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BWR Owners' Group Emergency Procedure and Severe Accident Guidelines

BWR Owners' Group Emergency Procedures Committee

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INTRODUCTION

The BWR Owners' Group Emergency Procedure and Severe Accident Guidelines (EPGs/SAGs) provide generic symptomatic direction for BWR emergency response and severe accident mitigation. The guidelines were developed by the BWR Owners' Group in response to NUREG-0737 Item I.C.1, "Guidance for the Evaluation and Development of Procedures for Transients and Accidents," and NEI 91-04, "Severe Accident Issue Closure Guidelines."

The EPGs/SAGs are divided into Emergency Procedure Guidelines (EPGs) and Severe Accident Guidelines (SAGs). The EPGs define strategies for responding to emergencies and events that may degrade into emergencies up until primary containment flooding is required. They comprise four guidelines and five associated contingencies:

Guidelines:

- RPV Control
- Primary Containment Control
- Secondary Containment Control
- Radioactivity Release Control

Contingencies:

- #1—Alternate Level Control
- #2—Emergency RPV Depressurization
- #3—Steam Cooling
- #4—RPV Flooding
- #5—Level/Power Control

The SAGs define strategies applicable after primary containment flooding is required. They comprise two guidelines:

- RPV and Primary Containment Flooding
- Containment and Radioactivity Release Control

The EPGs and SAGs function together as an integrated set of instructions. Each EPG guideline protects one of the principal barriers to radioactivity release through control of key plant parameters. The EPG contingencies form extensions to the top-level guidelines, providing more detailed instructions for controlling individual parameters under more degraded conditions. The SAGs extend the EPGs still further, addressing severe accident conditions.

The Cautions section contains warnings applicable to certain steps within the guidelines. It is common to both EPGs and SAGs. Cross-references, consisting of circled numbers in reverse type, appear in the right margin of the steps to which the cautions apply.

Each emergency operating procedure (EOP) developed from the EPGs should be entered whenever a defined entry condition occurs or an explicit direction to do so is encountered, irrespective of whether the procedure has already been entered, unless instructions developed from the severe accident guidelines are being executed. EOPs may be exited when it has been determined that an emergency no longer exists.

Plant specific accident management guidelines (PSAMGs) developed from the SAGs should be entered when it becomes necessary to flood the primary containment. Additional EOP entry conditions may then be disregarded until the PSAMGs are exited. Like EOPs, PSAMGs may be exited when it has been determined that an emergency no longer exists.

The EPG entry conditions are symptomatic of both emergencies and events which may degrade into emergencies. The existence of an entry condition is therefore not necessarily indicative of an emergency. Nor does the absence of entry conditions, by itself, necessarily signify that an emergency no longer exists.

The EPGs/SAGs impose various limits within which continued safe operation of a plant is ensured and beyond which certain actions may be required. While conservative, these limits have been derived using best-estimate engineering analyses rather than licensing models. Consequently, these limits are generally not as conservative as the limits specified in a plant's technical specifications and conformance with these guidelines does not necessarily ensure strict conformance with technical specifications or other licensing bases. This does not imply, however, that operation beyond technical specification limits is recommended. Rather, such operation may be required, and is now permitted, to mitigate certain degraded conditions.

The operator actions prescribed in the EPGs/SAGs will maintain the reactor plant in a safe condition irrespective of the initiating event. Every effort has been made to address any mechanistically possible condition, irrespective of the probability of occurrence, with appropriate generic operational guidance to minimize the impact on public health and safety. Procedures developed from these guidelines may be supplemented by event-specific procedures (e.g., earthquake, tornado, station blackout, and fire), but the event-specific actions must not contradict or subvert the steps prescribed in the EPGs/SAGs or degrade the operability of equipment critical to EPG/SAG strategies.

Certain interlocks and initiation logic must sometimes be bypassed to permit execution of EPG/SAG steps. Such actions are a necessary part of the EPG/SAG mitigation strategy, but are generally authorized only when conditions may exist for which the interlocks or logic features were not designed. It may sometimes also be appropriate to bypass interlocks to restore system operability following instrument failures or equipment malfunctions. These actions, however, cannot be explicitly addressed in the EPGs/SAGs since specific malfunctions cannot be identified in advance.

The EPGs/SAGs are applicable to General Electric product lines BWR-1 through BWR-6, but no single plant includes all of the systems addressed. Sample plant data is included to illustrate typical numerical values and step wordings and sample curves are shown in the Figures section at the end of the guidelines. Brackets enclose text that must be replaced with plant specific information and instructions that apply only to certain plant designs. The source of each bracketed numerical variable is identified in parentheses following the sample value. It is expected that each utility will replace all bracketed expressions with plant specific values, calculate plant specific curves, delete non-applicable instructions, and substitute plant specific terms for generic designations during conversion of the EPGs/SAGs to plant specific guidelines.

Unless otherwise specified, the suppression pool temperature, drywell temperature, and Mark III containment temperature action levels defined in the EPGs/SAGs are based upon bulk or average values. The methods by which the bulk or average temperatures are determined are dependent upon installed instrumentation and should be defined in plant specific procedures.

The EPGs/SAGs are supplemented by four appendices:

- Appendix A defines the formatting conventions used in the EPGs/SAGs.
- Appendix B explains the rationale, intent, and technical basis of the EPGs/SAGs.
- Appendix C provides acceptable methods for calculating plant specific variables and curves for which the basis is not evident from the text of the guidelines.
- Appendix D documents and explains the differences between the EPGs/SAGs and Revision 4 of the BWR Owners' Group Emergency Procedure Guidelines (NEDO-31331, March 1987).

TABLE I-1
ABBREVIATIONS

°F ..... degrees Fahrenheit

% ..... percent

ADS ..... Automatic Depressurization System

APRM ..... Average Power Range Monitor

ARI ..... Alternate Rod Insertion

CRD ..... Control Rod Drive

ECCS ..... Emergency Core Cooling System

ft. ..... feet

gal ..... gallon

gpm ..... gallons per minute

HPCI ..... High Pressure Coolant Injection

HPCS ..... High Pressure Core Spray

hr ..... hour

HVAC ..... Heating, Ventilation, and Air Conditioning

IC ..... Isolation Condenser

in ..... inches

lbm ..... pounds-mass

lbs ..... pounds

LCO ..... limiting condition for operation

LPCI ..... Low Pressure Coolant Injection

TABLE I-1 (continued)

LPCS .....Low Pressure Core Spray

min. .....minutes

mr .....milliroentgen

MSIV.....main steam isolation valve

MSL .....main steam line

NPSH .....net positive suction head

psi.....pounds per square inch

psig.....pounds per square inch gauge

RCIC .....Reactor Core Isolation Cooling

RHR .....Residual Heat Removal

rpm.....revolutions per minute

RPS.....Reactor Protection System

RPV.....reactor pressure vessel

RSCS.....Rod Sequence Control System

RWCU.....Reactor Water Cleanup

RWM.....Rod Worth Minimizer

SBGT .....Standby Gas Treatment

SLC .....Standby Liquid Control

SPMS .....Suppression Pool Makeup System

SRV.....safety relief valve

CAUTIONS

This section lists cautions which are applicable at one or more specific points within the guidelines. Where a caution is applicable, it is identified by a circled number in reverse type in the right margin.

❶

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

- The temperatures near all the instrument runs are below the RPV Saturation Temperature.
- 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	Range (in.)	Maximum Run Temperature (°F) DW	Maximum Run Temperature (°F) RB	Minimum Indicated Level (in.)
Fuel Zone	-317 to -17	324	NA	-301

- 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:

Instrument	Highest Drywell Run Temperature (°F) Between Low	Highest Drywell Run Temperature (°F) Between High	Minimum Indicated Level (in.)
Narrow Range	—	278	0
(0 to +60 in.)	278	350	5
	350	450	13
	450	550	25

Instrument	Highest Drywell Run Temperature (°F) Between Low	High	Minimum Indicated Level (in.)
Wide Range	—	211	-150
(-150 to +60 in.)	211	250	-147
	250	350	-138
	350	450	-128
	450	550	-115
Shutdown Range	—	150	11
(-17 to +383)	150	250	25
	250	350	43
	350	450	67
	450	550	99

❷ [Heated reference leg instruments] may not be used to determine RPV water level during rapid RPV depressurization below 500 psig.

❸ Operation of HPCI, RCIC, HPCS, LPCS, or RHR with suction from the suppression pool and pump flow above the NPSH or vortex limit may result in equipment damage.

❹ Elevated suppression chamber pressure may trip the RCIC turbine on high exhaust pressure.

❺ Operation of HPCI or RCIC turbines with suction temperatures above [225°F (maximum allowable cooling water temperature for HPCI or RCIC lube oil)] may result in equipment damage.

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

❼ Reducing primary containment pressure will reduce the available NPSH for pumps taking suction from the suppression pool.

RPV CONTROL
EMERGENCY PROCEDURE 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 ([100°F < RPV water temperature < 212°F (cold shutdown conditions)]).

ENTRY CONDITIONS

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

- RPV water level below [+12 in. (low level scram setpoint)]
- RPV pressure above [1045 psig (high RPV pressure scram setpoint)]
- Drywell pressure above [2.0 psig (high drywell pressure scram setpoint)]
- A condition which requires reactor scram, and reactor power above [3% (APRM downscale trip)] or cannot be determined

OPERATOR ACTIONS

> If while executing the following steps, Primary Containment Flooding is or has been required, enter [procedure developed from the RPV and Primary Containment Flooding Severe Accident Guideline].

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

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 Emergency Procedure Guideline Contingency #5].
- RPV water level cannot be determined, enter [procedure developed from Emergency Procedure Guideline Contingency #4].

If while executing the following step primary containment water level and suppression chamber pressure cannot be maintained below Primary Containment Pressure Limit A, but only if adequate core cooling can be assured, terminate injection into the RPV from sources external to the primary containment.

RC/L-2 Restore and maintain RPV water level between [+12 in. (low level scram setpoint or shutdown cooling RPV water level interlock, whichever is higher)] and [+58 in. (high level trip setpoint)] with one or more of the following systems:

- Condensate/Feedwater
- CRD
- RCIC, with suction from the condensate storage tank if available, defeating low RPV pressure and high area temperature isolation interlocks and high suppression pool water level suction transfer logic if necessary. ❸❹❺
- HPCI, with suction from the condensate storage tank if available, defeating high area temperature isolation interlocks and high suppression pool water level suction transfer logic if necessary. ❸❺
- HPCS, with suction from the condensate storage tank if available, defeating high suppression pool water level suction transfer logic if necessary. ❸
- LPCS ❸
- LPCI, with injection through the heat exchangers as soon as possible. ❸
- [RHR through the shutdown cooling return, with injection through the heat exchangers as soon as possible, defeating isolation interlocks if necessary. ❸]

If RPV water level cannot be restored and maintained above [+12 in. (low level scram setpoint or shutdown cooling RPV water level interlock, whichever is higher)], maintain RPV water level above [-164 in. (top of active fuel)].

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

- [RHR Service Water crosstie
- Fire System
- Interconnections with other units
- ECCS Keep-Full
- SLC (test tank)
- SLC (boron tank)]

If RPV water level can be restored and maintained above [-164 in. (top of active fuel)] and the ADS timer has initiated, prevent automatic initiation of ADS.

If RPV water level cannot be restored and maintained above [-164 in. (top of active fuel)], enter [procedure developed from Emergency Procedure Guideline Contingency #1].

RC/P Monitor and control RPV pressure

If while executing the following steps:

- A high drywell pressure ECCS initiation signal ([2.0 psig (drywell pressure which initiates ECCS)]) exists, prevent injection from those LPCS 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 Withdrawal Position)] or it has been determined that the reactor will remain shutdown under all conditions without boron, rapidly depressurize the RPV with the main turbine bypass valves and IC, irrespective of the resulting cooldown rate. ❷
- Emergency RPV Depressurization is or has been required, enter [procedure developed from Emergency Procedure Guideline Contingency #2].
- RPV water level cannot be determined, enter [procedure developed from Emergency Procedure Guideline Contingency #4].

RC/P-1 If any SRV is cycling, initiate IC and manually open SRVs until RPV pressure drops to [935 psig (RPV pressure at which all turbine bypass valves are fully open)].

If while executing the following steps:

- Suppression pool temperature cannot be maintained below the Heat Capacity Temperature Limit, maintain RPV pressure below the Limit, irrespective of the resulting cooldown rate.
- Suppression pool water level cannot be maintained below the SRV Tail Pipe Level Limit, maintain RPV pressure below the Limit, irrespective of the resulting cooldown rate.
- Steam Cooling is required, enter [procedure developed from Emergency Procedure Guideline 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 a steam line break,

open MSIVs, bypassing MSL and Offgas high radiation interlocks and low RPV water level interlocks if necessary, to re-establish the main condenser as a heat sink.

RC/P-2 Stabilize RPV pressure at a pressure below [1045 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:

- IC
- SRVs, only when suppression pool water level is above [4 ft. 9 in. (elevation of top of SRV discharge device)], defeating pneumatic supply isolation interlocks and restoring the pneumatic supply if necessary; open SRVs in the following sequence if possible: [M, B, G, F, D, L, K, C, A (SRV opening sequence)]; if the continuous SRV pneumatic supply is or becomes unavailable, place the control switch for each SRV in the [CLOSE or AUTO] position.
- HPCI, with suction from the condensate storage tank if available. ❸❺
- RCIC, with suction from the condensate storage tank if available. ❸❹❺
- [Other steam driven equipment]
- RWCU (recirculation mode), bypassing [regenerative heat exchangers and] filter/demineralizers and, if necessary, defeating SLC and other isolation interlocks.
- MSL drains
- RWCU (blowdown mode), only if no boron has been injected into the RPV or it has been determined that the reactor will remain shutdown under all conditions without boron; refer to [sampling procedures] 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
- [213 pounds (Cold Shutdown Boron Weight)] of boron 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 the cooldown rate below [100°F/hr (RPV cooldown rate LCO)], defeating pneumatic supply isolation interlocks and restoring the pneumatic supply if necessary.

If one or more SRVs are being used to depressurize 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, continue to cool down to cold shutdown conditions ([100°F < RPV water temperature < 212°F (cold shutdown conditions)]) with shutdown cooling [using only those RHR pumps not required to maintain RPV water level above [10 in. (RPV water level shutdown cooling interlock)] by operation in the LPCI mode]. Maintain the cooldown rate below [100°F/hr (RPV cooldown rate LCO)].

If shutdown cooling cannot be established, maintain RPV pressure below the shutdown cooling RPV pressure interlock using one or more of the systems used for depressurization.

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 [scram procedure].
- It has been determined that the reactor will remain shutdown under all conditions without boron, terminate boron injection and enter [scram procedure].
- The reactor is shutdown and no boron has been injected into the RPV, enter [scram procedure].

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 an MSL is not isolated,] [or if any of the following systems are operating:

- Feedwater
- HPCI
- RCIC]

confirm or initiate recirculation flow runback to minimum.]

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

[RC/Q-5 If ARI has not initiated, initiate ARI.]

Execute [Steps RC/Q-6 and RC/Q-7] concurrently.

RC/Q-6 Either:

- When periodic neutron flux oscillations in excess of [25% (Large Oscillation Threshold)] peak-to-peak commence and continue, or
- Before suppression pool temperature reaches the Boron Injection Initiation Temperature,

BORON INJECTION IS REQUIRED; inject boron into the RPV with SLC and prevent automatic initiation of ADS.

If boron cannot be injected with SLC, inject boron into the RPV by one or more of the following alternate methods:

- CRD
- HPCS
- RWCU
- Feedwater
- HPCI
- RCIC
- Hydro pump

If while executing the following steps SLC tank water level drops to [0% (low SLC tank water level trip)], confirm automatic trip of or manually trip the SLC pumps.

RC/Q-6.1 If boron is not being injected into the RPV by RWCU and RWCU is not isolated, bypass [regenerative heat exchangers and] filter/demineralizers.

RC/Q-6.2 Continue to inject boron until [213 pounds (Cold Shutdown Boron Weight)] of boron have been injected into the RPV.

RC/Q-6.3 Enter [scram procedure].

RC/Q-7 Insert control rods as follows:

RC/Q-7.1 Reset ARI, defeating ARI logic trips if necessary.

RC/Q-7.2 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 RSCS and RWM interlocks if necessary.
- Vent control rod drive overpiston volumes.

PRIMARY CONTAINMENT CONTROL EMERGENCY PROCEDURE GUIDELINE

PURPOSE

The purpose of this guideline is to:

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

ENTRY CONDITIONS

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

- Suppression pool temperature above [95°F (most limiting suppression pool temperature LCO)]
- Drywell temperature above [135°F (drywell temperature LCO or maximum normal operating temperature, whichever is higher)]
- Containment temperature above [90°F (containment temperature LCO)]
- Drywell pressure above [2.0 psig (high drywell pressure scram setpoint)]
- Suppression pool water level above [12 ft. 6 in. (maximum suppression pool water level LCO)]
- Suppression pool water level below [12 ft. 2 in. (minimum suppression pool water level LCO)]
- Primary containment hydrogen concentration above [2% (high hydrogen alarm setpoint)]

OPERATOR ACTIONS

If while executing the following steps, Primary Containment Flooding is or has been required, enter [procedure developed from the Containment and Radioactivity Release Control Severe Accident Guideline].

If while executing the following steps: ❼

- Suppression pool sprays have been initiated, terminate suppression pool sprays before suppression chamber pressure drops to 0 psig.
- Drywell sprays have been initiated, terminate drywell sprays before drywell pressure drops to 0 psig.

If while executing the following steps Suppression Pool Spray is required, but only if [suppression chamber pressure is above the Mark III Containment Spray Initiation Pressure Limit] [suppression pool water level is below 24 ft. 6 in. (elevation of suppression pool spray nozzles)], initiate suppression pool sprays, defeating suppression pool spray interlocks if necessary. If [drywell and suppression chamber hydrogen concentration can be determined to be below 6% and drywell and suppression chamber oxygen concentration can be determined to be below 5%] [containment hydrogen concentration can be determined to be below the containment Hydrogen Deflagration Overpressure Limit], use only those pumps not required to assure adequate core cooling by continuous injection. Sources external to the primary containment may be used only if primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A. ❸

If while executing the following steps Drywell Spray is required and drywell sprays are not operating and [suppression pool water level is below [17 ft. 2 in. (elevation of bottom of internal suppression chamber 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, [shut down recirculation pumps and drywell cooling fans and] initiate drywell sprays, defeating drywell spray interlocks if necessary. If drywell and suppression chamber hydrogen concentration can be determined to be below 6% and drywell and suppression chamber oxygen concentration can be determined to be below 5%, use only those pumps not required to assure adequate core cooling by continuous injection. Sources external to the primary containment may be used only if primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A. ❸

If while executing the following steps Drywell Spray is required and drywell sprays are operating, continue to operate drywell sprays, defeating drywell spray interlocks if necessary. If drywell and suppression chamber hydrogen concentration can be determined to be below 6% and drywell and suppression chamber oxygen concentration can be determined to be below 5%, use only those pumps not required to assure adequate core cooling by continuous injection. Sources external to the primary containment may be used only if primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A. ❸

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

SP/T Monitor and control suppression pool temperature below [95°F (most limiting suppression pool temperature LCO)] using available suppression pool cooling. ❸

When suppression pool temperature cannot be maintained below [95°F (most limiting suppression pool temperature LCO)]:

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

SP/T-2 Before suppression pool temperature reaches the Boron Injection Initiation Temperature, enter [procedure developed from the RPV Control Emergency Procedure Guideline] at [Step RC-1] and execute it concurrently with this procedure.

SP/T-3 When suppression pool temperature and RPV pressure cannot be maintained below the Heat Capacity Temperature Limit, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

DW/T Monitor and control drywell temperature below [135°F (drywell temperature LCO or maximum normal operating temperature, whichever is higher)] using available drywell cooling. ❶

When drywell temperature cannot be maintained below [135°F (drywell temperature LCO or maximum normal operating temperature, whichever is higher)]:

DW/T-1 Operate all available drywell cooling, defeating isolation interlocks if necessary.

DW/T-2 Before drywell temperature reaches [340°F (maximum temperature at which ADS is qualified or drywell design temperature, whichever is lower)], DRYWELL SPRAY IS REQUIRED.

DW/T-3 When drywell temperature cannot be maintained below [340°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 Emergency Procedure Guideline] at [Step RC-1] and execute it concurrently with this procedure.

CN/T Monitor and control containment temperature below [90°F (containment temperature LCO)], using available containment cooling. ❶

When containment temperature cannot be maintained below [90°F (containment temperature LCO)]:

CN/T 1 Operate all available containment cooling, defeating isolation interlocks if necessary.

CN/T-2 Before containment temperature reaches [185°F (containment design temperature)], SUPPRESSION POOL SPRAY IS REQUIRED.

CN/T-3 When containment temperature cannot be maintained below [185°F (containment design temperature)], EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from the RPV Control Emergency Procedure Guideline] at [Step RC-1] and execute it concurrently with this procedure.

PC/P Monitor and control primary containment pressure below [2.0 psig (high drywell pressure scram setpoint)] using the following systems:

- Containment pressure control systems; use [containment pressure control system operating procedures].
- SBGT [and drywell purge]; use [SBGT and drywell purge operating procedures].

When primary containment pressure cannot be maintained below [2.0 psig (high drywell pressure scram setpoint)]:

PC/P-1 Before suppression chamber pressure reaches [the Pressure Suppression Pressure] [13.8 psig (Suppression Chamber Spray Initiation Pressure)], SUPPRESSION POOL SPRAY IS REQUIRED.

PC/P-2 When suppression chamber pressure exceeds [13.8 psig (Suppression Chamber Spray Initiation Pressure)] DRYWELL SPRAY IS REQUIRED.

PC/P-3 When suppression chamber pressure cannot be maintained below the Pressure Suppression Pressure, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

PC/P-4 Before suppression chamber pressure reaches Primary Containment Pressure Limit A, vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, to control pressure below Primary Containment Pressure Limit A.

[PC/P-5 When suppression chamber pressure exceeds Primary Containment Pressure Limit A, vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate or whether adequate core cooling is assured, to control pressure below Primary Containment Pressure Limit A.]

SP/L Monitor and control suppression pool water level.

SP/L-1 Maintain suppression pool water level between [12 ft. 6 in. (maximum suppression pool water level LCO)] and [12 ft. 2 in. (minimum suppression pool water level LCO)]; refer to [sampling procedure] prior to discharging water; [suppression pool makeup may be augmented by SPMS].

If SPMS has been initiated, maintain suppression pool water level between [23 ft. 9 in. (SPMS initiation setpoint plus suppression pool water level increase which results from SPMS operation)] and [19 ft. 11 in. (minimum suppression pool water level LCO)].

If suppression pool water level cannot be maintained above [12 ft. 2 in. (minimum suppression pool water level LCO)], execute [Step SP/L-2].

If suppression pool water level cannot be maintained below [12 ft. 6 in. (maximum suppression pool water level LCO)] ([23 ft. 9 in. (SPMS initiation setpoint plus suppression pool water level increase which results from SPMS operation)] if SPMS has been initiated), execute [Step SP/L-3].

SP/L-2 SUPPRESSION POOL WATER LEVEL BELOW [12 ft. 2 in. (minimum suppression pool water level LCO)]

Execute [Steps SP/L-2.1 and SP/L-2.2] concurrently.

SP/L-2.1 Maintain suppression pool water level above [8 ft. 0 in. (elevation of the downcomer openings)] [16 ft. 1 in. (2 ft. above the elevation of the top of the horizontal vents)].

If suppression pool water level cannot be maintained above [8 ft. 0 in. (elevation of the downcomer openings)] [16 ft. 1 in. (2 ft. above the elevation of the top of the horizontal vents)], EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from the RPV Control Emergency Procedure Guideline] at [Step RC-1] and execute it concurrently with this procedure.

SP/L-2.2 Maintain suppression pool water level above [8 ft. 0 in. (elevation of the top of the HPCI exhaust)].

If suppression pool water level cannot be maintained above [8 ft. 0 in. (elevation of the top of the HPCI exhaust)], secure HPCI irrespective of whether adequate core cooling is assured.

SP/L-3 SUPPRESSION POOL WATER LEVEL ABOVE [12 ft. 6 in. (maximum suppression pool water level LCO)] ([23 ft. 9 in. (SPMS initiation setpoint plus suppression pool water level increase which results from SPMS operation)] if SPMS has been initiated)

Execute [Steps SP/L-3.1 and SP/L-3.2] concurrently.

SP/L-3.1 Maintain suppression pool water level below the SRV Tail Pipe Level Limit.

If suppression pool water level cannot be maintained below the SRV Tail Pipe Level Limit, enter [procedure developed from the RPV Control Emergency Procedure Guideline] at [Step RC-1] and execute it concurrently with this procedure.

If suppression pool water level and RPV pressure cannot be maintained below the SRV Tail Pipe Level Limit but only if adequate core cooling is assured, terminate injection into the RPV from sources external to the primary containment except from systems required to shut down the reactor.

If suppression pool water level and RPV pressure cannot be restored and maintained below the SRV Tail Pipe Level Limit, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

SP/L-3.2 Maintain suppression pool water level below [17 ft. 2 in. (elevation of bottom of internal suppression chamber to drywell vacuum breakers less vacuum breaker opening pressure in feet of water)].

If suppression pool water level cannot be maintained below [17 ft. 2 in. (elevation of bottom of internal suppression chamber 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 systems required to shut down the reactor.

PC/G 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 suppression chamber for hydrogen and oxygen in accordance with [sampling procedure].

Control hydrogen and oxygen concentrations in the drywell as follows:

		Drywell Oxygen Concentration			
		< 5%	≥ 5% or cannot be determined to be below 5%		
			Suppression Chamber Hydrogen Concentration		
			None Detected	< 6%	≥ 6% or cannot be determined to be below 6%
Drywell Hydrogen Concentration	None Detected	No action required	[PC/G-1]	[PC/G-2]	[PC/G-3]
	< 6%	[PC/G-1]			
	≥ 6% or cannot be determined to be below 6%				

Control hydrogen and oxygen concentrations in the suppression chamber as follows:

		Suppression Chamber Oxygen Concentration			
		< 5%	≥ 5% or cannot be determined to be below 5%		
			Drywell Hydrogen Concentration		
			None Detected	< 6%	≥ 6% or cannot be determined to be below 6%
Suppression Chamber Hydrogen Concentration	None Detected	No action required	[PC/G-4]	[PC/G-5]	[PC/G-6]
	< 6%	[PC/G-4]			
	≥ 6% or cannot be determined to be below 6%				

PC/G-1 Reduce drywell hydrogen and oxygen concentrations by one or both of the following methods:

- If the offsite radioactivity release rate is expected to remain below the offsite release rate specified in [Technical Specifications], vent and purge the drywell as follows, defeating isolation interlocks (except high radiation interlocks) if necessary:

  > If while executing the following steps the offsite radioactivity release rate reaches the offsite release rate specified in [Technical Specifications], secure the drywell vent and purge.

  (1) Refer to [sampling procedure].

  (2) Vent the drywell.

  (3) If the drywell can be vented, purge the drywell by injecting nitrogen into the drywell.

  (4) When drywell oxygen concentration is below 5% and hydrogen is no longer detected in the drywell, secure the drywell vent and purge.

- If drywell [and suppression chamber] hydrogen and oxygen concentrations are within the limits for recombiner operation:

  (1) Place hydrogen recombiners in service taking suction on the drywell and operate the drywell hydrogen mixing system.

  (2) When [either] drywell [or suppression chamber] hydrogen and oxygen concentrations are no longer within the limits for recombiner operation, secure all hydrogen recombiners taking suction on the drywell.

PC/G-2 Reduce drywell hydrogen and oxygen concentrations by the following methods:

- If adequate core cooling is not assured or the offsite radioactivity release rate is expected to remain below the offsite radioactivity release rate which requires a General Emergency, vent and purge the drywell as follows, defeating isolation interlocks if necessary:

  > If while executing the following steps adequate core cooling is assured and it has been determined that the offsite radioactivity release rate has reached the offsite radioactivity release rate which requires a General Emergency, secure the drywell vent and purge.

  (1) Vent the drywell.

  (2) If the drywell can be vented, purge the drywell by injecting nitrogen into the drywell at the maximum rate.

  (3) When drywell oxygen concentration is below 5% and hydrogen is not detected in the drywell, secure vent and purge not required by other steps in the [procedures developed from the Emergency Procedure Guidelines].

- If drywell [and suppression chamber] hydrogen and oxygen concentrations are within the limits for recombiner operation:

  (1) Place hydrogen recombiners in service taking suction on the drywell and operate the drywell hydrogen mixing system.

  (2) When [either] drywell [or suppression chamber] hydrogen and oxygen concentrations are no longer within the limits for recombiner operation, secure all hydrogen recombiners taking suction on the drywell.

PC/G-3 EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from the RPV Control Emergency Procedure Guideline] at [Step RC-1] and execute it concurrently with this procedure; secure the drywell hydrogen mixing system and all recombiners taking suction on the drywell and, irrespective of the offsite radioactivity release rate, vent and purge the drywell as follows, defeating isolation interlocks if necessary:

PC/G-3.1 Vent the drywell.

PC/G-3.2 If the drywell can be vented, purge the drywell by injecting air or nitrogen, whichever will more rapidly return hydrogen concentrations to below 6% or oxygen concentration to below 5%, into the drywell at the maximum rate.

PC/G-3.3 DRYWELL SPRAY IS REQUIRED.

PC/G-4 Reduce suppression chamber hydrogen and oxygen concentrations by one or both of the following methods:

- If the offsite radioactivity release rate is expected to remain below the offsite release rate specified in [Technical Specifications], vent and purge the suppression chamber as follows, defeating isolation interlocks (except high radiation interlocks) if necessary:

> If while executing the following steps the offsite radioactivity release rate reaches the offsite release rate specified in [Technical Specifications], secure the suppression chamber vent and purge.

(1) Refer to [sampling procedure].

(2) If suppression pool water level is below [26 ft. 9 in. (elevation of the bottom of the suppression chamber vent)], vent the suppression chamber.

(3) If the suppression chamber can be vented, purge the suppression chamber by injecting nitrogen into the suppression chamber.

(4) When suppression chamber oxygen concentration is below 5% and hydrogen is no longer detected in the suppression chamber, secure the suppression chamber vent and purge.

- If suppression chamber [and drywell] hydrogen and oxygen concentrations are within the limits for recombiner operation:

(1) Place hydrogen recombiners in service taking suction on the [suppression chamber] [drywell].

(2) When [either] suppression chamber [or drywell] hydrogen and oxygen concentrations are no longer within the limits for recombiner operation, secure all hydrogen recombiners taking suction on the [suppression chamber] [drywell].

PC/G-5 Reduce suppression chamber hydrogen and oxygen concentrations by the following methods:

- If adequate core cooling is not assured or the offsite radioactivity release rate is expected to remain below the offsite release rate which requires a General Emergency, vent and purge the suppression chamber as follows, defeating isolation interlocks if necessary:

> If while executing the following steps adequate core cooling is assured and it has been determined that the offsite radioactivity release rate has reached the offsite release rate which requires a General Emergency, secure the suppression chamber vent and purge.

(1) If suppression pool water level is below [26 ft. 9 in. (elevation of the bottom of the suppression chamber vent)], vent the suppression chamber.

(2) If the suppression chamber can be vented, purge the suppression chamber by injecting nitrogen into the suppression chamber at the maximum rate.

(3) When suppression chamber oxygen concentration is below 5% and hydrogen is not detected in the suppression chamber, secure vent and purge not required by other steps in the [procedures developed from the Emergency Procedure Guidelines].

- If suppression chamber [and drywell] hydrogen and oxygen concentrations are within the limits for recombiner operation:

(1) Place hydrogen recombiners in service taking suction on the [suppression chamber] [drywell].

(2) When [either] suppression chamber [or drywell] hydrogen and oxygen concentrations are no longer within the limits for recombiner operation, secure all hydrogen recombiners taking suction on the [suppression chamber] [drywell].

PC/G-6 EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from the RPV Control Emergency Procedure Guideline] at [Step RC-1] and execute it concurrently with this procedure; secure all recombiners taking suction on the suppression chamber and, irrespective of the offsite radioactivity release rate, vent and purge the suppression chamber as follows, defeating isolation interlocks if necessary:

PC/G-6.1 SUPPRESSION POOL SPRAY IS REQUIRED.

PC/G-6.2 If suppression pool water level is below [26 ft. 9 in. (elevation of the bottom of the suppression chamber vent)], vent the suppression chamber.

PC/G-6.3 If the suppression chamber can be vented, purge the suppression chamber by injecting air or nitrogen, whichever will more rapidly return hydrogen concentration to below 6% or oxygen concentration to below 5%, into the suppression chamber at the maximum rate.

PC/G Monitor and control drywell and containment hydrogen concentrations.

If while executing the following steps:

- The hydrogen monitoring system is or becomes unavailable, sample the drywell and containment for hydrogen in accordance with [sampling procedure].
- The igniters are deenergized and either containment hydrogen concentration cannot be determined to be below the containment Hydrogen Deflagration Overpressure Limit or drywell hydrogen concentration cannot be determined to be below [9% (drywell Hydrogen Deflagration Overpressure Limit)], prevent operation of the igniters until containment hydrogen concentration can be determined to be below the containment Hydrogen Deflagration Overpressure Limit and drywell hydrogen concentration can be determined to be below [9% (drywell Hydrogen Deflagration Overpressure Limit)].
- The igniters are deenergized and containment hydrogen concentration cannot be determined to be below the containment Hydrogen Deflagration Overpressure Limit, secure and prevent operation of the drywell hydrogen mixing systems and recombiners and, irrespective of the offsite radioactivity release rate, vent and purge the containment, defeating isolation interlocks if necessary, in accordance with [Steps PC/G-5.1 through PC/G-5.4] until the containment hydrogen concentration can be determined to be below the containment Hydrogen Deflagration Overpressure Limit.

PC/G-1 If containment hydrogen concentration is below the containment Hydrogen Deflagration Overpressure Limit and drywell hydrogen concentration is below [9% (drywell Hydrogen Deflagration Overpressure Limit)], energize the hydrogen igniters.

Execute [Steps PC/G-2, PC/G-3 and PC/G-4] concurrently.

PC/G-2 When hydrogen is detected in the containment or drywell, but only if the offsite radioactivity release rate is expected to remain below the offsite release rate specified in [Technical Specifications], vent and purge the containment as follows, defeating isolation interlocks (except high radiation interlocks) if necessary:

> If while executing the following steps the offsite radioactivity release rate reaches the offsite release rate specified in [Technical Specifications], secure the containment vent and purge.

PC/G-2.1 Refer to [sampling procedure].

PC/G-2.2 Vent the containment.

PC/G 2.3 If the containment can be vented, initiate and maximize the containment purge.

PC/G-2.4 When hydrogen is no longer detected in the containment or drywell, secure the vent and purge.

PC/G-3 Monitor and control hydrogen concentration in the drywell.

PC/G-3.1 When hydrogen is detected in the drywell, but only if containment hydrogen concentration is below the containment Hydrogen Deflagration Overpressure Limit [and RPV pressure is below Primary Containment Pressure Limit A], operate the drywell hydrogen mixing system.

PC/G-3.2 Continue in this procedure at [Step PC/G-5].

PC/G-4 Monitor and control hydrogen concentration in the containment.

PC/G-4.1 When containment hydrogen concentration reaches [1% (minimum hydrogen concentration for recombiner operation)], but only if containment hydrogen concentration is below [6% (maximum hydrogen concentration for recombiner operation)] and the containment Hydrogen Deflagration Overpressure Limit, place hydrogen recombiners in service.

PC/G-4.2 When containment hydrogen concentration reaches [6% (maximum hydrogen concentration for recombiner operation)] or the containment Hydrogen Deflagration Overpressure Limit, secure hydrogen recombiners.

PC/G-5 When containment hydrogen concentration reaches the containment Hydrogen Deflagration Overpressure Limit, vent and purge the containment as follows, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, to restore and maintain containment hydrogen concentration below the containment Hydrogen Deflagration Overpressure Limit:

PC/G-5.1 SUPPRESSION POOL SPRAY IS REQUIRED.

PC/G-5.2 If the igniters are de-energized, secure the drywell hydrogen mixing system.

PC/G-5.3 Vent the containment.

PC/G 5.4 If the containment can be vented, initiate and maximize containment purge.

PC/G-6 When containment hydrogen concentration can be maintained below the containment Hydrogen Deflagration Overpressure Limit, return to Step PC/G-1.

SECONDARY CONTAINMENT CONTROL EMERGENCY PROCEDURE 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
- A HVAC cooler differential temperature above the maximum normal operating differential temperature
- A HVAC exhaust radiation level above the maximum normal operating radiation level
- An area radiation level above the maximum normal operating radiation level
- A floor drain sump water level above the maximum normal operating water level
- An area water level above the maximum normal operating water level

OPERATOR ACTIONS

If while executing the following steps, Primary Containment Flooding is or has been required, enter [procedure developed from the Containment and Radioactivity Release Control Severe Accident Guideline].

If while executing the following steps secondary containment HVAC exhaust radiation level exceeds [20 mr/hr (secondary containment HVAC isolation setpoint)]:

- Confirm or manually initiate isolation of secondary containment HVAC, and
- Confirm initiation of or manually initiate SBGT.

If while executing the following steps:

- Secondary containment HVAC isolates, and,
- Secondary containment HVAC exhaust radiation level is below [20 mr/hr (secondary containment HVAC isolation setpoint)],

restart secondary containment HVAC, 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. [1]

SC/T-1 Operate available area coolers.

SC/T-2 If secondary containment HVAC exhaust radiation level is below [20 mr/hr (secondary containment HVAC isolation setpoint)], operate available secondary containment HVAC.

SC/T-3 When an area temperature exceeds its maximum normal operating temperature, isolate all systems that are discharging into the area except systems required to suppress a fire and systems required to be operated by [procedures developed from the Emergency Procedure Guidelines].

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, enter [procedure developed from the RPV Control Emergency Procedure 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 in more than one area, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

SC/T-5 When an area temperature exceeds its maximum safe operating temperature 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, isolate all systems that are discharging into the area except systems required to suppress a fire and systems required to be operated by [procedures developed from the Emergency Procedure Guidelines].

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, enter [procedure developed from the RPV Control Emergency Procedure 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 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 in more than one area, shut down the reactor.

SC/L Monitor and control secondary containment water levels.

SC/L-1 When a floor drain sump or area water level is above its maximum normal operating water level, operate available sump pumps to restore and maintain it below its maximum normal operating water level.

If any floor drain sump or area water level cannot be restored and maintained below its maximum normal operating water level, isolate all systems that are discharging water into the sump or area except systems required to suppress a fire and systems required to be operated by [procedures developed from the Emergency Procedure Guidelines].

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, enter [procedure developed from the RPV Control Emergency Procedure 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 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 in more than one area, shut down the reactor.

TABLE SC-1
SECONDARY CONTAINMENT PARAMETER OPERATING VALUES

Secondary Containment Parameter	Max Normal Operating Value	Max Safe Operating Value
Area Temperature	°F	°F
RWCU "A" pump room 158′	130	215
RWCU "B" pump room 158′	130	215
RWCU Hx room 158′ at Hxs	130	215
RWCU Hx room 158′ at discharge to hotwell	130	215
RWCU phase separator room 158′	130	215
RWCU holding pump room 185′	130	215
NE Diagonal	175	214
SE Diagonal	175	214
HPCI room, area A	175	214
HPCI room, area B	175	214
HPCI room, area C	175	214
Torus room, west wall	175	214
Torus room, east wall	175	214
Torus room, north wall	175	214
Torus room, south wall	175	214
Main steam tunnel	200	215
SE, Reactor 130′ area A	150	214
SE, Reactor 130′ area B	150	214
NW Diagonal, area A	175	310
NW Diagonal, area B	175	310
NW Diagonal, area C	175	310

TABLE SC-1 (continued)

Secondary Containment Parameter	Max Normal Operating Value
HVAC Cooler Differential Temperature	°F
RWCU "A" pump room 158'	75
RWCU "B" pump room 158'	75
RWCU Hx room 158' at Hxs	75
RWCU Hx room 158' at discharge to hotwell	75
RWCU phase separator room 158'	75
RWCU holding pump room 185'	75
Torus room, NW A	50
Torus room, west A	50
Torus room, NW B	50
Torus room, west B	50
Torus room, NW C	50
Torus room, west C	50
Torus room, NW D	50
Torus room, west D	50

TABLE SC-1 (continued)

Secondary Containment Parameter	Max Normal Operating Value	Max Safe Operating Value
HVAC Exhaust Radiation Level	mr/hr	mr/hr
Reactor Building	50	NA
Refuel floor	50	NA
Area Radiation Level	mr/hr	mr/hr
158′ southeast area	50	1250
158′ northeast area	50	1250
158′ northwest area	50	1250
130′ northeast area	50	1250
130′ northwest area	50	1250
Decontamination pump and equipment room	50	1250
South CRD hydraulic units	50	1250
Spent fuel pool passageway	50	1250
185′ operating floor	50	1250
185′ sample panel area	50	1250
185′ RWCU control panel area	50	1250
Fuel pool demin panel area	50	1250
CRD repair area	50	1250
RCIC equipment area	50	1250
CRD pump room SW	50	1250
RHR and core spray room northeast	50	1250
RHR and core spray room southeast	150	1250

TABLE SC-1 (continued)

Secondary Containment Parameter	Max Normal Operating Value	Max Safe Operating Value
Floor Drain Sump Water Level	in.	in.
Sump A (NE diagonal)	47	NA
Sump B (NW diagonal)	52	NA
Area Water Level	in.	in.
CRD compartment	7	260
RCIC compartment	7	22
RB NE corner room	7	14
RB SE corner room	7	15
HPCI compartment	7	14
Torus compartment NW	7	11
Torus compartment NE	7	11
Torus compartment SE	7	11
Torus compartment SW	7	11

RADIOACTIVITY RELEASE CONTROL EMERGENCY PROCEDURE 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, Primary Containment Flooding is or has been required, enter [procedure developed from the Containment and Radioactivity Release Control Severe Accident Guideline].

> If while executing the following steps HVAC in the turbine building (or any other building which may be contributing to radioactive release) is shutdown [or isolated due to high radiation], restart the HVAC as required, defeating isolation interlocks if necessary.

RR-1 Isolate all primary systems that are discharging into areas outside the primary and secondary containments except systems required to be operated by [procedures developed from the Emergency Procedure Guidelines].

RR-2 Before offsite radioactivity release rate reaches 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 Emergency Procedure Guideline] at [Step RC-1] and execute it concurrently with this procedure.

EMERGENCY PROCEDURE GUIDELINE
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 Emergency Procedure Guideline Contingency #5].
- RPV water level cannot be determined, enter [procedure developed from Emergency Procedure Guideline Contingency #4].
- RPV water level is increasing, enter [procedure developed from the RPV Control Emergency Procedure Guideline] at [Step RC/L].

If while executing the following steps primary containment water level and suppression chamber pressure cannot be maintained below Primary Containment Pressure Limit A, but only if adequate core cooling can be assured, terminate injection into the RPV from sources external to the primary containment.

C1-1 Prevent automatic initiation of ADS.

C1-2 Initiate IC.

C1-3 Line up for injection, start pumps, and irrespective of pump NPSH and vortex limits, maximize injection into the RPV using the following systems:

- Condensate/Feedwater
- CRD
- RCIC, with suction from the condensate storage tank if available, defeating low RPV pressure and high area temperature isolation interlocks and high suppression pool water level suction transfer logic if necessary. ❹
- HPCI, with suction from the condensate storage tank if available, defeating high area temperature isolation interlocks and high suppression pool water level suction transfer logic if necessary.
- HPCS, with suction from the condensate storage tank if available, defeating high suppression pool water level suction transfer logic if necessary
- LPCS
- LPCI, with injection through the heat exchangers as soon as possible.
- RHR through the shutdown cooling return, with injection through the heat exchangers as soon as possible, defeating isolation interlocks if necessary.

Injection may be augmented by one or more of the following alternate injection subsystems:

- RHR Service Water crosstie
- Fire System
- Interconnections with other units
- ECCS Keep-Full
- SLC (test tank)
- SLC (boron tank)

If less than 2 of the following injection subsystems can be lined up:

- Condensate
- HPCS
- RHR-A
- RHR-B
- RHR-C
- LPCS-A
- LPCS-B

commence preparing as many of the alternate injection subsystems as possible for injection.

C1-4 When RPV water level drops to [-164 in. (top of active fuel)], if no injection subsystem is lined up for injection with at least one pump running, line up for injection, start pumps, and increase injection flow to the maximum with alternate injection subsystems.

If:

- RPV water level cannot be maintained above [-195 in. (Minimum Steam Cooling RPV Water Level)] without Emergency RPV Depressurization, and
- Pumps capable of restoring and maintaining RPV water level above [-195 in. (Minimum Steam Cooling RPV Water Level)] following Emergency RPV Depressurization are running and lined up for injection,

then before RPV water level drops to [-195 in. (Minimum Steam Cooling RPV Water Level)], EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

C1-5 When RPV water level drops to [-195 in. (Minimum Steam Cooling RPV Water Level)]:

- If any system, injection subsystem, or alternate injection subsystem is lined up with at least one pump running and RPV water level cannot be restored and maintained above [-195 in. (Minimum Steam Cooling RPV Water Level)]:
  (1) EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; line up for injection, start pumps, and irrespective of pump NPSH and vortex limits, increase injection flow to the maximum with all systems, injection subsystems, and alternate injection subsystems.
  (2) If RPV water level cannot be restored and maintained above [-195 in. (Minimum Steam Cooling RPV Water Level)], PRIMARY CONTAINMENT FLOODING IS REQUIRED; enter [procedure developed from the RPV and Primary Containment Flooding Severe Accident Guideline].
- If no system, injection subsystem, or alternate injection subsystem is lined up with at least one pump running:
  (1) STEAM COOLING IS REQUIRED.
  (2) When Emergency RPV Depressurization is required, if RPV water level cannot be restored and maintained above [-195 in. (Minimum Steam Cooling RPV Water Level)], PRIMARY CONTAINMENT FLOODING IS REQUIRED; enter [procedure developed from the RPV and Primary Containment Flooding Severe Accident Guideline].

EMERGENCY PROCEDURE GUIDELINE
CONTINGENCY #2
EMERGENCY RPV DEPRESSURIZATION

If while executing the following steps Primary Containment Flooding is or has been required, enter [procedure developed from the RPV and Primary Containment Flooding Severe Accident Guideline].

If while executing the following steps RPV Flooding is required, enter [procedure developed from Emergency Procedure Guideline Contingency #4].

If while executing the following steps it is anticipated that primary containment water level will rise above [56 ft. 3 in. (elevation of the inboard main steam line drain valve motor operator or elevation of the lowest SRV pneumatic solenoid, whichever is lower)], open the inboard main steam line drain valve before primary containment water level reaches [56 ft. 3 in. (elevation of the inboard main steam line drain valve motor operator or elevation of the lowest SRV pneumatic solenoid, whichever is lower)], defeating isolation interlocks if necessary.

C2-1 When either: ❷

- All control rods can be determined to be 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
- All injection into the RPV except from boron injection systems, CRD, and RCIC has been terminated and prevented,

C2-1.1 If a high drywell pressure ECCS initiation signal ([2.0 psig (drywell pressure which initiates ECCS)]) exists, prevent injection from those LPCS and LPCI pumps not required to assure adequate core cooling.

C2-1.2 Initiate IC.

C2-1.3 Rapidly depressurize the RPV as follows, irrespective of the resulting cooldown rate:

If suppression pool water level is above [4 ft. 9 in. (elevation of top of SRV discharge device)], open all ADS valves, defeating pneumatic supply isolation interlocks and restoring the pneumatic supply if necessary.

If any ADS valve cannot be opened, but only if suppression pool water level is above [4 ft. 9 in. (elevation of top of SRV discharge device)], open other SRVs until [7 (number of SRVs dedicated to ADS)] valves are open.

If less than [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs are open and RPV pressure is at least [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure:

(1) Rapidly depressurize the RPV, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, using one or more of the following, until RPV pressure is less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure:

- IC
- Main condenser
- RHR (steam condensing mode)
- [Other steam driven equipment]
- RWCU (recirculation mode), bypassing [regenerative heat exchangers and] filter/demineralizers
- MSL drains
- RWCU (blowdown mode), only if no boron has been injected into the RPV or it has been determined that the reactor will remain shutdown under all conditions without boron.
- HPCI steam line
- RCIC steam line
- Head vent
- IC tube side vent
- Shutdown cooling, only if no boron has been injected into the RPV or it has been determined that the reactor will remain shutdown under all conditions without boron [, using only those RHR pumps not required to maintain RPV water level above [10 in. (RPV water level shutdown cooling interlock)] by operation in the LPCI mode].

(2) Maintain RPV pressure less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure using one or more of the systems used for depressurization.

If while executing the following step:

- Less than [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs are open and RPV pressure is at least [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure, or
- The reactor is not shutdown,

return to [Step C2-1.3].

C2-2 When the shutdown cooling RPV pressure interlock clears and 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
- [213 pounds (Cold Shutdown Boron Weight)] of boron have been injected into the RPV, or
- The reactor is shutdown and no boron has been injected into the RPV,

continue to cool down to cold shutdown conditions ([100°F < RPV water temperature < 212°F (cold shutdown conditions)]) with shutdown cooling [using only those RHR pumps not required to maintain RPV water level above [10 in. (RPV water level shutdown cooling interlock)] by operation in the LPCI mode].

If shutdown cooling cannot be established and further cooldown is required, continue to cool down to cold shutdown conditions ([100°F < RPV water temperature < 212°F (cold shutdown conditions)]), defeating isolation interlocks if necessary, using one or more of the following:

- IC
- SRVs
- Main condenser
- RHR (steam condensing mode)

- [Other steam driven equipment]
- RWCU (recirculation mode), bypassing [regenerative heat exchangers and] filter/demineralizers.
- MSL drains
- RWCU (blowdown mode), only if no boron has been injected into the RPV or it has been determined that the reactor will remain shutdown under all conditions without boron; refer to [sampling procedures] prior to initiating blowdown.
- HPCI steam line
- RCIC steam line
- Head vent
- IC tube side vent

EMERGENCY PROCEDURE GUIDELINE
CONTINGENCY #3
STEAM COOLING

If while executing the following steps Primary Containment Flooding is or has been required, enter [procedure developed from the RPV and Primary Containment Flooding Severe Accident Guideline].

If while executing the following steps:

- Emergency RPV Depressurization is required, enter [procedure developed from Emergency Procedure Guideline Contingency #2].
- RPV water level cannot be determined, enter [procedure developed from Emergency Procedure Guideline Contingency #4].
- Any system, injection subsystem, or alternate injection subsystem is lined up for injection with at least one pump running and RPV water level cannot be restored and maintained above [-195 in. (Minimum Steam Cooling RPV Water Level)], EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from Emergency Procedure Guideline Contingency #2].
- RPV water level is increasing, enter [procedure developed from the RPV Control Emergency Procedure Guideline] at [Step RC/P-2].
- One or more SRVs are being used to stabilize RPV pressure and the continuous SRV pneumatic supply is or becomes unavailable, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from Emergency Procedure Guideline Contingency #2].

C3-1 Confirm initiation of IC.

C3-2 Stabilize RPV pressure using one or more of the following systems:

- IC
- SRVs, only when suppression pool water level is above [4 ft. 9 in. (elevation of top of SRV discharge device)], defeating pneumatic supply isolation interlocks and restoring the pneumatic supply if necessary; open SRVs in the following sequence if possible: [M, B, G, F, D, L, K, C, A (SRV opening sequence)].
- HPCI, with suction from the condensate storage tank if available, defeating interlocks if necessary. ❸ ❺
- RCIC, with suction from the condensate storage tank if available, defeating interlocks if necessary ❸ ❹ ❺
- RWCU (recirculation mode), bypassing [regenerative heat exchangers and] filter/demineralizers and defeating isolation interlocks if necessary.

If RPV pressure cannot be stabilized and is increasing, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from Emergency Procedure Guideline Contingency #2].

C3-3 When RPV water level drops to [-208 in. (Minimum Zero-Injection RPV Water Level)], EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from Emergency Procedure Guideline Contingency #2].

EMERGENCY PROCEDURE GUIDELINE
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 not been determined that the reactor will remain shutdown under all conditions without boron, enter [procedure developed from Emergency Procedure Guideline Contingency #5] and [procedure developed from the RPV Control Emergency Procedure Guideline] at [Step RC/P].
- 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 Emergency Procedure Guideline] at [Steps RC/L and RC/P].

If while executing the following steps primary containment water level and suppression chamber pressure cannot be maintained below Primary Containment Pressure Limit A, but only if adequate core cooling can be assured, terminate injection into the RPV from sources external to the primary containment.

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, defeating interlocks as required.

C4-1.2 If suppression pool water level is above [4 ft. 9 in. (elevation of top of SRV discharge device)], open all ADS valves, irrespective of the resultant RPV cooldown rate, defeating pneumatic supply isolation interlocks and restoring the pneumatic supply if necessary.

If any ADS valve cannot be opened, but only if suppression pool water level is above [4 ft. 9 in. (elevation of top of SRV discharge device)], open other SRVs until [7 (number of SRVs dedicated to ADS)] are open.

C4-1.3 If at least [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs can be opened, close the MSIVs, main steam line drain valves, and IC, RCIC, and RHR steam condensing isolation valves.

C4-1.4 When RPV pressure is below the Minimum Alternate RPV Flooding Pressure or less than [4 (Minimum Number of SRVs Required for Emergency Depressurization)] are open, commence and, irrespective of pump NPSH and vortex limits, slowly increase injection into the RPV with the following systems to establish at least [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs open and RPV pressure above the Minimum Alternate RPV Flooding Pressure: 6

Minimum Alternate RPV Flooding Pressure

NUMBER OF OPEN SRVs	RPV PRESSURE (psig)
7 or more	94
6	112
5	137
4	175

- Motor driven feedwater pumps, defeating high RPV water level isolation interlocks if necessary.
- Condensate pumps
- CRD
- LPCI, with injection through the heat exchangers as soon as possible.
- RHR through the shutdown cooling return, with injection through the heat exchangers as soon as possible, defeating isolation interlocks if necessary.

If required to open at least [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs or to increase RPV pressure to above the Minimum Alternate RPV Flooding Pressure, use the following systems, irrespective of pump NPSH and vortex limits:

- LPCI, with injection through the heat exchangers as soon as possible.
- HPCS, with suction from the condensate storage tank if available, defeating high suppression pool water level and high RPV water level isolation interlocks if necessary.
- LPCS

- RHR Service Water crosstie
- Fire System
- Interconnections with other units
- ECCS Keep-Full

If less than [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs can be opened or RPV pressure cannot be increased to above the Minimum Alternate RPV Flooding Pressure, PRIMARY CONTAINMENT FLOODING IS REQUIRED; enter [procedure developed from the RPV and Primary Containment Flooding Severe Accident Guideline].

C4-1.5 When at least [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs are open and RPV pressure is above the Minimum Alternate RPV Flooding Pressure, control injection to maintain at least [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs open and RPV pressure above the Minimum Alternate RPV Flooding Pressure but as low as practicable.

If less than [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs can be opened or RPV pressure cannot be restored and maintained above the Minimum Alternate RPV Flooding Pressure, PRIMARY CONTAINMENT FLOODING IS REQUIRED; enter [procedure developed from the RPV and Primary Containment Flooding Severe Accident Guideline].

C4-1.6 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 Flood the RPV as follows:

C4-2.1 If suppression pool water level is above [4 ft. 9 in. (elevation of top of SRV discharge device)], open all ADS valves, irrespective of the resultant RPV cooldown rate, defeating pneumatic supply isolation interlocks and restoring the pneumatic supply if necessary.

If any ADS valve cannot be opened, but only if suppression pool water level is above [4 ft. 9 in. (elevation of top of SRV discharge device)], open other SRVs until [7 (number of SRVs dedicated to ADS)] are open.

C4-2.2 If at least [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs can be opened, close the MSIVs, main steam line drain valves, and IC, RCIC, and RHR steam condensing isolation valves.

C4-2.3 Commence and, irrespective of pump NPSH and vortex limits, increase injection into the RPV to establish:

- At least [4 (Minimum Number of SRVs Required for Emergency Depressurization] SRVs open, and
- RPV pressure not decreasing, and
- RPV pressure [50 psig (Minimum RPV Flooding Pressure)] or more above suppression chamber pressure

using the following systems:

- HPCS, with suction from the condensate storage tank if available, defeating high suppression pool water level and high RPV water level isolation interlocks if necessary.
- Motor driven feedwater pumps, defeating high RPV water level isolation interlocks if necessary.
- LPCS
- LPCI, with injection through the heat exchangers as soon as possible.
- [RHR through the shutdown cooling return, with injection through the heat exchangers as soon as possible, defeating isolation interlocks if necessary.]
- Condensate pumps
- CRD

- RHR Service Water crosstie
- Fire System
- Interconnections with other units
- ECCS Keep-Full
- SLC (test tank)
- SLC (boron tank)

If less than [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs can be opened or RPV pressure cannot be restored and maintained at least [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure, PRIMARY CONTAINMENT FLOODING IS REQUIRED; enter [procedure developed from the RPV and Primary Containment Flooding Severe Accident Guideline].

C4-2.4 When at least [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs are open and RPV pressure can be maintained at least [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure, control injection to maintain at least [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs open and RPV pressure at least [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure but as low as practicable.

If less than [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs can be opened or RPV pressure cannot be restored and maintained at least [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure, PRIMARY CONTAINMENT FLOODING IS REQUIRED; enter [procedure developed from the RPV and Primary Containment Flooding Severe Accident Guideline].

C4-3 When:

- RPV water level instrumentation is available, and
- Temperature[s] [near the cold reference leg instrument vertical runs] [is] below 212°F, and
- RPV pressure has remained at least [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure for at least the Minimum Core Flooding Interval,

Minimum Core Flooding Interval

[

Number of Open SRVs	Flooding Interval (min.)
7 or more	21
6	29
5	43
4	72

]

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 after commencing termination of injection into the RPV, return to [Step C4-2.3].

EMERGENCY PROCEDURE GUIDELINE
CONTINGENCY #5
LEVEL/POWER CONTROL

If while executing the following steps:

- RPV water level cannot be determined, enter [procedure developed from Emergency Procedure Guideline 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 Emergency Procedure Guideline] at [Step RC/L].
- Primary containment water level and suppression chamber pressure cannot be maintained below Primary Containment Pressure Limit A, but only if adequate core cooling can be assured, terminate injection into the RPV from sources external to the primary containment.

C5-1 Prevent automatic initiation of ADS.

[C5-2 If any MSL is not isolated, bypass [MSL and Offgas high radiation interlocks] [and] [low RPV water level interlocks] to maintain the main condenser as a heat sink.]

C5-3 If RPV water level is above [3% (APRM downscale trip)] or cannot be determined and RPV water level is above [-58 in. (24 in. below the feedwater sparger nozzles)]:

[• If any MSL is not isolated, bypass [MSL and Offgas high radiation interlocks] [and] [low RPV water level interlocks] to maintain the main condenser as a heat sink.]

- Lower RPV water level to below [-58 in. (24 inches below the feedwater sparger nozzles)] by terminating and preventing all injection into the RPV except from boron injection systems, RCIC, and CRD, defeating interlocks as necessary.

C5-4 If:

- Reactor power is above [3% (APRM downscale trip)] or cannot be determined, and
- RPV water level is above [-164 in. (top of active fuel)], and
- Suppression pool temperature is above the Boron Injection Initiation Temperature, and
- Either an SRV is open or opens or drywell pressure is above [2.0 psig (high drywell pressure scram setpoint)],

Then:

[• If any MSL is not isolated, bypass [MSL and Offgas high radiation interlocks] [and] [low RPV water level interlocks] to maintain the main condenser as a heat sink.]

- Lower RPV water level, irrespective of any reactor power or RPV water level oscillations, by terminating and preventing all injection into the RPV except from boron injection systems, RCIC, and CRD, defeating interlocks as necessary, until either:
  - Reactor power drops below [3% (APRM downscale trip)], or
  - RPV water level reaches [-164 in. (top of active fuel)], or
  - All SRVs remain closed and drywell pressure remains below [2.0 psig (high drywell pressure scram setpoint)].

If while executing the following steps Emergency RPV Depressurization is required, continue in this procedure at [Step C5-5.1].

If while executing the following step RPV water level is above [-58 i.. (24 in. below the feedwater sparger nozzles)] and reactor power is above [3% (APRM downscale trip)] or cannot be determined, return to [Step C5-3].

If while executing the following step:

- Reactor power is above [3% (APRM downscale trip)] or cannot be determined, and
- RPV water level is above [-164 in. (top of active fuel)], and
- Suppression pool temperature is above the Boron Injection Initiation Temperature, and
- Either an SRV is open or opens or drywell pressure is above [2.0 psig (high drywell pressure scram setpoint)],

return to [Step C5-3].

C5-5 Maintain RPV water level between [-195 in. (Minimum Steam Cooling RPV Water Level)] and either: ⑥

- If RPV water level was deliberately lowered in [Step C5-3 or C5-4], the level to which it was lowered, or
- If RPV water level was not deliberately lowered in [Step C5-3 or C5-4], [+58 in. (high level trip setpoint)],

with the following systems:

- Condensate/Feedwater
- CRD

- RCIC, with suction from the condensate storage tank if available, defeating low RPV pressure and high area temperature isolation interlocks and high suppression pool water level suction transfer logic if necessary. ❸❹❺
- HPCI, with suction from the condensate storage tank if available, defeating high area temperature isolation interlocks and high suppression pool water level suction transfer logic if necessary. ❸❺
- LPCI, with injection through the heat exchangers as soon as possible. ❸
- RHR through the shutdown cooling return, with injection through the heat exchangers as soon as possible, defeating isolation interlocks if necessary. ❸

If any MSL is not isolated, bypass [MSL and Offgas high radiation interlocks] [and] [low RPV water level interlocks] to maintain the main condenser as a heat sink.

If RPV water level cannot be restored and maintained above [-195 in. (Minimum Steam Cooling RPV Water Level)], EMERGENCY RPV DEPRESSURIZATION IS REQUIRED:

C5-5.1 Terminate and prevent all injection into the RPV except from boron injection systems, CRD, and RCIC, defeating interlocks as necessary, until RPV pressure is below the Minimum Alternate RPV Flooding Pressure.

Minimum Alternate RPV Flooding Pressure

NUMBER OF OPEN SRVs	RPV PRESSURE (psig)
7 or more	94
6	112
5	137
4	175
3	238
2	364
1	743

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

C5-5.2 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 [-195 in. (Minimum Steam Cooling RPV Water Level)]: (6)

- Condensate/Feedwater
- CRD
- RCIC, with suction from the condensate storage tank if available, defeating low RPV pressure and high area temperature isolation interlocks and high suppression pool water level suction transfer logic if necessary. (4)

[
- HPCI, with suction from the condensate storage tank if available, defeating high area temperature isolation interlocks and high suppression pool water level suction transfer logic if necessary.
]

[
- LPCI, with injection through the heat exchangers as soon as possible.
]

[
- RHR through the shutdown cooling return, with injection through the heat exchangers as soon as possible, defeating isolation interlocks if necessary.
]

If required to restore and maintain RPV water level above [-195 in. (Minimum Steam Cooling RPV Water Level)], use the following systems, irrespective of pump NPSH and vortex limits:

[
- HPCI, with suction from the condensate storage tank if available, defeating high area temperature isolation interlocks and high suppression pool water level suction transfer logic if necessary.
]

[
- LPCI, with injection through the heat exchangers as soon as possible.
]

- HPCS, with suction from the condensate storage tank if available, defeating high suppression pool water level suction transfer logic if necessary.
- LPCS

[
- RHR Service Water crosstie
- Fire System
- Interconnections with other units
- ECCS Keep-Full
]

If RPV water level cannot be restored and maintained above [-195 in. (Minimum Steam Cooling RPV Water Level)], PRIMARY CONTAINMENT FLOODING IS REQUIRED; enter [procedure developed from the RPV and Primary Containment Flooding Severe Accident Guideline].

C5-5.3 When RPV water level can be maintained above [-195 in. (Minimum Steam Cooling RPV Water Level)], return to [Step C5-5].

If while executing the following step reactor power commences and continues to increase, return to [Step C5-3].

C5-6 When [77 pounds (Hot Shutdown Boron Weight)] of boron have been injected into the RPV, restore and maintain RPV water level between [+12 in. (low level scram setpoint)] and [+58 in. (high level trip setpoint)].

If RPV water level cannot be restored and maintained above [+12 in. (low level scram setpoint)], maintain RPV water level above [-195 in. (Minimum Steam Cooling RPV Water Level)].

If RPV water level cannot be restored and maintained above [-195 in. (Minimum Steam Cooling RPV Water Level)], EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; return to [Step C5-5.1].

RPV AND PRIMARY CONTAINMENT FLOODING SEVERE ACCIDENT GUIDELINE

PURPOSE

The purpose of this guideline is to:

- Submerge the core and core debris,
- Shut down the reactor, and
- Depressurize the RPV and prevent it from repressurizing.

ENTRY CONDITIONS

This guideline is entered whenever Primary Containment Flooding is required.

OPERATOR ACTIONS

Execute [Steps RC/F, RC/P, and RC/Q] concurrently.

RC/F Monitor and control RPV and primary containment water levels. ❶❷

If while executing the following steps: ❼

- Drywell sprays have been initiated, terminate drywell sprays before drywell pressure drops to 0 psig.
- Suppression pool sprays have been initiated, terminate suppression pool sprays before suppression chamber pressure drops to 0 psig.

Flood the primary containment as follows:

Has it been determined that core debris has breached the RPV?

No

Yes [Step RC/F-1]

Can it be determined that RPV water level can be restored and maintained above [-164 in. (top of active fuel)]?

No

Yes [Step RC/F-2]

Can it be determined that RPV water level can be restored and maintained above [-314 in. (bottom of active fuel)]?

No

Yes [Step RC/F-3]

Can it be determined that injection into the RPV can be restored and maintained greater than the Minimum Debris Retention Injection Rate?

No

Yes [Step RC/F-4]

Are suppression chamber pressure and primary containment water level within the Pressure Suppression Pressure?

No

Yes [Step RC/F-5]

[Step RC/F-6]

RC/F-1 IT HAS BEEN DETERMINED THAT CORE DEBRIS HAS BREACHED THE RPV

RC/F-1.1 Secure RPV venting.

If while executing the following step primary containment water level and suppression chamber pressure approach or exceed Primary Containment Pressure Limit C, vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, to maintain suppression chamber pressure below Primary Containment Pressure Limit C. If primary containment water level and suppression chamber pressure cannot be maintained below Primary Containment Pressure Limit C, but only if total injection into the RPV and drywell can be maintained greater than the Minimum Debris Retention Injection Rate, terminate injection into the RPV and primary containment from sources external to the primary containment except drywell sprays.

If while executing the following step Suppression Pool Spray is required, but only if [suppression chamber pressure is above the Mark III Containment Spray Initiation Pressure Limit] [suppression pool water level is below 24 ft. 6 in. (elevation of suppression pool spray nozzles)] and, if drywell spray can be operated, only if drywell spray flowrate will not be reduced below [3840 gpm (Minimum Drywell Spray Flow)], initiate suppression pool sprays, defeating suppression pool spray interlocks if necessary, using sources external to the primary containment if possible but only if primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit C.

If while executing the following step:

- Drywell sprays are not operating and drywell temperature and pressure are within the Drywell Spray Initiation Limit, initiate drywell sprays, defeating drywell spray interlocks if necessary and irrespective of whether RPV or primary containment injection will be reduced. Use sources external to the primary containment if possible but only if primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit C or if primary containment water level is below [83 ft. 5 in. (elevation of top of active fuel or the highest drywell spray sparger, whichever is lower)].

- Drywell sprays are operating, maintain drywell spray flowrate greater than [3840 gpm (Minimum Drywell Spray Flow)], defeating drywell spray interlocks if necessary and irrespective of whether RPV or primary containment injection will be reduced. Use sources external to the primary containment if possible but only if primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit C or if primary containment water level is below [83 ft. 5 in. (elevation of top of active fuel or the highest drywell spray sparger, whichever is lower)].

RC/F-1.2 Flood the primary containment as follows:

Initiate SPMS.

Maximize injection into the RPV from sources external to the primary containment, defeating interlocks if necessary and irrespective of pump NPSH and vortex limits, using the following systems:

- Condensate/Feedwater
- CRD
- RCIC, defeating high suppression pool water level suction transfer logic if necessary. ❹
- HPCS
- LPCS
- LPCI, with injection through the heat exchangers as soon as possible.
- RHR through the shutdown cooling return, with injection through the heat exchangers as soon as possible.
- RHR Service Water crosstie
- Fire System
- Interconnections with other units
- ECCS Keep-Full
- SLC
- Other primary containment fill systems

If injection into the RPV from sources external to the primary containment will not be reduced, maximize injection into the primary containment from sources external to the primary containment.

If injection into neither the RPV nor the primary containment from sources external to the primary containment will be reduced, maximize injection into the RPV from the suppression pool.

If venting the primary containment will facilitate primary containment flooding, vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate.

If while executing the following step primary containment water level and suppression chamber pressure approach or exceed Primary Containment Pressure Limit C, vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, to maintain suppression chamber pressure below Primary Containment Pressure Limit C. If primary containment water level and suppression chamber pressure cannot be maintained below Primary Containment Pressure Limit C, terminate injection into the RPV and primary containment from sources external to the primary containment except drywell sprays.

If while executing the following step Suppression Pool Spray is required, but only if [suppression chamber pressure is above the Mark III Containment Spray Initiation Pressure Limit] [suppression pool water level is below 24 ft. 6 in. (elevation of suppression pool spray nozzles)], initiate suppression pool sprays, defeating suppression pool spray interlocks if necessary. Sources external to the primary containment may be used only if primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit C .

If while executing the following step Drywell Spray is required and:

- Drywell sprays are not operating and [suppression pool water level is below [17 ft. 2 in. (elevation of bottom of internal suppression chamber 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, initiate drywell sprays, defeating drywell spray interlocks if necessary. Sources external to the primary containment may be used only if primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit C.

- Drywell sprays are operating, continue to operate drywell sprays, defeating drywell spray interlocks if necessary. Sources external to the primary containment may be used only if primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit C.

RC/P/L.3 When primary containment water level reaches [83 ft. 5 in. (elevation of top of active fuel)]:

Operate HPCS and LPCS, taking suction from sources external to the primary containment only when required, defeating interlocks if necessary.

Maintain primary containment water level between [83 ft. 5 in. (elevation of top of active fuel)] and [103 ft. 6 in. (elevation of primary containment vent)] using the following systems, taking suction from sources external to the primary containment only when required, defeating interlocks if necessary:

- Condensate/Feedwater
- CRD
- LPCI, with injection through the heat exchangers as soon as possible.
- [RHR through the shutdown cooling return, with injection through the heat exchangers as soon as possible.]
- [RHR Service Water crosstie
- Fire System
- Interconnections with other units
- ECCS Keep-Full
- SLC
- Other primary containment fill systems]

If necessary to maintain primary containment water level above [83 ft. 5 in. (elevation of top of active fuel)], vent the primary containment, defeating interlocks if necessary and irrespective of the offsite radioactivity release rate.

RC/F-2 RPV WATER LEVEL CAN BE RESTORED AND MAINTAINED ABOVE [-164 IN. (TOP OF ACTIVE FUEL)]

If while executing this step primary containment water level and suppression chamber pressure approach or exceed Primary Containment Pressure Limit A:

(1) Terminate direct injection into the primary containment from sources external to the primary containment.

(2) If primary containment water level and suppression chamber pressure cannot be maintained below Primary Containment Pressure Limit A:

- Vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, to restore and maintain suppression chamber pressure below Primary Containment Pressure Limit A.

- If primary containment water level and suppression chamber pressure reach Primary Containment Pressure Limit A, but only if RPV water level can be maintained above [-164 in. (top of active fuel)], terminate injection into the RPV from sources external to the primary containment, except boron injection from SLC.

If while executing this step Suppression Pool Spray is required, but only if [suppression chamber pressure is above the Mark III Containment Spray Initiation Pressure Limit] [suppression pool water level is below 24 ft. 6 in. (elevation of suppression pool spray nozzles)] and RPV water level can be maintained above [-164 in. (top of active fuel)], initiate suppression pool sprays, defeating suppression pool spray interlocks if necessary. Sources external to the primary containment may be used only if primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A.

If while executing this step Drywell Spray is required and:

- Drywell sprays are not operating and [suppression pool water level is below [17 ft. 2 in. (elevation of bottom of internal suppression chamber 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 and RPV water level can be maintained above [-164 in. (top of active fuel)], initiate drywell sprays, defeating drywell spray interlocks if necessary. Sources external to the primary containment may be used only if primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A.

- Drywell sprays are operating, continue to operate drywell sprays, defeating drywell spray interlocks if necessary, but only if RPV water level can be maintained above [-164 in. (top of active fuel)]. Sources external to the primary containment may be used only if primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A.

Restore and maintain RPV water level between [-164 in. (top of active fuel)] and [+58 in. (high level trip setpoint)] using the following systems, taking suction from sources external to the primary containment only when required, defeating interlocks if necessary, and irrespective of pump NPSH and vortex limits:

- Condensate/Feedwater
- CRD
- RCIC, defeating high suppression pool water level suction transfer logic if necessary. 4
- [LPCI, with injection through the heat exchangers as soon as possible.]
- [RHR through the shutdown cooling return, with injection through the heat exchangers as soon as possible.]

If required to restore and maintain RPV water level above [-164 in. (top of active fuel)], use the following systems, taking suction from sources external to the primary containment only when required, defeating interlocks if necessary, and irrespective of pump NPSH and vortex limits:

- [LPCI, with injection through the heat exchangers as soon as possible.]
- HPCS, defeating high suppression pool water level suction transfer logic if necessary.
- LPCS
- [RHR Service Water crosstie
- Fire System
- Interconnections with other units
- ECCS Keep-Full
- SLC
- Other primary containment fill systems]

If necessary to restore and maintain RPV water level above [-164 in. (top of active fuel)], then irrespective of the offsite radioactivity release rate:

- Vent the primary containment defeating isolation interlocks if necessary.
- Vent the RPV with one or more of the following, defeating isolation interlocks if necessary:

  [
  - Flood vent valves
  - MSIVs
  - MSL drains
  - HPCI steam line
  - RCIC steam line
  - IC tube side vents
  - RHR
  ]

RC/F-3 RPV WATER LEVEL CAN BE RESTORED AND MAINTAINED ABOVE [-314 IN. (BOTTOM OF ACTIVE FUEL)]

If while executing this step primary containment water level and suppression chamber pressure approach or exceed Primary Containment Pressure Limit A:

(1) Terminate direct injection into the primary containment from sources external to the primary containment except drywell sprays.

(2) If primary containment water level and suppression chamber pressure cannot be maintained below Primary Containment Pressure Limit A:

- Vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, to restore and maintain suppression chamber pressure below Primary Containment Pressure Limit A.

- If primary containment water level and suppression chamber pressure reach Primary Containment Pressure Limit A, but only if RPV water level can be maintained above [-314 in. (bottom of active fuel)], terminate injection into the RPV from sources external to the primary containment, except boron injection from SLC.

If while executing this step RPV pressure is [50 psig (Minimum RPV Flooding Pressure)] or more above suppression chamber pressure, terminate direct injection into the primary containment from sources external to the primary containment.

If while executing this step Suppression Pool Spray is required, but only if [suppression chamber pressure is above the Mark III Containment Spray Initiation Pressure Limit] [suppression pool water level is below 24 ft. 6 in. (elevation of suppression pool spray nozzles)] and RPV water level can be maintained above [-314 in. (bottom of active fuel)], initiate suppression pool sprays, defeating suppression pool spray interlocks if necessary, using sources external to the primary containment if possible but only if RPV pressure is less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure and primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A.

If while executing this step Drywell Spray is required and:

- Drywell sprays are not operating and [suppression pool water level is below [17 ft. 2 in. (elevation of bottom of internal suppression chamber 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 and RPV water level can be maintained above [-314 in. (bottom of active fuel)], initiate drywell sprays, defeating drywell spray interlocks if necessary. Use sources external to the primary containment if possible but only if RPV pressure is less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure [and either primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A or primary containment water level is below [83 ft. 5 in. (elevation of top of active fuel or the highest drywell spray sparger, whichever is lower)]].
- Drywell sprays are operating, continue to operate drywell sprays, defeating drywell spray interlocks if necessary, but only if RPV water level can be maintained above [-314 in. (bottom of active fuel)]. Use sources external to the primary containment if possible but only if RPV pressure is less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure and either primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A or primary containment water level is below [83 ft. 5 in. (elevation of top of active fuel or the highest drywell spray sparger, whichever is lower)].

Initiate SPMS.

Operate the following systems, defeating interlocks if necessary and irrespective of pump NPSH and vortex limits:

- HPCS, with suction from the condensate storage tank if available, defeating high suppression pool water level suction transfer logic if necessary.
- LPCS; operate one LPCS with suction from the suppression pool if possible; supply other LPCS from sources external to the primary containment if possible.

Restore and maintain RPV water level above [-314 in. (bottom of active fuel)] using the following systems, defeating interlocks if necessary and irrespective of pump NPSH and vortex limits, maximizing injection into the RPV and primary containment from sources external to the primary containment:

- Condensate/Feedwater
- CRD
- RCIC, defeating high suppression pool water level suction transfer logic if necessary.
- LPCI, with injection through the heat exchangers as soon as possible.
- [RHR through the shutdown cooling return, with injection through the heat exchangers as soon as possible.]

[
- RHR Service Water crosstie
- Fire System
- Interconnections with other units
- ECCS Keep-Full
- SLC
- Other primary containment fill systems
]

If venting the primary containment will facilitate primary containment flooding, vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate.

When primary containment water level exceeds RPV water level, vent the RPV, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, with one or more of the following:

- Flood vent valves
- MSIVs
- MSL drains
- HPCI steam line
- RCIC steam line
- IC tube side vents
- RHR

RC/F-4 RPV WATER LEVEL CANNOT BE RESTORED AND MAINTAINED ABOVE [-314 in. (BOTTOM OF ACTIVE FUEL)], RPV INJECTION CAN BE RESTORED AND MAINTAINED GREATER THAN THE MINIMUM DEBRIS RETENTION INJECTION RATE

If while executing this step RPV water level can be determined and primary containment water level and suppression chamber pressure approach or exceed Primary Containment Pressure Limit B:

(1) Terminate direct injection into the primary containment from sources external to the primary containment except drywell sprays.

(2) If primary containment water level and suppression chamber pressure cannot be maintained below Primary Containment Pressure Limit B:

- Vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, to restore and maintain suppression chamber pressure below Primary Containment Pressure Limit B.

- If primary containment water level and suppression chamber pressure reach Primary Containment Pressure Limit B, but only if injection into the RPV can be maintained greater than the Minimum Debris Retention Injection Rate, terminate injection into the RPV from sources external to the primary containment, except boron injection from SLC.

If while executing this step RPV water level cannot be determined and primary containment water level and suppression chamber pressure approach or exceed Primary Containment Pressure Limit A:

(1) Terminate direct injection into the primary containment from sources external to the primary containment except drywell sprays.

(2) If primary containment water level and suppression chamber pressure cannot be maintained below Primary Containment Pressure Limit A:

- Vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, to restore and maintain suppression chamber pressure below Primary Containment Pressure Limit A.

- If primary containment water level and suppression chamber pressure reach Primary Containment Pressure Limit A, but only if injection into the RPV can be maintained greater than the Minimum Debris Retention Injection Rate, terminate injection into the RPV from sources external to the primary containment, except boron injection from SLC.

If while executing this step RPV pressure is more than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure, terminate direct injection into the primary containment from sources external to the primary containment.

If while executing this step Suppression Pool Spray is required, but only if [suppression chamber pressure is above the Mark III Containment Spray Initiation Pressure Limit] [suppression pool water level is below 24 ft. 6 in. (elevation of suppression pool spray nozzles)] and injection into the RPV can be maintained greater than the Minimum Debris Retention Injection Rate, initiate suppression pool sprays, defeating suppression pool spray interlocks if necessary, using sources external to the primary containment if possible but only if RPV pressure is less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure and primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A.

If while executing this step Drywell Spray is required and:

- Drywell sprays are not operating and [suppression pool water level is below [17 ft. 2 in. (elevation of bottom of internal suppression chamber 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 and injection into the RPV can be maintained greater than the Minimum Debris Retention Injection Rate, initiate drywell sprays, defeating drywell spray interlocks if necessary. Use sources external to the primary containment if possible but only if RPV pressure is less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure [and either primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A or primary containment water level is below [83 ft. 5 in. (elevation of top of active fuel or the highest drywell spray sparger, whichever is lower)]].

- Drywell sprays are operating, continue to operate drywell sprays, defeating drywell spray interlocks if necessary, but only if injection into the RPV can be maintained greater than the Minimum Debris Retention Injection Rate. Use sources external to the primary containment if possible but only if RPV pressure is less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure and either primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A or primary containment water level is below [83 ft. 5 in. (elevation of top of active fuel or the highest drywell spray sparger, whichever is lower)].

Initiate SPMS.

Operate the following systems, defeating interlocks if necessary and irrespective of pump NPSH and vortex limits:

- HPCS, with suction from the condensate storage tank if available, defeating high suppression pool water level suction transfer logic if necessary.
- LPCS; operate one LPCS with suction from the suppression pool if possible; supply other LPCS from sources external to the primary containment if possible.

Restore and maintain injection into the RPV greater than the Minimum Debris Retention Injection Rate using the following systems, defeating interlocks if necessary and irrespective of pump NPSH and vortex limits, maximizing injection into the RPV and primary containment from sources external to the primary containment:

- Condensate/Feedwater
- CRD
- RCIC, defeating high suppression pool water level suction transfer logic if necessary. ❹
- LPCI, with injection through the heat exchangers as soon as possible.
- RHR through the shutdown cooling return, with injection through the heat exchangers as soon as possible.
- RHR Service Water crosstie
- Fire System
- Interconnections with other units
- ECCS Keep-Full
- SLC
- Other primary containment fill systems

If venting the primary containment will facilitate primary containment flooding, vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate.

When primary containment water level reaches [53 ft. 7 in. (elevation of the bottom of the RPV lower head], vent the RPV, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, with one or more of the following:

[
- Flood vent valves
- MSIVs
- MSL drains
- HPCI steam line
- RCIC steam line
- IC tube side vents
- RHR
]

RC/F-5 RPV INJECTION CANNOT BE RESTORED AND MAINTAINED GREATER THAN THE MINIMUM DEBRIS RETENTION INJECTION RATE, SUPPRESSION CHAMBER PRESSURE AND PRIMARY CONTAINMENT WATER LEVEL ARE WITHIN THE PRESSURE SUPPRESSION PRESSURE

If while executing this step:

- Suppression chamber pressure cannot be maintained below the Pressure Suppression Pressure, vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, to control suppression chamber pressure below the Pressure Suppression Pressure.

- Primary containment water level cannot be maintained below [16 ft. 1 in. (Maximum Pressure Suppression Primary Containment Water Level)], terminate direct injection into the primary containment from sources external to the primary containment.

- Primary containment water level reaches [16 ft. 1 in. (Maximum Pressure Suppression Primary Containment Water Level)], terminate injection into the RPV from sources external to the primary containment, except boron injection from SLC.

If while executing this step RPV pressure is more than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure, terminate direct injection into the primary containment from sources external to the primary containment.

If while executing this step Suppression Pool Spray is required, but only if [suppression chamber pressure is above the Mark III Containment Spray Initiation Pressure Limit] [suppression pool water level is below 24 ft. 6 in. (elevation of suppression pool spray nozzles)] initiate suppression pool sprays, defeating suppression pool spray interlocks if necessary and irrespective of whether injection into the RPV will be reduced. Sources external to the primary containment may be used only if RPV pressure is less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure and suppression pool water level and suppression chamber pressure can be maintained below the Pressure Suppression Pressure.

If while executing this step Drywell Spray is required and:

- Drywell sprays are not operating and [suppression pool water level is below [17 ft. 2 in. (elevation of bottom of internal suppression chamber 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, initiate drywell sprays, defeating drywell spray interlocks if necessary and irrespective of whether injection into the RPV will be reduced. Sources external to the primary containment may be used only if RPV pressure is less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure and suppression pool water level and suppression chamber pressure can be maintained below the Pressure Suppression Pressure.

- Drywell sprays are operating, continue to operate drywell sprays, defeating drywell spray interlocks if necessary and irrespective of whether injection into the RPV will be reduced. Sources external to the primary containment may be used only if RPV pressure is less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure and suppression pool water level and suppression chamber pressure can be maintained below the Pressure Suppression Pressure.

Initiate SPMS.

Maximize injection into the RPV, defeating interlocks if necessary and irrespective of pump NPSH and vortex limits, using the following systems:

- Condensate/Feedwater
- CRD
- RCIC, defeating high suppression pool water level suction transfer logic if necessary. ❹
- HPCS, defeating high suppression pool water level suction transfer logic if necessary.
- LPCS
- LPCI, with injection through the heat exchangers as soon as possible.
- RHR through the shutdown cooling return, with injection through the heat exchangers as soon as possible.
- RHR Service Water crosstie
- Fire System
- Interconnections with other units
- ECCS Keep-Full
- SLC
- Other primary containment fill systems

If injection into the RPV will not be reduced and primary containment water level can be maintained below [16 ft. 1 in. (Maximum Pressure Suppression Primary Containment Water Level)], inject into the primary containment from sources external to the primary containment.

If venting the primary containment will facilitate primary containment flooding or RPV injection, vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate.

RC/F-6 RPV INJECTION CANNOT BE RESTORED AND MAINTAINED GREATER THAN THE MINIMUM DEBRIS RETENTION INJECTION RATE, SUPPRESSION CHAMBER PRESSURE AND PRIMARY CONTAINMENT WATER LEVEL ARE NOT WITHIN THE PRESSURE SUPPRESSION PRESSURE

If while executing this step, primary containment water level and suppression chamber pressure approach or exceed Primary Containment Pressure Limit A, vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, to maintain suppression chamber pressure below Primary Containment Pressure Limit A. If primary containment water level and suppression chamber pressure cannot be maintained below Primary Containment Pressure Limit A, terminate direct injection into the primary containment from sources external to the primary containment except drywell sprays.

If while executing this step RPV pressure is more than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure, terminate direct injection into the primary containment from sources external to the primary containment.

If while executing this step Suppression Pool Spray is required, but only if [suppression chamber pressure is above the Mark III Containment Spray Initiation Pressure Limit] [suppression pool water level is below 24 ft. 6 in. (elevation of suppression pool spray nozzles)] and either injection into the RPV will not be reduced, RPV pressure is at least [50 psig (Minimum RPV Flooding Pressure) above suppression chamber pressure, or suppression chamber pressure can be restored and maintained below the Pressure Suppression Pressure, initiate suppression pool sprays, defeating suppression pool spray interlocks if necessary, using sources external to the primary containment if possible but only if RPV pressure is less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure and primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A.

If while executing this step Drywell Spray is required and:

- Drywell sprays are not operating and [suppression pool water level is below [17 ft. 2 in. (elevation of bottom of internal suppression chamber 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 and either injection into the RPV will not be reduced, RPV pressure is at least [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure, or suppression chamber pressure can be restored and maintained below the Pressure Suppression Pressure, initiate drywell sprays, defeating drywell spray interlocks if necessary. Use sources external to the primary containment if possible but only if RPV pressure is less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure [and either primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A or primary containment water level is below [83 ft. 5 in. (elevation of top of active fuel or the highest drywell spray sparger, whichever is lower)]].

- Drywell sprays are operating, continue to operate drywell sprays, defeating drywell spray interlocks if necessary, but only if either injection into the RPV will not be reduced, RPV pressure is at least [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure, or suppression chamber pressure can be restored and maintained below the Pressure Suppression Pressure. Use sources external to the primary containment if possible but only if RPV pressure is less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure and either primary containment water level and suppression chamber pressure can be maintained below Primary Containment Pressure Limit A or if primary containment water level is below [83 ft. 5 in. (elevation of top of active fuel or the highest drywell spray sparger, whichever is lower)].

Initiate SPMS.

Maximize injection into the RPV, defeating interlocks if necessary and irrespective of pump NPSH and vortex limits, using the following systems:

- Condensate/Feedwater
- CRD
- RCIC, defeating high suppression pool water level suction transfer logic if necessary. ❹
- HPCS, defeating high suppression pool water level suction transfer logic if necessary.
- LPCS
- LPCI, with injection through the heat exchangers as soon as possible.
- [RHR through the shutdown cooling return, with injection through the heat exchangers as soon as possible.]

[
- RHR Service Water crosstie
- Fire System
- Interconnections with other units
- ECCS Keep-Full
- SLC
- Other primary containment fill systems
]

If injection into the RPV will not be reduced, maximize injection into the primary containment from sources external to the primary containment.

If venting the primary containment will facilitate primary containment flooding or RPV injection, vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate.

When primary containment water level reaches [53 ft. 7 in. (elevation of the bottom of the RPV lower head)], vent the RPV, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, with one or more of the following:

[
- Flood vent valves
- MSIVs
- MSL drains
- HPCI steam line
- RCIC steam line
- IC tube side vents
- RHR
]

RC/P Monitor and control RPV pressure.

> If while executing the following steps it is anticipated that primary containment water level will rise above [56 ft. 3 in. (elevation of the inboard main steam line drain valve motor operator or elevation of the lowest SRV pneumatic solenoid, whichever is lower)], open the inboard main steam line drain valve before primary containment water level reaches [56 ft. 3 in. (elevation of the inboard main steam line drain valve motor operator or elevation of the lowest SRV pneumatic solenoid, whichever is lower)], defeating isolation interlocks if necessary.

RC/P-1 Initiate IC.

RC/P-2 Rapidly depressurize the RPV as follows, irrespective of the resulting cooldown rate: ❷

If suppression pool water level is above [4 ft. 9 in. (elevation of top of SRV discharge device)], open all ADS valves, defeating pneumatic supply isolation interlocks and restoring the pneumatic supply if necessary.

If any ADS valve cannot be opened, but only if suppression pool water level is above [4 ft. 9 in. (elevation of top of SRV discharge device)], open other SRVs until [7 (number of SRVs dedicated to ADS)] valves are open.

If less than [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs are open and RPV pressure is at least [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure:

(1) Rapidly depressurize the RPV, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, using one or more of the following, until RPV pressure is less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure:

- IC
- Main condenser
- RHR (steam condensing mode)
- [Other steam driven equipment]
- RWCU (recirculation mode), bypassing [regenerative heat exchangers and] filter/demineralizers.
- MSL drains
- RWCU (blowdown mode), only if no boron has been injected into the RPV.
- HPCI steam line
- RCIC steam line
- Head vent
- IC tube side vent
- Shutdown cooling, only if no boron has been injected into the RPV.

(2) Maintain RPV pressure less than [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure using one or more of the systems used for depressurization.

If while executing the following step:

- Less than [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs are open and RPV pressure is at least [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure, or
- The reactor is not shutdown,

return to [Step RC/P-2].

RC/P-3 If further cooldown is required, continue to cool down to cold shutdown conditions ([100°F < RPV water temperature < 212°F (cold shutdown conditions)]), defeating isolation interlocks if necessary, using one or more of the following:

- IC
- SRVs
- Main condenser
- RHR (steam condensing mode)
- [Other steam driven equipment]
- RWCU (recirculation mode), bypassing [regenerative heat exchangers and] filter/demineralizers.
- MSL drains
- RWCU (blowdown mode), if no boron has been injected into the RPV; refer to [sampling procedures] prior to initiating blowdown.
- HPCI steam line
- RCIC steam line
- Head vent
- IC tube side vent
- Shutdown cooling, only if no boron has been injected into the RPV.

RC/Q Monitor and control reactor power.

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

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

> Execute [Steps RC/Q-3 and RC/Q-4] concurrently.

RC/Q-3 Inject boron into the RPV with SLC until SLC tank water level drops to [0% (low SLC tank water level trip)].

RC/Q-4 Insert control rods as follows until it has been determined that core debris has breached the RPV:

RC/Q-4.1 Reset ARI, defeating ARI logic trips if necessary.

RC/Q-4.2 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 RSCS and RWM interlocks if necessary.
- Vent control rod drive overpiston volumes.

CONTAINMENT AND RADIOACTIVITY RELEASE CONTROL SEVERE ACCIDENT GUIDELINE

PURPOSE

The purpose of this guideline is to:

- Protect equipment in the primary and secondary containments,
- Maintain primary and secondary containment integrity,
- Limit radioactivity release from the primary and secondary containments, and
- Limit radioactivity release into areas outside the primary and secondary containments.

ENTRY CONDITIONS

This guideline is entered whenever Primary Containment Flooding is required.

OPERATOR ACTIONS

If while executing the following steps secondary containment HVAC exhaust radiation level exceeds [20 mr/hr (secondary containment HVAC isolation setpoint)]:

- Confirm or manually initiate isolation of secondary containment HVAC, and
- Confirm initiation of or manually initiate SBGT.

If while executing the following steps:

- Secondary containment HVAC isolates, and,
- Secondary containment HVAC exhaust radiation level is below [20 mr/hr (secondary containment HVAC isolation setpoint)],

restart secondary containment HVAC, defeating high drywell pressure and low RPV water level isolation interlocks if necessary.

If while executing the following steps HVAC in the turbine building (or any other building which may be contributing to radioactive release) is shutdown (or isolated due to high radiation), restart the HVAC as required, defeating isolation interlocks if necessary.

Execute [Steps SP/T, DW/T, CN/T, PC/P, PC/R, PC/G, SC/T, SC/R, SC/L, and RR] concurrently.

SP/T Monitor and control suppression pool temperature.

If injection into neither the RPV nor the primary containment will be reduced or if RPV water level can be maintained above [-164 in. (top of active fuel)], control suppression pool temperature below [95°F (most limiting suppression pool temperature LCO)] using available suppression pool cooling.

DW/T Monitor and control drywell temperature. ❶

Control drywell temperature below [135°F (drywell temperature LCO or maximum normal operating temperature, whichever is higher)] using available drywell cooling, defeating isolation interlocks if necessary.

Before drywell temperature reaches [340°F (maximum temperature at which ADS is qualified or drywell design temperature, whichever is lower)], DRYWELL SPRAY IS REQUIRED.

CN/T Monitor and control containment temperature. ❶

Control containment temperature below [90°F (containment temperature LCO)], using available containment cooling, defeating isolation interlocks if necessary.

Before containment temperature reaches [185°F (containment design temperature)], SUPPRESSION POOL SPRAY IS REQUIRED.

PC/P Monitor and control primary containment pressure.

Before suppression chamber pressure reaches [the Pressure Suppression Pressure] [13.8 psig (Suppression Chamber Spray Initiation Pressure)], SUPPRESSION POOL SPRAY IS REQUIRED.

When suppression chamber pressure exceeds [13.8 psig (Suppression Chamber Spray Initiation Pressure)] DRYWELL SPRAY IS REQUIRED.

Before suppression chamber pressure reaches Primary Containment Pressure Limit C, vent the primary containment, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, to control pressure below Primary Containment Pressure Limit C.

PC/R Monitor and control [drywell] [suppression chamber] radiation level.

Before [drywell] [suppression chamber] radiation level reaches [14,000 R/hr (drywell or suppression chamber radiation level which requires a General Emergency)], SUPPRESSION POOL SPRAY IS REQUIRED and DRYWELL SPRAY IS REQUIRED.

PC/G 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 suppression chamber for hydrogen and oxygen in accordance with [sampling procedure].

Control hydrogen and oxygen concentrations in the drywell as follows:

		Drywell Oxygen Concentration			
		< 5%	≥ 5% or cannot be determined to be below 5%		
			Suppression Chamber Hydrogen Concentration		
			None Detected	< 6%	≥ 6% or cannot be determined to be below 6%
Drywell Hydrogen Concentration	None Detected	No action required	[PC/G-1]	[PC/G-2]	[PC/G-3]
	< 6%	[PC/G-1]			
	≥ 6% or cannot be determined to be below 6%				

Control hydrogen and oxygen concentrations in the suppression chamber as follows:

		Suppression Chamber Oxygen Concentration			
		< 5%	≥ 5% or cannot be determined to be below 5%		
			Drywell Hydrogen Concentration		
			None Detected	< 6%	≥ 6% or cannot be determined to be below 6%
Suppression Chamber Hydrogen Concentration	None Detected	No action required	[PC/G-4]	[PC/G-5]	[PC/G-6]
	< 6%	[PC/G-4]			
	≥ 6% or cannot be determined to be below 6%				

PC/G-1 Reduce drywell hydrogen and oxygen concentrations by one or both of the following methods:

- If the offsite radioactivity release rate is expected to remain below the offsite release rate specified in [Technical Specifications], vent and purge the drywell as follows, defeating isolation interlocks (except high radiation interlocks) if necessary:

  > If while executing the following steps the offsite radioactivity release rate reaches the offsite release rate specified in [Technical Specifications], secure the drywell vent and purge.

  (1) Refer to [sampling procedure].

  (2) Vent the drywell.

  (3) If the drywell can be vented, purge the drywell by injecting nitrogen into the drywell.

  (4) When drywell oxygen concentration is below 5% and hydrogen is no longer detected in the drywell, secure the drywell vent and purge.

- If drywell [and suppression chamber] hydrogen and oxygen concentrations are within the limits for recombiner operation:

  (1) Place hydrogen recombiners in service taking suction on the drywell and operate the drywell hydrogen mixing system.

  (2) When [either] drywell [or suppression chamber] hydrogen and oxygen concentrations are no longer within the limits for recombiner operation, secure all hydrogen recombiners taking suction on the drywell.

PC/G-2 Reduce drywell hydrogen and oxygen concentrations by the following methods:

- If RPV water level cannot be maintained above [-164 in. (top of active fuel)] or the offsite radioactivity release rate is expected to remain below the offsite radioactivity release rate which requires a General Emergency, vent and purge the drywell as follows, defeating isolation interlocks if necessary:

  > If while executing the following RPV water level can be maintained above [-164 in. (top of active fuel)] and it has been determined that the offsite radioactivity release rate has reached the offsite radioactivity release rate which requires a General Emergency, secure the drywell vent and purge.

  (1) Vent the drywell.

  (2) If the drywell can be vented, purge the drywell by injecting nitrogen into the drywell at the maximum rate.

  (3) When drywell oxygen concentration is below 5% and hydrogen is not detected in the drywell, secure vent and purge not required by other steps in the [procedures developed from the Severe Accident Guidelines].

- If drywell [and suppression chamber] hydrogen and oxygen concentrations are within the limits for recombiner operation:

  (1) Place hydrogen recombiners in service taking suction on the drywell and operate the drywell hydrogen mixing system.

  (2) When [either] drywell [or suppression chamber] hydrogen and oxygen concentrations are no longer within the limits for recombiner operation, secure all hydrogen recombiners taking suction on the drywell.

PC/G-3 Secure the drywell hydrogen mixing system and all recombiners taking suction on the drywell and, irrespective of the offsite radioactivity release rate, vent and purge the drywell as follows, defeating isolation interlocks if necessary:

PC/G-3.1 Vent the drywell.

PC/G-3.2 If the drywell can be vented, purge the drywell by injecting air or nitrogen, whichever will more rapidly return hydrogen concentrations to below 6% or oxygen concentration to below 5%, into the drywell at the maximum rate.

PC/G-3.3 DRYWELL SPRAY IS REQUIRED.

PC/G-4 Reduce suppression chamber hydrogen and oxygen concentrations by one or both of the following methods:

- If the offsite radioactivity release rate is expected to remain below the offsite release rate specified in [Technical Specifications], vent and purge the suppression chamber as follows, defeating isolation interlocks (except high radiation interlocks) if necessary:

> If while executing the following steps the offsite radioactivity release rate reaches the offsite release rate specified in [Technical Specifications], secure the suppression chamber vent and purge.

(1) Refer to [sampling procedure].

(2) If suppression pool water level is below [26 ft. 9 in. (elevation of the bottom of the suppression chamber vent)], vent the suppression chamber.

(3) If the suppression chamber can be vented, purge the suppression chamber by injecting nitrogen into the suppression chamber.

(4) When suppression chamber oxygen concentration is below 5% and hydrogen is no longer detected in the suppression chamber, secure the suppression chamber vent and purge.

- If suppression chamber [and drywell] hydrogen and oxygen concentrations are within the limits for recombiner operation:

(1) Place hydrogen recombiners in service taking suction on the [suppression chamber] [drywell].

(2) When [either] suppression chamber [or drywell] hydrogen and oxygen concentrations are no longer within the limits for recombiner operation, secure all hydrogen recombiners taking suction on the [suppression chamber] [drywell].

PC/G-5 Reduce suppression chamber hydrogen and oxygen concentrations by the following methods:

- If RPV water level cannot be maintained above [-164 in. (top of active fuel)] or the offsite radioactivity release rate is expected to remain below the offsite release rate which requires a General Emergency, vent and purge the suppression chamber as follows, defeating isolation interlocks if necessary:

> If while executing the following steps RPV water level can be maintained above [-164 in. (top of active fuel)] and it has been determined that the offsite radioactivity release rate has reached the offsite release rate which requires a General Emergency, secure the suppression chamber vent and purge.

(1) If suppression pool water level is below [26 ft. 9 in. (elevation of the bottom of the suppression chamber vent)], vent the suppression chamber.

(2) If the suppression chamber can be vented, purge the suppression chamber by injecting nitrogen into the suppression chamber at the maximum rate.

(3) When suppression chamber oxygen concentration is below 5% and hydrogen is not detected in the suppression chamber, secure vent and purge not required by other steps in the [procedures developed from the Severe Accident Guidelines].

- If suppression chamber [and drywell] hydrogen and oxygen concentrations are within the limits for recombiner operation:

(1) Place hydrogen recombiners in service taking suction on the [suppression chamber] [drywell].

(2) When [either] suppression chamber [or drywell] hydrogen and oxygen concentrations are no longer within the limits for recombiner operation, secure all hydrogen recombiners taking suction on the [suppression chamber] [drywell].

PC/G-6 Secure all recombiners taking suction on the suppression chamber and, irrespective of the offsite radioactivity release rate, vent and purge the suppression chamber as follows, defeating isolation interlocks if necessary:

PC/G-6.1 SUPPRESSION POOL SPRAY IS REQUIRED.

PC/G-6.2 If suppression pool water level is below [26 ft. 9 in. (elevation of the bottom of the suppression chamber vent)], vent the suppression chamber.

PC/G-6.3 If the suppression chamber can be vented, purge the suppression chamber by injecting air or nitrogen, whichever will more rapidly return hydrogen concentration to below 6% or oxygen concentration to below 5%, into the suppression chamber at the maximum rate.

PC/G Monitor and control drywell and containment hydrogen concentrations.

If while executing the following steps:

- The hydrogen monitoring system is or becomes unavailable, sample the drywell and containment for hydrogen in accordance with [sampling procedure].
- The igniters are deenergized and either containment hydrogen concentration cannot be determined to be below the containment Hydrogen Deflagration Overpressure Limit or drywell hydrogen concentration cannot be determined to be below [9% (drywell Hydrogen Deflagration Overpressure Limit)], prevent operation of the igniters until containment hydrogen concentration can be determined to be below the Containment Hydrogen Deflagration Overpressure Limit and drywell hydrogen concentration can be determined to be below [9% (drywell Hydrogen Deflagration Overpressure Limit)].
- The igniters are deenergized and containment hydrogen concentration cannot be determined to be below the containment Hydrogen Deflagration Overpressure Limit, secure and prevent operation of the drywell hydrogen mixing systems and recombiners and, irrespective of the offsite radioactivity release rate, vent and purge the containment, defeating isolation interlocks if necessary, in accordance with [Steps PC/G-5.1 through PC/G-5.4] until the containment hydrogen concentration can be determined to be below the containment Hydrogen Deflagration Overpressure Limit.

PC/G-1 If containment hydrogen concentration is below the containment Hydrogen Deflagration Overpressure Limit and drywell hydrogen concentration is below [9% (drywell Hydrogen Deflagration Overpressure Limit)], energize the hydrogen igniters.

Execute [Steps PC/G-2, PC/G-3 and PC/G-4] concurrently.

PC/G-2 When hydrogen is detected in the containment or drywell, but only if the offsite radioactivity release rate is expected to remain below the offsite release rate specified in [Technical Specifications], vent and purge the containment as follows, defeating isolation interlocks (except high radiation interlocks) if necessary:

> If while executing the following steps the offsite radioactivity release rate reaches the offsite release rate specified in [Technical Specifications], secure the containment vent and purge.

PC/G-2.1 Refer to [sampling procedure].

PC/G-2.2 Vent the containment.

PC/G 2.3 If the containment can be vented, initiate and maximize the containment purge.

PC/G-2.4 When hydrogen is no longer detected in the containment or drywell, secure the vent and purge.

PC/G-3 Monitor and control hydrogen concentration in the drywell.

PC/G-3.1 When hydrogen is detected in the drywell, but only if containment hydrogen concentration is below the containment Hydrogen Deflagration Overpressure Limit [and RPV pressure is below Primary Containment Pressure Limit A], operate the drywell hydrogen mixing system.

PC/G-3.2 Continue in this procedure at [Step PC/G-5].

PC/G-4 Monitor and control hydrogen concentration in the containment.

PC/G-4.1 When containment hydrogen concentration reaches [1% (minimum hydrogen concentration for recombiner operation)], but only if containment hydrogen concentration is below [6% (maximum hydrogen concentration for recombiner operation)] and the containment Hydrogen Deflagration Overpressure Limit, place hydrogen recombiners in service.

PC/G-4.2 When containment hydrogen concentration reaches [6% (maximum hydrogen concentration for recombiner operation)] or the containment Hydrogen Deflagration Overpressure Limit, secure hydrogen recombiners.

PC/G-5 When containment hydrogen concentration reaches the containment Hydrogen Deflagration Overpressure Limit, vent and purge the containment as follows, defeating isolation interlocks if necessary and irrespective of the offsite radioactivity release rate, to restore and maintain containment hydrogen concentration below the containment Hydrogen Deflagration Overpressure Limit:

PC/G-5.1 SUPPRESSION POOL SPRAY IS REQUIRED.

PC/G-5.2 If the igniters are de-energized, secure the drywell hydrogen mixing system.

PC/G-5.3 Vent the containment.

PC/G 5.4 If the containment can be vented, initiate and maximize containment purge.

PC/G-6 When containment hydrogen concentration can be maintained below the containment Hydrogen Deflagration Overpressure Limit, return to Step PC/G-1.

SC/T Monitor and control secondary containment temperatures. [1]

Operate available area coolers.

If secondary containment HVAC exhaust radiation level is below [20 mr/hr (secondary containment HVAC isolation setpoint)], operate available secondary containment HVAC.

When an area temperature exceeds its maximum normal operating temperature, isolate all systems that are discharging into the area except systems required to suppress a fire and systems required to be operated by [procedures developed from the Severe Accident Guidelines].

SC/R Monitor and control secondary containment radiation levels.

When an area radiation level exceeds its maximum normal operating radiation level, isolate all systems that are discharging into the area except systems required to suppress a fire and systems required to be operated by [procedures developed from the Severe Accident Guidelines].

SC/L Monitor and control secondary containment water levels.

When a floor drain sump or area water level is above its maximum normal operating water level, operate available sump pumps to restore and maintain it below its maximum normal operating water level.

If any floor drain sump or area water level cannot be restored and maintained below its maximum normal operating water level, isolate all systems that are discharging water into the sump or area except systems required to suppress a fire and systems required to be operated by [procedures developed from the Severe Accident Guidelines].

RR Isolate all primary systems that are discharging into areas outside the primary and secondary containments except systems required to be operated by [procedures developed from the Severe Accident Guidelines].

TABLE CR-1
SECONDARY CONTAINMENT PARAMETER OPERATING VALUES

Secondary Containment Parameter	Max Normal Operating Value
Area Temperature	°F
RWCU "A" pump room 158′	130
RWCU "B" pump room 158′	130
RWCU Hx room 158′ at Hxs	130
RWCU Hx room 158′ at discharge to hotwell	130
RWCU phase separator room 158′	130
RWCU holding pump room 185′	130
NE Diagonal	175
SE Diagonal	175
HPCI room, area A	175
HPCI room, area B	175
HPCI room, area C	175
Torus room, west wall	175
Torus room, east wall	175
Torus room, north wall	175
Torus room, south wall	175
Main steam tunnel	200
SE, Reactor 130′ area A	150
SE, Reactor 130′ area B	150
NW Diagonal, area A	175
NW Diagonal, area B	175
NW Diagonal, area C	175

TABLE CR-1 (continued)

Secondary Containment Parameter	Max Normal Operating Value
HVAC Cooler Differential Temperature	°F
RWCU "A" pump room 158′	75
RWCU "B" pump room 158′	75
RWCU Hx room 158′ at Hxs	75
RWCU Hx room 158′ at discharge to hotwell	75
RWCU phase separator room 158′	75
RWCU holding pump room 185′	75
Torus room, NW A	50
Torus room, west A	50
Torus room, NW B	50
Torus room, west B	50
Torus room, NW C	50
Torus room, west C	50
Torus room, NW D	50
Torus room, west D	50

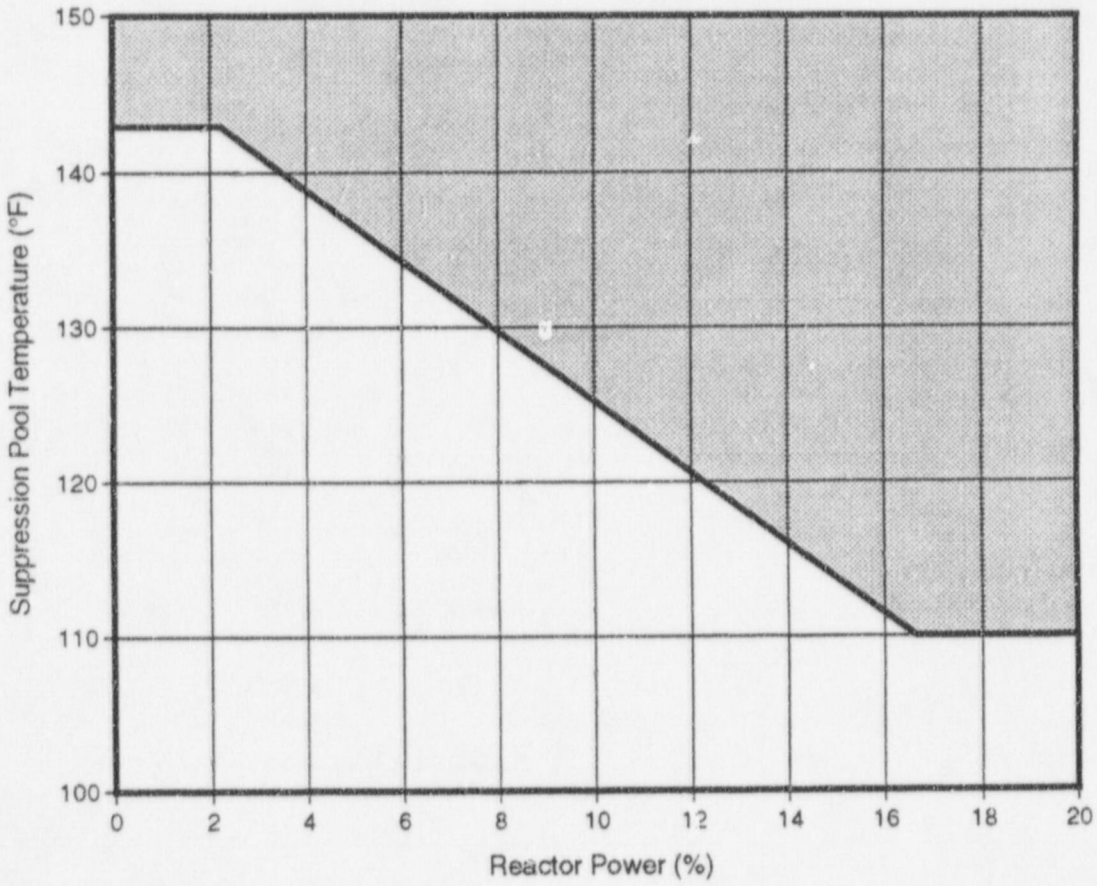
TABLE CR-1 (continued)

Secondary Containment Parameter	Max Normal Operating Value
HVAC Exhaust Radiation Level	mr/hr
Reactor Building	50
Refuel floor	50
Area Radiation Level	mr/hr
158′ southeast area	50
158′ northeast area	50
158′ northwest area	50
130′ northeast area	50
130′ northwest area	50
Decontamination pump and equipment room	50
South CRD hydraulic units	50
Spent fuel pool passageway	50
185′ operating floor	50
185′ sample panel area	50
185′ RWCU control panel area	50
Fuel pool demin panel area	50
CRD repair area	50
RCIC equipment area	50
CRD pump room SW	50
RHR and core spray room northeast	50
RHR and core spray room southeast	150

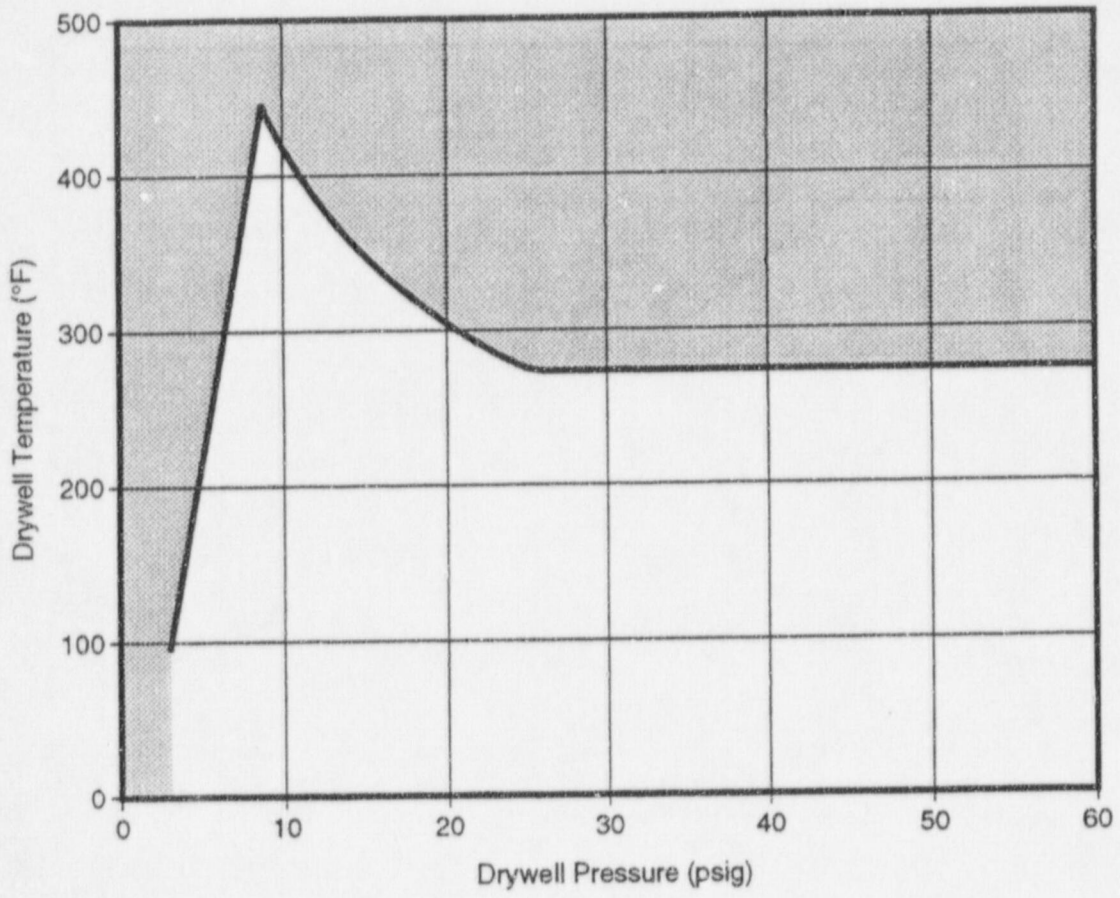
TABLE CR-1 (continued)

Secondary Containment Parameter	Max Normal Operating Value
Floor Drain Sump Water Level	in.
Sump A (NE diagonal)	47
Sump B (NW diagonal)	52
Area Water Level	in.
CRD compartment	7
RCIC compartment	7
RB NE corner room	7
RB SE corner room	7
HPCI compartment	7
Torus compartment NW	7
Torus compartment NE	7
Torus compartment SE	7
Torus compartment SW	7

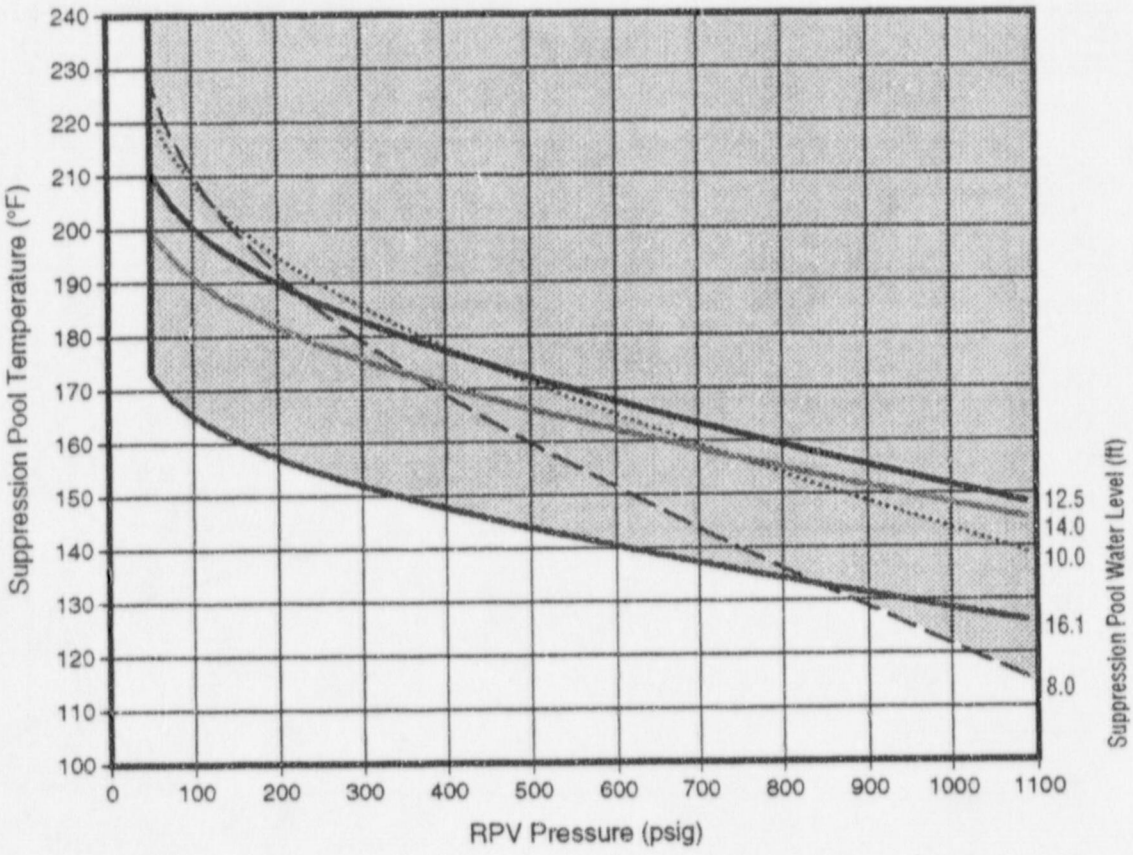
Boron Injection Initiation Temperature



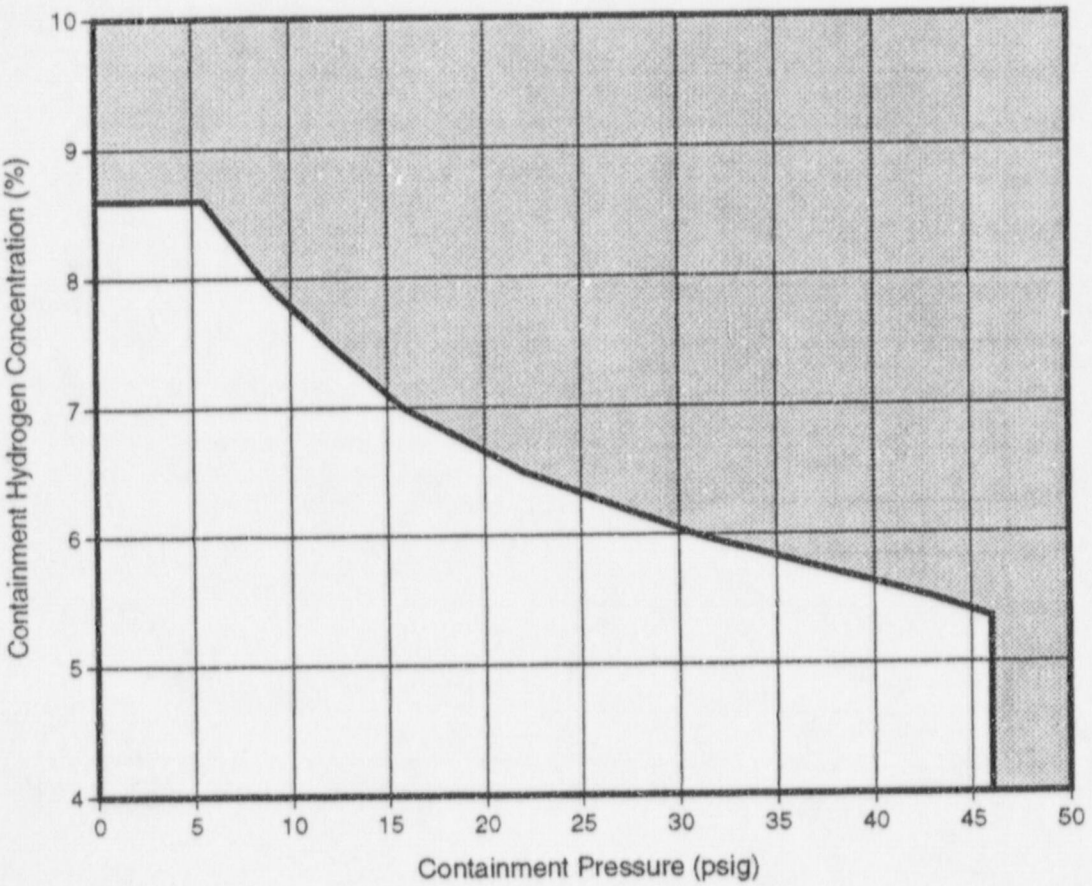
Drywell Spray Initiation Limit



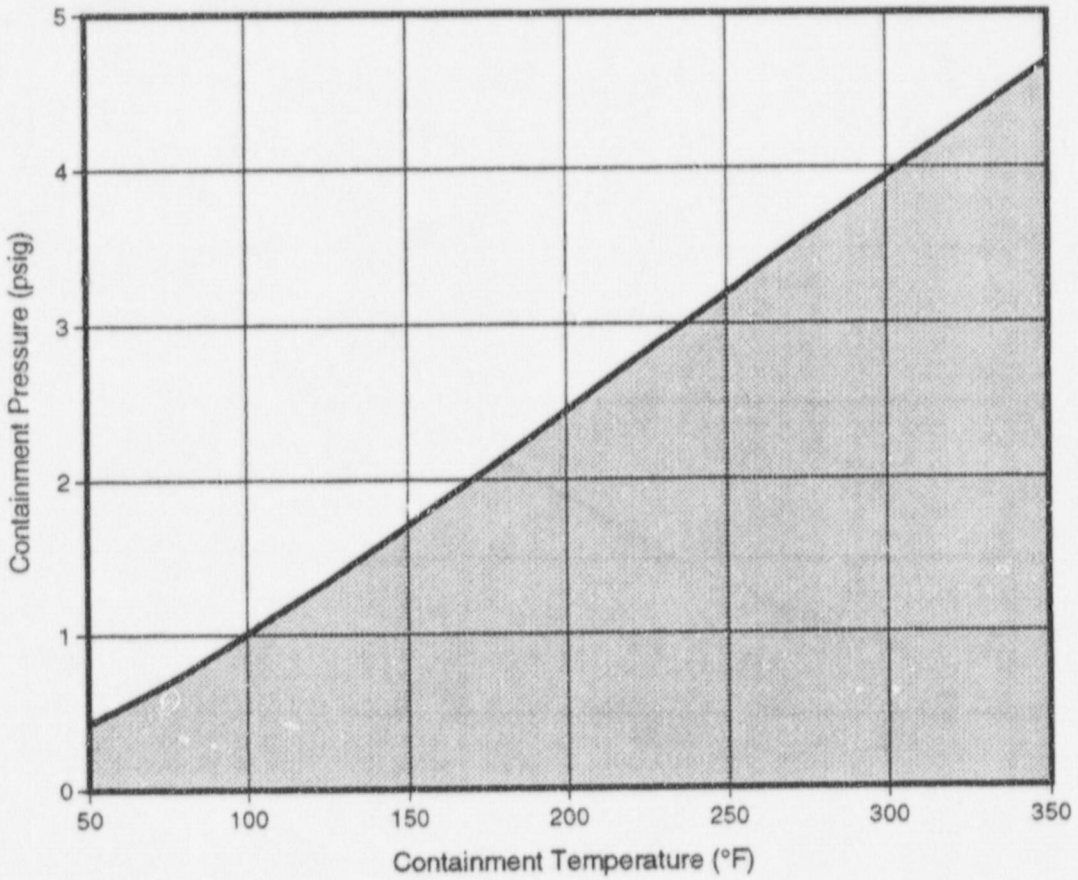
Heat Capacity Temperature Limit



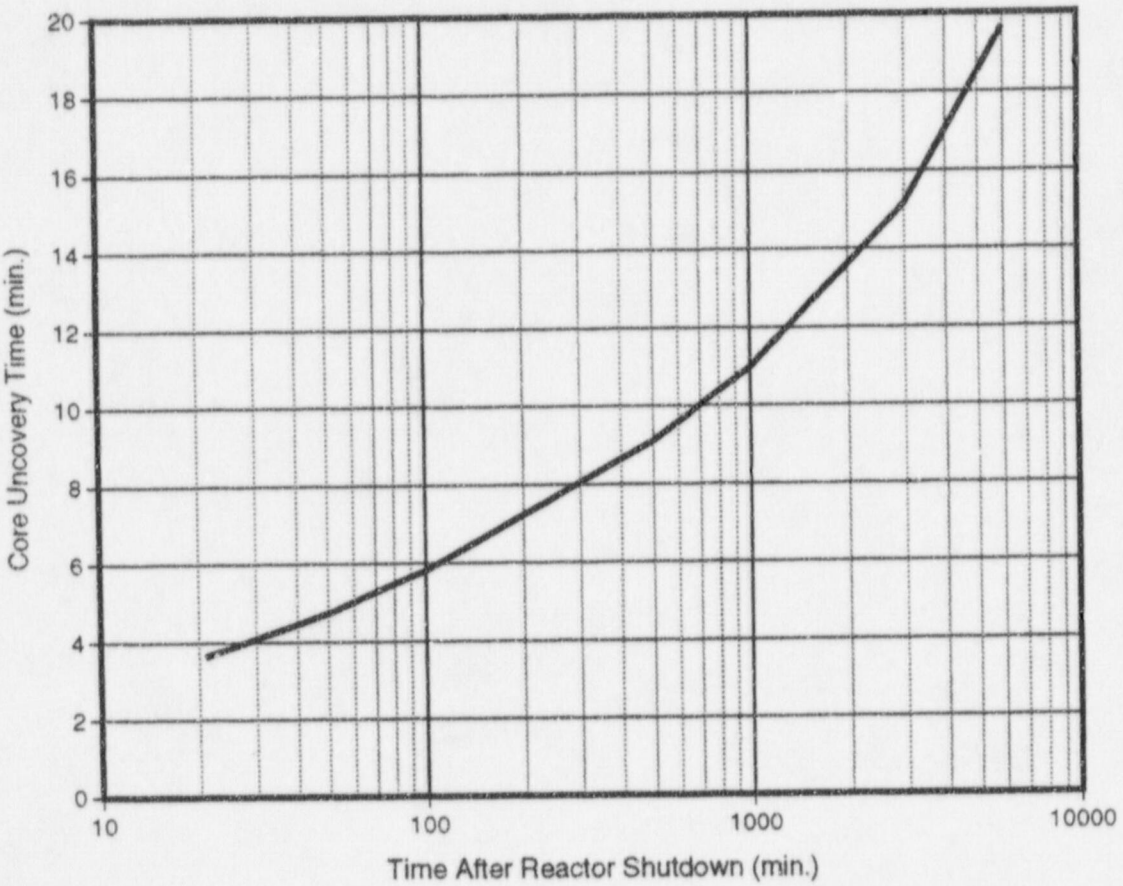
Mark III Containment Hydrogen Deflagration Overpressure Limit



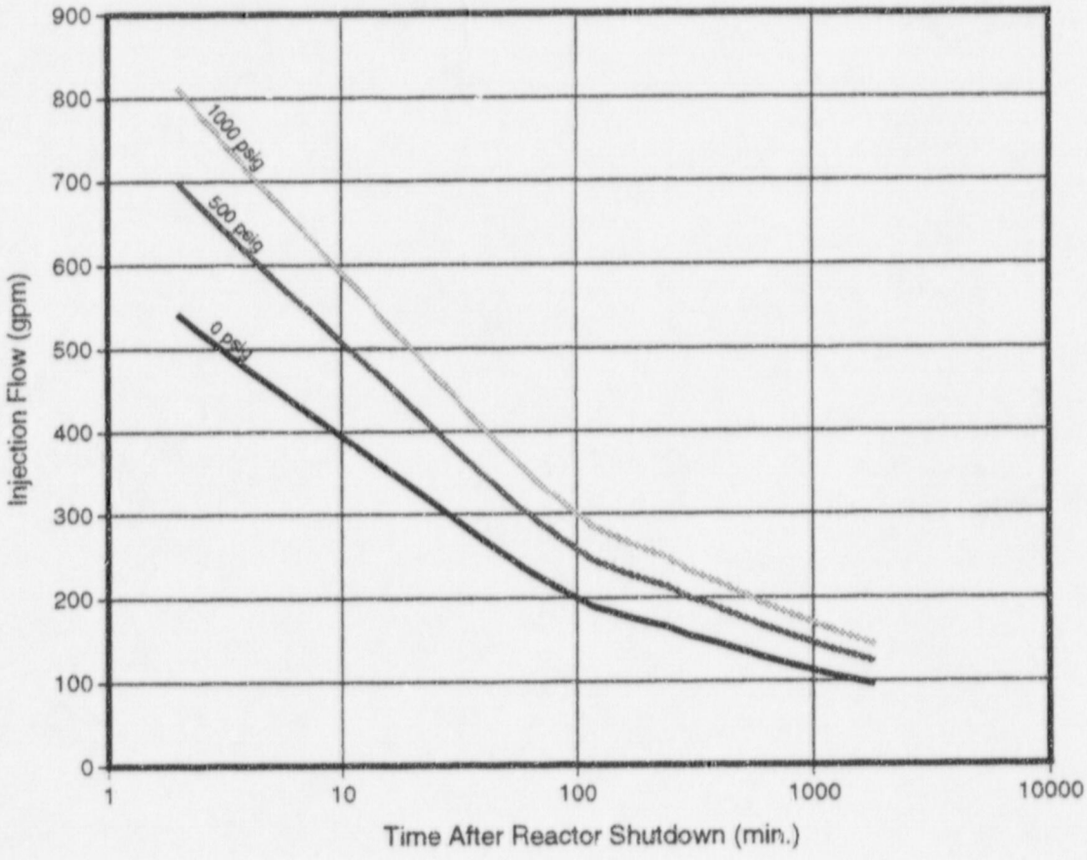
Mark III Containment Spray Initiation Pressure Limit



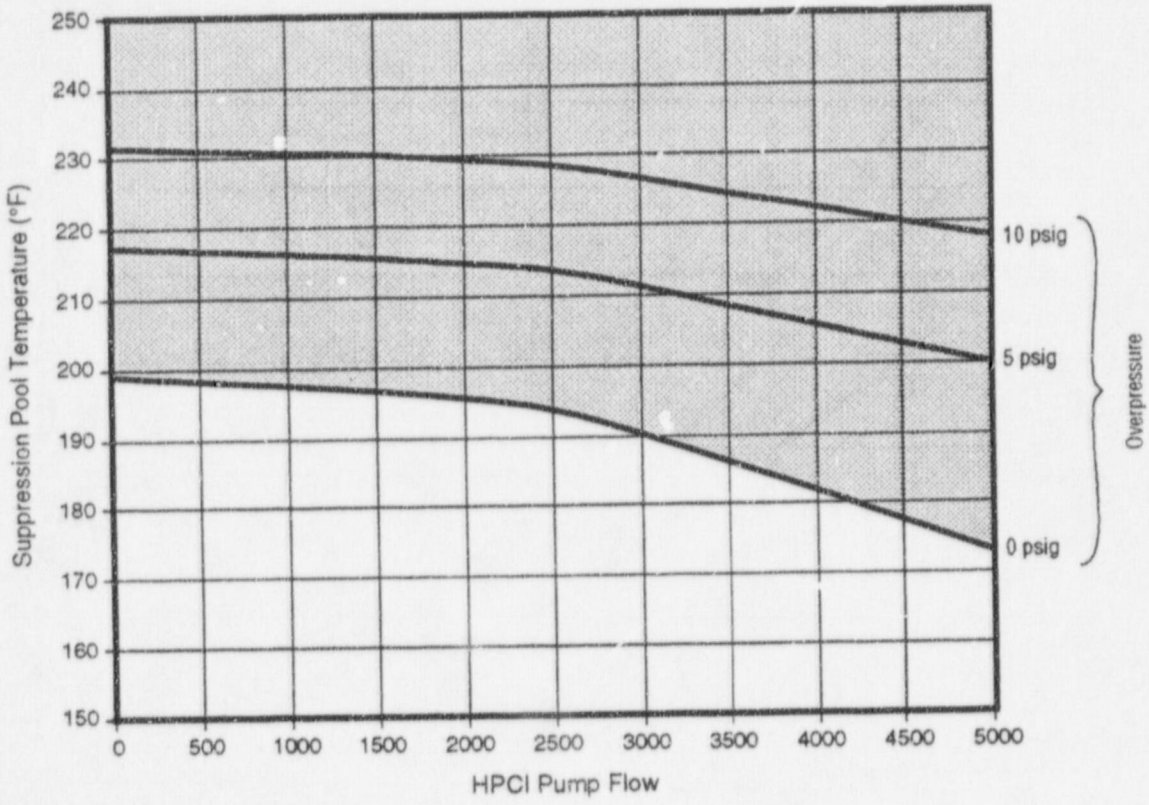
Maximum Core Uncovery Time Limit



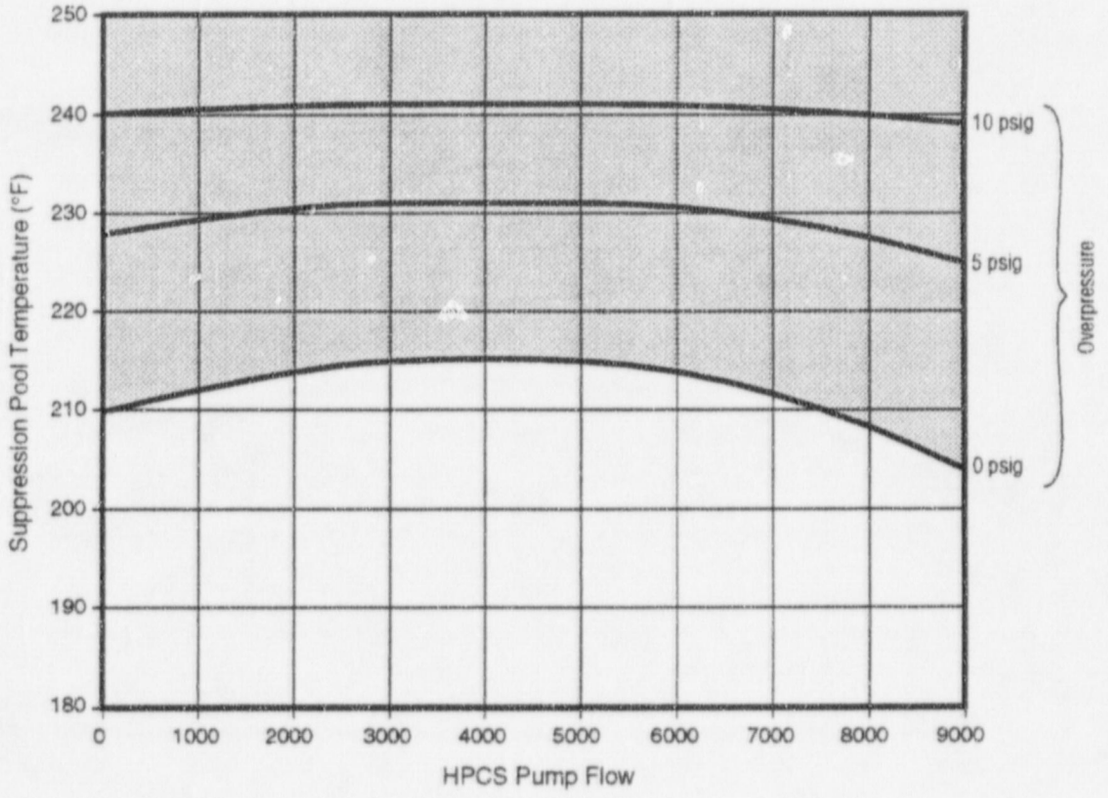
Minimum Debris Retention Injection Rate



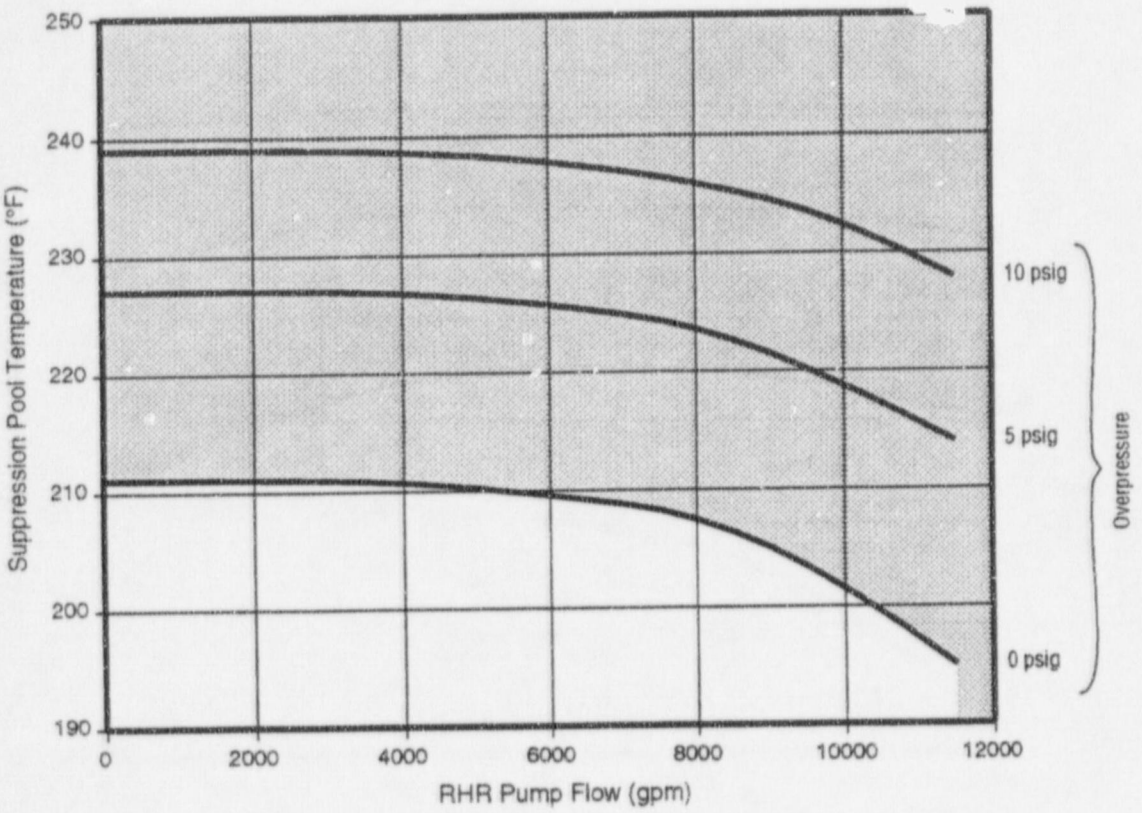
HPCI NPSH Limit



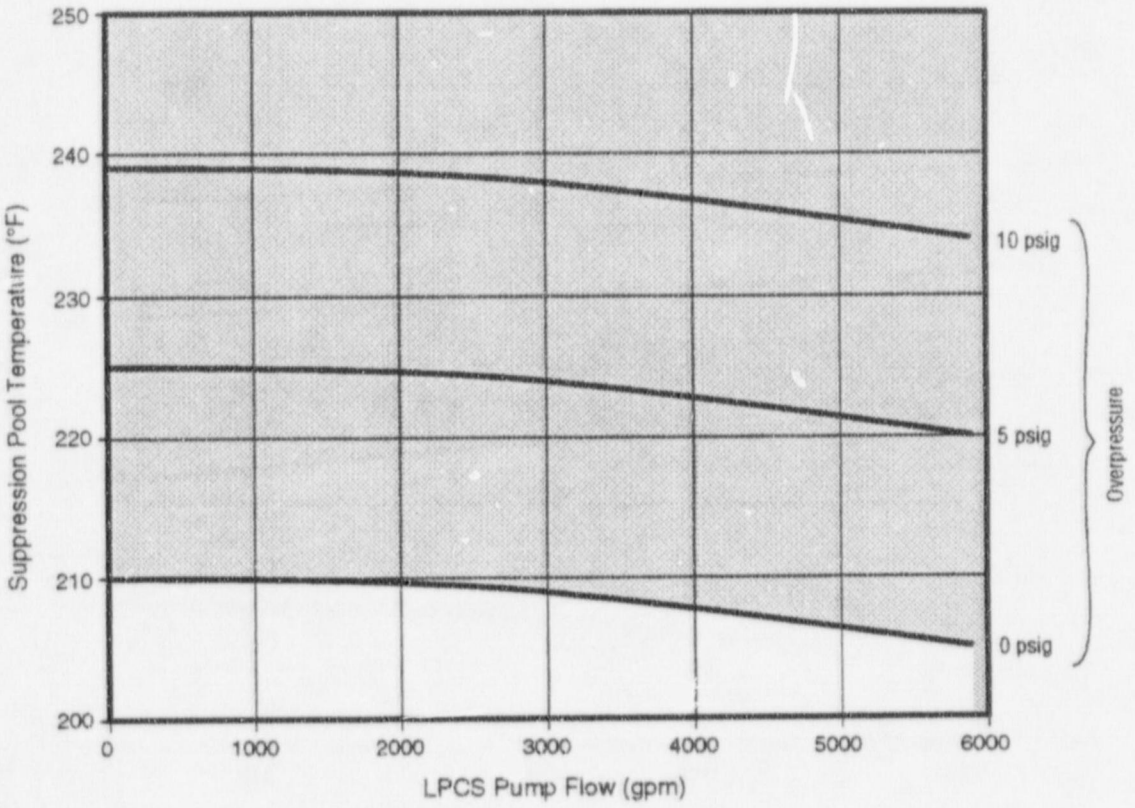
HPCS NPSH Limit



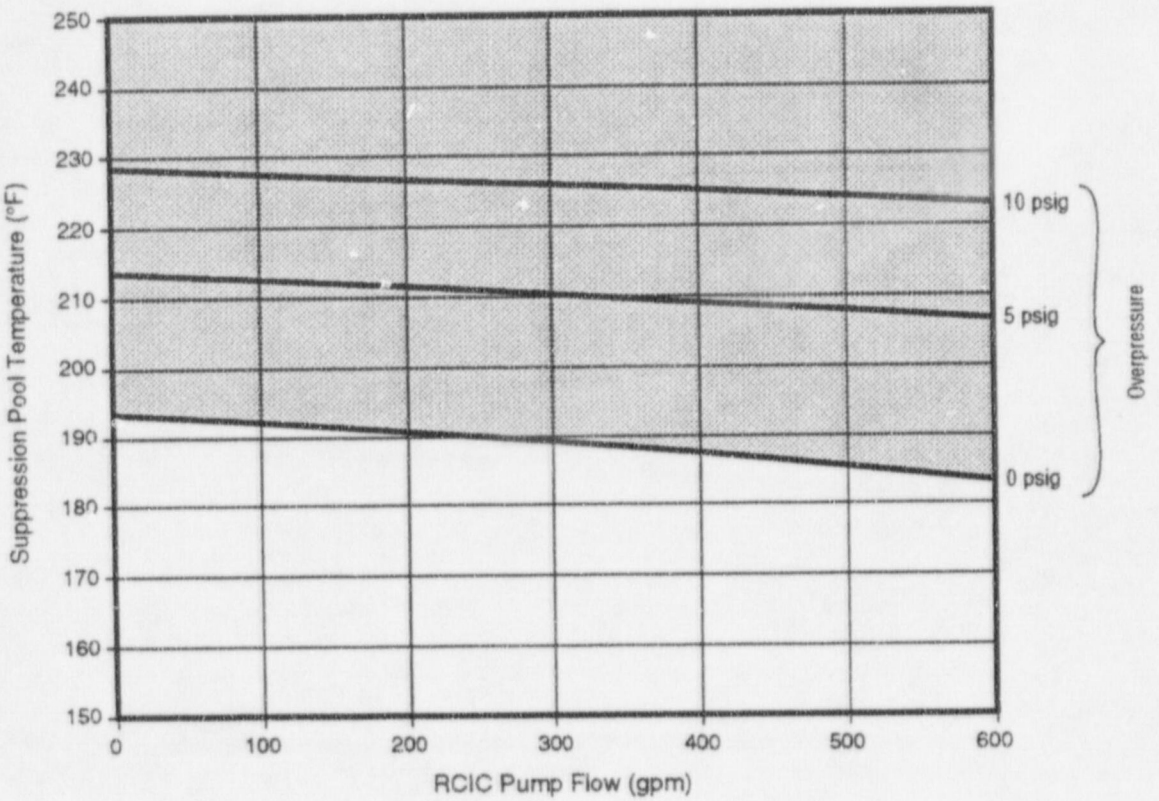
LPCI NPSH Limit



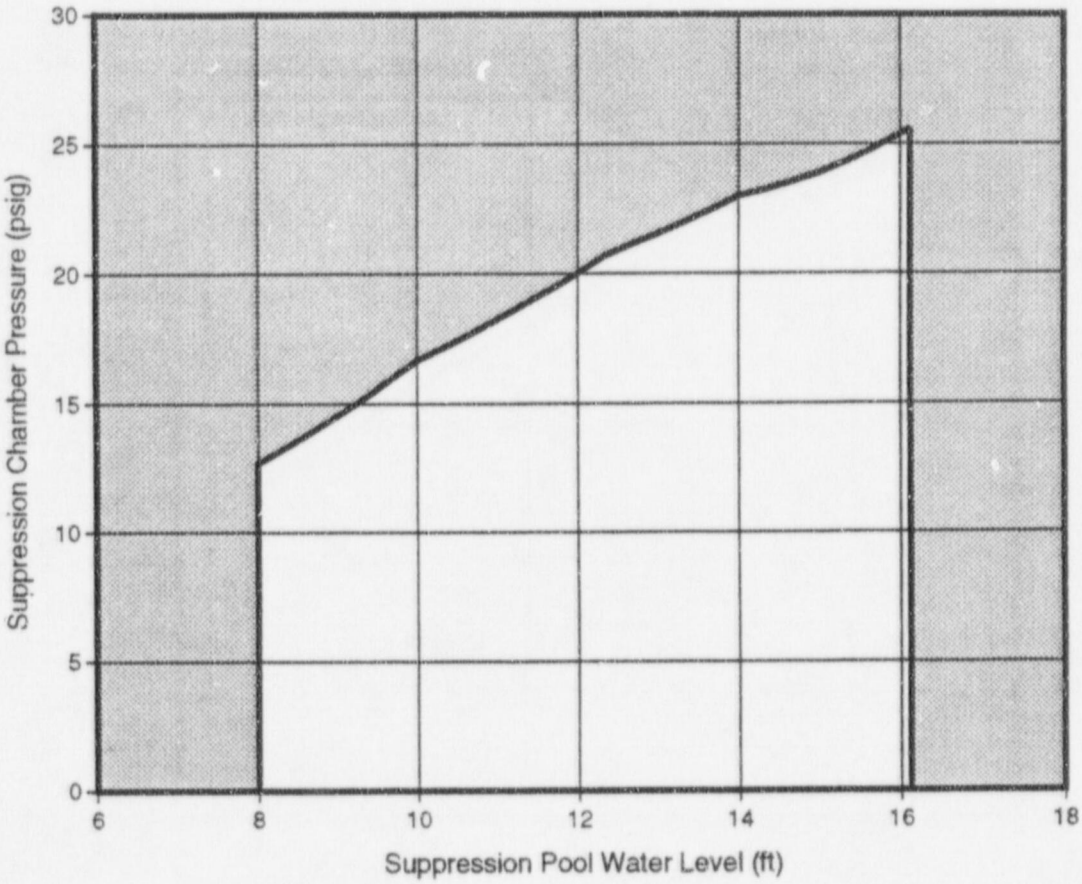
LPCS NPSH Limit



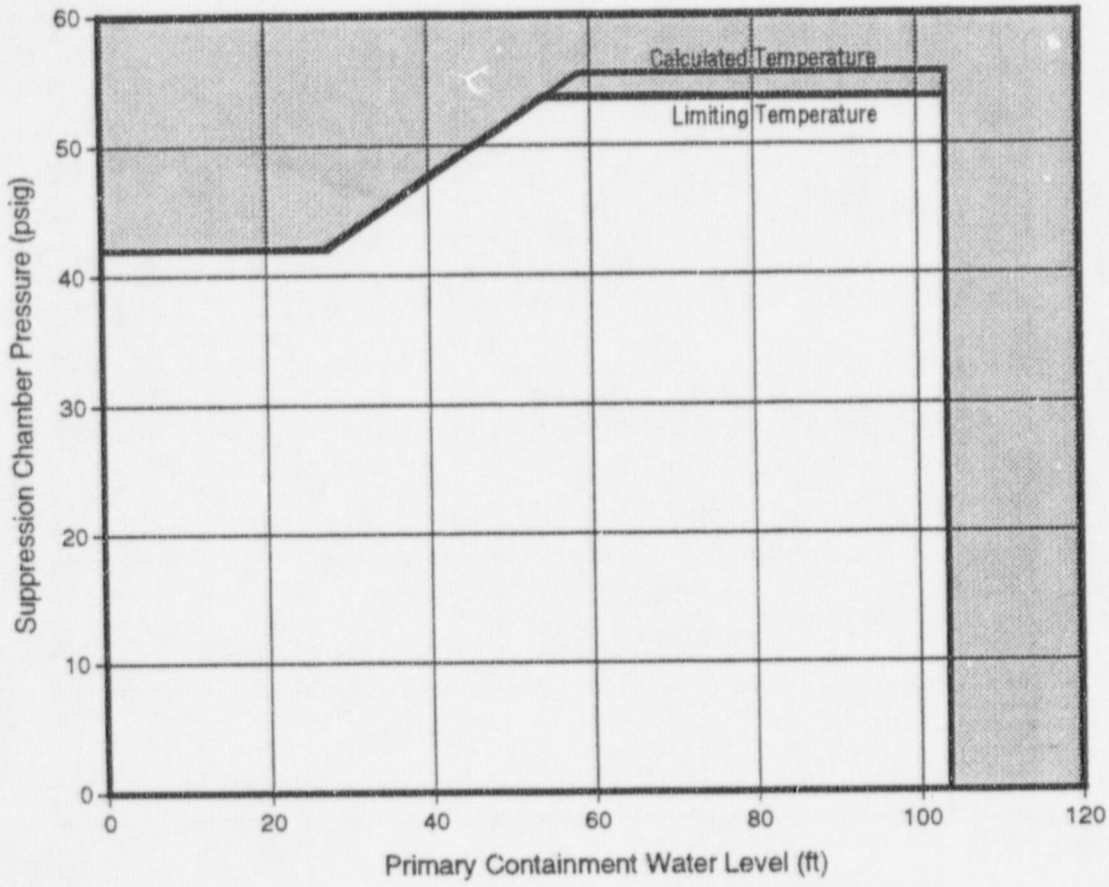
RCIC NPSH Limit



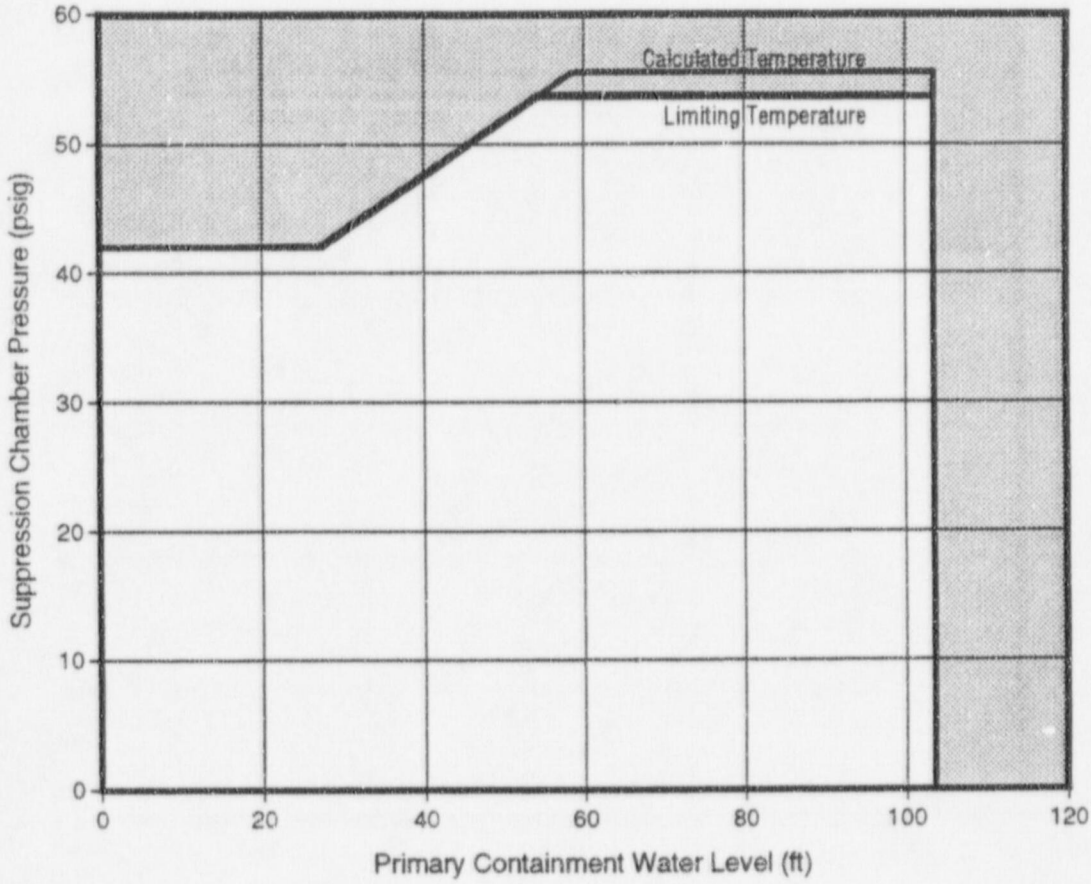
Pressure Suppression Pressure



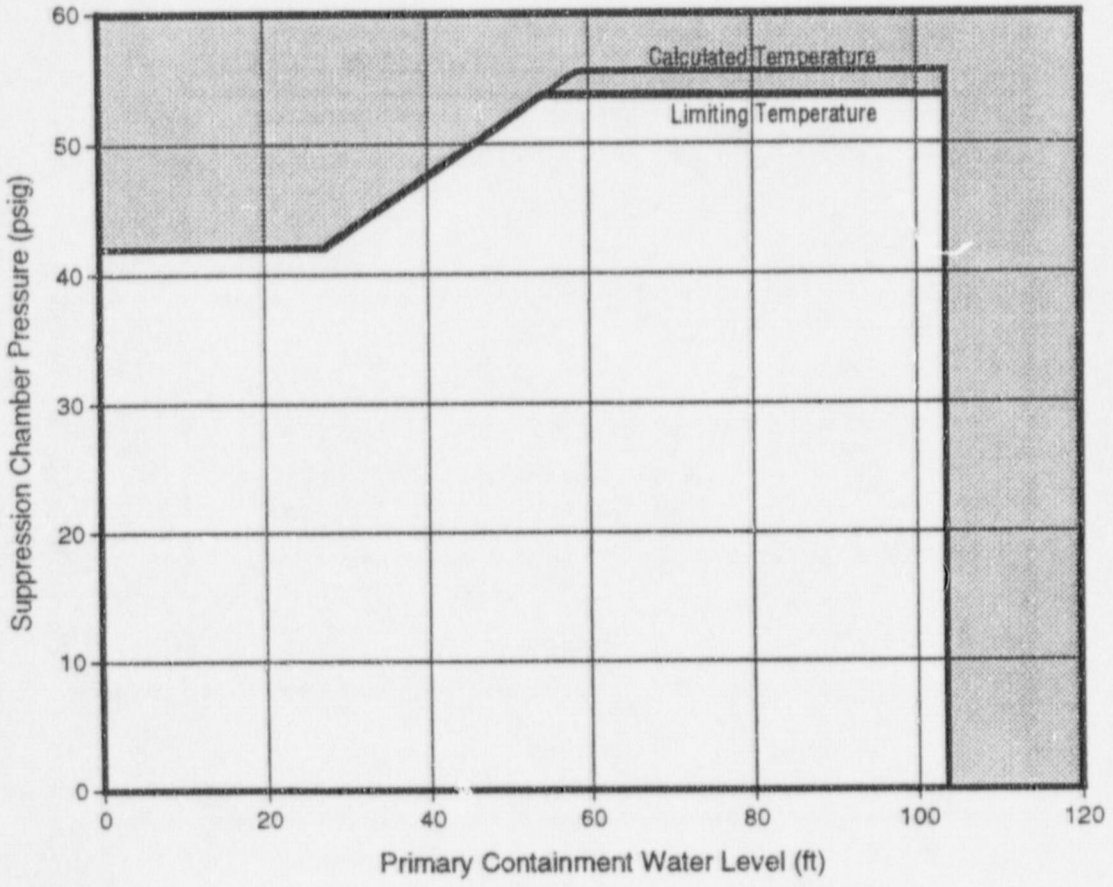
Primary Containment Pressure Limit A



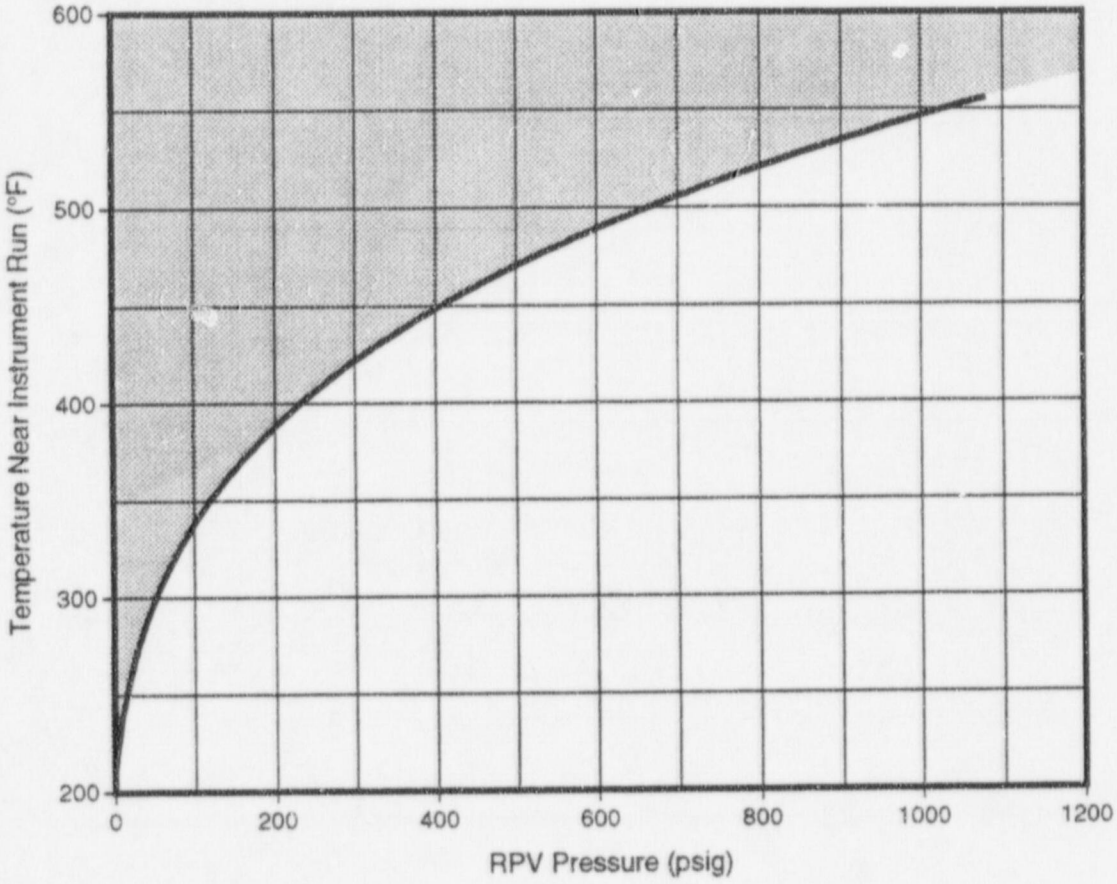
Primary Containment Pressure Limit B



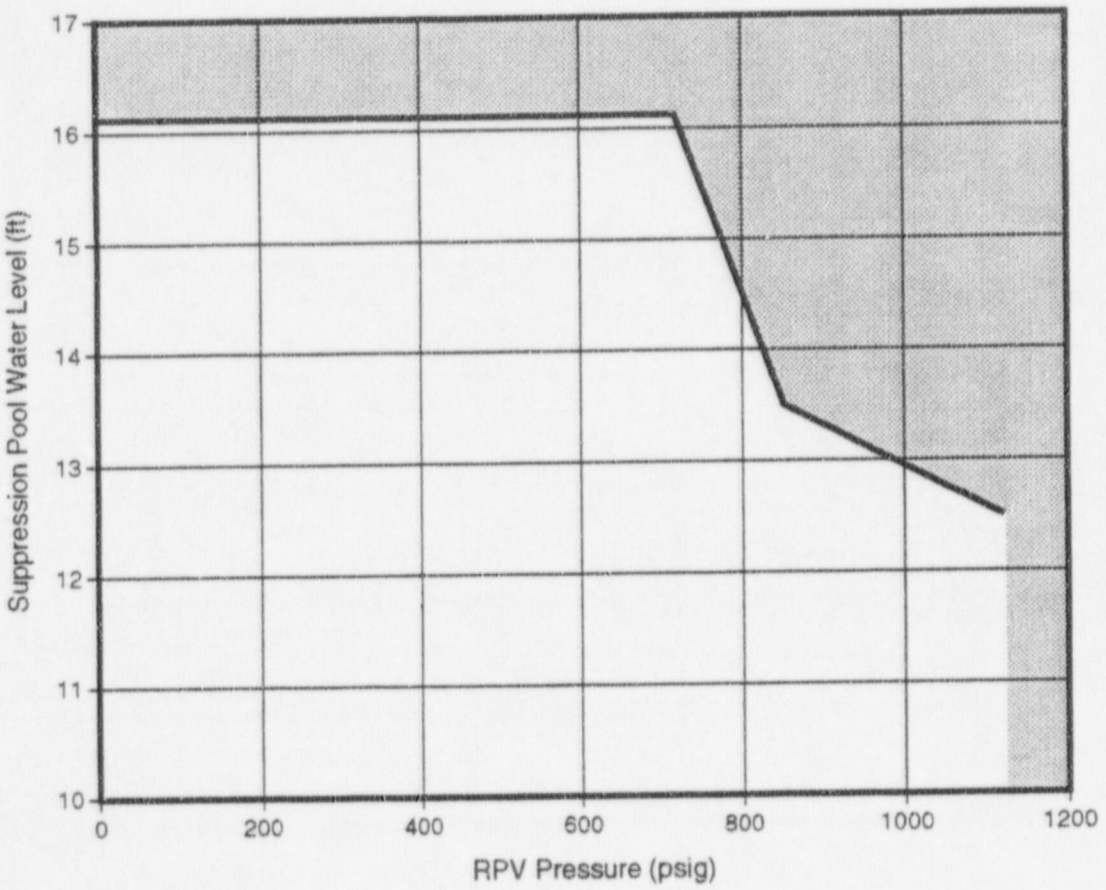
Primary Containment Pressure Limit C



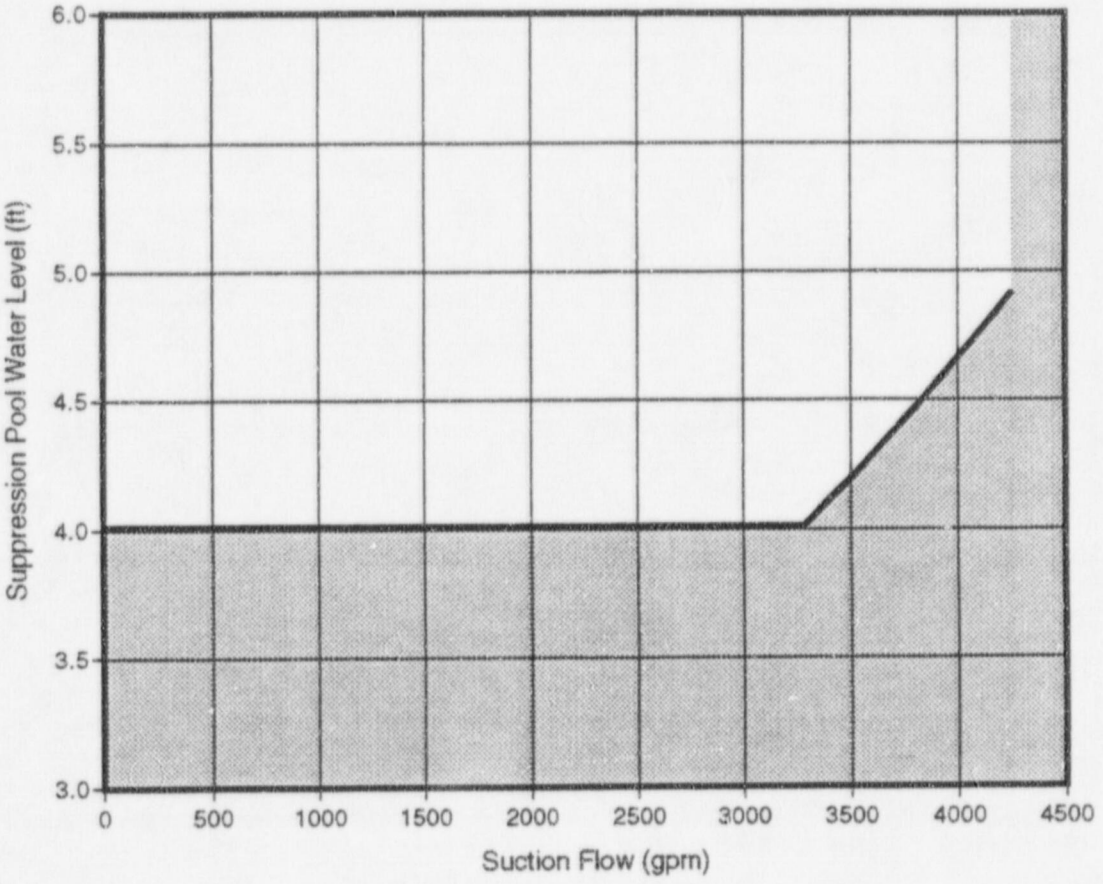
RPV Saturation Temperature



SRV Tail Pipe Level Limit



HPCI Vortex Limit



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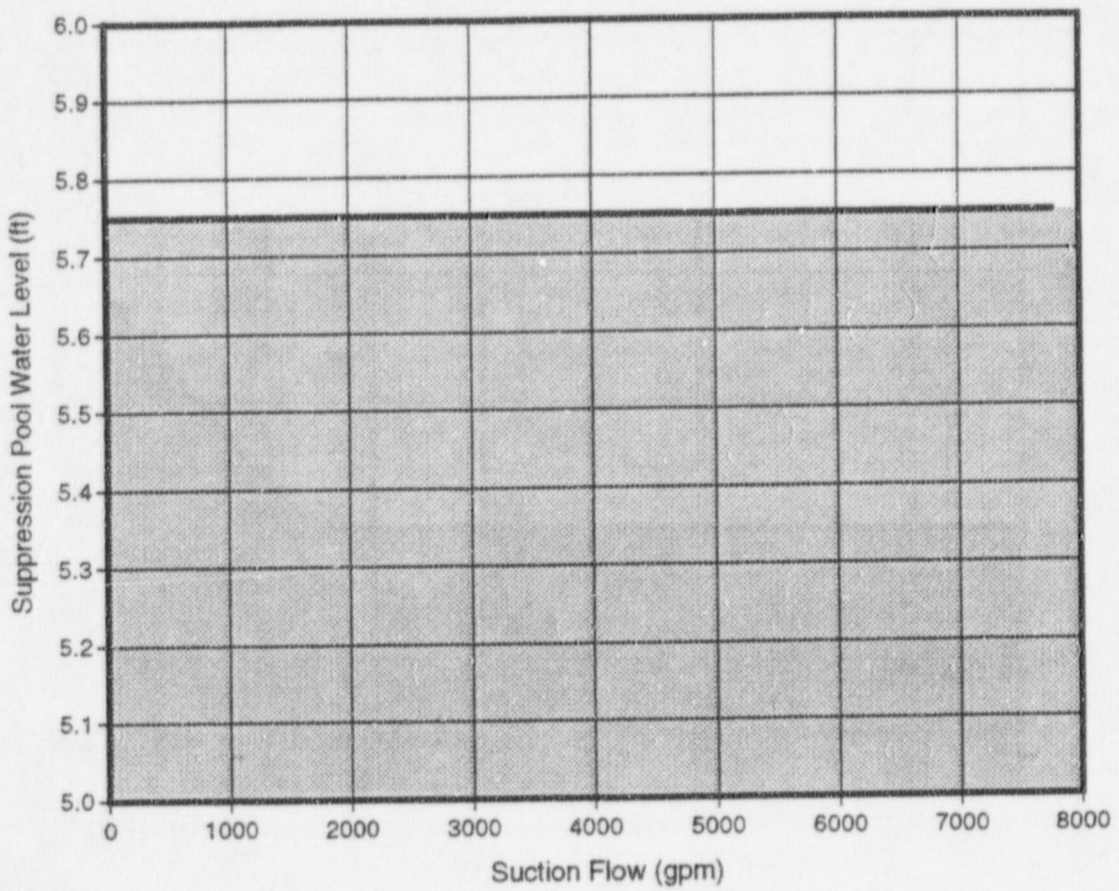
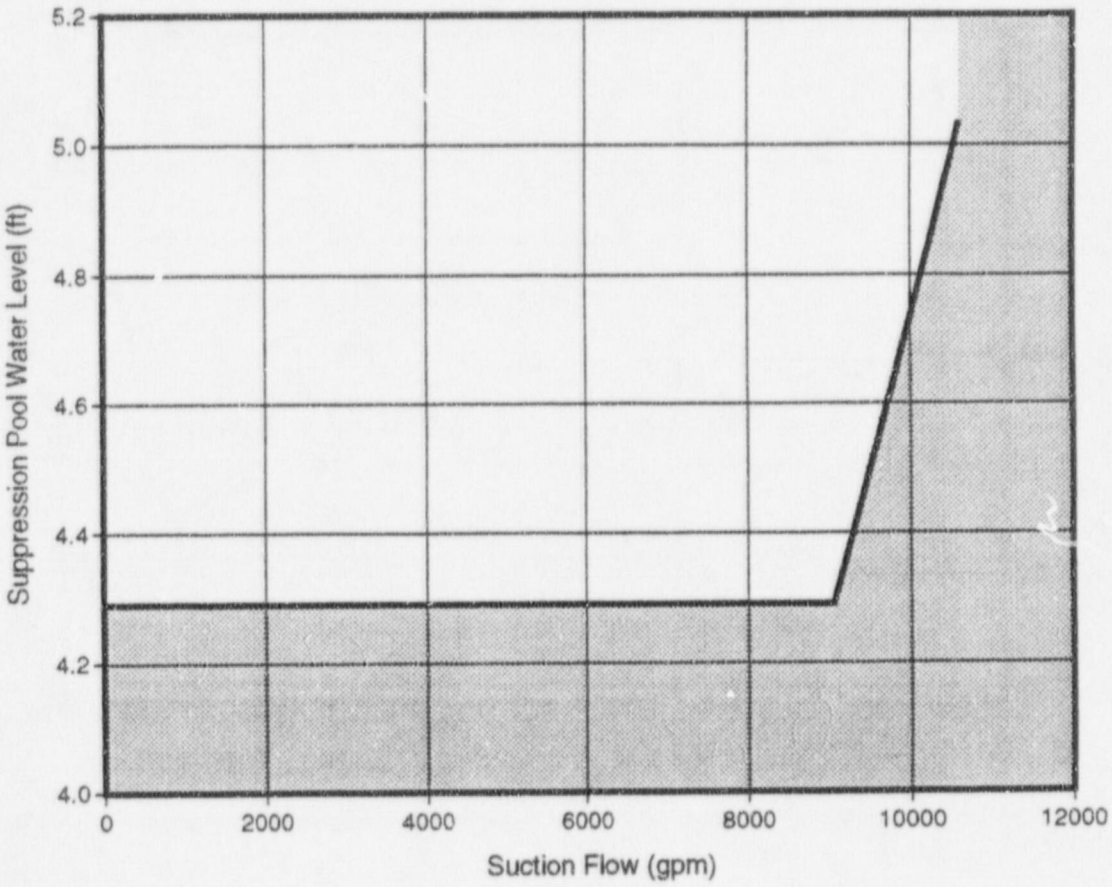
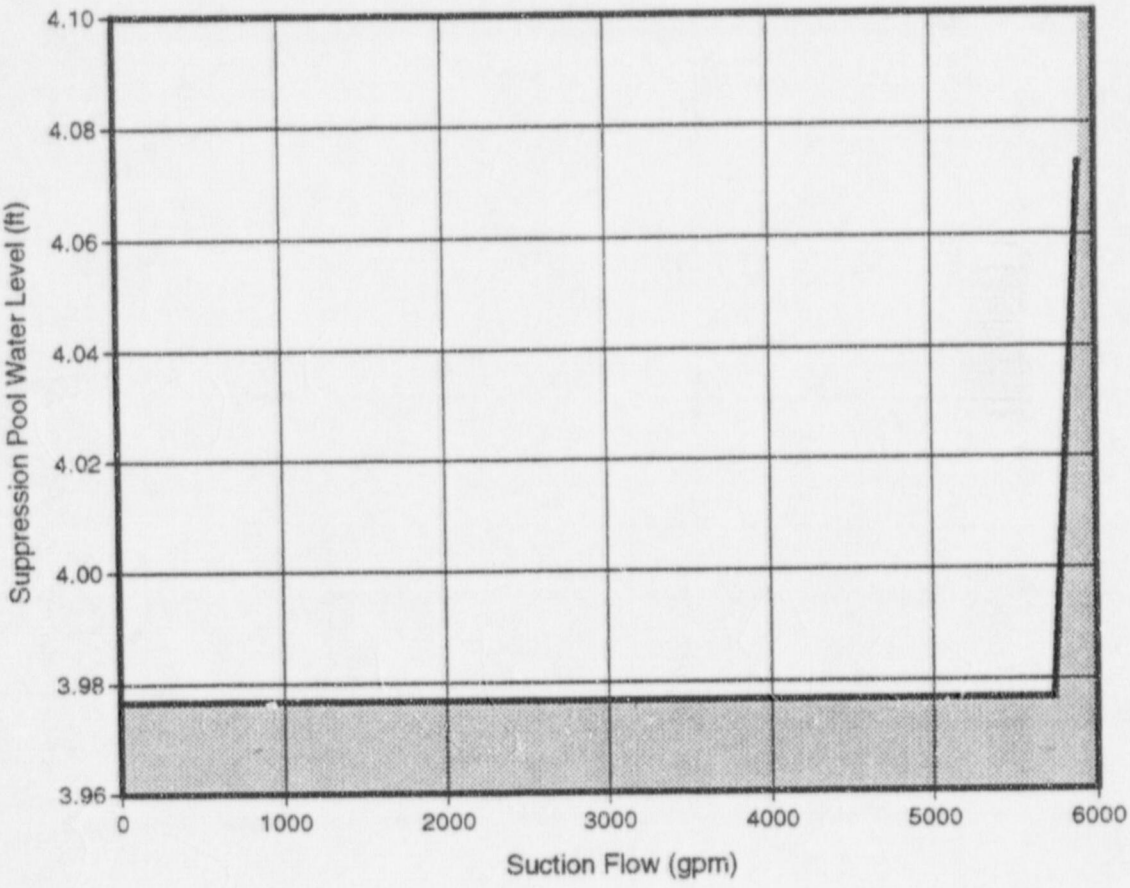


LPCI Vortex Limit



LPCS Vortex Limit



RCIC Vortex Limit