NEDO-31331
SUPPLEMENT A
CLASS I
MARCH 1987

APPENDIX A

TO
BWR OWNERS' GROUP

EMERGENCY PROCEDURE GUIDELINES

REVISION 4

Prepared for the

BWR OWNERS' GROUP

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- HPCI steam line
- RCIC steam line
- IC tube side vents
- RHR

C6-4 when primary containment water level reaches [83 ft 5 in. (elevation of top of active fuel)], maintain primary containment water level between [83 ft 5 in. (elevation of top of active fuel)] and the Maximum Primary Containment Water Level Limit with the following systems taking suction from sources external to the primary containment only when required:

- HPCS
- LPCS
- Feedwater/condensate
- CRD
- LPCI
- Head spray
- [RHR service water crosstie
- Fire system
- Interconnections with other units
- ECCS keep-full systems
- Other primary containment fill systems]

C6-1 Initiate SPMS.

C6-2 Operate the following systems:

- HPCS with suction from the condensate storage tank when available.
- LPCS; operate one LPCS with suction from the condensate storage tank [or fire system] only when the other LPCS is operating with suction from the suppression pool.
- Condensate/feedwater
- CRD
- RCIC with suction from the condensate storage tank only, defeating low RPV pressure isolation interlocks and high suppression pool water level suction transfer logic if necessary.
- LPCI with suction from sources external to the primary containment [only.] [if possible.]
- [RHR service water crosstie
- Fire system
- Interconnections with other units
- ECCS keep-full systems
- Other primary containment fill systems]

Execute [Steps C6-3 and C6-4] concurrently.

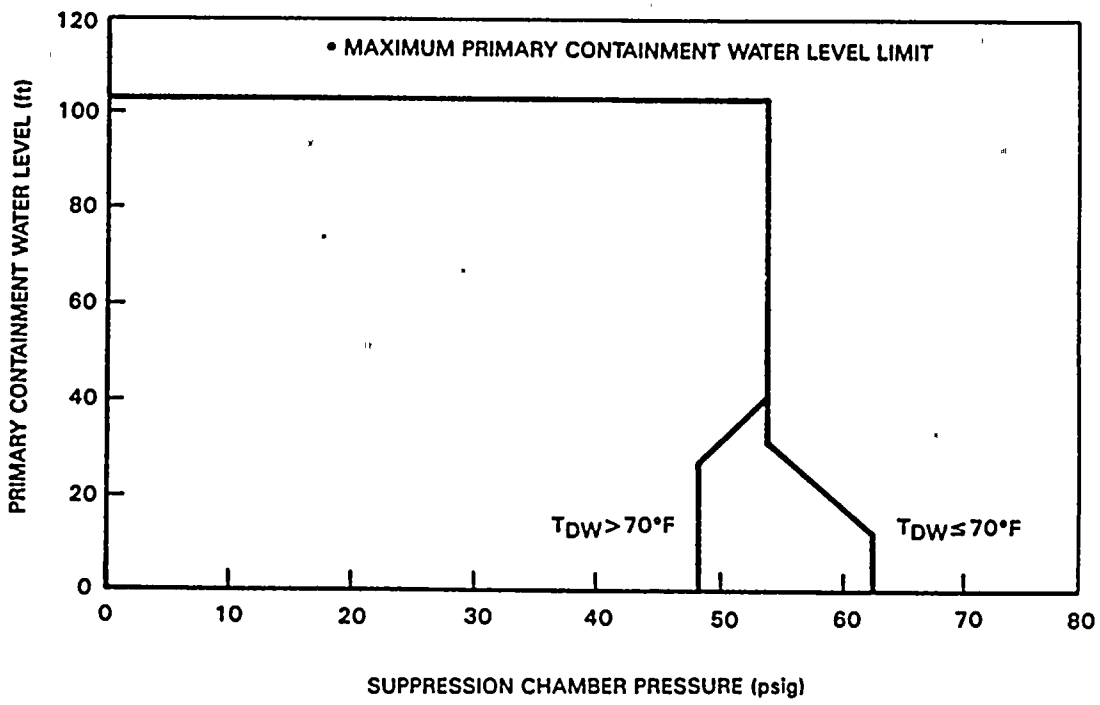
C6-3 When primary containment water level reaches [26 ft 3 in. (elevation of the bottom of the lowest recirculation piping)], then irrespective of the offsite radioactivity release rate vent the RPV, defeating isolation interlocks if necessary, until RPV water level reaches [-164 in. (top of active fuel)] with one or more of the following:

- Flood vent valves
- MSIVs
- Main steam line drains

CONTINGENCY #6
PRIMARY CONTAINMENT FLOODING

If while executing the following steps:

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



- RPV water level can be restored and maintained above [-164 in. (top of active fuel)] enter [procedure developed from the RPV Control Guideline] at [Step RC/L].

> If RPV water level cannot be restored and maintained above [-195 in. (Minimum Steam Cooling RPV Water Level)], enter [procedure developed from Contingency #6].

C5-3.3 When RPV water level can be maintained above [-195 in. (Minimum Steam Cooling RPV Water Level)], return to [Step C5-3].

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

C5-4 When [364 pounds (Hot Shutdown Boron Weight)] of boron have been injected, 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 [-164 in. (top of active fuel)].

If RPV water level cannot be maintained above [-164 in. (top of active fuel)], EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; return to [Step C5-3.1].

C5-5 When [procedure for cooldown to cold shutdown conditions] is entered from [procedure developed from the RPV Control Guideline] at [Step RC/P-5], proceed to cold shutdown in accordance with [procedure for cooldown to cold shutdown conditions].

- CRD
- RCIC with suction from the condensate storage tank, defeating low RPV pressure isolation interlocks and high suppression pool water level suction transfer logic if necessary.
- HPCI with suction from the condensate storage tank, defeating high suppression pool water level suction transfer logic if necessary.
- LPCI with injection through the heat exchangers as soon as possible.

If RPV water level cannot be restored and maintained above [-164 in. (top of active fuel)], restore and 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)], 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)]:

- HPCS
- LPCS
- RHR service water crosstie
- Fire System
- Interconnections with other units
- ECCS keep-full systems

If RPV water level was not deliberately lowered in [Step C5-2] and RPV water level cannot be maintained above [-164 in. (top of active fuel)], maintain RPV water level between [-195 in. (Minimum Steam Cooling RPV Water Level)] and [+58 in. (high level trip setpoint)].

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

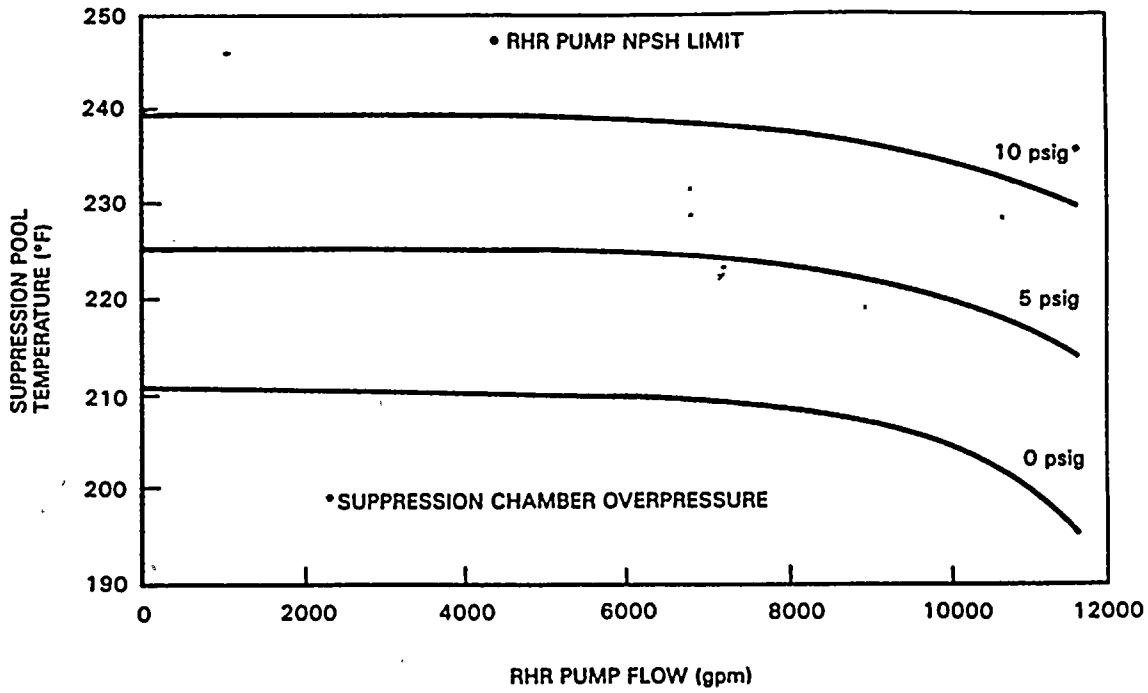
C5-3.1 Terminate and prevent all injection into the RPV except from boron injection systems, CRD, and RCIC until RPV pressure is below the Minimum Alternate RPV Flooding Pressure.

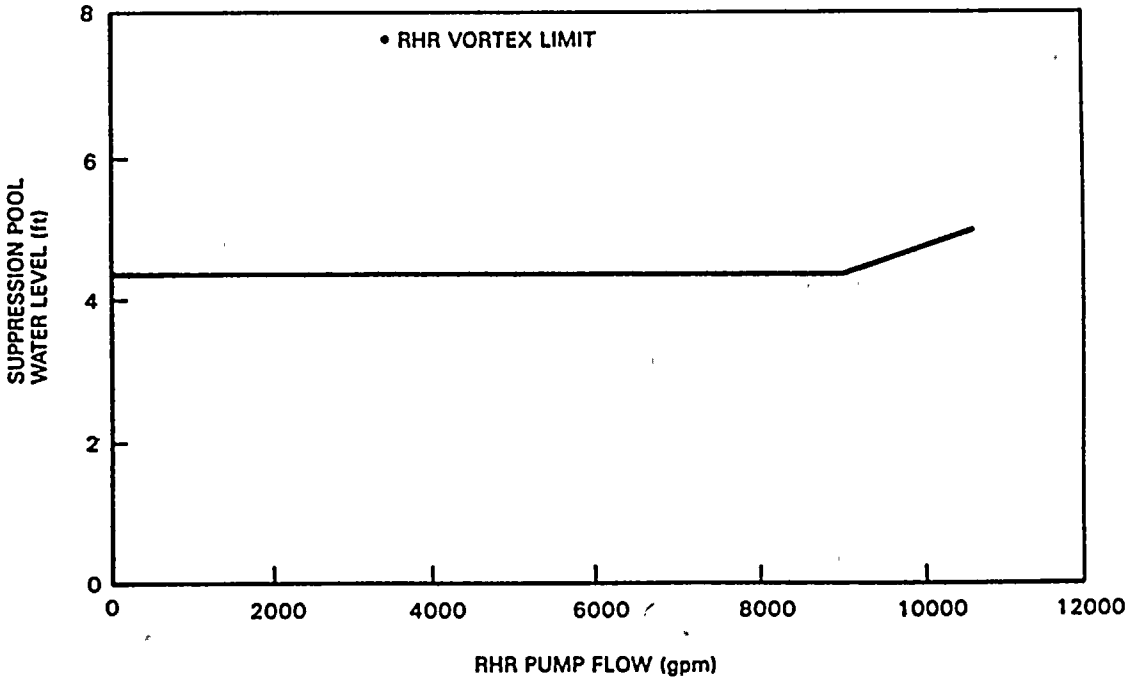
Number of open SRVs	Minimum Alternate RPV Flooding Pressure (psig)
[7 or more	94]
6	112
5	137
4	175
3	238
2	364
1	743]

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.

C5-3.2 Commence and, irrespective of pump NPSH and vortex limits, slowly increase injection into the RPV with the following systems to restore and maintain RPV water level above [-164 in. (top of active fuel)]: #7

- Condensate/feedwater


• RHR PUMP NPSH LIMIT
10 psig*
5 psig
0 psig
*SUPPRESSION CHAMBER OVERPRESSURE
SUPPRESSION POOL TEMPERATURE (°F)
250
240
230
220
210
200
190
0
2000
4000
6000
8000
10000
12000
RHR PUMP FLOW (gpm)


• RHR VORTEX LIMIT
SUPPRESSION POOL WATER LEVEL (ft)
8
6
4
2
0
0
2000
4000
6000
8000
10000
12000
RHR PUMP FLOW (gpm)

C5-3 Maintain RPV water level either: #7

- If RPV water level was deliberately lowered in [Step C5-2], between [-195 in. (Minimum Steam Cooling RPV Water Level)] and the level to which it was lowered, or
- If RPV water level was not deliberately lowered in [Step C5-2], between [-164 in. (top of active fuel)], and [+58 in. (high level trip setpoint)],

with the following systems:

- Condensate/feedwater
- CRD
- RCIC with suction from the condensate storage tank, defeating low RPV pressure isolation interlocks and high suppression pool water level suction transfer logic if necessary. #3 #4
- HPCI with suction from the condensate storage tank, defeating high suppression pool water level suction transfer logic if necessary. #3
- LPCI with injection through the heat exchangers as soon as possible; control and maintain pump flow less than the RHR Pump NPSH Limit and [the RHR Vortex Limit].

Then:

- If any MSIV is open, bypass low RPV water level pneumatic system and MSIV isolation interlocks and restore the pneumatic supply [to the containment], and
- Lower RPV water level, irrespective of any consequent reactor power or RPV water level oscillations, by terminating and preventing all injection into the RPV except from boron injection systems and CRD until either:

  - Reactor power drops below [3% (APRM downscale trip)], 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)].

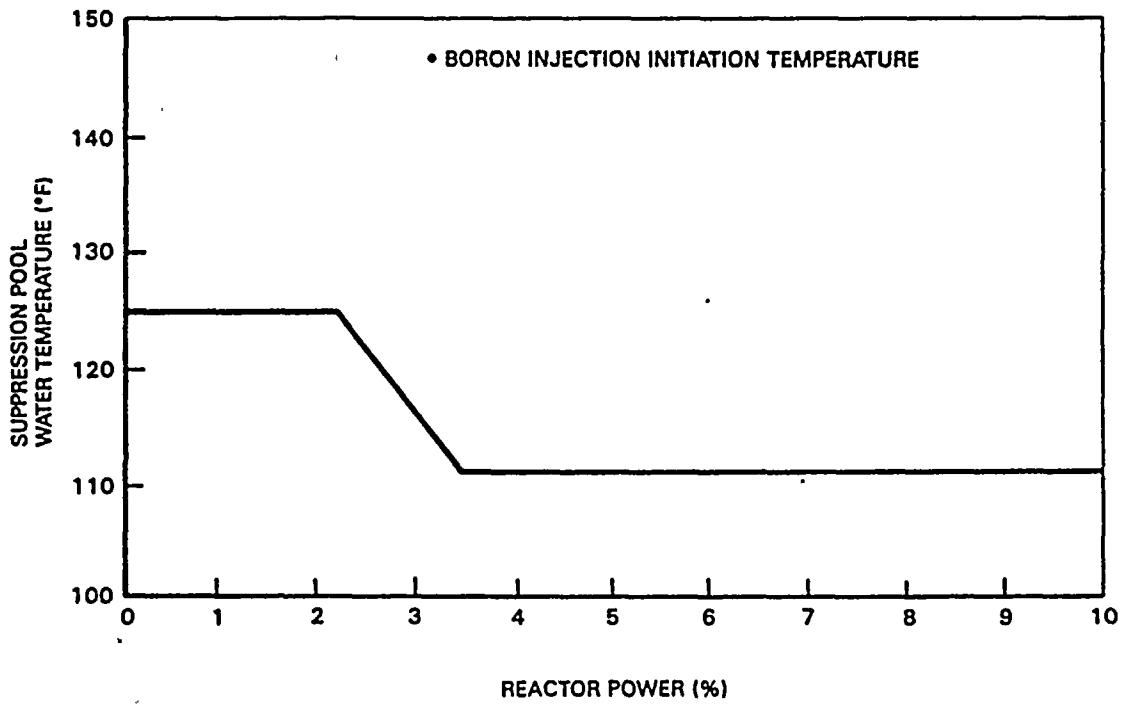
> If while executing the following steps Emergency RPV Depressurization is required, continue in this procedure at [Step C5-3.1].

> 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 C5-2].

C5-1 Prevent automatic initiation of ADS.

C5-2 If:

- Reactor power is above [3% (APRM downscale trip)] or cannot be determined, and
- Suppression pool temperature is above [the Boron Injection Initiation Temperature], and

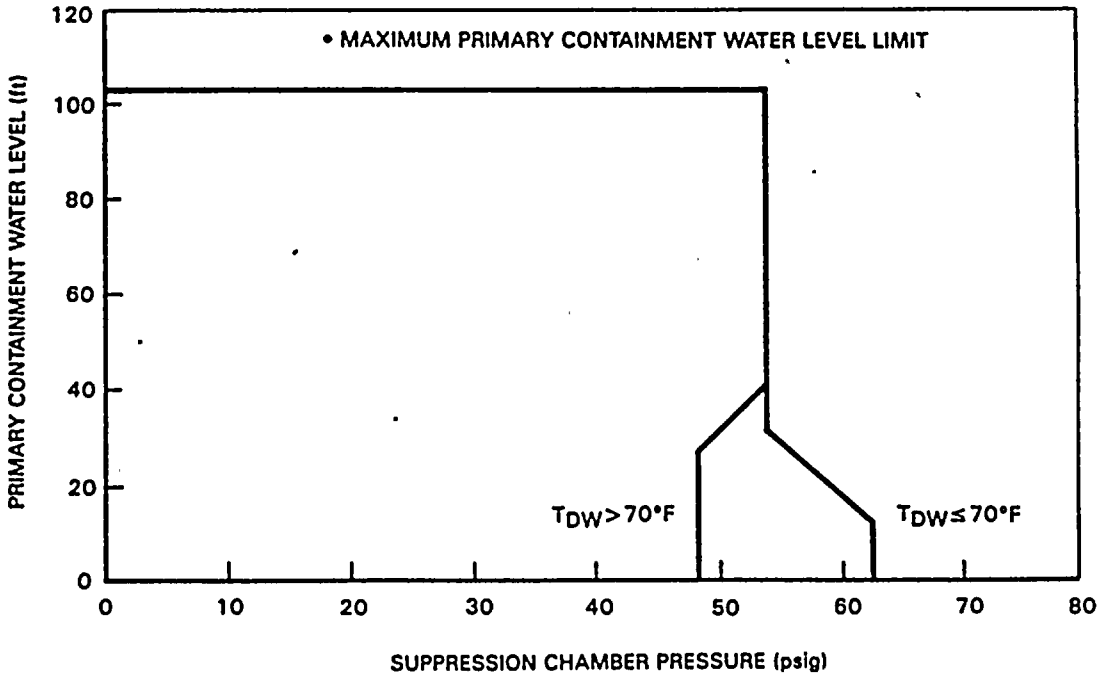


- Either an SRV is open or opens or drywell pressure is above [2.0 psig (high drywell pressure scram setpoint)],

CONTINGENCY #5
LEVEL/POWER CONTROL

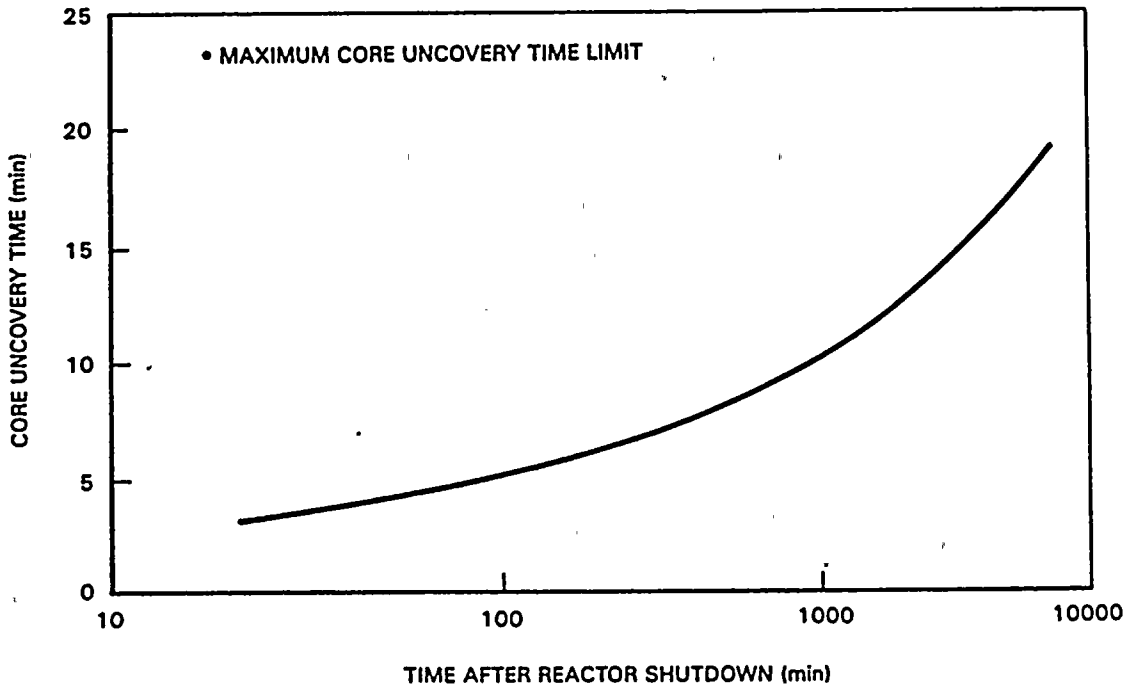
If while executing the following steps:

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



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 C4-3.1].



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

If less than [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRV[s] are open or RPV pressure cannot be maintained at least [50 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure, enter [procedure developed from Contingency #6] and [procedure developed from the RPV Control Guideline] at [Step RC/P-4] and execute these procedures concurrently.

C4-3.2 When at least [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRV[s] 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.

C4-4 When:

- RPV water level instrumentation is available, and
- Temperature[s] [near the cold reference leg instrument vertical runs] are 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]

Number of open SRVs	Minimum Core Flooding Interval (min)
7 or more	21
6	29
5	43
4	72

C4-2 If at least [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs can be opened or if a HPCS or motor driven feedwater pump is available for injection, close the MSIVs, main steam line drain valves, and IC, RCIC, and RHR steam condensing isolation valves.

C4-3 Flood the RPV as follows:

C4-3.1 Commence and, irrespective of pump NPSH and vortex limits, increase injection into the RPV with the following systems until at least [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs are open and RPV pressure is not decreasing and is [50 psig (Minimum RPV Flooding Pressure)] or more above suppression chamber pressure:

- HPCS, defeating 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.
- Condensate pumps
- CRD
- [RHR service water crosstie
- Fire System
- Interconnections with other units
- ECCS keep-full systems
- SLC (test tank)
- SLC (boron tank)]

[
- RHR service water crosstie
- Fire System
- Interconnections with other units
- ECCS keep-full systems
]

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] [is] open or RPV pressure cannot be increased to above the Minimum Alternate RPV Flooding Pressure, enter [procedure developed from Contingency #6] and [procedure developed from the RPV Control Guideline] at [Step RC/P-4] and execute these procedures concurrently.

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

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

C4-1.3 Commence and, irrespective of pump NPSH and vortex limits, slowly increase injection into the RPV with the following systems until at least [1 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure)] SRV[s] [is] open and RPV pressure is above the Minimum Alternate RPV Flooding Pressure: #7

- 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.]

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

- HPCS, defeating high RPV water level isolation interlocks if necessary.
- LPCS

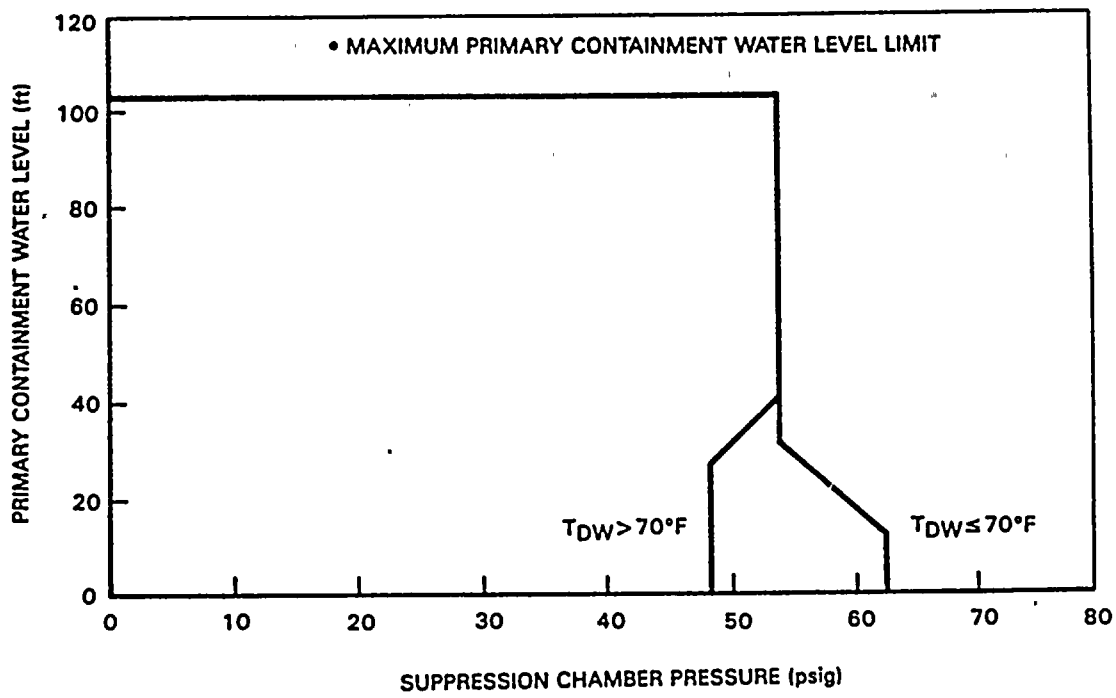
C4-1.1 Terminate and prevent all injection into the RPV except from boron injection systems and CRD until RPV pressure is below the Minimum Alternate RPV Flooding Pressure.

Number of open SRVs	Minimum Alternate RPV Flooding Pressure (psig)
[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.

C4-1.2 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.

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



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

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

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 Contingency #5] and [procedure developed from RPV Control Guideline] at [Step RC/P-4] and execute these procedures concurrently.
- If all control rods are inserted to or beyond position [02 (Maximum Subcritical Banked Withdrawal Position)] or it has been determined that the reactor will remain shutdown under all conditions without boron, enter [procedure developed from the RPV Control Guideline] at [Steps RC/L and RC/P-4] and execute these steps concurrently.

CONTINGENCY #3
STEAM COOLING

C3-1 Confirm initiation of IC.

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

If IC cannot be initiated, when RPV water level drops to [-208 in. (Minimum Zero-Injection RPV Water Level)] enter [procedure developed from Contingency #2].

C2-1.4 If less than [4 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs are open [and RPV pressure is at least 50 psig (Minimum SRV Reopening Pressure) above suppression chamber pressure], rapidly depressurize the RPV, defeating isolation interlocks if necessary, using one or more of the following:

- Main condenser
- RHR (steam condensing mode)
- [Other steam driven equipment]
- Main steam line drains
- HPCI steam line
- RCIC steam line
- Head vent
- IC tube side vent

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

C2-2 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
- [700 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,

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

CONTINGENCY #2
EMERGENCY RPV DEPRESSURIZATION

C2-1 When either: #2 #6

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

C2-1.1 If a high drywell pressure ECCS initiation signal ([2.0 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 If suppression pool water level is above [4 ft 9 in. (elevation of top of SRV discharge device)]:

- Open all ADS valves.
- If any ADS valve cannot be opened, open other SRVs until [7 (number of SRVs dedicated to ADS)] valves are open.

C1-4.2 When RPV water level drops to [-164 in. (top of active fuel)], EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; line up for injection, start pumps, and increase injection flow to the maximum with all alternate injection subsystems.

If RPV water level cannot be restored and maintained above [-164 in. (top of active fuel)], PRIMARY CONTAINMENT FLOODING IS REQUIRED; enter [procedure developed from Contingency #6].

C1-3 If RPV pressure is above [87 psig (highest RPV pressure at which the shutoff head of a low-water-quality alternate injection subsystem (excluding SLC) is reached)]:

> If while executing the following steps RPV pressure drops below [87 psig (highest RPV pressure at which the shutoff head of a low-water-quality alternate injection subsystem (excluding SLC) is reached)], continue in this procedure at [Step C1-4].

C1-3.1 If no injection subsystem is lined up for injection with at least one pump running, start pumps in alternate injection subsystems which are lined up for injection.

C1-3.2 When RPV water level drops to [-164 in. (top of active fuel)]:

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

C1-4 When RPV pressure drops below [87 psig (highest RPV pressure at which the shutoff head of a low-water-quality alternate injection subsystem (excluding SLC) is reached)]:

C1-4.1 Line up for injection, start pumps, and irrespective of pump NPSH and vortex limits, increase injection flow to the maximum with all systems and injection subsystems.

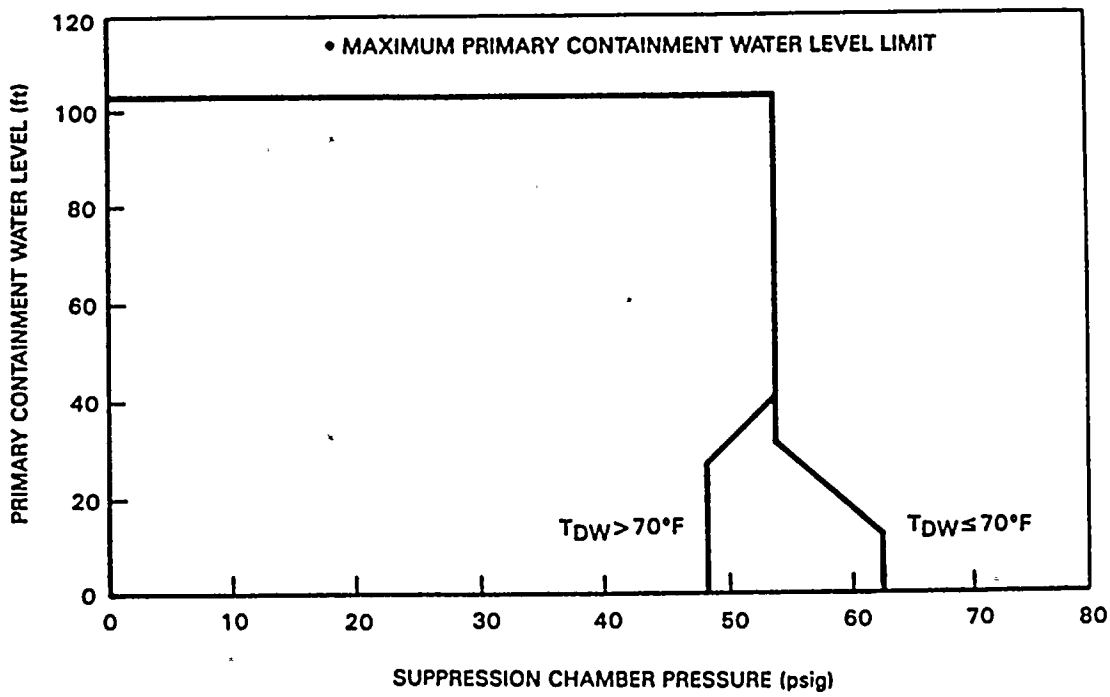
C1-2 Line up for injection, start pumps, and irrespective of pump NPSH and vortex limits, increase injection flow to the maximum with 2 or more of the following injection subsystems:

- Condensate
- HPCS
- LPCI-A with injection through the heat exchanger as soon as possible.
- LPCI-B with injection through the heat exchanger as soon as possible.
- LPCI-C with injection through the heat exchanger as soon as possible.
- LPCS-A
- LPCS-B

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

- RHR service water crosstie
- Fire system
- Interconnections with other units
- ECCS keep-full systems
- SLC (test tank)
- SLC (boron tank)

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



C1-1 Initiate IC.

CONTINGENCY #1

ALTERNATE LEVEL CONTROL

If while executing the following steps:

- Any control rod cannot be determined to be inserted to or beyond position [02 (Maximum Subcritical Banked Withdrawal Position)] and it has not been determined that the reactor will remain shutdown under all conditions without boron, enter [procedure developed from Contingency #5].
- RPV water level cannot be determined, enter [procedure developed from Contingency #4].
- RPV water level is increasing, enter [procedure developed from the RPV Control Guideline] at [Step RC/L].
- RPV water level drops below [-146 in. (ADS initiation setpoint)], prevent automatic initiation of ADS.

TABLE 1

OPERATING VALUES OF SECONDARY CONTAINMENT PARAMETERS (Continued)

SECONDARY CONTAINMENT PARAMETER	Max Normal Operating Value	Max Safe Operating Value
FLOOR DRAIN SUMP WATER LEVEL	Inches	
Sump A (NE diagonal)	47	NA
Sump B (NW diagonal)	52	NA
AREA WATER LEVEL	Inches	Inches
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

TABLE 1

OPERATING VALUES OF SECONDARY CONTAINMENT PARAMETERS (Continued)

SECONDARY CONTAINMENT PARAMETER	Max Normal Operating Value	Max Safe Operating Value
HVAC EXHAUST RADIATION LEVEL	mR/hr	
Reactor building	50	NA
Refuel floor	50	NA
AREA RADIATION LEVEL	mR/hr	mR/hr
158 ft southeast area	50	1250
158 ft northeast area	50	1250
158 ft northwest area	50	1250
130 ft northeast area	50	1250
130 ft northwest area	50	1250
Decontamination pump & equipment room	50	1250
South CRD hydraulic units	50	1250
Spent fuel pool passageway	50	1250
158 ft operating floor	50	1250
158 ft sample panel area	50	1250
158 ft 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 & core spray room northeast	50	1250
RHR & core spray room southeast	50	1250

TABLE 1

OPERATING VALUES OF SECONDARY CONTAINMENT PARAMETERS (Continued)

SECONDARY CONTAINMENT PARAMETER	Max Normal Operating Value	Max Safe Operating Value
HVAC COOLER DIFFERENTIAL TEMPERATURE	°F	
RWCU "A" pump room 158 ft	75	
RWCU "B" pump room 158 ft	75	
RWCU Hx room 158 ft at Hxs	75	
RWCU Hx room 158 ft at discharge to hotwell	75	
RWCU phase separator room 158 ft	75	
RWCU holding pump room 185 ft	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 1

OPERATING VALUES OF SECONDARY CONTAINMENT PARAMETERS

SECONDARY CONTAINMENT PARAMETER	Max Normal Operating Value	Max Safe Operating Value
AREA TEMPERATURE	°F	°F
RWCU "A" pump room 158 ft	130	215
RWCU "B" pump room 158 ft	130	215
RWCU Hx room 158 ft at Hxs	130	215
RWCU Hx room 158 ft at discharge to hotwell	130	215
RWCU phase separator room 158 ft	130	215
RWCU holding pump room 185 ft	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, westwall	175	214
Torus room, eastwall	175	214
Torus room, northwall	175	214
Torus room, southwall	175	214
Main steam tunnel	200	215
SE, Reactor 130 ft area A	150	214
SE, Reactor 130 ft area B	150	214
NW Diagonal, area A	175	310
NW Diagonal, area B	175	310
NW Diagonal, area C	175	310

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 shut down the reactor, assure adequate core cooling, or suppress a fire.

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

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

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

SC/L-2.2 When an area water level exceeds its maximum safe operating water level 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.

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 shut down the reactor, assure adequate core cooling, or suppress a fire.

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

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

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

SC/R-2.2 When an area radiation level exceeds its maximum safe operating radiation level 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/T Monitor and control secondary containment temperatures.

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 that are discharging into the area except systems required to shut down the reactor, assure adequate core cooling, or suppress a fire. [#1]

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

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

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

SC/T-4.2 When an area temperature exceeds its maximum safe operating temperature 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.

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.

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

SECONDARY CONTAINMENT CONTROL GUIDELINE

PURPOSE

The purpose of this guideline is to:

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

ENTRY CONDITIONS

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

- Differential pressure at or above 0 in. of water
- An area temperature above the maximum normal operating temperature
- 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

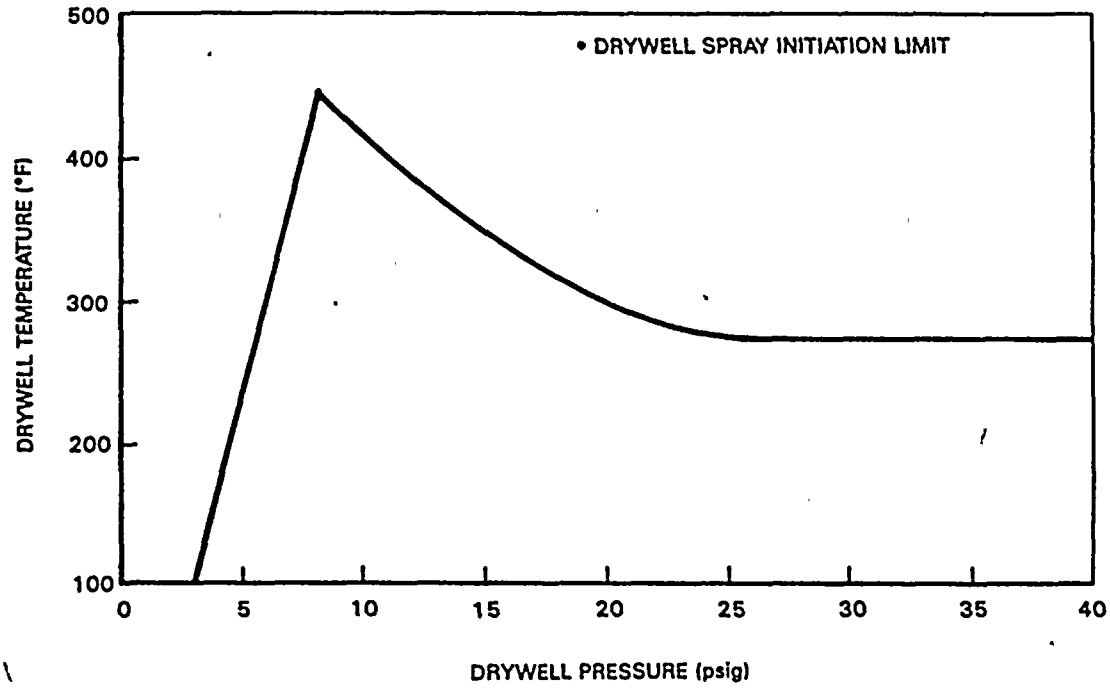
If while executing the following steps suppression pool or drywell sprays have been initiated and:

- Suppression chamber pressure drops below [2.0 psig (high drywell pressure scram setpoint)], terminate suppression pool sprays.
- Drywell pressure drops below [2.0 psig (high drywell pressure scram setpoint)], terminate drywell sprays.

PC/H-5.1 If suppression pool water level is below [24 ft 6 in. (elevation of suppression pool spray nozzles)], initiate suppression pool sprays.

PC/H-5.2 If [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 Limits, [shut down recirculation pumps and drywell cooling fans and] initiate drywell sprays.

PC/H-4.4 If [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 Limits, [shut down recirculation pumps and drywell cooling fans and] initiate drywell sprays [using only those RHR pumps not required to assure adequate core cooling by continuous operation in the LPCI mode].



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

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

- Suppression chamber pressure drops below [2.0 psig (high drywell pressure scram setpoint)], terminate suppression pool sprays.
- Drywell pressure drops below [2.0 psig (high drywell pressure scram setpoint)], terminate drywell sprays.

PC/H-4.1 If suppression pool water level is below [24 ft 6 in. (elevation of suppression pool spray nozzles)], initiate suppression pool sprays [using only those RHR pumps not required to assure adequate core cooling by continuous operation in the LPCI mode].

PC/H-4.2 If suppression pool water level is below [26 ft 9 in. (elevation of the bottom of the suppression chamber vent)], vent the suppression chamber in accordance with [procedure for primary containment venting].

If suppression pool water level is at or above [26 ft 9 in. (elevation of the bottom of the suppression chamber vent)] or if the suppression chamber cannot be vented, vent the drywell in accordance with [procedure for primary containment venting].

PC/H-4.3 If the suppression chamber or drywell can be vented, initiate and maximize the drywell purge flow.

If no hydrogen recombiner can be placed in service taking suction directly on the suppression chamber but only if the drywell hydrogen concentration is below [6% (maximum hydrogen concentration for recombiner operation or 6%, whichever is lower)] or drywell oxygen concentration is below [5% (maximum oxygen concentration for recombiner operation or 5%, whichever is lower)], place hydrogen recombiners in service taking suction indirectly on the suppression chamber by way of the drywell.

PC/H-3.2 When suppression chamber hydrogen concentration reaches [6% (maximum hydrogen concentration for recombiner operation or 6%, whichever is lower)] and suppression chamber oxygen concentration reaches [5% (maximum oxygen concentration for recombiner operation or 5%, whichever is lower)], secure all hydrogen recombiners taking suction directly on the suppression chamber.

PC/H-4 [When drywell or suppression chamber hydrogen concentration reaches 6% and drywell or suppression chamber oxygen concentration is above 5%,] EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from the RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure; secure hydrogen mixing systems and, irrespective of the offsite radioactivity release rate, vent and purge the primary containment, defeating isolation interlocks if necessary, to restore and maintain drywell and suppression chamber hydrogen concentrations below 6% or drywell and suppression chamber oxygen concentrations below 5% as follows:

hydrogen concentration for recombiner operation or 6%, whichever is lower)] or drywell oxygen concentration is below [5% (maximum oxygen concentration for recombiner operation or 5%, whichever is lower)], place hydrogen recombiners in service taking suction directly on the drywell and operate the drywell hydrogen mixing system.

PC/H-2.2 When drywell hydrogen concentration reaches [6% (maximum hydrogen concentration for recombiner operation or 6%, whichever is lower)] and drywell oxygen concentration reaches [5% (maximum oxygen concentration for recombiner operation or 5%, whichever is lower)], secure any hydrogen recombiner taking suction on the drywell.

PC/H-2.3 Continue in this procedure at [Step PC/H-4].

PC/H-3 Monitor and control hydrogen and oxygen concentrations in the suppression chamber.

PC/H-3.1 When suppression chamber hydrogen concentration reaches [1% (minimum hydrogen concentration for recombiner operation or minimum detectable hydrogen concentration, whichever is higher)] but only if suppression chamber hydrogen concentration is below [6% (maximum hydrogen concentration for recombiner operation or 6%, whichever is lower)] or suppression chamber oxygen concentration is below [5% (maximum oxygen concentration for recombiner operation or 5%, whichever is lower)], place hydrogen recombiners in service taking suction directly on the suppression chamber.

PC/H-1.1 Refer to [sampling procedure].

PC/H-1.2 If suppression pool water level is below [26 ft 9 in. (elevation of the bottom of the suppression chamber vent)], vent the suppression chamber in accordance with [procedure for primary containment venting].

If suppression pool water level is at or above [26 ft 9 in. (elevation of the bottom of the suppression chamber vent)] or if the suppression chamber cannot be vented, vent the drywell in accordance with [procedure for primary containment venting].

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

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

WHY IF UPON ENTRY @ O_2=5.1% WOULD YOU WANT TO AIR PURGE?

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

Execute [Steps PC/H-2 and PC/H-3] concurrently.

PC/H-2 Monitor and control hydrogen and oxygen concentrations in the drywell.

PC/H-2.1 When drywell hydrogen concentration reaches [1% (minimum hydrogen concentration for recombiner operation or minimum detectable hydrogen concentration, whichever is higher)] but only if drywell hydrogen concentration is below [6% (maximum

PC/H Monitor and control hydrogen and oxygen concentrations

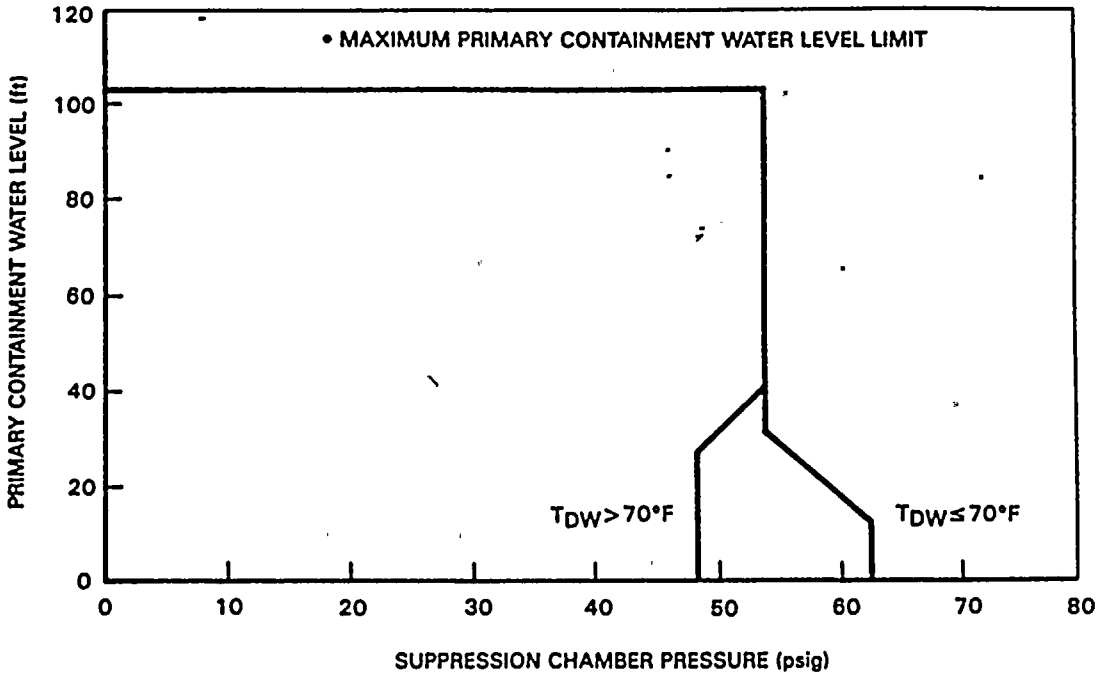
If while executing the following steps:

- 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].
- Drywell or suppression chamber hydrogen concentration cannot be determined to be below 6% and drywell or suppression chamber oxygen concentration cannot be determined to be below 5%, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from the RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure; secure and prevent operation of hydrogen mixing systems and recombiners and, irrespective of the offsite radioactivity release rate, vent and purge the primary containment in accordance with [Steps PC/H-4.1 through 4.4] until drywell and suppression chamber hydrogen concentrations can be determined to be below 6% or drywell and suppression chamber oxygen concentrations can be determined to be below 5%.

PC/H-1 When drywell or suppression chamber hydrogen concentration reaches [0.5% (minimum detectable hydrogen concentration)], but only if the offsite radioactivity release rate is expected to remain below the offsite release rate LCO, vent and purge the primary containment, defeating isolation interlocks if necessary, to restore and maintain drywell and suppression chamber hydrogen concentrations below [0.5% (minimum detectable hydrogen concentration)] as follows:

THIS IS TOO VAGUE EXPAND APPENDIX B.

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



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

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.

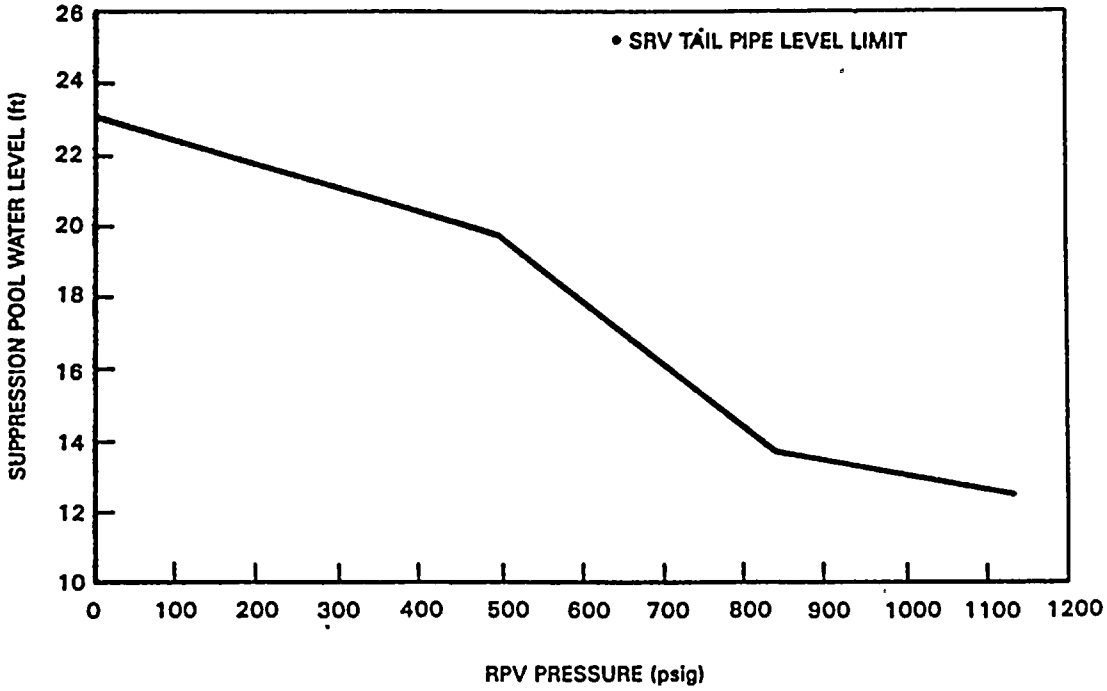
SP/L-3.2 Maintain suppression pool water level below [17 ft 2 in. (elevation of bottom of internal suppression chamber to drywell vacuum breakers less vacuum breaker opening pressure in feet of water)].

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 boron injection systems and CRD.

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

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 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 boron injection systems and CRD.

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.

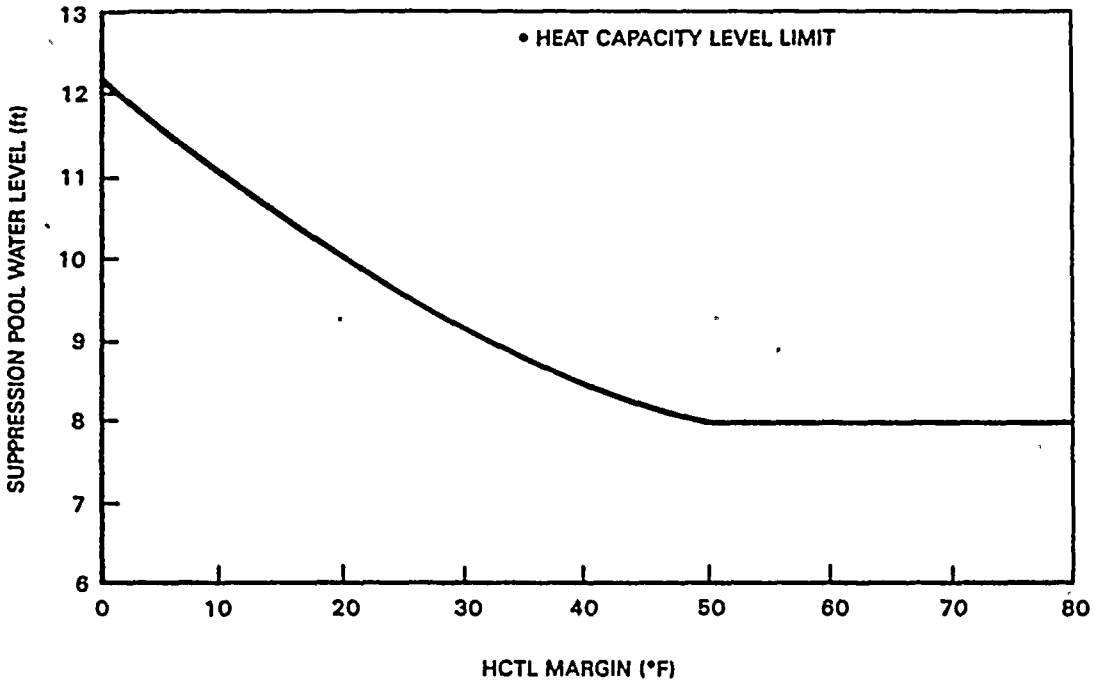
SP/L-3 SUPPRESSION POOL WATER LEVEL ABOVE [12 ft 6 in. (maximum suppression pool water level LCO)] ([23 ft 9 in. (SPMS initiation setpoint plus suppression pool water level increase which results from SPMS operation)] if SPMS has been initiated)

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

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 the Heat Capacity Level Limit.



Where HCTL Margin = Heat Capacity Temperature Limit minus suppression pool temperature

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

SP/L Monitor and control suppression pool water level.

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

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].

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

- If suppression pool water level is below [26 ft 9 in. (elevation of the bottom of the suppression chamber vent)], vent the suppression chamber in accordance with [procedure for primary containment venting].

- If suppression pool water level is at or above [26 ft 9 in. (elevation of the bottom of the suppression chamber vent)] or if the suppression chamber cannot be vented, vent the drywell in accordance with [procedure for primary containment venting].

PC/P-6 When suppression chamber pressure cannot be maintained below [the Primary Containment Pressure Limit], then irrespective of whether adequate core cooling is assured:

- [If suppression pool water level is below 24 ft 6 in. (elevation of suppression pool spray nozzles),] initiate suppression pool sprays.

- If [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 Limits, [shut down recirculation pumps and drywell cooling fans and] initiate drywell sprays.