UNIT NO. 5 DATE / /

MANUAL SET NO. 19

UNIT COOLDOWN TO COLD SHUTDOWN

1.0 PURPOSE

This procedure provides instructions for maintaining hot standby following reactor trip, maintaining hot standby following reactor shutdown, taking the unit from hot standby to cold shutdown. Instructions are provided for maintaining conditions stable at points between.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 PRECAUTIONS

2.1.1 If this procedure is terminated prior to completion, the Unit Shift Supervisor (USS) should note the reason for the termination in the comments section.

2.1.2 The Reactor Coolant System (RCS) pressure and temperature shall be maintained within the operating region of Figure 1.

2.1.3 Do not add positive reactivity by more than one controlled method at a time while the reactor is subcritical.

2.1.4 Whenever RCS temperature is above 160°F, at least one RCP should be in operation. Preferably Pump 4 to ensure best spray capability.

2.1.5 The hydrogen concentration in the RCS must be reduced to less than 5cc/kg prior to opening any RCS component.

2.1.6 The boron concentration in the pressurizer should not be different from the RCS by more than 50 ppm. Pressurizer Backup Heaters may be energized as necessary to equalize the boron concentration.

2.1.7 The Control Rod Drive Mechanism (CRDM) Cooling System shall be operating when RCS temperature is greater than or equal to 350°F or when any CRDM is energized.

8810070235 880929
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2.1.8 During cooldown, all Main Steam Isolation Valves (MSIVs) should be open or atmospheric reliefs balanced to allow uniform cooldown of all Reactor Coolant System (RCS) loops and Steam Generators (SGs). Steam dump is the preferred method of heat removal.

2.1.9 The Residual Heat Removal (RHR) Pump Suction Line should not be isolated from the RCS unless there is a steam bubble in the Pressurizer.

2.1.10 One Reactor Coolant Pump (RCP) should be running anytime RCS temperature is changed by more than 10°F in one hour.

2.1.11 Spray flow into the Pressurizer should not be initiated if the temperature difference between the Pressurizer steam space and the spray fluid exceeds 125°F.

2.1.12 Before auxiliary spray is initiated with a temperature difference between the pressurizer steam space and the spray fluid exceeding 320°F, notify the USS. (Technical Specification 5.7.1)

2.1.13 While in Hot Standby, feeding Steam Generators should be continuous to minimize thermal stresses on the Feedwater Nozzle.

2.1.14 Vacuum should be maintained on the Main Turbine following unit shutdown until the Turbine coasts down to approximately 66% rated speed (1200 rpm) unless an emergency dictates rapid coastdown of the Turbine Rotor.

2.1.15 The Main Turbine should be kept on Turning Gear until metal casing temperatures have returned to ambient. Bearing lube oil circulation must also be maintained.

2.1.16 During periods of operation with the RCS level below the Reactor Vessel Flange elevation (194 feet elevation), ongoing work activities should be closely scrutinized and any work activity limited that has the potential for reducing RCS inventory.

2.2 LIMITATIONS

2.2.1 The RCS pressure and temperature shall not exceed 425 psig and 350°F when open to the RHR system.

2.2.2 While in Modes 3 and 4, shutdown margin shall be greater than or equal to the limit specified in Technical Specification 3.1.1.2, Figure 3.1-1.

2.2.3 While in Mode 5, shutdown margin shall be greater than or equal to the limit specified in Technical Specification 3.1.1.2, Figure 3.1-2.

2.2.4 While in Mode 3, at least two RCS loops shall be in operation with the Reactor Trip Breakers closed and at least one in operation with the Reactor Trip Breakers open. (Technical Specifications 3.4.1.2)

2.2.5 While in Mode 4, at least two RCS loops and/or RHR trains shall be operable and at least one of the RCS loops and/or RHR trains shall be in operation. (Technical Specifications 3.4.1.3)

2.2.6 While in Mode 5 with the RCS loops filled, at least one RHR train shall be operable and in operation and either one additional RHR train operable or the secondary side water level of at least two steam generators shall be greater than 17% wide range. (Technical Specification 3.4.1.4.1)

2.2.7 While in Mode 5 with the RCS loops not filled, at least two RHR trains shall be operable and at least one RHR train shall be in operation. (Technical Specification 3.4.1.4.2)

2.2.8 While in Modes 4, 5, and 6 with the Reactor Vessel Head on, at least one of the following cold overpressure protection systems shall be operable:

a. Two PORVs with lift settings which do not exceed the limits established in Figure 1,

b. Two RHR suction Relief Valves each with a setpoint of 450 psig ±3%, or

c. The RCS depressurized with an RCS vent capable of relieving at least 670 gpm water flow at 470 psig. (Technical Specification 3.4.9.3)

2.2.9 While in Modes 5 and 6, at least one Charging Pump in the required boron injection flow path shall be operable. (Technical Specification 3.1.2.3)

2.2.10 The primary to secondary pressure differential shall not exceed 1600 psid or a secondary to primary pressure differential of 670 psid during unit operations or leak tests.

2.2.11 The maximum cooldown of the RCS shall be limited to 100°F in any one hour period. (Technical Specification 3.4.9.1)

2.2.12 The maximum cooldown of the pressurizer shall be limited to 200°F in any one hour period. (Technical Specification 3.4.9.2)

2.2.13 The maximum temperature differential between auxiliary spray water and pressurizer steam space is 625°F. (Technical Specification 3.4.9.2)

2.2.14 The temperature of both the primary and secondary coolant in the Steam Generators shall be greater than 70°F when the pressure of either coolant in the Steam Generator is greater than 200 psig. (Technical Specification 3.7.2)

2.2.15 While in Modes 3, 4 and 5, both channels of Source Range Nuclear Instrumentation shall be operable. (Technical Specifications Table 3.3-1, 6.B)

2.2.16 While in Modes 3, 4, and 5 at least one channel Source Range Nuclear Instrumentation should be selected to Recorder NR-45 and the CONTROL ROOM HI FLUX LEVEL AT SHUTDOWN alarm operable.

2.2.17 While in Modes 5 and 6, with the RCS level below Reactor Vessel Flange elevation (194 feet elevation), the RWST will be operable with a minimum volume of 70,832 gallons (5% of instrument span) of water at a boron concentration between 2000 and 2200 ppm.

3.0 INITIAL CONDITIONS

3.1 The reactor is shut down either following normal shutdown or reactor trip with Shutdown Rods either withdrawn or inserted.

3.2 RCS temperature is stabilized at no load Tavg under control of the steam dumps in Steam Pressure mode or by operation of the Steam Generator Atmospheric Relief Valves.

3.3 RCS pressure is stable at normal operating pressure.

3.4 At least one RCP is operating.

3.5 Pressurizer level is at approximately or returning to the program level with either the Positive Displacement (PD) Pump or a Centrifugal Charging Pump (CCP) operating to supply normal charging and RCP seal injection flow.

3.6 SG levels are at 45% to 55% NR level with Auxiliary Feedwater (AFW) operating.

3.7 The main Turbine is tripped and either coasting down or on the Turning Gear.

4.0 INSTRUCTIONS

NOTES

a. This procedure is divided into sections which permit either cooldown or maintaining stable conditions within a specified mode. Section E may be performed concurrently with Sections A,B,C,D.

b. Asterisk (*) steps beside INITIAL steps indicates steps that generate additional documents.

c. This procedure is written using Train A designations. Train B component designations are shown in parenthesis.

The sections of this procedure are:

A. Hot Standby Following Reactor Shutdown or Trip.

B. Cooldown to not less than 350°F.

C. Cooldown to not less than 205°F.

D. Cooldown to Cold Shutdown (less than 200°F).

E. Secondary Plant Shutdown.

SECTION A: Hot Standby Following Reactor Shutdown or Trip

A4.1 OPERATING IN HOT STANDBY FOLLOWING REACTOR SHUTDOWN OR TRIP:

INITIALS

A4.1.1 If this procedure has been entered from a reactor trip, then perform the following:

a. INITIATE 10000-C, "Reactor Trip Review", _____*

b. If entering this procedure from SI termination, then perform 11886, "Recovery From ESF Actuation", _____

c. If required, INITIATE STARTUP of the Auxiliary Boiler per 13760-C, "Auxiliary Steam Boiler System". _____

NOTIFY Chemistry Department,

d. If applicable, ENSURE that TDAFW Pump has been stopped per 13610, "Auxiliary Feedwater System" and returned to STANDBY per 13610, Checklist 2, _____*

e. When Source Range channels indication stabilize PLACE CONTROL ROOM HI FLUX LEVEL AT SHUTDOWN alarm in operation by performing the following:

(1) NOTIFY I&C and RESET the HI FLUX AT SHUTDOWN alarm setpoint per 24695 and 24696, "N.I. System Source Range Channel Calibration", _____

(2) ENABLE THE HI FLUX AT SHUTDOWN alarm by placing the HIGH FLUX AT SHUTDOWN NORMAL/BLOCK switches to the NORMAL, _____

INITIALS

(3) VERIFY annunciator SOURCE RNG HI SHUTDOWN FLUX ALARM BLOCKED ALB-10 B01 resets, _____

(4) SELECT both channels of Source Range indication on Recorder NR-45, _____

ANNOTATE chart to reflect channels selected,

f. CALCULATE SHUTDOWN MARGIN per 14005, "Shutdown Margin Calculations", _____*

g. If necessary, BORATE the RCS per 13009, "CVCS Reactor Makeup Control System", _____

h. SHUT DOWN the CVCS BTRS System by performing the following:

(1) PLACE the CVCS BTRS SELECTOR Switch HS-10351 in the OFF position, _____

(2) CLOSE the BTRS Demineralizer Flow Control HV-0387 to the FULLY CLOSED position, _____

i. DIRECT Chemistry to sample the RCS hydrogen, gas activity concentrations and PERFORM an RCS Iodine sample analysis per the required frequencies of Technical Specifications Table 4.4-4, _____

Person Contacted _____ Date _____ Time _____

j. MAXIMIZE CVCS letdown purification flow rate per 13006, "Chemical And Volume Control System Startup And Normal Operation", _____

_____ / _____
Date Time

INITIALS

k. MONITOR Main Turbine coastdown,

(1) ENSURE that the Turning Gear Motor Control Handswitch is in AUTO/PULL-TO-LOCK position, _____

(2) When Turbine Rotor reaches zero speed, VERIFY all Lift Pumps, Turning Gear Oil Pumps ON and Turning Gear engagement. _____

l. STOP both Heater Drain Pumps, _____

m. STOP all but one Condensate Pump, _____

n. REDUCE in-service Condensate Demineralizer Powdex Vessels as applicable per 13616, "Condensate Filter Demineralizer System",

o. PLACE the Condensate and Feedwater System on Long cycle recirc per 13615, "Condensate And Feedwater Systems", _____

p. NOTIFY Chemistry to initiate placing condensate and feedwater into proper chemical wet layup, _____

q. If necessary, SHUT DOWN all but one Circulating Water Pump, _____

r. If necessary, SHUT DOWN all but one River Makeup Pump and RECORD time in the Unit Control Log Book, _____

s. ENSURE SG Blowdown Isolation Valves 1-HV-7603A(B, C, D) open. _____

A4.1.2 If No-Load Tavg cannot be maintained due to excessive steam demand, REDUCE steam demand by performing the following:

a. ENSURE MSR Heating Steam Supply Valves HS-6015 and HS-6030 closed, _____

b. TRANSFER the Auxiliary Steam System steam supply to the Auxiliary Boiler per 13761, "Auxiliary Steam System", _____

INITIALS

c. TRANSFER the Turbine Steam Seal supply to the Auxiliary Steam Supply per 13825, "Turbine Steam Seal System", _____

d. TRANSFER the SJAE steam supply to the Auxiliary Steam Supply per 13620, "Condenser Air Ejection System", _____

e. If Main Generator is to be shut down for more than two days, then to prevent overheating relay 360A, OPEN links TBR 28, 29 and 30, located in Protective Relay Panel Bay 4, per 00306-C, "Temporary Jumper And Lifted Wire Control", _____

f. If the Generator Regulator Panel (1328-P5-GRC) is to be de-energized for maintenance, then OPEN links TBR 56 and 57 and TBS 4 and 5 located in Protective Relay Panel Bay 4, per 00306-C, "Temporary Jumper and Lifted Wire Control". This will prevent tripping Lockout Relays 386 G9 and 386 G10 which trip Generator Output Breakers. _____

g. At the Main Transformer Control Cabinets, de-energize the Transformer Oil Pumps and Fans per 13800, "Main Turbine Operation" Sub-subsection 4.3.1. _____

A4.1.3 Either OPERATE unit systems as necessary to maintain the unit at Hot Standby, or PROCEED to either Section B to initiate unit cooldown or 12003-C, "Reactor Startup" to return to power.

END OF SECTION A

SECTION B: Cooldown to not less than 350° F

NOTE

This section directs cooldown to 375°F or any point between without crossing the boundary for Mode 4 at 350°F.

B4.1 PREPARATION FOR UNIT COOLDOWN

INITIALS

B4.1.1 If required to cooldown secondary systems, then INITIATE Section E of this procedure.

B4.1.2 If Condenser vacuum is being maintained, then INITIATE placing a steam blanket on the MSR's per 13800, "Main Turbine Operation". _____

B4.1.3 INITIATE pressurizer and RCS boron equalization by energizing Pressurizer Backup Heaters. _____

B4.1.4 MAXIMIZE CVCS letdown purification flowrate. _____ date/time _____

B4.1.5 INITIATE Borating the RCS to the cold shutdown boron concentration per 13009, "CVCS Reactor Makeup Control System". _____

If applicable, PERFORM [illegible], "Boric Acid Injection Check Valve Cold Shutdown Inservice Test" during the boration. _____ *

B4.1.6 DIRECT Chemistry to sample the RCS and Pressurizer boron concentration. _____

B4.1.7 If withdrawn, INSERT all Shutdown Banks to the fully inserted position. _____

B4.1.8 OPEN the Reactor Trip breakers. _____

INITIALS

B4.1.9 If not currently in progress, INITIATE RCS gaseous activity degas by performing the following:

a. ENSURE that the Pressurizer Steam Space Sample line is in operation by verifying that the PRZR STM SAMPLE IRC/ORC Valves HV-3513/HV-3514 are open, _____

b. NOTIFY Chemistry to adjust the pressurizer steam space sample flow rate to maximum, _____

c. While maintaining hydrogen cover gas, DEGAS the RCS by raising VCT gas purge flow rate to the Gaseous Waste Processing System to approximately 1.2 scfm using HIC-1094, as limited by the Hydrogen Recombiners. _____

B4.1.10 When notified by Chemistry that the RCS gaseous activity has been reduced to an acceptable level, TRANSFER VCT cover gas to Nitrogen and INITIATE RCS Hydrogen degas per 13007, "VCT Gas Control And RCS Chemical Addition". _____

NOTE

Prior to opening the RCS to containment the hydrogen concentration shall be less than 5 cc/kg.

B4.1.11 START both Containment Pre-access Filter Units using CTB PREACCESS FLTR UNIT-1/2 FAN HS-2620/2621.

_____ _____
date/time

B4.1.12 If it is planned to cool down to Cold Shutdown, and if not performed in the previous three months, COMPLETE 14748, "AFW Check Valve Shutdown Inservice Test". _____*

INITIALS

B4.2 RCS COOLDOWN TO 375°F

B4.2.1 COMMENCE RCS/Pressurizer pressure and temperature trending at 30 minute intervals using Data Sheet 1 and ERF computer. (Technical Specification 4.4.9.1)

Data taking and plotting may be suspended during holds in the cooldown if the duration is expected to exceed one hour.

NOTE

It is recommended that the RCS temperature be maintained between 75° F and 125° F less than pressurizer temperature. (See Figure 1.)

B4.2.2 COMMENCE the cooldown to 375°F and 540 psig at a recommended rate of approximately 50°F per hour by performing the following:

a. REDUCE the number of operating RCPs to two per 13003, "Reactor Coolant Pump Operation", _____

Pumps 4 and 1 are the preferred running pumps,

b. INITIATE Pressurizer cooldown and depressurization by slowly opening the Pressurizer Spray Valves, _____

If necessary, selectively DE-ENERGIZE Pressurizer Back-up Heaters by placing Control Switches to PULL-TO-LOCK,

CAUTION

RCS temperature and pressure shall be maintained within the acceptable operating region of Figure 1.

c. Slowly ADJUST the Steam Dump Controller setpoint or if applicable the Atmospheric Relief Valves to initiate RCS cooldown. _____

INITIALS

B4.2.3 At approximately 2185 psig, OBSERVE PRZR PORV BLOCK VALVES HV-8000A and HV-8000B auto close. _____

NOTE

Depending on the rate of RCS cooldown and depressurization, Step B4.2.5 may occur before Step B4.2.4.

B4.2.4 At approximately 550°F RCS temperature PERFORM the following:

a. VERIFY status light LO LO TAVG TRAIN A STEAM DUMP INTL P12 illuminated, _____

b. BYPASS the LO LO TAVG interlock by momentarily placing the Train A and B Steam Dump Interlock Selector Switches to the BYPASS INTERLOCK position, _____

If operating on Steam Dumps, then VERIFY Steam Dump Cooldown Valves PV-0507A,B and C are open by observing ZLB-2 on QMCB, _____

CAUTION

If the RCS is allowed to pressurize above P11 and SG pressure is below 585 psig, Safety Injection and Steam Line Isolation will occur.

B4.2.5 At approximately 1970 psig, manually BLOCK Pressurizer Pressure and Steam Line Pressure Safety Injection and Steam Line Pressure Steam Line Isolation signals by performing the following:

a. It is is planned to cool down for refueling, then PERFORM 14710, "Remote Shutdown Panel Transfer Switch And Control Circuit 18 Month Surveillance Test" Data Sheets 3A and 3B in lieu of the following substeps, _____

b. VERIFY Block Permissive Status Light PRZR LO PRESS SI BLOCK PERM P11 illuminates, _____

INITIALS

c. BLOCK the Low Pressurizer Pressure Safety Injection signal using PRZR PRESS SI BLOCK/RESET A and B handswitches HS-40012 and 40013, _____

d. OBSERVE Status Lights PRZR TRAIN A/B SI BLOCKED illuminated, _____

e. BLOCK the Low Steam Line Pressure Safety Injection signal using LOW STM PRESS SI/SLI BLOCK RESET handswitches HS-40068 and 40069, _____

f. OBSERVE Status Lights STMLINE ISO TRAIN A/B SI BLOCKED illuminated. _____

B4.2.6 CHECK that Pressurizer level is between 20% and 40%. _____

B4.2.7 As RCS pressure lowers, OPEN additional Letdown Orifice Isolation Valves and ADJUST PIC-131 setpoint to maintain desired letdown flowrate.

B4.2.8 During RCS depressurization, MAINTAIN all RCP seal injection flow rates between 8 and 13 gpm by adjusting the Charging Header Flow Controller HC-0182.

B4.2.9 At approximately 950 psig, ISOLATE ECCS Accumulators by performing the following:

a. REMOVE TAG, UNLOCK and CLOSE the Accumulator Discharge Isolation Valve 480V MCC Breakers:

	UNIT 1	UNIT 2	
ACCUM-1	1ABE-19	2ABE-19	_____
ACCUM-2	1BBC-19	2BBC-19	_____
ACCUM-3	1ABC-19	2ABC-19	_____
ACCUM-4	1BBE-19	2BBE-19	_____

INITIALS

b. CLOSE the Accumulator Isolation Valves,

ACCUM-1 HV-8808A, _____

ACCUM-2 HV-8808B, _____

ACCUM-3 HV-8808C, _____

ACCUM-4 HV-8808D. _____

c. VERIFY annunciators ACCUM TANK 1(2,3,4) ISO VLV 8808A(B,C,D) NOT FULLY OPEN in alarm. ALB06-A05,B05,C05,D05, _____

d. OPEN, LOCK and TAG the Accumulator Discharge Isolation Valves 480V MCC Breakers,

	UNIT 1	UNIT 2	
ACCUM-1	1ABE 19	2ABE-19	_____
			_____ IV
ACCUM-2	1BBC-19	2BBC-19	_____
			_____ IV
ACCUM-3	1ABC-19	2ABC-19	_____
			_____ IV
ACCUM-4	1BBE-19	2BBE-19	_____
			_____ IV

B4.2.10 When steam pressure falls too less than 550 psig, at the USS's discretion the Steam Generators may be supplied by the running Condensate Pump per Section E4.2 of this procedure.

INITIALS

B4.2.11 Either OPERATE unit systems as necessary to maintain RCS within the following parameter values or PROCEED to either Section C to continue the cooldown or 12002-C, "Unit Heatup to Normal Operating Temperature and Pressure" to commence a heatup.

RCS temperature	375°F ±10°F
RCS pressure	540 psig ±25 psig
Pressurizer level	at program level

END OF SECTION B

SECTION C: Cooldown to not less than 205°F

NOTE

This section directs cooldown to 225°F or any point between without crossing the boundary for Mode 5.

C4.1 PREPARATION FOR CONTINUING UNIT COOLDOWN.

INITIALS

C4.1.1 If required to cooldown secondary systems and break condenser vacuum, then INITIATE SECTION E of this procedure.

CAUTION

Maintain pressurizer cold calibration level greater than 17%.

C4.1.2 If it is planned to cool down to cold shutdown, then ALLOW pressurizer level to rise during the cooldown to not greater than 80% cold calibrate.

C4.1.3 COMMENCE RCS/Pressurizer pressure and temperature trending at 30 minutes intervals using Data Sheet 1 and ERF computer. (Technical Specification 4.4.9.1)

Plotting may be suspended during holds in the cooldown if the duration is expected to exceed one hour.

INITIALS

C4.2 RCS COOLDOWN TO 225°F.

NOTE

It is recommended that the RCS temperature be maintained between 75°F and 125°F less than pressurizer temperature. (See Figure 1.)

C4.2.1 COMMENCE the cooldown to 225°F and 250 psig at a recommended rate of approximately 50°F per hour by performing the following:

a. CONTINUE the pressurizer cooldown and depressurization by slowly opening the Pressurizer Spray Valves, _____

If necessary, selectively DE-ENERGIZE Pressurizer Backup Heaters by placing Control Switches to PULL-TO-LOCK,

CAUTION

RCS temperature and pressure shall be maintained within the acceptable operating region of Figure 1.

b. Slowly ADJUST the Steam Dump Controller Setpoint or if applicable the Atmospheric Relief Valves to initiate RCS cooldown. _____

C4.2.2 If it is planned to cool down for refueling, then prior to reaching 350°F, REQUEST confirmation from Engineering/Maintenance that actions have been taken to preclude Reactor Vessel Seismic Tie Rod Binding. _____

C4.2.3 Prior to reaching 350°F, NOTIFY Chemistry to isolate PERMS CVCS Letdown Monitor RE-48000. _____

INITIALS

C4.2.4 Prior to reaching 350°F, PLACE the Cold Overpressure Protection System (COPS) in operation by performing the following:

a. If not performed in the previous three months, PERFORM 14860, "PORV Cold Shutdown Inservice Test", _____*

b. ARM the A and B COPS by placing the PRZR PORV BLOCK VLV COLD OVERPRESSURE CNTL handswitches HS-8000G and 8000H to the ARM position, _____

c. VERIFY the following annunciators alarmed upon arming COMS:

A COLD OP ACTU VLV HV-8000A NOT FULL OPEN (ALB12 E06), _____

B COLD OP ACTU VLV HV-8000B NOT FULL OPEN (ALB12 F06), _____

d. ENSURE PRZR PORVs PV-455A and 1-PV-456A are closed and the handswitches in AUTO, _____

e. ENSURE OPEN PRZR PORV BLOCK Valves HV-8000A and 8000B, _____

NOTE

Step f satisfies Technical Specification surveillance 4.4.9.3.1.c

f. VERIFY the following annunciators reset:

A COLD OP ACTU VLV HV-8000A NOT FULL OPEN (ALB12 E06), _____

B COLD OP ACTU VLV HV-8000B NOT FULL OPEN (ALB12 F06). _____

C4.2.5 At 350°F, LOG time and date of entry into Mode 4 in the Unit Control Log Book.

_____ _____
date/time

INITIALS

C4.2.6 Within 4 hours after entering Mode 4 and prior to reaching 325°F PERFORM the following:

a. RACK OUT and TAG both safety Injection Pump Breakers,

	UNIT 1	UNIT 2	
SI PMP-A	1AA02-16	2AA02-16	_____
SI PMP-B	1BA03-17	2BA03-17	_____

NOTE

AFWAS should be defeated to the SG Blowdown Valves, Sample Valves and MDAFW Pump Discharge Valves to accommodate MFP activities and/or SG draining/ filling operations without resulting in impacting those activities.

b. At the USS's discretion, REMOVE and TAG the following fuses:

(1) Train A

(a) Auxiliary Relay Panel - Fuse Block (Allows full use of SG Blowdown valves),

UNIT 1	UNIT 2	
1ACPAR6-FU-2	2ACPAR6-FU-2	_____
		_____ IV

(b) Auxiliary Relay Panel - Fuse Block (Inhibits feed pump trip signal to initiate AFWAS),

UNIT 1	UNIT 2	
1NCPAR-2-FU-4	2NCPAR-2-FU-4	_____
		_____ IV

INITIALS

(2) Train B

(a) Auxiliary Relay Panel - Fuse Block (Allows full use of SG Blowdown valves),

UNIT 1	UNIT 2	
1BCPAR7-FU-6	2BCPAR7-FU-6	_____
		IV

(b) Auxiliary Relay Panel - Fuse Block (Inhibits feed pump trip signal to initiate AFWAS),

UNIT 1	UNIT 2	
1NCPAR-4-FU-1	2NCPAR-4-FU-1	_____
		IV

c. PLACE standby MDAFW Pumps handswitch in PULL-TO-LOCK. _____

d. If the TDAFW Pump is not being utilized, CLOSE HV-5122, 5125, 5127 and 5120. _____

INITIALS

C4.2.7 When the RCS pressure is less than 377 psig, and RCS temperature is less than 340°F, PLACE at least one RHR Train in operation per 13011, "Residual Heat Removal System". _____

a. OPERATE RHR HX Outlet Valves HV-0606(0607) and Bypass Valves FV-0618(0619) to control RCS temperature as necessary and RHR flow at a minimum total flow of 3000 gpm,

b. If applicable, PERFORM 14896, "ECCS Check Valve Cold Shutdown Inservice Test", _____*

c. ENSURE RHR Suction Isolation surveillance is initiated each shift per 14000, "Shift And Daily Surveillance Logs". _____

CAUTION

While in Mode 5 with the Reactor Coolant Loops filled, with 1 RHR Train inoperable, the secondary side water level of at least two Steam Generators shall be greater than 17% WR.

C4.2.8 If desired, REDUCE the number of operating RCPs to one per 13003, "Reactor Coolant Pump Operation". _____

Pump 4 is the preferred running pump to ensure best spray capability.

C4.2.9 When SG pressure falls to 25 psig INITIATE aligning Nitrogen to the SG's per 13601, "Steam Generator And Main Steam System Operation" with regulators set at 2 to 5 psig.

C4.2.10 If it is intended to perform maintenance on the RAT's during the outage, then NOTIFY Maintenance to initiate work towards backfeeding through the Main Transformer and UAT's. _____

INITIALS

C4.2.11 Either OPERATE unit systems as necessary to maintain RCS within the following parameter values or PROCEED to either Section D to continue the cooldown or 12001-C, "Unit Heatup to Hot Shutdown" to commence a heatup.

CAUTION

Ensure running RCP seal differential pressure is maintained greater than 200 psid.

RCS temperature	225 F ±10°F
RCS pressure	250 psig ±25 psig

END OF SECTION C

SECTION D: Cooldown to Cold Shutdown (less than 200°F).

NOTE

This section directs cooldown to Mode 5 and maintains temperature between 130°F and 80°F.

D4.1 PREPARATION FOR CONTINUING UNIT COOLDOWN

INITIALS

D4.1.1 If required to cool down secondary systems and break condenser vacuum, then INITIATE Section E of this procedure.

D4.1.2 COMMENCE RCS/Pressurizer pressure and temperature trending at 30 minute intervals using Data Sheet 1 and EPF Computer. (Technical Specification 4.4.9.1)

Plotting may be suspended during holds in the cooldown if the duration is expected to exceed one hour.

D4.1.3 ENSURE RHR letdown is in operation with flow rate greater than or equal to 75 gpm. _____

D4.2 RCS COOLDOWN TO BETWEEN 130°F and 80°F

D4.2.1 COMMENCE the cooldown at a recommended rate of approximately 50°F per hour by performing the following:

a. Slowly ADJUST the RHR Outlet Valves HV-0606(0607) to reduce RCS temperature, _____

CAUTION

Ensure running RCP seal differential pressure is maintained greater than 200 psid.

b. MAINTAIN Pressurizer pressure at 250 psig, ±25 psig, by selective use of Pressurizer Backup Heaters. _____

INITIALS

D4.2.2 At 200°F, LOG time and date of entry into Mode 5 in the Unit Control Log Book. _____

time/date

D4.2.3 RACK OUT and TAG the Containment Spray pump breakers.

	UNIT 1	UNIT 2	
CS PMP A	1AA02-14	2AA02-14	_____
CS PMP B	1BA03-14	2BA03-14	_____

D4.2.4 As directed by the USS, PLACE the Containment Pre-access Purge System in operation per 13125, "Containment Purge System". _____*

D4.2.5 To facilitate personnel ingress and egress, during cold shutdown, NOTIFY Maintenance to bypass the Containment Personnel Lock Interlock System.

If desired the Containment Equipment Hatch Missile Shield may be moved at this time.

D4.2.6 NOTIFY Work Planning Group to schedule and initiate mode dependent Fire Protection Surveillances. _____

D4.2.7 When the RCS temperature is less than 140°F, PERFORM the following:

a. If withdrawn, INSERT all Shutdown Banks to the fully inserted position, _____

b. OPEN the Reactor Trip Breakers, _____

c. STOP the CRDM Cooling Fans using the following handswitches:

CRDM UNIT - FAN 1 HS-12273A,
CRDM UNIT - FAN 2 HS-12274A,
CRDM UNIT - FAN 3 HS-12275A,
CRDM UNIT - FAN 4 HS-12276A. _____

d. If it is intended to remain in cold shutdown for greater than 4 days, then PLACE the SG's in wet layup per 13601, "Steam Generator and Main Steam System Operation". _____

INITIALS

NOTE

The RCP(s) shall be run for one or more hours after reaching the desired RCS temperature plateau to enhance SG and RCS temperature equalization.

D4.2.8 When RCS temperature is less than 110°F, the remaining RCPs may be stopped per 13003, "Reactor Coolant Pump Operation". _____

D4.2.9 If it is desired to collapse the pressurizer bubble and cooldown the pressurizer, then PERFORM the following:

a. ENSURE all CVCS Letdown Orifices are in operation, _____

CAUTION

Expect rapid pressurizer pressure rise with charging flow greater than letdown flow at the point of going solid. Be prepared to reduce charging flow or raise letdown flow to prevent extreme pressure fluctuations.

b. RAISE pressurizer level by raising charging flow rate and/or lowering RHR letdown flow rate, _____

c. When the pressurizer is solid as indicated by rising RCS pressure or if PIC-131 is in AUTO rising letdown flow rate, then PERFORM the following:

(1) BALANCE charging and letdown flow rates using HV-0128 and/or PIC-131 to maintain RCS pressure at 250 psig ±25 psig, _____

INITIALS

NOTE

Charging flow may remain greater than letdown flow as a result of coolant contraction during the cooldown.

(2) Charging/RHR letdown flow rate should be adjusted so that RHR letdown purification flow is maintained greater than or equal to 75 gpm, _____

(3) OPEN Pressurizer Auxiliary Spray valve HV-8145. _____

(a) INITIATE AUX SPRAY/PRZR DELTA-T surveillance per 14915, "Special Conditions Surveillance Logs", (Technical Specification 4.4.9.2), _____*

(b) If pressurizer auxiliary spray water delta-T exceeds 320°F, then LOG the spray valve operation in the Unit Control Log and NOTIFY Engineering to log the cycle per 50040-C, "Component Cyclic or Transient Limits", _____*

(4) CLOSE the open Charging Isolation Valve HV-8146 or HV-8147, _____

(5) Continue CHARGING through the pressurizer auxiliary spray line until pressurizer steam space temperature is less than 190°F. _____

D4.2.10 MAINTAIN RCS temperature between 130°F and 80°F using RHR HX Outlet Valves HV-0606(0607). _____

NOTIFY Engineering to log the unit cooldown per 50040-C, "Component Cyclic or Transient Limits". _____*

INITIALS

CAUTION

Ensure all RCP's are shutdown.

D4.2.11 If it is desired to depressurize the RCS, then PERFORM the following:

a. INITIATE Lowering RCS pressure to atmospheric (50 psig as indicated on PI-408, 418, 428 or 438) using letdown pressure control PIC-131, _____

b. When RCS pressure reaches 100 psig (150 psig as indicated on PI-408, 418, 428, 438), CLOSE all RCP Seal Leakoff Isolation valves HV-8141A, B, C, D, _____

c. ENSURE PRT nitrogen pressure is maintained greater than 0.5 psig. _____

NOTE

SI Pmp Cold Leg Isolation Valves are closed to preclude inadvertent draining of RWST to the RCS while the RCS is depressurized and partially drained.

D4.2.12 ISOLATE the Safety Injection Cold legs by performing the following:

a. CLOSE SI PMP-A TO COLD LEG ISO VLV HV-8821A, _____

b. CLOSE SI PMP-B TO COLD LEG ISO VLV HV-8821B, _____

c. OPEN and TAG the following SI Cold Leg Isolation Valves MCC breakers:

	UNIT 1	UNIT 2	
(1) SI PMP-A TO COLD LEG ISO VLV HV-8821A.	1ABD-15	2ABD-15	_____
(2) SI PMP-B TO COLD LEG ISO VLV HV-8821B.	1BBD-15	2BBD-15	_____

INITIALS

CAUTION

Prior to opening the RCS to the containment atmosphere, the RCS hydrogen concentration shall be less than 5 cc/kg.

D4.2.13 When required, INITIATE RCS draining by performing the following:

a. If it is intended to drain down to perform maintenance on Reactor Head, SG's or RCP seals, then the following RCS level controls should be placed into effect:

(1) If it is intended to operate at one foot above mid-nozzle level, the preferred RHR configuration is one train operating with a flow of 3000 gpm, _____

(2) If it is intended to operate at one foot above mid-nozzle level, a minimum of two incore thermocouples should be available during periods where the Reactor Head is installed, _____

(3) I&C should be notified to install temporary remote RCS level monitoring in the Control Room, _____

(4) Tygon tube watch is required any time the RCS level is being changed while the RCS level is below 17% (approximately 207 feet elevation) pressurizer level, _____

(5) Periodic comparison checks should be made every 4 hours between the Control Room Temporary RCS Level Monitors and the Tygon tube, _____

(6) The Control Room Monitors should agree within 2 percent of scale with the Tygon tube,

INITIALS

(7) Two out of three Level Monitors must agree before draining RCS below the top of the hot leg (188 feet 3 inches).

(8) If neither Control Room RCS Level Monitor is available, then a continuous Tygon tube watch should be established while RCS level is below 17% pressurizer level. _____

(9) While operating with Steam Generator Nozzle Dams installed, ENSURE one Safety Injection Pump is capable of being racked in and operated if needed.

(10) While level is in the region of the hot legs, TREND RHR Pump parameters on ERF for early detection of possible RHR Pump degradation due to vortexing.

(11) Minimum RCS level is one foot above mid-nozzle (188 feet 0 inches elevation) except for Steam Generator burping during initial drain down. For effective SG tube draining, RCS level should be lowered to 187 feet 6 inches. Upon completion of SG burping, RAISE RCS level to 188 feet - 0 inches and MAINTAIN at this level thereafter. _____

(12) INITIATE draining the RCS per 13005, "Reactor Coolant System Draining".

INITIALS

D4.2.14 If it is intended to drain the RCS to less than 25% cold calibrate pressurizer level, then prior to reaching 25% ISOLATE potential dilution flow paths by performing the following:

a. CLOSE, LOCK and TAG the following valves:

(1) UNIT 1: CVCS ISOLATION RMW TO BA BLEND, 1-1208-U4-175 _____

UNIT 2: CVCS ISOLATION RMW TO BA BLEND, 2-1208-U4-175 _____

(2) UNIT 1: CVCS ISOLATION RMW TO CVCS, 1-1208-U4-177 _____

UNIT 2: CVCS ISOLATION RMW TO CVCS, 2-1208-U4-177 _____

b. ENSURE CLOSED, LOCKED and TAGGED the following valves:

(1) UNIT 1: CVCS OUTLET CHEM MIXING TK, 1-1208-U4-181 _____

UNIT 2: CVCS OUTLET CHEM MIXING TK, 2-1208-U4-181 _____

(2) UNIT 1: CVCS SUPPLY RMW TO CHEM MIXING TK, 1-1208-U4-176 _____

UNIT 2: CVCS SUPPLY RMW TO CHEM MIXING TK, 2-1208-U4-176 _____

INITIALS

(3) UNIT 1: CVCS FLUSH RMW TO TRN A EMERG BORATION, 1-1208-U4-183 _____

UNIT 2: CVCS FLUSH RMW TO TRN A EMERG BORATION, 2-1208-U4-183 _____

(4) UNIT 1: RMWST TO BTRS ISO, 1-1208-U6-226 _____

UNIT 2: RMWST TO BTRS ISO, 2-1208-U6-226 _____

c. When necessary, makeup to the VCT by performing the following:

(1) OPEN RWST TO CCP A & B SUCTION Valves LV-0112D and LV-0112E,

(2) CLOSE VCT OUTLET ISOLATIONS, LV-0112B and LV-0112C,

(3) ENSURE Letdown to VCT or Hold-up Tank Valve LV-0112A is in the VCT position,

(4) When VCT level has been returned to normal, OPEN LV-0112B and LV-0112C then CLOSE LV-0112D and LV-0112E.

D4.2.15 OPERATE unit systems as necessary to maintain the above conditions.

a. If required to break condenser vacuum, then PROCEED to Section E,

b. If it is intended to proceed to Mode 6, then GO to 12007-C, "Refueling Entry",

c. If it is intended to commence unit heat up, then GO to 12001-C, "Unit Heatup to Hot Shutdown".

END OF SECTION D

SECTION E. Secondary Plant Shutdown

NOTE

This section directs secondary plant activities during unit shutdown and can be used in conjunction with primary system cooldown operations.

The subsections of this section are:

E4.1 Transfer From Steam Dumps to Atmospheric Relief valves.

E4.2 Feeding Steam Generators With Condensate Pump.

E4.3 Breaking Condenser Vacuum.

E4.4 Secondary Systems activities.

E4.1 TRANSFER FROM STEAM DUMPS TO ATMOSPHERIC RELIEF VALVES

INITIALS

E4.1.1 TRANSFER to the SG Atmospheric Relief Valves by performing the following:

a. Slowly OPEN each atmospheric relief while verifying a reduced steam dump demand signal on UI-507. _____

b. VERIFY that the Steam Dump Control Valves close if PIC-507 is in AUTO or if operating in MANUAL, slowly CLOSE the Steam Dump Control Valves while opening each atmospheric relief. _____

c. When all Steam Dump Control Valves are closed, ENSURE PIC-507 is in MANUAL. _____

d. BALANCE the positions of each atmospheric relief while maintaining Tavg as desired. _____

INITIALS

E4.2 FEEDING STEAM GENERATORS WITH CONDENSATE [redacted]

E4.2.1 At the USS's discretion, INITIATE feeding Steam Generators with the running Condensate Pump by performing the following:

a. VERIFY SG pressure is less than 550 psig. _____

b VERIFY that lube oil pressure to the reset MFP and MFP Turbine Fearings is 10 to 12 psig by local indications. _____

c. OPEN the reset MFP Discharge Valve by placing the Control Switch in OPEN-PULL-TO-LOCK at the Main Control Panel QMCB: _____

SGFP A HS-5208,

SGFP B HS-5209.

d. If not previously performed, RESET both trains of Feedwater Isolation:

(1) HS-40049 for Train A, _____

(2) HS-40050 for Train B. _____

e. OPEN all BFIV's, _____

f. CONTINUE maintaining desired SG level utilizing the BFRV's. _____

INITIALS

E4.3 BREAKING CONDENSER VACUUM

E4.3.1 If necessary, TRANSFER the Auxiliary Steam System steam supply to the Auxiliary Boiler per 13761, "Auxiliary Steam System". _____

E4.3.2 TRANSFER the Turbine Steam Seal supply to the Auxiliary Steam Supply per 13825, "Turbine Steam Seal System". _____

E4.3.3 TRANSFER the SJAE steam supply to the Auxiliary Steam Supply per 13620, "Condenser Air Ejection System". _____

E4.3.4 CLOSE the MSIVs and Bypasses. _____

CAUTION

Breaking condenser vacuum will result in a MFPT Low Vac Trip. If AFWAS has not been defeated, then both MFPs tripped will result in a AFWAS initiation.

E4.3.5 PLACE the standby MDAFW Pump(s) Handswitches in PULL-TO-LOCK. _____

E4.3.6 BREAK condenser vacuum and SHUT DOWN the Steam Jet Air Ejectors and the Condenser Vacuum Pumps per 13620, "Condenser Air Ejection System".

E4.3.7 PERFORM the following to reset the AFWAS signal:

a. RESET the AFWAS by resetting one MFPT Low Vacuum Trip by momentarily placing the MFPT-A(B) VAC TRIP BYPASS Handswitch to RESET position and MFPT A(B) TRIP RESET HS-3169 (3170) to the RESET position, _____

b. If running a MDAFW Pump, then THROTTLE the AFW Flow Control Valves to the pre-initiation flow rate, _____

INITIALS

c. If applicable, ENSURE the SG Blowdown Isolation Valves HV-7603A(B,C,D) open. _____

E4.3.8 After the condenser pressure reaches atmospheric, SHUT DOWN the Turbine Steam Seal System per 13825, "Turbine Steam Seal System". _____

E4.3.9 MAINTAIN the main Turbine and MFPTs on Turning Gear per 13800, "Main Turbine Operation" and 13615, "Condensate and Feedwater Systems".

E4.4 SECONDARY SYSTEM ACTIVITIES

E4.4.1 If condensate and feedwater cleanup is not anticipated, then when condensate and feedwater metal temperatures are less than 200°F, SHUT DOWN the Condensate and Feedwater System per 13615, Condensate And Feedwater Systems". _____

E4.4.2 NOTIFY Chemistry and SHUT DOWN the Condensate Filter Demineralizer System per 13616, "Condensate Filter Demineralizer System". _____

E4.4.3 If the secondary outage is planned to exceed 10 days, then PERFORM the following:

a. When condensate and feedwater metal temperature is between 90°F and 200°F, COORDINATE with Chemistry and PLACE the Feedwater Heaters in wet layup, _____

b. When Turbine metal temperatures reach ambient, REMOVE Turbine from Turning Gear per 13800, "Main Turbine Operation", _____

c. During the unit outage, once a week, PLACE the Turbine on Turning Gear for 4 to 6 hours.

INITIALS

E4.4.4 If required, PLACE a steam blanket on the MSRs per 13800, "Main Turbine Operation". _____

E4.4.5 If required, for Condenser Waterbox or Circulating Water System maintenance, SHUT DOWN the Circulating Water System per 13724, "Circulating Water System". _____

If required for maintenance or inspection, then INITIATE draining of the Condenser Waterboxes per 13724, "Circulating Water System". _____

E4.4.6 If main generator maintenance or inspection is planned, then INITIATE purging the main generator per 13810, "Generator Gas System". _____

If hydrogen atmosphere is to be maintained, then MINIMIZE usage during the outage by reducing hydrogen pressure to not less than 5 psig.

E4.4.7 SHUT DOWN the Isophase Bus Duct Cooling System by performing the following:

a. At 480V AC SWGR NB03, OPEN Isophase Bus Duct Heater Breaker

UNIT 1: 1NB03-16, _____

UNIT 2: 2NB03-16. _____

b. At local Panel PLCB, STOP the running fan using HS-16550 for Fan No. 1 and/or HS-16551 for Fan No. 2.

Completed _____
Signature Date/Time

Reviewed _____
Signature Date/Time

Comments _____

_____

_____

_____

5.0 REFERENCES

5.1 PROCEDURES

5.1.1	10006-C,	"Reactor Trip Review"
5.1.2	12001-C,	"Unit Heatup To Hot Shutdown"
5.1.3	12002-C,	"Unit Heatup To Normal Operating Temperature And Pressure"
5.1.4	12003-C,	"Reactor Startup"
5.1.5	13003,	"Reactor Coolant Pump Operation"
5.1.6	13005,	"Reactor Coolant System Draining"
5.1.7	13006,	"Chemical And Volume Control System Startup And Normal Operation"
5.1 8	13007,	"VCT Gas Control And RCS Chemical Addition"
5.1.9	13009,	"CVCS Reactor Makeup Control System"
5.1.10	13010,	"Boron Thermal Regeneration System"
5.1.11	13011,	"Residual Heat Removal System"
5.1.12	13120,	"Containment Building Cooling Systems'
5.1.13	13125,	"Containment Purge System"
5.1.14	13601,	"Steam Generator And Main Steam System Operation"
5.1.15	13605,	"Steam Generator Blowdown Processing System"
5.1.16	13610,	"Auxiliary Feedwater System"
5.1.17	13615,	"Condensate And Feedwater Systems"
5.1.18	13616,	"Condensate Filter Demineralizer System"
5.1.19	13617,	"Feedwater Heater Extraction, Vent And Drain System"
5.1.20	13620,	"Condenser Air Ejection System"
5.1.21	13724,	"Circulating Water System"

5.1.22	13760,	"Auxiliary Steam Boiler System"
5.1.23	13761,	"Auxiliary Steam System"
5.1.24	13800,	"Main Turbine Operation"
5.1.25	13810,	"Generator Gas System"
5.1.26	13825,	"Turbine Steam Seal System"
5.1.27	14000,	"Operations Shift and Daily Surveillance Logs"
5.1.28	14005,	"Shutdown Margin Calculations"
5.1.29	14748,	"AFW Check Valve Cold Shutdown Inservice Test"
5.1.30	14915,	"Special Conditions Surveillance Logs"
5.1.31	24695,	"N.I. System Source Range Channel Calibration"
5.1.32	24696,	"N.I. System Source Range Channel Calibration"

END OF PROCEDURE TEXT

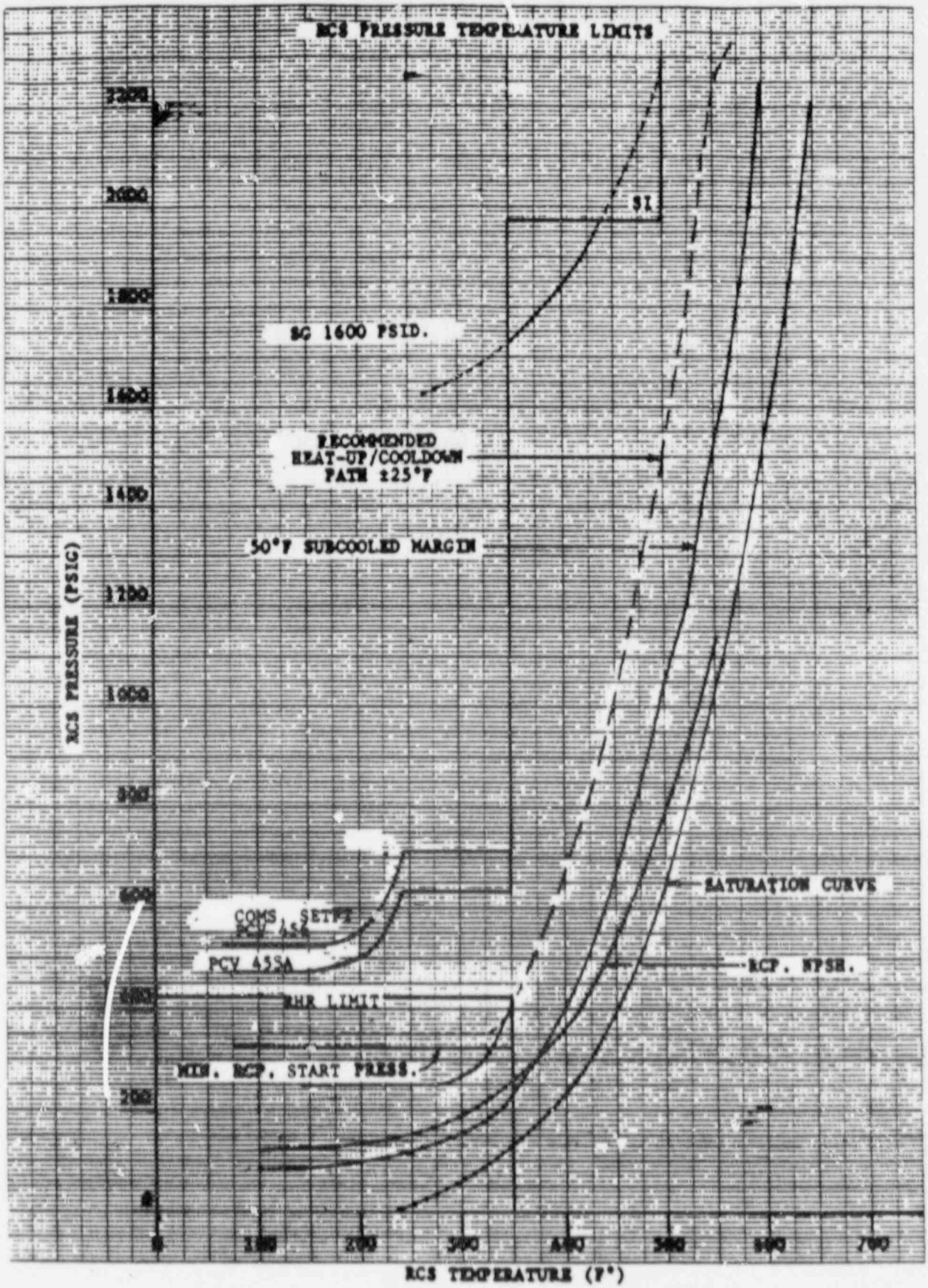

FIGURE 1 - RCS PRESSURE TEMPERATURE LIMITS

703445

Sheet 1 of 1

UNIT NO. _____ DATE ___/___/___

RCS/PRZR TEMPERATURE AND PRESSURE

DATA SHEET 1

TIME	Lowest Channel of TI-0413B TI-0423B TI-0433B TI-0443B RCS TEMP	TI-0454 PRZR TEMP	PI-438LR or PI-405WR PRZR PRESS	PRZR/RCS DELTA T

Completed _____
Signature Date/Time

Reviewed _____
Signature Date/Time

Comments _____

Attachment 6

RACEWAY DRAWINGS COLOR CODED FOR SAFE SHUTDOWN CIRCUIT LOCATIONS

P = PINK

AX3DF300-P
AX3DF302-B
AX3DF399-P
1X3DF302/1-P
1X3DF304-P
1X3DF30C-P
1X3DF30F-P
1X3DF314-P
1X3DF31D-P
1X3DF31E-P
2X3DF160-B
2X3DF162-B
2X3DF163-B
2X3DF172-B
2X3DF173-B
2X3DF340-B
2X3DF340-P
2X3DF341-B
2X3DF342-B
2X3DF343-B
2X3DF344-B
2X3DF346-B
2X3DF347/1-B
2X3DF347/2-B
2X3DF348-B
2X3DF349-B
2X3DF34C-P
2X3DF34E-B
2X3DF350-B
2X3DF351-B
2X3DF352-B
2X3DF353-B
2X3DF354-B
2X3DF357-B
2X3DF358-B
2X3DF359-B
2X3DF35A-B

B = BLUELINE

2X3DF35D-P
2X3DF35E-P
2X3DF35F-B
2X3DF361-B
2X3DF362-B
2X3DF363-B
2X3DF36A-B
2X3DF36B-B
2X3DF371-B
2X3DF372-B
2X3DF373-B
2X3DF390-B
2X3DF42E-P
2X3DF430-B
2X3DF432-B
2X3DF43?-P
2X3DF434-P
2X3DF441-P
2X3DF442-P
2X3DF443-P
2X3DF444-P
2X3DF445-P
2X3DF446-B
2X3DF44A-B
2X3DF44B-B
2X3DF44D-B
2X3DF451-P
2X3DF452-P
2X3DF453-P
2X3DF454-P
2X3DF455-P
2X3DF456-P
2X3DF45B-P
2X3DF45C-P
2X3DF45E-B
2X3DF45F-P
2X3DF522-P

2X3DF522-B
2X3DF523-B
2X3DF524-B
2X3DF526-B
2X3DF529-B
2X3DF52A-B
2X3DF52B-B
2X3DF52C-B
2X3DF52D-B
2X3DF52E-P
2X3DF52F-P
2X3DF530-B
2X3DF532-B
2X3DF532-P
2X3DF533-B
2X3DF534-B
2X3DF535-B
2X3DF537-B
2X3DF538-B
2X3DF539-B
2X3DF53A-B
2X3DF53A-P
2X3DF53B-B
2X3DF53C-P
2X3DF53C-B
2X3DF53D-B
2X3DH8C3-P
2X3DH8C5-P
2X3DH8C7-P
2X3DF8D1-P
2X3DH8D4-P
2X3DH8D5-P
2X3DH8D7-B
2X3DH8E3-P
2X3DH8E4-P
2X3DF8F1-P
2X3DH8F2-P
2X3DH8F3-P
2X3DH8F4-P

FIRE AREA DRAWINGS

AX4DJ8007
AX4DJ8008
AX4DJ8009
AX4DJ8010
AX4DJ8011
AX4DJ8012
AX4DJ8013
AX4DJ8014
AX4DJ8015
AX4DJ8016
AX4DJ8017
AX4DJ8018
AX4DJ8019
AX4DJ8020
AX4DJ8021
AX4DJ8022
AX4DJ8023
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AX4DJ8026
AX4DJ8027
AX4DJ8028
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AX4DJ8032
AX4DJ8041
AX4DJ8042
AX4DJ8043
AX4DJ8044
AX4DJ8045
AX4DJ8046
AX4DJ8047
AX4DJ8048

PROCESS AND INSTRUMENTATION DIAGRAMS

2X4DB100
2X4DB101
2X4DB102
2X4DB111
2X4DB112
2X4DB113
2X4DB114
2X4DB115
2X4DB116-1
2X4DB116-2
2X4DB118
2X4DB119
2X4DB120
2X4DB121
2X4DB122
2X4DB131
2X4DB133-1
2X4DB133-2
2X4DB134
2X4DB135-1
2X4DB135-2
2X4DB136
2X4DB137
2X4DB138-1
2X4DB138-2
2X4DB139
2X4DB140
2X4DB159-1
2X4DB159-2
2X4DB159-3
2X4DB161-1
2X4DB161-2
2X4DB161-3
2X4DB168-3
2X4DB170-1
2X4DB170-2
2X4DB203
AX4DB204-1
AX4DB204-2
2X4DB205-1
2X4DB205-2
AX4DB206-1
AX4DB206-2
AX4DB206-3
2X4DB207-1
2X4DB208-1
2X4DB208-2
2X4DB208-3
2X4DB209
2X4DB210
2X4DB211
2X4DB212
AX4DB215
AX4DB216
2X4DB217
2X4DB221
AX4DB223
AX4DB225
2X4DB227
2X4DB228
2X4DB233
2X4DB234
AX4DB241
2X4DB174-1
thru
2X4DB174-6
CX4DB173-1
thru
CX4DB173-6

ELECTRICAL N^{P} LINE DRAWINGS

2X3D-AA-A01A
2X3D-AA-D02A
2X3D-AA-D02B
2X3D-AA-D03A
2X3D-AA-D03B
2X3D-AA-E01A
2X3D-AA-E04A
2X3D-AA-E05A
2X3D-AA-E06A
2X3D-AA-E07A
2X3D-AA-E10A
2X3D-AA-E16A
2X3D-AA-E17A
2X3D-AA-F03A
2X3D-AA-F04A
2X3D-AA-F11A
2X3D-AA-F11B
2X3D-AA-F12A
2X3D-AA-F12B
2X3D-AA-F16A
2X3D-AA-F17A
2X3D-AA-F18A
2X3D-AA-F19A
2X3D-AA-F24A
2X3D-AA-F25A
2X3D-AA-F36A
2X3D-AA-F38A
2X3D-AA-G01A
2X3D-AA-G02A
2X3D-AA-G02C
2X3D-AA-H01A
2X3D-AA-H01B
2X3D-AA-H02A
2X3D-AA-H02B
2X3D-AA-H04A
2X3D-AA-H05A

LOOP DIAGRAMS

2X5DV009
2X5DV010
2X5DV041
2X5DV042
2X5DV043
2X5DV044
2X5DV065
2X5DV066
2X5DV067
2X5DV068
2X5DV069
2X5DV070
2X5DV071
2X5DV072
2X5DV079
2X5DV080
2X5DV091
2X5DV092
2X5DV093
2X5DV112
2X5DV113
2X5DV149
2X5DV150
2X5DV185
2X5DV186
2X5DV191
2X5DV192
2X5DV288
2X5DV289
2X5DV332
2X5DV333
2X5DV428
2X5DV429
2X5DV430
2X5DV431
2X5DV489
2X5DV490
2X5DV492
2X5DV495-1
2X5DV495-2

ELECTRICAL ELEMENTARY DRAWINGS

2X3D-BA-D02B
2X3D-BA-D02C
2X3D-BA-D02D
2X3D-BA-D02E
2X3D-BA-D02F
2X3D-BA-D02K
2X3D-BA-D02L
2X3D-BA-D03B
2X3D-BA-D03C
2X3D-BA-D03D
2X3D-BA-D03E
2X3D-BA-D03G
2X3D-BA-D03H
2X3D-BA-D03J
2X3D-BA-E02A
2X3D-BA-E02B
2X3D-BA-E02C
2X3D-BA-E02D
2X3D-BA-E02P
2X3D-BA-E02Q
2X3D-BA-E02R
2X3D-BA-E02S
2X3D-BA-E02V
2X3D-BA-E02W
2X3D-BA-E02X
2X3D-BA-E02Y
2X3D-BA-E02Z

2X3D-BA-E04A
2X3D-BA-E04B
2X3D-BA-E04D
2X3D-BA-E04E
2X3D-BA-E04F
2X3D-BA-H01A
2X3D-BA-H01B
2X3D-BA-H01C
2X3D-BA-H01D
2X3D-BA-H01E
2X3D-BA-H01F
2X3D-BA-H01G
2X3D-BA-H02A
2X3D-BA-H02B
2X3D-BA-H02C
2X3D-BA-H02D
2X3D-BA-H02E
2X3D-BA-H02F
2X3D-BA-H02G
2X3D-BA-H03A
2X3D-DA-H03B
2X3D-BA-H03C
2X3D-BA-H03D
2X3D-BA-H03G
2X3D-BA-H04A
2X3D-BA-H04B
2X3D-BA-H04C
2X3D-BA-H04D
2X3D-BA-H04F
2X3D-BA-J02A
2X3D-BA-J02B
2X3D-BA-J02C
2X3D-BA-J02D
2X3D-BA-J02E
2X3D-BA-J02F
2X3D-BA-J04A
2X3D-BA-J04B
2X3D-BA-J04C
2X3D-BA-J04D
2X3D-BA-J04G
2X3D-BA-J04H
2X3D-BA-M11A

ELECTRICAL ELEMENTARY DRAWINGS

2X3D-BC-C04P
2X3D-BC-C06C
2X3D-BC-C06D
2X3D-BC-C07C
2X3D-BC-C07D
2X3D-BC-C08C
2X3D-BC-C08D
2X3D-BC-C09C
2X3D-BC-C09D
2X3D-BC-F02A
2X3D-BC-F02C
2X3D-BC-F02D
2X3D-BC-F02G
2X3D-BC-F04A
2X3D-BC-F04B
2X3D-BC-F05A
2X3D-BC-F05B
2X3D-BC-F08A
2X3D-BC-F08B
2X3D-BC-F08C
2X3D-BC-F08D
2X3D-BC-Q01J
2X3D-BC-Q01K
2X3D-BC-Q01S
2X3D-BC-Q01T
2X3D-BC-Q01W
2X3D-BC-Q01X
2X3D-BC-Q02A
2X3D-BC-Q02B
2X3D-BC-Q02E
2X3D-BC-Q02F
2X3D-BC-Q02H
2X3D-BC-Q02J
2X3D-BC-Q03P
2X3D-BC-Q03Q
2X3D-BC-Q03R
2X3D-BC-Q04B
2X3D-BC-Q04C

2X3D-BD-B02A
2X3D-BD-B02B
2X3D-BD-B03F
2X3D-BD-B03H
2X3D-BD-B03K
2X3D-BD-B03R
2X3D-BD-C01A
2X3D-BD-C01B
2X3D-BD-C01F
2X3D-BD-C01G
2X3D-BD-C01Q
2X3D-BD-C01T
2X3D-BD-C01U
2X3D-BD-C01V
2X3D-BD-C01W
2X3D-BD-C02F
2X3D-BD-C02G
2X3D-BD-C02H
2X3D-BD-C02J
2X3D-BD-C02P
2X3D-BD-C02Q
2X3D-BD-C03F
2X3D-BD-C03G
2X3D-BD-C03J
2X3D-BD-C03K
2X3D-BD-C03T
2X3D-BD-C03Z
2X3D-BD-C04H
2X3D-BD-C04J
2X3D-BD-C04L
2X3D-BD-C04U
2X3D-BD-C05A
2X3D-BD-C05B
2X3D-BD-C05C
2X3D-BD-C05D
2X3D-BD-C05E
2X3D-BD-C05F
2X3D-BD-C05G
2X3D-BD-C05H
2X3D-BD-C05L
2X3D-BD-C05P
2X3D-BD-C05Q

ELECTRICAL ELEMENTARY DRAWINGS (cont'd)

2X3D-BD-D02E
2X3D-BD-D02F
2X3D-BD-D02L
2X3D-BD-D02M
2X3D-BD-D02V
2X3D-BD-D02W
2X3D-BD-D04K
2X3D-BD-D05H
2X3D-BD-D05J
2X3D-BD-D05K
2X3D-BD-E01A
2X3D-BD-E01B
2X3D-BD-E02C
2X3D-BD-E02D
2X3D-BD-E02E
2X3D-BD-E02F
2X3D-BD-E02G
2X3D-BD-E02H
2X3D-BD-E02J
2X3D-BD-E02K
2X3D-BD-E02N
2X3D-BD-E02P

2X3D-BD-E02Q
2X3D-BD-E03H
2X3D-BD-K03A
2X3D-BD-K03B
2X3D-BD-K03C
2X3D-BD-K03D
2X3D-BD-K03E
2X3D-BD-K03F
2X3D-BD-K03G
2X3D-BD-K03H
2X3D-BD-K04A
2X3D-BD-K04B
2X3D-BD-K04C
2X3D-BD-K04D
2X3D-BD-K04E
2X3D-BD-K04F
2X3D-BD-K04Y
2X3D-BD-K04Z
2X3D-BD-K05U
2X3D-BD-K05V
2X3D-BD-K05W
2X3D-BD-K05X
2X3D-BD-L01A
2X3D-BD-L01B
2X3D-BD-L01C
2X3D-BD-L01D
2X3D-BD-L01E
2X3D-BD-L01F
2X3D-BD-L03A
2X3D-BD-L03B
2X3D-BD-L03F
2X3D-BD-L03G
2X3D-BD-L03H
2X3D-BD-L03J
2X3D-BD-U01C
2X3D-BD-U01D
2X3D-BG-C01B
2X3D-BG-C01E
2X3D-BG-C01F
2X3D-BG-C01Q
2X3D-BG-C01R
2X3D-BG-C01V
2X3D-BG-C01X
2X3D-BG-C01Y
2X3D-BG-C01Z
2X3D-BG-C02J
2X3D-BG-C02Y
2X3D-BG-C02Z
2X3D-BG-C04A
2X3D-BG-C04B
2X3D-BG-C04N
2X3D-BG-C04P

ELECTRICAL ELEMENTARY DRAWINGS (cont'd)

2X3D-BG-C04Q
2X3D-BG-C04R
2X3D-BG-C04S
2X3D-BG-C04T
2X3D-BG-C04U
2X3D-BG-C04V
2X3D-BG-C07B
2X3D-BG-C07C
2X3D-BG-C07M
2X3D-BG-C07N
2X3D-BG-C07R
2X3D-BG-D05A
2X3D-BG-D05B
2X3D-BG-D05C
2X3D-BG-D05D
2X3D-BG-D05E
2X3D-BG-D05F
2X3D-BG-D05G
2X3D-BG-D05H
2X3D-BG-D05N
2X3D-BG-D05P
2X3D-BG-F01B
2X3D-BG-F01C
2X3D-BG-F01E
2X3D-BG-F01F
2X3D-BG-F01H
2X3D-BG-F01J
2X3D-BG-F01K
2X3D-BG-F01L
2X3D-BG-F01M
2X3D-BG-G01M
2X3D-BG-G01N
2X3D-BG-G02A
2X3D-BG-G02B
2X3D-BG-G02C
2X3D-BG-G02D
2X3D-BG-G03A
2X3D-BG-G03B
2X3D-BH-G01X
2X3D-BH-G01Z
2X3D-BH-G02B
2X3D-BH-G02D
2X3D-BH-G03A
2X3D-BH-G03B
2X3D-CD-B14A
2X3D-CD-B15A
2X3D-CD-C02B
2X3D-CD-C02D
2X3D-CD-C02F
2X3D-CD-C02H
2X3D-CD-C02J
2X3D-CD-C03B
2X3D-CD-C03D
2X3D-CD-C03F
2X3D-CD-C03H
2X3D-CD-C03J
2X3D-CD-S02E
2X3D-CE-B13B
2X3D-CE-D16A
2X3D-CE-D16B
2X3D-CE-D20A
2X3D-CE-D23A

Attachment 12

EMERGENCY LIGHTING UNIT LOCATION DRAWING

2X3DG341
2X3DG342
2X3DG343
2X3DG344
2X3DG345
2X3DG351
2X3DG352
2X3DG353
2X3DG354
2X3DG37A
2X3DG355
2X3DG356
2X3DG361
2X3DG362
2X3DG363
2X3DG364
2X3DG371
2X3DG372
2X3DG373
2X3DG390
2X3DG441
2X3DG442
2X3DG443
2X3DG444
2X3DG445
2X3DG446
2X3DG451
2X3DG452
2X3DG453
2X3DG454
2X3DG456
2X3DG460
2X3DH8C4
2X3DH8D3
2X3DH8F4

Attachment 13

EQUIPMENT LOCATION DRAWINGS

2X4DE312
2X4DE313
2X4DE314
2X4DE315
2X4DE316
2X4DE317
2X4DE318
2X4DE319
2X4DE320
2X4DE321
2X4DE322
2X4DE323
2X4DE324
2X4DE325
2X4DE327
2X4DE328
2X4DE329
2X4DE330
2X4DE331