Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

September 26, 1984

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: LaSalle County Station Unit 2
Facility Operating License NPF-18
Condition No. 4 of Attachment 2
NRC Docket No. 50-374

References (a): License NPF-18 Attachment 2, Condition No. 4.

(b): August 25, 1983, letter to H. R. Denton from Cordell Reed.

(c): December 15, 1983, letter to H. R. Denton from B. Rybak.

Dear Mr. Denton:

This letter is submitted to comply with a LaSalle County Station Unit 2 license condition [reference (a)]. The attachments to this letter constitute a procedures generation package to upgrade LaSalle's emergency operating procedure to BWROG Rev. 3.

Please direct any questions you may have concerning this matter to this office.

One signed original and fifteen copies of this letter and the attachments are provided for your use.

Very truly yours,

J. G. Marshall

J. G. Marshall
Nuclear Licensing Administrator

lm

cc: Region III Inspector - LSCS
A. Bournia - NRR

Attachments 1: Technical Guideline - The technical basis for our Symptom oriented Emergency Procedures (LGA's)
2: Writer's Guideline - guidance for the LGA writer
3: Validation Description - LGA validation procedure
4: Verification Description - LGA validation procedure
5: Training Description - description of training planned for the LGA's

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ATTACHMENT A

A

Since the Technical Specifications permit MSIV isolation in hot standby, this should not require entry into the RPV Control Guideline and a subsequent scram per Step RC-1; the entry condition needs to be limited to isolations which require a scram.

Resolved entry conditions deleted as it is no longer required with Radioactivity Release Control Guideline.

B

6.3.2.2.6 ECCS Pumps NPSH

The ECCS pump specifications are such that the NPSH requirements for HPCS, LPCS and LPCI are met with the containment at atmospheric pressure and the suppression pool at saturation temperature. The NPSH available and required for all pumps in the ECCS are shown in Figures 6.3-3, 6.3-6, and 6.3-9. Vendor tests on ECCS pumps show that 1 foot NPSH is required for the LPCS pump and 6 feet NPSH is required for the LPCI pumps. The HPCS pump requires 12.5 feet NPSH. Available NPSH is determined assuming suppression pool suction strainers are 50% clogged.

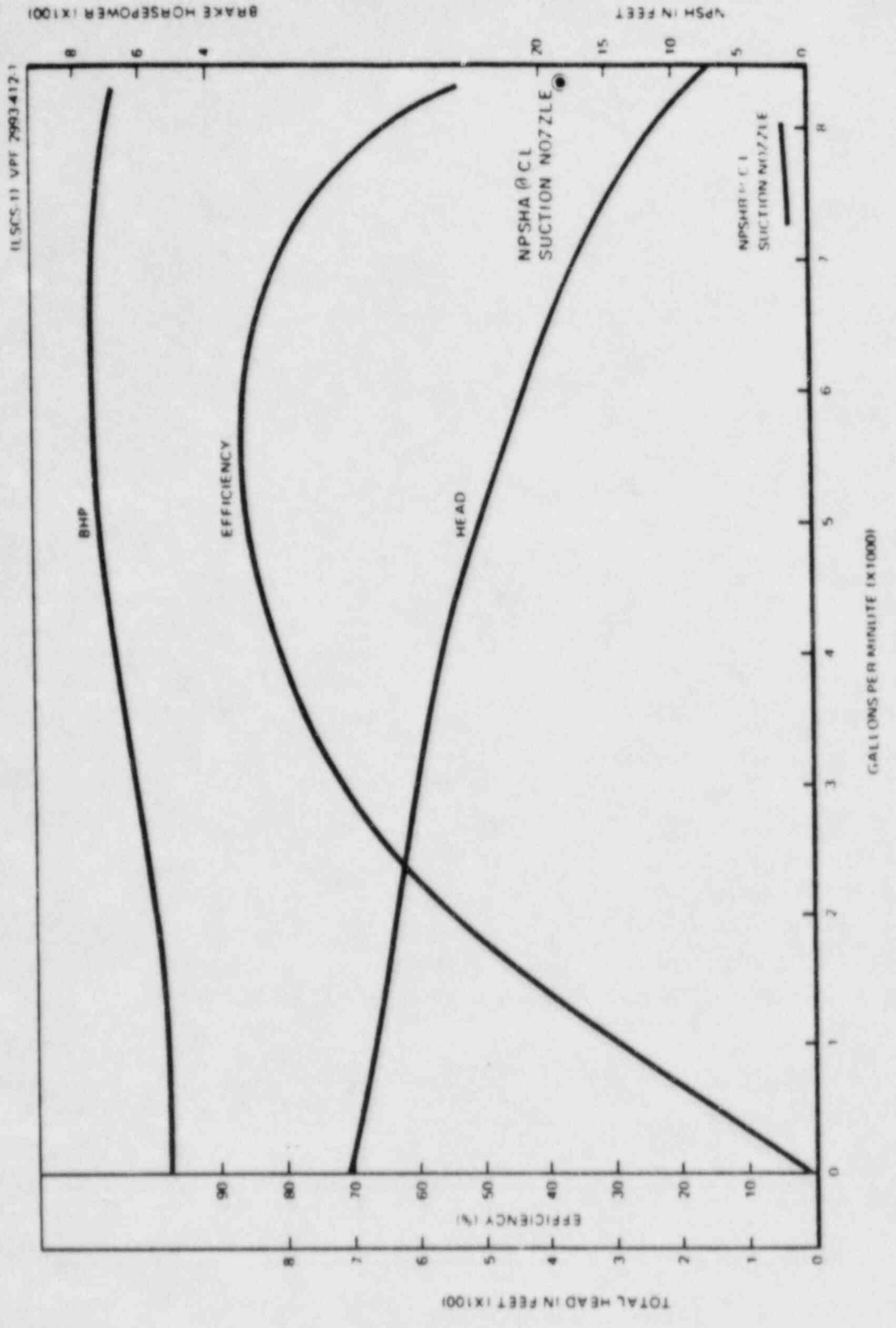

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FIGURE 6.3-9

LPCI PUMP CHARACTERISTICS

(SHEET 1 of 6)

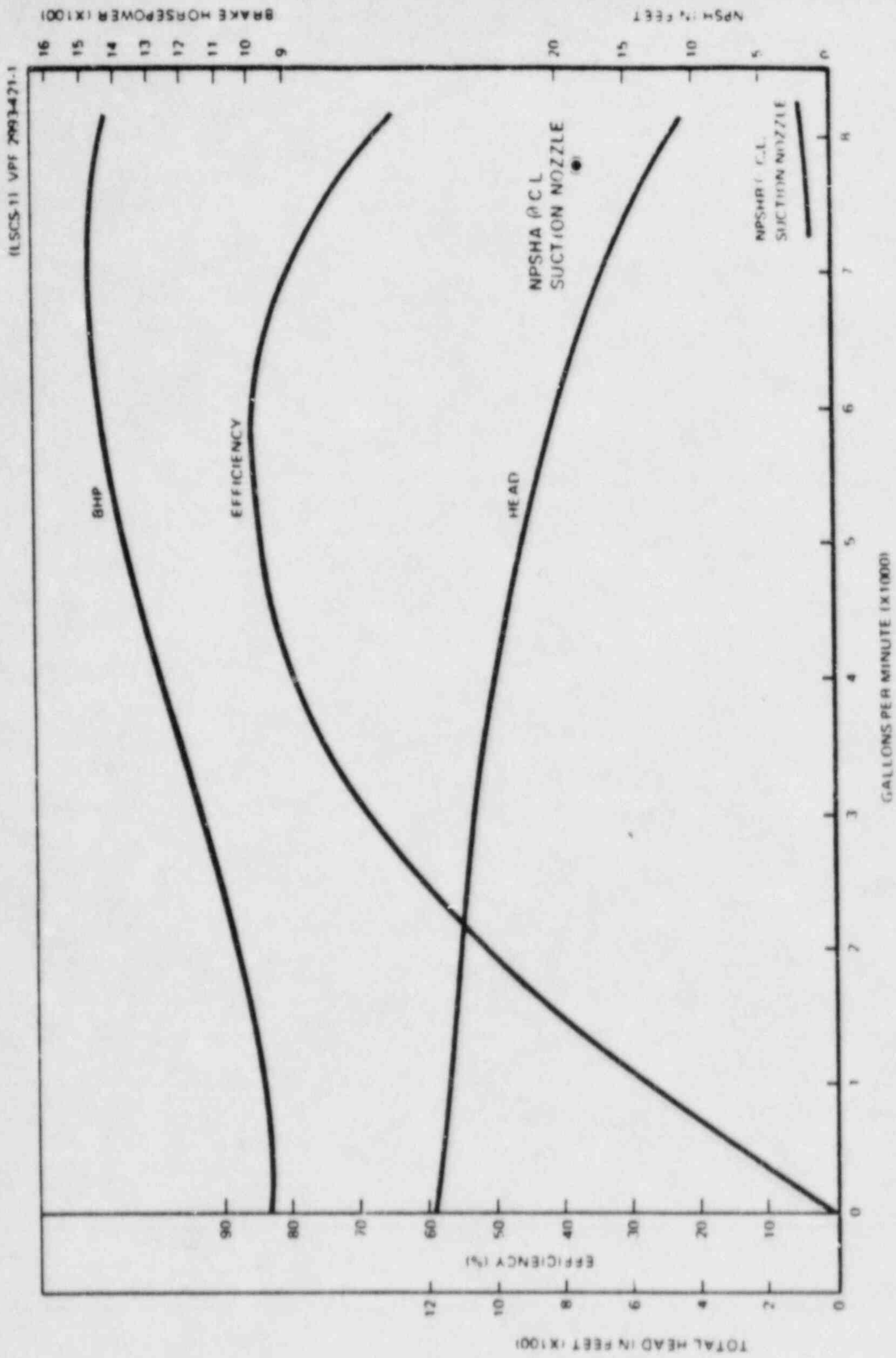

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FIGURE 6.3-6

LPCS PUMP CHARACTERISTICS

(SHEET 1 of 2)

C

It may not be possible to restore CS or LPCS to the AUTOMATIC/STANDBY mode when the ECCS initiation signal clears; the step needs to include the "if possible" phrase from Caution #10.

Resolved caution changed by deletion of requirement to restore systems to to AUTOMATIC/STANDBY as this may precipitate subsequent RPV level control problems; Caution #10 changed similarly.

C

RCIC turbine not system is throttled to maintain turbine speed above the minimum; the term system needs to be changed to turbine

Resolved caution changed

by substitution of turbine

for system

D

CAUTION #18

If continuous LPCI operation of any RHR pump is required to assure adequate core cooling, do not divert that pump from the LPCI mode.

DISCUSSION:

If LPCI injection is not required to assure adequate core cooling, it is permissible to utilize RHR pumps for other functions such as suppression pool cooling or containment spray. However, if adequate core cooling requires continuous LPCI operation with a particular RHR pump, it should not be diverted from the injection mode. Caution #18 provides the flexibility of using one RHR loop to inject into the RPV (LPCI mode) and the other RHR loops to operate in some other mode (e.g., suppression pool cooling) if single loop LPCI operation is sufficient to assure adequate core cooling.

"Continuous" as used in Caution #18 permits intermittment simultaneous use of all RHR pumps in modes of operation other than LPCI if adequate core cooling is not lost in the interim. By alternating modes of RHR operation, assuring adequate core cooling and protecting containment integrity need not be mutually exclusive.

Caution #18 is applicable to steps of the EPGs where the RHR System is to be operated in a mode other than LPCI and containment integrity is not immediately threatened. Where diverting the RHR System from the LPCI mode is absolutely required to protect containment integrity, the wording "irrespective of adequate core cooling" is included in the EPG step to specifically highlight the non-applicability of Caution #18.

E

The present step could be accomplished by initiating only one of the listed functions/systems; it needs to be reworded to require confirmation or initiation of all functions/systems which should have initiated.

Resolved step changed by deletion of second sentence and substitution of "Initiate each of the following which should have initiated but did not:" for first sentence.

F

Contingency #7 should be entered whenever boron has been injected into the RPV; the entry condition needs to be expanded from "Boron Injection is required" to "Boron Injection is required or has been initiated."

Resolveo boxes

changed by addition of "or boron has been injected into into tha RPV".

G

STEP:

RC/L-3 When [procedure for cooldown to cold shutdown conditions] is entered from [step RC/P-5], proceed to cold shutdown in accordance with [procedure for cooldown to cold shutdown conditions].

DISCUSSION:

After RPV pressure has been reduced to below the shutdown cooling interlocks and the shutdown cooling mode of RHR has been established, normal operating procedures provide the appropriate instructions for continued control of RPV water level while proceeding to cold shutdown conditions.

H

7.4.2 Operator Actions (RC/P)

STEP:

RC/P Monitor and control RPV pressure.

If while executing the following steps:	
o Emergency RPV Depressurization is anticipated and Boron Injection is not required, rapidly depressurize the RPV with the main turbine bypass valves.	#13

DISCUSSION:

Failure to terminate and prevent injection into the RPV (except from boron injection systems and CRD) may result in the rapid injection of large volumes of relatively cold, unborated water from low pressure systems as RPV pressure decreases and drops below the shutoff heads of the pumps in these systems. Such an occurrence could dilute boron concentration and reduce water temperature in the core region, thereby adding sufficient net positive reactivity to induce a reactor power excursion which could damage the core.

Loss of the continuous SRV pneumatic supply limits the number of times that an SRV can be cycled since pneumatic pressure is required for valve operation. Even though the SRV accumulators contain a reserve pneumatic supply, leakage through in-line valves and fittings may deplete this supply. Thus, subsequent to the loss of the continuous SRV pneumatic supply, there is no assurance as to the number of SRV operating cycles remaining. For these reasons, if SRVs must be used to augment RPV pressure control and if the continuous SRV pneumatic supply is or becomes unavailable, the valve should be closed to limit the number of cycles on the valve and conserve pneumatic pressure so that if Emergency Depressurization is subsequently required, the valve will be available for this purpose. If other pressure control systems are not capable of maintaining RPV pressure below the lowest SRV lifting pressure, the SRV will still open when its lifting pressure is reached.

Note when SRV's are being used to depressurize, the valve is left open.

J

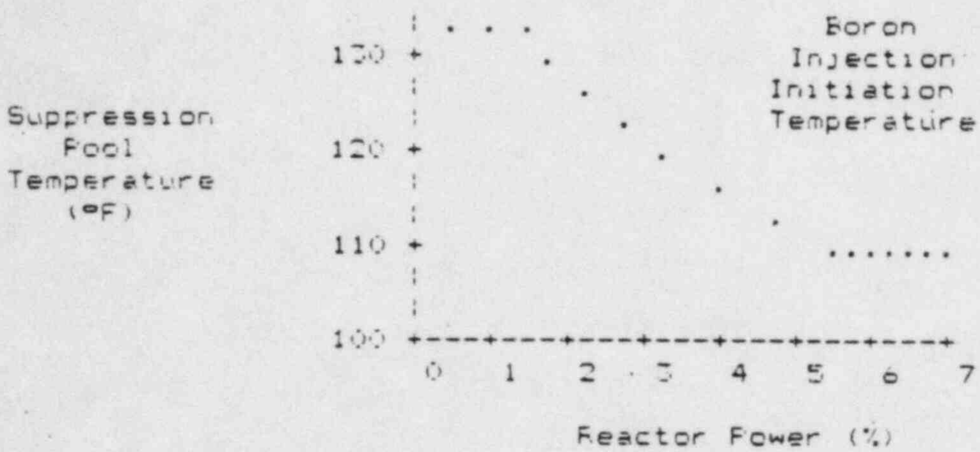
Rod insertion criteria should be "..rods at or beyond [06..",
not "..rods beyond [06..".

Resolved all references
to rod insertion criteria
changed to "..at or beyond
[06..".

K

STEP:

RC/Q-4 If the reactor cannot be shutdown 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. | #19 |



DISCUSSION:

So long as the core remains submerged (the preferred method of adequate core cooling), fuel integrity and RPV integrity are not directly challenged even under scram failure conditions. A scram failure coupled with an MSIV isolation, however, results in a rapid heatup of the suppression pool due to the steam energy discharged from the RPV via the SRVs. The challenge to containment thus becomes the limiting factor which defines the requirement for boron injection.

f the suppression temperature and RPV pressure cannot be re-
tored and maintained below the Heat Capacity Temperature Limit, mergency RPV Depressurization is required (Step SP/T-4). To void depressurizing the RPV with the reactor at power, it is esirable to shut down the reactor through boron injection prior o reaching the Heat Capacity Temperature Limit. The Boron njection Initiation Temperature is defined so as to achieve this hen practicable.

DS initiation may result in the injection of large volumes of elatively cold, unborated water from low pressure injection ystems. With the reactor either critical or shutdown on soluble on, the positive reactivity addition due to boron dilution and emperature reduction may result in a reactor power excursion eading to substantial core damage. Defeating ADS is therefore ppropriate whenever Boron Injection is required.

tep RC/Q-4 does not limit the operator to resetting the ADS imer as was the limited action specified in Step RC/L-2; other ethods are to be employed here to permanently defeat the auto-atic functioning of ADS at least as long as reactor shutdown is ontingent upon in-core boron concentration.

he applicability of Caution #19 is indicated at this step to reserve the SLC pumps should they subsequently be needed.

L

The manual scram should be initiated only after the SDV has had a chance to drain; the step needs to reflect this waiting period.

Resolved changed step to read "Drain the scram discharge volume and initiate a manual reactor scram;" utilities to discuss proposed change with operators and prepare for discussion at next EPC meeting.

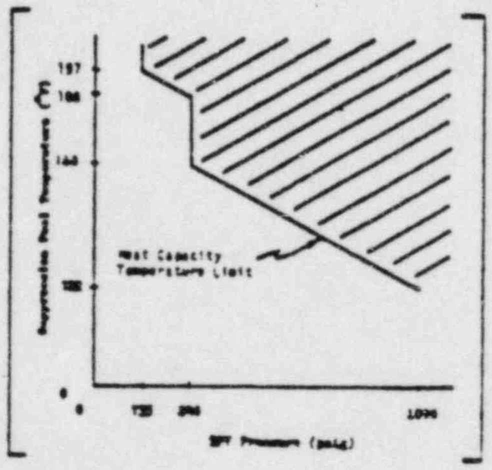
Resolved 5/10/84: step changed as proposed.

M

STEP:

SP/T-4 If suppression pool temperature cannot be maintained below the Heat Capacity Temperature Limit, maintain RPV pressure below the Limit: enter [procedure developed from the RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure.

8
#13
#14



DISCUSSION:

Continued heatup of the suppression pool may ultimately result in exceeding primary containment design temperature limits or in reducing suppression pool heat capacity below that required to assure stable steam condensation. The Heat Capacity Temperature Limit (HCTL) defines the operating regime which assures continued operation within these limits. Exceeding primary containment design temperature limits may result in containment failure due

to excessive thermal loads on the containment shell or to failure of equipment located within the containment. Unstable steam condensation produces extremely high dynamic pressure loads on the containment shell and submeged structures, generally resulting in failure of the containment and loss of the containment function. Step SP/T-4 specifies the action required to adequately address these concerns.

If the actions performed under Steps SP/T-1, SP/T-2, and SP/T-3 are insufficient to maintain suppression pool temperature below the HCTL, control of the other parameter, RPV pressure, is effected through entry into the RPV Control Guideline and execution of the RPV pressure control steps specified therein. The instruction specifying entry into the RPV Control Guideline is explicitly stated here because conditions requiring entry into the Primary Containment Control Guideline do not necessarily also require entry into the RPV Control Guideline. Entry at Step RC-1 assures concurrent control of the three interrelated RPV parameters (RPV water level, RPV pressure, and reactor power).

Caution #8 is identified as being applicable at this step because of the relationship between high suppression pool temperature and pump NPSH.

Caution #13 is identified as being applicable at this step to highlight the possibility that the rate of RPV pressure reduction

required to remain below the Heat Capacity Temperature Limit may result in exceeding the Technical Specification limit for cooldown rate.

Caution #14 is identified as being applicable at this step to assure that proper consideration is given to maintaining adequate core cooling.

N

STEP:

SP/T-4

If suppression pool temperature and RPV pressure cannot be restored and maintained below the Heat Capacity Temperature Limit, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

DISCUSSION:

Once it is concluded that the preceding actions are insufficient to restore and maintain suppression pool temperature and RPV pressure below the HCTL, depressurization of the RPV is manually initiated while the heat capacity of the suppression pool remains sufficient to safely accommodate the blowdown. As discussed earlier, the consequences of not depressurizing the RPV when required may include failure of equipment important to safety, loss of containment integrity, loss of the pressure suppression function of the primary containment, and loss of the water supply to the ECCS pumps, all of which may also lead to inadequate core cooling.

O

STEP:

> If while executing the following steps suppression pool sprays have been initiated, when suppression chamber pressure drops below 0 psig, terminate suppression pool sprays.

DISCUSSION:

Once suppression pool sprays have been initiated, convective cooling may gradually depressurize the containment to below its design negative pressure even though containment pressure was above the Mark III Containment Spray Initiation Pressure Limit when sprays were initiated. This is the result of the event-specific criteria employed to size the atmosphere-to-containment vacuum breakers, if any. Terminating suppression pool sprays when suppression chamber pressure drops below 0 psig terminates the depressurization before the design negative pressure is exceeded.

10.2 Entry

P

The entry condition for this guideline is:

- o Offsite radioactivity release rate above the off site release rate which requires an Alert.

DISCUSSION:

The entry condition for the Radioactivity Release Control Guideline directly relates to the purpose of the guideline and provides the vehicle for coordinated execution of emergency operating procedures and the emergency plan. The specific value selected for this entry condition corresponds directly to an action level in the emergency plan. It is sufficiently high that it is not expected to occur during normal operation but sufficiently low that, of and by itself, it does not threaten the health and safety of the public.

STEP:

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

DISCUSSION:

Depressurizing the RPV immediately reduces the driving head and flow from primary systems that are discharging outside the primary and secondary containments.

The instruction to enter the RPV Control Guideline provides the mechanism by which Contingency #2 (Emergency RPV Depressurization) is reached. Refer to Section 7.4 for a discussion regarding entry to Contingency #2 from the RPV Control Guideline. Entry at Step RC-1 ensures that a reactor scram is initiated and assures concurrent control of the three interrelated RPV parameters (RPV water level, RPV pressure, and reactor power).

R

The box following the table should precede it (or else "following" should be changed to "preceding") and should include the step requiring prevention of automatic initiation of ADS.

Resolved box moved to precede Step C1-3; box includes step requiring prevention of automatic initiation of ADS.

S

STEP:

> If RPV Flooding is required, enter [procedure developed from CONTINGENCY #6].

C2-2 Enter [procedure developed from the RPV Control Guideline] at [Step RC/P-2].

DISCUSSION:

With RPV depressurization complete, Contingency #2 is exited. If plant conditions exist which require RPV Flooding (entry to Contingency #2 was required if RPV Flooding was required and the number of open SRVs was less than the number of SRVs dedicated to ADS), further instructions for RPV pressure control are specified in Contingency #6. Otherwise, the RPV pressure control steps of the RPV Control Guideline provide the appropriate instructions for continuing control of RPV pressure.

T

The language in the first box refers to the "the following steps," but there is only one step in this contingency; this language needs to be changed to "this step."

Resolved changed

as proposed.

TT

All other pumps (except CRD and boron injection systems (7)) should be secured prior to this step.

Resolved new step C5-5 added.

U

STEP:

C6-2 If any control rod is not inserted beyond position [06 (maximum subcritical banked withrawal position)]:

C6-2.1 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	110]
[6	135]
[5	165]
[4	210]
[3	280]
[2	430]
[1	870]

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.

DISCUSSION:

If any control rod is not inserted beyond the Maximum Subcritical Banked Withdrawal Position, the reactor may become critical during the flooding evolution. The consequences of a return to

criticality during plant cooldown are generally manageable but here, where the cooldown may be very rapid and the criticality may occur with the RPV solid, these consequences could include significant damage to both the core and the RPV. Thus RPV flooding under these conditions must be accomplished in a manner which carefully controls the rate at which positive reactivity is added to the core.

Before the RPV is flooded it should, if at all possible, be depressurized. This increases the number of systems which may be used for flooding and decreases the pressure at which the SRVs and associated discharge piping must accommodate the flow of two-phase and subcooled water. However, a rapid depressurization of the RPV may result in the rapid injection of large volumes of relatively cold, unborated water from low pressure injection systems as RPV pressure decreases and drops below the shutoff heads of the pumps in these systems. Thus all injection into the RPV must be terminated and prevented prior to commencing the rapid depressurization: this sequence of actions is specified by this step in conjunction with Step C2-1 of Contingency #2 (Emergency RPV Depressurization). Injection from boron injection systems and CRD is not terminated here because boron injection systems add negative reactivity and CRD is required to manually insert control rods.

So long as RPV pressure remains above the Minimum Alternate RPV Flooding Pressure, the core is adequately cooled by a combination of submergence and steam cooling irrespective of whether any water is being injected into the RPV. This is so because the Minimum Alternate RPV Flooding Pressure is defined for a given number of open SRVs to be the lowest RPV pressure at which steam flow up through a completely uncovered core and out the SRVs can adequately cool the core by heat transfer to the steam alone. Of course if this steam flow exists and the core is also partially submerged, which would be necessary to maintain this steam flow and a constant RPV pressure, the entire core is that much cooler.

Once RPV pressure drops below the Minimum Alternate RPV Flooding Pressure, the rate of depressurization is small and injection into the RPV must be re-established in order to adequately cool the core and ultimately flood the RPV. If less than the minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure can be opened, then injection into the RPV must be re-established without delay for the same reasons.

V

STEP:

C6-2.3 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 by throttling injection.

DISCUSSION:

As discussed under Step C6-2.2, throttling injection to maintain RPV pressure above the Minimum Alternate RPV Flooding Pressure assures that either the RPV will flood to the main steam lines or, if the reactor returns to criticality, the core will be adequately cooled by a combination of submergence and steam cooling. RPV pressure should be maintained above the Minimum Pressure but as low as practicable to minimize the flooding rate and accompanying thermal and hydraulic loads on the RPV as well as the dilution of any boron in the core region.

W

STEP:

C6-3 If RPV water level cannot be determined:

C6-3.1 Commence and increase injection into the RPV with the following systems until at least [3 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs are open and RPV pressure is not decreasing and is [77 psig (Minimum RPV Flooding Pressure)] or more above suppression chamber pressure.

- o HPCS
- o Motor driven feedwater pumps
- o LPCS
- o LPCI
- o Condensate pumps
- o CRD
- [o RHR service water crosstie]
- [o Fire System]
- [o Interconnections with other units]
- [o ECCS keep-full systems]
- [o SLC (test tank)]
- [o SLC (boron tank)]

DISCUSSION:

If RPV water level can be determined, Step C6-4 specifies the appropriate actions for RPV flooding and Step C6-3 is bypassed.

For plant conditions where RPV water level cannot be determined, RPV pressure indication is utilized to confirm that sufficient water is being injected into the RPV to flood it. The Minimum RPV Flooding Pressure is defined to be the lowest differential pressure between the RPV and the suppression chamber (and thus across the open SRVs) at which steam flow through the Minimum Number of SRVs Required for Emergency Depressurization is sufficient to remove all decay heat generated within the core with no steam superheat (i.e., by boiling heat transfer alone). The decay heat generation rate used in making the determination of this Minimum Pressure is that which corresponds to core conditions ten minutes after a scram from full power. Since ten minutes is the earliest RPV Flooding could reasonably be expected to be required, establishing and maintaining RPV pressure above the Minimum RPV Flooding Pressure assures that more than enough steam flows through the SRVs to carry away all core decay heat. This in turn requires that more than enough water to carry away decay heat by boiling reaches the core, and this requires that RPV water level increases. Maintaining this Minimum Pressure (and thus steam flow) thereby assures that the RPV will ultimately flood to the main steam lines.

Therefore, three conditions must be satisfied to verify RPV Flooding without direct indication of RPV water level:

1. RPV pressure must be greater than suppression chamber pressure by at least the Minimum RPV Flooding Pressure. This ensures more than enough steam is flowing through the SRVs to remove all decay heat.

2. RPV pressure must not be decreasing. This ensures that the requisite steam flow will be maintained.

3. At least the Minimum Number of SRVs Required for Emergency Depressurization must be open. This ensures that the requisite steam flow will exist when the RPV is above the Minimum RPV Flooding Pressure.

This step requires that injection into the RPV be increased until all three of the above conditions are satisfied.

The list of injection systems identified in Step C6-3.1 contains all of the motor-driven systems which may be used for injection into the RPV. As many of these systems as necessary should be used to establish and maintain the three conditions required for verification of RPV Flooding.

X

17.3 Operator Actions

STEP:

| If while executing the following steps:
|
| o RPV water level cannot be determined. RPV FLOODING IS REQUIRED: enter [procedure developed from CONTINGENCY #6].
|
| o RPV Flooding is required. enter [procedure developed from CONTINGENCY #6].

DISCUSSION:

The actions specified in Contingency #7 require the ability to determine RPV water level. When RPV water level cannot be determined, RPV Flooding is required to assure continued adequate core cooling. RPV Flooding is also required for the plant conditions listed in Table 16-1 in Section 16. If RPV Flooding is required, the appropriate steps to accomplish this evolution are contained in Contingency #6.

Y

The means by which RPV water level is deliberately lowered is the termination and prevention of injection into the RPV. With the reactor at power, coolant inventory is lost by steam flow through one or more open SRVs (or through a break). If the inventory loss is not made up, RPV water level will decrease by boiloff. Injection from boron injection systems and CRD is not terminated here because boron injection systems add negative reactivity and CRD is required to manually insert control rods. Further, the flow rates from these systems are small compared to the boiloff rate with the reactor at power.

RPV water level is allowed to continue to decrease until either:

1. The suppression pool heatup is terminated or reduced to near that which results from absorption of decay heat, or

2. RPV water level has decreased to the Flow Stagnation Water Level, defined to be the higher of either the top of the active fuel or the elevation at which natural circulation flow in the RPV stagnates.

If the suppression pool heatup is terminated or reduced to near that which results from the absorption of decay heat, as indicated by reactor power below the APRM downscale trip setpoint or the combination of all SRVs closed and drywell pressure below the high drywell pressure scram setpoint, the potential for

Z

The portion of the step which directs the operator to maintain RPV water level above TAF needs to restrict him to the use of the systems listed earlier in this step.

Resolved step changed by addition of "with these systems."

AA

STEP:

C7-4 When [procedure for cooldown to cold shutdown conditions] is entered from [procedure developed from the RPV Control Guideline] at [Step RC/P-R], proceed to cold shutdown in accordance with [procedure for cooldown to cold shutdown conditions].

DISCUSSION:

After RPV pressure has been reduced to below the shutdown cooling interlocks and the shutdown cooling mode of RHR has been established, normal operating procedures provide the appropriate instructions for continued control of RPV water level while proceeding to cold shutdown conditions.