1

FLORIDA POWER & LIGHT COMPANY
ST LUCIE PLANT UNIT 1
EMERGENCY OPERATING PROCEDURE 0120040
REVISION 10

1.0 Title:

NATURAL CIRCULATION/COOLDOWN

2.0 Approval:

Reviewed by Plant Nuclear Safety Committee July 2 1974
Approved by K N Harris Plant Manager August 10 1974

Revision 10 Reviewed by Facility Review Group April 1982
Approved by C M Wethy Plant Manager April 19 - 1982

3.0 Purpose and Discussion:

3.1 Purpose

1. This procedure provides instructions to the operator in the event of a total loss of Reactor Coolant Pump (RCP) flow to the reactor core.

2. This procedure also provides guidance to the operator in the event that the plant must be cooled down using natural circulation flow.

3.2 Precautions - See Appendix A.

3.3 Discussion - See Appendix B.

4.0 Symptoms:

4.1 Loss of off-site power.

4.2 Loss of or low voltage on 6.9 KV busses as indicated by:

1. 6.9 KV switchgear 1A1, 1B1 differential current trip.

2. 6.9 KV switchgear 1A1, 1B1 UNDERVOLTAGE alarm.

4.3 RCP OVERLOAD alarm.

4.4 REACTOR COOLANT LOW FLOW channel pre-trip alarm.

4.5 REACTOR COOLANT LOW FLOW channel trip.

8205100363 820504
PDR ADOCK 05000335
F PDR

4.0 Symptoms: (cont)

4.6 Loss of Component Cooling Water (CCW) flow to RCPs for greater than 10 minutes, requiring manual trip of all four pumps.

4.7 Valid SIAS-CIS caused by low RCS pressure, requiring all RCPs to be tripped after all Control Element Assemblies have been inserted for 5 seconds.

5.0 Instructions:

5.1 Automatic Action

1. Reactor coolant low flow reactor trip (Setpoint: 95% of full RCS flow).

5.2 Immediate Operator Action

5.2.1 Carry out immediate operator actions for reactor trip as follows:

1. Trip the turbine and reactor manually.

2. Ensure all CEA's are fully inserted and reactor trip breakers are open.

3. Verify decreasing reactor power level.

4. Ensure the turbine valves are closed.

5. Ensure generator field and 240 KV breakers are open.

6. Ensure transfer of electrical power from auxiliary transformer(s) to startup transformer(s)

   <u>OR</u>

   Ensure that the diesel generators have started and are feeding emergency busses, and are not overloaded.

7. Close MV-08-4, MV-08-6, MV-08-8, and MV-08-10 (MSR Reheat Block Valves).

8. Ensure that the Main Feedwater (MFW) System is restoring or maintaining steam generator level, and that FCV-9011 and FCV-9021 (MFW Regulating Valves) are closed, and FCV-9005 and FCV-9006 (MFW 15% Bypass Valves) open to approximately 5% of full load flow.

   <u>OR</u>

   Initiate Auxiliary Feedwater (AFW) flow to both steam generators, and ensure flow to both steam generators.

5.0 Instructions (Cont'd)

5.2.1 (Cont'd)

9. If all feedwater flow is stopped or lost and steam generator level is less than 42% then:

   a) Reinitiate auxiliary feedwater flow as soon as possible; however, do not exceed a flow rate of 150 gpm per steam generator. R10

   b) Limit feedwater flow rate to 150 gpm per steam generator until continuous feedwater flow to the steam generator has been maintained for five minutes. R10

   NOTE: If 'A' and 'B' AFW pumps are in operation and 'C' AFW pump is not needed to restore steam generator levels to normal levels, place the "C" AFW AUTO START BYPASS switch in BYPASS. R10

10. Ensure that Tav is being reduced to reference setpoint by the steam dump valves to the condenser. If the bypass valves or the condenser are not available, use the atmospheric dump valves.

11. If any of the above automatic functions have failed to occur, manually initiate that function.

5.2.2 Verify that shutdown margin (SDM) is $\geq$ 5.0% $^{\Delta K}/K$. IF SDM is less than specified, emergency borate the RCS until SDM is $\geq$5.0% $^{\Delta K}/K$.

5.2.3 Continue to perform in parallel with this procedure any applicable operator actions that are required by the initiating event procedure (s).

5.2.4 Implement the Emergency Plan as necessary in accordance with EPIP 3100021E, "Duties of the Emergency Coordinator".

5.3 Subsequent Actions

5.3.1 Establish and maintain hot let temperature (T_h) at least 20°F below the saturation temperature corresponding to RCS pressure (refer to Figure 1) by doing the following:

1. Operate presurizer heaters or auxiliary spray to increase or maintain pressurizer pressure, and to provide subcooling margin.

R10

5.0 Instructions (Cont'd)

5.3.1 (Cont'd)

2. Increase turbine bypass or atmospheric steam dump flow to reduce or maintain RCS temperature and prevent lifting secondary safeties.

5.3.2 Verify that the pressurizer level control system is functioning to maintain pressurizer level. If necessary, manually operate charging and letdown to restore and maintain normal pressurizer level. If operable charging pumps cannot restore RCS inventory and pressurizer level, observe RCS and containment parameters for indications of · LOCA.

5.3.3 Restore and maintain steam generator levels at approximately 65%. When feeding the steam generators use caution to avoid excessively cooling the RCS.

CAUTION: Do <u>not</u> exceed a cooldown rate of $75^{o}F$/hr.

5.3.4 Verify the following indications that natural circulation flow has been established within approximately 15 minutes after RCPs were tripped:

1. Loop ΔT (T_h - T_c) less than normal full power T (<$46^{o}F$).

NOTE: The effective core ΔT with only one steam generator in operation is determined as $Th-Tc_{core}$ where

$$Tc_{core} = \frac{2x(Tc \text{ operating loop}) + Tc \text{ non-operating loop}}{3}$$

2. Cold leg temperatures (Tc) constant or decreasing.
3. Hot leg temperatures (Th) stable (i.e., not steadily increasing).
4. No abnormal differences between Th RTD's and core thermocouples.

5.3.5 Confirm boron concentration in the RCS by sampling from as many different points as possible.

5.3.6 Maintain the plant in a stabilized condition based upon auxiliary plant systems availability (e.g., condensate inventory).

5.3.7 If one or more RCP's are restored to an operable condition within 10 minutes, start an RCP in each loop if the following criteria are satisfied:

1. At least one steam generator is removing heat from the RCS.
2. Pressurizer level and pressure are responding normally to the Pressurizer Level and Control System.
3. The RCS is at least $20^{o}F$ subcooled (refer to Figure 1).
4. The yellow PERMISSIVE light on the associated pump control switch is lit.
5. No indication of voids in RCS are present.

5.0 Instructions: (cont)

5.3 (cont)

5.3.8 If all four RCPs can be returned to operable status within 10 minutes, power operation may be resumed under the direction of the Nuclear Plant Supervisor. If RCS cooldown is required under these conditions, the cooldown should be accomplished using forced circulation.

5.3.9 If required to conduct a plant cooldown to shutdown cooling (SDC) conditions using natural circulation, proceed as follows:

1. Establish as stable plant conditions as circumstances permit.

2. Verify that RCS boration has progressed to the point that the required SDM can be maintained during the cooldown.

3. Commence supplying makeup water to the Condensate Storage Tank. If off-site power is not available, place the Water Treatment Plant in service as per Appendix C.

4. Commence an RCS cooldown by utilizing one of the following methods:

   a. If the condenser is available, use the Steam Dump Bypass System and Main or Auxiliary Feedwater.

   b. If the condenser is not available, use the atmospheric dump valves and Main or Auxiliary Feedwater.

5. Continuously verify natural circulation flow throughout the cooldown process.

6. Observe all available indications to determine conditions within the RCS.

   a. Use the Subcooled Margin Monitor (SMM), Th, Tc, and RCS pressure to verify that the RCS is subcooled.

5.0 Instructions: (cont)

5.3 (cont)

5.3.9 (cont)

6. (cont)

   b. Figure 1 or the nomograph on RTGB-103 should be used for comparison with the SMM; subcooled margin can also be determined by subtracting Th from pressurizer temperature (TE-1101).

   c. Incore thermocouples, recorded on the DDPS, can also be used for indication of Th.

7. Establish and maintain a RCS cooldown rate of 50°F/hr. (See Figure 2). The highest RCS cold leg temperature shall be plotted every 30 minutes on a copy of Figure 4. The RCS temperature and pressure shall be determined to be within the limits of Technical Specification Figure 3.4-2B at least once per 30 minutes during cooldown.

8. The pressurizer water phase shall be recorded on Figure 5 and plotted every 30 minutes on Figure 4. This temperature shall also be compared with the lowest spray water temperature to ensure that differential temperature does not exceed 350°F.

9. Maintain RCS pressure above and to the right of the curve values shown on Figure 3.

10. During the cooldown, maintain a minimum of 20°F subcooling by the following methods (listed in order of preference):

    a. Manual control of pressurizer heaters and auxiliary spray.

       NOTE: Use only one charging pump.

    b. Operating charging or HPSI pumps.

11. During the cooldown, maintain pressurizer level by the following methods (listed in order of preference):

    a. Control charging and letdown.

    b. Operating HPSI pumps.

5.0 Instructions: (cont)

5.3 (cont)

5.3.9 (cont)

6. (cont)

   b. Figure 1 or the nomograph on RTGB-103 should be used for comparison with the SMM; subcooled margin can also be determined by subtracting Th from pressurizer temperature (TE-1101).

   c. Incore thermocouples, recorded on the DDPS, can also be used for indication of Th.

7. Establish and maintain a RCS cooldown rate of 50°F/hr. (See Figure 2). The highest RCS cold leg temperature shall be plotted every 30 minutes on a copy of Figure 4. The RCS temperature and pressure shall be determined to be within the limits of Technical Specification Figure 3.4-2B at least once per 30 minutes during cooldown.

8. The pressurizer water phase shall be recorded on Figure 5 and plotted every 30 minutes on Figure 4. This temperature shall also be compared with the lowest spray water temperature to ensure that differential temperature does not exceed 350°F.

9. Maintain RCS pressure above and to the right of the curve values shown on Figure 3.

10. During the cooldown, maintain a minimum of 20°F subcooling by the following methods (listed in order of preference):

    a. Manual control of pressurizer heaters and auxiliary spray.

       NOTE: Use only one charging pump.

    b. Operating charging or HPSI pumps.

11. During the cooldown, maintain pressurizer level by the following methods (listed in order of preference):

    a. Control charging and letdown.

    b. Operating HPSI pumps.

5.0 Instructions: (cont)

5.3 (cont)

5.3.9 (cont)

12. Monitor the available condensate inventory and replenish the CST as required.

    CAUTION: Condensate Storage Tank volume shall be maintained 116,000 gallons per Technical Specifications 3.7.1.3. If this limit cannot be maintained, proceed to Appendix E.

13. During RCS cooldown and depressurization, perform the evolutions specified in Appendix D.

14. During RCS depressurization monitor for void formation in the reactor vessel upper head region. Indications of possible void formation include:

    a. RCS temperature $>$ Tsat for the corresponding RCS pressure.

    b. A pressurizer level increase significantly greater than expected while operating auxiliary spray.

    c. A pressurizer level decrease while operating charging.

    d. If the Pressurizer Level Control System is in automatic, an unanticipated letdown flow greater than charging flow.

15. If voiding in the RCS is indicated, perform the following:

    a. Isolate letdown by closing V-2515 and V-2516 (Letdown Containment Isolation).

    b. Stop the RCS depressurization.

    c. Stop the RCS cooldown.

    d. If possible, review and select one RCP in each loop for restarting.

1

5.0 Instructions: (cont)

5.3 (cont)

5.3.9 (cont)

15. (cont)

e. Repressurize the RCS to eliminate the void by operating pressurizer heaters or HPSI and charging pumps.

NOTE: If the HPSI or charging pumps are utilized to charge the RCS solid, the pumps should be stopped after solid RCS conditions are indicated.

f. If required to continue the cooldown with the known presence of a steam void in the reactor vessel head, proceed using the Fill and Drain method (Appendix E).

g. When conditions permit, re-initiate letdown and resume depressurization to SDC initiation pressure.

16. If off-site power has been lost, and it becomes necessary to augment the cooldown rate refer to Appendix F.

17. When RCS temperature reaches 325°F, maintain the RCS at this temperature for an additional 20.4 hours (See Figure 2).

18. Upon completion of the required "soak" period, initiate SDC in accordance with Appendix G.

5.0 Instructions: (cont)

5.3 (cont)

5.3.9 (cont)

15. (cont)

e. Repressurize the RCS to eliminate the void by operating pressurizer heaters or HPSI and charging pumps.

NOTE: If the HPSI or charging pumps are utilized to charge the RCS solid, the pumps should be stopped after solid RCS conditions are indicated.

f. If required to continue the cooldown with the known presence of a steam void in the reactor vessel head, proceed using the Fill and Drain method (Appendix E).

g. When conditions permit, re-initiate letdown and resume depressurization to SDC initiation pressure.

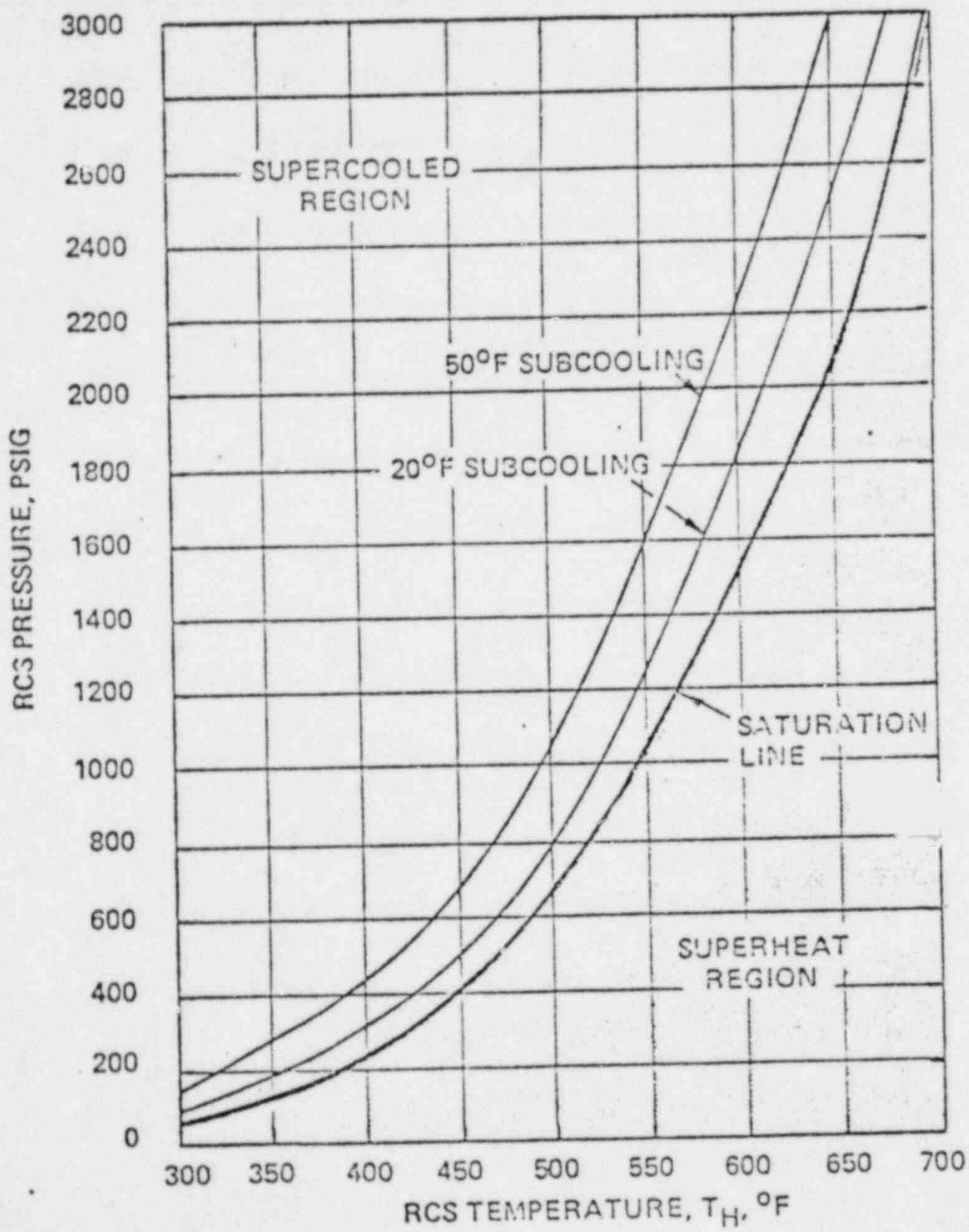
16. If off-site power has been lost, and it becomes necessary to augment the cooldown rate refer to Appendix F.

17. When RCS temperature reaches 325°F, maintain the RCS at this temperature for an additional 20.4 hours (See Figure 2).

18. Upon completion of the required "soak" period, initiate SDC in accordance with Appendix G.

1

Figure 1
SATURATION



EMERGENCY OPERATING PROCEDURE 0120040, Rev 10

NATURAL CIRCULATION/COOLDOWN

FIGURE 2

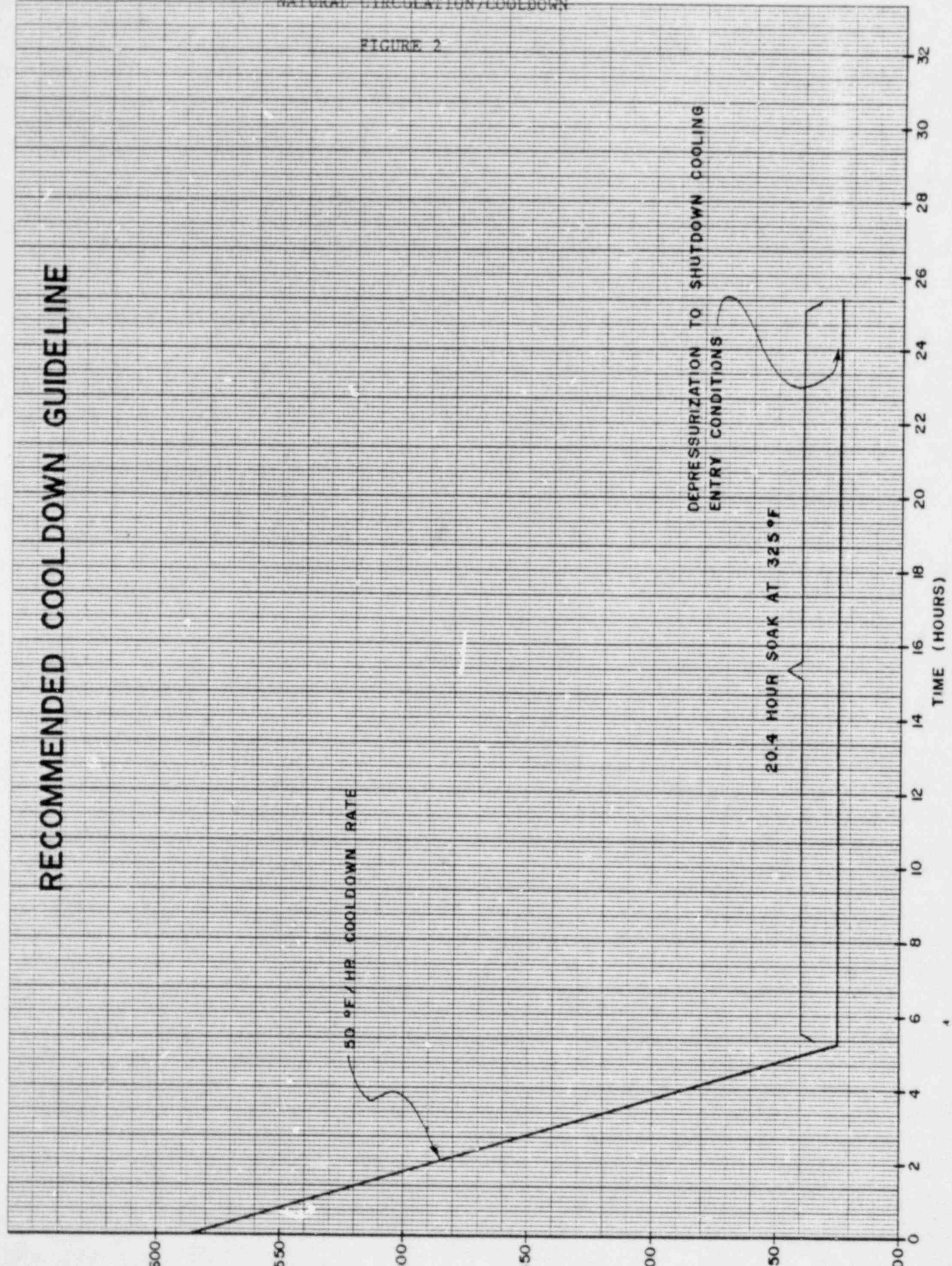
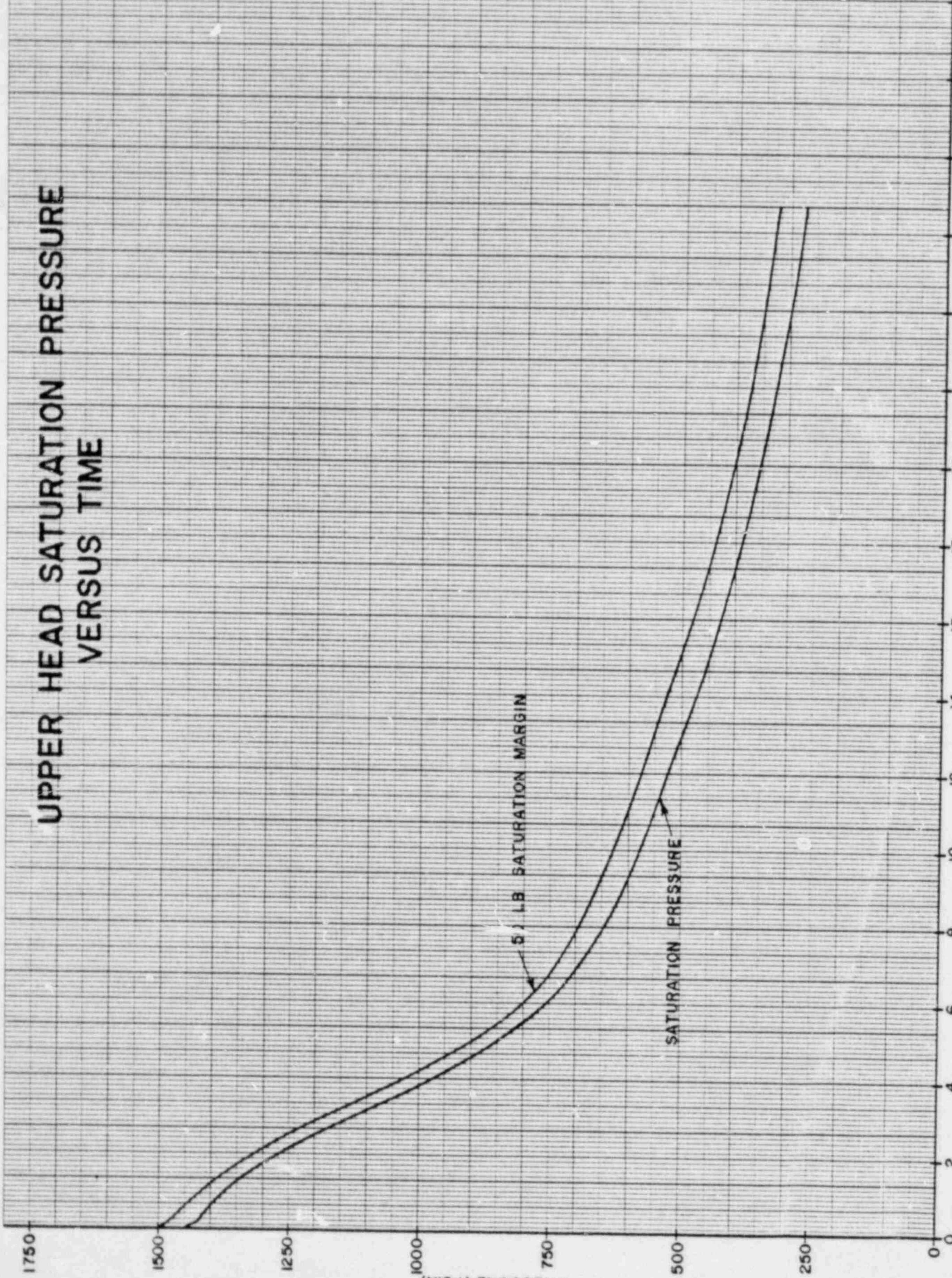


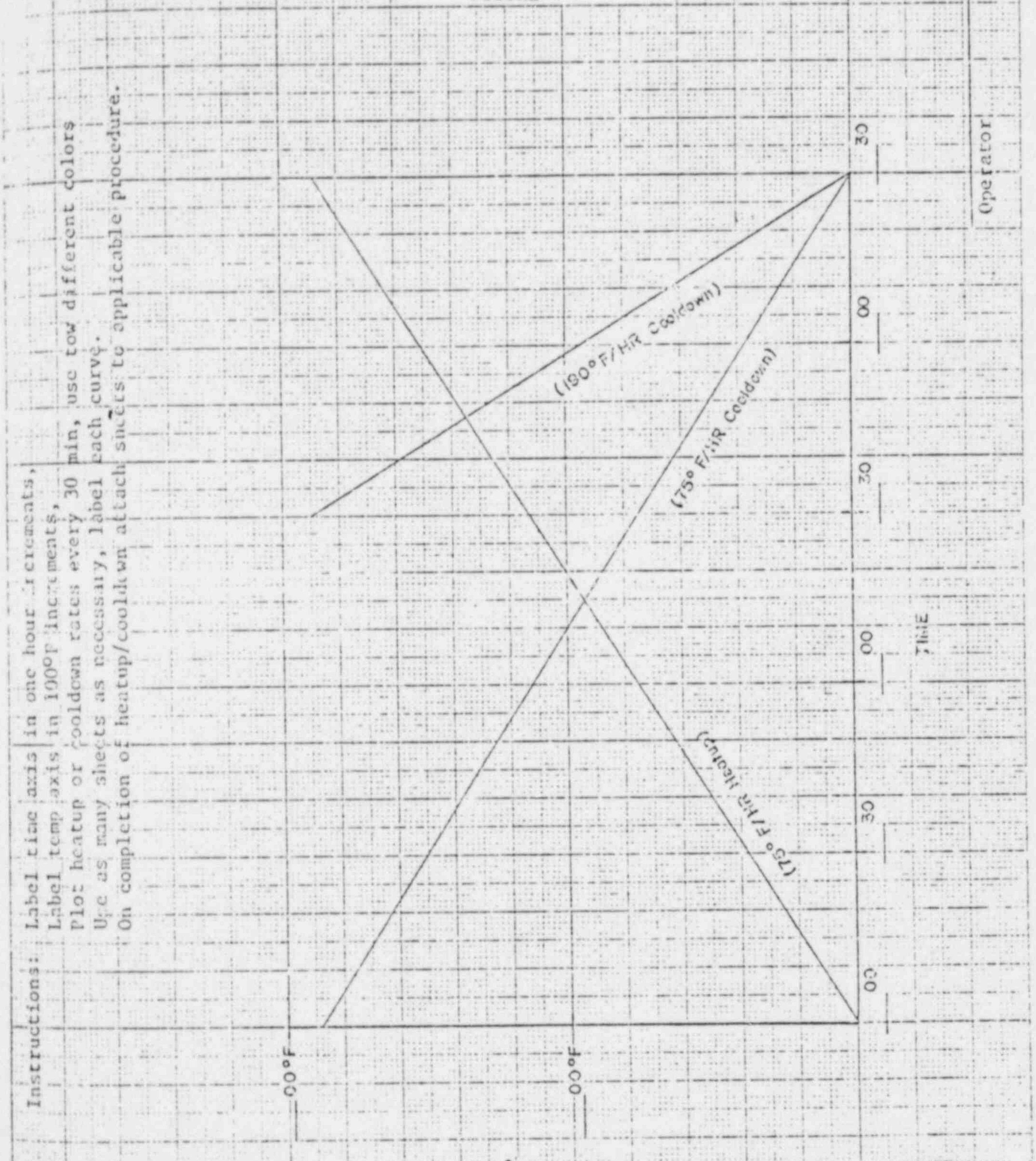
FIGURE 3



K+E 10 X 10 TO THE CENTIMETER KEUFFEL & ESSER CO. 46 1513

EMERGENCY OPERATING PROCEDURE 0120040, Rev 10
NATURAL CIRCULATION/COOLDOWN

FIGURE 4



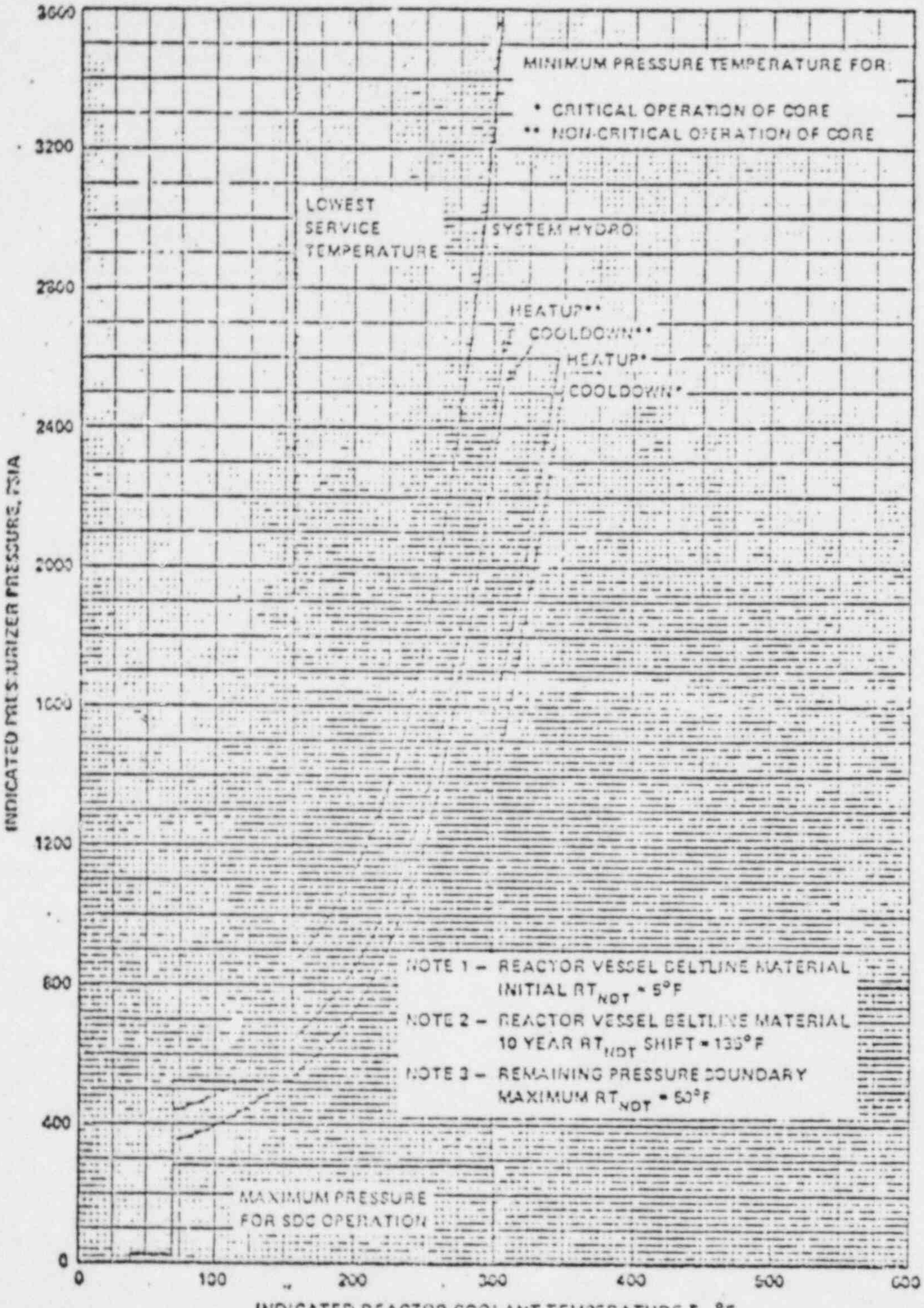


FIGURE 3.4-2b

Reactor Coolant System Pressure Temperature Limitations for up to 10 Years of Full Power Operation

EMERGENCY OPERATING PROCEDURE 0120040, Rev 10
NATURAL CIRCULATION/COOLDOWN

FIGURE 5

DATE________________

TIME every 30 minutes	Column 1 Pressurizer Temp TI-1101	Column 2 Lowest Spray Line Temp TIA 1103/1104	Column 3 Pressurizer Press PIC 1103/1104	* Difference Column 1 minus Column 2

*Limited to $\leq 350^{\circ}$ and $\geq 50^{\circ}$

RCS TEMP AND PRESSURE SHALL BE WITHIN LIMITS OF FIGURE 3.4-2b FOR EACH 30 MINUTE PERIOD.

________ Operator ________ Shift

________ Operator ________ Shift

________ Operator ________ Shift

EMERGENCY OPERATING PROCEDURE 0120040, Rev 10
NATURAL CIRCULATION/COOLDOWN

APPENDIX A

PRECAUTIONS

1. Natural circulation flow cannot be verified until the RCP's have stopped coasting down after being tripped.

2. Due to increased loop transit times, verification of plant responses to a plant change cannot be accomplished until approximately 10 to 15 minutes following the action.

3. After a cold shutdown boron concentration is attained in the RCS, makeup water added to the RCS during the cooldown should be at least the same boron concentration as in the RCS to prevent any dilution of RCS boron concentration.

4. Once pressurizer cooldown has begun, pressurizer level indication decalibration will occur (indication on the normal pressurizer level indication will begin to deviate from the true pressurizer level). The temperature compensation correction curve posted on the RTGB should be used to determine true pressurizer water level. Cold calibrated pressurizer level indication is also available for lower pressurizer temperatures.

Minimize the use of pressurizer auxiliary spray whenever the temperature differential between the spray water and the pressurizer is greater than 200°F. Any auxiliary spray cycle which results in a spray line temperature change of 650°F to 120°F in $<$ 1.5 seconds shall be recorded in accordance with AP 0010134.

6. If pressurizer spray is not available, boron concentration in the pressurizer may be lower than the RCS loop boron concentration. RCS boron concentration should be increased to avoid being diluted below minimum requirements by a possible pressurizer outsurge.

7. If either the HPSI or LPSI pumps are utilized to collapse any steam voids in the RCS by charging the system solid, the pump(s) should be stopped after solid conditions are indicated. This will minimize the potential for any inadvertant flowpath from the RCS back to the Refueling Water Tank.

8. If the RCS is solid, closely monitor any makeup or draining and any system heatup or cooldown to avoid any unfavorable rapid pressure excursions.

9. During all phases of the cooldown, monitor RCS temperature to avoid exceeding a cooldown rate $>$ 100°F/hr.

1

EMERGENCY OPERATING PROCEDURE 0120040, Rev 10
NATURAL CIRCULATION/COOLDOWN

APPENDIX A (cont)

10. If cooling down by natural circulation with an isolated steam generator, an inverted ΔT (i.e., $T_c > T_h$) may be observed in the idle loop. This is due to a small amount of reverse heat transfer in the isolated steam generator and will have no effect on natural circulation flow in the intact steam generator.

11. All available indications should be used to aid in diagnosing the event since it may cause irregularities in a particular instrument reading. Critical parameters must be verified when one or more confirmatory indications are available.

12. When establishing auxiliary feedwater flow to the Steam Generators, use Steam Generator levels as well as header flowrates to ensure each Steam Generator is receiving auxiliary feedwater.

13. Condensate inventory should be monitored periodically to ensure that an adequate supply is available. Makeup to the Condensate Storage Tank should be started as soon as practical. If CST level decreases to $<$116,000 gallons, the plant should be immediately cooled down utilizing the Fill and Drain Method (Appendix E).

1

EMERGENCY OPERATING PROCEDURE 0120040, Rev 10
NATURAL CIRCULATION/COOLDOWN

APPENDIX B

DISCUSSION

Reactor Coolant Pump forced circulation and heat transfer to the Steam Generators is the preferred mode of operation for decay heat removal whenever plant temperatures and pressures are above the Shutdown Cooling System entry conditions. The natural circulation capability at the St. Lucie Plant provides an emergency means for core cooling using the steam generators, if the RCPs are unavailable.

Natural circulation is governed by decay heat, component elevations, primary to secondary heat transfer, loop flow resistance, and voiding. Component elevations at St. Lucie Plant are such that satisfactory natural circulation decay heat removal is obtained by density differences between the bottom of the core and the top of the steam generator tube sheet. An additional contribution to natural circulation flowrate is the density difference obtained as the coolant passes through the Steam Generator U-tubes, but this is not required for satisfactory natural circulation. Natural circulation is assured even if the U-tubes are partially uncovered on the Steam Generator secondary side. Because of the temperature distribution in the Steam Generator U-tubes, there is no degradation in primary to secondary heat transfer as long as the secondary level covers at least 1/3 of the tube height. By ensuring that the loop ΔT is less than the full power ΔT, the power-to-flow ratio is assured to be less than 1.0 during natural circulation.

Satisfactory natural circulation heat removal can be obtained with either one or two Steam Generators. Unequal auxiliary feedwater to the Steam Generators will not lead to unsatisfactory natural circulation as long as all of the decay heat is being removed through the Steam Generators.

Assurance that the RCS is being maintained in a subcooled condition can be obtained as follows. With the Subcooling Margin Monitor (SMM) operating normally, the nomograph on RTGB 104 is used in conjunction with the SMM to eliminate dependence on a single instrument. With the SMM inoperable, reference to the nomograph utilizing control room indication such as hot leg temperature, pressurizer pressure, and incore thermocouples will determine the margin to saturation. Subcooling margin can also be determined by subtracting hot leg temperature from pressurizer temperature (TE-1101).

During normal plant operation under conditions of forced circulation flow, there is only a small flow of coolant in the reactor vessel head area. During periods of natural circulation, there is little, if any, effective flow. If the RCS is cooled down using natural circulation, it is possible to generate a steam void in the reactor vessel head when saturation conditions develop. These conditions can be produced by the temperature sustained by the retained metal heat and decreased RCS pressure during cooldown.

EMERGENCY OPERATING PROCEDURE 0120040, Rev 10
NATURAL CIRCULATION/COOLDOWN

APPENDIX B (cont)

Analyses have demonstrated that the upper reactor head region fluid can be cooled to Shutdown Cooling System (SDC) entry conditions without void formation using a hot leg temperature cooldown rate of 50°F/hr in approximately 14.2 hours. In order to provide additional conservatism, this procedure directs that a cooldown rate of about 50°F/hr to 325°F be utilized, followed by a soak of 325°F for 20.4 hours for a total cooldown time of approximately 25.7 hours from cooldown initiation. (See Figure 1). The condensate supply required for this cooldown is 270,500 gallons. Makeup water can be supplied from the Water Treatment Plant and the two 500,000 gallon City Water Storage Tanks, or Treated Water Storage Tank. Pumping capability from all sources can be supplied from the diesel generators.

An alternative to the above cooldown procedure is the fill and drain method (See Appendix E). This method may be employed should an exteremely low probability event occur which could cause a loss of condensate makeup capacity or require a rapid RCS de-pressurization rate. It provides for cooling of the upper reactor vessel head region by using auxiliary spray to the pressurizer to lower RCS pressure and create a void in the upper head. Voiding in the upper head flushes hot upper head fluid into the cooler RCS where it mixes with RCS water. The water flushed out of the upper head will cause a surge of water from the RCS into the pressurizer. The process is halted by stopping the spray. The insurge compresses the pressurizer steam space, raising the pressure, thus stopping the insurge and halting flashing in the upper head. Charging to the RCS will then force fluid into the upper head due to the elevation difference between the reactor vessel upper head and the pressurizer. Mixing of colder loop water with the hot upper head cools the upper head and causes an outsurge from the pressurizer. The process is continued until the upper head is solid. The cycle is then repeated until RCS temperature and pressure have been reduced to SDC entry conditions.

The above procedure has been analyzed and performed successfully twice at St. Lucie and is considered a safe, <u>alternative</u> method of natural circulation cooldown.

EMERGENCY OPERATING PROCEDURE 0120040, Rev 10
NATURAL CIRCULATION/COOLDOWN

APPENDIX C

PLACING WATER TREATMENT PLANT IN SERVICE

DURING LOSS OF OFF-SITE POWER

NOTE: Makeup to the Condensate Storage Tank (CST) should be initiated as soon as diesel generator loading allows.

1.	Strip the non-vital 4.16 KV busses.	1A2	1B2
	NOTE: All should have opened automatically.		
2.	Insert the Sync Plug and close the 4.16 KV non-vital breaker.	1A2-20109	1B2-20309
3.	Hold the control switch closed while closing 4.16 KV vital breaker.	1A3-20209	1B3-20411
4.	Strip the non-vital 480V Load Center.	1A1	1B1
5.	Close the 4.16 KV non-vital breaker.	1A1-20110	1B2-20310
6.	Close the non-vital Load Center breaker.	1A1-40103	1B1-40403
7.	Strip the 480 V MCC.	1A4	1B4
8.	Close the 480 V Load Center breaker.	1A1-40113	1B1-40413

9. Start only equipment required to transfer water to the CST.

   NOTE: If a shortage of water persists in the CST, it is permissible to overide, as necessary, any automatic trips (e.g., conductivity, silica, etc.).

10. Water may also be supplied to the CST from the Treated Water Storage Tank as follows:

a.	Complete steps 1 thru 6 above		
b.	Strip the 480V MCC	1A3	1B3
c.	Close the 480 V Load Center breaker.	1A1-40116	1B1-40412
d.	Align valves to pump from TWST to CST.		
e.	Close breakers and start treater water transfer pump(s) 1A and/or 1B	1A3-41016	1B3-41816

11. If the Water Treatment Plant cannot be placed in service, transfer water directly from the City Water Tanks to the CST using a fire pump and a temporary fire hose.

    NOTE: City Water Tanks should not be reduced below 300,000 gallons each, per Technical Specification 3.7.11.1.

EMERGENCY OPERATING PROCEDURE 0120040, Rev 10
NATURAL CIRCULATION/COOLDOWN

APPENDIX D

RCS COOLDOWN/DE-PRESSURIZATION CHECKOFF LIST

1. At RCS pressure of 1750 psig, isolate and bypass the following transmitters:

_______ 1.1 FT-2212 (Charging Header Flow Transmitter)

NOTE: Close the valve on the transmitter marked HIGH SIDE, open the valve marked BYPASS, and close the valve marked LOW SIDE.

_______ 1.2 PT-2212 (Charging Header Pressure Transmitter)

NOTE: Close its isolation valve.

_____ 2. At RCS pressure of 1700 psia, the SIAS Channel BLOCK PERMISSIVE annunciator will come on. Block Channels A and B of SIAS by turning the key-interlocked switches to the BLOCK position.

NOTE: If the channels have been blocked, the two annunciators SIAS ACTUATION CHANNEL A BLOCKED and SIAS ACTUATION CHANNEL B BLOCKED will come on.

3. At RCS pressure $<$1750 psia, align the NaOH System as follows:

3.1 Close and lock NaOH system injection header isolation valves:

_______ V-07255

_______ V-07257

_______ V-07271

_______ V-07272

3.2 De-energize the NaOH system admission valves after ensuring that they are closed:

_______	SE-07-1A	RTGB 106	TBCCC	F31,32
_______	SE-07-1B	RTGB 106	TBGG	F31,32
_______	SE-07-2A	RTGB 106	TBCCC	F49,50
_______	SE-07-2B	RTGB 106	TBGG	F49.50

1

EMERGENCY OPERATING PROCEDURE 0120040, Rev 10
NATURAL CIRCULATION/COOLDOWN

APPENDIX D (cont)

_____ 4. At Steam Generator pressure of 685 psig, the MSIS ACTUATION CHANNEL A BLOCK PERMISSIVE and MSIS ACTUATION CHANNEL B BLOCK PERMISSIVE annunciators will come on. Block the MSIS channels by turning the key-interlocked switches to the BLOCK position.

NOTE: If the channels have been blocked, the two annunciators MSIS ACTUATION CHANNEL A BLOCKED and MSIS ACTUATION CHANNEL B BLOCKED will come on.

_____ 5. Prior to reaching RCS pressure of 1100 psia, unisolate and place in operation the standby pressurizer level control and letdown pressure control valves.

6. When RCS temperature is <500°F and RCS pressure is <1500 psia, perform the following:

6.1 Close the Safety Injection Tank discharge valves by placing the switch in the BYPASS CLOSE position and racking out its respective breaker:

	VALVE		BREAKER
_____	V-3614	_____	41312
_____	V-3624	_____	41222
_____	V-3634	_____	42033
_____	V-3644	_____	42113

6.2 Close the Containment Spray (CS) pump discharge valves:

_____ V-07145

_____ V-07130

6.3 Close and tag the manual valves in the CS header:

_____ V-07161 (A Hdr)

_____ V-07164 (B Hdr)

6.4 Close containment spray motor operated valves

_____ MV-07-3A (A Hdr)

_____ MV-07-3B (B Hdr)

EMERGENCY OPERATING PROCEDURE 0120040, Rev 10
NATURAL CIRCULATION/COOLDOWN

APPENDIX D (cont)

7. When RCS pressure reaches 415 psia or RCS cold leg temperature reaches 275°F, annunciator SELECT LOW RANGE OPERATION will come on.

_____ 7.1 Close MOV-1403 and MOV-1405 (PORV Isolation)

_____ 7.2 Select LOW RANGE on control switches for PORV-1402 and PORV-1404, and ensure that neither PORV opens.

_____ 7.3 Open MOV-1403 and MOV-1405 (PORV Isolation).

8. When RCS temperature reaches 325°F and RCS pressure reaches 260 psia, perform the following:

_____ 8.1 Remove the trip and close fuses on two HPSI pumps, and tag with caution tags.

NOTE: Ensure the remaining HPSI pump is operable.

_____ 8.2 Remove the trip and close fuses on the A and B CS Pumps, and tag with caution tags.

9. When RCS temperature reaches 200°F, perform the following:

_____ 9.1 Remove the trip and close fuses on the remaining HPSI pump and tag with caution tags.

_____ 9.2 Tag out one charging pump such that no more than two charging pumps are available for dilution below 200°F.

EMERGENCY OPERATING PROCEDURE 0120040, Rev 10
NATURAL CIRCULATION/COOLDOWN

APPENDIX E

RCS FILL AND DRAIN METHOD OF COOLING

REACTOR VESSEL HEAD REGION

NOTE: This method of RCS cooldown should only be employed in the event that rapid de-pressurization of the RCS is required, or Condensate Storage Tank level decreases below 116,000 gallons.

CAUTION: During this evolution, pressurizer level is not a valid indicator of RCS inventory during transient conditions. Care should be exercised to observe other parameters which would indicate any loss of RCS inventory.

1. Take manual control of the charging and letdown system.

2. Lower RCS pressure by using auxiliary sprays into the pressurizer.

3. As voiding occurs in the upper reactor vessel head, a surge of water from the RCS will cause pressurizer level to increase rapidly. Terminate auxiliary spray prior to pressurizer level increasing to 70% indicated level.

4. Cool the upper reactor vessel head region by charging with a charging pump to the RCS loop(s). Continue charging until either of the following conditions occur:

   4.1 Pressurizer level decreases to 30% indicated level

   or

   4.2 The upper reactor head is charged solid.

   NOTE: A solid upper head condition will be evident by an increasing pressurizer level as charging to the loops is continued.

5. Repeat steps 1 thru 4 above until SDC entry conditions are established.

EMERGENCY OPERATING PROCEDURE 0120040, Rev 10
NATURAL CIRCULATION/COOLDOWN

APPENDIX F

AUGMENTED COOLDOWN WITH THE STEAM DUMP

BYPASS SYSTEM (SBCS)

If the desired RCS cooldown rate cannot be attained, the SBCS can be used either by itself or in conjunction with the atmospheric dump valves. Since condenser vacuum will not be available, the following actions should be taken to place the SBCS in service:

1. Call available maintenance personnel on site to remove the target flange on a SBVS valve (preferably V-8803).

   NOTE: If no maintenance personnel are on site, call the Duty Call Supervisor.

2. Isolate all other SBCS valves from the condenser (except the selected valve).

3. Jumper V-8803 by placing a jumper on termination box EM 104, leads 10 to 11 (located behind and in the lower portion of RRS #2 cabinet in RTGB-104).

4. Reset the condenser vacuum interlock by depressing the reset button (on the outside of the RRS #2 cabinet) and observe that the condenser vacuum interlock yellow light goes out.

   NOTE: This will bypass the vacuum permissive and allow operation of V-8803 to atmosphere after removal of the target flange.

5. Place all SBCS controllers in MANUAL.

6. When the target flange for V-8803 has been removed and the vacuum interlock jumpered, manually adjust the controller for V-8803 to control RCS cooldown rate.

   CAUTION: Do not exceed a cooldown rate ≥ 75°F/hr.

EMERGENCY OPERATING PROCEDURE 0120040, Rev 10
NATURAL CIRCULATION/COOLDOWN

APPENDIX G

INITIATION OF SHUTDOWN COOLING

_____ 1. Open V-3657 (SDC discharge to LPSI header).

_____ 2. Open MV-3452 and MV-3453 (LPSI pump supply to SDC HX).

_____ 3. Check to be open FCV-3306 (SDC HX bypass).

_____ 4. Close MV-03-2 (FCV-3306 bypass).

_____ 5. Open MV-03-1A and MV-03-1B (SDC recirc warmup).

_____ 6. Open MV-3456 and MV-3457 (SDC HX isolation).

_____ 7. Check to be open V-3204 and V-3205 (LPSI mini-flow).

_____ 8. Check to be open V-3659 and V-3660 (Mini-flow header stop).

_____ 9. Start 1A and 1B LPSI pumps.

_____ 10. Check to be closed V-3661 (Check valve leakage drain).

_____ 11. Open HCV-3615, HCV-3625, HCV-3635, and HCV-3645 (LPSI isolation).

_____ 12. Open HCV-3618, HCV-3628, HCV-3638, and HCV-3648 (Check valve leakage control).

_____ 13. Open V-3459, V-3463, and V-07009 (RWT recirc stop).

_____ 14. Check the boron concentration in the system after circulating for ten minutes. Continue circulation until the boron concentration is ≥ to the concentration in the RCS.

_____ 15. Close HCV-3618, HCV-3628, HCV-3638, and HCV-3648 (Check valve leakage control).

_____ 16. Close V-3459, V-3463, and V-07009 (RWT recirc stop).

_____ 17. Close HCV-3615, HCV-3625, HCV-3635, and HCV-3645 (LPSI isolation).

_____ 18. Close V-3657 (SDC HX discharge to LPSI header).

_____ 19. Continue to run the LPSI pumps to heatup the SDC system as much as practical.

CAUTION: ENSURE LPSI PUMP MINIMUM FLOW IS MAINTAINED IN THE SDC SYSTEM WHEN ONE OR BOTH MINIFLOW VALVES ARE CLOSED.

EMERGENCY OPERATING PROCEDURE 0120040, Rev 10
NATURAL CIRCULATION/COOLDOWN

APPENDIX G (cont)

_____ 20. Verify flow on FI-3306 and close V-3205 (manual LPSI pump recirc).

_____ 21. Close V-3204 (manual LPSI pump recirc).

_____ 22. Stop the A and B LPSI Pumps.

_____ 23. Close MV-3444 and MV-3432 (LPSI pump suction from RWT).

_____ 24. Close MV-03-1A and MV-03-1B (SDC recirc warmup).

_____ 25. Check RCS pressure $<$ 265 psia, then open V-3651, V-3652, V-3480 and V-3481 (SDC return valves).

_____ 26. Open HCV-14-3A and HCV-14-3B (CCW to SDC HX).

_____ 27. Start A or B LPSI pump.

_____ 28. Slowly inch open either HCV-3625 or HCV-3635 in approximately 5% increments to bring the SDC system up to temperature.

_____ 29. Adjust FIC-3306 to maximum flow in AUTO mode.

_____ 30. When temperature has stabilized, slowly open V-3615, V-3625, V-3635, and V-3645 (LPSI discharge valves) and adjust FIC-3306 to control flow at 3000 gpm in AUTO.

_____ 31. Adjust HCV-3657 (SDC return) to maintain the desired cooldown rate.

NOTE: When the cooldown is completed, all of the flow should be going through HCV-3657, and FCV-3306 should be closed.

1

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT #1
EMERGENCY PROCEDURE 0810040
REVISION 14

1.0 Title:

MAIN STEAM LINE BREAK

2.0 Approval:

Reviewed by Plant Nuclear Safety Committee October 2 1974.
Approved by [signature] Plant Manager October 24 1974.

Revision 14 Reviewed by Facility Review Group APRIL 6 1982
Approved by [signature] Plant Manager 4-16-1982

3.0 Purpose:

3.1 This procedure provides instructions to be followed in the event of an uncontrolled steam release from a steam generator.

3.2 Discussion:

A rupture of a steam line is assumed to include any accident which results in an uncontrolled steam release from a steam generator. The release can occur due to a break in a pipe line or from the malfunction of atmospheric dump valves or steam dump and bypass valves or safety valves. The steam release results in an initial increase in steam flow which decreases during the accident as the steam pressure falls. The energy removal from the Reactor Coolant System causes a reduction of coolant temperature and pressure. This transient results in the RCS being at saturation conditions with the potential for void formations in the system. Operator actions should be directed toward establishing subcooled conditions in the Reactor Coolant System.

3.2.1 Core protection after a break would be provided by MSIS at 600 PSIA steam generator pressure and SIAS at 1600 PSIA pressurizer pressure or 5 PSIG containment pressure (break inside containment).

1

3.0 Purpose: (Cont'd)

3.2 Discussion: (Cont'd)

3.2.2 All available indications should be used to aid in diagnosing the event since the accident may cause irregularities in a particular instrument reading. Critical parameters must be verified when one or more confirmatory indications are available. With the Subcooling Margin Monitor (SMM) operating normally, use the nomograph on RTGB 104 in conjunction with the SMM to eliminate dependence on a single instrument. With the SMM inoperable refer to the nomograph utilizing control room indicators such as T_{HOT}, pressurizer pressure and incore thermocouples to determine the margin to saturation. Subcooling margin can also be determined by subtracting hot leg temperature from pressurizer temperature (TE 1101).

4.0 Symptoms:

4.1 Continuously decreasing Tavg.
4.2 Abnormally low pressure in one or both steam generators.
4.3 Low pressurizer level.
4.4 Low pressurizer pressure.
4.5 High containment pressure (break inside containment).
4.6 Initial rise in S.G. Level followed by rapid decrease in affected steam generator level.

NOTE: Some instruments (valve position, temperature, pressure, level indication, etc.) specified for use in this procedure have not been designed for long term post-steam line break conditions inside the containment. Therefore, the operator should be especially alert that the potential exists for erroneous indication after > 15 minutes have elapsed following a steam line break inside containment.

5.0 Instructions:

5.1 Immediate Automatic Actions:

5.1.1 Reactor trip
5.1.2 Turbine trip
5.1.3 Generator lockout
5.1.4 Auxiliaries transfer to startup transformer
5.1.5 MSIS initiates at 600 psia SG press
5.1.6 Safety injection initiates at 1600 psia in pressurizer.
5.1.7 Containment isolation initiation from SIAS or at 5 psig containment pressure.
5.1.8 Containment spray initiates at 10 psig and SIAS.
5.1.9 Aux Feedwater Auto Start Sequence when either S/G level decreases to 34% indicated level.

EMERGENCY PROCEDURE 0810040, REV. 14
MAIN STEAM LINE BREAK

5.0 Instructions: (cont)

5.2 Immediate Operator Action:

5.2.1 Carry out immediate operator actions for reactor trip per OP 0030130.

5.2.2 After an SIAS caused by low reactor coolant system pressure and after it has been verified that all CEA's have been fully inserted for 5 seconds, stop all operating reactor coolant pumps.

5.2.3 Ensure MSIS initiated at 600 PSIA steam generator pressure or initiate manually.

5.2.4 Place both AFW auto start bypass switches in bypass to prevent feeding the faulted S/G.

5.2.5 Observe steam generator levels and pressures to determine affected steam generator.

5.2.6 Establish flow to the non-faulted steam generator when the cooldown transient has terminated and the RCS temperature is above 400°F. Maintain RCS temperature stable with steam dump to atmosphere on non-faulted steam generator.

5.2.7 If all feedwater flow is stopped or lost and steam generator level is less than 42% then:

1. Reinitiate auxiliary feedwater flow as soon as possible; however, do not exceed a flow rate of 150 gpm.

2. Limit feedwater flow rate to 150 gpm until continuous feedwater flow to the SG has been maintained for five minutes

5.3 Subsequent Action:

Observe all available indications to determine conditions within the RCS. Use SMM display, RCS hot leg temperature, RCS cold leg temperature, incore thermocouple temperature and RCS pressure to determine if the RCS is sub-cooled or saturated. An increase in temperature above the saturation temperature for the existing pressure is an indication of voiding in the RCS. If this occurs the operator must ensure that the RCP's are turned off, the SIS is providing makeup to the RCS, and that the operable steam generator is removing heat from the RCS.

5.3.1 Refer to Table I to ensure the proper operation of engineered safety features as time and conditions permit.

5.3.2 Implement the Emergency Plan as necessary in accordance with EPIP 3100021E, "Duties of the Emergency Coordinator".

1

EMERGENCY PROCEDURE 0810040, REV. 14
MAIN STEAM LINE BREAK

5.0 Instructions: (Cont'd)

5.3 Subsequent Action: (Cont'd)

5.3.3 Check SIAS to be initiated at 1600 psia pressurizer pressure or 5 psig containment pressure or initiate manually. Refer to Table I.

5.3.4 Check CIS initiation by SIAS or 5 psig containment pressure or initiate manually. Refer to Table I.

5.3.5 Check CSAS initiated at 10 psig containment pressure or initiate manually. Refer to Table I.

5.3.6 Maintain hot leg temperature less than 520°F with auxiliary feed and steam dump to atmosphere.

NOTE: Do not admit auxiliary feed flow to the faulted steam generator regardless of location of break.

5.3.7 When pressurizer level on control channels indicates 30% energize all pressurizer heaters to aid in increasing RCS pressure.

5.3.8 When pressurizer level indicates 40% secure all charging pumps.

5.3.9 As hot leg temperature is maintained less than 520°F verify that pressurizer pressure stabilizes at approximately 1250 psia (shut off head of HPSI).

NOTE: Ensuring hot leg temperature less than 520°F and pressurizer pressure greater than 1250 psia ensures a margin of 50°F subcooled.

5.3.10 Stop emergency diesel generators if offsite power is available.

5.3.11 When containment pressure is less than 10 psig, reset CSAS. Stop containment spray pumps and close containment spray flow control valves FCV 07-1A and FCV 07-1B.

5.3.12 When containment pressure is less than 5 psig, reset CIS.

5.3.13 Open MV 21-3 and MV 21-2 ICW to TCW heat exchangers.

5.3.14 Close HCV 14-3A and HCV 14-3B, CCW outlet from SDC heat exchanger, to reduce CCW flow requirements.

1

EMERGENCY PROCEDURE 0810041, REV. 14
MAIN STEAM LINE BREAK

5.0 Instructions: (cont)

5.3 Subsequent Action: (cont)

5.3.15 Restore CCW to the RCP's by performing the following steps:

5.3.15.1 Restore the non-essential CCW header:

5.3.15.1.1 Open 14-8A and HCV 14-9 ('N' header supply and return from 'A' CCW header). Open HCV 14-8B and HCV 14-10 ('N' header supply and return from 'B' CCW header).

5.3.15.2 Restore CCW flow to the RCP's as follows:

5.3.15.2.1 Open HCV 14-2
HCV 14-6
HCV 14-1
HCV 14-7

Reactor coolant pump CCW header supply and return valves.

5.3.15.2.2 Open the following valves to restore CCW flow to the individual RCP seal coolers.

HCV 14-11-1A1
HCV 14-11-1A2
HCV 14-11-1B1
HCV 14-11-1B2

Note: It may be necessary to cycle these valves to restore flow.

5.3.16 To allow potential ECCS area radioactive leakage and RCS sample water, collected in the ECCS area sumps to be pumped to the Reactor Coolant Drain Tank inside containment, perform the following:

1. At the C.R.A.C. panel place the "ECCS Area Leakage System" control switch to the "RDT" position and ensure that:

HCV-06-9 "R.D. Pump Suction" closes
HCV-06-7 "Sump Pump to EDT" closes
HCV-06-8 "Sump Pump to RDT" opens

1

5.0 Instructions: (cont)

5.3 Subsequent Action: (cont)

5.3.16 (cont)

2. At RTGB 105 open AOV-6301 and AOV-6302 "RDT Contmt Isol" valves by placing the switches in reset, then open positions.

3. Ensure the C.R.A.C. panel annunciator "ECCS Pump Room Leakage Valves Misaligned" is not lit.

NOTE: The following valves are provided with "CIS-OVERRIDE" capability:

AOV-5200, 5203 "Reactor Coolant Sample"
FCV-26-1, 3 "Containment Sample Supply"
FCV-26-2,4 "Containment Sample Return"
AOV-6301, 6302 "RDT Containment Isolation"

5.3.17 Re-establish charging and letdown per OP #0210030 charging and letdown off-normal operation.

5.3.18 When HPSI pumps have run for at least 20 minutes and 50°F sub-cooling is established, the pumps may be secured.

5.3.19 Continue a controlled cooldown in accordance with OP #0030127.

NOTE: Portions of the containment spray system will contain NaOH.

5.3.19 Notify Duty Call Supervisor.

1

6.0 References:

6.1 FSAR, Sections 6, 7, and 15.

7.0 Records Required:

7.1 Normal Log Entry

7.2 "AP0010134 'Component Cycles and Transients."

1

TABLE I

1.0 Safety Injection Actuation Signal

1.1	Two HPSI Pumps	ON	
1.2	Two LPSI Pumps	ON	
1.3	Eight HPSI Discharge Valves (HCV-3617, 3627, 3637, 3647)	OPEN	
1.4	Four LPSI Discharge Valves (HCV-3615, 3625, 3635, 3645)	OPEN	
1.5	Check proper operation of the Safety Injection System by the following means. 1.5.1 Check HPSI flow rates on: FI-3311, 3321, 3331, 3341. 1.5.2 Check LPSI flow rates on: FI-3312, 3322, 3332, 3342. 1.5.3 Check decreasing Safety Injection Tank Level on: LIA-3311, 3321, 3331, 3341.		
1.6	Two CCW Pumps	ON	
1.7	Two CCW Valves from SDC HX's (HCV 14-3A, HCV 14-3B).	OPEN	
1.8	Four Containment Cooling Fans	ON	
1.9	Four CCW "N-Header" Isolation Valves (HCV-14-8A, 14-9, 14-8B, 14-10).	SHUT	
1.10	Four SIT Check Valve Leakoff Valves (V-3618, 3628, 3638, 3648).	SHUT	
1.11	Two R.A.B. Main Supply Fans (HVS-4A, 4B)	ON	
1.12	Two ECCS Area Exhaust Fans (HVE 9A, 9B)	ON*	
1.13	Eight Aux Bldg Dampers (D-5A, 6A, 9A, 12A, 5B, 6B, 9B, 12B)	SHUT	
1.14	Four Aux Bldg/ECCS Pump Room Dampers (D-13, 14, 15, 16)	OPEN	
1.15	Four Reactor Coolant Pump CCW Isolation Valves (HCV-14-1, 14-2, 14-6, 14-7).	SHUT	
1.16	Two FWP Discharge Valves (MV-09-1; MV-09-2)	SHUT	
1.17	Two Feedwater Block Valves (MV-09-7; MV-09-8)	SHUT	
1.18	Two Charging Pumps	ON	
1.19	Two Boric Acid Makeup Pumps	ON	
1.20	Two Letdown Isolation Valves (V-2515; V-2516)	SHUT	
1.21	VCT Outlet Valve (V-2501)	SHUT	
1.22	Two Gravity Feed Valves (V-2508; V-2509)	OPEN	
1.23	Emergency Borate Valve (MV-2514)	OPEN	
1.24	Two Bam Pump Recirc Valves (V-2510, V-2511)	SHUT	
1.25	Blender Outlet Valve to VCT (V-2512)	SHUT	
1.26	Load Control Valve (MV-2525)	SHUT	
1.27	Boric Acid Header Discharge Valve (MV-2161)	SHUT	
1.28	Two Rx Cavity Sump Isol Valves (LCV 07-11A; LCV 07-11B)	SHUT	
1.29	Two Intake Cooling Water Pumps	ON	
1.30	Two ICW to TCW Hx Isol Valves (MV-21-2; MV-21-3)	SHUT	
1.31	'A'ICW Lube Water Supply to CW Pumps (FCV 21-3A)	SHUT	R/11
1.32	'B'ICW Lube Water Supply to CW Pump (FCV 21-3B)	SHUT	R/11

*NOTE: Only one ECCS area exhaust fan is required, the other fan should be shutdown and kept in standby.

1

EMERGENCY PROCEDURE NO. 0810040, REV 14
MAIN STEAM LINE BREAK

TABLE 1

2.0 Containment Isolation Actuation Signal

	2.1	Two Shield Building Vent Fans (HVE-6A, HVE-6B)	ON*
	2.2	Two Control Room Vent Booster Fans (HVE-13A, HVE-13B)	ON
**a.	2.3	Two Letdown Isolation Valves (V-2516, V2515)	SHUT
	2.4	Two RCS Sample Isolation Valves (V-5200, V-5203)	SHUT
	2.5	Four Pressurizer Sample Valves (V-5201, V-5202, V-5204, V-5205)	SHUT
	2.6	One Instrument Air To Containment Isolation Valve (MV-18-1)	SHUT
**b.	2.7	Six Containment Purge Valves (FCV-25-1, 25-3, 25-5, 25-6, 25-4, 25-2)	SHUT
	2.8	Two Containment Purge Exhaust Fans (HVE-8A, HVE-8B)	OFF
	2.9	One Nitrogen to Containment Supply Valve (V-6741)	SHUT
	2.10	Two Containment Waste Gas Header Isolation Valves (V-6554, V-6555)	SHUT
	2.11	Two Containment Sump Pump Discharge Valves (LCV-07-11A, LCV-07-11B)	SHUT
	2.12	Four Steam Generator Blowdown Isolation Valves (FCV-23-3, FCV-23-5, FCV-23-4, FCV-23-6)	SHUT
	2.13	Two Steam Generator Blowdown Sample Isolation Valves (FCV-23-7 and 9)	SHUT
	2.14	Two Reactor Drain Tank Discharge Isolation Valves (V-6301, V-6302)	SHUT
	2.15	Four Control Room Air Inlet Valves (FCV-25-16, FCV-25-17, FCV-25-14, FCV-25-15)	SHUT
	2.16	Two Control Room Kitchen Air Exhaust Valves (FCV-25-24, FCV-25-25)	SHUT
	2.17	Two Control Room Toilet Air Exhaust Valves (FCV-25-18, FCV-25-19)	SHUT
**c.	2.18	Six Containment Radiation Sample Suction and Return Valves (FCV-26-2, 4, 6, FCV-26-1, 3, 5)	SHUT
	2.19	Primary Makeup Water Isol Valve (MV-15-1)	SHUT
	2.20	Two RCP Controlled Bleedoff Isol Valves (V-2505 and ISE-01-1)	SHUT

*NOTE: Only one shield building vent fan is required, the other should be shutdown and kept in standby.

**NOTE: Due to the possibility of NAMCO position indication switch failure on the letdown isolation valves, V2515, V-2516, containment purge valves FCV25-3, FCV25-4, and radiation monitor isolation valves FCV26-1, FCV26-3, FCV26-5, perform the following on receipt of valid CIS.

a. V2515, V2516: Close valves using switch on RTGB, ensure valves closed by observing letdown flow, press
b. FCV25-3, FCV25-4: Ensure other valves in the line are closed (FCV25-1, FCV25-2, FCV25-5, FCV25-6).
c. FCV26-1, FCV26-3, FCV26-5: Close valves using RTGB switch, close manual valves at monitor cabinet, ensure no flow indication on monitor.

1

TABLE 1

3.0 Containment Spray Actuation Signal

3.1	Two Containment Spray Pumps	ON
3.2	Two Containment Spray Header Inlet Valves (FCV-07-1A, FCV-07-1B)	OPEN
3.3	Four NAOH (Caustic) Admission Valves (FSE-07-1A, FSE-07-2A, FSE-07-1B, FSE-07-2B)	OPEN
3.4	Verify Containment Spray Flow in FI-07-1A and FI-07-1B.	
3.5	Verify NAOH (Caustic) Flow on Post Accident Panel "A" (FI-07-2, FR-07-2)	

1

TABLE 1

4.0 Recirculation Actuation Signal

4.1	Two LPSI Pumps	OFF
4.2	Two Safety Injection Miniflow Recirc. Valves (V-3659, V-3660)	SHUT
4.3	Two Containment Sump Outlet Valves (MV-07-2A, MV-07-2B)	OPEN
4.4	Two RWT Outlet Valves (MV-07-1A, MV-07-1B)	SHUT
4.5	Verify HPSI flow to core continues after RAS on FI-3321, FI-3341, FI-3311, FI-3331.	

1

TABLE I

5.0 Main Steam Isolation Signal

5.1	Two Main Steam Isolation Valves (HCV-08-1A, HCV-08-1B)	SHUT
5.2	Two Main Steam Isolation Bypass Valves (MV-08-1A, MV-08-1B)	SHUT
5.3	Two Main Feedwater Pump Discharge Valves (MV-09-1, MV-09-2)	SHUT
5.4	Two Main Feedwater Block Valves (MV-09-7, MV-09-8)	SHUT

FLORIDA POWER & LIGHT CO.
ST. LUCIE PLANT
OFF NORMAL OPERATING PROCEDURE
NO. #1220030
REV. #4

1.0 Title:

Linear Power Range Channel Malfunction

2.0 Approval:

Reviewed by Plant Nuclear Safety Committee September 12 1975
Approved by J.H. Barrow For Plant Manager Sept. 12 1975

Rev. No. 4 Reviewed by Facility Review Group APRIL 6 1982
Approved by C.M. Wethy Plant Manager 4-16- 1982

3.0 Purpose and Discussion:

3.1 This procedure provides a guide for operator action in the event of a linear power channel malfunction.

3.2 Since the linear power range drawer provides pretrip alarms, trips and logic signals to the reactor protection system (RPS) all indications should be assumed valid until proven otherwise.

4.0 Symptoms:

Any of the following symptoms can indicate a linear power channel malfunction.

4.1 Activated annunciators

Reactor Power Range Subchannel Deviation
Reactor Power High Level Channel trip
Reactor Power High Level Channel pretrip
Reactor Nuclear ΔT Power Channel Deviation
Thermal Margin/Low Pressure Channel trip
Thermal Margin/Low Pressure Channel pretrip
Reactor Power Ratio Deviation
Local Power Density Channel trip
Local Power Density Channel pretrip
Nuclear Instrumentation Channel Inoperative
Dropped CEA, RPS

4.0 Symptoms: (Continued)

4.2 Significant disagreement between channels and subchannels as read on local drawer mounted meters and remote meters mounted on RTGB 104.

4.3 Drift of indication or bistable settings.

4.4 Loss of power to the drawer and/or detector high voltage.

5.0 Instructions:

5.1 Immediate Automatic Action

5.1.1 A reactor trip is initiated by a two out of four coincidence logic if variable over power, local power density or thermal margin/low pressure exceeds their calculated trip setpoints.

5.1.2 A CEA withdrawal prohibit (CWP) is initiated by a two out of four coincidence logic if power, local power density or thermal margin/low pressure signals exceeds their calculated pretrip setpoints.

5.2 Immediate Operator Action

5.2.1 Acknowledge alarm(s).

5.2.2 Compare meter indications on all channels and subchannels to discern a valid alarm/indication from a channel malfunction.

5.3 Subsequent Action R4

5.3.1 Once the malfunctioning channel has been determined, perform the following:

5.3.1.1 Safety Channel (A,B,C or D): Bypass the associated channel hi power, TM/Lo pressure, loss of load and local power density trip units. R4

5.3.1.2 Control Channel (RRS 9 or 10): At the power ratio calculator (bottom rear of RPS cabinet D) place the toggle switch associated with malfunctioning channel (9 or 10) in the OUT position. This will clear the power ratio deviation annunciator. Ensure the RRS is selected to the operable channel.

5.3.2 In the event of a reactor power range subchannel deviation annunciator and a safety (RPS, A, B, C or D) channel has been determined to be malfunctioning perform the following:

5.3.2.1 Perform Step 5.3.1.1.

5.3.2.2 At the comparator averager (rear of RPS Cabinet A) place the malfunctioning channel (A=5, B=6, C=7, D=8) toggle switch in the OFF position. This will clear the reactor power range subchannel deviation annunciator.

R4

OFF NORMAL OPERATING PROCEDURE #1220030 REV. #4
LINEAR POWER RANGE CHANNEL MALFUNCTION

5.0 Instructions: (Cont'd)

5.3 Subsequent Action (Cont'd)

5.3.3 The balance of the subsequent operator action is determined by the mode at which the reactor is operating and the number of inoperable channels, refer to Tech Spec Table 3.3-1.

5.3.4 Notify I & C as soon as practical.

6.0 References:

6.1 Technical Specifications

6.2 Dual Linear power channel Model NP-6 Operation & Maintenance Manual 8770-6861.

7.0 Records:

7.1 Normal Log Entries.