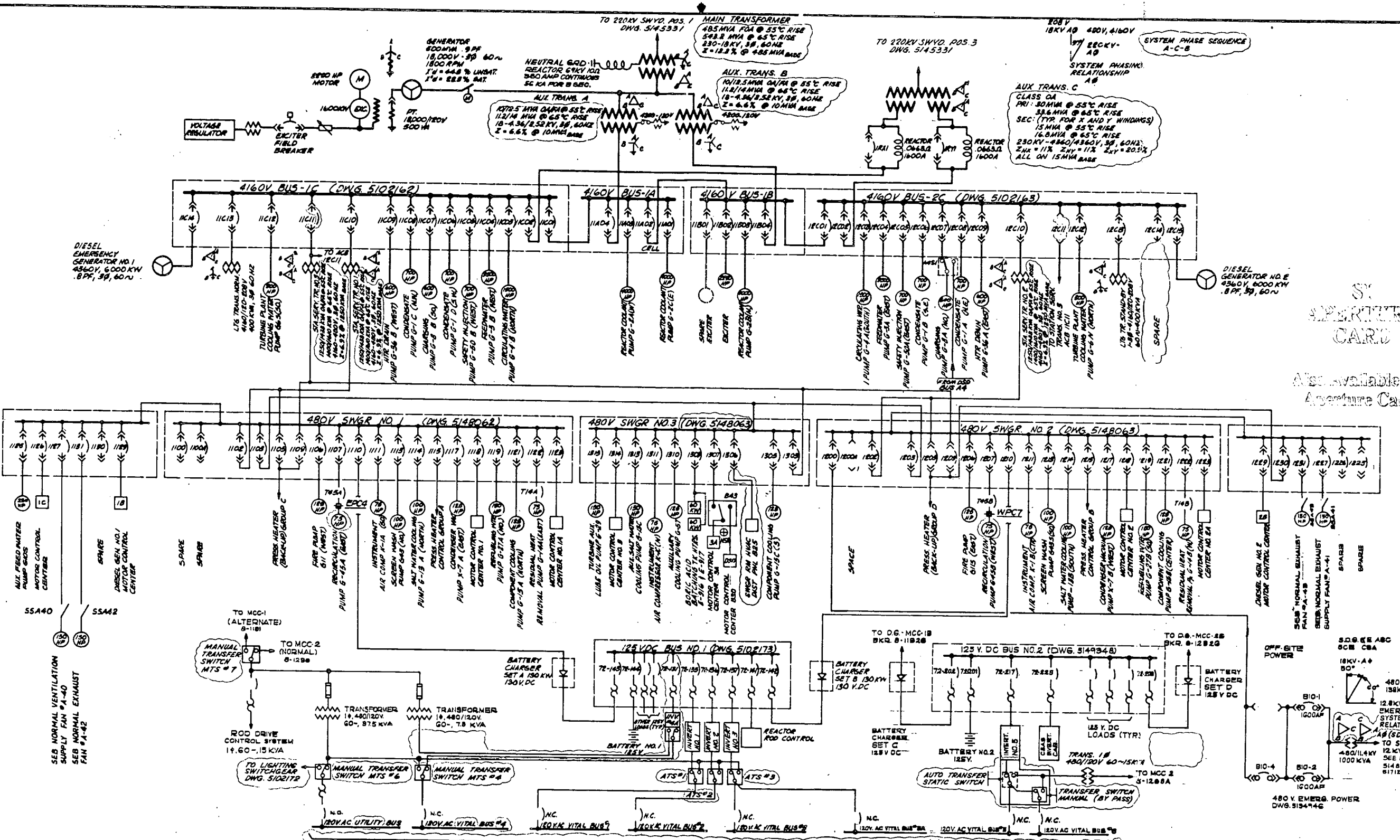
ST
APERTURE
CARD

890227031 11-169

Also Available On
Aperture Card

MICROFILMED FROM

17X



APERTURE CARD

Also Available On Aperture Card


8902270311-170

SONGS I
SAFETY RELATED
EXCEPT AS NOTED


SUPERSEDES DWG. # 5146828-19

Rev.	Description	Date	By	Appr.	Rev.	Description	Date	By	Appr.
26	AS BUILT - INCORP DCN 32, 33	7/13/86	WJ	SA	3341	Location	SAN ONOFRE NUCLEAR GEN STA		
27	AS BUILT - INCORP DCN 30, 31	7/13/86	WJ	SA	2203				
28	AS BUILT - INCORP DCN 29	11/11/85	WJ	SA	60	EAC 3085			
29	AS BUILT - INCORP DCN 28	11/11/85	WJ	SA	3488				
30	AS BUILT - INCORP DCN 27	11/11/85	WJ	SA	3489				
31	AS BUILT - INCORP DCN 26	11/11/85	WJ	SA	3490				
32	AS BUILT - INCORP DCN 25	11/11/85	WJ	SA	3491				
33	AS BUILT - INCORP DCN 24	11/11/85	WJ	SA	3492				
34	AS BUILT - INCORP DCN 23	11/11/85	WJ	SA	3493				
35	AS BUILT - INCORP DCN 22	11/11/85	WJ	SA	3494				
36	AS BUILT - INCORP DCN 21	11/11/85	WJ	SA	3495				
37	AS BUILT - INCORP DCN 20	11/11/85	WJ	SA	3496				
38	AS BUILT - INCORP DCN 19	11/11/85	WJ	SA	3497				
39	AS BUILT - INCORP DCN 18	11/11/85	WJ	SA	3498				
40	AS BUILT - INCORP DCN 17	11/11/85	WJ	SA	3499				
41	AS BUILT - INCORP DCN 16	11/11/85	WJ	SA	3500				
42	AS BUILT - INCORP DCN 15	11/11/85	WJ	SA	3501				
43	AS BUILT - INCORP DCN 14	11/11/85	WJ	SA	3502				
44	AS BUILT - INCORP DCN 13	11/11/85	WJ	SA	3503				
45	AS BUILT - INCORP DCN 12	11/11/85	WJ	SA	3504				
46	AS BUILT - INCORP DCN 11	11/11/85	WJ	SA	3505				
47	AS BUILT - INCORP DCN 10	11/11/85	WJ	SA	3506				
48	AS BUILT - INCORP DCN 9	11/11/85	WJ	SA	3507				
49	AS BUILT - INCORP DCN 8	11/11/85	WJ	SA	3508				
50	AS BUILT - INCORP DCN 7	11/11/85	WJ	SA	3509				
51	AS BUILT - INCORP DCN 6	11/11/85	WJ	SA	3510				
52	AS BUILT - INCORP DCN 5	11/11/85	WJ	SA	3511				
53	AS BUILT - INCORP DCN 4	11/11/85	WJ	SA	3512				
54	AS BUILT - INCORP DCN 3	11/11/85	WJ	SA	3513				
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56	AS BUILT - INCORP DCN 1	11/11/85	WJ	SA	3515				

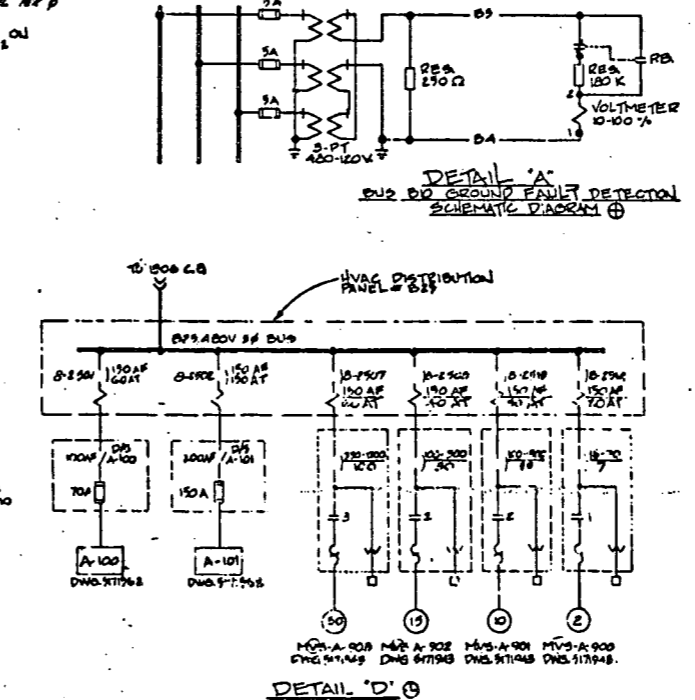
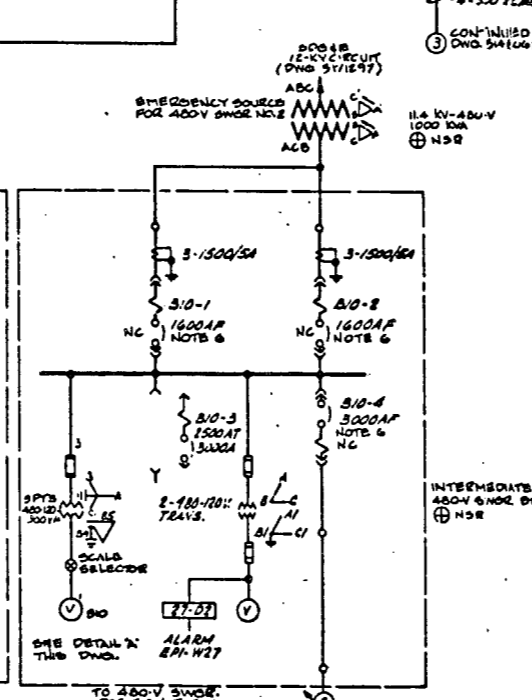
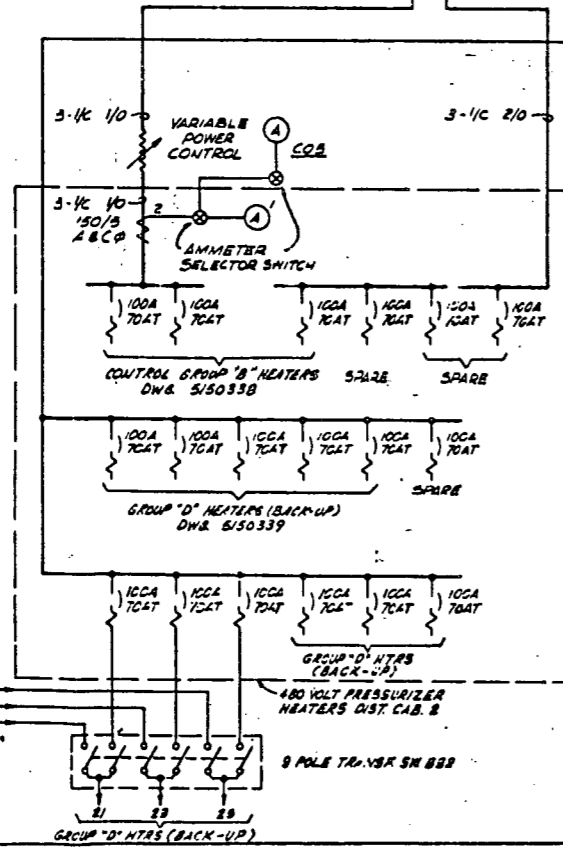
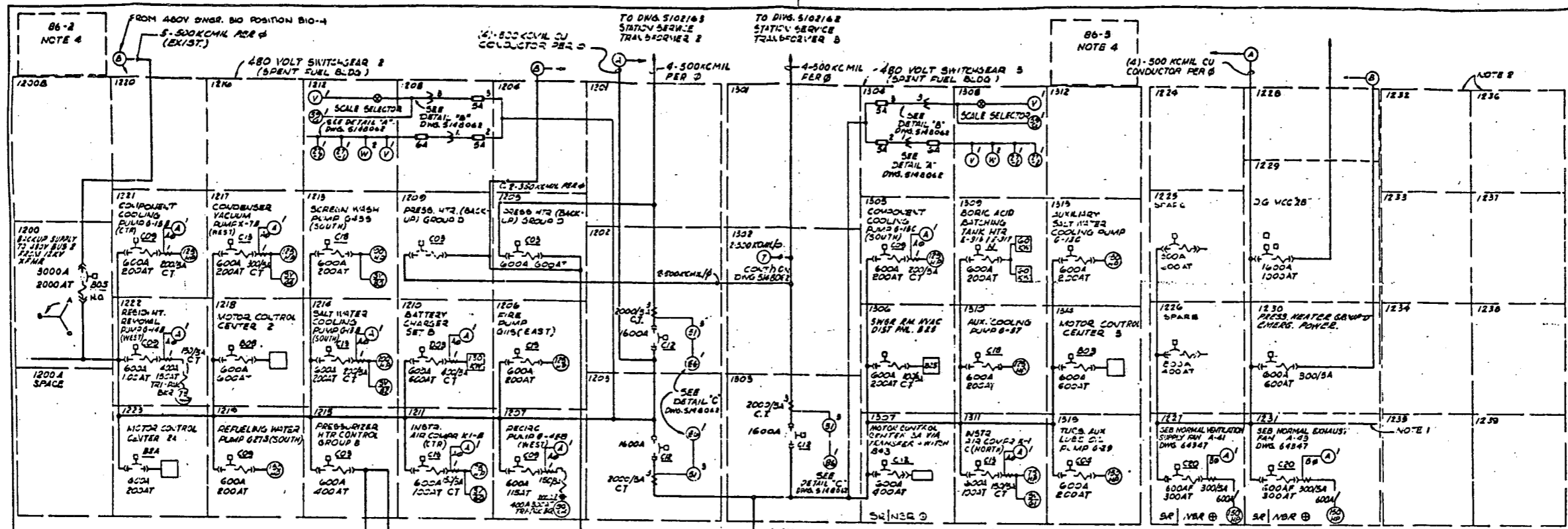
5146828-26

 Southern California Edison Company INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS 1, 2 & 3)		FORM/DOC USE ONLY FORM NO. S-4 DOCUMENT NO. 5148063 REV. NO. 11	FORM NO. 1-88-3515 DEP. NO. 1-3515.0BE REV. NO. 0 VER. NO. 40 REV. NO. 11
1. ORIGINATOR: T. HONG (ELEC) DOCUMENT TITLE: 0/L DIAG. 480V SWGR NO. 2 & 3 DESCRIPTION OF CHANGE:		FAX: 807-5237 DATE: 9-15-88 DRAWN: E-CG CHECKED: SREAN	
1. SPARE SWGR. 1210, AND RESERVE FOR FUTURE TEMPORARY POWER TO BATTERY CHARGER B IN MODE 5 & 6 SEE SUPPLEMENTAL PAGES N/A			
Ref: Design Calculation/Specification Numbers		Seismic Category: N/A	
2. Other Affected Documents <input type="checkbox"/> None <input checked="" type="checkbox"/> Specific affected documents are listed on the CC(123) 184 associated with the source document checked below: <input checked="" type="checkbox"/> This DCP (Forms CC(123) 183 and CC(123) 184 attached) <input type="checkbox"/> This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached) <input type="checkbox"/> The following document:			
3. Affected Systems: ELE			
A. SCE Design Approvals			
NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/NEE & L	
OTHER	DATE	OTHER	DATE
OTHER	DATE	CHECKED	DATE
DESIGNER	DATE	DESIGNER	DATE
INDEPENDENT REVIEW ENGR.	DATE	RESPONSIBLE ENGINEER	DATE
RESPONSIBLE ENGINEER	DATE	FIELD/PLANT SUPERVISOR	DATE
GROUP SUPERVISING ENGINEER	DATE	FIELD SUPERVISOR	DATE
SUPERVISING ENGINEER I	DATE	FIELD SUPERVISOR	DATE
MANAGER, STATION VEGETATION	DATE	FIELD SUPERVISOR	DATE
QUALITY ASSURANCE	DATE	QUALITY ASSURANCE	DATE
Conversion to DCN Date: 2-8-89		SEE PROJECT ADMINISTRATION	

DCP 1-3515.0BE REV 0 SHEET 60

 Southern California Edison Company INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS 1, 2 & 3)		INTERIM DCN NO. _____ PROJECT NO. S-4 DOCUMENT NO. 5148063 REV. NO. 11 DATE _____	PROJECT NO. 1-88-3515 REV. NO. 1-3515.0BE REV. NO. 0 REV. NO. 40 REV. NO. 11
OPERATOR T. HONG (ELEG) PHONE NO. 807-5237 DATE 9-15-88 REPORT TITLE 0% DIAG. 480V SWGR NO. 2 R3 E-00 SREAN		DESCRIPTION OF CHANGE <p style="text-align: center;">1. SPARE SWGR. 1210, AND RESERVE FOR FUTURE TEMPORARY POWER TO BATTERY CHARGER B IN MODE 5 & 6</p> <p style="text-align: center;">SEE SUPPLEMENTAL PAGES</p> <p style="text-align: center;">N/A</p>	
Ref: Design Calculation/Specification Numbers N/A		Seismic Category N/A	
2. Other Affected Documents <input type="checkbox"/> None <input checked="" type="checkbox"/> Specific affected documents are listed on the CC(123) 184 associated with the source document checked below: <input checked="" type="checkbox"/> This DCP (Forms CC(123) 183 and CC(123) 184 attached) <input type="checkbox"/> This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached) <input type="checkbox"/> The following document:			
3. Affected Systems ELE			
4. SCE Design Approvals			
NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/MES & L	
OTHER	DATE	OTHER	DATE
CHECKED	DATE	CHECKED	DATE
INDEPENDENT REVIEW ENG.	DATE	INDEPENDENT REVIEW ENG.	DATE
RESPONSIBLE ENGINEER	DATE	RESPONSIBLE ENGINEER	DATE
GROUP SUPERVISING ENGINEER	DATE	GROUP SUPERVISING ENGINEER	DATE
SUPERVISING ENGINEER I	DATE	SUPERVISING ENGINEER I	DATE
MANAGER, STATION VERIFICATION	DATE	MANAGER, STATION VERIFICATION	DATE
QUALITY ASSURANCE	DATE	QUALITY ASSURANCE	DATE
Conversion to DCN Date 2-8-89		SEE PROJECT ADMINISTRATION	

DCP 1-3515.0BE REV 0 SHEET 60



NOTES:

1. FUTURE BUS EXTENSION.
2. FUTURE UNITS.
3. FOR DETAILS AND PREFERRED TABLES SEE DWG. 5148063.
4. FOR DETAILS SEE DWG. 455866.
5. FOR DC CONTROL CIR. SEE SWGR. 5 DWG. 5151906.
6. OVER CURRENT DEVICES ARE DISABLED BREAKERS ARE USED AS DISCONNECTS ONLY.

CAUTION:

1. ABOVE FROM EMERGENCY SOURCE 11.4 KV SOURCE 60° OUT OF PHASE WITH DEF. 480V.
2. SEE 480V BUS 5148063.
3. BREAKER 1200 NORMALLY OPEN. BREAKER 1200 MAY BE CLOSED ONLY WHEN 480V SWGR. 2 HAS BEEN DISCONNECTED FROM ALL NORMAL STATION SOURCES.
4. NO MORE THAN 11 (ELEVEN) BREAKERS SHALL BE CONNECTED TO ANY CONTROL GROUP OR BACKUP GROUP.

INTERMEDIATE 480V SWGR.

13	45	BUILT-IN DEF. OF
14	46	BUILT-IN DEF. OF
15	47	BUILT-IN DEF. OF
16	48	BUILT-IN DEF. OF
17	49	BUILT-IN DEF. OF
18	50	BUILT-IN DEF. OF
19	51	BUILT-IN DEF. OF
20	52	BUILT-IN DEF. OF
21	53	BUILT-IN DEF. OF
22	54	BUILT-IN DEF. OF
23	55	BUILT-IN DEF. OF
24	56	BUILT-IN DEF. OF
25	57	BUILT-IN DEF. OF
26	58	BUILT-IN DEF. OF
27	59	BUILT-IN DEF. OF
28	60	BUILT-IN DEF. OF
29	61	BUILT-IN DEF. OF
30	62	BUILT-IN DEF. OF
31	63	BUILT-IN DEF. OF
32	64	BUILT-IN DEF. OF
33	65	BUILT-IN DEF. OF
34	66	BUILT-IN DEF. OF
35	67	BUILT-IN DEF. OF
36	68	BUILT-IN DEF. OF
37	69	BUILT-IN DEF. OF
38	70	BUILT-IN DEF. OF
39	71	BUILT-IN DEF. OF
40	72	BUILT-IN DEF. OF
41	73	BUILT-IN DEF. OF
42	74	BUILT-IN DEF. OF
43	75	BUILT-IN DEF. OF
44	76	BUILT-IN DEF. OF
45	77	BUILT-IN DEF. OF
46	78	BUILT-IN DEF. OF
47	79	BUILT-IN DEF. OF
48	80	BUILT-IN DEF. OF
49	81	BUILT-IN DEF. OF
50	82	BUILT-IN DEF. OF
51	83	BUILT-IN DEF. OF
52	84	BUILT-IN DEF. OF
53	85	BUILT-IN DEF. OF
54	86	BUILT-IN DEF. OF
55	87	BUILT-IN DEF. OF
56	88	BUILT-IN DEF. OF
57	89	BUILT-IN DEF. OF
58	90	BUILT-IN DEF. OF
59	91	BUILT-IN DEF. OF
60	92	BUILT-IN DEF. OF
61	93	BUILT-IN DEF. OF
62	94	BUILT-IN DEF. OF
63	95	BUILT-IN DEF. OF
64	96	BUILT-IN DEF. OF
65	97	BUILT-IN DEF. OF
66	98	BUILT-IN DEF. OF
67	99	BUILT-IN DEF. OF
68	100	BUILT-IN DEF. OF



Southern Calif. Edison Company
Songs 1, 2 & 3

INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

BEFORE

INTERIM DCN NO. _____

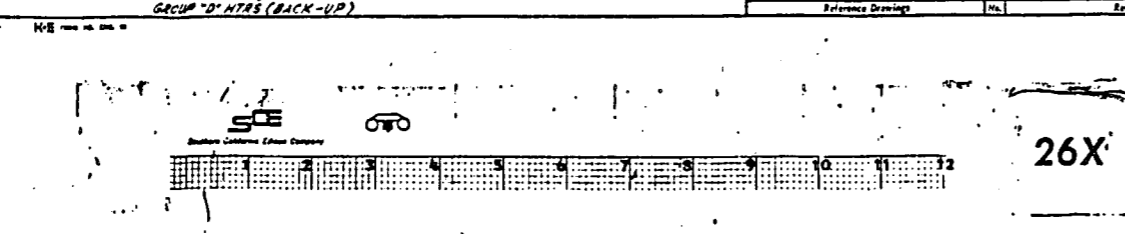
DCN NUMBER **5-2**

DATE	BY	REV.	DATE	BY	REV.
5/15/75	T. HONG	1	5/15/75	T. HONG	1

5148063 - 11 11 40 EAN

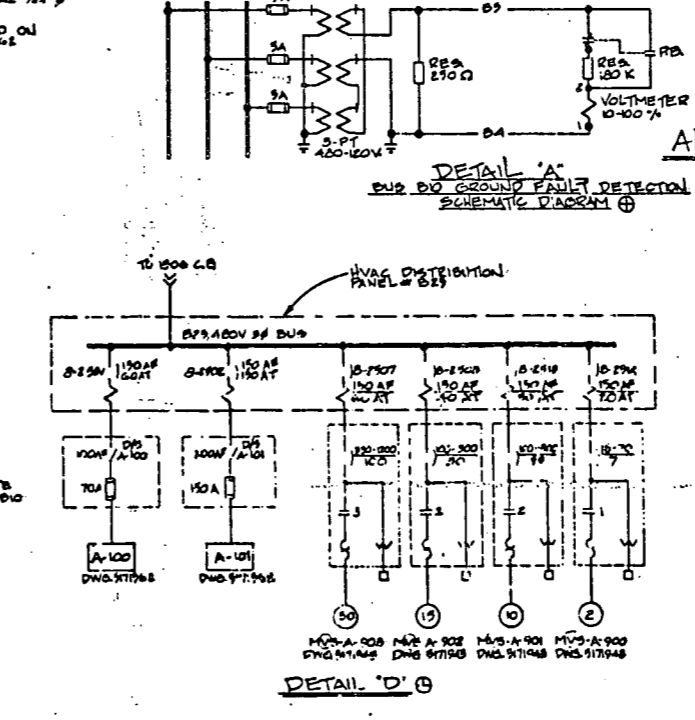
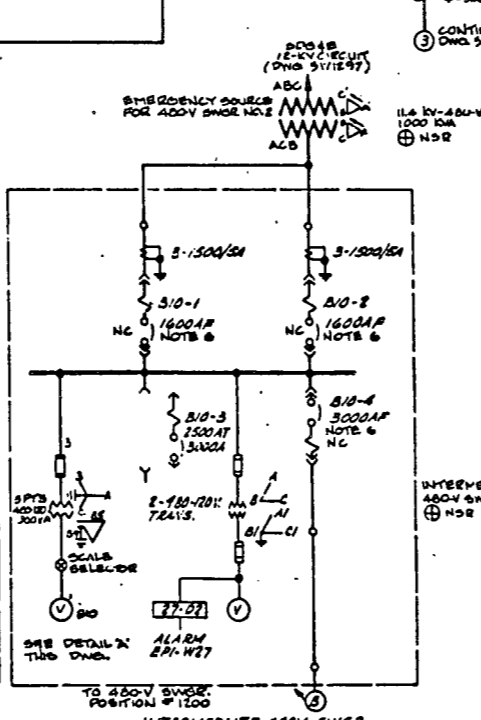
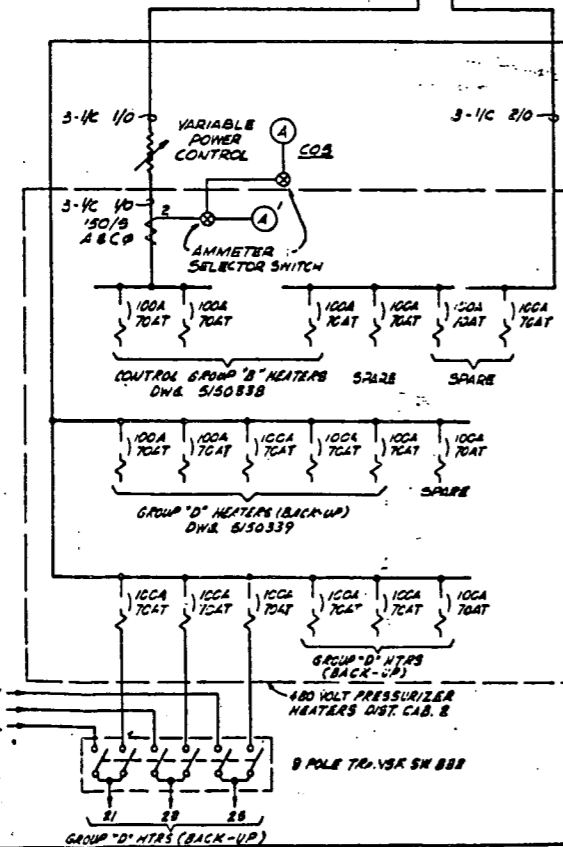
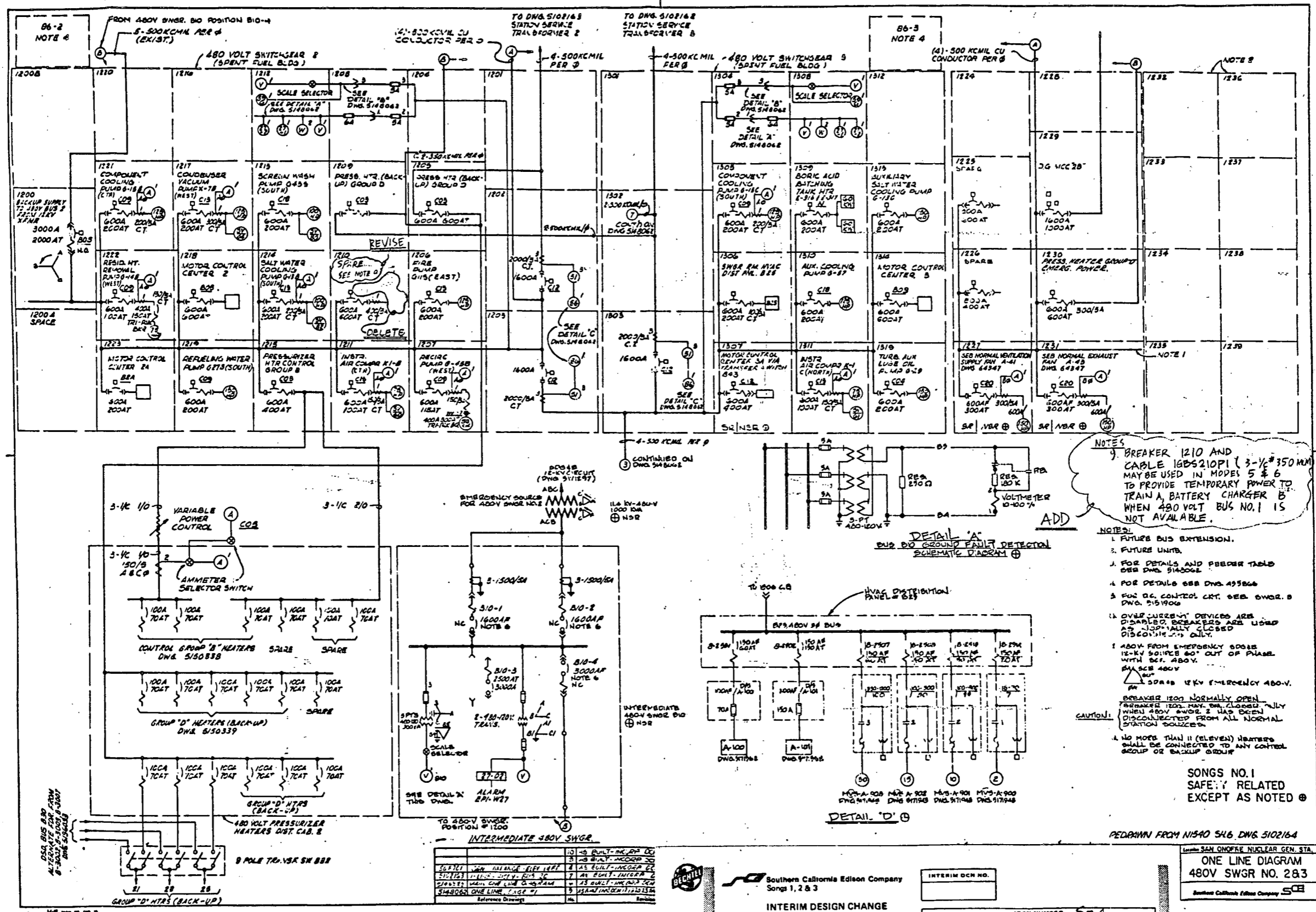
SONGS NO. 1
SAFE: ? RELATED
EXCEPT AS NOTED

5148063-11



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8902270314-17



NOTES
 1. BREAKER 1210 AND CABLE 16BS210P1 (3-1/2" 350MM) MAY BE USED IN MODES 5 & 6 TO PROVIDE TEMPORARY POWER TO TRAIN A BATTERY CHARGER B WHEN 480 VOLT BUS NO. 1 IS NOT AVAILABLE.

- NOTES:**
1. FUTURE BUS EXTENSION.
 2. FUTURE UNITS.
 3. FOR DETAILS AND FEEDER TABLES SEE DWS 514006.
 4. FOR DETAILS SEE DWS 495864.
 5. FOR 0% CONTROL CRT. SEE SWGR. 8 DWS 515190.
 6. OVERCURRENT DEVICES ARE DISABLED. BREAKERS ARE USED AS DISCONNECTS ONLY.
 7. 480V FROM EMERGENCY SOURCE IS 15KV SOURCE 60° OUT OF PHASE WITH 480V.
 8. 500A 15KV EMERGENCY 480V.
 9. BREAKER 1200 NORMALLY OPEN.
 10. BREAKER 1200 MAY BE CLOSED ONLY WHEN 480V SWGR 2 HAS BEEN DISCONNECTED FROM ALL NORMAL STATION SOURCES.
- CAUTION:**
1. NO MORE THAN 11 (ELEVEN) HEATERS SHALL BE CONNECTED TO ANY CONTROL GROUP OR BACKUP GROUP.

SONGS NO. 1
 SAFETY RELATED
 EXCEPT AS NOTED

10	15	BUILT-NC	00
11	20	BUILT-NC	00
12	25	BUILT-NC	00
13	30	BUILT-NC	00
14	35	BUILT-NC	00
15	40	BUILT-NC	00
16	45	BUILT-NC	00
17	50	BUILT-NC	00
18	55	BUILT-NC	00
19	60	BUILT-NC	00
20	65	BUILT-NC	00
21	70	BUILT-NC	00
22	75	BUILT-NC	00
23	80	BUILT-NC	00
24	85	BUILT-NC	00
25	90	BUILT-NC	00
26	95	BUILT-NC	00
27	100	BUILT-NC	00
28	105	BUILT-NC	00
29	110	BUILT-NC	00
30	115	BUILT-NC	00
31	120	BUILT-NC	00
32	125	BUILT-NC	00
33	130	BUILT-NC	00
34	135	BUILT-NC	00
35	140	BUILT-NC	00
36	145	BUILT-NC	00
37	150	BUILT-NC	00
38	155	BUILT-NC	00
39	160	BUILT-NC	00
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41	170	BUILT-NC	00
42	175	BUILT-NC	00
43	180	BUILT-NC	00
44	185	BUILT-NC	00
45	190	BUILT-NC	00
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79	360	BUILT-NC	00
80	365	BUILT-NC	00
81	370	BUILT-NC	00
82	375	BUILT-NC	00
83	380	BUILT-NC	00
84	385	BUILT-NC	00
85	390	BUILT-NC	00
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87	400	BUILT-NC	00
88	405	BUILT-NC	00
89	410	BUILT-NC	00
90	415	BUILT-NC	00
91	420	BUILT-NC	00
92	425	BUILT-NC	00
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95	440	BUILT-NC	00
96	445	BUILT-NC	00
97	450	BUILT-NC	00
98	455	BUILT-NC	00
99	460	BUILT-NC	00
100	465	BUILT-NC	00



Southern California Edison Company
 Songs 1, 2 & 3

INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
 SUPPLEMENTAL PAGE

AFTER

INTERIM DCN NO.	
IDCN NUMBER	5-4
BRANCH NO.	5148063
REV. NO.	11
DATE	11/40
REV. BY	EAN
CHKD BY	
APP. BY	
DATE	

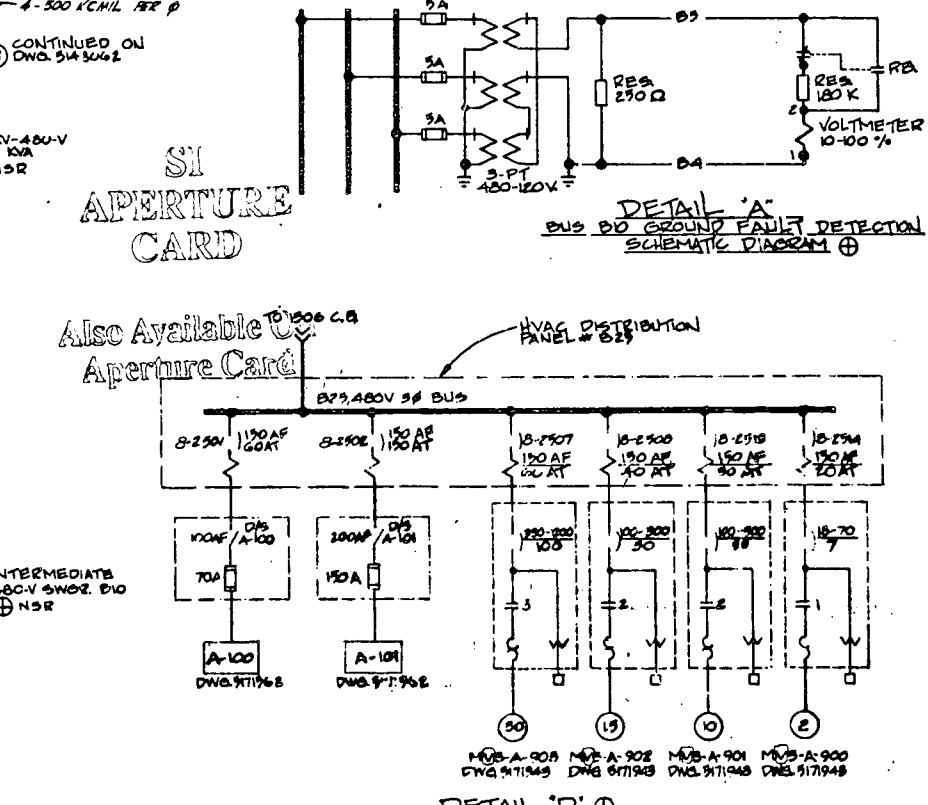
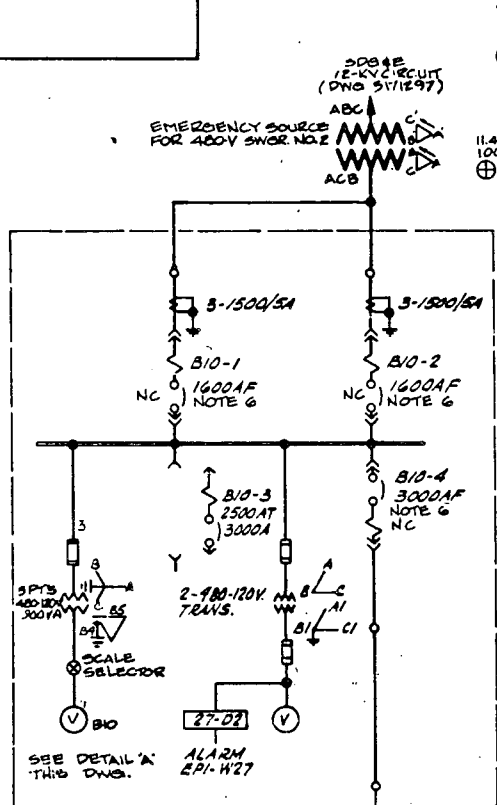
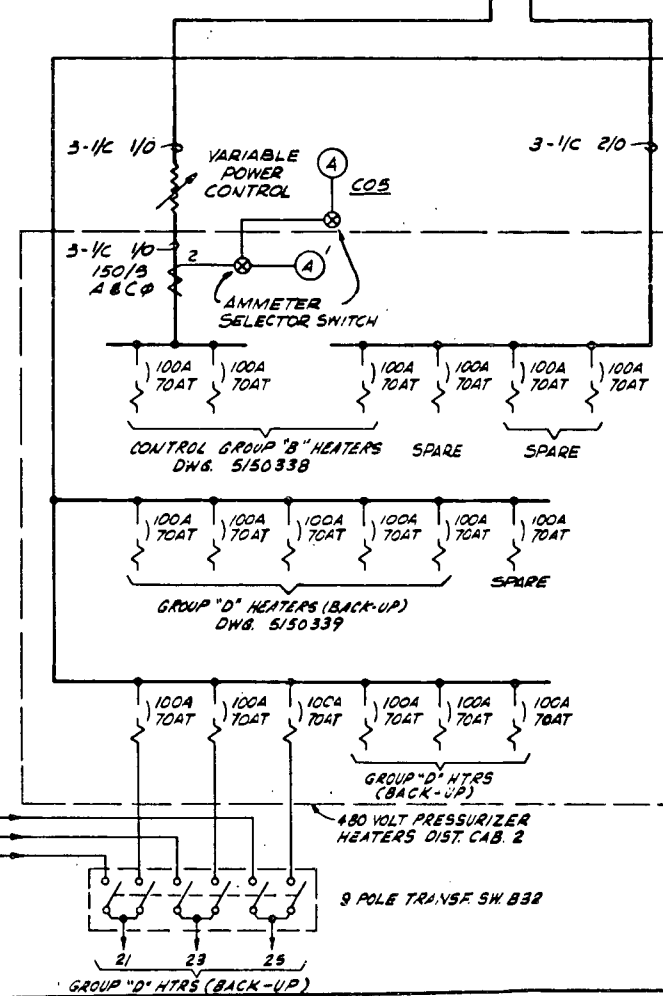
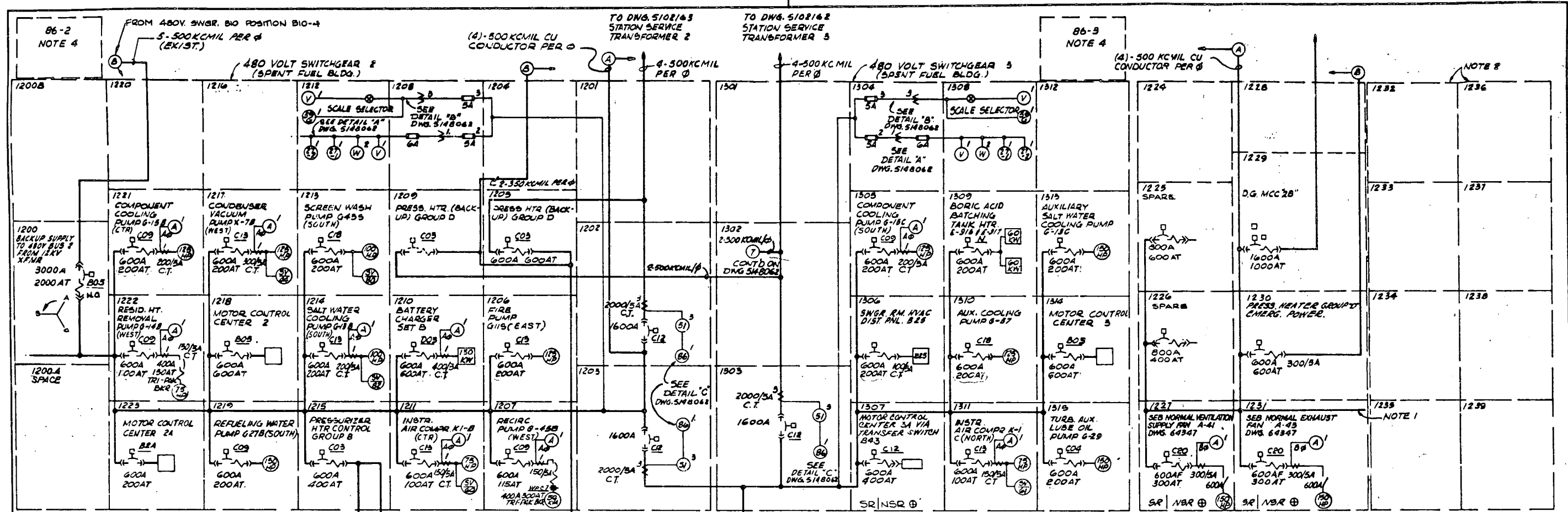
SCED
 ONE LINE DIAGRAM
 480V SWGR NO. 283
 Southern California Edison Company

5148063-11

Date 11/15/82 Page 3 of 3
 By T. Hong
 DCN 1-3515.0BE REV. 2 SHEET 62

APPROVAL CARD

Also Available On
 Approval Card



- NOTES:**
1. FUTURE BUS EXTENSION.
 2. FUTURE UNITS.
 3. FOR DETAILS AND FEEDER TABLES SEE DWG. 5148062.
 4. FOR DETAILS SEE DWG. 455866.
 5. FOR O.C. CONTROL CKT. SEE SWGR. 5 DWG. 5151900.
 6. OVERCURRENT DEVICES ARE DISABLED. BREAKERS ARE USED AS NORMALLY CLOSED DISCONNECTS ONLY.
 7. 480V FROM EMERGENCY SOURCE 12-KV SOURCE 60° OUT OF PHASE WITH SEE 480V. SA SEE 480V 60° SPARE 12KV EMERGENCY 480V.
- CAUTION:**
- BREAKER 1200 NORMALLY OPEN. BREAKER 1200 MAY BE CLOSED ONLY WHEN 480V SWGR. 2 HAS BEEN DISCONNECTED FROM ALL NORMAL STATION SOURCES.
 - 8. NO MORE THAN 11 (ELEVEN) HEATERS SHALL BE CONNECTED TO ANY CONTROL GROUP OR BACKUP GROUP.

SONGS NO. 1
SAFETY RELATED
EXCEPT AS NOTED

PEDRAWN FROM 1540 546 DWG. 5102164

Reference Drawing	No.	Revisions	Date	Appr'd	O.E.	C.M.	Made	10. No.	Scale	10.0%
5148063	10	AS BUILT-INCORP DCN 38	12-20-54							
5148063	9	AS BUILT-INCORP DCN 35 56 27	11-21-54							
5148063	8	AS BUILT-INCORP DCN 33 34	4-23-54							
5148063	7	AS BUILT-INCORP DCN 31 32	3-25-54							
5148063	6	AS BUILT-INCORP DCN 30	11-11-53							
5148063	5	AS BUILT-INCORP DCN 29	11-11-53							
5148063	4	AS BUILT-INCORP DCN 28	11-11-53							
5148063	3	AS BUILT-INCORP DCN 27	11-11-53							
5148063	2	AS BUILT-INCORP DCN 26	11-11-53							
5148063	1	AS BUILT-INCORP DCN 25	11-11-53							

ONE LINE DIAGRAM
480V SWGR NO. 2&3

8902270311-173

5148063-11

<p>Southern California Edison Company FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS 1, 2 & 3)</p>	FORM/DOC USE ONLY	PFE NO.
	FORM NO. <u>J-2125</u>	REV. NO. <u>1-5113.04SE</u>
	DOCUMENT NO. <u>5149178</u>	REV. NO. <u>9</u>
	SHEET	DCN VERSION NO. <u>38</u>

ORIGINATOR: NOEL M. BASILIO PAR: 87376 DATE: 1-13-89
 DOCUMENT TITLE: LOAD SEQ. SCH. DRAWN: IC-10 BY: SR

DESCRIPTION OF CHANGE

ADD DESCRIPTION TO SEQ. CONTACT 18-2 & 18-4

REF: 8

PE WAIVER REQUIRED	<input checked="" type="checkbox"/> YES
	<input type="checkbox"/> NO
PFO REVISION REQUIRED	<input checked="" type="checkbox"/> YES
	<input type="checkbox"/> NO

2. Other Affected Documents

None

Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:

This DCP (Forms CC(123) 183 and CC(123) 184 attached)

This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)

The following document: E-7392 TO DWG. SIS 1922

3. Affected Systems SIS, ELE

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/RES & L	
OTHER	DATE	CHECKER	DATE
		<u>Nuclear Jose Marra</u>	<u>1/14/89</u>
		<u>RES</u>	<u>1-13-89</u>
		<u>CONSTRUCTION</u>	<u>1-13-89</u>
		<u>DISCIPLINE SUPERVISOR</u>	<u>1-14-89</u>
		<u>PROJECT ENGINEER</u>	<u>1/14/89</u>
		<u>DISCIPLINE CHIEF</u>	<u>1/15/89</u>
		<u>QUALITY ASSURANCE</u>	<u>1-15-89 1526</u>

Conversion to DCN Date 2-7-89

APERTURE CARD

APERTURE CARD

8902270311-174

16X

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SCED Southern California Edison Company
Songs 1, 2 & 3

INTERIM DCN NO.

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

FIELD NUMBER J-2125					
DRAWING NO.	SHEET NO.	REV. NO.	REV. DATE		QUALITY CLASS
			DATE	BY	
5149178	-	9	9	33	SR

BEFORE

THIS IS THE AFTER CONDITION
OF FIELD E-6885

Date 1-13-89 Page 2 of 3
By NMBASILIO

DESCRIPTION OF CHANGE

FLAG. NO SEE NOTE 5	FUNCTIONAL AND DEVICE DESCRIPTION	DEVICE IDENTIFICATION	SERVED FROM	BKR I.D.	POWER REQM'TS	EVENT	OUT PUT		
							CONTACT TYPE	CONTACT TYPE	TERMINATION SEE NOTE 5
128	SPARE	—	—	—	—	SIS/SISLOP	MAINTAINED	NC	TB18-244

SCED Southern California Edison Company
Songs 1, 2 & 3

INTERIM DCN NO.

FIELD INTERIM DESIGN CHANGE
NOTICE (IDCN)/DESIGN
CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

FIELD NUMBER J-2125					
DRAWING NO.	SHEET NO.	REV. NO.	REV. DATE		QUALITY CLASS
			DATE	BY	
5149178	-	9	9	33	SR

AFTER

Date 1-13-89 Page 3 of 3
By NMBASILIO

DESCRIPTION OF CHANGE

FLAG. NO SEE NOTE 5	FUNCTIONAL AND DEVICE DESCRIPTION	DEVICE IDENTIFICATION	SERVED FROM	BKR I.D.	POWER REQM'TS	EVENT	OUT PUT		
							CONTACT TYPE	CONTACT TYPE	TERMINATION SEE NOTE 5
128	TRIP SST #3 SUPPLY BREAKER	152-11C11	4160V #1C	11C11	—	SIS/SISLOP	MAINTAINED	NO (NOTED)	TB18-244

NOTE:

10. FIELD TO REWIRE CONTACT TO NO.

16X

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Also Available On
Apostrophe Card

APPROPRIATE
CARD

SI

8902270311-175

TIME	PROCESS PRIORITY	FLAG NO. SEE NOTE 5	FUNCTIONAL AND DEVICE DESCRIPTION	DEVICE IDENTIFICATION	SERVED FROM	BKR. I. D.	POWER REQNTS.	EVENT	OUTPUT			LOAD ACTUATION TIMING					REMARKS	LEGEND:					
									CONTACT TYPE	CONTACT TYPE	TERMINATION SEE NOTE 6	RELAY DRVR I. D. SEE NOTE 7	0	10	20	30			60	300			
0 SEC.	A1A	101	TRIP REACTOR BKR "B"	SCRAM BKR. "B"	-	-	DC	LOP/SIS/SISLOP	MAINTAINED	NO	TB10-1#3	SLOT 2/0 CRT.A	Δ										
	A2A	102	(REACTOR PROTECTION SCRAM SIGNAL "B")	SCRAM BKR UV SIG.	-	-	DC	LOP/SIS/SISLOP	MAINTAINED	NO	TB10-5#7	SLOT 2/0 CRT.A	Δ										
	A3A #	103	DE-ENERGIZE REACTOR BKR. UV RELAYS	LOCKOUT SWGR 1	SWGR 1	-	-	SISLOP	MAINTAINED	NO	TB10-10#12	SLOT 2/0 CRT.B	Δ										
	A4A	104	ENERGIZE LOCKOUT RELAY	480V UV TRIP	DC	DC	DC	SISLOP	MOMENTARY	NO	TB11-2#4	SLOT 2/0 CRT.A	Δ										
	A4A-1	105	INITIATE 480V U.V. TRIP	LOCKOUT MCC 1	MCC 1	-	-	SISLOP	MAINTAINED	NO	TB11-5#7	SLOT 2/0 CRT.B	Δ										
	A5A	106	ENERGIZE LOCKOUT RELAY	LOCKOUT MCC 1	MCC 1	-	-	SISLOP	MAINTAINED	NO	TB11-9#11	SLOT 2/0 CRT.B	Δ										
	A6A	107	ENERGIZE LOCKOUT RELAY	LOCKOUT MCC 1	MCC 1	-	-	SISLOP	MAINTAINED	NO	TB12-1#3	SLOT 2/0 CRT.B	Δ										
	A7A	108	SPARE	LOCKOUT	-	-	-	SISLOP	MAINTAINED	NO	TB12-5#7	SLOT 2/0 CRT.C	Δ										
	A8A	109	ENERGIZE LOCKOUT RELAY (SPARE)	LOCKOUT MCC 1C	SWGR #1	DC	DC	SISLOP	MOMENTARY	NO	TB12-9#11	SLOT 2/0 CRT.A	Δ										
	A8A-1	110	TRIP & ENERGIZE LOCKOUT RELAY	LOCKOUT	-	-	-	SISLOP	MAINTAINED	NO	TB13-1#3	SLOT 2/0 CRT.C	Δ										
	A9A	111	ENERGIZE LOCKOUT RELAY (SPARE)	TRIP BUS TIE BREAKER	TRIP BKR. DG #1	4160V #1C	11C01	DC	SISLOP	MAINTAINED	NO	TB13-5#7	SLOT 2/0 CRT.C	Δ									
	A9A-1	112	SPARE	BLOCK DG 1 EXCITATION SHUTDOWN CKT.	TRIP BKR. DG #1	4160V #1C	11C14	DC	LOB/LOP/SIS/SISLOP	MOMENTARY	NO	TB13-9#11	SLOT 2/0 CRT.C	Δ									
	A9A-2	113	TRIP BUS TIE BREAKER	TRIP BKR. DG #1	4160V #1C	11C14	DC	LOB/LOP/SIS/SISLOP	MOMENTARY	NO	TB14-1#3	SLOT 1/9 CRT.B	Δ										
	A9A-3	114	BLOCK DG 1 EXCITATION SHUTDOWN CKT.	TRIP BKR. DG #1	4160V #1C	11C14	DC	LOB/LOP/SIS/SISLOP	MOMENTARY	NO	TB14-5#7	SLOT 1/9 CRT.A	Δ										
	A10A	115	TRIP DIESEL GEN. CIRCUIT BREAKER	TRIP XFMR LTG.	4160V #1C	11C13	DC	LOB/LOP/SIS/SISLOP	MOMENTARY	NO	TB14-9#11	SLOT 1/9 CRT.A	Δ										
	A10A-1	116	SPARE	DG 1 FIELD RESET	-	-	DC	SISLOP	MOMENTARY	NO	TB15-1#3	SLOT 1/9 CRT.D	Δ										
	A11A	117	TRIP LIGHTING TRANSFORMER	4KV U.V. TRIP	DC	DC	DC	SISLOP	MOMENTARY	NO	TB15-5#7	SLOT 1/9 CRT.D	Δ										
	A11A-1	118	DG 1 FIELD RESET	TRIP TURB. PLANT CLG. WTR. PUMP	TRIP PUMP G6S	4160V #1C	11C12	DC	SISLOP	MAINTAINED	NO	TB16-1#3	SLOT 2/0 CRT.B	Δ									
	A11A-2	119	INITIATE 4KV U.V. TRIP	LOCKOUT MTR. HTR. PNLS.	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB16-5#7	SLOT 3/11 CRT.B	Δ										
	A12A	120	TRIP TURB. PLANT CLG. WTR. PUMP																				
	A13A	121	LOCKOUT MOTOR HEATER PANELS																				
0 SEC	A1B-1	141	START DIESEL GENERATOR CKT. #1	START DG #1 CKT. 1	-	-	DC	LOB/LOP/SIS/SISLOP	MAINTAINED	NO	TB22-1#3	SLOT 1/9 CRT.B	Δ										
	A1B-2	142	START DIESEL GENERATOR CKT. #2	START DG #1 CKT. 2	-	-	DC	LOB/LOP/SIS/SISLOP	MAINTAINED	NO	TB22-5#7	SLOT 1/9 CRT.B	Δ										
0 SEC	A1C	122	CLOSE FEEDWATER BYPASS/CONTROL VALVE	CV-142, FCV-456	-	-	DC	SIS/SISLOP	MAINTAINED	NO	TB16-9#11	SLOT 3/11 CRT.A	Δ										
	A2C	123	OPEN SAFETY INJECTION HDR. ISOLATION VALVE	HV-851B	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB17-1#3	SLOT 3/11 CRT.A	Δ										
	A3C	124	CLOSE HP FEEDWATER HDR. ISOLATION VALVE	HV-852B	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB17-5#7	SLOT 3/11 CRT.A	Δ										
	A4C #	125	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NC	TB45-1#3	SLOT 3/11 CRT.B	Δ										
	A5C #	126	FIRST OUTANN. AUTO ALERT SYS. (TSC) (FOX 3AMS)	S.I. ALARM	120 VAC	-	-	SIS/SISLOP	MAINTAINED	NC	TB46-1#3	SLOT 3/11 CRT.B	Δ										
	A6C	127	SPARE	-	-	-	-	SISLOP	MOMENTARY	NO	TB17-10#12	SLOT 3/11 CRT.A	Δ										
	A7C	128	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NC	TB18-2#4	SLOT 3/11 CRT.A	Δ										
	A8C	129	TRIP 480V SWGR. BUS #1 & #3 TIE BKR.	TIE BKR 1-3	-	52-1103	-	SIS/SISLOP	MAINTAINED	NO	TB18-6#8	SLOT 3/11 CRT.B	Δ										
	A9C	130	TRIP HEATER DRAIN PUMP	HTR. DRN PMP W	4160V #1C	11C09	600 HP	SIS/SISLOP	MAINTAINED	NO	TB18-10#12	SLOT 3/11 CRT.C	Δ										
	A10C	131	OPEN SAFETY INJECTION HDR. ISOLATION VALVE	HV-853B	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB19-1#3	SLOT 3/11 CRT.D	Δ										
	A11C	132	TRIP CONDENSATE PUMP	COND PMP NW	4160V #1C	11C08	700 HP	SIS/SISLOP	MAINTAINED	NO	TB19-6#8	SLOT 3/11 CRT.C	Δ										
	A12C	133	TRIP CONDENSATE PUMP	COND PMP SW	4160V #1C	11C08	700 HP	SIS/SISLOP	MAINTAINED	NO	TB19-9#11	SLOT 3/11 CRT.C	Δ										
	A12C1	134	CONT. ISO. SYSTEM	R-4, CIS NEST	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB20-1#3	SLOT 3/11 CRT.C	Δ										
	A13C	135	CLOSE LP FEEDWATER HDR. ISOLATION VALVE	HV-854B	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB20-5#7	SLOT 3/11 CRT.D	Δ										
	A14C	136	TRIP FEEDWATER PUMP	G-3B (WEST)	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB20-9#11	SLOT 3/11 CRT.D	Δ										
	A15C	137	OPEN SAFETY INJECTION "LOOP B" VALVE	MOV-850B	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB21-1#3	SLOT 3/11 CRT.B	Δ										
	A16C	138	OPEN SAFETY INJECTION "LOOP C" VALVE	MOV-850C	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB21-5#7	SLOT 3/11 CRT.D	Δ										
	A17C #	139	CLOSE LET DOWN ORIFICE ISOLATION VALVES	CLOSE CV-202, 203, 204	120 VAC	-	-	SIS/SISLOP	MAINTAINED	NO	TB50-1#3	SLOT 3/11 CRT.D	Δ										
10 SEC	A1D	140	CLOSE DIESEL GEN CIRCUIT BREAKER THE FOLLOWING DEVICES ARE MAINTAINED CLOSED TO SUPPLY PWR. TO RESPECTIVE BUSES AS SOON AS THE ABOVE BREAKER IS CLOSED: 4160/480V SERV. TRANSF. #1 [11C10] 480V SWGR. #1 [1102] MCC #1, 1A, 1B [111B, 112B, 113A] BATTERY CHARGER A #1 C [SWGR #1 & MCC 1B] COMMUNICATION PANEL [1110, 11B32, 1195]	CLOSE BKR DS 1	4160V #1C	11C14	-	SISLOP	MAINTAINED	NO	TB21-9#11	SLOT 1/9 CRT.C	Δ										

APERTURE CARD

APERTURE CARD

8902270311-176

SONGS NO. 1
SAFETY RELAY
STATION FILE 1542 SH. 140

5149956	LOP/SIS/SISLOP TRAIN #1	10	AS BUILT BY FLUOR D.C. 3/7/38 (REVISED 1/24/39)	1-39	JGG	LS	SH	-	AS GJ	6P95	Location SAN ONOFRE NUCLEAR GEN. STA.
5149957	LOP/SIS/SISLOP TRAIN #2	9	AS BUILT BY FLUOR D.C. 2/23/38 (REVISED 1/24/39)	1-39	JGG	LS	SH	-	AS GJ	6P95	Location SAN ONOFRE NUCLEAR GEN. STA.
5149979	LOAD SEQ. SCHED. TRAIN #1	8	AS BUILT BY FLUOR D.C. 2/23/38 (REVISED 1/24/39)	1-39	JGG	LS	SH	-	AS GJ	6P95	Location SAN ONOFRE NUCLEAR GEN. STA.
5149180	SEQUENCER LOGIC DIAGRAM	7	REVISED TO REFLECT 21 JULY 1978 - INCORPORATE CHANGES FROM 5149178 AND 5149179	1-78	JGG	LS	SH	-	AS GJ	6P95	Location SAN ONOFRE NUCLEAR GEN. STA.

5149178-10

INTERIM DCN NO. _____ PAGE 1 OF 1

Southern California Edison Company FIELD INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS 1, 2 & 3)		DCN/DCN USE ONLY IDCN NO. J-2124 DOCUMENT NO. 5149179 SHEET 11	PFE NO. 1-5113.04SE REV. NO. 0 REVISION NO. 19 REV. NO. 11						
ORIGINATOR 1. NOEL M. BASILIO	PAF 87376 DCN TITLE LOAD SCHED. SCH.	DATE 1-13-89 DRAWN IC-10 CHECKED 3R							
DESCRIPTION OF CHANGE <p>THIS FIDCN VOIDS IDCN # S-4</p> <p>CONTACT 59-9 & 59-11 WAS CHANGED TO 18-2 & 18-4</p>									
8 REF: _____		<table border="1"> <tr> <td>PE WAIVER REQUIRED</td> <td><input checked="" type="checkbox"/> YES</td> <td><input type="checkbox"/> NO</td> </tr> <tr> <td>PFO REVISION REQUIRED</td> <td><input type="checkbox"/> YES</td> <td><input checked="" type="checkbox"/> NO</td> </tr> </table>		PE WAIVER REQUIRED	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	PFO REVISION REQUIRED	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
PE WAIVER REQUIRED	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO							
PFO REVISION REQUIRED	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO							
2. Other Affected Documents <input type="checkbox"/> None <input checked="" type="checkbox"/> Specific affected documents are listed on the CC(123) 184 associated with the source document checked below: <input type="checkbox"/> This DCP (Forms CC(123) 183 and CC(123) 184 attached) <input type="checkbox"/> This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached) <input checked="" type="checkbox"/> The following document: E-7332 TO DNS 5151922									
3. Affected Systems SIS, ELE									
4. SCE Design Approvals									
NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/NEE & L							
OTHER	DATE	CHECKER	DATE						
		James Alvarado	1/14/89						
CHECKER	DATE	CHECKER	DATE						
		CPM	1-13-89						
RESPONSIBLE ENGINEER	DATE	RESPONSIBLE ENGINEER	DATE						
	1/13/89	James O. Bails	1-13-89						
RESPONSIBLE ENGINEER	DATE	RESPONSIBLE ENGINEER	DATE						
		W. Stumandy	1-14-89						
GROUP SUPERVISING ENGINEER	DATE	DISCIPLINE SUPERVISOR	DATE						
SUPERVISING ENGINEER	DATE	PROJECT ENGINEER	DATE						
		W. Stumandy	1/16/89						
MANAGER, STATION TECHNICAL	DATE	PROJECT ENGINEER	DATE						
QUALITY ASSURANCE	DATE								
	1/15/89								
Conversion to DCN Date	2-7-89	DATE	1-15-89 (150)						

51
 APERTURE
 CARD

Also Available On
 Aperture Card

8902270311-177

16X

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TIME	PROCESS PRIORITY	FLAG NO. SEE NOTE 3	FUNCTIONAL AND DEVICE DESCRIPTION	DEVICE IDENTIFICATION	SERVED FROM	BKR. I. D.	POWER REQ'TS.	EVENT	OUTPUT				LOAD ACTUATION TIMING					REMARKS
									CONTACT TYPE	CONTACT TYPE	TERMINATION SEE NOTE 6	RELAY DRVR. I. D. SEE NOTE 7	0	10	21	30	40		300
											TIME IN SECONDS							
11 SEC.	CONT.	FROM DWG.	5149178															
	B1*	143	OPEN CHARGING LINE FLOW CONTROL V.	FCV-1112	-	-	DC	SIS/SISLOP	MAINTAINED	NO	TB51-1#3	SLOT 4/12 CRT.C	Δ					B7-ONE SECOND TIME DELAY BETWEEN ACTUAL OPENING OF CV-875B & CLOSING OF CV-37 OF CI FOR LEGEND & NOTES REFER TO DWG. 5149178
	B2	144	START SAFETY INJECTION PUMP	S.I. PMP. W	4160V, #1C	11C05	700 HP	SIS/SISLOP	MAINTAINED	NO	TB37-1#3	SLOT 4/12 CRT.D	STARTED					
	B3	145	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB37-5#7	SLOT 5/13 CRT.A						
	B4*	146	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB52-1#3	SLOT 5/13 CRT.A						
	B4-1	147	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB37-9#11	SLOT 4/12 CRT.A	Δ					
	B5	148	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB38-1#3	SLOT 4/12 CRT.B						
	B6	149	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB38-5#7	SLOT 4/12 CRT.B						
	B7	150	OPEN FEEDWATER RECIRC. SYS. VALVE	CV-875B	DC BUS#1	-	DC	SIS/SISLOP	MAINTAINED	NO	TB38-9#11	SLOT 5/13 CRT.A	OPENING - 20 SEC. SLOW RATE OPENED					
	B8	151	OPEN REFUEL WTR. TO CHG. PMP. SUCTION V.	MOV-1100B	MCC#1	42-1147	-	SIS/SISLOP	MAINTAINED	NO	TB39-1#3	SLOT 4/12 CRT.B	OPENING OPENED					
	B8-1	152	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB39-5#7	SLOT 4/12 CRT.B	Δ					
	B9**	153	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB39-9#11	SLOT 5/13 CRT.C	Δ					
	B10**	154	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB40-1#3	SLOT 5/13 CRT.C	Δ					
	B11*	155	START EMERGENCY SIREN	SIREN	MCC#10R#2	42-1144	10 HP	SIS/SISLOP	MAINTAINED	NO	TB57-1#3	SLOT 5/13 CRT.A	Δ					
	B12**	156	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB40-5#7	SLOT 5/13 CRT.C	Δ					
	B12-1*	157	CLOSE MAIN FEEDWATER BLOCK VALVE	CLOSE MOV-22	MCC#1	42-1183	-	SIS/SISLOP	MAINTAINED	NO	TB58-1#3	SLOT 5/13 CRT.B	Δ					
	B13	158	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB40-9#11	SLOT 4/12 CRT.D						
	B14	159	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB41-1#3	SLOT 4/12 CRT.B						
	B15	160	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB41-5#7	SLOT 4/12 CRT.B						
	B16	161	BLOCK O/L RELAY TRIP OF S.I. PUMP	OIL TRIP S.I. PMP.W	4160V, #1C	11C05	PART OF B2	SIS/SISLOP	MAINTAINED	NC	TB41-9#11	SLOT 4/12 CRT.A	Δ					
	B16-1*	162	TRIP REACT. COOL. PUMPS	RCP A,B,C	4160V, #1B	11B03	DC	SIS/SISLOP	MAINTAINED	NO	TB68-1#3	SLOT 4/12 CRT.D	Δ					
	B17	163	BLOCK O/L RELAY TRIP OF FDM. PUMP	OIL TRIP FDM. PMP.W	4160V, #1C	11C04	PART OF B13	SIS/SISLOP	MAINTAINED	NC	TB42-1#3	SLOT 4/12 CRT.A	Δ					
	B18	164	CLOSE MAIN FEEDWATER BLOCK VALVE	CLOSE MOV-20	MCC#1	42-1197	-	SIS/SISLOP	MAINTAINED	NO	TB42-5#7	SLOT 5/13 CRT.A	Δ					
	B19	165	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB42-9#11	SLOT 5/13 CRT.B	Δ					
B20*	166	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NC	TB69-1#3	SLOT 5/13 CRT.B	Δ						
B21	167	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NC	TB43-1#3	SLOT 5/13 CRT.B	Δ						
B22	168	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NC	TB43-5#7	SLOT 5/13 CRT.B	Δ						
B23	169	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB43-9#11	SLOT 4/12 CRT.C	Δ						
B24*	191	CLOSE MOV 1204	MOV 1204	MCC#1	-	-	SIS/SISLOP	MAINTAINED	NO	TB49-1#3	LATER	CLOSING CLOSED						
12 SEC.	C1	170	CLOSE RECIRC. TO CONDENSER VALVE	CV-37	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB53-1#3	SLOT 6/14 CRT.A	Δ					C1-ONE SECOND TIME DELAY BETWEEN ACTUAL OPENING OF CV-875B (B7) & CLOSING OF CI
	C2	171	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB53-5#7	SLOT 6/14 CRT.B	Δ					
21 SEC.	D1	172	START CHARGING PUMP	CHG. PUMP S	4160V, #1C	11C07	600 HP	SIS/SISLOP	MAINTAINED	NO	TB28-1#3	SLOT 7/15 CRT.A	Δ					D4 - MOV 720A OPENING INTERLOCKED WITH AUX. CONTACT OF S.W. CLG. PUMP CKT. BKR. D5 - TWO FORM "A" INDEPENDENT OUTPUTS - SEE DWG. 5149180
	D2	173	START COMPONENT COOLING PUMP	COMP. CLG. PMP. N	480V, SWGR#1	52-1121	125 HP	SIS/SISLOP	MAINTAINED	NO	TB28-5#7	SLOT 7/15 CRT.A	Δ					
	D3	174	CHARGING PUMP INTERLOCK	CHG. PMP. INTLK.	4160V, #1C	11C07	DC	SIS/SISLOP	MAINTAINED	NO	TB28-9#11	SLOT 7/15 CRT.A	Δ					
	D4	175	START SALT WATER COOLING PUMP	SALT WTR. CLG. PMP. N	480V, SWGR#1	52-1114	100 HP	SIS/SISLOP	MAINTAINED	NO	TB29-1#3	SLOT 7/15 CRT.A	Δ					
	D5	176	SIS TO CONTAINMENT SPRAY ACTUATION SYS.	SIS SPRAY SYS.	DC	DC	DC	SIS/SISLOP	MAINTAINED	NO	TB29-5,6,7#8	SLOT 7/15 CRT.D	Δ					
	D6	177	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB29-9#11	SLOT 7/15 CRT.B	Δ					
	D7	178	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NC	TB30-1#3	SLOT 7/15 CRT.C	Δ					
	D8	179	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB30-5#7	SLOT 7/15 CRT.C	Δ					
	D9	180	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB30-9#11	SLOT 7/15 CRT.C	Δ					
	D10	181	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB31-1#3	SLOT 7/15 CRT.C	Δ					
	ADJUSTABLE	E1	182	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB59-1#3	SLOT 8/16 CRT.A					
E2		183	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB59-5#7	SLOT 8/16 CRT.A						
E3		184	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB59-9#11	SLOT 8/16 CRT.A						
E4		185	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NC	TB60-1#3	SLOT 8/16 CRT.A						
ADJUSTABLE	F1	186	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB66-1#3	SLOT 8/16 CRT.A						
	F2	187	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB66-5#7	SLOT 8/16 CRT.A						
	F3	188	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NO	TB66-9#11	SLOT 8/16 CRT.A						
	F4	189	SPARE	-	-	-	-	SIS/SISLOP	MAINTAINED	NC	TB67-1#3	SLOT 8/16 CRT.A						

890227031I-178

SI
REPLACEMENT
CARD

Also Available On
Alphabet Card

SONGS NO. 1
SAFETY RELATED

STATION FILE 1542 SH. 141

5149958	SIS-LOP-SISLOP TRAIN 2	10	AS BUILT BY FLOORING INC. DCN 18/83	5-4-83	SHC	-	TTA	RR	RIS	-	6	INCORP. CCN 9, 10 EFF. DATE IMMED.	8/15/78	1044	2-278	AS	67	6839	Location SAN ONOFRE NUCLEAR GEN. STA.
5149957	SIS-LOP-SISLOP TRAIN 1	9	AS BUILT INCORP. DCN # 17	5-7-87	SHC	-	TTA	RR	RIS	-	3	REC. REV. ADDED STATION FILE NO. CCN 8	10-31	1073	1073	RE	60	2200	LOAD SEQUENCE SCHEDULE
5149178	LOAD SEQ. SCH. LOAD TRAIN 1	2	INCORP. DCN # 16, DCN # 14, 15 SUPERCEDED BY DCN # 6	6-3-82	SHC	-	TTA	RR	RIS	-	4	INCORP. CCN 1 EFF. DATE IMMED.	5/21/77	1073	1073	RE	60	1073	LOAD TRAIN NO. 1
5149180	SEQUENCER LOGIC DIAGRAM 7	7	REC. REV. - INCORP. CCN 11	1/16/91	SHC	-	TTA	RR	RIS	-	2	INCORP. CCN 5 EFF. DATE IMMED.	5/21/77	1073	1073	RE	60	1073	
Reference Drawings		No.	Revisions	Date	Approved	O.E.	O.E.	C.V.	Made	J.O. No.	Scale	Notes	None						

TIME	PROCESS PRIORITY	FLAG NO SEE NOTE 5	FUNCTIONAL AND DEVICE DESCRIPTION	DEVICE IDENTIFICATION	SERVED FROM	BKR. I. D.	POWER REQM'TS	EVENT	OUTPUT			LOAD ACTUATION TIMING					REMARKS		
									CONTACT TYPE	CONTACT TYPE	TERMINATION SEE NOTE 6	RELAY DRV'R I. D. SEE NOTE 7	0	10	21	30		60	300
0 SEC.	A1A	101	TRIP REACTOR BKR "A"	SCRAM BKR. A	---	---	DC	LOP/SIS/SISLOP	MAINTAINED	NO	TB10-1 # 3	SLOT 2/10 CKT A	Δ						
	A2A	102	(REACTOR PROTECTION SCRAM SIGNAL "A")	52-1306	SWGR 3	DC	DC	LOP/SIS/SISLOP	MAINTAINED	NO	TB10-5 # 7	SLOT 2/10 CKT A	Δ						
	A3A *	103	TRIP HVAC BREAKER	SCRAM BKR UV SIGNAL	---	---	DC	LOP/SIS/SISLOP	MAINTAINED	NC	TB44-1 # 3	SLOT 2/10 CKT A	Δ						
	A4A	104	DE-ENERGIZE REACTOR BKR. UV RELAYS	LOCKOUT SWGR #2	---	---	---	SISLOP	MAINTAINED	NO	TB10-10 # 12	SLOT 2/10 CKT B	Δ						
	A4A-1	105	ENERGIZE LOCKOUT RELAY	LOCKOUT SWGR #3	---	---	---	SISLOP	MOMENTARY	NO	TB11-2 # 4	SLOT 2/10 CKT A	Δ						
	A5A	106	INITIATE 480V. U.V. TRIP	480V. U.V. TRIP	DC	DC	DC	SISLOP	MOMENTARY	NO	TB11-5 # 7	SLOT 2/10 CKT B	Δ						
	A6A	107	ENERGIZE LOCKOUT RELAY	LOCKOUT MCC #2A	---	---	---	SISLOP	MAINTAINED	NO	TB11-9 # 11	SLOT 2/10 CKT B	Δ						
	A7A	108	ENERGIZE LOCKOUT RELAY	LOCKOUT MCC #2	---	---	---	SISLOP	MAINTAINED	NO	TB12-1 # 3	SLOT 2/10 CKT B	Δ						
	A8A	109	ENERGIZE LOCKOUT RELAY	LOCKOUT MCC #2	---	---	---	SISLOP	MAINTAINED	NO	TB12-5 # 7	SLOT 2/10 CKT C	Δ						
	A8A-1	110	TRIP & ENERGIZE LOCKOUT RELAY	LOCKOUT MCC3A	SWGR #3	DC	DC	SISLOP	MOMENTARY	NO	TB12-9 # 11	SLOT 2/10 CKT A	Δ						
	A9A	111	ENERGIZE LOCKOUT RELAY	LOCKOUT MCC #3	---	---	---	SISLOP	MAINTAINED	NO	TB13-1 # 3	SLOT 2/10 CKT C	Δ						
	A10A	112	ENERGIZE LOCKOUT RELAY	LOCKOUT MCC #3	---	---	---	SISLOP	MAINTAINED	NO	TB13-5 # 7	SLOT 2/10 CKT A	Δ						
	A11A	113	TRIP BUS TIE BREAKER	TRIP TIE BKR	4160V #2C	12C01	DC	SISLOP	MAINTAINED	NO	TB13-9 # 11	SLOT 2/10 CKT C	Δ						
	A11A-1	114	BLOCK DG 2 EXCITATION SHUTDOWN CKT.	BLOCK DG #2 EXC. SHT. DN CKT.	DG #2	---	DC	LOB/LOP/SIS/SISLOP	MAINTAINED	NC	TB14-1 # 3	SLOT 1/9 CKT B	Δ						
	A12A	115	TRIP DIESEL GEN. CIRCUIT BREAKER	TRIP BKR. DG #2	4160V #2C	12C15	DC	LOB/LOP/SIS/SISLOP	MOMENTARY	NO	TB14-5 # 7	SLOT 1/9 CKT A	Δ						
	A12A-1	116	SPARE	---	---	---	---	LOB/LOP/SIS/SISLOP	MOMENTARY	NO	TB14-9 # 11	SLOT 1/9 CKT A	Δ						
	A13A	117	TRIP LIGHTING TRANSFORMER	TRIP XFMR. LTG.	4160V #2C	12C13	---	SISLOP	MOMENTARY	NO	TB15-1 # 3	SLOT 1/9 CKT D	Δ						
	A13A-1	118	DG.2 FIELD RESET	DG2 FIELD RESET	---	---	DC	SISLOP	MOMENTARY	NO	TB15-5 # 7	SLOT 1/9 CKT D	Δ						
	A13A-2	119	INITIATE 4KV U.V. TRIP	4KV U.V. TRIP	DC	DC	DC	SISLOP	MOMENTARY	NO	TB15-9 # 11	SLOT 1/9 CKT D	Δ						
	A14A	120	TRIP TURB. PLANT CLG. WTR. PUMP	TRIP PUMP G6N	4160V #2C	12C12	---	SISLOP	MAINTAINED	NO	TB16-1 # 3	SLOT 2/10 CKT B	Δ						
	A15A	121	LOCKOUT MOTOR HEATER PANELS	LOCKOUT MTR. HTR. PNLS.	---	---	---	SIS/SISLOP	MAINTAINED	NO	TB16-5 # 7	SLOT 3/11 CKT B	Δ						
0 SEC.	A1B	141	START DIESEL GENERATOR CKT. #1	START DG #2 CKT. #1	---	---	---	LOB/LOP/SIS/SISLOP	MAINTAINED	NO	TB22-1 # 3	SLOT 1/9 CKT B	Δ						
	A2B	142	START DIESEL GENERATOR CKT. #2	START DG #2 CKT. #2	---	---	---	LOB/LOP/SIS/SISLOP	MAINTAINED	NO	TB22-5 # 7	SLOT 1/9 CKT B	Δ						
0 SEC.	A1C	122	OPEN SAFETY INJECTION HDR. ISOLATION VALVE	HV-851A	---	---	---	SIS/SISLOP	MAINTAINED	NO	TB16-9 # 11	SLOT 3/11 CKT A	Δ						
	A2C	123	CLOSE FEEDWATER BYPASS/CONTROL VALVE	CV-143, FCV-457	---	---	DC	SIS/SISLOP	MAINTAINED	NO	TB17-1 # 3	SLOT 3/11 CKT A	Δ						
	A3C	124	CLOSE FEEDWATER BYPASS/CONTROL VALVE	CV-144, FCV-45B	---	---	DC	SIS/SISLOP	MAINTAINED	NO	TB17-5 # 7	SLOT 3/11 CKT A	Δ						
	A4C *	125	OPEN SAFETY INJECTION "LOOP A" VALVE	MOV850A	---	---	---	SIS/SISLOP	MAINTAINED	NO	TB45-1 # 3	SLOT 3/11 CKT B	Δ						
	A5C *	126	FIRST OUTANN., AUTO ALERT SYS. & TSC (FOX 3AMS)	S.I. ALARM	120 VAC	---	---	SIS/SISLOP	MAINTAINED	NC	TB46-1 # 3	SLOT 3/11 CKT B	Δ						
	A6C	127	SPARE	---	---	---	---	SISLOP	MOMENTARY	NO	TB17-10 # 12	SLOT 3/11 CKT A	Δ						
	A7C	128	CLOSE HP FEEDWATER HDR. ISOLATION VALVE	HV-852A	---	---	---	SIS/SISLOP	MAINTAINED	NO	TB18-2 # 4	SLOT 3/11 CKT A	Δ						
	A8C	129	OPEN SAFETY INJECTION "LOOP C" VALVE	MOV-850C	---	---	---	SIS/SISLOP	MAINTAINED	NO	TB18-6 # 8	SLOT 3/11 CKT B	Δ						
	A9C	130	CLOSE LP FEEDWATER HDR. ISOLATION VALVE	HV-854A	---	---	---	SIS/SISLOP	MAINTAINED	NO	TB18-10 # 12	SLOT 3/11 CKT C	Δ						
	A10C	131	TRIP HEATER DRAIN PUMP	HTR. DRN. PMP. E	4160V #2C	12C09	600 HP	SIS/SISLOP	MAINTAINED	NO	TB19-1 # 3	SLOT 3/11 CKT D	Δ						
	A11C	132	OPEN SAFETY INJECTION HDR. ISOLATION VALVE	HV-853A	---	---	---	SIS/SISLOP	MAINTAINED	NO	TB19-6 # 8	SLOT 3/11 CKT C	Δ						
	A12C	133	TRIP FEEDWATER PUMP	G-3A (EAST)	---	---	---	SIS/SISLOP	MAINTAINED	NO	TB19-9 # 11	SLOT 3/11 CKT C	Δ						
	A12C-1	134	CONT. ISO SYSTEM	R-16, C13 NE2T	---	---	---	SIS/SISLOP	MAINTAINED	NO	TB20-1,2 # 3,4	SLOT 3/11 CKT C	Δ						
	A13C	135	TRIP CONDENSATE PUMP	COND PMP. NE	4160V #2C	12C08	700 HP	SIS/SISLOP	MAINTAINED	NO	TB20-5 # 7	SLOT 3/11 CKT D	Δ						
	A14C	136	TRIP CONDENSATE PUMP	COND PMP. SE	4160V #2C	12C06	700 HP	SIS/SISLOP	MAINTAINED	NO	TB20-9 # 11	SLOT 3/11 CKT D	Δ						
	A15C	137	INITIATE EVENTS RECORDER	EVENTS RECORDER	---	---	DC	SIS/SISLOP	MAINTAINED	NO	TB21-1 # 3	SLOT 3/11 CKT B	Δ						
	A16C	138	TRIP 480V SWGR BUS #1 & #3 TIE BREAKER	TIE BREAKER 2-3	---	52-1203	---	SIS/SISLOP	MAINTAINED	NO	TB21-5 # 7	SLOT 3/11 CKT D	Δ						
	A17C *	139	CLOSE LET DOWN ORIFICE ISOLATION VALVES	CLOSE CV-202, CV-203, 204	120V AC	---	---	SIS/SISLOP	MAINTAINED	NO	TB50-1 # 3	SLOT 3/11 CKT D	Δ						
10 SEC.	A1D	140	CLOSE DIESEL GEN. CIRCUIT BREAKER	CLOSE BKR. DG #2	4160V #2C	12C15	---	SISLOP	MAINTAINED	NO	TB21-9 # 11	SLOT 1/9 CKT C	Δ						
			<p>THE FOLLOWING DEVICES ARE MAINTAINED CLOSED TO SUPPLY PWR TO RESPECTIVE BUSES AS SOON AS THE ABOVE BREAKER IS CLOSED.</p> <p>4160/480V SERV. TRANSF #2 [12C10] 480V SWGR #2 [1202] MCC #2, 2A, 2B, 3 [1218, 1223, 1229, 1314] BATTERY CHARGER B & D [SWGR #2 & MCC #2] COMMUNICATION PANEL [1210, 1232, 1293]</p>																

FOR LEGEND & NOTES REFER TO DWG. 5149178

NOTES:
 1. FIELD TO CONVERT CONTACT TO N.O.
 2. SEE NOTE 9 ON DWG. 5149178

SI APERTURE CARD

Also Available On Aperture Card

SONGS NO.1 SAFETY RELATED

8902270311-179

STATION FILE 1542 SH.143

12	AS BUILT BY FLUOR, INC. DSN 34(DP1-11/12/80)	1-5-80	JSS	FR	LS	---	6	REG. REV. ADDED STATION FILE NO.	6/27/77	5	INCORP. CON. 2 EFF. DATE IMMED.	6/27/77	5	INCORP. CON. 3 EFF. DATE IMMED.	6/27/77
11	AS BUILT BY FLUOR, INC. DSN 34(DP1-11/12/80)	4/7/77	---	---	---	---	5	INCORP. CON. 2 EFF. DATE IMMED.	6/27/77	4	INCORP. CON. 2 EFF. DATE IMMEDIATELY	6/27/77	4	INCORP. CON. 3 EFF. DATE IMMEDIATELY	6/27/77
10	AS BUILT - INCORP. DSN 28 THRU 32	---	---	---	---	---	4	INCORP. CON. 1 EFF. DATE IMMEDIATELY	6/27/77	3	INCORP. CON. 2 EFF. DATE IMMEDIATELY	6/27/77	3	INCORP. CON. 3 EFF. DATE IMMEDIATELY	6/27/77
9	AS BUILT - INCORP. DSN 28 THRU 32	---	---	---	---	---	3	INCORP. CON. 1 EFF. DATE IMMEDIATELY	6/27/77	2	INCORP. CON. 2 EFF. DATE IMMEDIATELY	6/27/77	2	INCORP. CON. 3 EFF. DATE IMMEDIATELY	6/27/77
8	AS BUILT - INCORP. DSN 28 THRU 32	---	---	---	---	---	2	INCORP. CON. 1 EFF. DATE IMMEDIATELY	6/27/77	1	INCORP. CON. 2 EFF. DATE IMMEDIATELY	6/27/77	1	INCORP. CON. 3 EFF. DATE IMMEDIATELY	6/27/77
7	INCORP. CON. 11 EFF. DATE IMMED.	2-14-79	---	---	---	---	1	INCORP. CON. 1 EFF. DATE IMMEDIATELY	6/27/77	0	---	---	---	---	---

5149181-12

Southern California Edison Company

TIME	PROCESS PRIORITY	FLAG NO. SEE NOTE 5	FUNCTIONAL AND DEVICE DESCRIPTION	DEVICE IDENTIFICATION	SERVED FROM	BKR. I. D.	POWER REQMTS.	EVENT	OUTPUT			LOAD ACTUATION TIMING					REMARKS		
									CONTACT TYPE	CONTACT TYPE	TERMINATION SEE NOTE 6	RELAY DRVR I. D. SEE NOTE 7	0	10	20	30		60	300
											TIME IN SECONDS								
11 SEC.	CONT. FROM DWG 5149181																		
B1 *	143	OPEN CHARGING LINE FLOW CONTROL V.	FCV-1112	-	-	-	DC	S15/S15LOP	MAINTAINED	NO	TB51-1#3	SLOT 4/12 CKT.C							
B2	144	START SAFETY INJECTION PUMP	S.I. PMP, E	4160V, #2C	12C05	-	700 H.P.	S15/S15LOP	MAINTAINED	NO	TB37-1#3	SLOT 4/12 CKT.D	STARTING						
B3	145	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB37-5#7	SLOT 5/13 CKT.A							
B4 *	146	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB52-1#3	SLOT 5/13 CKT.A							
B4-1	147	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB37-9#11	SLOT 4/12 CKT.A							
B5	148	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB38-1#3	SLOT 4/12 CKT.B							
B6	149	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB38-5#7	SLOT 4/12 CKT.B							
B7	150	OPEN FEEDWATER RECIRC. SYS. VALVE	CV-875 A	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB38-9#11	SLOT 5/13 CKT.A							
B8	151	OPEN REFUEL WTR. TO CHG. PMP. SUCTION V.	MOV-1100D	MCC #2	42-1280	-	-	S15/S15LOP	MAINTAINED	NO	TB39-1#3	SLOT 4/12 CKT.B							
B8-1	152	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB39-5#7	SLOT 4/12 CKT.B							
B9 **	153	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB39-9#11	SLOT 5/13 CKT.C							
B10 **	154	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB40-1#3	SLOT 5/13 CKT.C							
B11 *	155	START EMERGENCY SIREN	SIREN	MCC #2	8-1293A	-	10 HP	S15/S15LOP	MAINTAINED	NO	TB57-1#3	SLOT 5/13 CKT.A							
B12 **	156	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB40-5#7	SLOT 5/13 CKT.C							
B12-1 *	157	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB58-1#3	SLOT 5/13 CKT.B							
B13	158	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB40-9#11	SLOT 4/12 CKT.D							
B14	159	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB41-1#3	SLOT 4/12 CKT.B							
B15	160	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB41-5#7	SLOT 4/12 CKT.B							
B16	161	BLOCK O/L RELAY TRIP OF S.I. PUMP	O/L TRIP S.I. PMP	4160V, #2C	12C05	-	PART OF B2	S15/S15LOP	MAINTAINED	NO	TB41-9#11	SLOT 4/12 CKT.A							
B16-1 *	162	TRIP REACT. COOL. PUMPS	RCP A, B, & C	4160V, #1B	11B03	-	DC	S15/S15LOP	MAINTAINED	NO	TB68-1#3	SLOT 4/12 CKT.D							
B17	163	BLOCK O/L RELAY TRIP OF FDM. PUMP	O/L TRIP FDM PMP	4160V, #2C	12C04	-	-	S15/S15LOP	MAINTAINED	NO	TB42-1#3	SLOT 4/12 CKT.A							
B18	164	CLOSE MAIN FEEDWATER BLOCK VALVE	CLOSE MOV-21	MCC #2	12-1242	-	-	S15/S15LOP	MAINTAINED	NO	TB42-5#7	SLOT 5/13 CKT.A							
B19	165	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB42-9#11	SLOT 5/13 CKT.B							
B20 *	166	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB69-1#3	SLOT 5/13 CKT.B							
B21	167	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB43-1#3	SLOT 5/13 CKT.B							
B22	168	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB43-5#7	SLOT 5/13 CKT.B							
B23	169	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB43-9#11	SLOT 4/12 CKT.C							
B24 *	191	SPARE	-	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB43-1#3	LATER							
12 SEC.	C1	170	CLOSE RECIRC. TO CONDENSER VALVE	CV-36	-	-	-	S15/S15LOP	MAINTAINED	NO	TB53-1#3	SLOT 6/14 CKT.A							
	C2	171	SPARE	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB53-5#7	SLOT 6/14 CKT.B							
21 SEC.	D1	172	START CHARGING PUMP	CHG. PMP N	4160V, #2C	12C07	600 HP	S15/S15LOP	MAINTAINED	NO	TB28-1#3	SLOT 7/15 CKT.A							
	D2	173	START COMPONENT COOLING PUMP	COMP. CLG. PMP B CTR.	480V, SWGR #2	1221	125 HP	S15/S15LOP	MAINTAINED	NO	TB28-5#7	SLOT 7/15 CKT.A							
	D3	174	START SALT WATER COOLING PUMP	SALT WTR. CLG. PMP S	480V, SWGR #2	1214	100 HP	S15/S15LOP	MAINTAINED	NO	TB28-9#11	SLOT 7/15 CKT.A							
	D4	175	CHARGING PUMP INTERLOCK	CHG. PMP INTLK.	4160V, #2C	12C07	DC	S15/S15LOP	MAINTAINED	NO	TB29-1#3	SLOT 7/15 CKT.A							
	D5	176	SIS TO CONTAINMENT SPRAY ACTUATION SYS	SIS SPRAY SYS.	DC	-	DC	S15/S15LOP	MAINTAINED	NO	TB29-5,6,7#8	SLOT 7/15 CKT.D							
	D6	177	SPARE	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB29-9#11	SLOT 7/15 CKT.B							
	D7	178	SPARE	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB30-1#3	SLOT 7/15 CKT.C							
	D8	179	SPARE	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB30-5#7	SLOT 7/15 CKT.C							
	D9	180	SPARE	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB30-9#11	SLOT 7/15 CKT.C							
	D10	181	SPARE	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB31-1#3	SLOT 7/15 CKT.C							
ADJUSTABLE	E1	182	SPARE	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB59-1#3	SLOT 8/16 CKT.A							
	E2	183	SPARE	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB59-5#7	SLOT 8/16 CKT.A							
	E3	184	SPARE	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB59-9#11	SLOT 8/16 CKT.A							
	E4	185	SPARE	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB60-1#3	SLOT 8/16 CKT.A							
ADJUSTABLE	F1	186	SPARE	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB66-1#3	SLOT 8/16 CKT.A							
	F2	187	SPARE	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB66-5#7	SLOT 8/16 CKT.A							
	F3	188	SPARE	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB66-9#11	SLOT 8/16 CKT.A							
	F4	189	SPARE	-	-	-	-	S15/S15LOP	MAINTAINED	NO	TB67-1#3	SLOT 8/16 CKT.A							

B7-ONE SECOND TIME DELAY BETWEEN ACTUAL OPENING OF CV-875A & CLOSING OF CV-36

FOR LEGEND & NOTES REFER TO DWG. 5149178

C1-ONE SECOND TIME DELAY BETWEEN OPENING OF CV875A & CLOSING OF CV-36

D3-MOV 120B OPENING INTERLOCKED WITH AUX. CONTACT OF SW. CLG. PUMP CKT. BKR.
D5-TWO FORM "A" INDEPENDENT OUTPUTS - SEE DWG 5149180

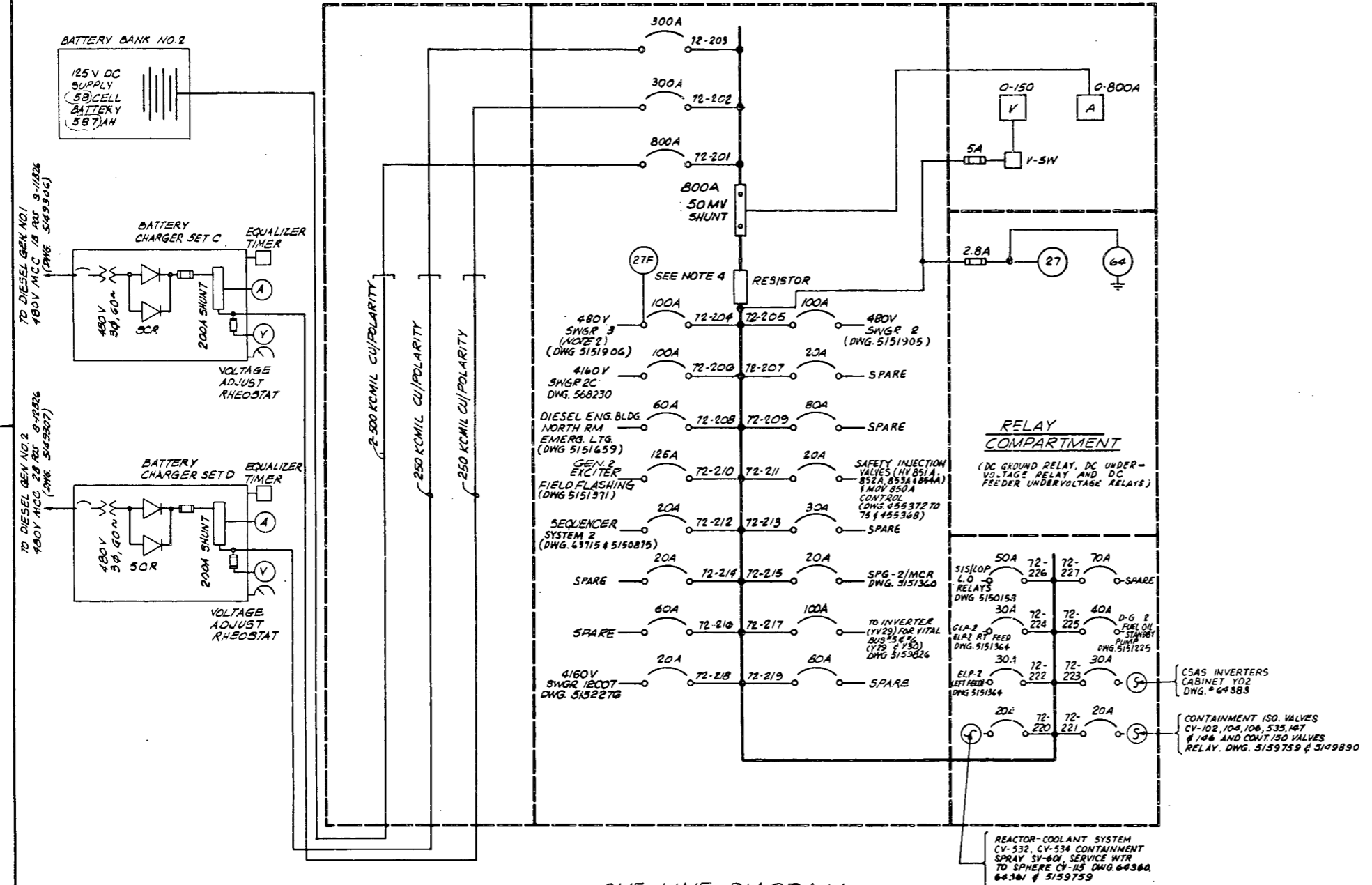
SI APERTURE CARD
Also Available On Aperture Card

8902270311-180

SONGS NO. 1 SAFETY RELATED

12	AS BUILT BY FLUOR; INC. DEN 190CR 501-P-6339	1/7/76	AS	12	AS BUILT BY FLUOR; INC. DEN 18(DCP#38012072R)	6/14/88	INC	10	AS BUILT - IN CORR DCN 17	1/1/87	INC	11	AS BUILT - IN CORR DCN 15	1/1/86	INC	12	AS BUILT - IN CORR DCN 15	1/1/86	INC	13	AS BUILT - IN CORR DCN 15	1/1/86	INC	14	AS BUILT - IN CORR DCN 15	1/1/86	INC		
15	5149958	SIS-LOP-SISLOP TRAIN #1	1/1/86	INC	16	5149957	SIS-LOP-SISLOP TRAIN #1	1/1/86	INC	17	5149178	LOAD SEQ SCH LOAD TRAIN #1	1/1/86	INC	18	5149180	SEQUENCER LOGIC DIAGRAM	1/1/86	INC	19	5149180	SEQUENCER LOGIC DIAGRAM	1/1/86	INC	20	5149180	SEQUENCER LOGIC DIAGRAM	1/1/86	INC
Reference Drawings		No.	Revisions	Date	Revisions		Date	Revisions		Date	Revisions		Date	Revisions		Date	Revisions		Date	Revisions		Date	Revisions		Date	Revisions		Date	

Also Available On
Aperture Card



ONE LINE DIAGRAM
125 V DC BUS 2 SWITCHBOARD

DEVICE TABLE

DEVICE NO.	DESCRIPTION	MFG & TYPE	FUNCTION
44	DC GROUND RELAY	GUARDIAN 7152-0915-0004	ALARM
72	DC CIRCUIT BREAKER		OVERLOAD & FAULT PROT.
27	DC UNDERVOLTAGE RELAY	PHR CONN PROD. MODEL D5LVB02-01	ALARM
27F	DC FEEDER UNDERVOLTAGE RELAY	STRUTHER-DUNN 219XNSP	ALARM

LEGEND

- MOLDED CASE CIRCUIT BREAKER WITH THERMAL-MAGNETIC TRIP
- DC INSTRUMENT SHUNT
- AMMETER
- VOLTMETER
- RELAY (SEE DEVICE NO. INSIDE CIRCLE FOR RELAY FUNCTION)
- FUSE
- VOLTMETER SWITCH, FOUR POSITIONS: 1. BATTERY VOLTAGE, 2. POSITIVE TO GROUND, 3. NEGATIVE TO GROUND, 4. OFF

- NOTES:
- PROVIDE SELECTIVE COORDINATION WHEREIN ONLY THE CIRCUIT BREAKER NEAREST THE FAULT OPENS TO REMOVE A SHORT CIRCUIT AND THE MAIN 800A CIRCUIT BREAKER REMAINS CLOSED.
 - 480V SWGR, 3 DC CONTROL POWER IS SERVED FROM EITHER 125V D.C. SYSTEM 1 OR 2 THROUGH AN INTERLOCKING DEVICE TO AVOID BOTH D.C. SYSTEMS BEING PARALLELED.
 - THE SYSTEM IS UNGROUNDED.
 - TYPICAL FOR BREAKERS 72-204 THRU 72-227

5. CHECK CALCULATION (DC-1399) *SIZING 125V D.C. BATTERY # 2* BEFORE ADDING ANY LOADS TO 125 V. D.C. BATTERY # 2.

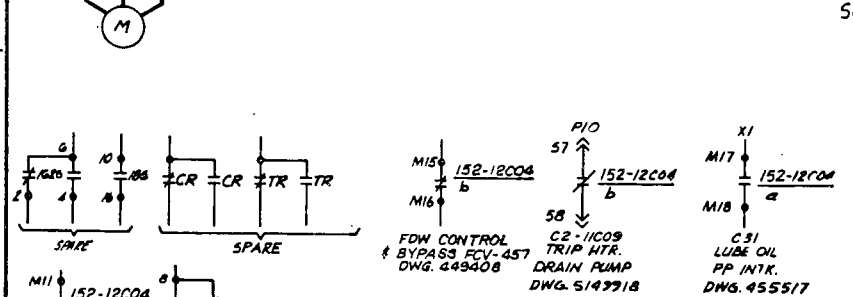
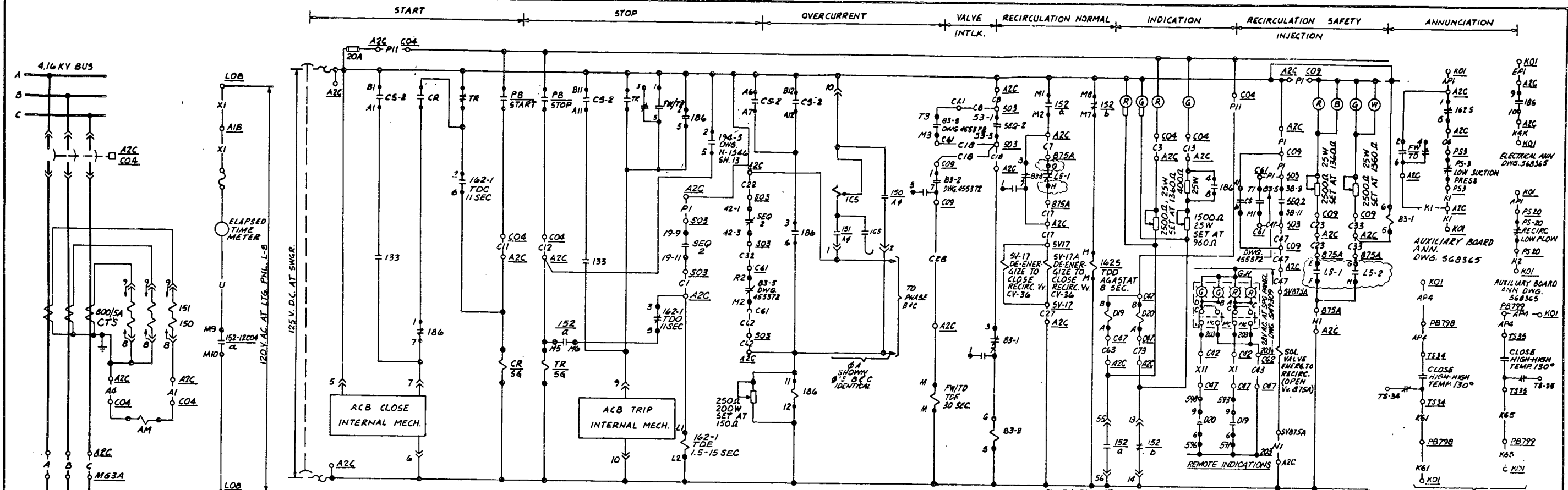
8902270311-181

No.	Revisions	Date	By	App'd	Scale	Notes
10	AS BUILT - INCORP DCN 23, 24, 25	5-19-76	GL		3/4"	4 INCORP CCN 6, 7, 8, 9 & 10 EFF DATE IMMED
9	AS BUILT - INCORP DCN 22 (21 NOT USED)	5-19-76	GL		3/4"	3 INCORP CCN 5 EFFECT DATE IMMED
8	AS BUILT - INCORP DCN 21	5-19-76	GL		3/4"	
7	REC. REV - ADDED STM. FILE NO.	5-15-71	GL		3/4"	11 AS BUILT - INCORP DCN 26
6	REC. REV - ADDED STM. FILE NO.	5-15-71	GL		3/4"	0 ISSUE FOR CONSTRUCTION
5	INCORP CCN 11 EFF DATE IMMED	5-19-76	GL		3/4"	

ONE LINE DIAGRAM
125V DC SYSTEM NO. 2

Southern California Edison Company

5149348-11



EQUIPMENT	SCHEME NO.	BREAKER NO.	LOCATION	INTERLOCKS	WIRE	SEQUENCE NO.	TRIP TIME	DM NO.
FEEDWATER PUMP G-3A (EAST)	1A2C04	152-12C04	PS-20 PS-3 C61 SV-17-17A	A2C C42 C47	194-5 V875A HV-B53A K4K K2 KI	2	19 9.11 0 SEC	5102005
FEEDWATER PUMP G-3B (WEST)	1A1C04	152-11C04	PS-10 PS-4 C60 SV-18-18A	A1C C41 C46	194-1 V875B HV-B53B K4P K19 K20	1	20 9.11 0 SEC	5100714 5102005

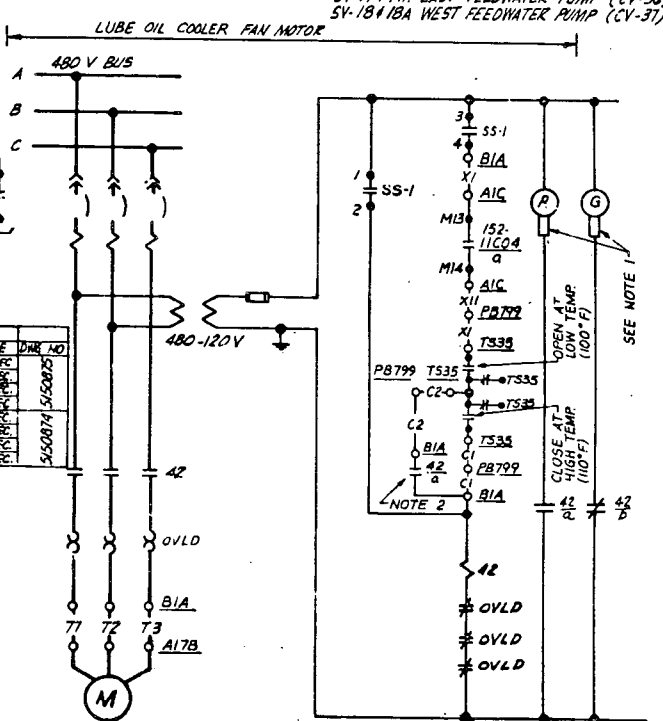
RELAY	TYPE	DESCRIPTION
113	SE 146A SIM TO M8379 SH.G14	AUXILIARY RELAY 125 VOLT COIL
148	AGASTAT M8379 SH.G14	AUXILIARY RELAY, TIME DELAY STARTS WHEN DEENERGIZED.
FW/TO	M8379 SH.G14	AUXILIARY RELAY, TIME DELAY STARTS WHEN ENERGIZED.
150	150-15	WEST CO-5 AC OVERCURRENT RELAY WITH I.T.
180	MG-6 M6379 SH.W4	TRIPPING & LOCKOUT RELAY
C	5G	CLOSE RELAY
TR	5G	TRIP RELAY
162-1	AGASTAT NO. 7012 AC	TIME DELAY ENERGIZED RELAY 1.5-15 SEC. SET AT 11 SEC.

CONTACTS	CONTACT DEVELOPMENT		
	OPEN	INTERMEDIATE	CLOSE
A - B			
C - D			
E - F			
G - H			

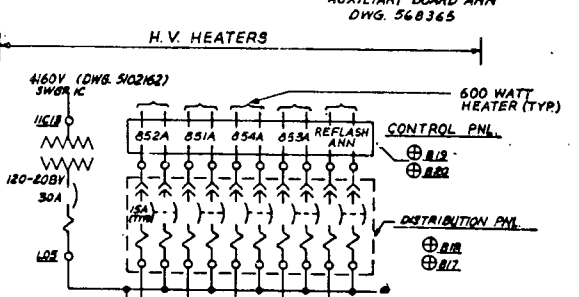
CONTACT	POSITION			CLOSE	OPEN
	CLOSE	AFTER CLOSE	AFTER OPEN		
A11 - B11	X				
A12 - B12		X	X		
A1 - B1				X	
A5 - A6	X	X		X	X
A6 - A7				X	X
B5 - B6	X	X			
B6 - B7				X	X

CONTACT	POSITION			ON	OFF	AUTO
	ON	OFF	AUTO			
1 - 2	X					
3 - 4			X			
5 - 6	X					
7 - 8				X		

- NOTES:
- FIELD INSTALL NEW INDICATING LIGHTS "SQUARE-D" CATALOGUE #9001-KPI WITH CAPS CAT.#9001-GG 6RG
 - FIELD TO REMOVE TWO AUXILIARY CONTACTS & MECHANISM FROM SPARE STARTERS 42-11A15 & 42-12B2



SCHEME NO.	STARTER NO.	152/NO.	LOCATION	INTERLOCK
1FB1415	42-11A15	11C04, M13-M14	B1A, A17B, C44	TS-35
1GB0282	42-12B2	11C04, M13-M14	B02, A18, C45	TS-34



CONTACTS	CONTACT DEVELOPMENT		
	OPEN	INTERMEDIATE	CLOSE
A - B			
C - D			
E - F			
G - H			

SCHEME NO.	152/NO.	LOC.	EQUIPMENT
1NB1174	11C18	LO2/B18	HEATERS B19
1NB1176	11C18	LO2/B17	HEATERS B10

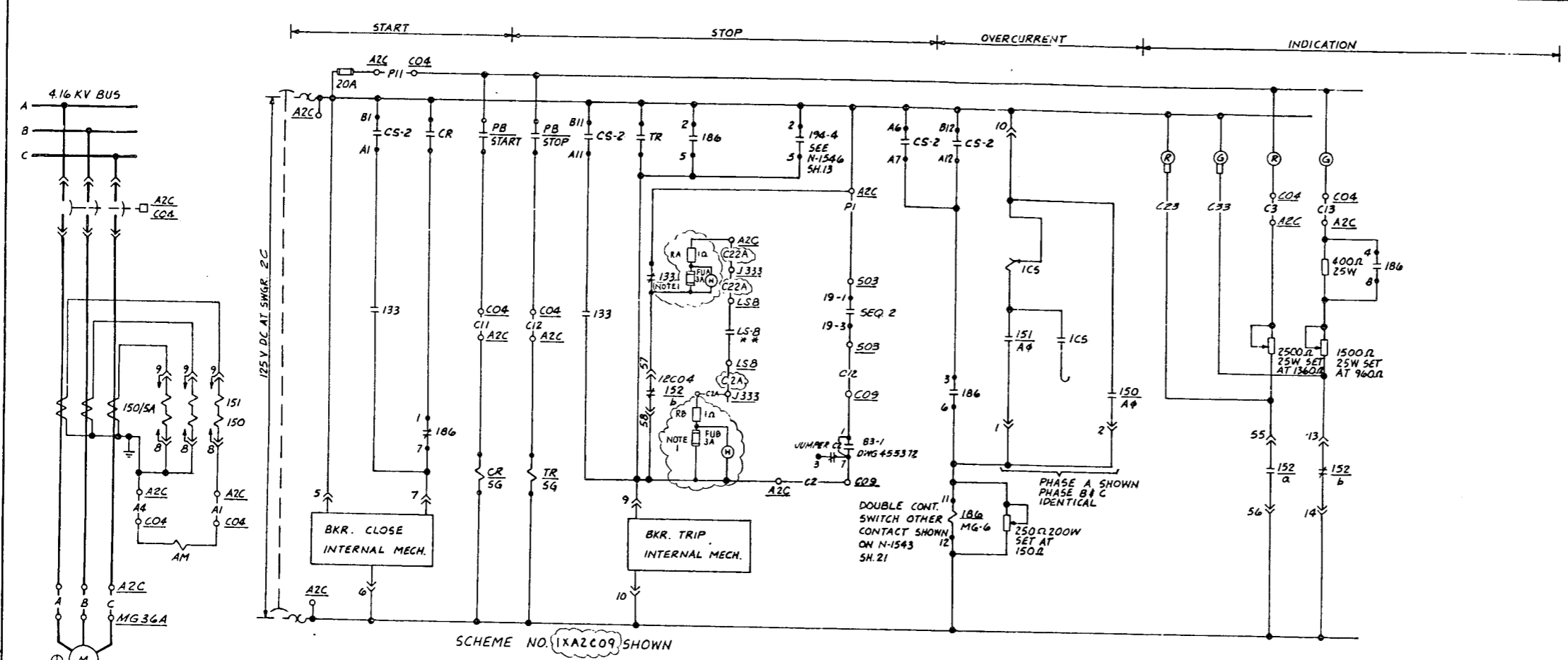
NO.	DATE	BY	DESCRIPTION	REVISED
1	11-11-61	W.S.	AS BUILT - INCORP DCN 23	
2	11-11-61	W.S.	AS BUILT - INCORP DCN 22	
3	11-11-61	W.S.	AS BUILT - INCORP DCN 21 TO 24 (M13/M14)	
4	11-11-61	W.S.	AS BUILT - INCORP DCN 20 TO 24 (M13/M14)	
5	11-11-61	W.S.	RECORD REVISION REV'D TITLE	
6	11-11-61	W.S.	RECORD REVISION REV'D DATE	
7	11-11-61	W.S.	RECORD REVISION REV'D TIME	
8	11-11-61	W.S.	RECORD REVISION REV'D NAME	

8902270311-182

SONGS 1 SAFETY RELATED (EXCEPT AS NOTED - ⊕) FEEDWATER & CONDENSATE REDRAWN FROM N1543 SH. 1 & 2
 ELEMNTARY DIAGRAM FEEDWATER PUMPS, HTRS & COOLING FANS

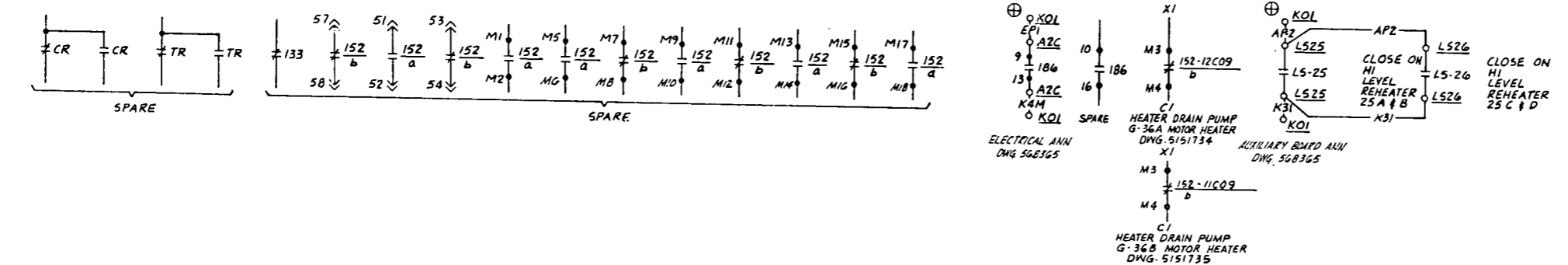
5149858-11

SI APERTURE CARD
 Also Available Aperture Card



CONTACT	DISABLE POSITION				
	PULL TRIP	TRIP	AFTER TRIP	AFTER CLOSE	CLOSE
A11-B11	X	X			
A12-B12			X	X	
A1-B1					X
A5-A6	X	X	X	X	X
A5-A7				X	X
B5-B6	X	X	X	X	X
B6-B7				X	X

CONTROL SWITCH
WEST TYPE "W-2" SPRINGS RETURN
TAN OVAL FIXED HANDLE



EQUIPMENT	SCHEME NO.	BREAKER NO.	LS	152	J.B.	LOCATION	WIRE NO.	INTLK.	INTLK.	SEQUENCER					
										NO.	T.B. STUD	TIME	DWR. NO.		
HTR. DRAIN PUMP G-36A (EAST)	1XA2C09	152-12C09	LS-8	12C04	J-333	M636A	A2C	K4M	1944	HV-453A	2	19	1.3	0.5EC	5150875
HTR. DRAIN PUMP G-36B (WEST)	1WA1C09	152-11C09	LS-10	11C04	J-323	M636B	A1C	K4N	194	HV-453B	1	18	10.18	0.36C	5150874

NOTE:
1. FUSE SIZE AS SHOWN IS PER ENGINEERING DESIGN. CHANGES IN FUSE SPECIFICATION REQUIRE PROTECT ENGINEERING OR STATION TECHNICAL APPROVAL REF: CALC DC-2994 (FUSE MFR: BUSSMANN FUSE-KTK-3)

8902270311-183

SAFETY RELATED EXCEPT AS NOTED
SONGS I FEEDWATER & CONDENSATE
REDRAWN FROM N-1543 SH.4

NO.	DATE	BY	REVISIONS	DATE	BY	REVISIONS
5149957			OPERATING CONDITIONS TRAIN 1			
5149958			OPERATING CONDITIONS TRAIN 2			
5149974			SIS/LOOP LOCKOUT RELAYS			
5149672			DEVICE FUNCTION NO. 1 SYMBOL			
5149964			EQUIP. LOCATION INDEX			
5102167			1-LINE-MCC-2			
5102165			1-LINE-MCC-1			
5149955			SIS/LOOP LOCKOUT RELAYS			
5146828			MAIN-1 LINE DIAG.			

Location SAN ONOFRE NUCLEAR GEN. STA.
ELEMENTARY DIAGRAM
HEATER DRAIN PUMP
G36A & B

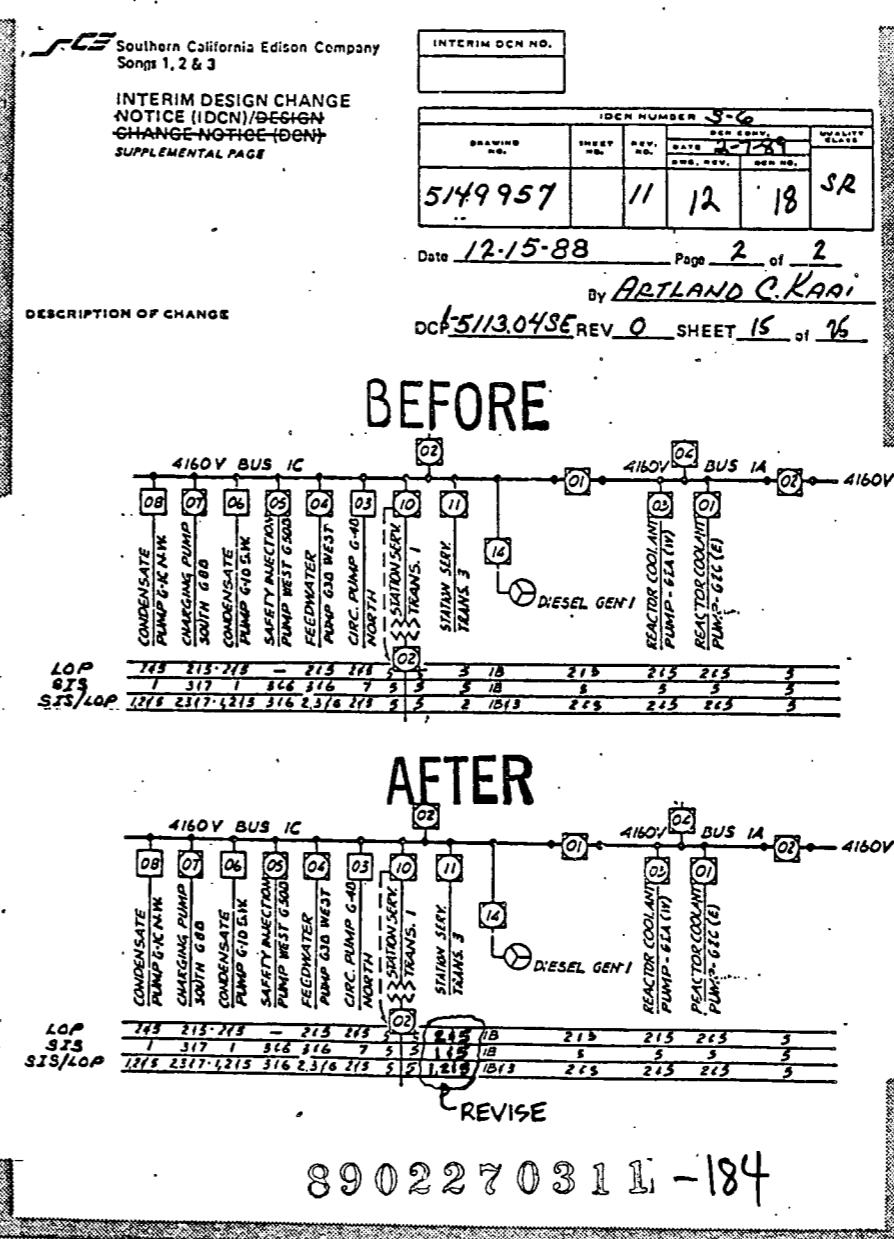
Southern California Edison Company

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5149918-6

PAGE 1 OF 2

SCE Southern California Edison Company INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS 1, 2 & 3)	CON/DCN USE ONLY	DCN NO. 1-88-5113.04
	ISSN NO. S-6	REV. NO. 5113.04SE
	DOCUMENT NO. 5149957	REV. NO. 11
	SHEET	CONVERSION NO. 18
DESIGNER	DATE	DATE
ARTLAND C. KARI	87326	12-15-88
EMER. OP COND 4KV 480V LOP-SIS-SIS/LOP TR 1 E-10		SR
REVISE Emergency Operating Conditions for 4160V Bus 1C Bkkt 11		
DCF 5113.04SE REV 0 SHEET 14 of 26		
2. Other Affected Documents <input type="checkbox"/> None <input checked="" type="checkbox"/> Specific affected documents are listed on the CC(123) 184 associated with the source document checked below: <input checked="" type="checkbox"/> This DCP (Forms CC(123) 183 and CC(123) 184 attached) <input type="checkbox"/> This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached) <input type="checkbox"/> The following document:		
3. Affected Systems SIS, ELE		
4. SCE Design Approvals		
NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/DESIGN
OTHER	DATE	DATE
		NUCLEAR Josa Lanza 12/23/88
OTHER	DATE	DATE
		I&C Bob Burnett 12/23/88
ENGINEER	DATE	DATE
		12-23-88
INDEPENDENT REVIEW ENGR.	DATE	DATE
		12-23-88
RESPONSIBLE ENGINEER	DATE	DATE
		12/23/88
GROUP SUPERVISOR ENGINEER	DATE	DATE
		12/23/88
SUPERVISOR ENGINEER	DATE	DATE
		12/23/88
MANAGER, STATION TECHNICAL	DATE	DATE
		12/23/88
QUALITY ASSURANCE	DATE	DATE
		12/27/88
Conversion to DCN Date 2-7-89		Ullrich Knight



16X

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FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3	COM/DC USE ONLY CIG	INTERIM DCN NO.																				
	IDCN NO. S-6	DCN NO./REV. NO. 3364.00TJZ/0																				
	DOCUMENT NO. 5149958 SHEET NO. 11	DCN CONVERSION NO. 23																				
	Page 1 of 2																					
1. Originator K. WARNER Tel: 976-4790 Date 8-9-88																						
Document Title EMERG OPR. CONDITION DRADM.I.D. 4KV @ 480V LOP-SIS-SIS/LOP TRAIN 2 EOG SR																						
DESCRIPTION OF CHANGE <p style="text-align: center;">REMOVE SWD SUPPLY TRANSFORMER FROM 4160V BUS 2C ADD 410W PUMP TO 4160V BUS 2C</p> <p style="text-align: right;">RECEIVED CDM JAN 25 1989 SITE FILE COPY</p> <p style="text-align: center;"><i>B.B. 11/16/88</i> DCP# 3364.00TJZ REV 0 SHT 2 OF 235</p>																						
2. Other Affected Documents	3. Affected Systems	4. Design Approvals																				
S102163	ELE AFW	<table border="1"> <tr> <td>DESIGNED</td> <td><i>[Signature]</i></td> <td>DATE</td> <td>8/13/88</td> </tr> <tr> <td>CHECKED</td> <td><i>[Signature]</i></td> <td>DATE</td> <td>11/1/88</td> </tr> <tr> <td>APPROVED</td> <td><i>[Signature]</i></td> <td>DATE</td> <td>8/13/88</td> </tr> <tr> <td>LEAD DESIGN ENGINEER</td> <td><i>[Signature]</i></td> <td>DATE</td> <td>11/1/88</td> </tr> <tr> <td>BY</td> <td><i>[Signature]</i></td> <td>DATE</td> <td></td> </tr> </table>	DESIGNED	<i>[Signature]</i>	DATE	8/13/88	CHECKED	<i>[Signature]</i>	DATE	11/1/88	APPROVED	<i>[Signature]</i>	DATE	8/13/88	LEAD DESIGN ENGINEER	<i>[Signature]</i>	DATE	11/1/88	BY	<i>[Signature]</i>	DATE	
DESIGNED	<i>[Signature]</i>	DATE	8/13/88																			
CHECKED	<i>[Signature]</i>	DATE	11/1/88																			
APPROVED	<i>[Signature]</i>	DATE	8/13/88																			
LEAD DESIGN ENGINEER	<i>[Signature]</i>	DATE	11/1/88																			
BY	<i>[Signature]</i>	DATE																				
5. SCE/Contractor Project Administration																						
Conversion to DCN Date 1-25-89		<i>C. Stocker</i>																				

FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3 SUPPLEMENTAL PAGE	INTERIM DCN NO.	DCN NO./REV. NO.
	IDCN NUMBER S-6	DCN CONVERSION NO. 23
	DRAWING NO. 5149958 SHEET NO. 11	DCN CONVERSION NO. 23
	Page 2 of 2	
1. Originator K. WARNER Date 11-16-87		
Document Title EMERG OPR. CONDITION DRADM.I.D. 4KV @ 480V LOP-SIS-SIS/LOP TRAIN 2 EOG SR		
DESCRIPTION OF CHANGE <p style="text-align: center;">BEFORE DCP# 3364.00TJZ REV 0 SHT 2 OF 235</p> <p style="text-align: center;">AFTER</p> <p style="text-align: right;">RECEIVED CDM JAN 25 1989 SITE FILE COPY</p>		

N1592
SH 139A

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APERTURE
CARD

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Aperture Card.

8902270311-186

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<p>Southern California Edison Company INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS 1, 2 & 3)</p>	FORM/DCN USE ONLY	FORM NO. 1-88-5113.L
	ISSUE NO. 8-B	REV. NO. 1-5113.2BE
	DOCUMENT NO. 5149958	REV. NO. 11
	SHEET NO. 11	REV. NO. 11

1. ORIGINATOR: **H. Sun** DATE: **9/14/88**
 PROJECT NO.: **(213)807-5237**
 DOCUMENT TITLE: **EMERG OP COND. 4KV & 480V LOP-SIS-SIS/LOP TRAIN N.R. 2**

DESCRIPTION OF CHANGE:
- CHANGE THE OPERATING CONDITION OF 480V SWGR BUS 2-3 TIE BREAKER (52-1203) AS SHOWN

Ref: Design Calculation/Specification Numbers **N/A** Seismic Category **NA**

2. Other Affecting Documents

None

Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:

This DCP (Forms CC(123) 183 and CC(123) 184 attached)

This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)

The following document:

RECEIVED CDM
JAN * 9 1989
SITE FILE COPY

3. Affected Systems **SIS, 480**

4. SCE Design Approvals

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/RES & L	
OTHER	DATE	OTHER	DATE
ENGINEER		N/A	
INDEPENDENT REVIEW ENGR.		10/3/88	
RESPONSIBLE ENGINEER		10-4-88	
GROUP SUPERVISING ENGINEER		10-8-88	
SUPERVISING ENGINEER I		10/8/88	
MANAGER, STATION TECHNICAL			
QUALITY ASSURANCE		10/9/88	

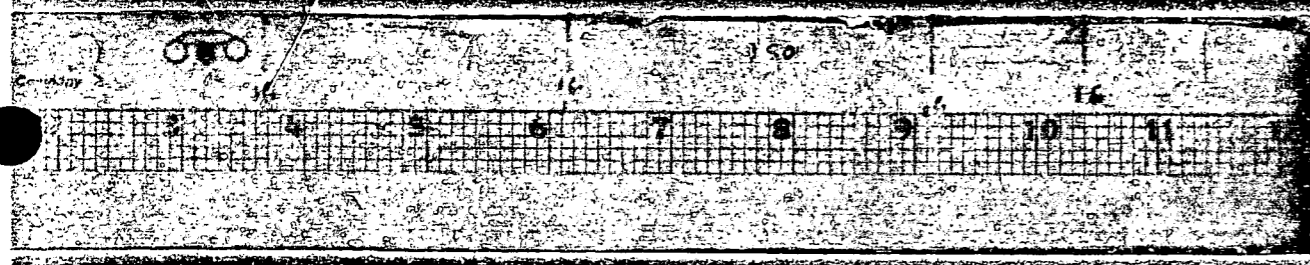
Conversion to DCN Date: **1-3-89**

DCP-5113.2BE-REV 0 SHEET 53

S.
APERTURE
CARD

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Aperture Card

8902270311-187



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DCP-5113-28 REV 0 SHEET 54

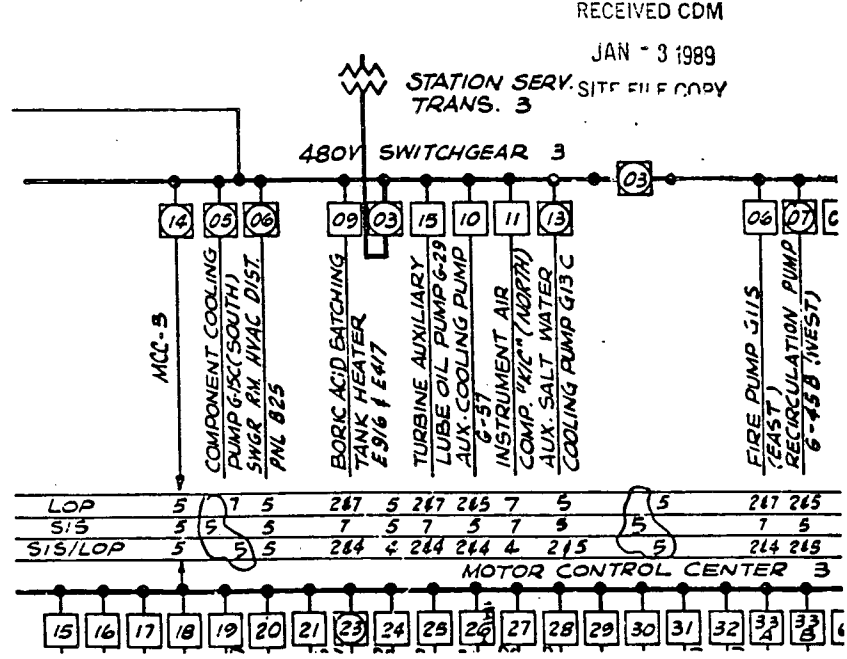
Southern California Edison Company
Songs 1, 2 & 3
INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.					
IDCN NUMBER <u>V-5</u>					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	BY	CHKD.
5149958	- 11	11	22	SR	

Date 9/14/88 Page 2 of 3
By H. Sun

DESCRIPTION OF CHANGE

BEFORE:



SEE 20-1700 REV 11/76

DCP-5113-28 REV 0 SHEET 55

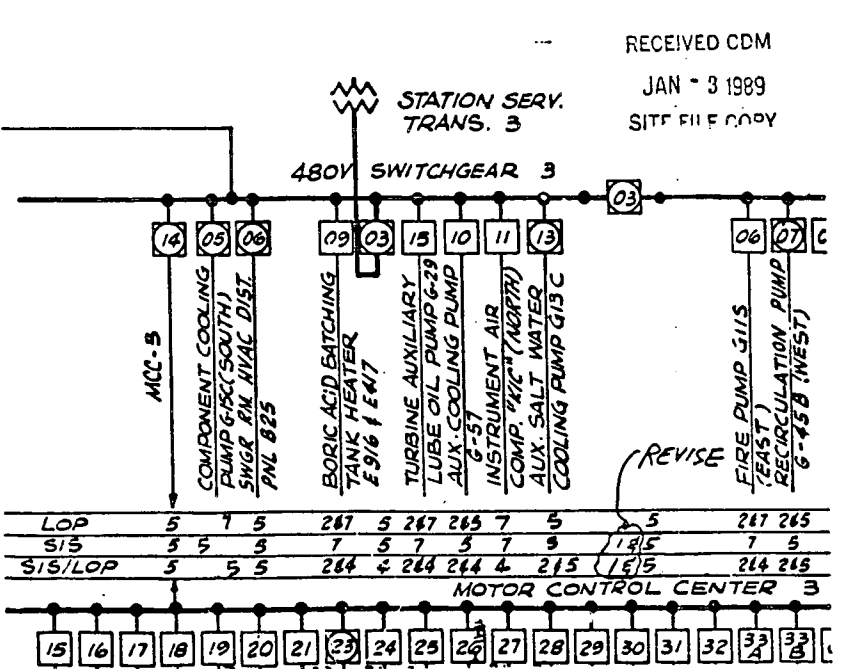
Southern California Edison Company
Songs 1, 2 & 3
INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.					
IDCN NUMBER <u>V-5</u>					
DRAWING NO.	SHEET NO.	REV. NO.	DATE	BY	CHKD.
5149958	- 11	11	22	SR	

Date 9/14/88 Page 2 of 3
By H. Sun

DESCRIPTION OF CHANGE

AFTER



SEE 20-1700 REV 11/76

APERTURE CARD

Also Available On Aperture Card.

8902270311-188

16X

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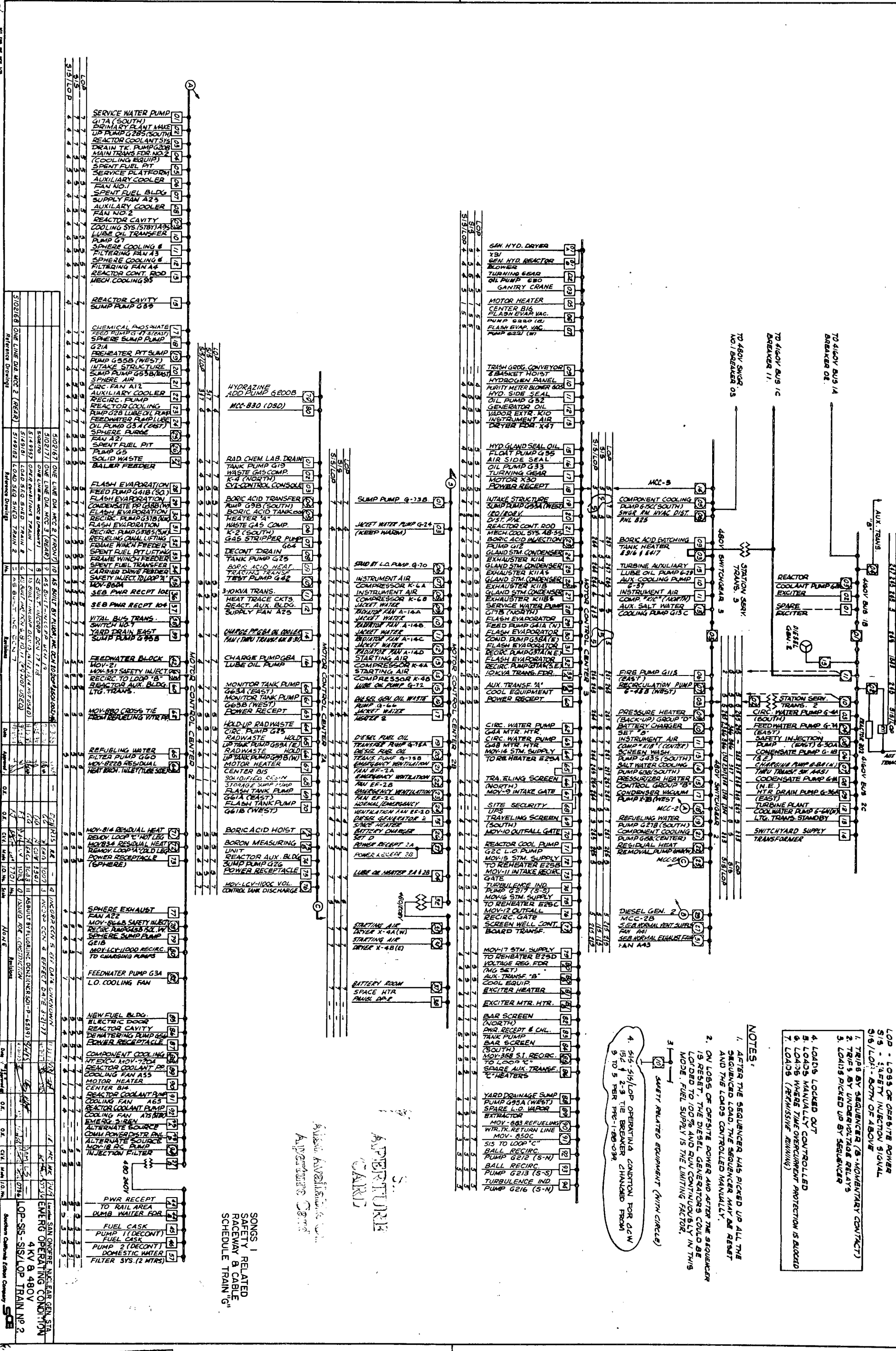
16

OPERATING CONDITIONS

- 1. LOSS OF OFFSITE POWER
- 2. SAFETY INJECTION SIGNAL
- 3. LOSS OF 480V
- 4. TRIP BY SEQUENCER (B-MOMENTARY CONTACT)
- 5. TRIP BY UNDERVOLTAGE RELAYS
- 6. LOADS PICKED UP BY SEQUENCER
- 7. LOADS LOCKED OUT
- 8. LOADS MANUALLY CONTROLLED
- 9. LOADS WHERE THE OVERCURRENT PROTECTION IS BLOCKED
- 10. LOADS (DEFENSIVE RUNNING)

NOTES:

1. AFTER THE SEQUENCER HAS PICKED UP ALL THE SEQUENCED LOAD THE SEQUENCER MAY BE RESET AND THE LOADS CONTROLLED MANUALLY.
2. ON LOSS OF OFFSITE POWER AND AFTER THE SEQUENCER IS RESET, THE DIESEL GENERATORS SHOULD BE LOADED TO 100% AND RUN CONTINUOUSLY IN THIS MODE. FUEL SUPPLY IS THE LIMITING FACTOR.
3. SAFETY RELATED EQUIPMENT (WITH CIRCLES)
4. SIS/SIS/LOP OPERATING CONDITION FOR DCW 152 & 2-3 THE BREAKER CHANGED FROM 5 TO 5 PER PFC-1-80-039



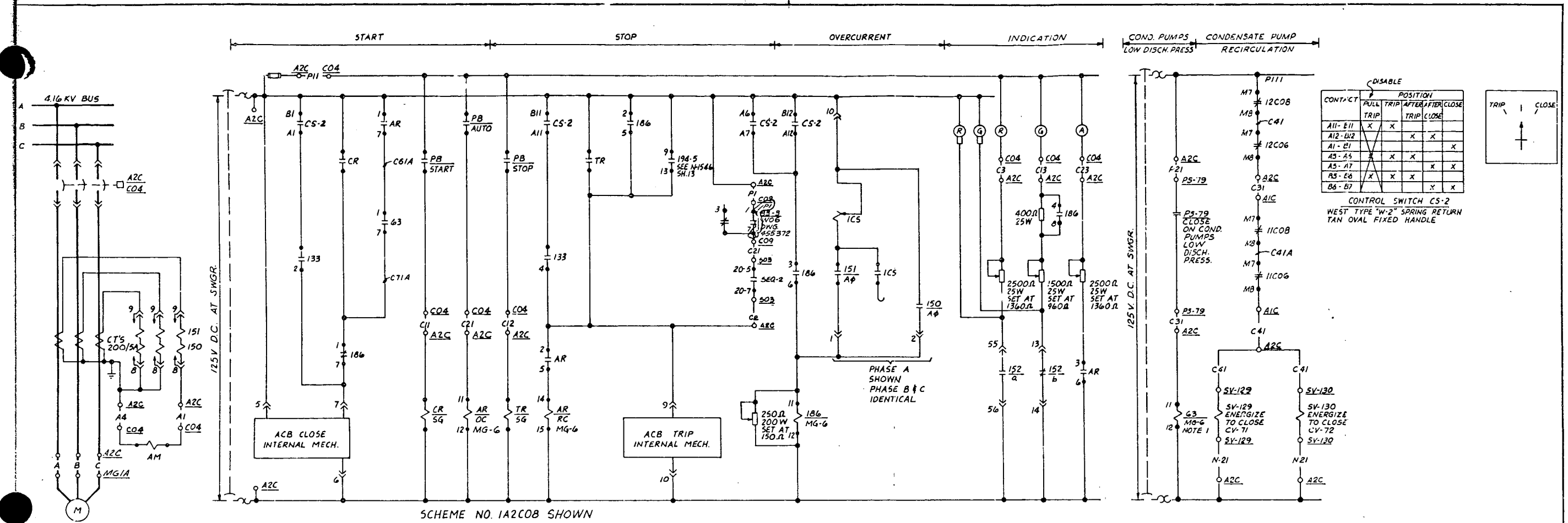
LOP	SIS	SIS/LOP	DESCRIPTION
1	1	1	SERVICE WATER PUMP
2	1	1	G17A (SOUTH)
3	1	1	PRIMARY PLANT MAKE
4	1	1	UP PUMP G285 (SOUTH)
5	1	1	REACTOR COOLANT PUMP
6	1	1	DRAIN TK PUMP G308
7	1	1	MAIN TRANS FOR NO. 2
8	1	1	(COOLING EQUIP)
9	1	1	SPENT FUEL PIT
10	1	1	SERVICE PLATFORM
11	1	1	AUXILIARY COOLER
12	1	1	FAN NO. 1
13	1	1	SPENT FUEL BLDG
14	1	1	SUPPLY FAN A23
15	1	1	AUXILIARY COOLER
16	1	1	FAN NO. 2
17	1	1	REACTOR CAVITY
18	1	1	COOLING SYS. (SOUTH)
19	1	1	LUBE OIL TRANSFER
20	1	1	PUMP G7
21	1	1	SPHERE COOLING &
22	1	1	FILTERING FAN A3
23	1	1	FILTRER COOLING &
24	1	1	FILTRER FAN A3
25	1	1	REACTOR CONT. ROD
26	1	1	MECH. COOLING 95
27	1	1	REACTOR CAVITY
28	1	1	SUMP PUMP G55
29	1	1	CHEMICAL WASTE
30	1	1	FEED PUMP G77 (EAST)
31	1	1	SPHERE SUMP PUMP
32	1	1	G21A
33	1	1	PREHEATER PIT SUMP
34	1	1	PUMP G55B (WEST)
35	1	1	INTAKE STRUCTURE
36	1	1	SUMP PUMP G55B (EAST)
37	1	1	SPHERE AIR
38	1	1	CIRC. FAN A12
39	1	1	AUXILIARY COOLER
40	1	1	RECIRC. PUMP
41	1	1	REACTOR COOLING
42	1	1	PUMP G28 LUBE OIL PUMP
43	1	1	REACTOR COOLING
44	1	1	OIL PUMP G5 A (EAST)
45	1	1	SPHERE PURGE
46	1	1	FAN A21
47	1	1	SPENT FUEL PIT
48	1	1	TRAMP G5
49	1	1	SOLID WASTE
50	1	1	BALER FEEDER
51	1	1	FLASH EVAPORATION
52	1	1	FEED PUMP G41B (SC)
53	1	1	FLASH EVAPORATION
54	1	1	CONDENSATE PUMP (SOUTH)
55	1	1	FLASH EVAPORATION
56	1	1	RECIRC. PUMP G31B (SC)
57	1	1	FLASH EVAPORATION
58	1	1	RECIRC. PUMP G31B (SC)
59	1	1	REFUELING OIL LIFTING
60	1	1	FRAME WINCH FEEDER
61	1	1	SPENT FUEL PIT LIFTING
62	1	1	FRAME WINCH FEEDER
63	1	1	SPENT FUEL TRANSFER
64	1	1	CARRIER DRIFT FEEDER
65	1	1	SPENT FUEL TRANSFER
66	1	1	MOV-88M
67	1	1	SEB PWR RECP 104
68	1	1	SEB PWR RECP 104
69	1	1	VITAL BUS TRANS.
70	1	1	SWITCH NO. 1
71	1	1	YARD DRAIN EAST
72	1	1	SUMP PUMP G95B
73	1	1	FEEDWATER BLOCK
74	1	1	MOV-21
75	1	1	MOV-587 SAFETY INJECT
76	1	1	RECIRC. TO LOOP "B"
77	1	1	REACTOR AUX. BLDG.
78	1	1	LTY. TRANS.
79	1	1	MOV-690 CROSS TIE
80	1	1	FROM REFUELING WTR TR
81	1	1	REFUELING WATER
82	1	1	FILTER PUMP G40
83	1	1	HEAT EXCH. RESISTOR
84	1	1	HEAT EXCH. INLET/OUTLET
85	1	1	MOV-814 RESIDUAL HEAT
86	1	1	REMOV. LOOP "A" HEAT
87	1	1	REMOV. LOOP "A" HEAT
88	1	1	REMOV. LOOP "A" HEAT
89	1	1	REMOV. LOOP "A" HEAT
90	1	1	REMOV. LOOP "A" HEAT
91	1	1	REMOV. LOOP "A" HEAT
92	1	1	REMOV. LOOP "A" HEAT
93	1	1	REMOV. LOOP "A" HEAT
94	1	1	REMOV. LOOP "A" HEAT
95	1	1	REMOV. LOOP "A" HEAT
96	1	1	REMOV. LOOP "A" HEAT
97	1	1	REMOV. LOOP "A" HEAT
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8902270311-189

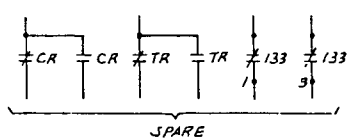
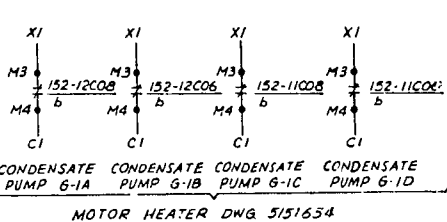
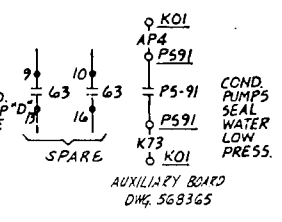
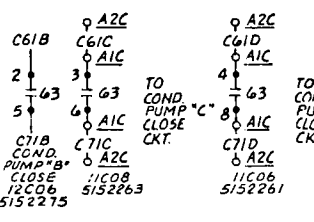
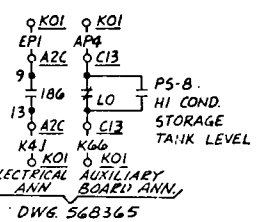
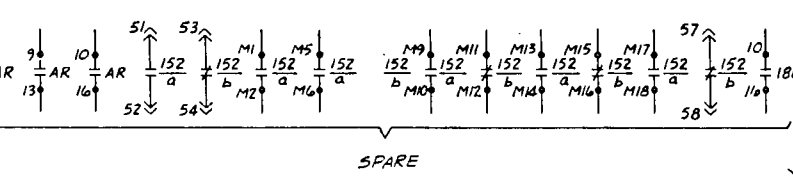
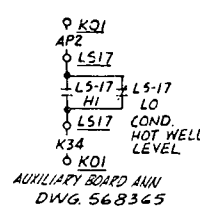
5149958-11

APERTURE CARD

SONGS I RELATED RACEWAY & CABLE SCHEDULE TRAIN G



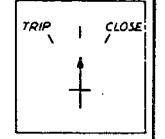
SCHEME NO. 1A2COB SHOWN



EQUIPMENT	BREAKER NO.	SCHEME NO.	LOCATION	WIRE	INTLK.	INTLK.	SEQUENCE				INTLK-RLY-TERM'S		
							NO.	T.B.	STUD	TIME			
CONDENSATE PUMP G-1A (N.E.)	152-12COB	1A2COB	A2C	MG1A	K4J	194-5	NY-853A	2	20	5-7	0 SEC.	5150875	B3-3 - W06 - 1 & 7
CONDENSATE PUMP G-1B (S.E.)	152-12CO6	1A2CO6	A2C	MG1B	K4L	194-5	NY-853A	2	20	9-11	0 SEC.		B3-3 - W06 - 8 & 2
CONDENSATE PUMP G-1C (N.W.)	152-11COB	1A1COB	A1C	MG1C	K4O	194-1	NY-853B	1	19	6-8	0 SEC.	5150874	B3-3 - W09 - 1 & 7
CONDENSATE PUMP G-1D (S.W.)	152-11CO6	1A1CO6	A1C	MG1D	K4Q	194-1	NY-853B	1	19	9-11	0 SEC.		B3-3 - W09 - 8 & 2

CONTACT	POSITION			
	PULL TRIP	TRIP	AFTER TRIP	CLOSE
A11-E11	X	X		
A12-E12			X	X
A1-E1				X
A5-A5		X	X	X
A5-A7		X	X	X
A5-E6	X	X	X	X
B6-B7				X

CONTROL SWITCH CS-2
WEST TYPE "W-2" SPRING RETURN
TAN OVAL FIXED HANDLE



890227031N-190

REDRAWN FROM N-1543 SH3 & N-1543 SH3A

NO.	DESCRIPTION	DATE	BY	CHKD.	APP'D.	SCALE	REVISIONS
3	REVISION						
4	REVISION						
5	REVISION						
6	REVISION						
7	REVISION						
8	REVISION						
9	REVISION						
10	REVISION						
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100	REVISION						

Location SAN ONOFRE NUCLEAR GEN. STA.
ELEMENTARY DIAGRAM
CONDENSATE PUMPS
G-1A, G-1B, G-1C & G-1D
Southern California Edison Company

5149970-4

MCC 3

Table with 3 columns: CONTACT, FUNCTION, REFERENCE. Title: 86-M3-4 (LOR/ER RELAY CONTACTS)

MCC 3

Table with 3 columns: CONTACT, FUNCTION, REFERENCE. Title: 86-M3-3 (LOR/ER RELAY CONTACTS)

MCC 3

Table with 3 columns: CONTACT, FUNCTION, REFERENCE. Title: 86-M3-2 (LOR/ER RELAY CONTACTS)

MCC 3

Table with 3 columns: CONTACT, FUNCTION, REFERENCE. Title: 86-M3-1 (LOR/ER RELAY CONTACTS)

480V SWGR 3

Table with 3 columns: CONTACT, FUNCTION, REFERENCE. Title: 86-3 (LOR/ER RELAY CONTACTS)

NOTE: LOR/ER RELAY CONTACTS ARE SHOWN IN THE RESET POSITION

APERTURE CARD

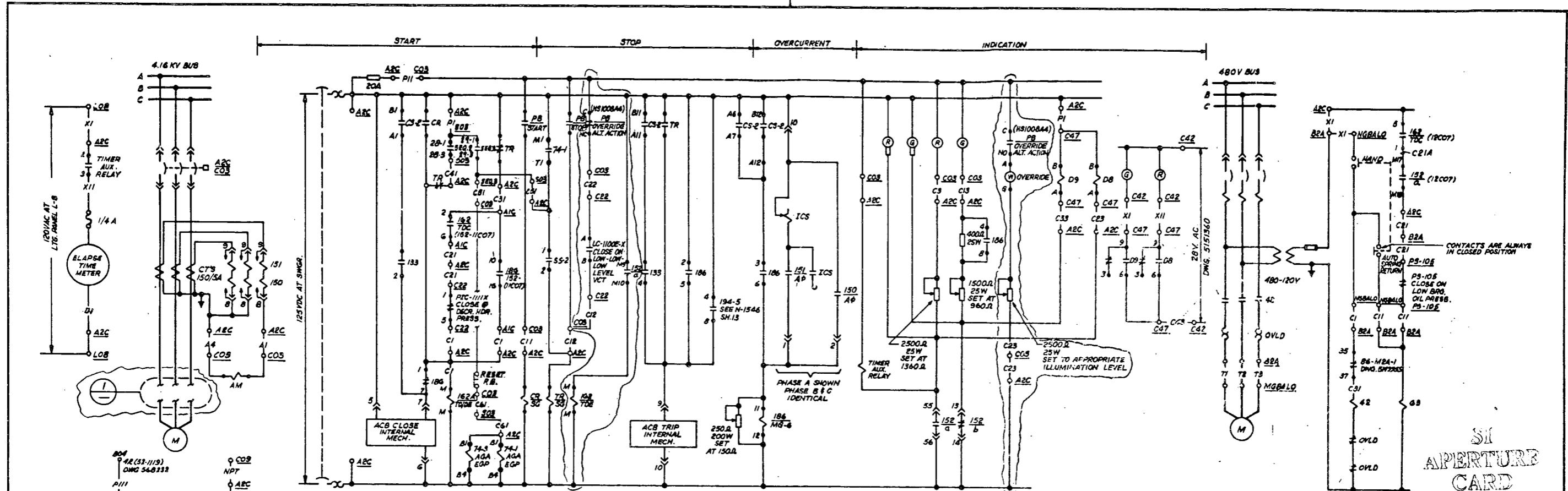
Also Available On Aperture Card

8902270311-191

3ONGS I ELECTRICAL AUXILIARIES SAFETY RELATED SUPERSEDE DWGS. N1546 SH.26 / 5102187. CONNECTION DATA TABLE SIS/LOP LOCKOUT RELAYS TRAIN 2 SH.2

Revision table with columns: No., Description, Date, Appr., etc.

5149975-8



SI APERTURE CARD

Also Available On Aperture Card

SCHEME NO. 1A2C07 SHOWN

SCHEME NO. 1B2A16 SHOWN

CONTACT	POSITION	BUS 1	OFF	BUS 2
1-2	X			
3-4				X
5-6	X			
7-8				X

SELECTOR SWITCH SS1 & SS2
 SQUARE D CAT #900-K3-130
 MANUAL RETURN CONTACTS
 BLACK OVAL HANDLE

EQUIPMENT	SCHEME NO.	STARTER NO.	LOCATION	WIRE NO.	INTERLOCKS	DEVICE NO.
LUBE OIL PUMP FOR CHRG. PUMP G-BA	1B2A16	4B-1A16	A2C B2A	NPT	1A2C07, 152A (12C07)	PS-108
LUBE OIL PUMP FOR CHRG. PUMP G-8B	1B18'9	4B-118'9	A1C B01	K62	1A2C07, 152A (12C07)	PS-108

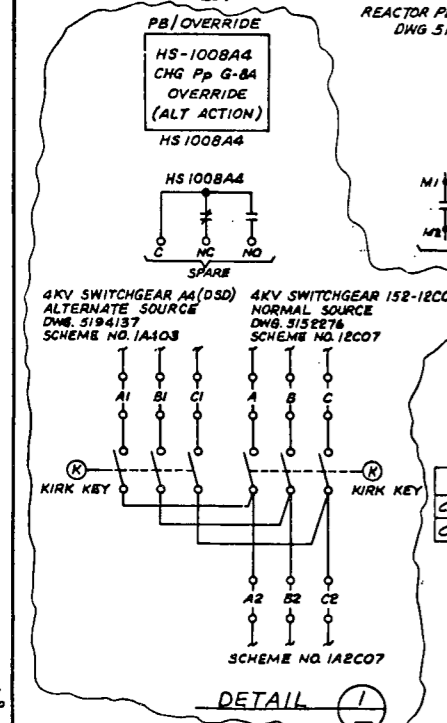
CONTACT	POSITION			
	PULL TRIP	TRIP AFTER TRIP	AFTER CLOSE	CLOSE
A11-B11	X	X		
A12-B12			X	X
A1-B1				X
A5-A6	X	X	X	
A6-A7				X
B5-B6	X	X	X	
B6-B7				X

CONTROL SWITCH CS-2
 WEST TYPE "W-2" SPRING RETURN
 TAN OVAL FIXED HANDLE

- NOTES:
- SELECTOR SWITCHES SS1 & SS2 TO BE MANUALLY ALIGNED WITH TRIP SUPPLYING 140V-1100C. IF 140V-1100C IS ALIGNED TO MCC-2A, SS1 AND SS2 ARE TO BE POSITIONED TO BUS 2C. IF 140V-1100C IS ALIGNED TO MCC-1, SS1 AND SS2 ARE TO BE POSITIONED TO BUS 1C.
 - ALARM RELAYS 74-1, 74-2, 74-3 ARE QUALIFIED GRADE ADJUST TYPE EGP RELAYS, PLUG-IN TYPE.

SONGS I
 SAFETY RELATED
 REACTOR AUXILIARIES

EQUIPMENT	SCHEMATIC	BREAKER NO.	WIRE NO.	LOCATION	INTERLOCKS	156	DEVI	SEL. SW.	SEQUENCER	ALARM RELAY	ELAPSED TIME METER
CHRG. PUMP G-8A (NORTH)	1A2C07 / 1A408	152-12C07 / 152-12C07	K4-M, K6E	A2C M4-B4 C47	1194-5 / 152-11C07	152-11C07	TC-1119A # B	SS2-(1,2)	2 29 1,3 2 28 1,3 20 SEC.	5150875	74-3 74-1 XII UI
CHRG. PUMP G-8B (SOUTH)	1A1C07	152-11C07	K4-S, K6E	A1C M4-B4 C46	1194-5 / 152-12C07	152-12C07	TC-1119C # D	SS1-(3,4)	1 28 9-11 1 28 1,3 20 SEC.	5150875	74-4 74-2 XII U



DETAIL 1

NO.	DESCRIPTION	DATE	BY	CHKD.	APP'D.	REVISION
1	AS BUILT - INCORP. DCN 16 THRU 21	7-21-72				
2	AS BUILT - INCORP. DCN 22 THRU 25	7-21-72				
3	CANCEL CTS 1, 2 (MAY-1100C)	7-21-72				
4	INCORP. CTS 1, 2 DISC 8 (MAY-1100C) & SAFETY FUNCTIONS AS CONSIDERED FOR THE 140V-1100C (MAY-1100C) TURN OVER CHECKER	7-21-72				
5	140V-1100C (MAY-1100C) DISC 8 (MAY-1100C) SAFETY FUNCTIONS AS CONSIDERED FOR THE 140V-1100C (MAY-1100C) TURN OVER CHECKER	7-21-72				

Southern California Edison Company		CSW/DCN USE ONLY	DCN NO.
FIELD	INTERIM DESIGN CHANGE NOTICE (IDCN) / DESIGN CHANGE NOTICE (DCN) (For SONGS 1, 2 & 3)	IDCN NO. E-7333	DCN NO. 1-5119.043E
		DOCUMENT NO. 5150874	REV. NO. 14
		VERSION NO. 34	REV. NO. 14

ORIGINATOR	NOEL BASILIO	JAN	87376	DATE	1-13-89
SEQUENCE	E/D	SEQ.	4	DATE	E-10
DESCRIPTION OF CHANGE	SREAN				

DESCRIPTION OF CHANGE

THIS FIDCN SUPERSEDES IDCN # 5-4 IN ITS ENTIRETY

- ASSIGNED SEQ. CONTACT 18-2 & 18-4 TO TRIP SST # 3 SUPPLY BREAKER

8 REF:	PE WAIVER REQUIRED	NO	OR	YES
	PFO REVISION REQUIRED	NO	OR	YES

2. Other Affected Documents

None

Specific affected documents are listed on the CC(123) 184 associated with the source document checked below:

This DCP (Forms CC(123) 183 and CC(123) 184 attached)

This FIDCN/DCN (Forms CC(123) 183 and CC(123) 184 attached)

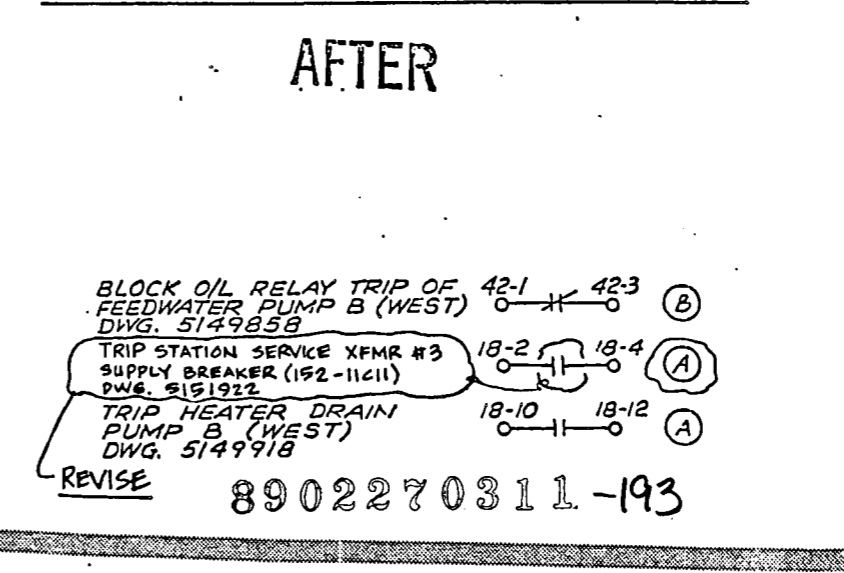
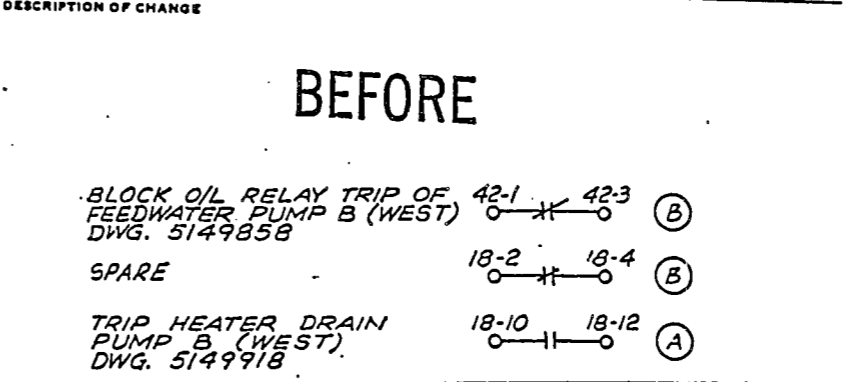
The following document: E-7332 TO DWG. 5151922

3. Affected Systems **SIS, ELE**

NUCLEAR GENERATION SITE DEPARTMENT		ENGINEERING AND CONSTRUCTION DEPARTMENT/RES & L	
OTHER	DATE	OTHER	DATE
		Nuclear	1/14/89
CHECKER	DATE	CHECKER	DATE
		Jan Hanna	1/14/89
INDEPENDENT REVIEW ENGR.	DATE	INDEPENDENT REVIEW ENGR.	DATE
			1-13-89
RESPONSIBLE ENGINEER	DATE	RESPONSIBLE ENGINEER	DATE
		A.B. Samuels	1/14/89
GROUP SUPERVISING ENGINEER	DATE	GROUP SUPERVISING ENGINEER	DATE
		A.B. Samuels for L.N. Khan	1/14/89
SUPERVISING ENGINEER	DATE	SUPERVISING ENGINEER	DATE
		A.B. Samuels for L.N. Khan with A. Hanna	1/14/89
NUCLEAR STATION TECHNICAL QUALITY ASSURANCE	DATE	NUCLEAR STATION TECHNICAL QUALITY ASSURANCE	DATE
		K.R. Johnson for J. Reilly	1/15/89
CONVERSION TO DCN DATE	DATE	CONVERSION TO DCN DATE	DATE
		2-7-89	1-13-89 1324

FIELD INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
SUPPLEMENTAL PAGE

INTERIM DCN NO.		IDCN NUMBER E-7333	
DRAWING NO.	SHEET NO.	REV. NO.	DATE
5150874	14	14	1-13-89
Date 1-13-89		Page 2 of 2	
By NBASILIO			



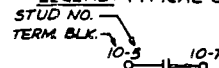
APERTURE CARD

Also Available On Aperture Card

16X

MICROFILMED FROM BEST AVAILABLE COPY

LEGEND: TYPICAL SAMPLE



SEQUENCER NO. 1 FOR LOAD TRAIN NO. 1 DWG. 5149178 & 5149179

SEE DWG. 63715 FOR DETAILS OF SAFETY INJECTION CIRCUITRY

TO CONTAINMENT ISOLATION SYSTEM TRAIN "F" DWG. 5159760

4160V. BUS 1C UNDERVOLTAGE DWG. 5150876

4160V. BUS 1C UNDERVOLTAGE DWG. 5150351

DIESEL GEN. UNIT #12 DWG. 5151363

DIESEL GEN. UNIT #13 DWG. 5149630

4160V BUS 1C UNDERVOLTAGE DWG. 5150876

4160V BUS 1C UNDERVOLTAGE DWG. 5150351

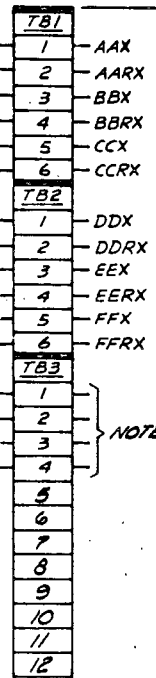
BLOCK AUTO INJECTION SIGNAL DWG. 63715

125V D.C. PWR SUPPLY BREAKER 72/124 DWG. 63715

REMOTE SURVEILLANCE PANEL

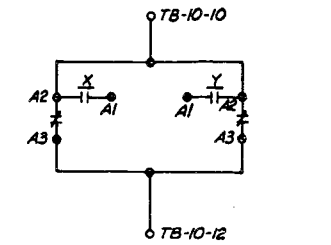
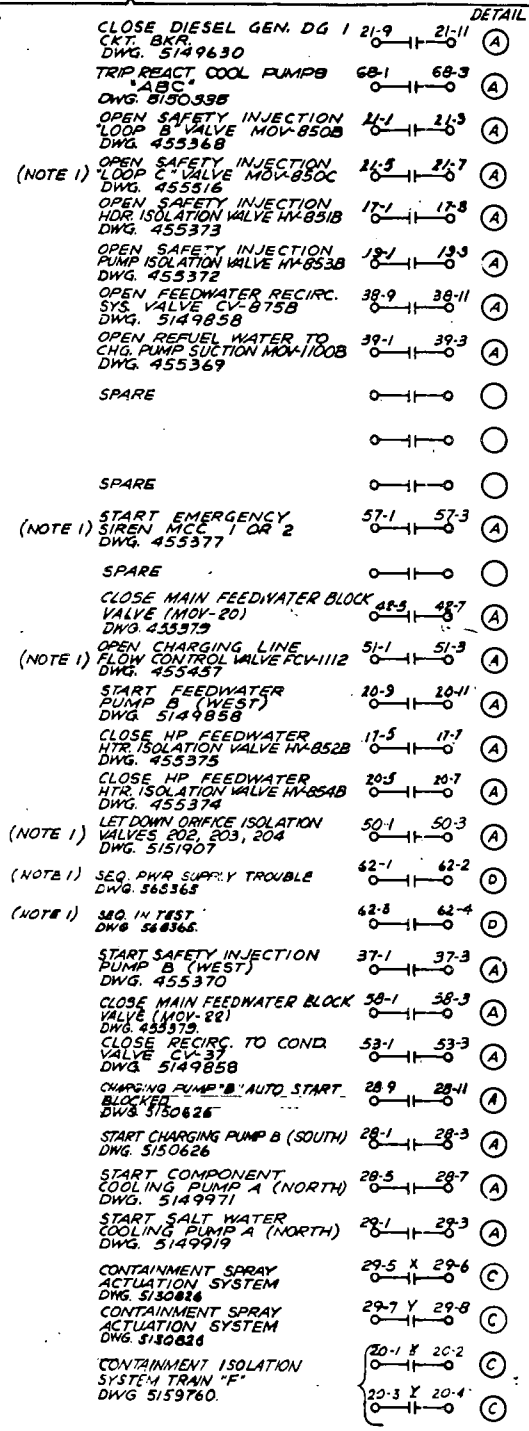
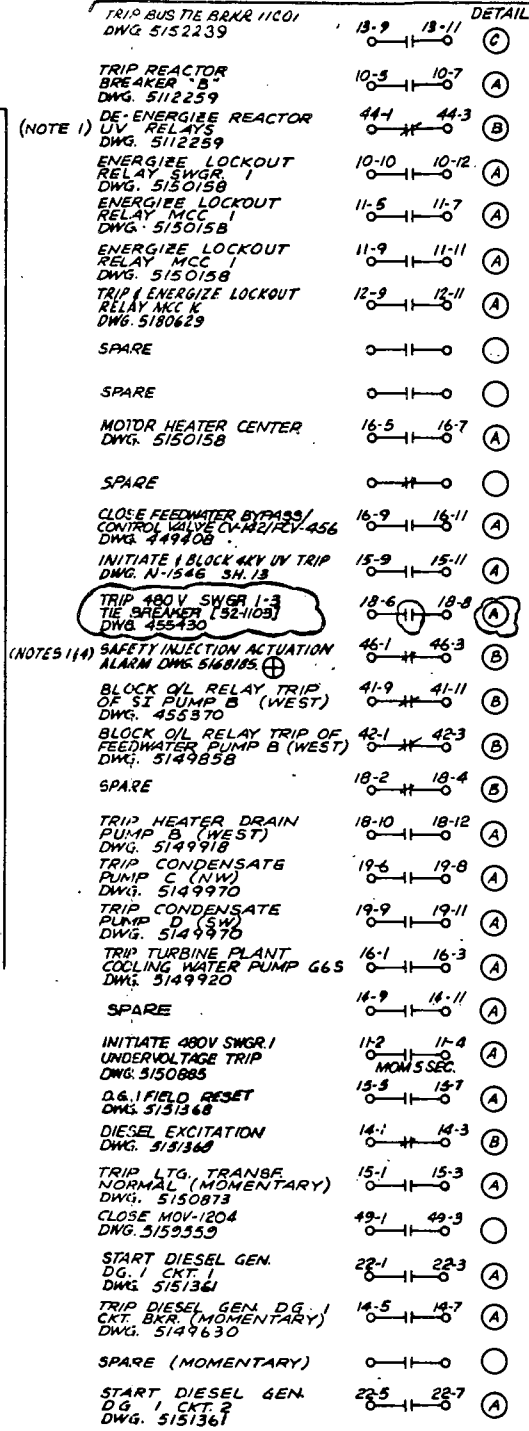
SI APERTURE CARD

Also Available On Aperture Card

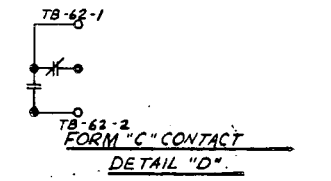


SEQUENCER NO. 1 (502)

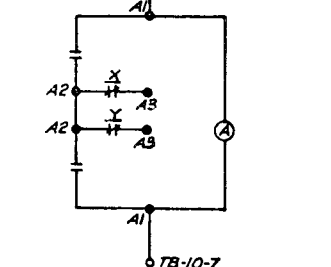
- NOTE: 1. BOTH SEQUENCERS OPERATING THE SAME LOAD 2. FOR SPARE CONTACTS SEE DWGS. 5149178 & 5149179 3. CHANGES IN INTERNAL WIRING SHALL BE DONE BY SEQUENCER SUPPLIER CONSOLIDATED CONTROL CO. TO ACCOMMODATE ADDITIONAL UNDERVOLTAGE SIGNAL INPUT FROM 4160V BUS 1C & 2C. 4. CONTACTS FOR NON-SAFETY RELATED OUTPUTS ARE ISOLATED WITH INDIVIDUAL ISOLATION BOX.



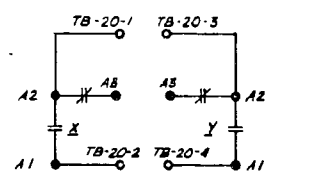
NORMALLY CLOSED CONTACTS DETAIL "B"



NORMALLY OPEN CONTACTS DETAIL "A"



NORMALLY OPEN CONTACTS DETAIL "C"



NORMALLY OPEN CONTACTS DETAIL "C"

8902270311-194

SONGS I SAFETY RELATED EXCEPT AS NOTED

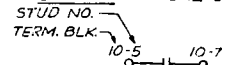
N1542 SH.137 THIS DRAWING SUPERSEDED DWG. 5149454

Table with columns for drawing number, description, date, and revision. Includes entries for 63715 SAFETY INJECTION SYSTEM, 5149178 SEQUENCER LOGIC DIAGRAM, and 5150874-15.

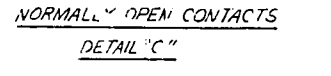
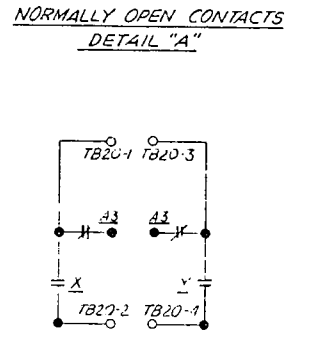
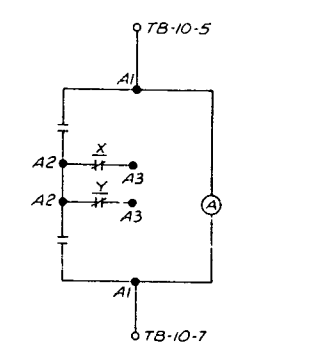
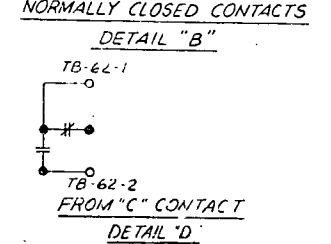
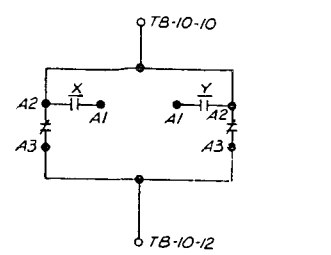
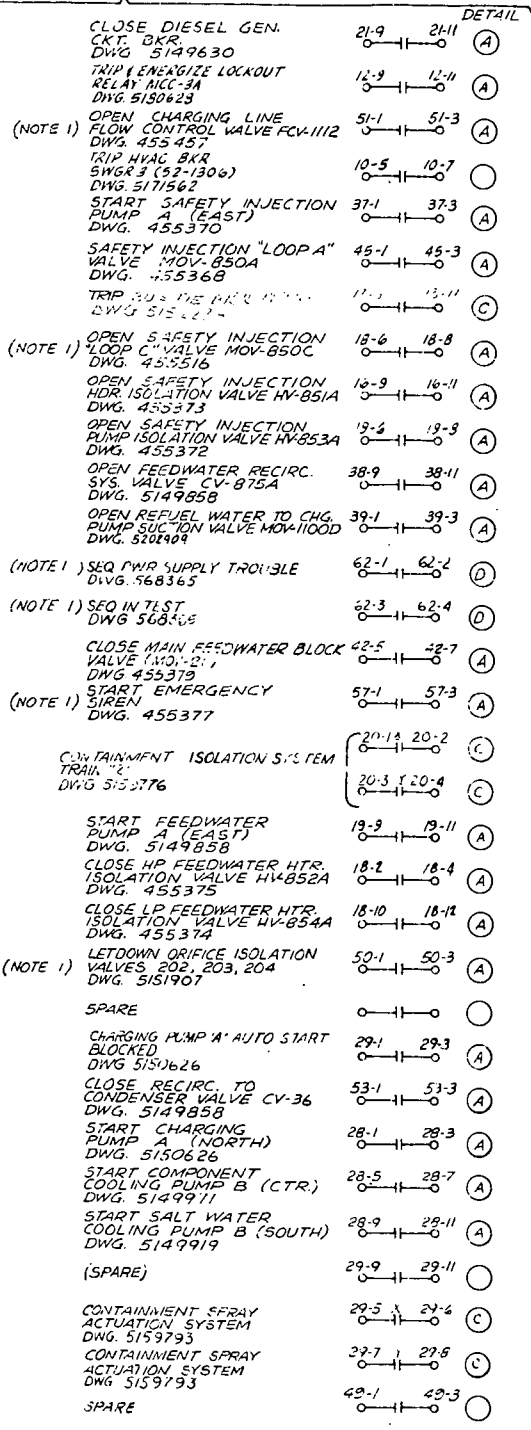
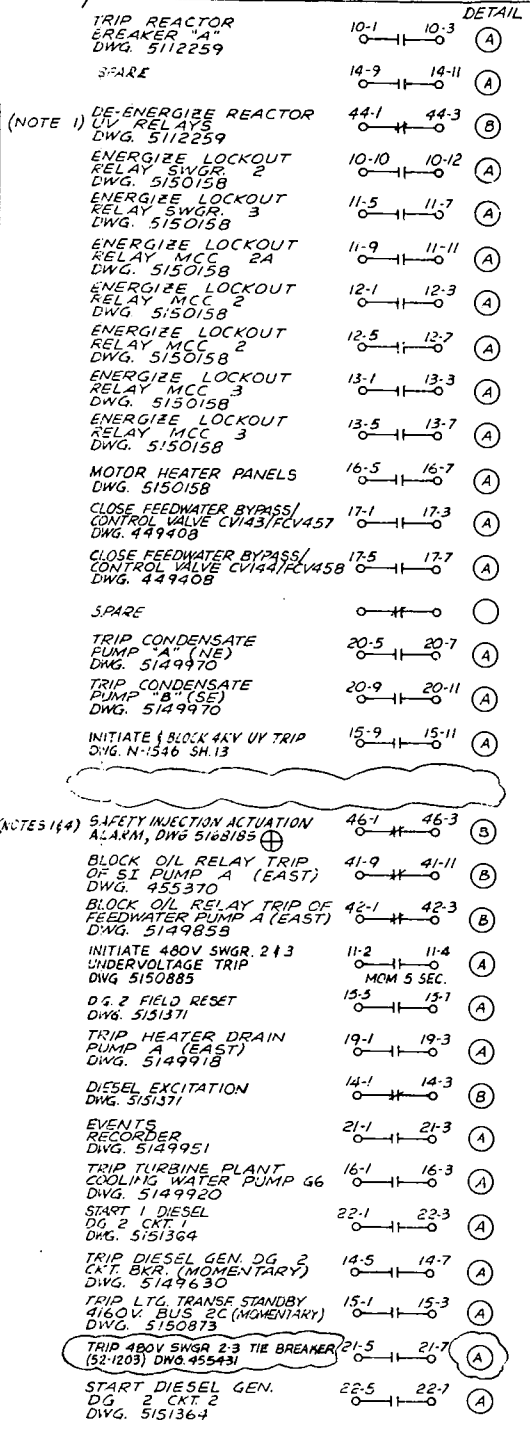
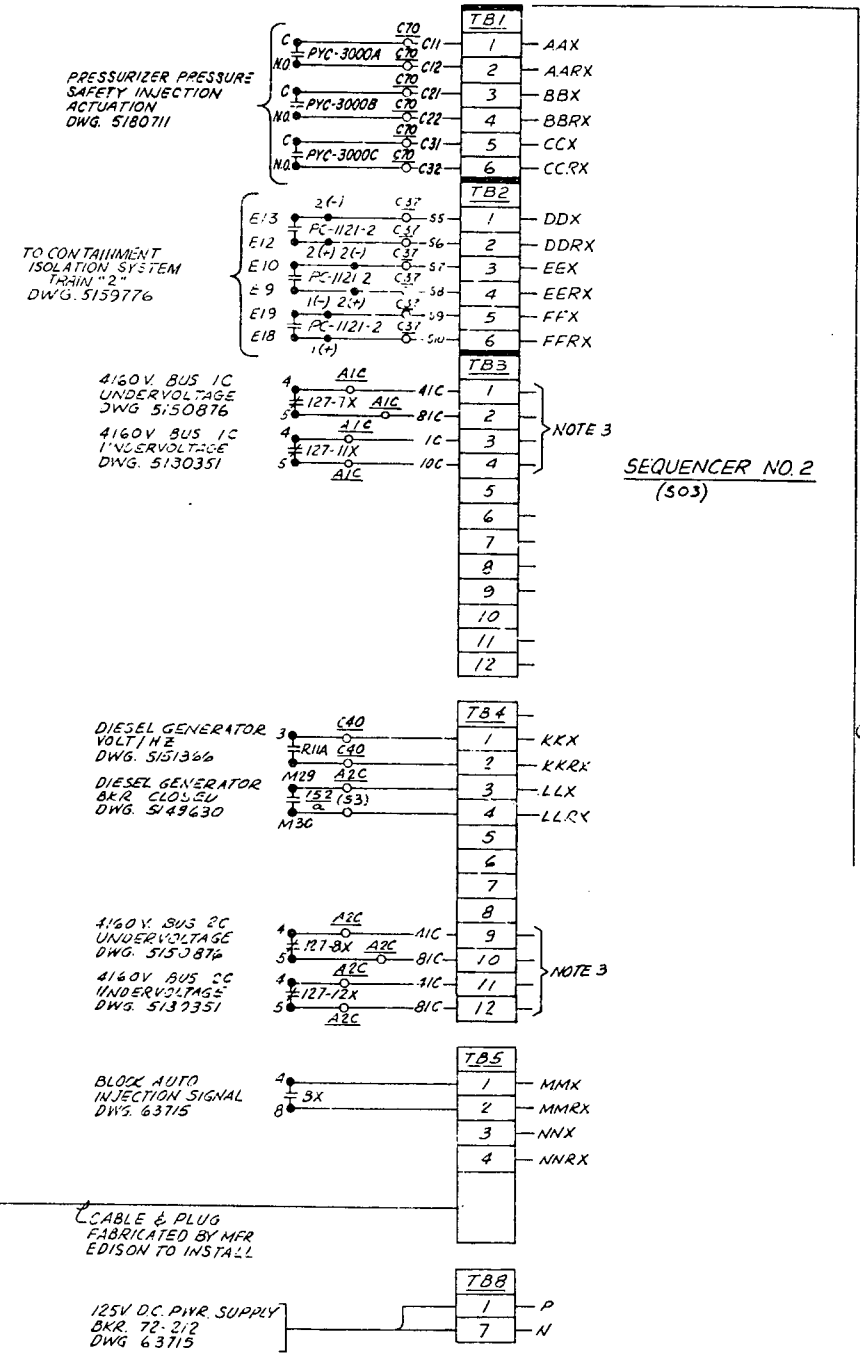
5150874-15

12-1-80

LEGEND: TYPICAL SAMPLE



SEQUENCER NO. 2
FOR LOAD TRAIN NO. 2
DWG. 5149180 & 5147181



- NOTES:
1. BOTH SEQUENCERS OPERATING THE SAME LOAD
2. FOR SPARE CONTACTS SEE DWGS. 5145181 & 5149182
3. CHANGES IN INTERNAL WIRING SHALL BE DONE BY SEQUENCER SUPPLIER...
4. CONTACTS FOR NON-SAFETY RELATED OUTPUTS ARE ISOLATED WITH INDIVIDUAL ISOLATION BOX.

APERTURE CARD
Also Available On Aperture Card.

8902270311-195

THIS DRAWING SUPERSEDED DWG. 5149454

Table with columns for Reference Drawings, Revisions, Date, and Approval. Includes drawing numbers like 5149180 and 5150875.

AAS WP 8060.2
TMI-II PROJECT
WP No. 2.1., 2.2.2b
SONGS I
SAFETY RELATED
EXCEPT AS NOTED

5150875-17

FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3	CDM/DDC USE ONLY CIG	INTERIM DCN NO. PFC NO.
	DCN NO. 5-2	DCN NO./REV. NO. 3364.00TJZ/0
	DOCUMENT NO. 5150876 Sht. - Rev. 10 Page 1 of 2	DCN CONVERSION NO. 21
1. Originator A. D. TUMA Tel: 714-975-9316 Date 8-9-88		
Document Title E/D, 4.16 KV BUSES UNDERVOLTAGE & GEN. UNDER FREQ. RELAYS.		DRADM I.D. QC E-09 SR
DESCRIPTION OF CHANGE - ADD POWER AND CONTROL CIRCUITS FOR AUX. FEEDWATER PUMP G-10W FROM CUBICLE 12C14.		
RECEIVED CDM JAN 25 1989 SITE FILE COPY		
DCP # ³³⁶⁴ 3364 .00TJZ REV 0 SHT 349 OF 3350		
2. Other Affected Documents 5151562 5151027	3. Affected Systems ELE - 4KV.	4. Design Approvals CHECKED <i>William Smith</i> DATE 8-15-88 DESIGNED <i>Paul Spindel</i> DATE 11/11/87 RESPONSIBLE ENGINEER <i>[Signature]</i> DATE 8/16/88 LEAD DESIGN ENGINEER <i>[Signature]</i> DATE 11/11/87 OTHER _____ DATE _____ QUALITY ASSURANCE <i>[Signature]</i> DATE 11/22/88
5. SCE/Contractor Project Administration Conversion to DCN Date 1-25-89 C. Strickman		

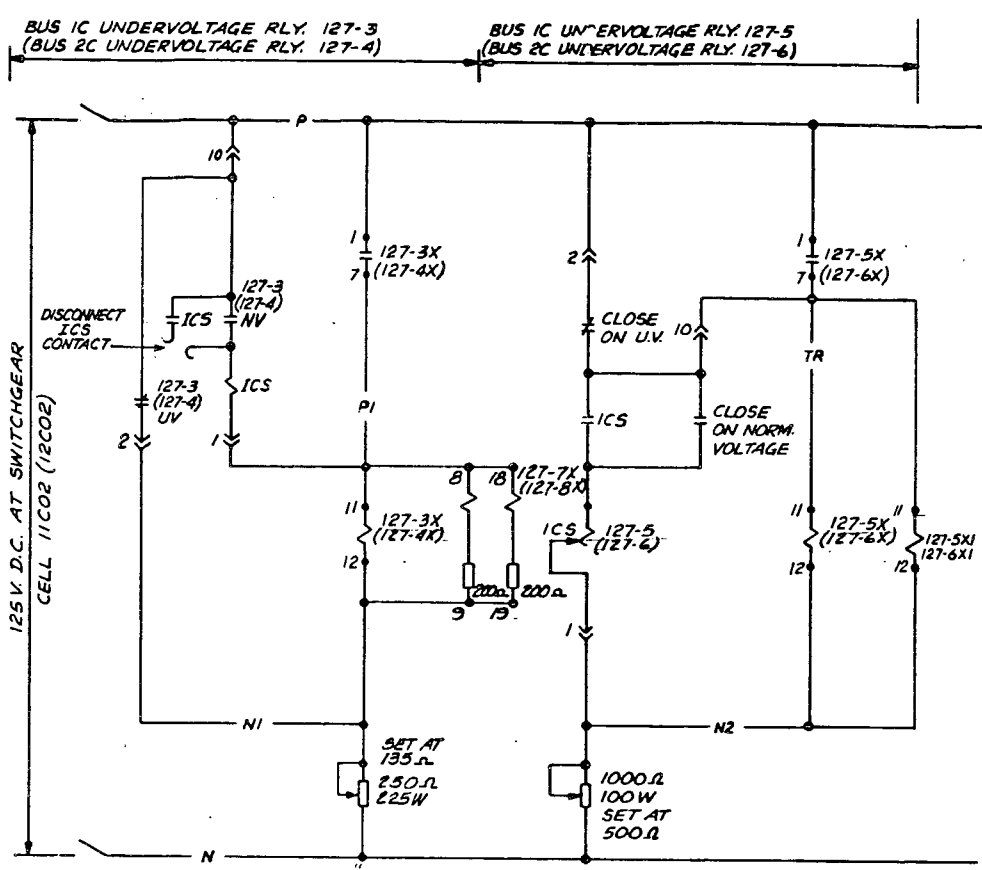
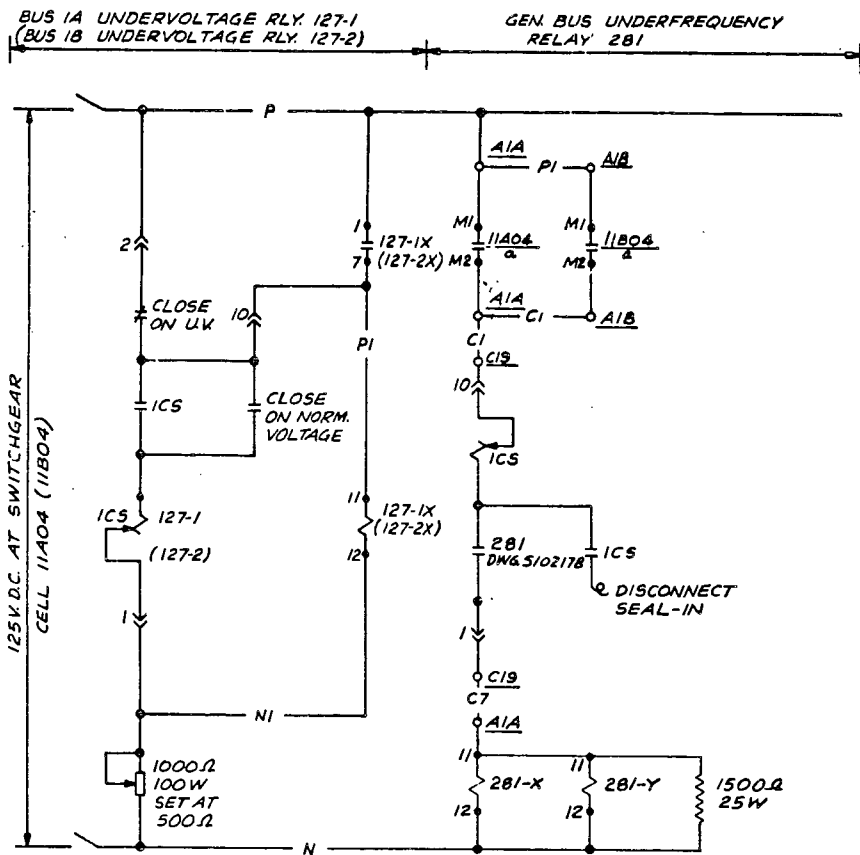
FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3 SUPPLEMENTAL PAGE	INTERIM DCN NO. 5-2		DCN CONV. QUALITY CLASS		
	DCN NUMBER	DRAWING SHEET NO.	REV. NO.	DATE / /	DCN REV. SUB. NO.
	5150876	- 10	10	21	SR
Date 12-29-87 Page 2 of 2		By D.M. DELANG			
DESCRIPTION OF CHANGE BEFORE					
RECEIVED CDM JAN 25 1989 SITE FILE COPY					
AFTER					
DCP #3364.00TJZ REV 0 SHT 350 OF 3350					

N1546
SH12

APERTURE CARD
 Also Available On
 Aperture Card

8902270311 -196

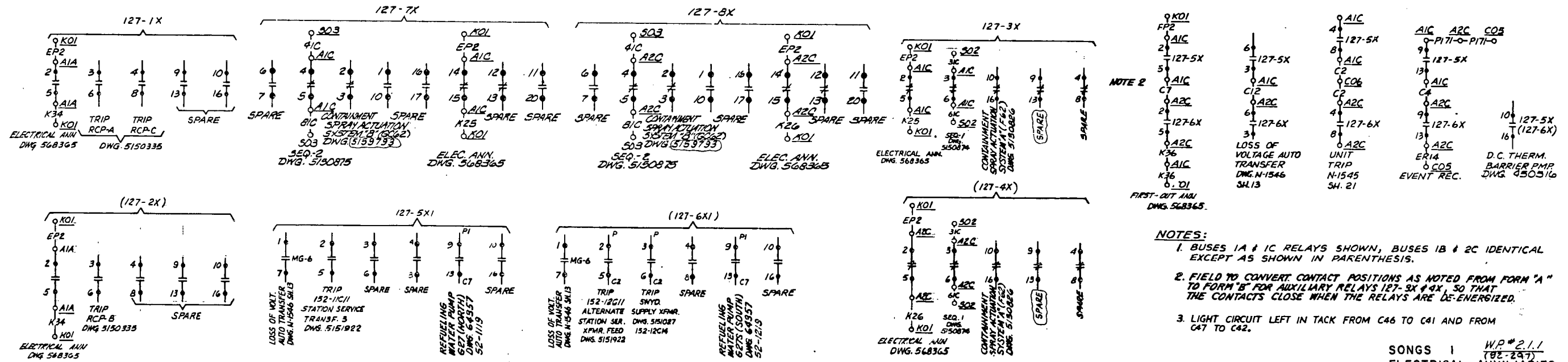
MICROFILMED FROM



DEVICE	TYPE	DESCRIPTION
127-1,2	CV-7 (WEST)	UNDERVOLTAGE RELAY
127-5,6	CV-6 (WEST)	UNDERVOLTAGE RELAY
127-1X, 2X, 3X, 4X, 5X, 6X, 6X1	MG-6	AUXILIARY RELAY 48V D.C. COIL.
281	CF-1	UNDERFREQUENCY RELAY
281-X, Y	MG-6	AUXILIARY RELAY 48V D.C. COIL.
7X, 8X	AP (WEST)	AUX. RELAY 48V D.C. COIL WITH 4 A.C. & 4 D.C. CONTACTS

SL APERTURE CARD

Also Available On Aperture Card



- NOTES:
- BUSES 1A & 1C RELAYS SHOWN, BUSES 1B & 2C IDENTICAL EXCEPT AS SHOWN IN PARENTHESIS.
 - FIELD TO CONVERT CONTACT POSITIONS AS NOTED FROM FORM "A" TO FORM "B" FOR AUXILIARY RELAYS 127-3X & 4X, SO THAT THE CONTACTS CLOSE WHEN THE RELAYS ARE DE-ENERGIZED.
 - LIGHT CIRCUIT LEFT IN TACK FROM C46 TO C41 AND FROM C47 TO C42.

SONGS 1 W.P.#21.1 (82-297) ELECTRICAL AUXILIARIES SAFETY RELATED

8902270311-197

REDRAWN FROM DWG. N-1546 5H.12

NO.	DESCRIPTION	DATE	BY	CHK.	APP.	REV.
1	AS BUILT - INCORP. DCN 19	8-2-90	AK			
2	AS BUILT - INCORP. CC 18, P.O. # 480	8-22-74				
3	INCORPORATED 12 EFF. DATE IMM.	11-2-79				
4	INCORP. REV. - REVISED TITLE	11-2-79				
5	INCORP. CCN 14 EFF. DATE IMM.	2-17-77				
6	INCORP. CCN 14 EFF. DATE IMM.	2-17-77				
7	ANNUNCIATOR WINDOW ENLARGING	2-17-77				

FLUOR ENGINEERS, INC. POWER DIVISION INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN) SONGS 1, 2 & 3	CDM/DDC USE ONLY CIG	INTERIM DCN NO. PFC NO.
	TECH NO. S-1	DCP NO./REV. NO. 3364.00TJZ/0
	DOCUMENT 5151027 - 3	DCN CONVERSION NO. 11
	Page 1 of 3	
1. Originator KAYLO WARNER Tel: (714) 975-4790 Date 8-9-88		
Document Title E/D AFWP G-10W & DISCHARGE VALVE CV-3110 TRAIN B		
DRADM I.D. E-09 QC SREAN		
DESCRIPTION OF CHANGE <ul style="list-style-type: none"> - REMOVE SWYD SUPPLY TRANC FEED & ASSOC. REFERENCES INCLUDING TITLE BLOCK, - ADD FEED TO AFWP & ASSOCIATED CONTROLS & REFERENCES INCLUDING TITLE BLOCK, - 4160V SWGR CUBICLE 12C14, WILL CONTROL 'SR' EQPT, CHANGE QC FROM 'NSR' TO 'SREAN' - REVISE DOCUMENT TITLE. 		
RECEIVED CDM JAN 25 1989 SITE FILE COPY		
DCP #3364.00TJZ REV 0 SHT 51 OF 3350		
2. Other Affected Documents 5152282 5102163 5196232	3. Affected Systems AFW ELE	4. Design Approvals CHECKED <i>[Signature]</i> DATE 8/18/88 DESIGNER <i>[Signature]</i> DATE 11/11/88 RESPONSIBLE ENGINEER <i>[Signature]</i> DATE 8/16/88 LEAD DESIGN ENGINEER <i>[Signature]</i> DATE 11/11/88 QUALITY ASSURANCE <i>[Signature]</i> DATE 11/18/88
5. SCE/Contractor Project Administration Conversion to DCN Date 1-25-89 <i>[Signature]</i>		

A1546
SH 8

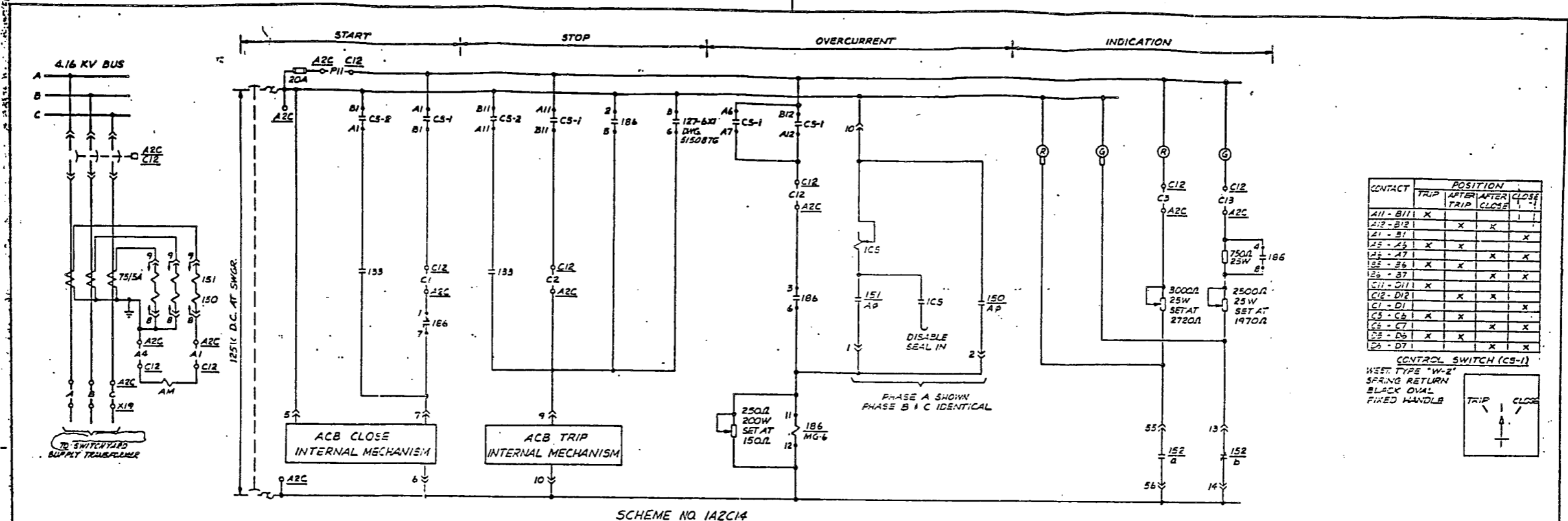
APERTURE
CARD

Also Available On
Aperture Card

8902270311-198

MICROFILMED FROM BEST AVAILABLE COPY

17X



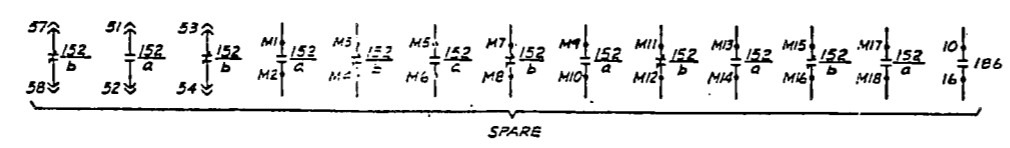
SCHEME NO. 1A2C14

CONTACT	POSITION		
	TRIP	AFTER TRIP	AFTER CLOSE
A11 - B11	X		
A12 - B12	X	X	X
A1 - B1			X
A2 - A6	X	X	X
A2 - A7			X
B2 - B6	X	X	X
B2 - B7			X
C11 - D11	X		
C12 - D12		X	X
C1 - D1			X
C3 - C5	X	X	X
C5 - C7			X
D2 - D6	X	X	X
D2 - D7			X

CONTROL SWITCH (CS-1)
WEST TYPE "W-2"
SPRING RETURN
BLACK OVAL
FIXED HANDLE

CONTACT	POSITION		
	TRIP	AFTER TRIP	AFTER CLOSE
A11 - B11	X	X	
A12 - B12	X	X	X
A1 - B1			X
A2 - A6	X	X	X
A2 - A7			X
B2 - B6	X	X	X
B2 - B7			X

CONTROL SWITCH (CS-2)
WEST TYPE "W-2"
SPRING RETURN
BLACK OVAL
FIXED HANDLE



EQUIPMENT	SCHEME NO.	BREAKER NO.	LOCATION	INTERLOCK
SWITCHYARD SUPPLY TRANSFORMER	1A2C14	152-12C14	A2C, C12	12Y-CX1

5152281 MID-LEVEL SWGR (12Y-12C14)
5152282 DEVICE FUNCTION NOS. 12Y-12C14
5152283 EQUIPMENT LOCATION INCL. 12Y-12C14
5152284 WINDOW ENGRAVING
5152285 LINE DIAGRAM 12Y-12C14

RECEIVED CDM
JAN 25 1989
SITE FILE COPY

DCP # 5151027-3 REV 0 SHT 2 OF 3

FLUOR ENGINEERS, INC.
POWER DIVISION
INTERIM DESIGN CHANGE NOTICE (IDCN)/DESIGN CHANGE NOTICE (DCN)
SONGS 1, 2 & 3
SUPPLEMENTAL PAGE

INTERIM DCN NO.		IDCN NUMBER	
S-1		S-1	
DRAWING NO.	SHEET NO.	REV. NO.	DATE
5151027	- 3	3	11
Date 8-2-88		Page 2 of 3	
By K. WARNER			

SONGS NO. 1
NON-SAFETY RELATED
ELECTRICAL AUXILIARIES

REDRAWN FROM N-154L SH. 8
SAN DIEGO NUCLEAR GEN. STA.
ELEMENTARY DIAGRAM
SWITCHYARD
SUPPLY TRANS. 4KV. ACB

DESCRIPTION OF CHANGE
BEFORE

MICROFILMED FROM BEST AVAILABLE COPY

8902270311-199