BOSTON EDISON

PILGRIM NUCLEAR POWER STATION

PLANT-SPECIFIC TECHNICAL GUIDELINES

FOR EMERGENCY OPERATING PROCEDURES

G/21

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SECTION 1

INTRODUCTION

These Plant-Specific Technical Guidelines (PSTGs) have been developed based on Draft Revision 4AF of the generic BWR Owners' Group Emergency Procedure Guidelines and the design of structures and systems at the Pilgrim Nuclear Power Station (PNPS). The PSTGs are compresed of the following:

- Operator Precautions (Section 2)
- RPV Control Guideline (Section 3)
- Primary Containment Control Guideline (Section 4)
- Secondary Containment Control Guideline (Section 5)
- Radioactivity Release Control Guideline (Section 6)
- Contingency #1 - Alternate Level Control (Section 7)
- Contingency #2 - Emergency RPV Depressurization (Section 8)
- Contingency #3 - Steam Cooling (Section 9)
- Contingency #4 - RPV Flooding (Section 10)
- Contingency #5 - Level/Power Control (Section 11)
- Contingency #6 - Primary Containment Flooding (Section 12)

Drywell temperature is determined by a plant-specific prodedure for determining bulk drywell atmosphere average temperature. Torus water temperature is also a bulk average temperature, but it is indicated directly.

Unless specified otherwise, torus water level values are referenced to the instrument zero of the wide range torus water level instrument and primary containment water level values are referenced to plant elevation.

Table 1-1 is a list of the abbreviations used in the PSTGs.

Brackets [ ] enclose plant-specific procedure references and step numbers which are determined coincident with the development of the plant-specific EOPs.

Parentheses ( ) enclose statements identifying the source of a plant-specific numerical value. Where multiple sources apply, that which corresponds to (and thus ultimately defines) the value shown is highlighted by boldface print.

At various points throughout these PSTGs, operator precautions are noted by the sumbol:

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The number within the box refers to a numbered "Caution" which is contained in Section 2. These "Cautions" are brief and succinct red flags for the operator.

At various points within these PSTGs, limits are specified beyond which certain actions are required. While conservative, these limits are derived from engineering analyses utilizing best-estimate (as opposed to licensing) models. Consequently, these limits are generally not as conservative as the limits specified in the PNPS Technical Specifications. This is not to imply that operation beyond the Technical Specifications is recommended in any emergency. Rather, such operation is required and is now permitted under certain degraded conditions in order to safely mitigate the consequences of those degraded conditions. The limits specified in the PSTGs establish the boundaries within which continued safe operation of the plant can be assured. Therefore, conformance with procedures developed from the PSTGs does not ensure strict conformance with Technical Specifications or other licensing bases.

At other points within these PSTGs, defeating safety system interlocks and initiaion logic is specified. This is also required in order to safely mitigate the consequences of degraded conditions, and it is generally specified only when conditions exist for which the interlock or logic was not designed. Bypassing other interlocks may also be required due to instrument failure, etc., but these interlocks cannot be identified in advance and are therefore not specified in the PSTGs.

The entry conditions for these PSTGs are symptomatic of both emergencies and events which may degrade into emergencies. The PSTGs specify actions appropriate for both. Therefore, entry into procedures developed from these PSTGs is not conclusive that an emergency has occurred.

Each procedure developed from these PSTGs is entered whenever any of its entry conditions occurs, irrespective of whether that procedure has already been entered or is presently being executed. The procedure is exited and the operator returns to non-emergency procedures when one of the exit conditions specified in the procedure is satisfied, or when it is determined that an emergency no longer exists. For example, the procedure developed from the RPV Control Guideline specifies cooldown to cold shutdown conditions by various methods and exit after the shutdown cooling interlocks have cleared, but entry into this procedure does not require any cooldown if it can be determined that an emergency no longer exists prior to establishing the conditions required to commence the cooldown as specified in the procedure. After a procedure developed from these PSTGs has been entered, subsequent clearing of all entry conditions for that procedure is not, by itself, conclusive that an emergency no longer exists.

Procedures developed from these PSTGs specify symptomatic operator actions which will maintain the reactor plant in a safe condition and optimize plant response and margin to safety irrespective of the initiating event. However, for certain specific events (e.g., earthquake, tornado, blackout, or fire), emergency response and recovery can be further enhanced by additional auxiliary event-specific operator actions which may be provided in supplemental event-specific procedures intended or use in conjunction with the symptomatic procedures. As with actions specified in any other procedure intended for use with the symptomatic procedures, these event-specific operator actions must not contradict or subvert the symptomatic operator actions specified in the symptomatic procedures and must not result in loss or unavailability of equipment the operation of which is specified in these procedures.

TABLE 1-1

PSTG ABBREVIATIONS

ADS	-	Automatic Depressurization System
APRM	-	Average Power Range Monitor
ARI	-	Alternate Rod Insertion
cps	-	Counts Per Second
CRD	-	Control Rod Drive
CS	-	Core Spray
CST	-	Condensate Storage Tank
DW	-	Drywell
ECCS	-	Emergency Core Cooling System
Elev	-	Elevation
°F	-	Degrees Fahrenheit
ft	-	Feet
gpm	-	Gallons Per Minute
HPCI	-	High Pressure Coolant Injection
Hx	-	Heat Exchanger
H&V	-	Heating and Ventilation
hr	-	Hour
in.	-	Inch
LCO	-	Limiting Condition for Operation
LI	-	Level Indicator
LPCI	-	Low Pressure Coolant Injection
LR	-	Level Recorder
Min	-	Minimum
mR	-	Milliroentgen/Millirem
MSIV	-	Main Steamline Isolation Valve
NA	-	Not Applicable
NPSH	-	Net Positive Suction Head

TABLE 1-1
PSTG ABBREVIATIONS (Continued)

N.W.	-	Northwest
psi(g)	-	Pounds Per Square Inch (Gauge)
RB	-	Reactor Building
RBCCW	-	Reactor Building Closed Cooling Water
RCIC	-	Reactor Core Isolation Cooling
RHR	-	Residual Heat Removal
RPM	-	Revolutions Per Minute
RPS	-	Reactor Protection System
RPV	-	Reactor Pressure Vessel
RWCU	-	Reactor Water Cleanup
RWM	-	Rod Worth Minimizer
SBGT	-	Standby Gas Treatment
SBLC	-	Standby Liquid Control
S.E.	-	Southeast
SRV	-	Safety Relief Valve
S.W.	-	Southwest
SSW	-	Salt Service Water
TBCCW	-	Turbine Building Closed Cooling Water
TIP	-	Transversing In-Core Probe
&	-	Ampersand (used instead of the word "and")
'	-	Feet (units of elevation)
"	-	Inches (units of elevation)
≤	-	Less than or equal to
%	-	Percent

SECTION 2

OPERATOR PRECAUTIONS

CAUTION #1

An RPV water level instrument may be used to determine RPV water level only when all the following conditions are satisfied for that instrument:

1. The temperatures near all the instrument runs are below the RPV Saturation Temperature (Figure 1).

2. For each of the instruments in the following table, the instrument reads above the Minimum Indicated Level or the temperatures near all the instrument reference leg vertical runs are below the Maximum Run Temperature.

Instrument (Number) [Range (in.)]	Maximum Run Temperature (°F) DW Runs	RB Runs	Minimum Indicated Level (in.)
Feedwater Control A (LI 640-29A) [0 to +60]	NA	NA	0.0
Feedwater Control B (LI 640-29B) [0 to +60]	NA	NA	0.0
Wide Range A (LI 106A) (LR 1001-650A) [-277.5 to +22.5]	NA	314	-263.3
Wide Range B (LI 106B) (LR 1001-650B) [-277.5 to +22.5]	NA	324	-267.9

3. For each of the following instruments, the instrument reads above the Minimum Indicated Level associated with the highest temperature near an instrument reference leg vertical run:

a. Narrow Range A [-50 to +50 in.]
(LI 263-100A)
(LR 1001-604A)

Highest Reactor Building Run Temperature (°F) Between Low	High	Minimum Indicated Level (in.)
	186	-50
187	200	-49.2
201	250	-45.5
251	300	-41.3
301	350	-36.4

b. Narrow Range B [-50 to +50 in.]
(LI 263-100b)
(LR 1001-604B)

Highest Reactor Building Run Temperature (°F) Between Low	High	Minimum Indicated Level (in.)
	181	-50
182	200	-48.8
201	250	-44.9
251	300	-40.4
301	350	-35.3

CAUTION #2

Operating the HPCI turbine below 715 rpm (minimum turbine speed limit per turbine vendor manual) or the RCIC turbine below 1000 rpm (minimum turbine speed limit per turbine vendor manual) may result in unstable system operation and equipment damage.

CAUTION #3

Elevated torus pressure may trip the RCIC turbine on high exhaust pressure.

CAUTION #4

A rapid increase in injection into the RPV may induce a large power excursion and result in substantial core damage.

SECTION 3

RPV CONTROL GUIDELINE

PURPOSE

The purpose of this guideline is to:

- Maintain adequate core cooling,
- Shut down the reactor, and
- Cool down the RPV to cold shutdown conditions (RPV water temperature $\leq$ 212°F (cold shutdown conditions)).

ENTRY CONDITIONS

The entry conditions for this guideline are any of the following:

- RPV water level below +9 in. (low RPV water level scram setpoint)
- RPV pressure above 1085 psig (high RPV pressure scram setpoint)
- Drywell pressure above 2.5 psig (high drywell pressure scram setpoint)
- A condition which requires reactor scram, and reactor power above 7% (APRM downscale trip setpoint) or cannot be determined

OPERATOR ACTIONS

RC-1 If reactor scram has not been initiated, initiate reactor scram.

Irrespective of the entry conditions, execute [Steps RC/L, RC/P, and RC/Q] concurrently.

RC/L Monitor and control RPV water level. |"#1"|

RC/L-1 Initiate each of the following which should have initiated but did not:

- Isolation
- ECCS
- Emergency diesel generator

If while executing the following step:

- Any control rod cannot be determined to be inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position) and it has not been determined that the reactor will remain shutdown under all conditions without boron, enter [procedure developed from Contingency #5].

- RPV water level cannot be determined, enter [procedure developed from Contingency #4].

- Primary containment water level and torus pressure cannot be maintained below the Maximum Primary Containment Water Level Limit (Figure 2), then irrespective of whether adequate core cooling is assured terminate injection into the RPV from sources external to the primary containment until primary containment water level and torus pressure can be maintained below the Maximum Primary Containment Water Level Limit.

RC/L-2 Restore and maintain RPV water level between +9 in. (**low RPV water level scram setpoint** or shutdown cooling low RPV water level interlock, whichever is higher) and +48 in. (high RPV water level trip setpoint) with one or more of the following systems:

- Condensate/feedwater
- CRD
- RCIC with suction from the CST, defeating low RPV pressure isolation interlocks if necessary. #2 #3
- HPCI with suction from the CST, defeating high torus water level suction transfer logic if necessary. #2
- CS; control and maintain pump flow less than the CS Pump NPSH Limit (Figure 3) and the CS Vortex Limit (Figure 4).
- LPCI, with injection through the heat exchangers as soon as possible; control and maintain pump flow less than the RHR Pump NPSH Limit (Figures 5a and 5b) and the RHR Vortex Limit (Figure 6).

If RPV water level cannot be restored and maintained above +9 in. (**low RPV water level scram setpoint** or shutdown cooling low RPV water level interlock, whichever is higher), maintain RPV water level above -126.3 in. (top of active fuel).

RPV water level control may be augmented by one or more of the following systems:

- SW crosstied to RHR
- City Water crosstied to RHR
- Fire Water crosstied to RHR
- ECCS Keep-Full
- Demineralized Water Transfer crosstied to SBLC (test tank or boron tank)
- Condensate Transfer crosstied to ECCS fill line

If RPV water level can be maintained above -126.3 in. (top of active fuel) and the ADS timer has initiated, prevent automatic RPV depressurization by resetting the ADS timer.

If RPV water level cannot be maintained above -126.3 in. (top of active fuel), enter [procedure developed from Contingency #1]

RC/L-3 When Procedure 2.1.5, "Controlled Shutdown from Power", is entered from [Step RC/P-5], proceed to cold shutdown in accordance with the appropriate section of Procedure 2.1.5, "Controlled Shutdown from Power".

RC/P Monitor and control RPV pressure.

If while executing the following steps:

- A high drywell pressure ECCS initiation signal (2.5 psig (drywell pressure which initiates ECCS)) exs.sts, prevent injection from those CS and LPCI pumps not required to assure adequate core cooling prior to depressurizing below their maximum injection pressures.
- Emergency RPV Depressurization is anticipated and either all control rods are inserted to or beyond position 02 (Maximum Subcritical Banked ithdrawal Position) or it has been determined that the reactor will remain shutdown under all conditions without boron, then irrespective of the resulting RPV cooldown rate, rapidly depressurize the RPV with the main turbine bypass valves.

- Emergency RPV Depressurization is required and less than 4 (number of SRVs dedicated to ADS) SRVs are open, enter [procedure developed from Contingency #2].

- RPV water level cannot be determined and less than 4 (number of SRVs dedicated to ADS) SRVs are open, enter [procedure developed from Contingency #2].

- RPV water level cannot be determined and 4 (number of SRVs dedicated to ADS) SRVs are open, enter [procedure developed from Contingency #4].

RC/P-1 If any SRV is cycling, manually open SRVs until RPV pressure drops to 940 psig (RPV pressure at which all turbine bypass valves are fully open).

If while executing the following steps:

- Torus water temperature cannot be maintained below the Heat Capacity Temperature Limit (Figure 7), then irrespective of the resulting RPV cooldown rate maintain RPV pressure below the Limit.

- Suppression pool water level cannot be maintained below the SRV Tail Pipe Level Limit (Figure 8), then irrespective of the resulting RPV cooldown rate maintain RPV pressure below the Limit.

- Steam Cooling is required, enter [procedure developed from Contingency #3].

If while executing the following steps:

- Boron Injection is required, and

- The main condenser is available, and

- There has been no indication of gross fuel failure or steam line break,

open MSIVs, bypassing low RPV water level isolation interlocks if necessary, to re-establish the main condenser as a heat sink.

RC/P-2 Stabilize RPV pressure at a pressure below 1085 psig (high RPV pressure scram setpoint) with the main turbine bypass valves.

RPV pressure control may be augmented by one or more of the following systems:

- SRVs only when torus water level is above 46 in. (top of the SRV discharge device); open SRVs in the following sequence if possible: B, C, D, A (SRV opening sequence); if the continuous SRV pneumatic supply is or becomes unavailable, place the control switch for each SRV in the AUTO position.
- HPCI with suction from the CST, defeating high torus water level suction transfer logic if necessary. #2
- RCIC with suction from the CST. #2 #3
- RWCU (recirculation mode), bypassing filter/demineralizers and, if necessary, defeating SBLC and other isolation interlocks.
- Main steam line drains.
- RWCU (blowdown mode) if no boron has been injected into the RPV; refer to procedure 5.7.3.1, "Primary Coolant Sampling, Transport and Analyses Under Emergency Conditions" prior to initiating blowdown.

If while executing the following steps the reactor is not shutdown, return to [Step RC/P-2].

RC/P-3 When either:

- All control rods are inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position), or
- It has been determined that the reactor will remain shutdown under all conditions without boron, or
- 538.9 pounds (Cold Shutdown Boron Weight) of boron that is enriched to at least 54.5 atom-percent boron-10 have been injected into the RPV, or

- The reactor is shutdown and no boron has been injected into the RPV,

depressurize the RPV and maintain cooldown rate below 100°F/hr (RPV cooldown rate LCO).

If one or more SRVs are being used to depressurized the RPV and the continuous SRV pneumatic supply is or becomes unavailable, depressurize with sustained SRV opening.

RC/P-4 When the shutdown cooling RPV pressure interlock clears, initiate shutdown cooling using only those RHR pumps not required to maintain RPV water level above +9 in. (shutdown cooling low RPV water level interlock) by operation in the LPCI mode.

If shutdown cooling cannot be established and further RPV cooldown is required, continue to cool down using one or more of the systems used for depressurization.

RC/P-5 When either:

- All control rods are inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position), or
- It has been determined that the reactor will remain shutdown under all conditions without boron, or
- 538.9 pounds (Cold Shutdown Boron Weight) of boron that is enriched to at least 54.5 atom percent boron-10 have been injected into the RPV,

proceed to cold shutdown in accordance with the appropriate section of Procedure 2.1.5, "Controlled Shutdown from Power".

RC/Q Monitor and control reactor power.

If while executing the following steps:

- All control rods are inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position), terminate boron injection and enter Procedure 2.1.6, "Reactor Scram".
- It has been determined that the reactor will remain shutdown under all conditions without boron, terminate boron injection and enter Procedure 2.1.6, "Reactor Scram".
- The reactor is shutdown and no boron has been injected into the RPV, enter Procedure 2.1.6, "Reactor Scram".

RC/Q-1 Confirm or place the reactor mode switch in SHUTDOWN.

RC/Q-2 If ARI has not initiated, initiate ARI.

RC/Q-3 If the main turbine-generator is on-line and the MSIVs are open, confirm or initiate recirculation flow runback to minimum.

RC/Q-4 If reactor power is above 3% (APRM downscale trip setpoint) or cannot be determined, trip the recirculation pumps.

Execute [Steps RC/Q-5 and RC/Q-6] concurrently.

RC/Q-5 Before torus water temperature reaches the Boron Injection Initiation Temperature (Figure 9) but only if the reactor cannot be shut down, BORON INJECTION IS REQUIRED; inject boron into the RPV with SBLC and prevent automatic initiation of ADS.

If boron cannot be injected with SBLC, inject boron into the RPV with RWCU.

If while executing the following steps SBLC tank water level drops to an indicated value of 2% (minimum SBLC tank water level for continued SBLC pump operation), manually trip the SBLC pumps.

RC/Q-5.1 If boron is not being injected into the RPV by RWCU and RWCU is not isolated, bypass the RWCU filter/demineralizers.

RC/Q-5.2 Continue to inject boron until 538.9 pounds (Cold Shutdown Boron Weight) of boron that is enriched to at least 54.5 atom-percent boron-10 have been injected into the RPV.

RC/Q-5.3 Enter Procedure 2.1.6, "Reactor Scram".

RC/Q-6 Insert control rods as follows:

RC/Q-6.1 Reset ARI, defeating ARI logic trips if necessary.

RC/Q-6.2 Insert control rods with one or more of the following methods:

- De-energize scram solenoids
- Vent the scram air header
- Reset the scram, defeating RPS logic trips if necessary, drain the scram discharge volume, and initiate a manual scram
- Open individual scram test switches
- Increase CRD cooling water differential pressure
- Drive control rods, defeating RWM interlocks if necessary
- Vent control rod drive overpiston volumes

SECTION 4

PRIMARY CONTAINMENT CONTROL GUIDELINE

PURPOSE

The purpse of this guideline is to:

- Maintain primary ccntainment integrity, and
- Protect equipment in the primary containment.

ENTRY CONDITIONS

The entry conditions for this guideline are any of the following:

- Torus water temperature above 80°F (most limiting torus water temperature LCO)
- Drywell temperature above 152°F (drywell temperature LCO or maximum normal operating temperature, whichever is higher)
- Drywell pressure above 2.5 psig (high drywell pressure scram setpoint)
- Torus water level above 130 in. (maximum torus water level LCO)
- Torus water level below 127 in. (maximum torus water level LCO)
- Primary containment hydrogen concentration above 4% (high primary containment hydrogen concentration alarm setpoint)

OPERATOR ACTIONS

Irrespective of the entry condition, execute [Steps SP/T, DW/T, PC/P, SP/L, and PC/H] concurrently.

SP/T Monitor and control torus water temperature below 80°F (most limiting torus water temperature LCO) using available suppression pool cooling.

When torus water temperature cannot be maintained below 80°F (most limiting torus water temperature LCO):

SP/T-1 Operate all available torus cooling using only those RHR pumps not required to assure adequate core cooling by continuous operation in the LPCI mode.

SP/T-2 Before torus water temperature reaches the Boron Injection Initiation Temperature (Figure 9), enter [procedure developed from the RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure.

SP/T-3 When torus water temperature and RPV pressure cannot be maintained below the Heat Capacity Temperature Limit (Figure 7), EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

DW/T Monitor and control drywell temperature below 152°F (drywell temperature LCO or **maximum normal operating temperature**, whichever is higher) using available drywell cooling.

When drywell temperature cannot be maintained below 152°F (drywell temperature LCO or **maximum normal operating temperature**, whichever is higher): #1

DW/T-1 Operate all available drywell cooling.

If while executing the following steps drywell sprays have been initiated and drywell pressure drops below 2.5 psig (high drywell pressure scram setpoint), terminate drywell sprays.

DW/T-2 Before drywell temperature reaches 281°F (maximum temperature at which ADS is qualified or **drywell design temperature**, whichever is lower) but only if torus water level is below 183 in. (bottom of internal torus to drywell vacuum breakers less vacuum breaker opening pressure in feet of water) and drywell temperature and pressure are within the Drywell Spray Initiation Limit (Figure 10), shut down recirculation pumps and drywell cooling fans and initiate drywell sprays using only those RHR pumps not required to assure adequate core cooling by continuous operation in the LPCI mode.

DW/T-3 When drywell temperature cannot be maintained below 281°F (maximum temperature at which ADS is qualified or **drywell design temperature**, whichever is lower), EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from the RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure.

PC/P Monitor and control primary containment pressure below 2.5 psig (high drywell pressure scram setpoint) using the Primary Containment Atmosphere Control System.

When primary containment pressure cannot be maintained below 2.5 psig (high drywell pressure scram setpoint):

If while executing the following steps suppression chamber sprays have been initiated and torus pressure drops below 2.5 psig (high drywell pressure scram stepoint) terminate suppression chamber sprays.

PC/P-1 Before torus pressure reaches 11.0 psig (Supression Chamber Spray Initiation Pressure), but only if torus water level is below 305 in. (suppression chamber spray nozzles), initiate suppression chamber sprays using only those RHR pumps not required to assure adequate core cooling by continuous operation in the LPCI mode.

If while executing the following steps drywell sprays have been initiated and drywell pressure drops below 2.5 psig (high drywell pressure scram setpoint), terminate drywell sprays.

PC/P-2 When torus pressure exceeds 11.0 psig (Suppression Chamber Spray Initiation Pressure) but only if torus water lever is below 183 in. (bottom of internal torus to drywell vacuum breakers less vacuum breaker opening pressure in feet of water) and drywell temperature and pressure are within the Drywell Spray Initiation Limit (Figure 10), shut down recirculation pumps and drywell cooling fans and initiate drywell sprays using only those RHR pumps not required to assure adequate core cooling by continuous operation in the LPCI mode.

PC/P-3 When torus pressure cannot be maintained below the Pressure Suppression Pressure (Figure 11), EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

PC/P-4 Before torus pressure reaches the Primary Containment Pressure Limit (Figure 12), then irrespective of the offsite radioactivity release rate, vent the primary containment, defeating isolation interlocks if necessary, to reduce and maintain pressure below the Primary Containment Pressure Limit as follows:

- If torus water level is below 310 in (bottom of the torus vent), vent the torus in accordance with Procedure 5.4.6, "Primary Containment Venting and Purging Under Emergency Conditions".

- If torus water level is at or above 310 in. (bottom of the torus vent) or if the torus cannot be vented, vent the drywell in accordance with Procedure 5.4.6, "Primary Containment Venting and Purging Under Emergency Conditions".

PC/P-5 When torus pressure cannot be maintained below the Primary Containment Pressure Limit (Figure 12), then irrespective of whether adequate core cooling is assured:

- If torus water level is below 305 in. (suppression chamber spray nozzles), initiate suppression chamber sprays.

- If torus water level is below 183 in. (bottom of internal torus to drywell vacuum breakers less vacuum breaker opening pressure in feet of water) and drywell temperature and pressure are within the Drywell Spray Initiation Limit (Figure 10), shut down recirculation pumps and drywell cooling fans and initiate drywell sprays.

SP/L Monitor and control torus water level.

| If while executing the following steps Primary Containment Flooding is required, enter [procedure developed from Contingency #6].

SP/L-1 Maintain torus water level between 130 in. (maximum torus water level LCO) and 127 in. (minimum torus water level LCO); refer to sampling procedures prior to discharging water.

If torus water level cannot be maintained above 127 in. (minimum torus water level LCO), execute [Step SP/L-2].

If torus water level cannot be maintained below 130 in. (maximum torus water lever LCO), execute [Step SP/L-3].

SP/L-2 TORUS WATER LEVEL BELOW 127 in. (minimum torus water level LCO)

SP/L-2.1 Maintain torus water level above the Heat Capacity Level Limit (Figure 13).

If torus water level cannot be maintained above the Heat Capacity Level Limit (Figure 13), EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from the RPV Guideline] at [Step RC-1] and execute it concurrently with this procedure.

SP/L-2.2 Maintain torus water level above 82 in. (top of the HPCI exhaust).

If torus water level cannot be maintained above 82 in. (top of the HPCI exhaust), secure HPCI irrespective of whether adequate core cooling is assured.

SP/L-3 TORUS WATER LEVEL ABOVE 130 in. (maximum torus water level LCO)

| Execute Steps SP/L-3.1, SP/L-3.2, and SP/L-3.3] concurrently.

SP/L-3.1 Maintain torus water level below the SRV Tail Pipe Level Limit (Figure 8).

If torus water level cannot be maintained below the SRV Tail Pipe Level Limit (Figure 8), enter [procedure developed from the RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure.

If torus water level and RPV pressure cannot be maintained below the SRV Tail Pipe Level Limit (Figure 8), but only if adequate core cooling is assured, terminate injection into the RPV from sources external to the primary containment except from boron injection systems and CRD.

If torus water level and RPV pressure cannot be restored and maintained below the SRV Tail Pipe Level Limit (Figure 8), EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

SP/L-3.2 Maintain torus water level below 183 in. (bottom of internal torus to drywell vacuum breakers less vacuum breaker opening pressure in feet of water).

If torus water level cannot be maintained below 183 in. (bottom of internal torus to drywell vacuum breakers less vacuum breaker opening pressure in feet of water):

- Terminate drywell sprays
- If adequate core cooling is assured, terminate injection into the RPV from sources external to the primary containment except from boron injection systems and CRD.

SP/L-3.3 Maintain primary containment water level below the Maximum Primary Containment Water Level Limit (Figure 2).

If primary containment water level cannot be maintained below the Maximum Primary Containment Water Level Limit (Figure 2), terminate injection into the RPV from sources external to the primary containment irrespective of whether adequate core cooling is assured.

PC/H Monitor and control primary containment hydrogen and oxygen concentrations.

If while executing the following steps:

- The hydrogen or oxygen monitoring system is or becomes unavailable, sample the drywell and torus for hydrogen and oxygen.
- Drywell or torus hydrogen concentration cannot be determined to be below 6% and drywell or torus oxygen concentration cannot be determined to be below 5%, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from the RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure; irrespective of the offiste radioactivity release rate, vent and purge the primary containment in accordance with [Steps PC/H-2.1 through 2.4] until drywell and torus hydrogen concentrations can be determined to be below 6% or drywell and torus oxygen concentrations can be determined to be below 5%.

PC/H-1 When drywell or torus hydrogen concentration reaches 1.0% (minimum detectable hydrogen concentration), but only if the offiste radioactivity release rate is expected to remain below the offsite release rate LCO, vent and purge the primary containment, defeating isolation interlocks if necessary, to restore and maintain drywell and torus hydrogen concentrations below 1.0% (minimum detectable hydrogen concentration) as follows:

If while executing the following steps the offsite radioactivity release rate reaches the offsite release rate LCO, isolate the primary containment vent and purge.

PC/H-1.1 Sample and analyze the primary containment atmosphere for radioactivity in accordance with procedure 5.7.3.2, "Drywell Atmosphere Sampling, Transport and Analyses Under Emergency Conditions".

PC/H-1.2 If torus water level is below 310 in. (bottom of the torus vent), vent the torus in accordance with procedure 5.4.6, "Primary Containment Venting and Purging Under Emergency Conditions".

If torus water level is at or above 310 in. (bottom of the torus vent) or if the torus cannot be vented, vent the drywell in accordance with procedure 5.4.6, "Primary Containment Venting and Purging Under Emergency Conditions".

PC/H-1.3 If the torus or drywell can be vented:

- If drywell oxygen concentration is below 5% initiate and maximize the drywell nitrogen purge flow.

- If drywell oxygen concentration is not below 5% initiate and maximize the drywell air purge flow.

PC/H-2 When drywell or torus hydrogen concentration reaches 6% and drywell or torus oxygen concentration is above 5% EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from the RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure; irrespective of the offsite radioactivity release rate, vent and purge the primary containment, defeating isolation interlocks if necessary, to restore and maintain drywell and torus hydrogen concentrations below 6% or drywell and torus oxygen concentrations below 5% as follows:

If while executing the following steps suppression chamber or drywell spray have been initiated and:

- Torus pressure drops below 2.5 psig (high drywell pressure scram setpoint), terminate suppression chamber sprays.

- Drywell pressure drops below 2.5 psig (high drywell pressure scram setpoint), terminate drywell sprays.

PC/H-2.1 If torus water level is below 305 in. (suppression chamber spray nozzles), initiate suppression chamber sprays using only those RHR pumps not required to assure adequate core cooling by continuous operation in the LPCI mode.

PC/H-2.2 If torus water level is below 310 in. (bottom of the torus vent), vent the torus in accordance with Procedure 5.4.6, "Primary Containment Venting and Purging Under Emergency Conditions".

If torus water level is at or above 310 in. (bottom of the torus vent) or if the torus cannot be vented, vent the drywell in accordance with Procedure 5.4.6, "Primary Containment Venting and Purging Under Emergency Conditions".

PC/H-2.3 If the torus or drywell can be vented, initiate and maximize the drywell purge flow.

PC/H-2.4 If torus water level is below 183 in. (bottom of internal torus to drywell vacuum breakers less vacuum breaker opening pressure in feet of water) and drywell temperature and pressure are within the Drywell Spray Initiation Limit (Figure 10), shut down recirculation pumps and drywell cooling fans and initiate drywell sprays using only those RHR pumps not required to assure adequate core cooling by continuous operation in the LPCI mode.

PC/H-3 When drywell or torus hudrogen concentration cannot be restored and maintained below 6% and drywell or torus oxygen concentration cannot be restored and maintained below 5%, then irrespective of whether adequate core cooling is assured:

If while executing the following steps suppression chamber or drywell sprays have been initiated and:

- Torus pressure drops below 2.5 psig (high drywell pressure scram setpoint), terminate suppression chamber sprays.

- Drywell pressure drops below 2.5 psig (high drywell pressure scram setpoint), terminate drywell sprays.

PC/H-3.1 If torus water level is below 305 in. (suppression chamber spray nozzles), initiate suppression chamber sprays.

PC/H-3.2 If torus water level is below 183 in. (bottom of internal torus to drywell vacuum breakers less vacuum breaker opening pressure in feet of water) and drywell temperature and pressure are within the Drywell Spray Initiation Limit (Figure 10), shut down recirculation pumps and drywell cooling fans and initiate drywell sprays.

SECTION 5

SECONDARY CONTAINMENT CONTROL GUIDELINE

PURPOSE

The purpose of this guideline is to:

- Protect equipment in the secondary containment,
- Limit radioactivity release to the secondary containment, and either:
- Maintain secondary containment integrity, or
- Limit radioactivity release from the secondary containment.

ENTRY CONDITIONS

The entry conditions for this guideline are any of the following secondary containment conditions:

- Differential pressure at or above 0 in. of water
- An area temperature above the maximum normal operating temperature (Table 5-1)
- A H&V cooler temperature above the maximum normal operating temperature (Table 5-2)
- Reactor building exhaust radiation level above 710 cps (maximum normal operating H&V exhaust radiation level)
- An area radiation level above the maximum normal operating radiation level (Table 5-3)
- Reactor building floor drain sump water level above 1 in. on HPCI pump room floor (maximum normal operating floor drain sump water level)
- An area water level above the maximum normal operating water level (Table 5-4)

OPERATOR ACTIONS

If while executing the following steps refuel floor exhaust radiation level exceeds 16 mR/hr (reactor building H&V high radiation level secondary containment isolation setpoint):

- Confirm or manually initiate reactor building H&V secondary containment isolation, and
- Confirm or manually initiate SBGT operation.

If while executing the following steps:

- Reactor building H&V isolates, and
- Refuel floor exhaust radiation level is below 16 mR/hr (reactor building H&V radiation level secondary containment isolation setpoint.)

reset the secondary containment isolation and restart reactor building H&V, defeating high drywell pressure and low RPV water level isolation interlocks if necessary.

Irrespective of the entry condition, execute [Steps SC/T, SC/R, and SC/L] concurrently.

SC/T Monitor and control secondary containment temperatures.

SC/T-1 Control secondary containment area temperatures below maximum normal operating values (Table 5-1) using available area coolers.

SC/T-2 If refuel floor exhaust radiation level is below 16 mR/hr (reactor building H&V high radiation level secondary containment isolation setpoint), operate available reactor building H&V.

SC/T-3 When an area temperature exceeds it maximum normal operating temperature (Table 5-1), isolate all systems that are discharging into the area except systems required to shut down the reactor, assure adequate core cooling, or suppress a fire.

#1

Execute Steps [SC/T-4 and SC/T-5] concurrently.

SC/T-4 If a primary system is discharging into secondary containment:

SC/T-4.1 Before any area temperature reaches its maximum safe operating temperature (Table 5-1), enter [procedure developed from the RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure.

SC/T-4.2 When an area temperature exceeds its maximum safe operating temperature (Table 5-1) in more than one area, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

SC/T-5 When an area temperature exceeds its maximum safe operating temperature (Table 5-1) in more than one area, shut down the reactor.

SC/R Monitor and control secondary containment radiation levels.

SC/R-1 When an area radiation level exceeds its maximum normal operating radiation level (Table 5-3), isolate all systems that are discharging into the area except systems required to shut down the reactor, assure adequate core cooling, or suppress a fire.

Execute [Steps SC/R-2 and SC/R-3] concurrently.

SC/R-2 If a primary system is discharging into secondary containment:

SC/R-2.1 Before any area radiation level reaches its maximum safe operating radiation level (Table 5-3), enter [procedure developed from the RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure.

SC/R-2.2 When an area radiation level exceeds its maximum safe operating radiation level (Table 5-3) in more than one area, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

SC/R-3 When an area radiation level exceeds its maximum safe operating radiation level (Table 5-3) in more than one area, shut down the reactor.

SC/L Monitor and control secondary containment water levels.

SC/L-1 When the reactor building floor drain sump or an area water level is above its maximum normal operating water level (Table 5-4), operate available sump pumps to restore and maintain it below its maximum normal operating water level.

If the reactor building floor drain sump or any area water level cannot be restored and maintained below its maximum normal operating water level (Table 5-4), isolate all systems that are discharging water into the sump or area except systems required to shut down the reactor, assure adequate core cooling, or suppress a fire.

Execute [Steps SC/L-2 and SC/L-3] concurrently.

SC/L-2 If a primary system is discharging into secondary containment:

SC/L-2.1 Before any area water level reaches its maximum safe operating water level (Table 5-4), enter [procedure developed from the RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure.

SC/L-2.2 When an area water level exceeds its maximum safe operating water level (Table 5-4) in more than one area, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

SC/L-3 When an area water level exceeds its maximum safe operating water level (Table 5-4) in more than one area, shut down the reactor.

TABLE 5-1
SECONDARY CONTAINMENT AREA MAXIMUM TEMPERATURES

AREA	MAX NORMAL OPERATING VALUE	MAX SAFE OPERATING VALUE
	°F	°F
RWCU filter area - 74' Elev.	105	120
RWCU holding pump area - 74' Elev.	105	120
RWCU backwash tank area - 51' Elev.	105	214
RWCU "A" pump area - 51' Elev.	105	213
RWCU "B" pump area - 51' Elev.	105	213
RWCU heat exchanger area - 51' Elev.	105	215
RWCU piping mezzanine area 36' Elev.	105	238
RCIC torus piping area	105	258
RCIC turbine area	105	130
RCIC piping area - 23' Elev. (TIP room)	105	224
Main steam tunnel area		
Main steam tunnel area	105	289
HPCI torus piping area	105	258
HPCI turbine area	105	130
HPCI piping area - 23' Elev. ("B" RHR valve room)	105	309
RHR "B" and "D" pump area	105	130
RHR "A" and "C" pump area	105	130
RWCU & RHR piping area - 23' Elev. ("A" RHR valve room)	105	251
RHR S.E. pipewell area	105	224
RHR piping area - 80' Elev. (Fuel pool heat exchanger area)	105	120

TABLE 5-2

SECONDARY CONTAINMENT H&V COOLER MAXIMUM TEMPERATURES

COOLER	MAX NORMAL OPERATING VALUE (Panel C-61)
	°F
HPCI compartment	100
RHR quadrant	100
CRD quadrant	100
RCIC quadrant	100

TABLE 5-3

SECONDARY CONTAINMENT AREA MAXIMUM RADIATION LEVELS

AREA	MAX NORMAL OPERATING VALUE	MAX SAFE OPERATING VALUE
H&V EXHAUST RADIATION LEVEL		
Reactor building	710 cps	NA
Refuel floor	16 mR/hr	NA
	mR/hr	mR/hr
N.W. equipment space/HPCI pump room 17'6" Elev.	20	1000
CRD pump room - 17'6" Elev.	20	1000
RCIC pump room - 17'6" Elev.	22	1000
S.E. equipment space - 17'6" Elev.	350	1000
CRD HCU west area - 23' Elev.	300	1000
CRD HCU east area - 23' Elev.	300	1000
RB west area 51' Elev.	5	1000
RB east area 51' Elev.	8	1000
North storage and laydown area 74'3" Elev.	28	1000
Fuel pool cooling pump/hx area 74'3" Elev.	60	1000
SBLC pump area - 91'3" Elev.	5	1000
Skimmer surge tank area 91'3" Elev.	40	1000

TABLE 5-4

SECONDARY CONTAINMENT SUMP/AREA MAXIMUM WATER LEVELS

AREA	MAX NORMAL OPERATING VALUE	MAX SAFE OPERATING VALUE
SUMP		
Reactor building floor drain	1 inch on HPCI pump room floor	NA
AREA	INCHES (ABOVE FLOOR)	INCHES (ABOVE FLOOR)
N.W. quadrant	1	6
S.E. quadrant	1	6
HPCI compartment	1	6
S.W. quadrant	1	6
CRD quadrant	1	6

SECTION 6

RADIOACTIVITY RELEASE CONTROL GUIDELINE

PURPOSE

The purpose of this guideline is to limit radioactivity release into areas outside the primary and secondary containments.

ENTRY CONDITIONS

The entry condition for this guideline is:

- Offsite radioactivity release rate above the offsite release rate which requires an Alert.

OPERATOR ACTIONS

If while executing the following steps turbine building H&V is shutdown, restart turbine building H&V.

RR-1 Isolate all primary systems that are discharging into areas outside the primary and secondary containments except systems required to assure adequate core cooling or shut down the reactor.

RR-2 When offsite radioactivity release rate approaches or exceeds the offsite release rate which requires a General Emergency but only if a primary system is discharging into an area outside the primary and secondary containments, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from the RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure.

SECTION 7

CONTINGENCY #1 - ALTERNATE LEVEL CONTROL

If while executing the following steps:

- Any control rod cannot be determined to be inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position) and it has not been determined that the reactor will remain shutdown under all conditions without boron, enter [procedure developed from Contingency #5].
- RPV water level cannot be determined, enter [procedure developed from Contingency #4].
- RPV water level is increasing, enter [procedure developed from the RPV Control Guideline] at [Step RC/L].
- RPV water level drops below -49 in. (ADS low RPV water level initiation setpoint), prevent automatic initiation of ADS.
- Primary containment water level and torus pressure cannot be maintained below the Maximum Primary Containment Water Level Limit (Figure 2), then irrespective of whether adequate core cooling is assured terminate injection into the RPV from sources external to the primary containment until primary containment water level and torus pressure can be maintained below the Maximum Primary Containment Water Level Limit.

C1-1 Line up for injection, start pumps, and irrespective of pump NPSH and vortex limits, increase injection flow to the maximum with 2 or more of the following injection subsystems:

- Condensate
- LPCI-A, with injection through the heat exchanger as soon as possible.
- LPCI-B, with injection through the heat exchanger as soon as possible.
- CS-A
- CS-B

If less than 2 of the injection subsystems can be lined up, commence lining up as many of the following alternate injection subsystems as possible:

- SSW crosstied to RHR
- City Water crosstied to RHR
- Fire Water crosstied to RHR
- ECCS Keep-Full
- Demineralized Water Transfer crosstied to SBLC (test tank or boron tank)
- Condensate Transfer crosstied to ECCS fill line

C1-2 If RPV pressure is above 125 psig (highest RPV pressure at which the shutoff head of a low-water-quality alternate injection subsystem (excluding SBLC) is reached):

If while executing the following steps RPV pressure drops below 125 psig (highest RPV pressure at which the shutoff head of a low-water-quality alternate injection subsystem (excluding SBLC is reached), continue in this procedure at [Step C1-3].

C1-2.1 If no injection subsystem is lined up for injection with at least one pump running, start pumps in alternate injection subsystems which are lined up for injection.

C1-2.2 When RPV water level drops to -126.3 in. (top of active fuel):

- If any system, injection subsystem or alternate injection subsystem is lined up with at least one pump running, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.
- If no system, injection subsystem or alternate injection subsystem is lined up with at least one pump running, STEAM COOLING IS REQUIRED.

C1-3 When RPV pressure drops below 125 psig (highest RPV pressure at which the shutoff head of a low-water-quality alternate injection subsystem (excluding SBLC) is reached):

C1-3.1 Line up for injection, start pumps, and irrespective of pump NPSH and vortex limits, increase injection flow to the maximum with all systems and injection subsystems.

C1-3.2 When RPV water level drops to -126.3. in. (top of active fuel), EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; line up for injection, start pumps, and increase injection flow to the maximum with as many alternate injection subsystems as possible.

If RPV water level cannot be restored and maintained above -126.3 in. (top of active fuel), PRIMARY CONTAINMENT FLOODING IS REQUIRED, enter [procedure developed from Contingency #6].

SECTION 8

CONTINGENCY #2 - EMERGENCY RPV DEPRESSURIZATION

C2-1 When either:

- Any control rod cannot be determined to be inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position) and it has not been determined that the reactor will remain shutdown under all conditions without boron and all injection into the RPV except from boron injection systems, CRD, and RCIC has been terminated and prevented, or

- All control rods are inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position) or it has been determined that the reactor will remain shutdown under all conditions without boron,

C2-1.1 If a high drywell pressure ECCS initiation signal (2.5 psig (drywell pressure which initiates ECCS)) exists, prevent injection from those CS and LPCI pumps not required to assure adequate core cooling.

C2-1.2 If suppression pool water level is above 46 in. (top of the SRV discharge device), then irrespective of the resulting RPV cooldown rate, open all ADS valves.

C2-1.3 If less than 3 (Minimum Number of SRVs Required for Emergency Depressurization) SRVs are open and RPV pressure is at least 50 psig (Minimum SRV Reopening Pressure) above torus pressure, rapidly depressurize the RPV, defeating isolation interlocks if necessary, using one or more of the following:

- Main turbine bypass valves
- Main steam line drains
- HPCI steam line
- RCIC steam line
- RPV head vent

If RPV water level cannot be determined, either [procedure developed from Contingency #4].

C2-2 When either:

- All control rods are inserted to or beyond position 02 (Maximum Subcritical Banked Withorawal Position), or
- It has been determined that the reactor will remain shutdown under all conditions without boron, or
- 538.9 pounds (Cold Shutdown Boron Weight) of boron that is enriched to at least 54.5 atom-percent boron-10 have been injected into the RPV, or
- The reactor is shutdown and no boron has been injected into the RPV,

enter [procedure developed from the RPV Control Guideline] at [Step RC/P-4].

SECTION 9

CONTINGENCY #3 - STEAM COOLING

If while executing this step Emergency RPV Depressurization is required, RPV water level cannot be determined, or any system, injection subsystem, or alternate injection subsystem is lined up for injection with at least one pump running, enter [procedure developed from Contingency #2].

C3-1 When RPV water level drops to -168.3 in. (Minimum Zero-Injection RPV Water Level) enter [procedure developed from Contingency #2].

SECTION 10

CONTINGENCY #4 - RPV FLOODING

If while executing the following steps RPV water level can be determined:

- If any control rod cannot be determined to be inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position) and it has been determined that the reactor will remain shutdown under all conditions without boron, enter [procedure developed from Contingency #5] and [procedure developed from RPV Control Guideline] at [Step RC/P-4] and execute these procedures concurrently.

- If all control rods are inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position) or it has been determined that the reactor will remain shutdown under all conditions without boron, enter [procedure developed from the RPV Control Guideline] at [Steps RC/L and RC/P-4] and execute these steps concurrently.

If while executing the following steps primary containment water level and torus pressure cannot be maintained below the Maximum Primary Containment Water Level Limit (Figure 2), then irrespective of whether adequate core cooling is assured terminate injection into the RPV from sources external to the primary containment until primary containment water level and torus pressure can be maintained below the Maximum Primary Containment Water Level Limit.

C4-1 If any control rod cannot be determined to be inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position) and it has not been determined that the reactor will remain shutdown under all conditions without boron, flood the RPV as follows:

If while executing the following steps either all control rods are inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position) or it has been determined that the reactor will remain shutdown under all conditions without boron but RPV water level cannot be determined, continue in this procedure at [Step C4-2].

C4-1.1 Terminate and prevent all injection into the RPV except from boron injection systems and CRD until RPV pressure is below the Minimum Alternate RPV Flooding Pressure.

Number of Open SRVs	Minimum Alternate RPV Flooding Pressure (psig)
4	180.6
3	245.8
2	376.0
1	765.7

If less than 1 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure) SRV can be opened, continue in this procedure.

C4-1.2 If at least 3 (Minimum Number of SRVs Required for Emergency Depressurization) SRVs can be opened, close the MSIVs, main steam line drain valves, and RCIC steam line isolation valves.

C4-1.3 Commence and, irrespective of pump NPSH and vortex limits, slowly increase injection into the RPV with the following systems until at least 1 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure) SRV is open and RPV pressure is above the Minimum Alternate RPV Flooding Pressure:

#4

- Feedwater pumps, defeating high RPV water level pump trip logic if necessary.
- Condensate pumps
- CRD
- LPCI, with injection through the heat exchangers as soon as possible.

If less than 1 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure) SRV is open or RPV pressure cannot be increased to above then Minimum Alternate RPV Flooding Pressure, commence and, irrespective of pump NPSH and vortex limits, slowly increase injection into the RPV with the following systems until at least 1 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure) SRV is open and RPV pressure is above the Minimum Alternate RPV Flooding Pressure:

- CS
- SSW crosstied to RHR
- City Water crosstied to RHR
- Fire Water crosstied to RHR
- ECCS Keep-Full
- Condensate Transfer crosstied to ECCS

If less than 1 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure) SRV is open or RPV pressure cannot be increased to above the Minimum Alternate RPV Flooding Pressure, PRIMARY CONTAINMENT FLOODING IS REQUIRED; enter [procedure developed from Contingency #6] and [procedure developed from the RPV Control Guideline] at [Step RC/P-4] and execute these procedures concurrently.

C4-1.4 When at least 1 (minimum number of SRVs from which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure) SRV is open and RPV pressure is above the Minimum Alternate RPV Flooding Pressure, control injection to maintain at least 1 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure) SRV open and RPV pressure above the Minimum Alternate Flooding Pressure but as low as practicable.

C4-1.5 When all control rods are inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position) or it has been determined that the reactor will remain shutdown under all conditions without boron, continue in this procedure.

C4-2 If at least 3 (Minimum Number of SRVs Required for Emergency Depressurization) SRVs can be opened or if a feedwater pump is available for injection, close the MSIVs, main steam line drain valves, and RCIC steam line isolation valves.

C4-3 Flood the RPV as follows:

C4-3.1 Commence and, irrespective of pump NPSH and vortex limits, increase injection into the RPV with the following systems until at least 3 (Minimum Number of SRVs Required for Emergency Depressurization) SRVs are open and RPV pressure is not decreasing and is 52 psig (Minimum RPV Flooding Pressure) or more above torus pressure:

- Feedwater pumps, defeating high RPV water level pump trip logic if necessary.
- CS
- LPCI, with injection through the heat exchangers as soon as possible.
- Condensate pumps
- CRD
- SSW crosstied to RHR
- City Water crosstied to RHR
- Fire Water crosstied to RHR
- Demineralized Water Transfer crosstied to SBLC
- ECCS Keep-Full
- Condensate Transfer crosstied to ECCS

If less than 3 (Minimum Number of SRVs Required for Emergency Depressurization) SRVs are open or RPV Pressure cannot be maintained at least 52 psig (Minimum RPV Flooding Pressure) above torus pressure PRIMARY CONTAINMENT FLOODING IS REQUIRED; enter [procedure developed from Contingency #6] and [procedure developed from the RPV Control Guideline] at [Step RC/P-4] and execute these procedures concurrently.

C4-3.2 When at least 3 (Minimum Number of SRVs Required for Emergency Depressurization) SRVs are open and RPV pressure can be maintained at least 52 psig (Minimum RPV Flooding Pressure) above torus pressure, control injection to maintain at least 3 (Minimum Number of SRVs Required for Emergency Depressurization) SRVs open and RPV pressure at least 52 psig (Minimum RPV Flooding Pressure) above torus pressure but as low as practicable.

C4-4 When

- RPV water level instrumentation is available, and
- Temperatures near the RPV water level instrument reference leg vertical runs are below 212°F, and
- RPV pressure has remained at least 52 psig (Minimum RPV Flooding Pressure) above torus pressure for at least the Minimum Core Flooding Interval

Number of Open SRVs	Minimum Core Flooding Interval (minutes)
4	62.9
3	107.6

Terminate all injection into the RPV and reduce RPV water level until RPV water level indication is restored.

If RPV water level indication is not restored within the Maximum Core Uncovery Time Limit (Figure 14) after commencing termination of injection into the RPV, return to [Step C4-3.1].

C4-5 Enter [procedure developed from the RPV Control Guideline] at [Steps RC/L and RC/P-4] and execute these steps concurrently.

SECTION 11

CONTINGENCY #5 - LEVEL/POWER CONTROL

If while executing the following steps:

- RPV water level cannot be determined, enter [procedure developed from Contingency #4].
- All control rods are inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position) or it has been determined that the reactor will remain shutdown under all conditions without boron, enter [procedure developed from the RPV Control Guideline] at [Step RC/L].
- Primary containment water level and torus pressure cannot be maintained below the Maximum Primary Containment Water Level Limit (Figure 2), then irrespective of whether adequate core cooling is assured terminate injection into the RPV from sources external to the primary containment until primary containment water level and torus pressure can be maintained below the Maximum Primary Containment Water Level Limit.

C5-1 Prevent automatic initiation of ADS.

C5-2 If:

- Reactor power is above 3% (APRM downscale trip setpoint) or cannot be determined, and
- Torus temperature is above the Boron Injection Initiation Temperature (Figure 9), and
- Either an SRV is open or opens or drywell pressure is above 2.5 psig (high drywell pressure scram setpoint),

Then:

- If any MSIV is open, bypass low RPV water level MSIV isolation interlocks, and
- Lower RPV water level, irrespective of any consequent reactor power or RPV water level oscillations, by terminating and preventing all injection into the RPV except from boron injection systems and CRD until either:
  - Reactor power drops below 3% (APRM downscale trip setpoint), or

- RPV water level reaches -126.3 in. (top of active fuel), or
- All SRVs remain closed and drywell pressure remains below 2.5 psig (high drywell pressure scram setpoint).

If while executing the following steps Emergency RPV Depressurization is required, continue in this procedure at [Step C5-3.1].

If while executing the following step:

- Reactor power is above 3% (APRM downscale trip setpoint) or cannot be determined, and
- RPV water level is above -126.3 in. (top of active fuel), and
- Torus temperature is above the Boron Injection Initiation Temperature (Figure 9), and
- Either an SRV is open or opens or drywell pressure is above 2.5 psig (high drywell pressure scram setpoint),

return to [Step C5-2].

C5-3 Maintain RPV water level either:

#4

- If RPV water level was deliberately lowered in [Step C5-2], between -156.3 in. (Minimum Steam Cooling RPV Water Level) and the level to which it was lowered, or
- If RPV water level was not deliberately lowered in [Step C5-2], between -126.3 in. (top of active fuel) and +48 in. (reactor feedwater pump high RPV water level trip setpoint),

with the following systems:

- Condensate/feedwater
- CRD

- RCIC with suction from the CST, defeating low RPV pressure isolation interlocks if necessary.

#2 #3

- HPCI with suction from the CST, defeating high torus water level suction transfer logic if necessary.

#2

- LPCI, with injection through the heat exchangers as soon as possible; control and maintain pump flow less than RHR Pump NPSH Limit (Figure 5a and 5b) and the RHR Vortex Limit (Figure 6).

If RPV water level was not deliberately lowered in [Step C5-2] and RPV water level cannot be maintained above -126.3 in. (top of active fuel), maintain RPV water level between -156.3 in. (Minimum Steam Cooling RPV Water Level) and +48 in. (high RPV water level trip setpoint).

If RPV water level cannot be maintained above -156.3 in. (Minimum Steam Cooling RPV Water Level), EMERGENCY RPV DEPRESSURIZATION IS REQUIRED:

C5-3.1 Terminate and prevent all injection into the RPV except from boron injection systems, CRD, and RCIC until RPV pressure is below the Minimum Alternate RPV Flooding Pressure.

Number of Open SRVs	Minimum Alternate RPV Flooding Pressure (psig)
4	180.6
3	245.8
2	376.0
1	766.7

If less than 1 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure) SRV can be opened, continue in this procedure.

C5-3.2 Commence and, irrespective of pump NPSH and vortex limits, slowly increase injection into the RPV with the following systems to restore and maintain RPV water level above -126.3 in. (top of active fuel):

#4

- Condensate/feedwater
- CRD
- RCIC with suction from the CST, defeating low RPV pressure isolation interlocks if necessary.
- HPCI with suction from the CST, defeating high torus water level suction transfer logic if necessary.
- LPCI, with injection through the heat exchangers as soon as possible.

If RPV water level cannot be restored and maintained above -126.3 in. (top of active fuel), restore and maintain RPV water level above -156.3 in. (Minimum Steam Cooling RPV Water Level).

If RPV water level cannot be restored and maintained above -156.3 in. (Minimum Steam Cooling RPV Water Level), commence and, irrespective of pump NPSH and vortex limits, slowly increase injection into the RPV with the following systems to restore and maintain RPV water level above -156.3 in. (Minimum Steam Cooling RPV Water Level).

- CS
- SSW crosstied to RHR
- City Water crosstied to RHR
- Fire Water crosstied to RHR
- ECCS Keep-Full
- Condensate Transfer crosstied to ECCS

If RPV water level cannot be restored and maintained above -156.3 in. (Minimum Steam Cooling RPV Water Level), PRIMARY CONTAINMENT FLOODING IS REQUIRED; enter [procedure developed from Contingency #6]

C5-3.3 When RPV water level can be maintained above -156.3 in. (Minimum Steam Cooling RPV Water Level), return to [Step C5-3].

If while executing the following step reactor power commences and continues to increase, return to [Step C5-2].

C5-4 When 370.5 pounds (Hot Shutdown Boron Weight) of boron that is enriched to at least 54.4 atom-percent Boron-10 have been injected into the RPV, restore and maintain RPV water level between +9 in. (low RPV water level scram setpoint) and +48 in. (high RPV water level trip setpoint).

If RPV water level cannot be restored and maintained above +9 in. (low RPV water level scram setpoint), maintain RPV water level above -126.3 in. (top of active fuel).

If RPV water level cannot be maintained above -126.3 in. (top of active fuel), EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; return to [Step C5-3.1].

C5-5 When Procedure 2.1.5, "Controlled Shutdown from Power" is entered from [procedure developed from RPV Control Guideline] at [Step RC/P-5], proceed to cold shutdown in accordance with the appropriate section of Procedure 2.1.5, "Controlled Shutdown from Power".

SECTION 12

CONTINGENCY #6 - PRIMARY CONTAINMENT FLOODING

If while executing the following steps:

- Primary containment water level and torus pressure cannot be maintained below the Maximum Primary Containment Water Level Limit (Figure 2), then irrespective of whether adequate core cooling is assured terminate injection into the RPV from sources external to the primary containment until primary containment water level and torus pressure can be maintained below the Maximum Primary Containment Water Level Limit.

- RPV water level can be restored and maintained above -126.3 in. (top of active fuel), enter [procedure developed from the RPV Control Guideline] at [Step RC/L].

C6-1 Operate the following systems:

- CS; operate one CS with suction from the CST only when the other CS is operating with suction from the torus.
- Condensate/feedwater
- CRD
- RCIC with suction from CST only, defeating low RPV pressure isolation interlocks if necessary.
- LPCI with suction from sources external to the primary containment only.
- SSW crosstied to RHR
- City Water crosstied to RHR
- Fire Water crosstied to RHR
- ECCS Keep-Full
- Condensate Transfer crosstied to ECCS
- Gravity feed from CST to HPCI minimum flow line

Execute [Steps C6-2 and C6-3] concurrently.

C6-2 When primary containment water level reaches +11 ft (bottom of the lowest recirculation piping), then irrespective of the offsite radioactivity release rate vent the RPV, defeating isolation interlocks if necessary, until RPV water level reaches -126.3 in. (top of active fuel) with one or more of the following:

- MSIVs
- Main steam line drains
- HPCI steam line
- RCIC steam line

C6-3 When primary containment water level reaches 67.5 ft (top of active fuel), maintain primary containment water level between 67.5 ft (top of active fuel) and the Maximum Primary Containment Water Level Limit (Figure 2) with the following systems taking suction from sources external to the primary containment only when required:

- CS
- Condensate/feedwater
- CRD
- LPCI
- SSW crosstied to RHR
- City Water crosstied to RHR
- Fire Water crosstied to RHR
- ECCS Keep-Full
- Condensate Transfer crosstied to ECCS
- Gravity feed from CST to HPCI minimum flow line

ATTACHMENT A
PSTG FIGURES

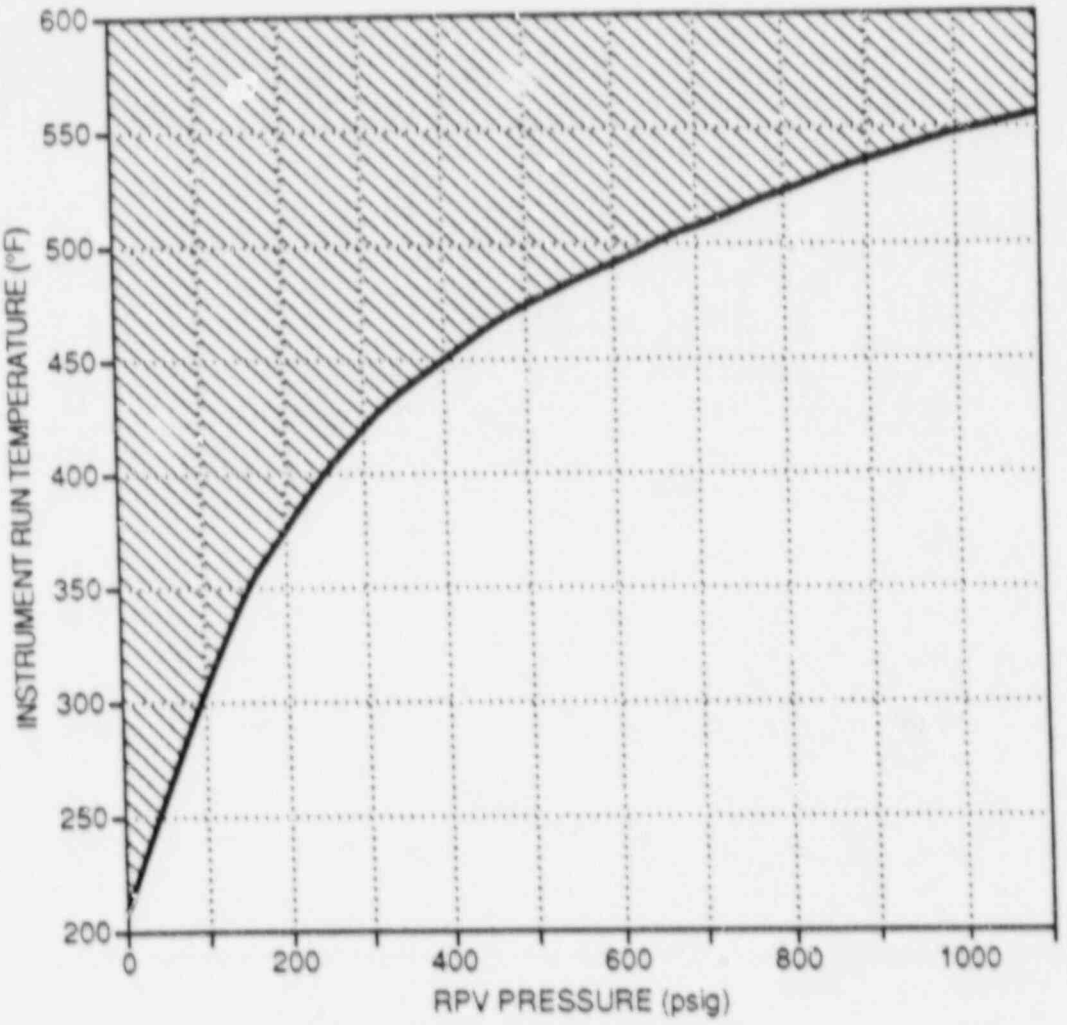


Figure 1: RPV Saturation Temperature

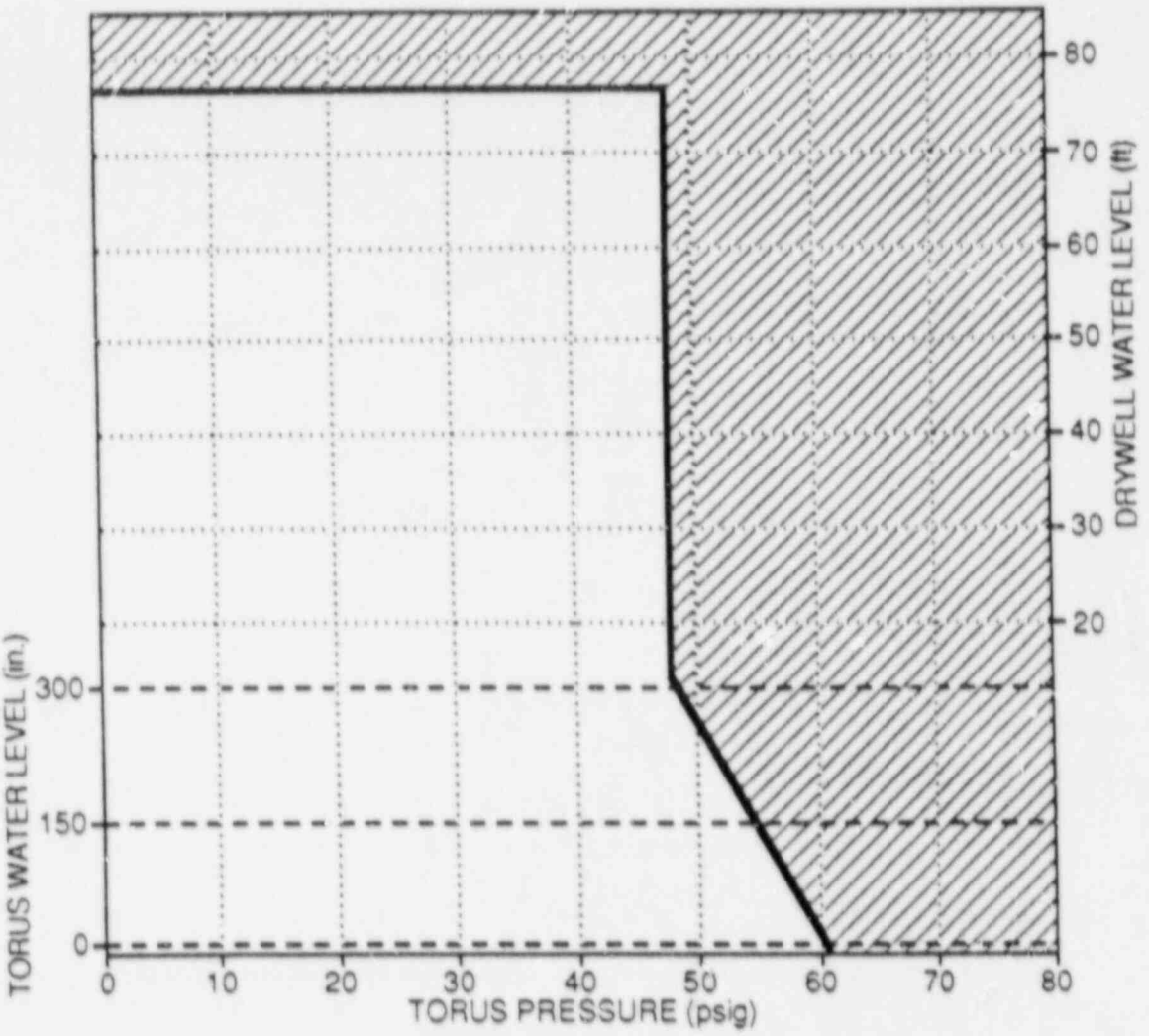
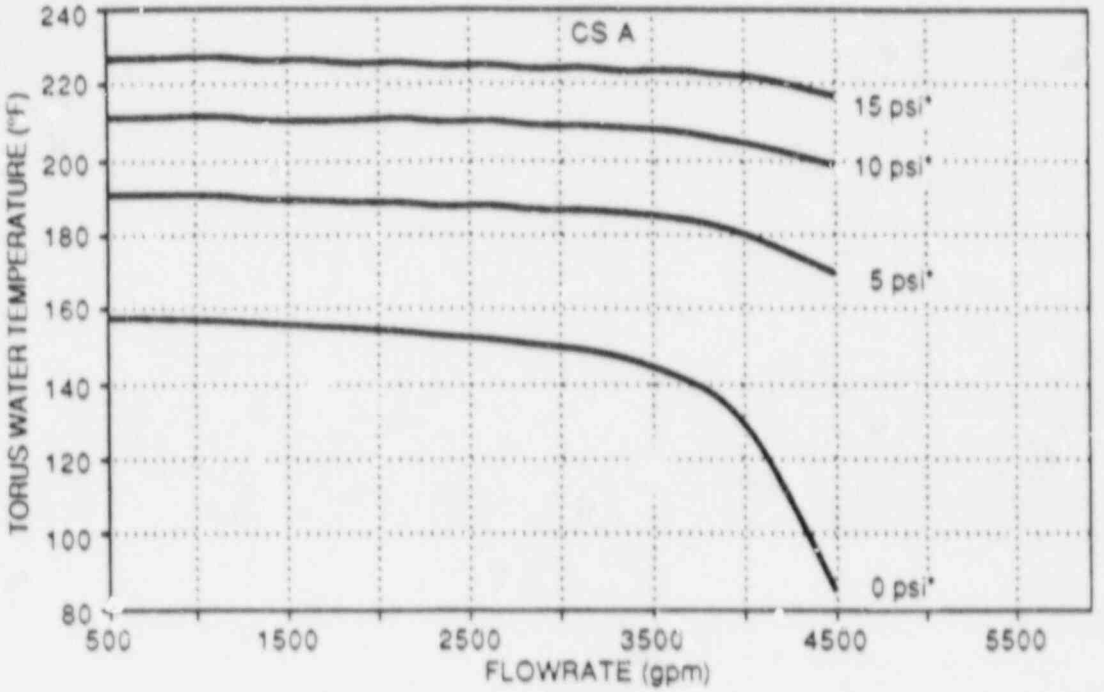
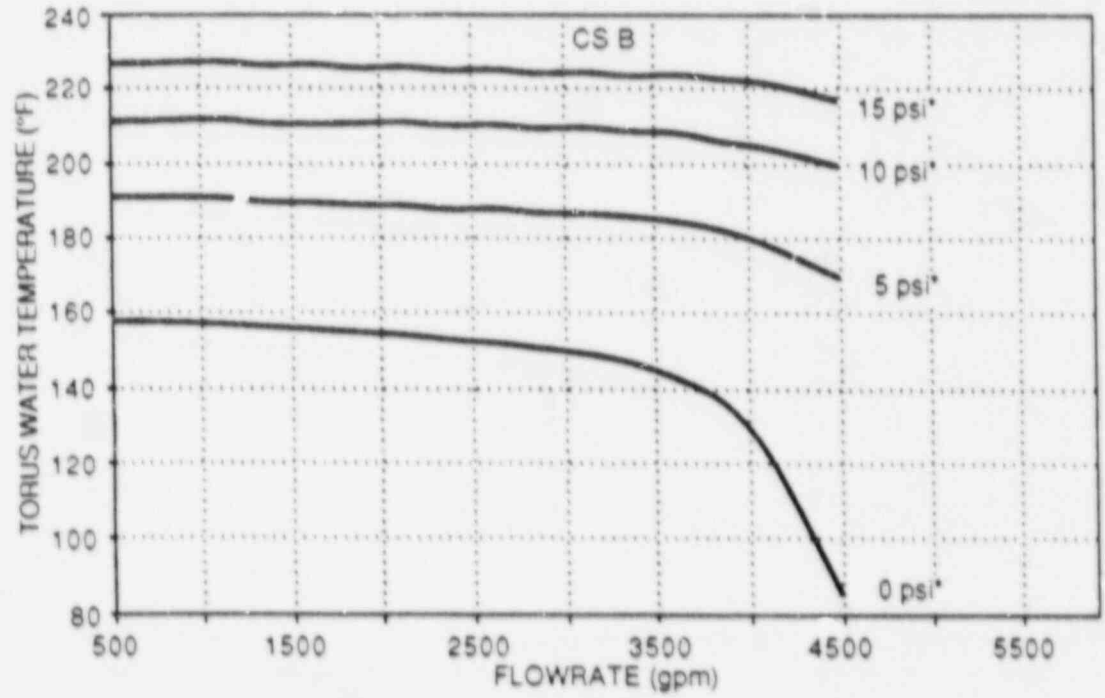


Figure 2: Maximum Primary Containment Water Level Limit





* Indicates overpressure (i.e., airspace pressure plus hydrostatic head above suction strainer)

Figure 3: CS Pump NPSH Limits

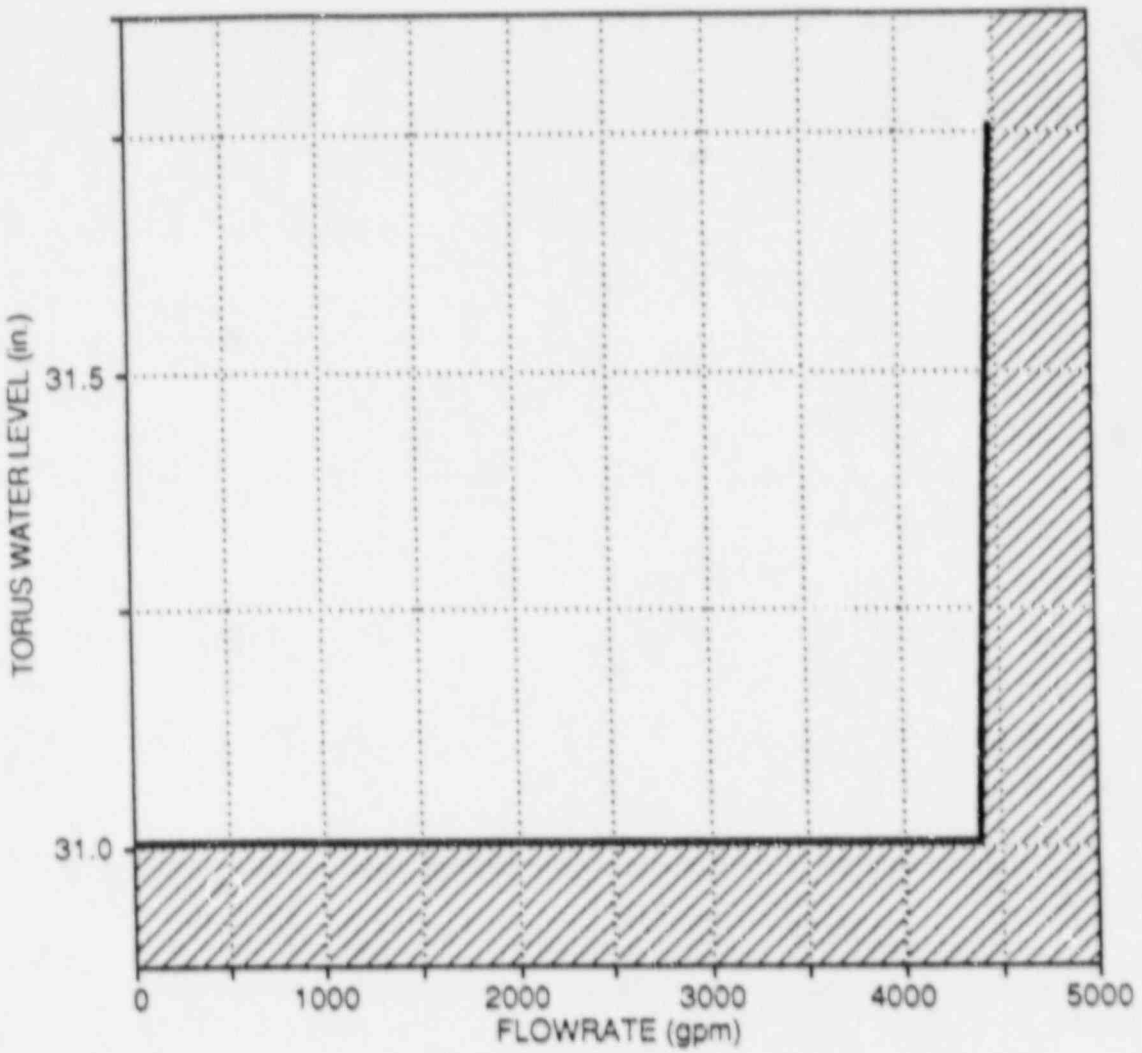
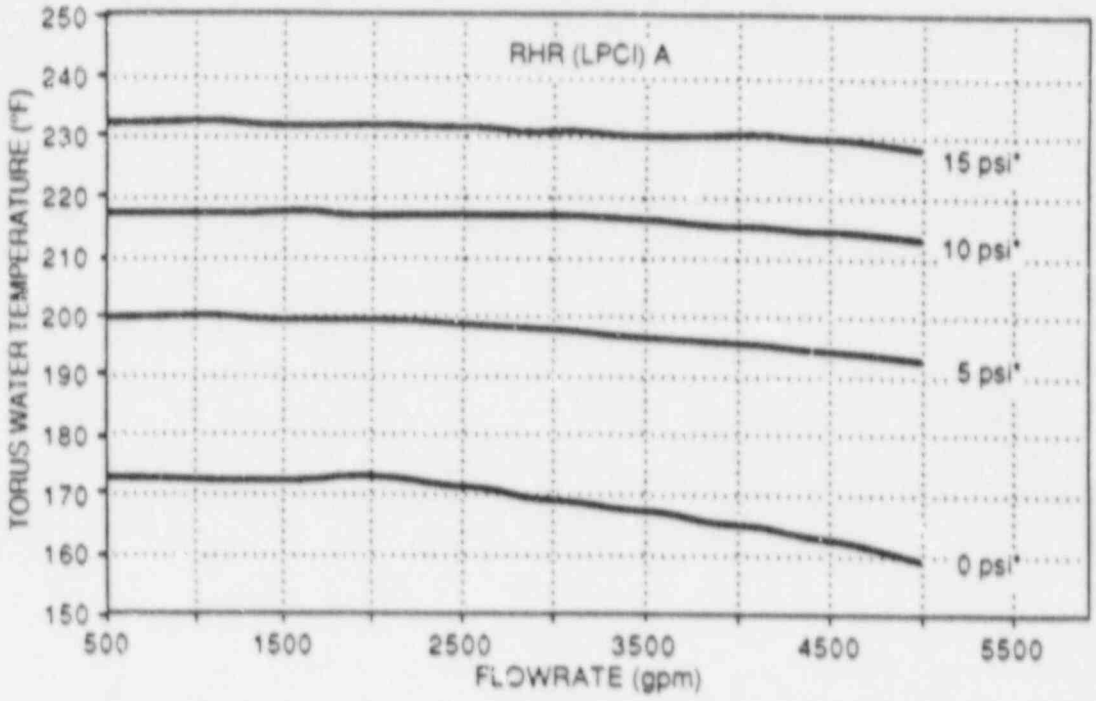
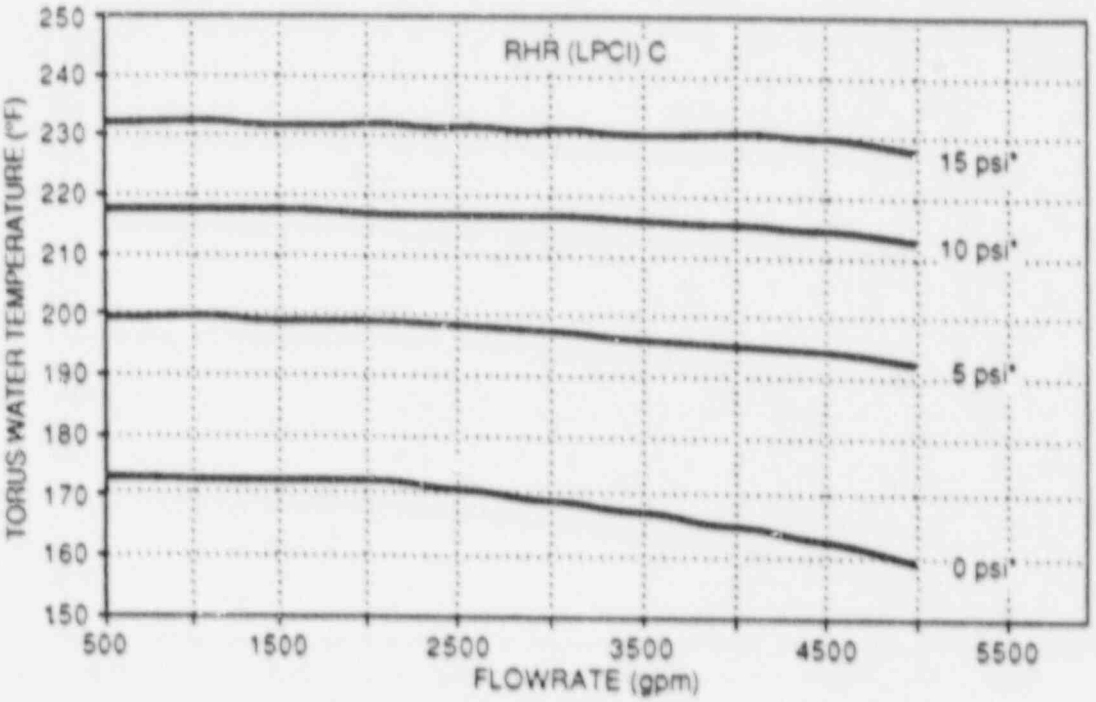


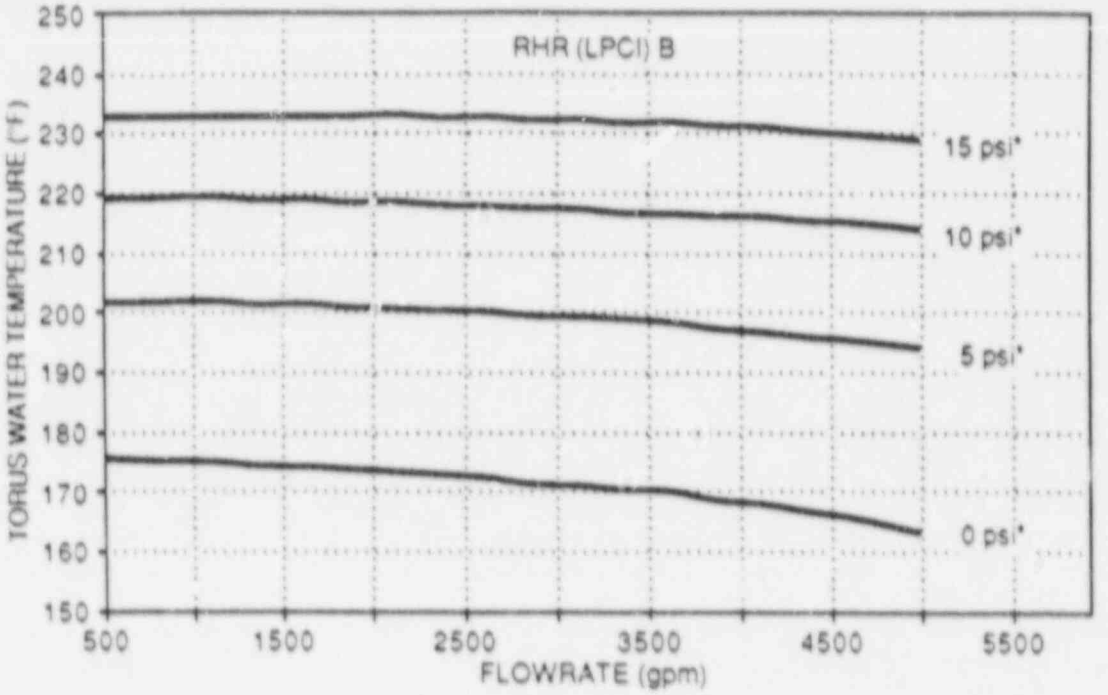
Figure 4: CS Vortex Limit

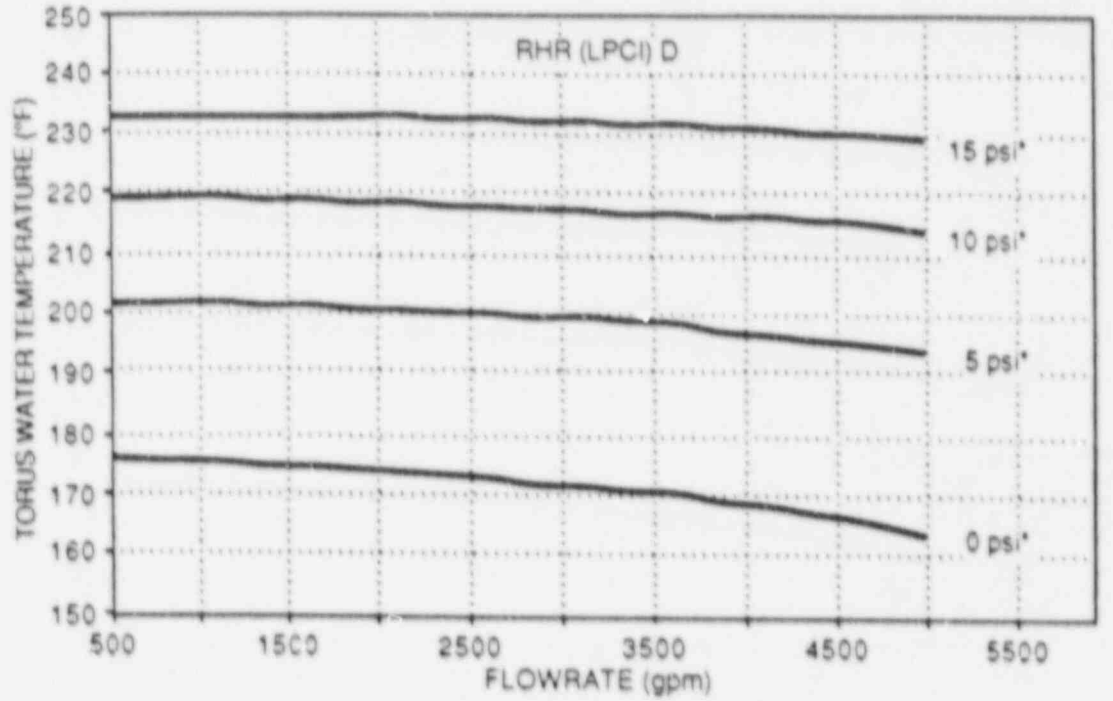




* Indicates overpressure (i.e., airspace pressure plus hydrostatic head above suction strainer)

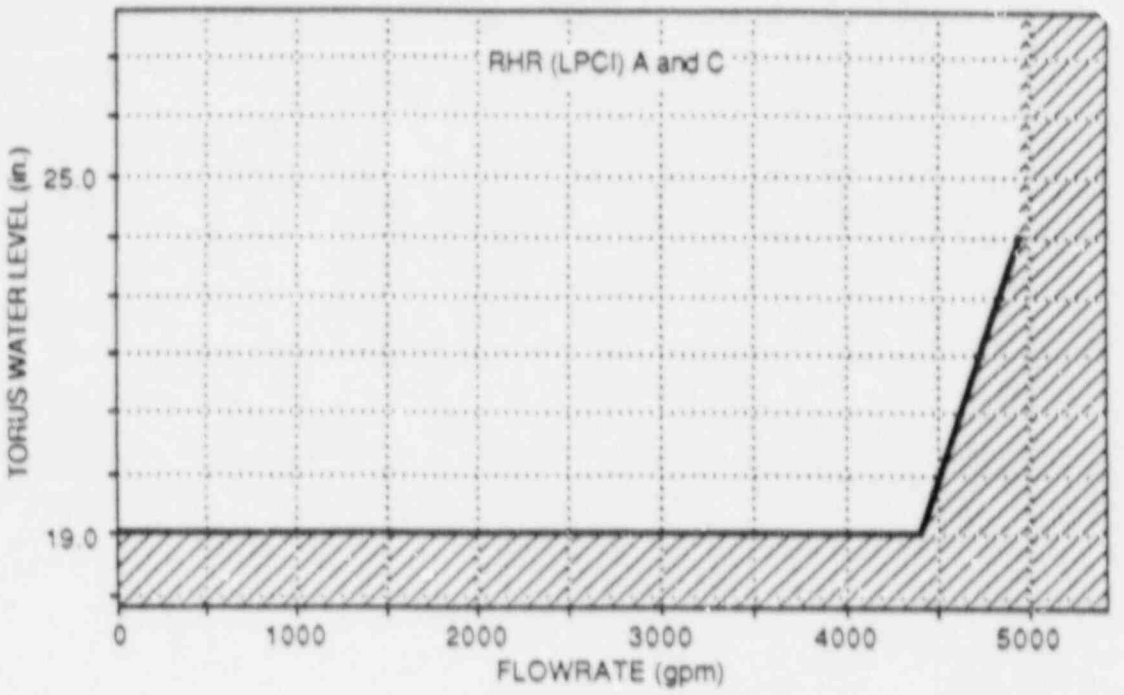
Figure 5a: RHR Pump A and C NPSH Limits





* Indicates overpressure (i.e., airspace pressure plus hydrostatic head above suction strainer)

Figure 5b: RHR Pump B and D NPSH Limits



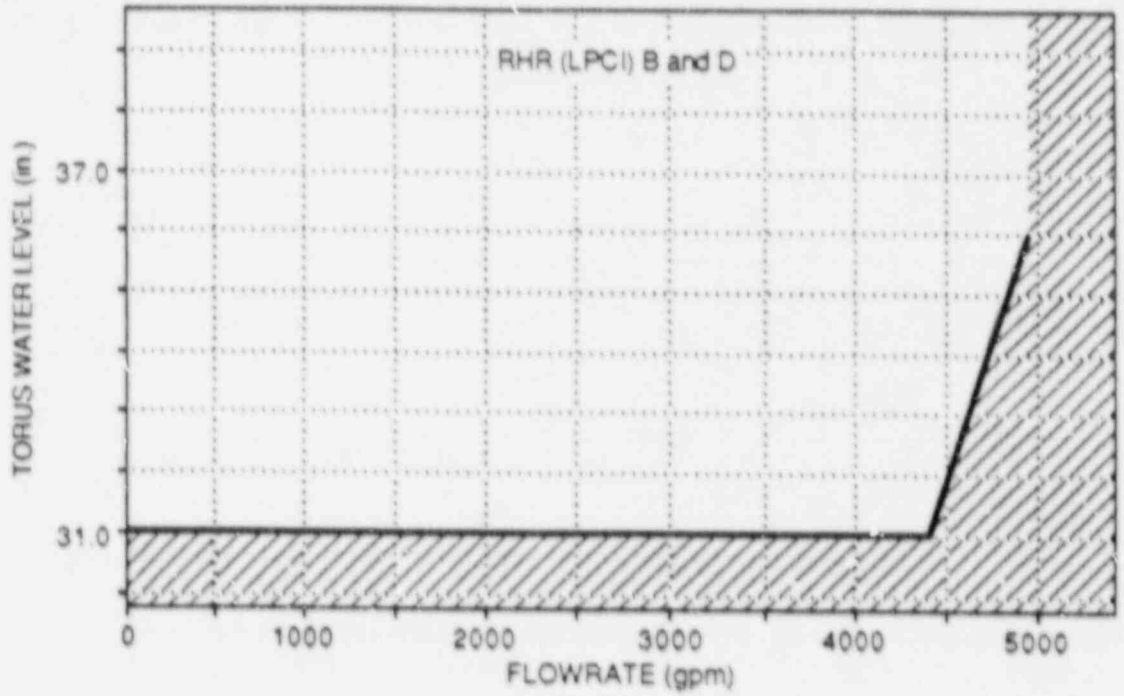


Figure 6: RHR Vortex Limits

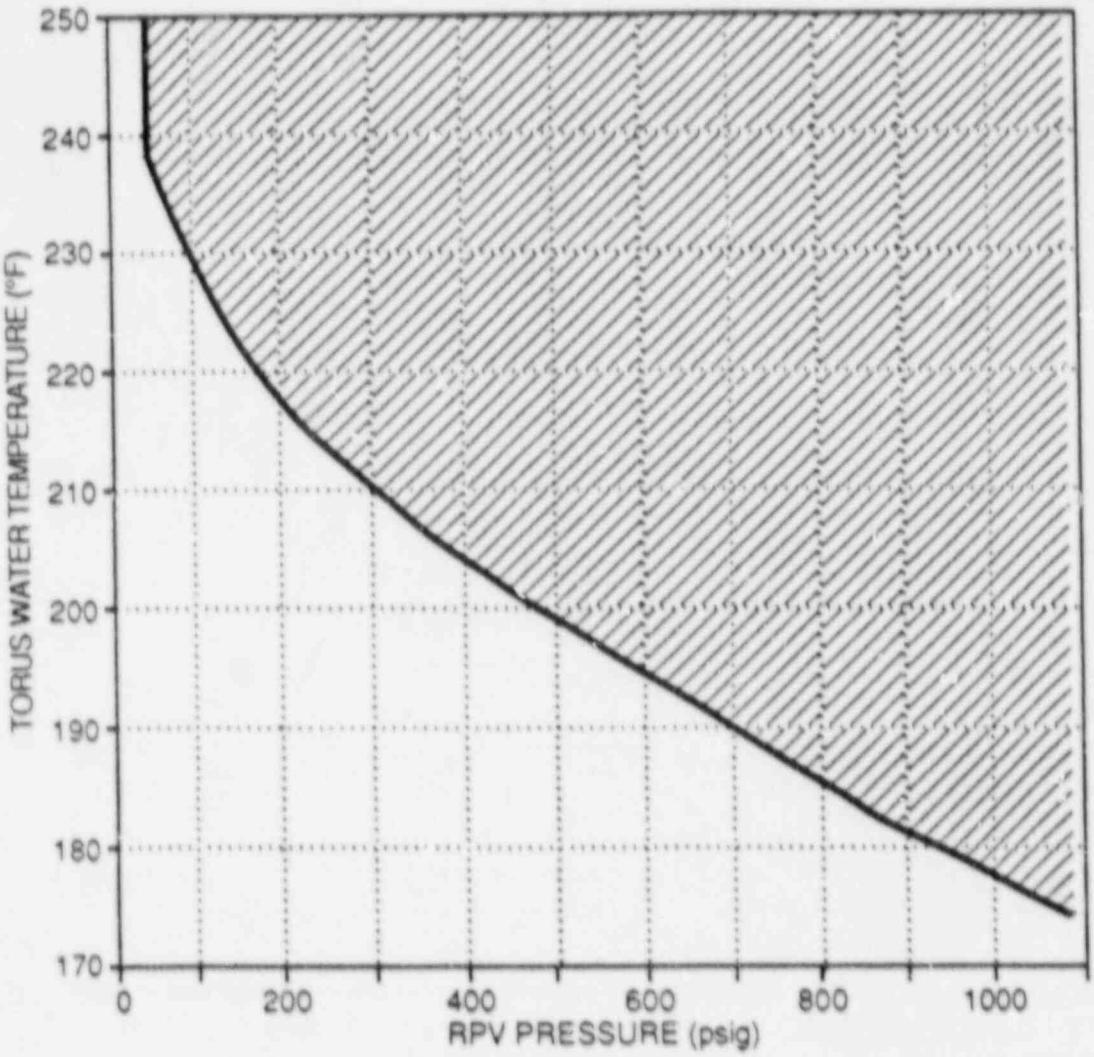


Figure 7: Heat Capacity Temperature Limit

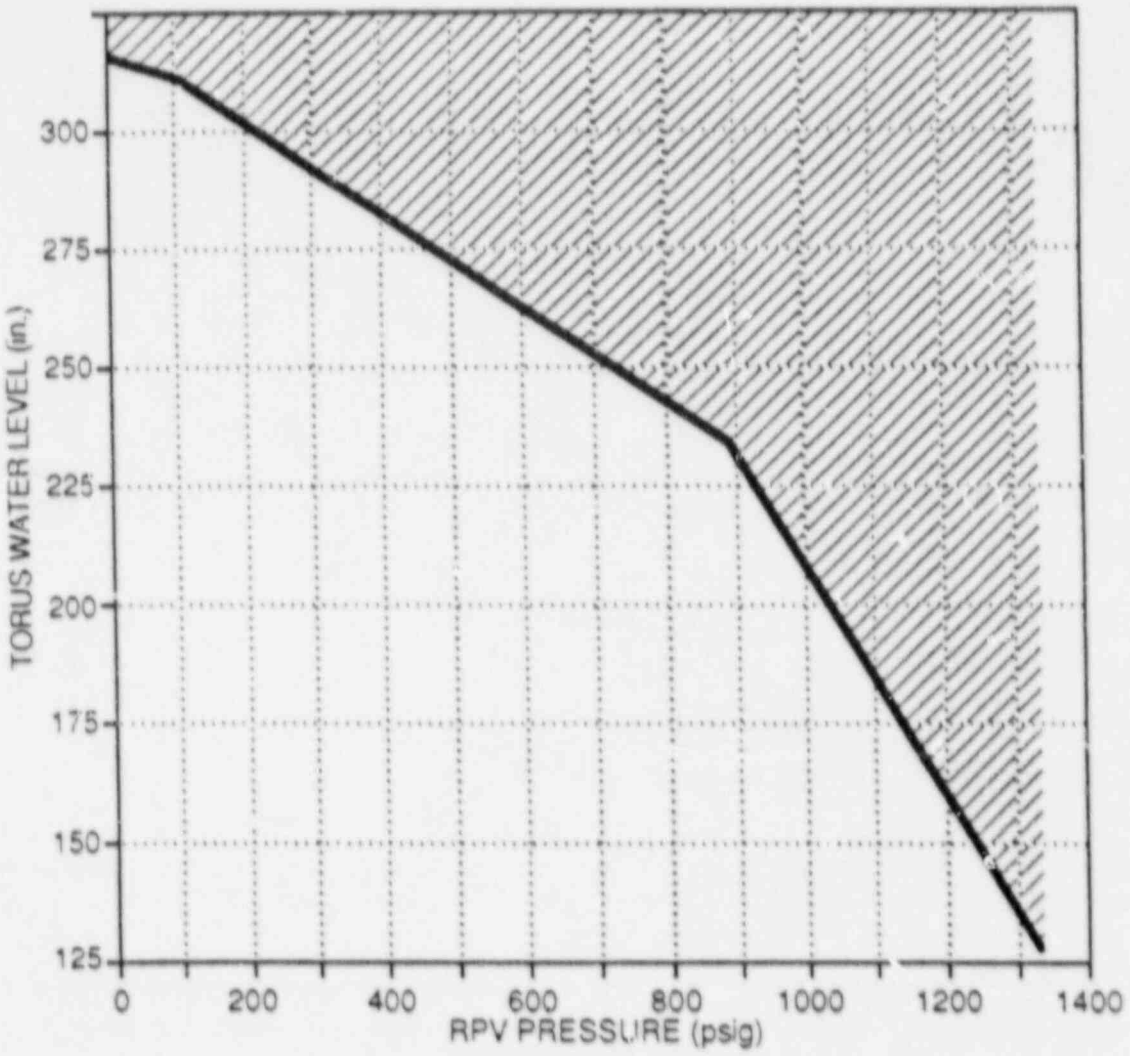


Figure 8: SRV Tail Pipe Level Limit

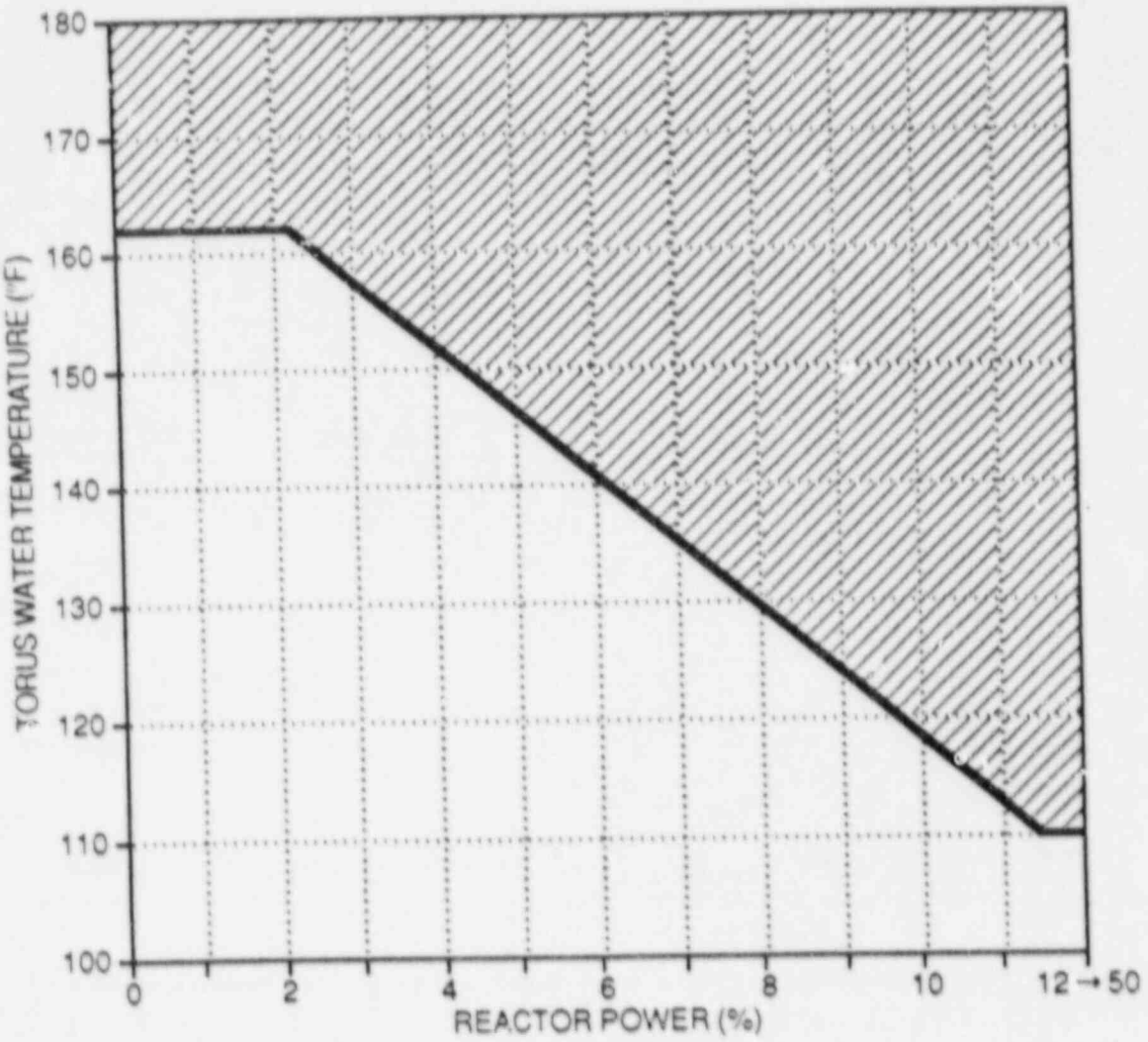


Figure 9: Boron Injection Initiation Temperature

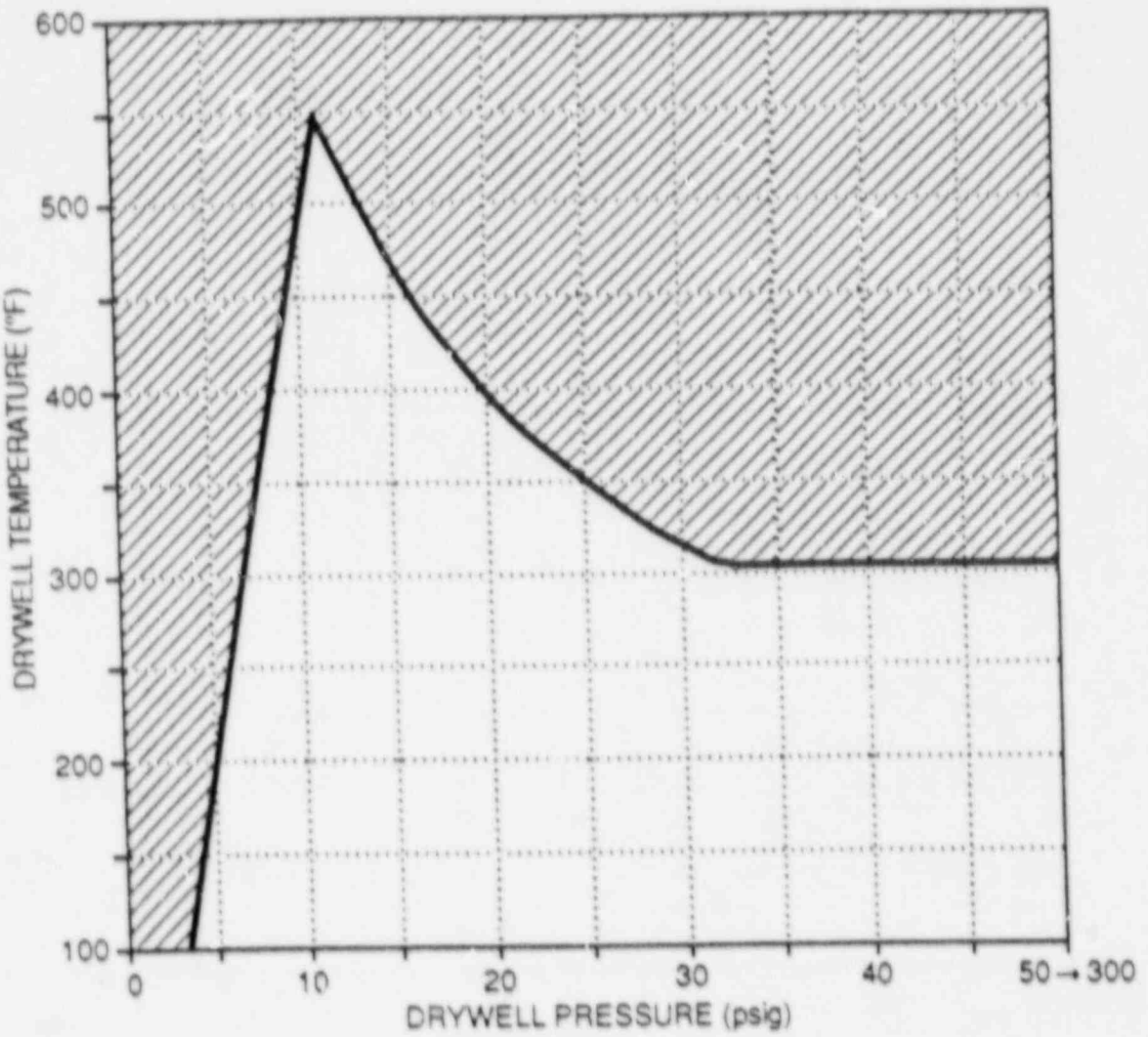


Figure 10: Drywell Spray Initiation Limit

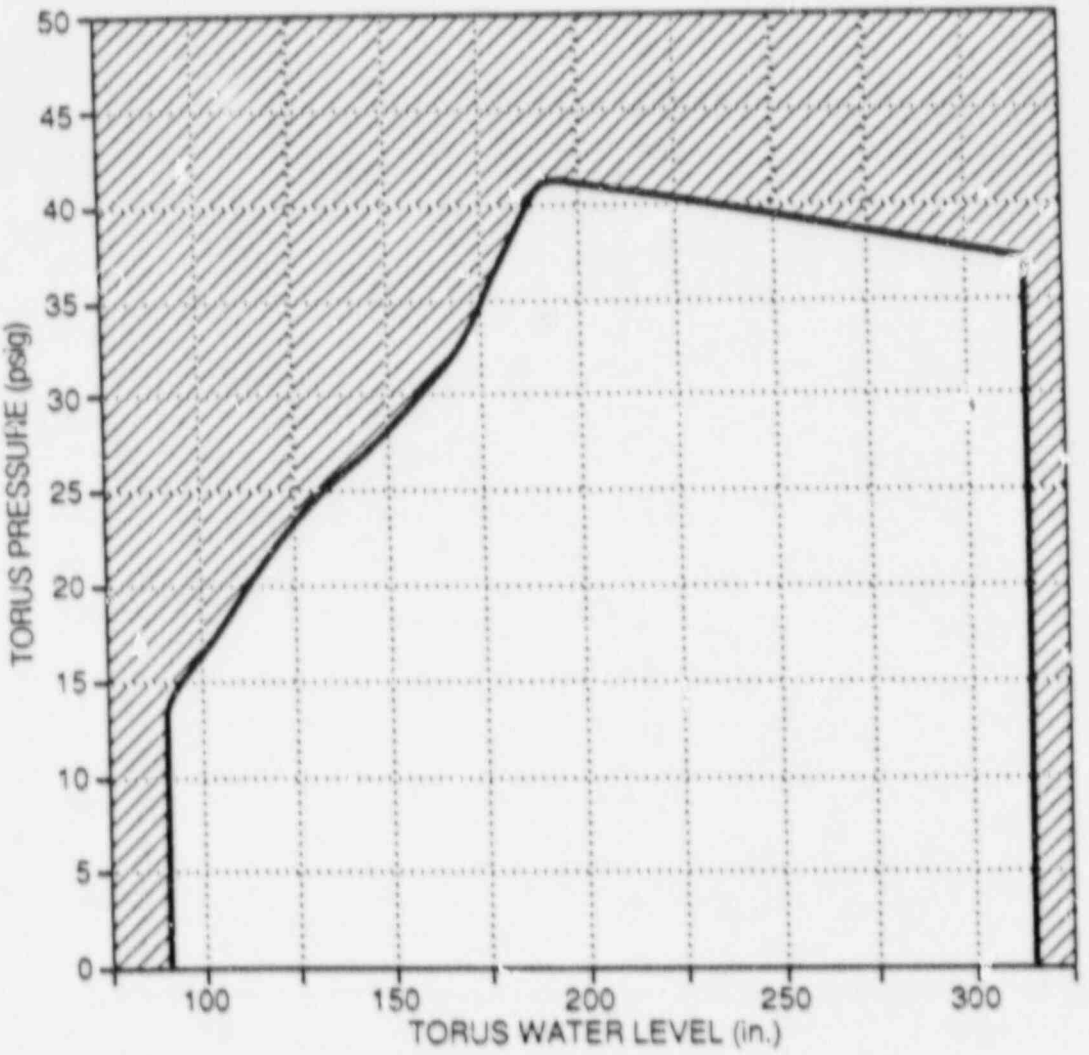


Figure 11: Pressure Suppression Pressure

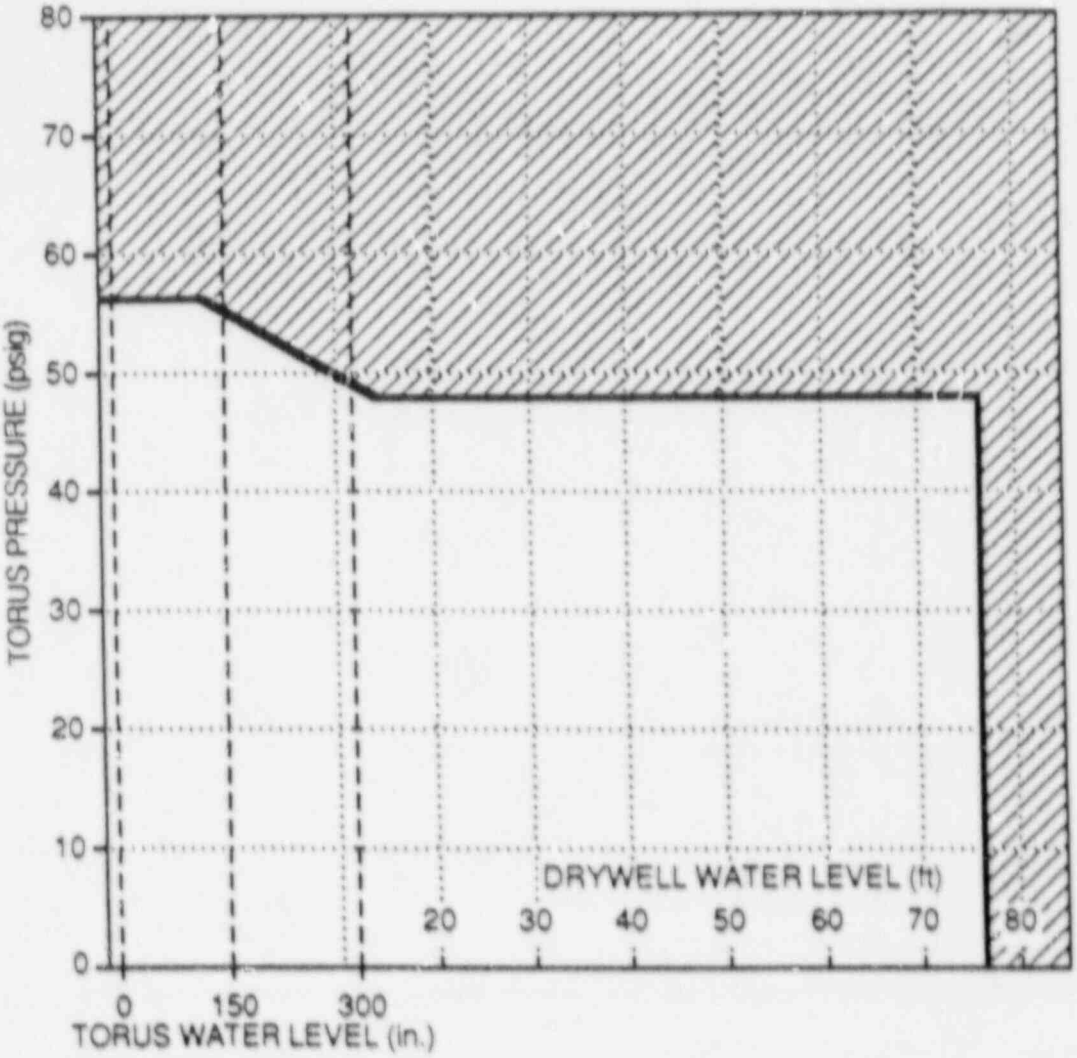


Figure 12: Primary Containment Pressure Limit

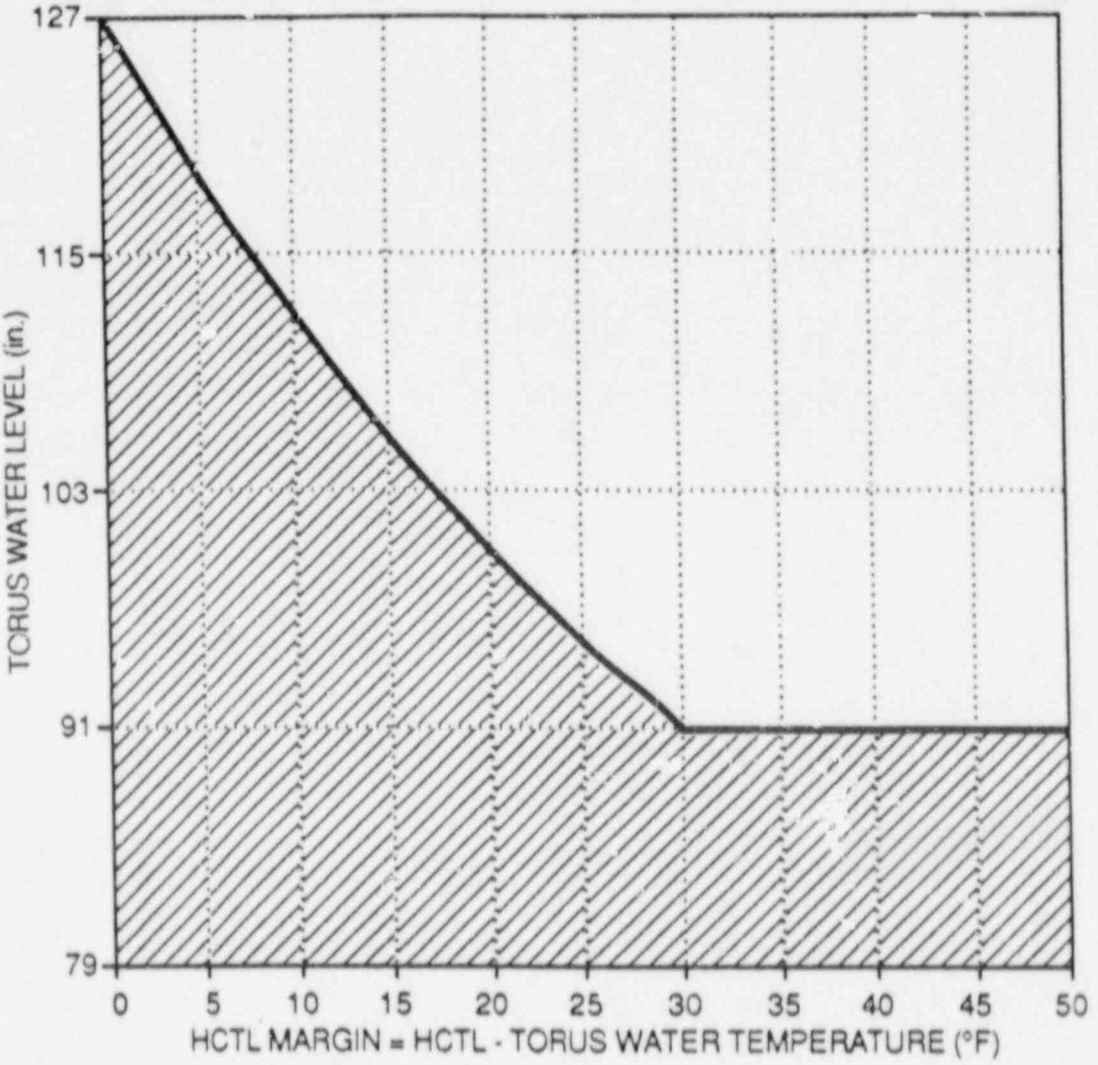


Figure 13: Heat Capacity Level Limit

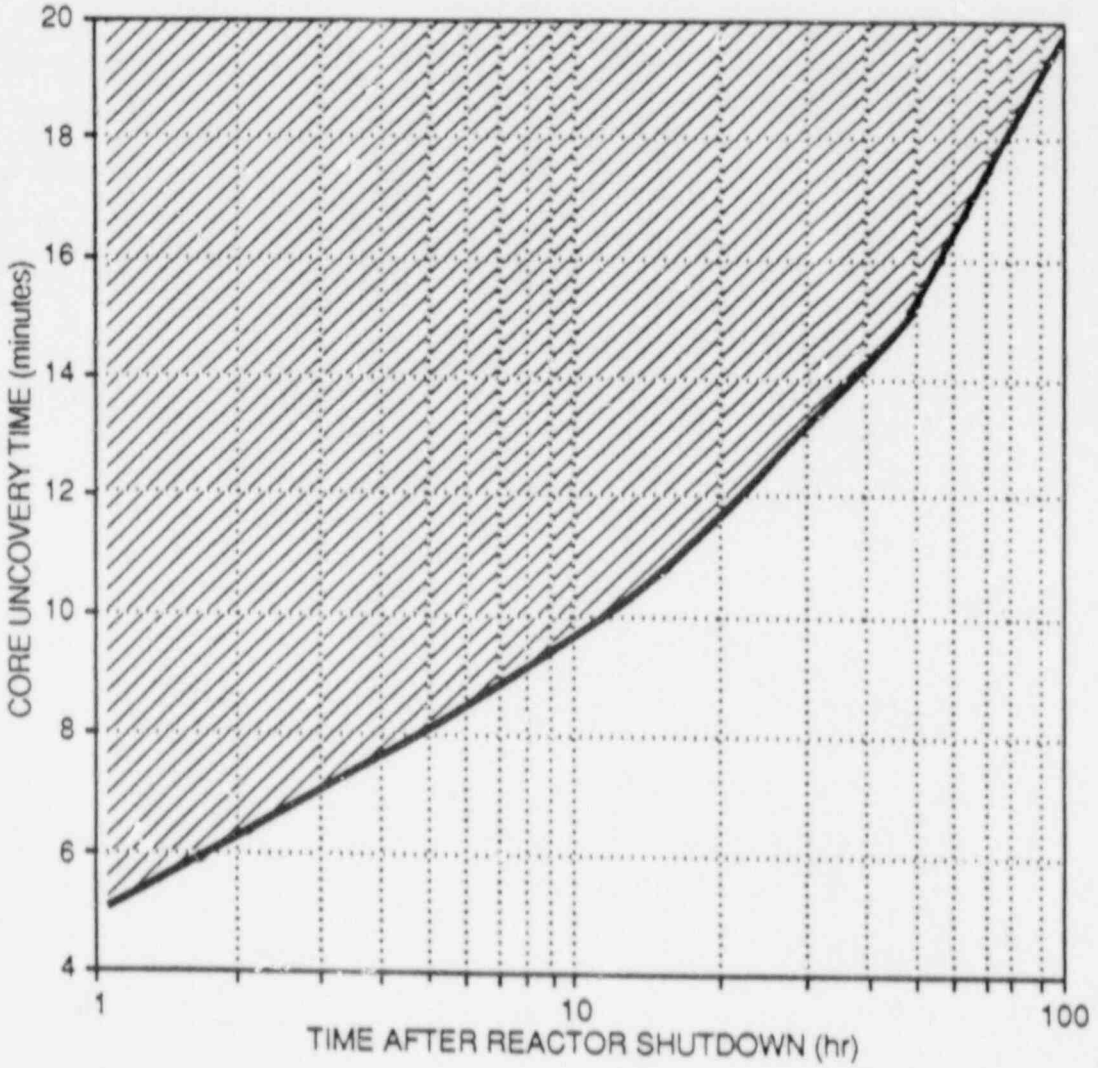


Figure 14: Maximum Core Uncovery Time Limit

PILGRIM NUCLEAR POWER STATION

COLLECTION OF PLANT OPERATING PROCEDURES

UTILIZED TO DEVELOP, PROCESS AND ISSUE

THE

PLANT-SPECIFIC EMERGENCY OPERATING PROCEDURES

INTRODUCTION

The enclosed is the collection of plant operating procedures used to develop, process and issue the Pilgrim Plant-Specific Emergency Operating Procedures (EOPs).

Procedure 1.3.4-10 - Writers' Guide for EOPs

This document specifies the appropriate instructions, requirements, and conventions to be employed for writing PNPS Emergency Operating Procedures (EOPs). These guidelines are provided to ensure that the required level of consistency in the organization, format, style, and content of the EOPs is established and effectively maintained. This Writers' Guide specifies the specific requirements or elements of each EOP including its identification, format, and content. The guidance provided herein is applicable to both the initial preparation and subsequent revisions of all PNPS EOPs. This document supplements existing BECo and PNPS administrative procedures governing plant procedure preparation, revision, and control, but does not supplant them.

Procedure 1.3.4-13 - EOP Verification Program

This document provides the appropriate requirements and instructions for verifying the PNPS Emergency Operating Procedures (EOPs). The requirements and instructions specified herein apply to the overall process of developing new EOPs and revising existing EOPs. This document supplements existing PNPS procedures governing procedure preparation, revision, and control, but does not supplant them.

The EOP verification is defined as the process of confirming and documenting the technical accuracy and written correctness of the EOPs. Technical accuracy is the EOP characteristic that refers to the compatability of the procedures with plant systems, hardware and instrumentation. Additionally it also deals with the conformity of the EOPs with other plant procedures that were referenced by it. Agreement with the technical content of the Plant-Specific Technical Guidelines (PSTGs) is also required. Written correctness is the characteristic of EOPs which refers to the conformity of the procedures to EOP format and editorial content requirements presented in the Writers' Guide.

Procedure 1.3.4-14 - EOP Validation Program

This document provides the appropriate requirements and instructions for validating the PNPS Emergency Operating Procedures (EOPs). The requirements and instructions specified herein apply to the overall process of developing new EOPs and revising existing EOPs. This document supplements existing PNPS procedures governing procedure preparation, revision, and control, but does not supplant them.

EOP validation is best and simply defined as the process of confirming and documenting the operational correctness and usability of the EOPs. Correctness is the EOP characteristic which refers to the compatability of the procedures with plant hardware, plant responses, operator capabilities, interactions with other plant procedures and the composition and manning level of on-shift personnel. Usability is the EOP characteristic which refers to the adequacy of the procedures level of detail and understandability of the information presented in the procedure.