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June 28, 1985

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 from Cordell Reed to H. R. Denton.

(c): December 15, 1983 letter from Cordell Reed to H. R. Denton.

(d): September 26, 1984 letter from J. G. Marshall to H. R. Denton.

(e): April 1, 1985 letter from A. Schwencer to D. L. Farrar transmitting Draft SER.

Dear Mr. Denton:

Enclosed please find the revised LGA Procedures Generation Package (PGP) in response to the questions included in the Draft Safety Evaluation Report.

In addition to the PGPs, copies of the calculational procedures and derivations for the Drywell Spray Initiation Pressure Limit are included as response to questions A.3 and A.4 (Attachments 6 and 7).

Please note that we expect further revisions to the Emergency Procedure Guidelines based on results of the actual Validation/Verification and Training Programs.

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

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

Very truly yours,

H. L. Massin
Nuclear Licensing Administrator

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Attachments 1: Technical Guideline - The technical basis for our Symptom Oriented Emergency Procedures (LGAs)
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 LGAs
6: Drywell Spray Initiation Pressure Limit
7: Primary Containment Pressure Limit

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

0315K

LaSalle County Station

Emergency Procedure Generation Package

June 1985

DRAFT SAFETY EVALUATION REPORT

PROCEDURES GENERATION PACKAGE

LASALLE COUNTY STATION, UNITS 1 AND 2

1. INTRODUCTION

Following the Three Mile Island (TMI) accident, the Office of Nuclear Reactor Regulation developed the "TMI Action Plan" (NUREG-0660 and NUREG-0737), which required licensees of operating reactors to reanalyze transients and accidents and upgrade emergency operating procedures (EOPs) (Item I.C.1). The plan also required the NRC staff to develop a long-term plan that integrated and expanded efforts on the writing, reviewing, and monitoring of plant procedures (Item I.C.9). NUREG-0899, "Guidelines for the Preparation of Emergency Operating Procedures," represents the staff's long-term program for upgrading EOPs, and describes the use of a "Procedures Generation Package" (PGP) to prepare EOPs. Submittal of the PGP is a requirement of Supplement 1 to NUREG-0737, "Requirements for Emergency Response Capability (Generic Letter 82-33)." The Generic Letter requires each licensee to submit to the NRC a PGP which includes:

- (i) plant-specific technical guidelines
- (ii) writer's guide
- (iii) description of the program to be used for the validation of EOPs
- (iv) description of the training program for the upgraded EOPs

This report describes the results of our review of Commonwealth Edison Company's response to Section 7 of Generic Letter 82-33 related to development and implementation of EOPs for LaSalle County Station, Units 1 and 2.

Our review was conducted to determine the adequacy of the licensee's program for preparing and implementing EOPs. Criteria for the review of a PGP are not currently in the Standard Review Plan (SRP). Therefore, this review was based on NUREG-0899, the reference document for the EOP

upgrade portion of Supplement 1 to NUREG-0737 (Generic Letter 82-33). Review criteria based on this guidance will be developed for the next SRP revision. Section 2 of this SER briefly discusses the licensee's submittal, the staff review methods, and the acceptability of the submittal. Section 3 contains the conclusions of our review.

As indicated in the following sections, our review determined that the PGP for LaSalle County Station, Units 1 and 2, is acceptable with the exception of the items described in Section 2. The licensee should address these items in a revision to the PGP, or justify why such revisions are not necessary. Our review of the licensee's response to these items will be documented in a subsequent safety evaluation report. The revision of the PGP, and subsequently of the EOPs, should not impact the schedule for the use of the EOPs. The revision should be made in accordance with the licensee's administrative procedures.

2. EVALUATION AND FINDINGS

The licensee submitted its PGP in a letter dated September 26, 1984, from J. M. Marshall to H. R. Denton. The PGP contained the following five parts:

1. LaSalle County Station Emergency Procedure Guideline Technical Guideline, Including Attachment A

2. Writers Guide for LaSalle General Abnormal (LGA) Symptom-Based Emergency Procedures

3. Validation Description for LaSalle General Abnormal (LGA) Symptom-Based Emergency Procedures

4. Verification Description for LaSalle General Abnormal (LGA) Symptom-Based Emergency Procedures

5. Training Description for LaSalle General Abnormal (LGA) Symptom-Based Emergency Procedures

A discussion of these submittals, with the Verification Program and Validation Program discussion combined, follows.

A. Plant-Specific Technical Guidelines (P-STGs)

The P-STGs were reviewed to determine if they provided acceptable methods to meet the objectives of NUREG-0899. The licensee briefly described a method wherein they will use generic Emergency Procedure Guidelines (EPGs) and, with appropriate changes, develop EOPs for the LaSalle County Station, Units 1 and 2.

The Boiling Water Reactor Owners Group (BWROG) EPGs, Revision 3, dated December 8, 1982, was approved by the NRC staff in a letter dated November 23, 1983, from D. Crutchfield to T. Dente of the BWROG.

The licensee's P-STGs were generated from Revision 3I of the EPGs. Each deviation from Revision 3 of the EPGs is identified by a letter in the margin of the P-STGs. Attachment A to the P-STGs describes the deviations and provides an explanation for each one. The staff's review was performed by conducting a step-by-step comparison of the P-STGs with the NRC approved BWROG EPGs, Revision 3. In addition, the staff reviewed each deviation including the justification for each deviation.

Revision 3 to the EPGs is generic to GE-BWR 1 through 6 designs in that it addresses all major systems which may be used to respond to an emergency. Because no specific plant includes all of the systems in these guideline, the guidelines were made applicable to LaSalle by deleting statements which address systems not installed at the LaSalle plant. Except for the following items, the licensee's P-STGs are acceptable because our review determined that (1) they are mostly

consistent with the generic guidelines and (2) the deviations from the EPGs provide acceptable means for mitigating the consequences of accidents and transients. These items should be addressed in a revision to the P-STGs.

1. The deviation notation "A" on the introductory page adjacent to the third paragraph appears to be misplaced. It should be adjacent to the second paragraph. This placement should be corrected since the explanation of the "A" deviation in Attachment A corresponds to the entry condition for the RPV Control Guideline.

2. On page RC-6, the EPG indicates that "other steam driven equipment" (plant specific) should be listed for Step RC/P-2. The LaSalle P-STG should list this equipment.

3. For procedural step DW/T-3, page PC-5 of the Technical Guideline, a discussion of the bases for the drywell spray initiation pressure limit-rated spray and the derivation of Figure 4, should be provided.

4. In order for us to determine if the value for the "Primary Containment Pressure Limit" shown in Figure C14-1 is acceptable, a discussion of the basis should be provided. The discussion should include consideration of structural analyses and tests, purge valve operability, automatic depressurization system operability, vent capacity requirements, and limitation of offsite release rates.

5. IC and HPCI systems are not installed at LaSalle. Therefore, reference to these systems should be lined out in the bottom line of the first paragraph in the Contingency #6 technical guideline - RPV Flooding.

6. Provide a description of the process for using the EPGs and background information to identify control room operator tasks and information and control needs. This process can be described in either the revised PGP or in the Detailed Control Room Design Review (DCRDR) Program Plan.

With satisfactory resolution of the above items, the licensee's P-STGs will provide an adequate technical basis for developing plant EOPs.

B. Writer's Guide

The writer's guide was reviewed to determine if it provided acceptable methods for accomplishing the objectives stated in NUREG-0899. The licensee stated that the purpose of the writer's guide is to provide administrative and technical guidance on the preparation of the LGAs. The writer's guide provides instructions for writing LGAs, including format, instructional steps, mechanics of style, flow charts, symbols, graphs, place-keeping aids, logic terms, and examples. The writer's guide states each LGA shall provide the basic purpose for the procedure, list the entry conditions, and in the body of the procedure, contingent operator actions based on interpretation of parameters and conditions. Our review of the writer's guide identified the following items that should be addressed in the PGP:

1. To minimize confusion, delay, and errors in execution of LGA steps, the LGAs should be structured and written so that they meet the following objectives. The PGP should be revised to include instructions which will ensure that the LGAs meet these objectives: (1) the LGAs can be executed by the minimum shift and control room staffing as required by Technical Specifications, (2) the operator roles specified in the LGAs and the training program are consistent with pre-established leadership roles and division of responsibility, (3) action steps minimize

movement and physical conflict between personnel needed for carrying out the steps, and (4) unintentional duplication of tasks is avoided.

2. The writer's guide should provide instructions for the use of tables in the LGAs including when tables should be used, how they should be formatted and where in the LGAs they should be located.

3. The writer's guide should provide instructions for including location information in the LGAs for instrumentation and controls that are infrequently used or located outside the control room.

4. The writer's guide or other administrative procedures should address maintenance, accessibility and copy quality of the LGAs.

5. To avoid confusion in component identification, the writer's guide (Section 4.9) should be expanded to address consistent use of nomenclature on equipment labels, on control room labels and in the LGAs.

With the exception of the above items, the writer's guide provides acceptable methods for accomplishing the objectives stated in NUREG-0899. Use of the writer's guide should help ensure that the LGAs are useable, accurate, complete, readable, convenient to use and acceptable to control room operators.

C. Validation and Verification Programs

The descriptions of the validation and verification programs were reviewed to determine if they address the objectives stated in NUREG-0899, i.e., to establish the accuracy of information and/or instructions, to determine that the procedures can be accurately and efficiently carried out, and to demonstrate that the procedures are adequate to mitigate transients and accidents.

The licensee's LGA Validation Program describes a method for determining that the actions specified in the LGAs can be followed by control room operators to manage emergency conditions. The licensee's method is to walkdown the procedure at the plant and at the BWR simulator. The walkdown will also verify that the equipment which is referenced is physically installed and useable as described in the procedures, and will assure understanding and useability of the procedures as written. Comments accumulated from the walkdowns and the operator training course will be evaluated and incorporated in the procedures as deemed necessary.

The licensee's LGA Verification Program describes methods for determining that the actions specified in the LGAs are technically correct and accurately reflect the technical guidelines. To assure that the new/revised LGA meets the guidelines established by the BWROG and that the revisions to the source documents have been properly reflected in the LGAs, the licensee will review the reference documents used in preparing/revising the particular LGA. To ascertain that changes to the LGAs do not affect the intent of the LGAs, the licensee will check that the calculations summary page was completed and reviewed by two people and, if more recent data could affect the calculations, have new calculations completed. The licensee stated that individuals chosen as verifiers will be based on familiarity of the LGAs and general plant knowledge; licensed individuals are preferrable. The verification description states that a biannual review is to be conducted to assure that any changes in the source documents, plant systems, etc., are reflected in the calculations and the procedures.

The licensee's PGP described methods to be used to accomplish most of the objectives of NUREG-0899. However, the licensee should address the following items in the validation/verification program:
(1) Indicate that the full complement of the LGAs are to be exercised (including multiple failures, both simultaneous and sequential) on

the simulator and/or in combination with other methods. (2) State the criteria for selecting scenarios to be used in simulator exercises for verification/validation. (3) Indicate that areas not covered by simulator exercises will undergo validation/verification by other means. (4) Explain the method by which multiple units will be handled in the process to account for unit differences. (5) Indicate the type of individuals, e.g., plant operators, subject matter experts, and procedure writers, who are involved in the validation/verification process. (6) Describe the roles played by the participants (i.e., how will operators, subject matter experts, etc. participate in the validation/verification process. (7) Discuss your intent to establish a process to validate/verify revisions to the LGAs.

Inclusion of the above items should result in validation and verification programs that provide assurance that the LGAs will adequately incorporate the guidance of the writer's guide and the P-STG and will guide the operator in mitigating the consequences of accidents and transients. We find that with exception of the above items, the descriptions of the validation and verification programs provide acceptable methods for accomplishing the objectives of NUREG-0899. Therefore, with the exceptions noted, we conclude that the validation and verification programs are acceptable. The staff will confirm that the licensee adequately addresses these items and will report its review in a subsequent safety evaluation report.

D. Training Program

The licensee's description of the training program on revisions to the LGAs was reviewed to determine if it addresses the objectives stated in NUREG-0899. The description includes a list of training program goals and indicates that the training program consists of classroom training sessions and practical training on the simulator. The licensee stated that the classroom training session will be

considered complete when the licensed operator scores 80 percent or above on the written examination, that additional training will be required if the trainee scores below 80 percent on the written examination, and that each license operator shall receive practical training on using the LGAs. The licensee stated that the practical training will include a simulation of postulated transients which will require entry into each LGA and that training will normally be conducted on the LaSalle simulator. Under special circumstances, an actual control room walkthrough may be substituted for the simulator training to fulfill the practical training requirements. The licensee stated that this special substitution must be approved by the training supervisor before it will be allowed.

Our review of the training program description identified the following items that should be addressed in the PGP: (1) simulator training should include team training so that individuals will learn to perform the LGAs as individuals and teams, (2) training the operators on their roles and team work for portions of the LGAs which cannot be fully exercised on the simulator, and (3) the operators should be evaluated on the simulator portion of the training.

Inclusion of the above items should result in a training program that meets the guidance of NUREG-0899 and should provide assurance that the LGAs will adequately guide the operators in mitigating the consequences of accidents and transients. Therefore, with the exceptions noted, we conclude that the training program is acceptable. The staff will confirm that the licensee adequately addresses these items and will report its review in a subsequent safety evaluation report.

3. CONCLUSIONS

Based on our review, we conclude that, with the exceptions noted in Section 2 of this SER, the Commonwealth Edison Company PGP for the LaSalle County Station, Units 1 and 2 meets the requirements of

Supplement 1 to NUREG-0737 and provides acceptable methods for accomplishing the objectives of NUREG-0899. The PGP should be revised to address the items described in Section 2 and re-submitted.

PREPUBLICATION DRAFT

EMERGENCY PROCEDURE GUIDELINES

Revision 3

BWR 1 through 6

December 8, 1982

LASALLE COUNTY STATION EMERGENCY PROCEDURE GUIDELINE

TECHNICAL GUIDELINE

This Technical Guideline has been generated from revision 3I of the Emergency Procedure Guideline. Any differences between revision 3I and revision 3 of the EPG has been designated by a letter in the margin. Attachment A consists of a description of the change and the appropriate reason. Each change is noted every time it appears throughout the Technical Guideline.

All parameters have been changed to comply with LSCS physical characteristics.

The following systems are not installed at LaSalle and all references to them are lined out without comment.

1. IC
2. HPCI
3. Mk III Containment
4. Heated Reference Legs
5. Mk I Containment
6. SPMS
7. LPCS-B

Emergency Procedure Guidelines

INTRODUCTION

Based on the various BWR system designs, the following generic symptomatic emergency procedure guidelines have been developed:

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

The RPV control Guideline maintains adequate core cooling, shuts down the reactor, and cools down the RPV to cold shutdown conditions. This guideline is entered whenever low RPV water level, high RPV pressure, or high drywell pressure occurs, or whenever a condition which requires reactor scram exists and reactor power is above the APRM downscale trip or cannot be determined.

The Primary Containment Control Guideline maintains primary containment integrity and protects equipment in the primary containment. This guideline is entered whenever suppression pool temperature, drywell temperature, containment temperature, drywell pressure, or suppression pool water level, is above its high operating limit or suppression pool water level is below its low operating limit.

The Secondary Containment Control Guideline protects equipment in the secondary containment, limits radioactivity release to the secondary containment, and either maintains secondary containment integrity or limits radioactivity release from the secondary containment. This guideline is entered whenever a secondary containment temperature, radiation level, or water level is above its maximum normal operating value or secondary containment differential pressure reaches zero.

The Radioactivity Release Control Guideline limits radioactivity release into areas outside the primary and secondary containments. This guideline is entered whenever offsite radioactivity release rate is above that which requires an Alert.

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

Table I is a list of the abbreviations used in the guidelines.

Brackets [ ] enclose plant unique setpoints, design limits, pump shutoff pressures, etc., and parentheses ( ) within brackets indicate the source for the bracketed variable. Illustrated in these guidelines are variables for a typical BWR/4 or BWR/6 as appropriate.

At various points throughout these guidelines, precautions are noted by the symbol:

The number within the box refers to a numbered "Caution" contained in the Operators Precautions section. These "Cautions" are brief and succinct red flags for the operator. The basis for each caution as well as for every step is provided in Appendix B.

The emergency procedure guidelines are generic to GE-BWR 1 through 6 designs in that they address all major systems which may be used to respond to an emergency. Because no specific plant includes all of the systems in these guidelines, the guidelines are applied to individual plants by deleting statements which are not applicable or by substituting equivalent systems where appropriate. For example, plants with no low pressure injection system will delete statements referring to LPCI, and plants with Low Pressure Core Flooding will substitute LPCF for LPCI.

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

TABLE I

EPG ABBREVIATIONS

ADS	-	Automatic Depressurization System
APRM	-	Average Power Range Monitor
CRD	-	Control Rod Drive
ECCS	-	Emergency Core Colling System
HCU	-	Hydraulic Control Unit
~~HPCI~~	~~-~~	~~High Pressure Coolant Injection~~
HPCS	-	High Pressure Core Spray
HVAC	-	Heating, Ventilating and Air Conditioning
~~IC~~	~~-~~	~~Isolation Condenser~~
LCO	-	Limiting Condition for Operation
LOCA	-	Loss of Collant Accident
LPCI	-	Low Pressure Coolant Injection
LPCS	-	Low Pressure Core Spray
MSIV	-	Main Steamline Isolation Valves
NDTT	-	Nil-Ductility Transition Temperature
NPSH	-	Net Positive Suction Head
RCIC	-	Reactor Core Isolation Cooling
RHR	-	Residual Heat Removal
RPS	-	Reactor Protection System
RPV	-	Reactor Pressure Vessel
RSCS	-	Rod Sequence Control System
RWCU	-	Reactor Water Cleanup
SBGT	-	Standby Gas Treatment

TABLE I (continued)

SLC	-	Standby Liquid Control
SORV	-	Stuck Open Relief Valve
~~SPMS~~	~~-~~	~~Suppression Pool Makeup System~~
SRV	-	Safety Relief Valve

OPERATOR PRECAUTIONS

GENERAL

This section lists "Cautions" which are generally applicable at all times.

CAUTION #1

Monitor the general state of the plant. If an entry condition for a [procedure developed from the Emergency Procedure Guidelines] occurs, enter that procedure. When it is determined that an emergency no longer exists, enter [normal operating procedure].

CAUTION #2

Monitor RPV water level and pressure and primary containment temperatures and pressure from multiple indications.

CAUTION #3

If a safety function initiates automatically, assume a true initiating event has occurred unless otherwise confirmed by at least two independent indications.

CAUTION #4

Whenever RHR is in the LPCI mode, inject through the heat exchangers as soon as possible.

CAUTION #5

Suppression pool temperature is determined by [procedure for determining bulk suppression pool water temperature]. Drywell temperature is determined by [procedure for determining drywell atmosphere average temperature]. ~~Containment temperature is determined by [procedure for determining Mark III containment atmosphere average temperature].~~ Mk III only

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CAUTION #6

Whenever [temperature near the instrument reference leg vertical runs] exceeds the temperature in the table and the instrument reads below the indicated level in the table, the actual RPV water level may be anywhere below the elevation of the lower instrument tap.

See Attached

Temperature	Indicated Level	Instrument
[any	617 in.	Shutdown Range Level (500 to 900 in.)]
[107°F	-107 in.	Wide Range Level (-150 to +60 in.)]
[310°F	19 in.	Narrow Range Level (0 to +60 in.)]
[545°F	200 in.	Fuel Zone Level (200 to 500 in.)]

[aList in order of increasing temperature.]

CAUTION #7

[Heated reference leg instrument] indicated levels are not reliable during rapid RPV depressurization below 500 psig. For these conditions, utilize [cold reference leg instruments] to monitor RPV water level.

Heated reference legs not installed.

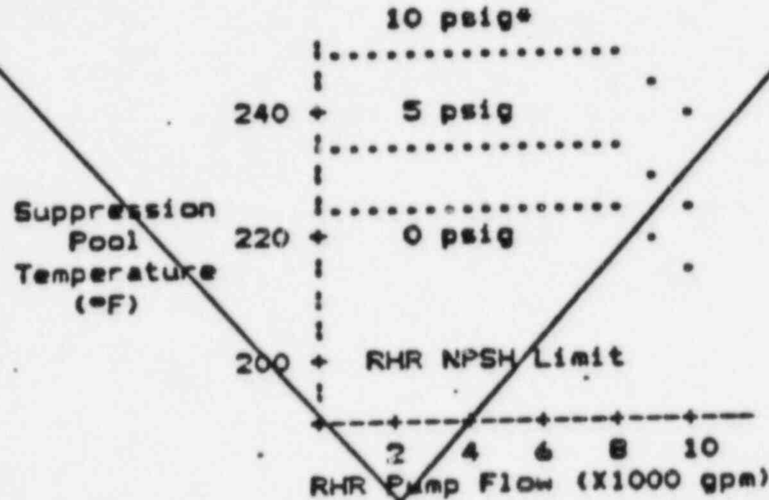
CAUTION #6

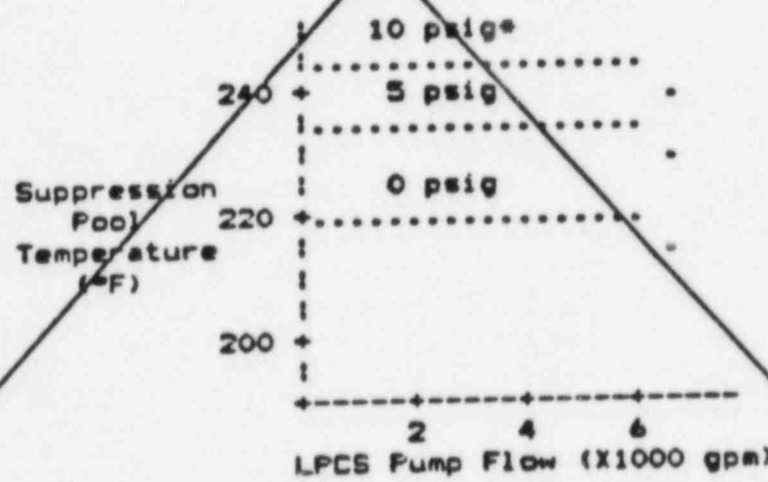
TEMPERATURE	INDICATED LEVEL	LEVEL INSTRUMENT
ANY	146 in	U-1 SHUTDOWN RANGE
ANY	150 in	U-2 SHUTDOWN RANGE
180°	175 in	U-1 UPSET RANGE
180°	180 in	U-2 UPSET RANGE

B

CAUTION #8

Observe NPSH requirements for pumps taking suction from the suppression pool.





*Suppression chamber pressure
Suppression pool at normal water level

CAUTION #9

If signals of high suppression pool water level [~~12 ft. 7 in.~~ +3 in. (high level suction interlock)] or low condensate storage tank water level [~~0 in.~~ 3 ft. 1 in. (low level suction interlock)] occur, confirm automatic transfer of or manually transfer ~~HPCI~~, HPCS, and RCIC suction from the condensate storage tank to the suppression pool.

SPECIFIC

This section lists "Cautions" which are applicable at one or more specific points within the guidelines. Where a "Caution" is applicable, it is identified with the symbol ! # !.

CAUTION #10

Do not secure or place an ECCS in MANUAL mode unless, by at least two independent indications, (1) misoperation in AUTOMATIC mode is confirmed, or (2) adequate core cooling is assured. If an ECCS is placed in MANUAL mode, it will not initiate automatically.

CAUTION #11

If a high drywell pressure ECCS initiation signal [~~2.0~~ 1.69 psig (drywell pressure which initiates ECCS)] occurs or exists while depressurizing, prevent injection from those LPCS and LPCI pumps not required to assure adequate core cooling prior to reaching their maximum injection pressures.

CAUTION #12

Do not throttle ~~HPCI or~~ RCIC turbine~~s~~ below [~~2200~~ 2100 rpm (minimum turbine speed limit per turbine vendor manual)].

CAUTION #13

Cooldown rates above [100°F/hr (RPV cooldown rate LCO)] may be required to accomplish this step.

CAUTION #14 57

Do not depressurize the RPV below [~~100~~ psig (~~HPCI or~~ RCIC low pressure isolation setpoint, ~~whichever is higher~~)] unless motor driven pumps sufficient to maintain RPV water level are running and available for injection.

CAUTION #15

Open SRVs in the following sequence if possible: [SRV opening sequence].

CAUTION #16

Bypassing low RPV water level [ventilation system and] MSIV isolation interlocks may be required to accomplish this step.

CAUTION #17

Cooldown rates above [100°F/hr (RPV cooldown rate LCO)] may be required to conserve RPV water inventory, protect primary containment integrity, or limit radioactive release to the environment.

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.

CAUTION #19

No Auto Trip.
~~Confirm automatic trip or~~ manually trip SLC pumps at [0% (low level trip)] in the SLC tank.

CAUTION #20

Defeating RSCS interlocks may be required to accomplish this step.

CAUTION #21

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

CAUTION #22

Defeating isolation interlocks may be required to accomplish this step.

MK I ONLY

~~**CAUTION #23**~~

~~Do not initiate drywell sprays if suppression pool water level is above [17 ft. 2 in. (elevation of bottom of Mark I internal suppression chamber to drywell vacuum breakers less vacuum breaker opening pressure in feet of water)].~~

CAUTION #24

Bypassing high drywell pressure and low RPV water level secondary containment HVAC isolation interlocks may be required to accomplish this step.

CAUTION #25

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

CAUTION #26

Large reactor power oscillations may be observed while executing this step.

Emergency Procedure Guidelines

RPV CONTROL GUIDELINE

PURPOSE

The purpose of this guideline is to:

- o Maintain adequate core cooling,
- o Shut down the reactor, and
- o Cool down the RPV to cold shutdown conditions ([~~100~~ 90°F < RPV water temperature < ~~212~~ [illegible]°F (cold shutdown conditions)]).

ENTRY CONDITIONS

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

- o RPV water level below [+ ~~12~~ 12.5 in. (low level scram setpoint)]
- o RPV pressure above [~~1045~~ 1043 psig (high RPV pressure scram setpoint)]
- o Drywell pressure above [~~2.0~~ 1.69 psig (high drywell pressure scram setpoint)]
- o A condition which requires reactor scram, and reactor power above [~~3%~~ 5% (APRM downscale trip)] or cannot be determined

A

OPERATOR ACTIONS

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

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

RC/L Monitor and control RPV water level.

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

- o Isolation
- o ECCS
- [o Emergency diesel generator]

If while executing the following step: **F**

- o Boron Injection is required or boron has been injected into the RPV, enter [procedure developed from CONTINGENCY #7].
- 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].

RC/L-2 Restore and maintain RPV water level between [+ ~~12~~ 12.5 in. (low level scram setpoint)] and [+ ~~50~~ 55.5 in. (high level trip setpoint)] with one or more of the following systems: | #9 | #10 | #11 |

- o Condensate/feedwater system [~~1110~~ 1076 - 0 psig (RPV pressure range for system operation)]
- o CRD system [~~1110~~ 1076 - 0 psig (RPV pressure range for system operation)]
- o RCIC system [~~1110~~ 1076 - ~~50~~ 57 psig (RPV pressure range for system operation)] | #12 |
- o ~~HPCI system [1110 - 100 psig (RPV pressure~~ range for system operation)]
- o HPCS system [~~1110~~ 1076 - 0 psig (RPV pressure range for system operation)]
- o LPCS system [~~425~~ 440 - 0 psig (RPV pressure range for system operation)]

- LPCI system [~~250~~ 260 - 0 psig (RPV pressure range for system operation)]

If RPV water level cannot be restored and maintained above [+~~12~~ 13 in. (low level scram setpoint)], maintain RPV water level above [-~~164~~ 161 in. (top of active fuel)].

If RPV water level can be maintained above [-~~164~~ 161 in. (top of active fuel)] and the ADS timer has initiated, prevent automatic RPV depressurization by resetting the ADS timer.

> If RPV water level cannot be maintained above [-~~164~~ 161 in. (top of active fuel)], enter [procedure developed from CONTINGENCY #1].

> If Alternate Shutdown Colling is required, enter [procedure developed from CONTINGENCY #5.]

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]. G

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 | H

- o Emergency RPV Depressurization or RPV Flooding is required and less than [7 (number of SRVs dedicated to ADS)] SRVs are open, enter [procedure developed from CONTINGENCY #2].

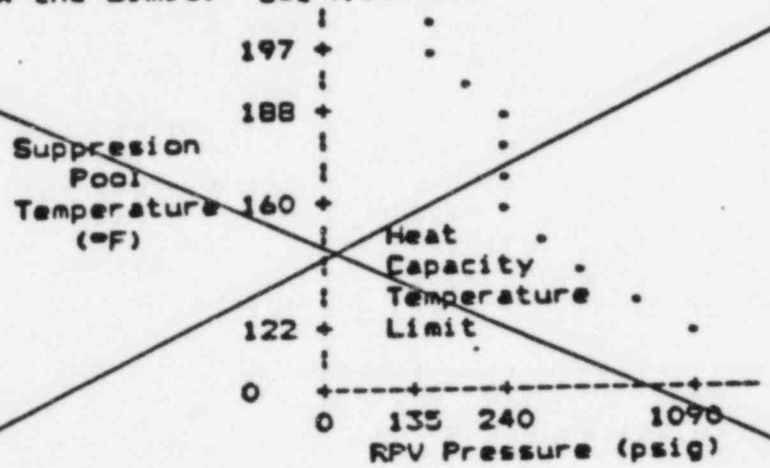
- o RPV Flooding is required and at least [7 (number of SRVs dedicated to ADS)] SRVs are open, enter [procedure developed from CONTINGENCY #6].

RC/P-1 If any SRV is cycling, ~~initiate IC and~~ manually open SRVs until RPV pressure drops to [~~935~~ 40 psig (RPV pressure at which all turbine bypass valves are fully open)].

If while executing the following steps:

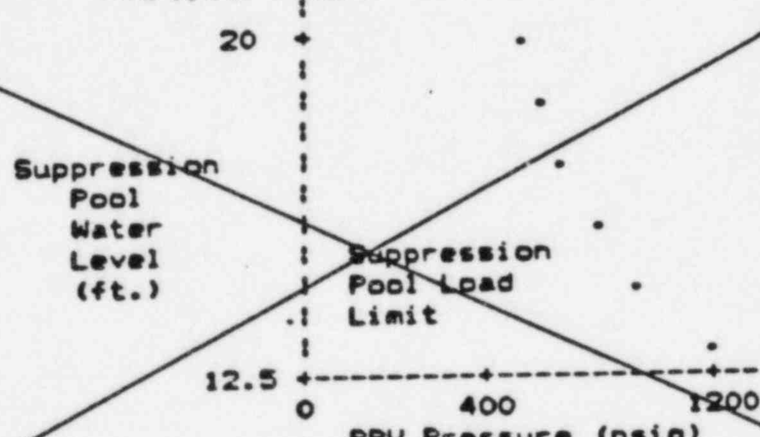
~~#8~~
#13
#14

o Suppression pool temperature cannot be maintained below the Heat Capacity Temperature Limit, maintain RPV pressure below the Limit. See Attached



#13
#14

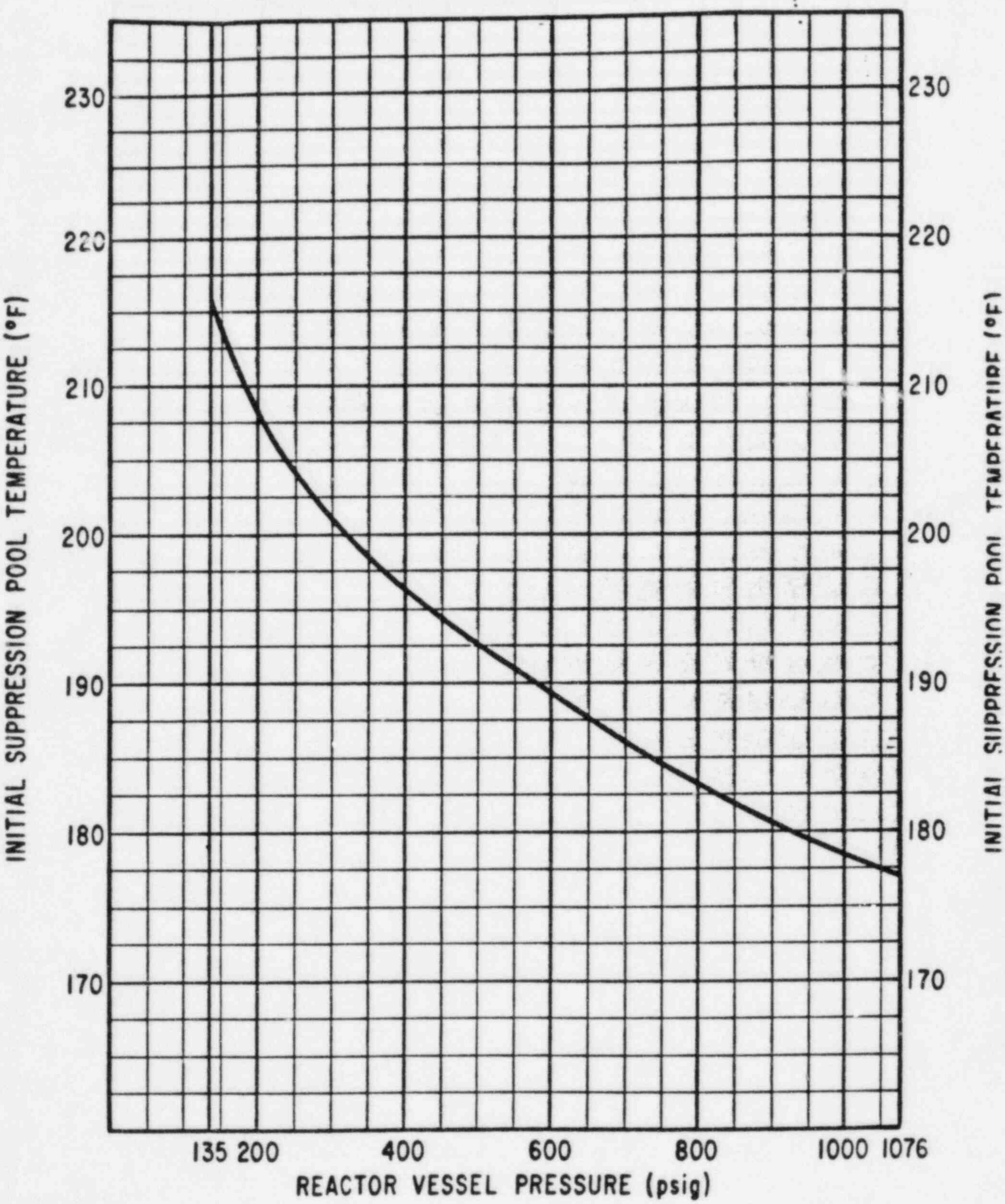
o Suppression pool water level cannot be maintained below the Suppression Pool Load Limit, maintain RPV pressure below the the Limit. See Attached



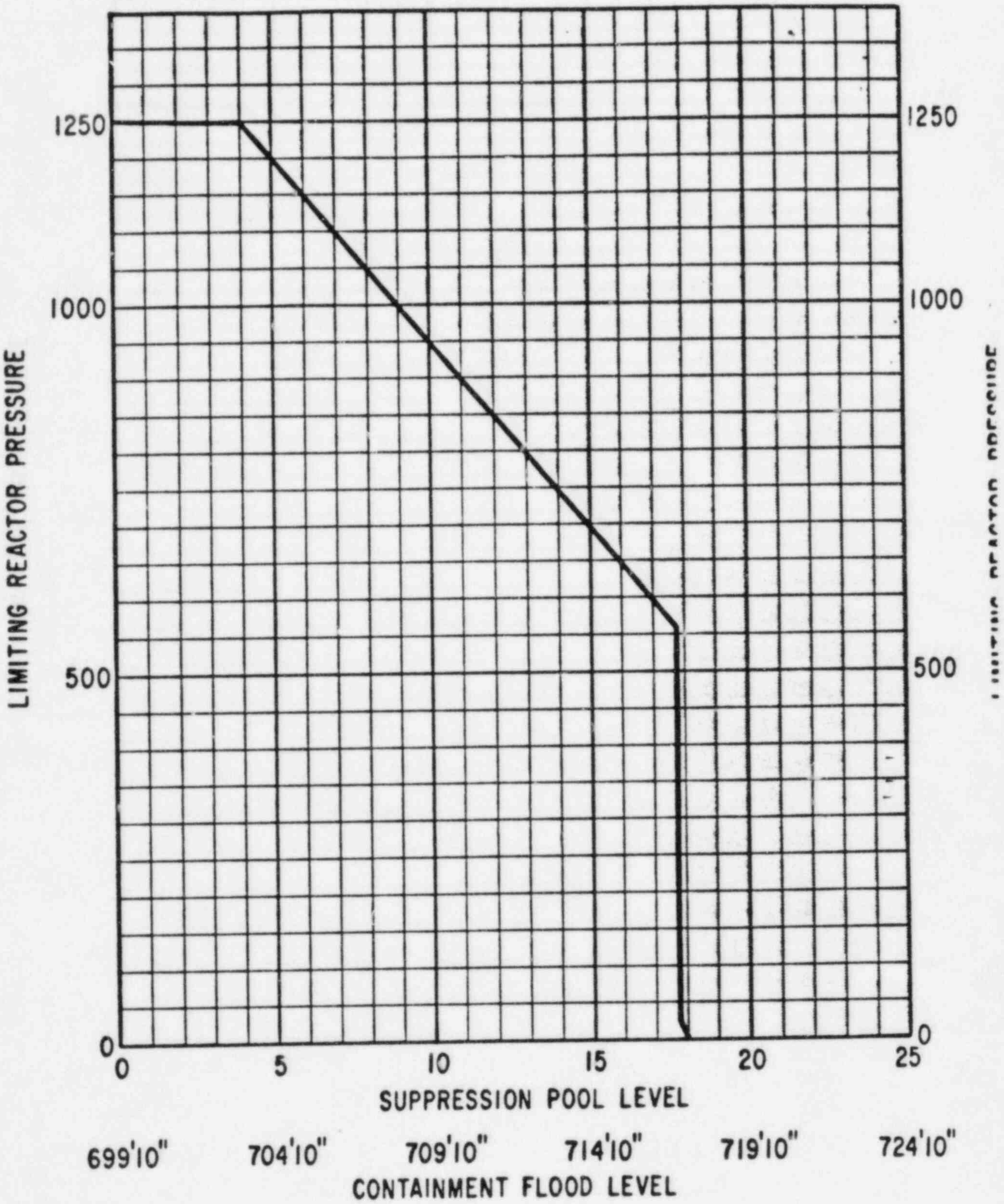
o Steam Cooling is required, enter [procedure developed from CONTINGENCY #3].

LGA-G1

HEAT CAPACITY TEMPERATURE LIMIT



LGA - G5
SUPPRESSION POOL LOAD LIMIT



| If while executing the following steps: |
|
| o Boron Injection is required, and |
|
| o The main condenser is available, and |
|
| o There has been no indication of gross fuel failure or steam line break, |
|
| open MSIVs to re-establish the main condenser as a heat sink. | #16 |

RC/P-2 Control RPV pressure below [~~1090~~ 1076 psig (lowest SRV lifting pressure)] with the main turbine bypass valves. | #14 |

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

- ~~IC~~

- SRVs only when suppression pool water level is above [~~14~~ ft. ~~9 in.~~ (elevation of top of SRV discharge device)]. | #15 | If the continuous SRV pneumatic supply is or becomes unavailable, place the control switch for each SRV in the [~~CLOSE~~ AUTO] position. | #12 |

- ~~HPCI~~

- RCIC

- [other steam driven equipment] Steam Jet Air Ejectors, Turbine Driven Reactor Feed Pumps, Radwaste Reboilers, Gland Seal Steam Reboilers, Main Condenser Deaerating Steam.

- RWCU (recirculation mode) if no boron has been injected into the RPV.

- Main steam line drains

- RWCU (blowdown mode) if no boron has been injected into the RPV. 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:

- o All control rods are inserted to or beyond position [06 (maximum subcritical banked withdrawal position)], or
- o [~~280 pounds~~ 3035 gal (Cold Shutdown Boron ~~Weight~~ Volume)] of boron have been injected into the RPV, or
- o The reactor is shutdown and no boron has been injected into the RPV,

depressurize the RPV and maintain cooldown rate below [100°F/hr (RPV cooldown rate LCO)]. | #14 | #17 |

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 RHR shutdown cooling interlocks clear, initiate the shutdown cooling mode of RHR. | #18 |

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

| If RPV cooldown is required but cannot be accomplished and all control rods are inserted to or beyond position [06 (maximum subcritical banked withdrawl position)], ALTERNATE SHUTDOWN COOLING IS REQUIRED; enter [procedure developed from CONTINGENCY #5.]. |

RC/P-5 Proceed to cold shutdown in accordance with ~~[procedure for cooldown to cold shutdown conditions]~~. LGP 2-1 NORMAL UNIT SHUTDOWN

RC/Q Monitor and control reactor power.

> If while executing the following steps:
>
> - All control rods are inserted to or beyond position [06 (maximum subcritical banked withdrawal position)], terminate boron injection and enter [scram procedure].
> - The reactor is shutdown and no boron has been injected into the RPV, enter [scram procedure].

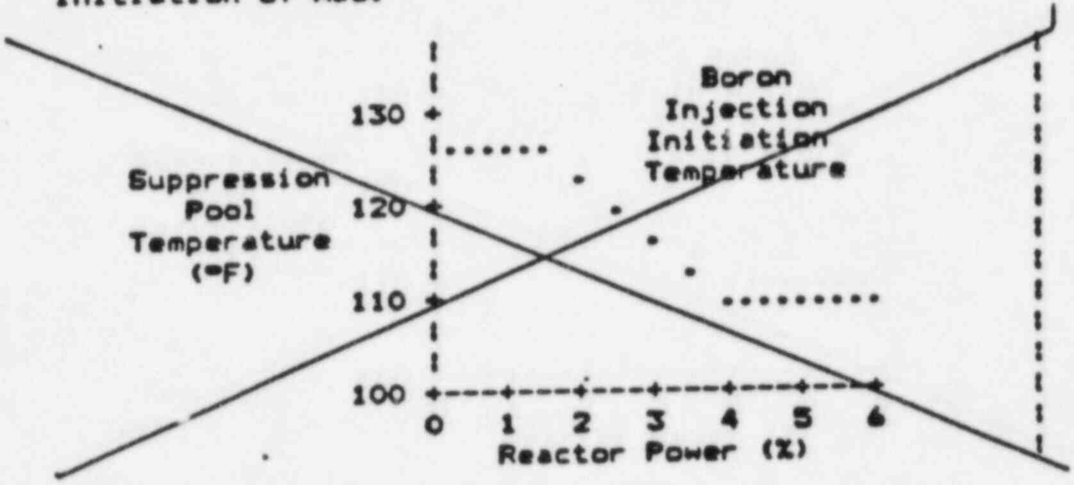
RC/Q-1 [Confirm or place the reactor mode switch in SHUTDOWN.]

RC/Q-2 If the main turbine-generator is on-line [and the MSIVs are open], confirm or inititate recirculation flow runback to minimum.

RC/Q-3 If reactor power is above [5% (APRM downscale trip)] or cannot be determined, trip the recirculation pumps.

> Execute [Steps RC/Q-4 and RC/Q-5] concurrently.

RC/Q-4 If the reactor cannot be shutdown before suppression pool temperature reaches [the Boron Injection Initiation Temperature], 110°F BORON INJECTION IS REQUIRED; inject boron into the RPV with SLC and prevent automatic initiation of ADS. | #19 | K



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

[o CRD]

[o HPCS]

[o RWCU]

[o Feedwater]

~~[o HPCI~~]

[o RCIC]

[o Hydro pump]

RC/Q-4.1 If boron is not being injected into the RPV by RWCU, confirm automatic isolation of or manually isolate RWCU.

RC/Q-4.2 Continue to inject boron until [~~300 pounds~~ 3035 gal (Cold Shutdown Boron Weight)] of boron have been injected into the RPV.

RC/Q-4.3 Enter [scram procedure].

RC/Q-5 Insert control rods as follows:

RC/Q-5.1 If any scram valve is not open:

- o [Remove:

  H11-P609 C71-F~~18~~14A,E,C,G,

  H11-P611 C71-F~~18~~14B,F,D,H

  (fuses ~~with~~ which de-energize RPS scram solenoids)].

- o ~~Close [C11-F095 (scram air header supply valve)] and open [C11-F008 (scram air header vent valve)].~~

  CLOSE 1(2)IA206 Scram Air Header Supply Stop and REMOVE the Scram Air Header Supply Filter 1(2)C11-D006

When control rods are not moving inward:

- o [Replace:

  H11-P609 C71-F18A,E,C,G

  H11-P611 C71-F18B,F,D,H

  (fuses ~~with~~ which de-energize RPS scram solenoids)].

- o ~~Close [C11-F008 (scram air header vent valve)] and open [C11-F095 (scram air header vent supply valve)].~~

  INSTALL the Scram Air Header Supply Filter 1(2)C11-D006 and OPEN 1(2)IA206 Scram Air Header Supply Stop.

RC/Q-5.2 Reset the reactor scram.

If the reactor scram cannot be reset:

1. Start all CRD pumps.

   If no CRD pump can be started, continue in this procedure at [Step RC/Q-5.6.1].

2. Close [C11-F034 (HCU accumulator charging water header valve)].

3. Rapidly insert control rods manually until the reactor scram can be reset. | #20 |

4. Reset the reactor scram.

5. Open [C11-F034 (HCU accumulator charging water header valve)].

RC/Q-5.3 Drain the scram discharge volume and initiate a manual reactor scram.

1. If control rods moved inward, return to [Step RC/Q-5.2].

2. Reset the reactor scram.

   If the reactor scram cannot be reset, continue in this procedure at [Step RC/Q-5.5.1].

3. Open the scram discharge volume vent and drain valves.

RC/Q-5.4 Individually open the scram test switches for control rods not inserted to or beyond position [06 (maximum subcritical banked withdrawl position)].

When a control rod is not moving inward, close its scram test switch.

RC/Q-5.5 Reset the reactor scram.

If the reactor scram cannot be reset:

1. Start all CRD pumps.

   If no CRD pump can be started, continue in this procedure at [Step RC/Q-5.6.1].

2. Close [C11-F034 (HCU accumulator charging water header valve)].

RC/Q-5.6 Rapidly insert control rods manually until all control rods are inserted to or beyond position [06 (maximum subcritical banked withdrawal position)]. | #20 |

If any control rod cannot be inserted to or beyond position [06 (maximum subcritical banked withdrawl position)]:

1. Individually direct the effluent from [C11-F102 (CRD withdraw line vent valve)] to a contained radwaste drain and open [C11-F102 (CRD withdraw line vent valve)] for each ontrol rod not inserted to or beyond position [06 (maximum subcritical banked withdrawal position)].

2. When a control rod is not moving inward, close its [C11-F102 (CRD withdraw line vent valve)].

PRIMARY CONTAINMENT CONTROL GUIDELINE

PURPOSE

The purpose of this guideline is to:

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

ENTRY CONDITIONS

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

- o Suppression pool temperature above [~~95~~ 100°F (most limiting suppression pool temperature LCO)]
- o Drywell temperature above [135°F (drywell temperature LCO or maximum normal operating temperature, whichever is higher)]
- Mk III only ~~o Containment temperature above [90°F (containment temperature LCO)]~~
- o Drywell pressure above [~~2.0~~ 1.69 psig (high drywell pressure scram setpoint)]
- o Suppression pool water level above [~~12 ft. 6 in.~~ +3 in. (maximum suppression pool water level LCO)]
- o Suppression pool water level below [~~12 ft. 2 in.~~ −4.5 in. (minimum suppression pool water level LCO)]

OPERATOR ACTIONS

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

SP/T Monitor and control suppression pool temperature.

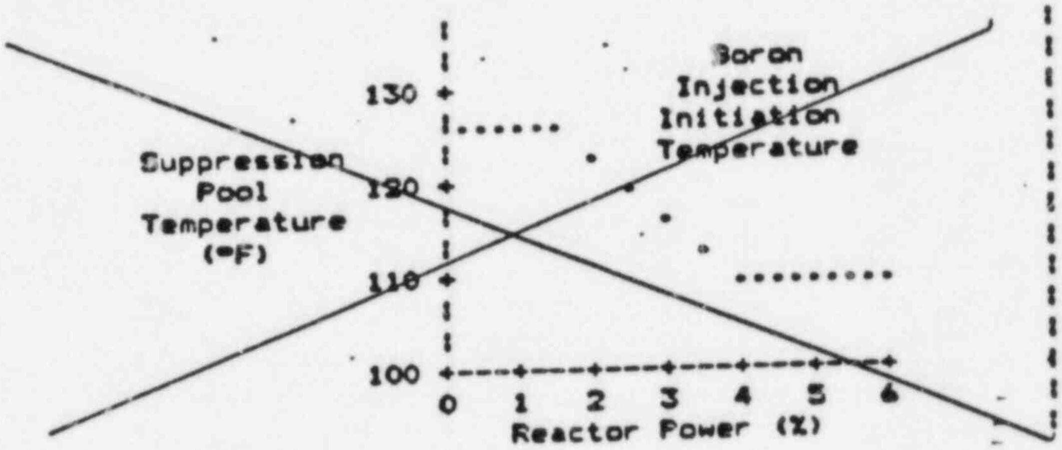
SP/T-1 Close all SORVs.

If any SORV cannot be closed [within 2 minutes (optional plant-specific time interval)], scram the reactor.

SP/T-2 When suppression pool temperature exceeds [95°F (most limiting suppression pool temperature LCO)], operate available suppression pool cooling. | #10 |

SP/T-3 Before suppression pool temperature reaches 110°F [the Boron Injection Initiation Temperature], scram the reactor.

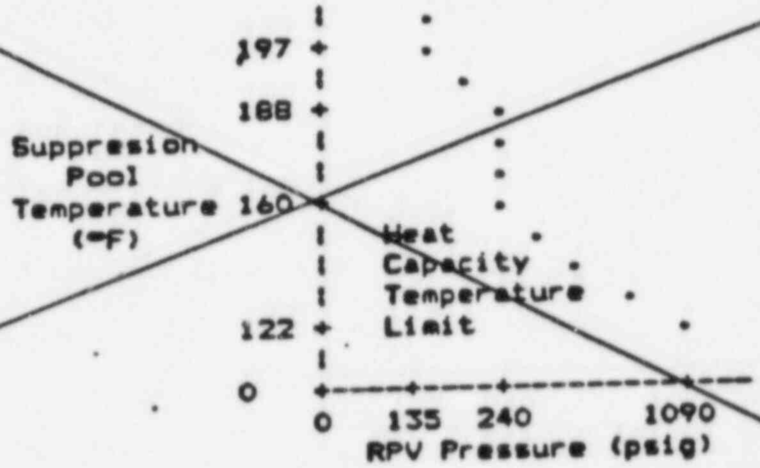
K



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. See Attached

#13
#14

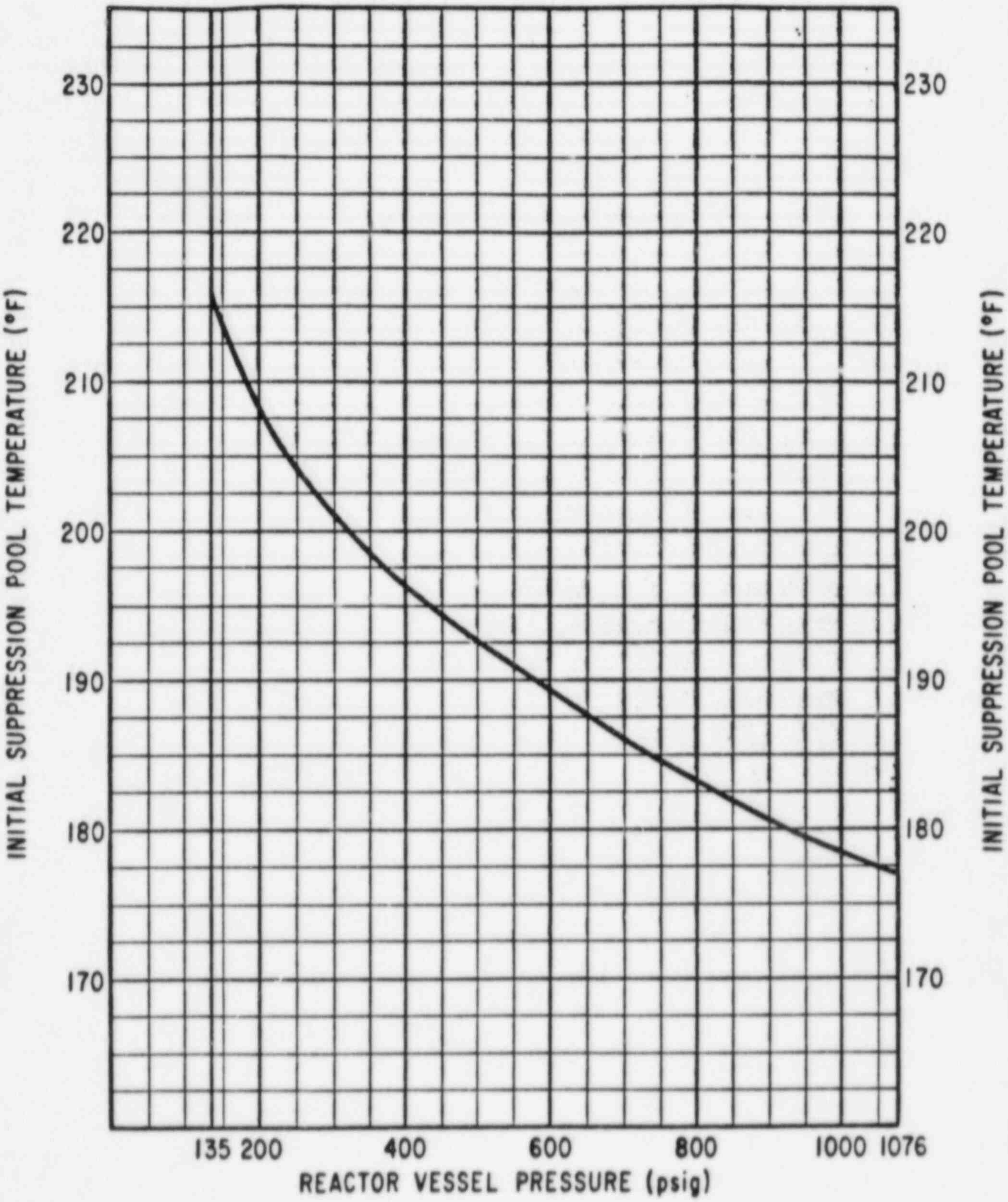
M



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

N

LGA - G1
HEAT CAPACITY TEMPERATURE LIMIT



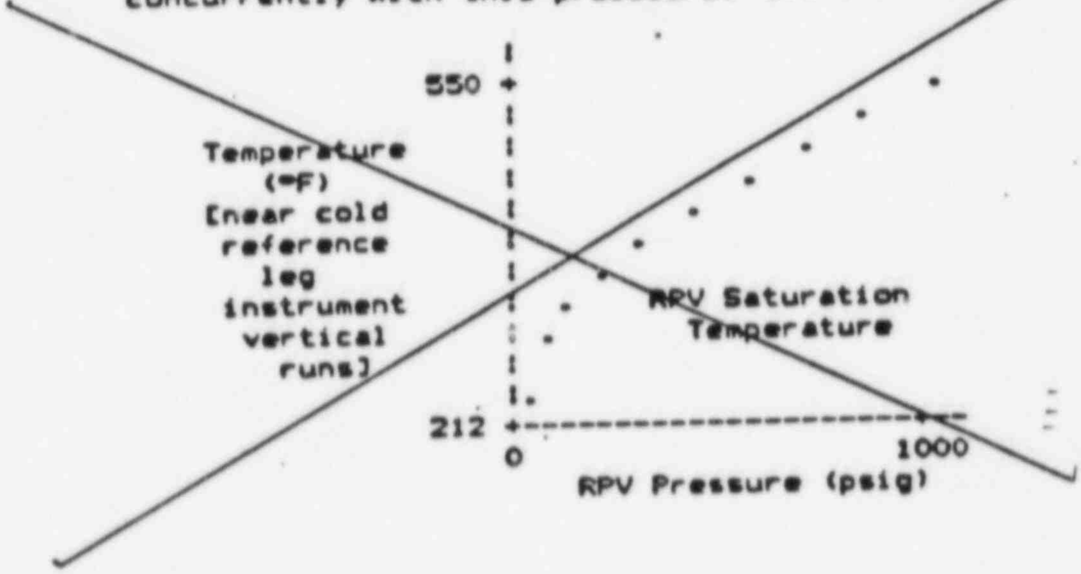
DW/T Monitor and control drywell temperature.

DW/T-1 When drywell temperature exceeds [135°F (drywell temperature LCO or maximum normal operating temperature, whichever is higher)], operate available drywell cooling. | #6 |

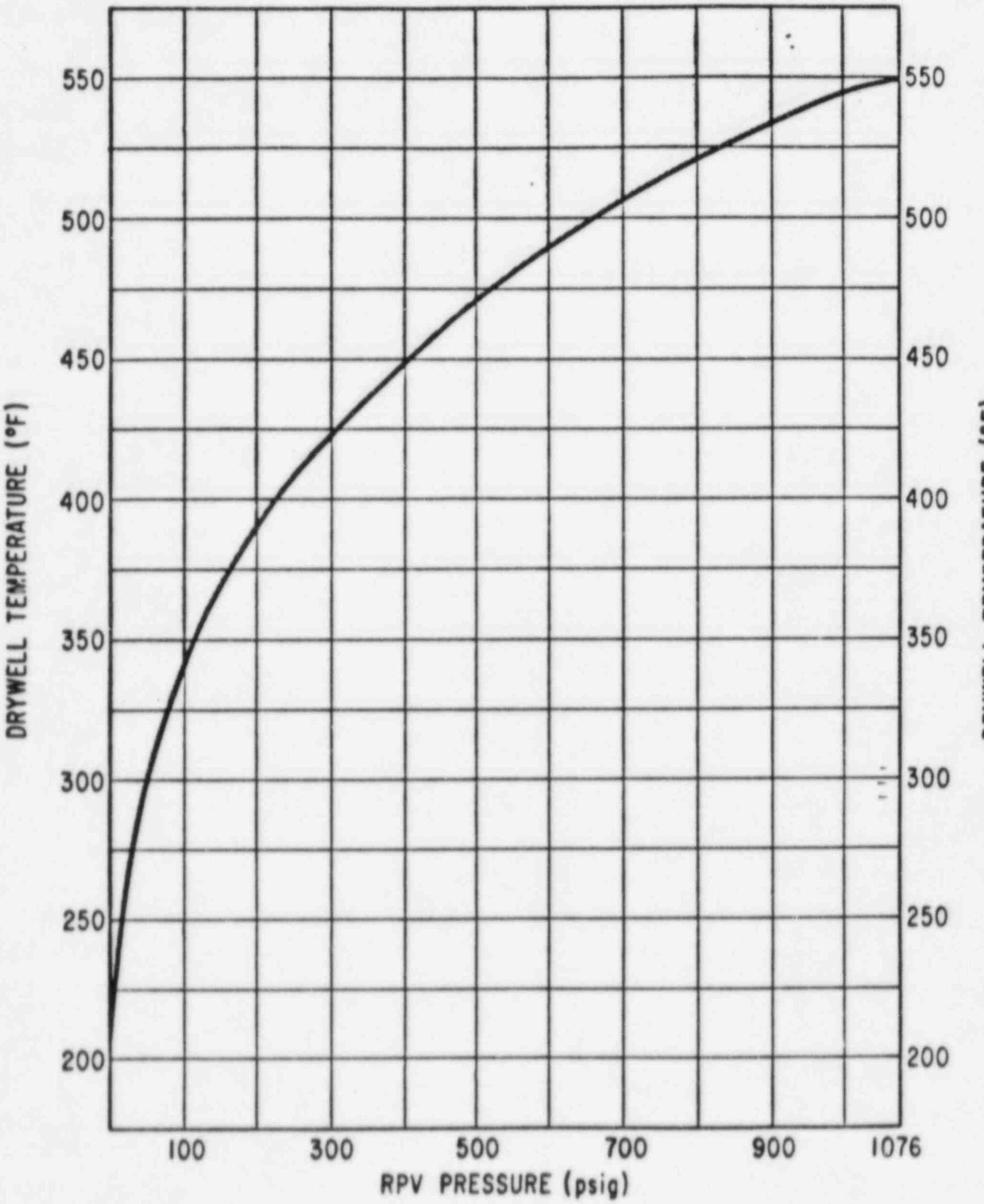
| Execute [Steps DW/T-2 and DW/T-3] concurrently. |

DW/T-2 If drywell temperature ~~[near the cold reference leg instrument vertical runs]~~ reaches the RPV Saturation Temperature, RPV FLOODING IS REQUIRED; enter [procedure developed from the RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure. See Attached

Temp indication near verticle run of ref leg not installed.

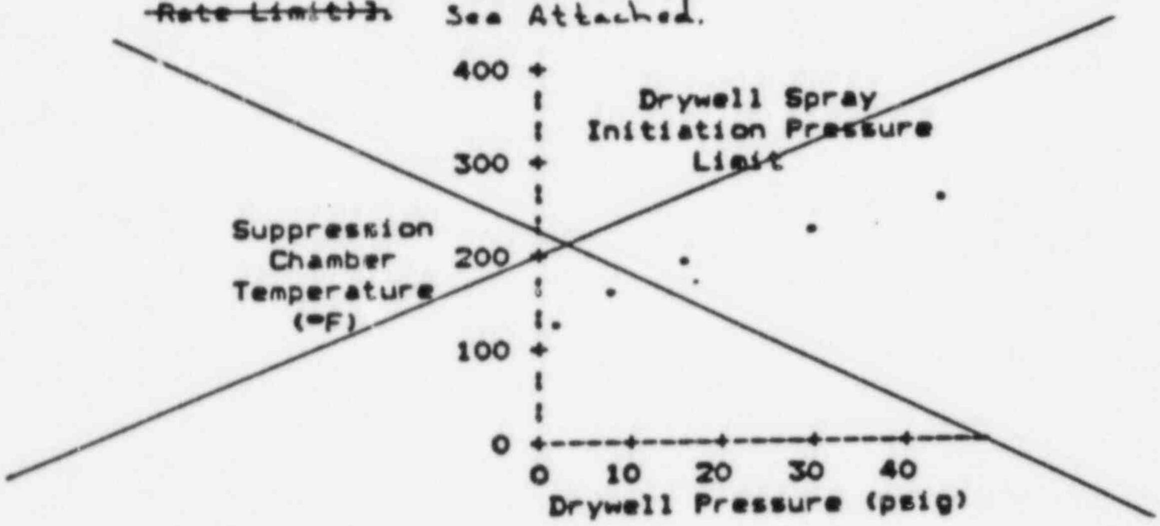


LGA - G2
RPV SATURATION LIMIT



DW/T-3 Before drywell temperature reaches [340°F (maximum temperature at which ADS qualified or drywell design temperature, whichever is lower)] but only if [suppression chamber temperature and drywell pressure are below the Drywell Spray Initiation Pressure Limit], [shut down recirculation pumps and drywell cooling fans and] initiate drywell sprays. ~~[restricting flow rate to less than 720 gpm (Maximum Drywell Spray Flow Rate Limit)].~~ See Attached. | #18 |

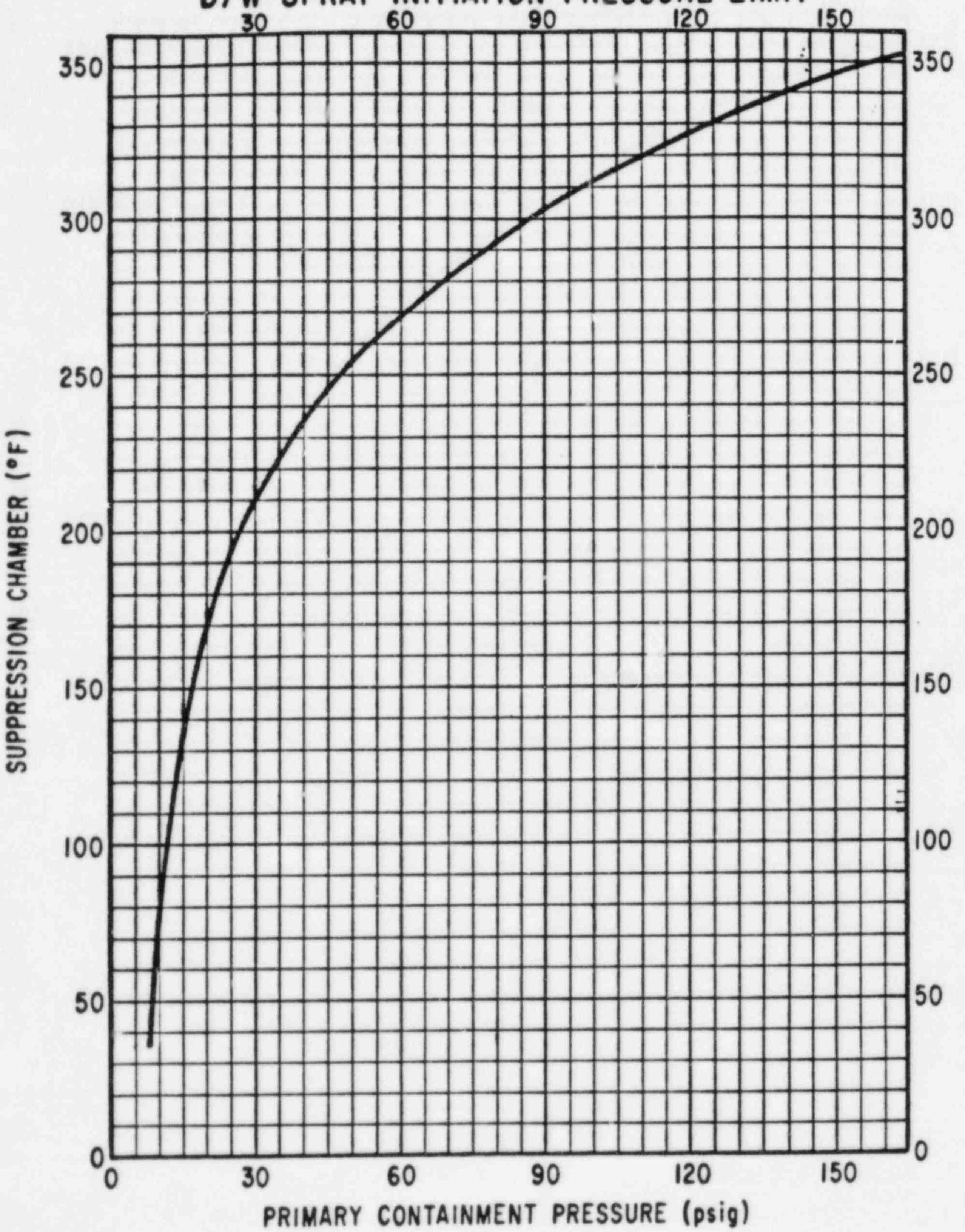
A per calculation C8



If drywell temperature cannot be maintained below [340°F (maximum temperature at which ADS qualified or drywell design temperature, whichever is lower)], EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from the RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure.

LGA - G3

D/W SPRAY INITIATION PRESSURE LIMIT



MK III ONLY

CN/T Monitor and control containment temperature.

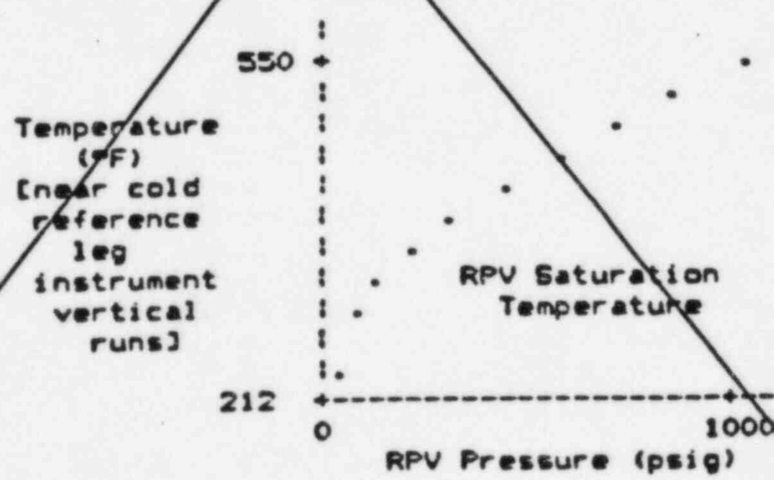
CN/T-1 When containment temperature exceeds [90°F (containment temperature LCO)], operate available containment cooling. | #6 |

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

CN/T-2 Before containment temperature reaches [185°F (containment design temperature)], but only if [suppression chamber pressure is above 1.7 psig (Mark III Containment Spray Initiation Pressure Limit)], initiate suppression pool sprays. | #18 |

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

CN/T-4 If containment temperature [near the cold reference leg instrument vertical runs] reaches the RPV Saturation Temperature, RPV FLOODING IS REQUIRED.



PC/P Monitor and control primary containment pressure.

PC/P-1 Operate [the following systems, as required:

- o Containment pressure control systems. Use containment pressure control system operating procedure.]

- [o] SBGT [and drywell purge], only when the temperature in the space being evacuated is below [212°F (Maximum Noncondensible Evacuation Temperature)]. Use [SBGT and drywell purge operating procedures]. | #21 |

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

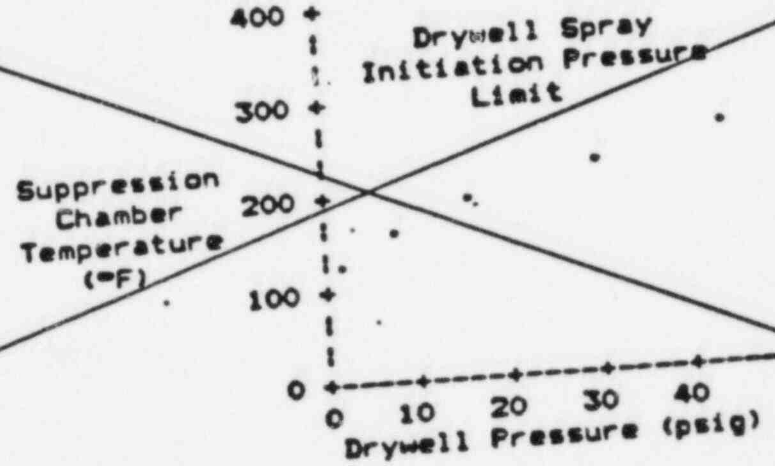
PC/P-2 Before suppression chamber pressure reaches [~~the~~ 29 psig Pressure Suppression Pressure][~~17.4 psig~~ 19.5 psig (Suppression Chamber Spray Initiation Pressure)], ~~but only if [suppression chamber pressure is above 1.7 psig (Mark III Containment Spray Initiation Pressure Limit)]~~ [suppression pool water level is below ~~24 ft. 6 in.~~ 723.5 ft el. (elevation of suppression pool spray nozzles)], initiate suppression pool sprays. | ~~# 8~~ | | #18 |

~~See Attached~~

PC/P-3 If suppression chamber pressure exceeds [~~17.4~~ 19.5 psig (Suppression Chamber Spray Initiation Pressure)], but only if [suppression chamber temperature and drywell pressure are below the Drywell Spray Initiation Pressure Limit], [shut down recirculation pumps and drywell cooling fans and] initiate drywell sprays ~~[restricting flow rate to less than 720 gpm (Maximum Drywell Spray Flow Rate Limit)]~~. | #18 |

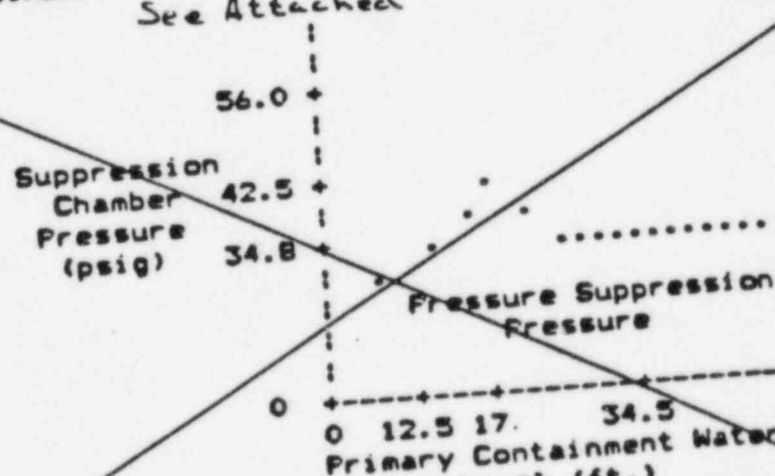
See Attached

JA per Calculation C8



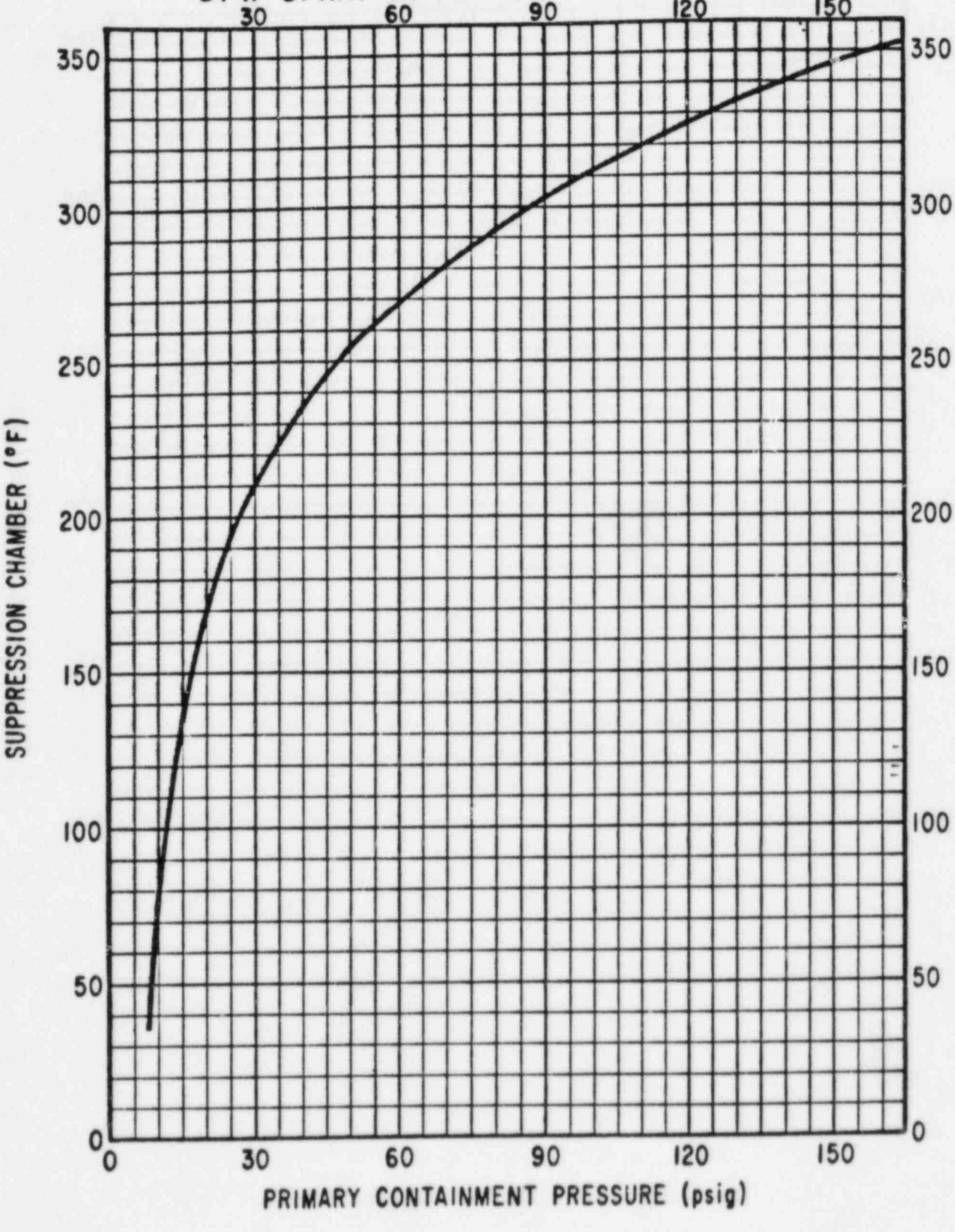
PC/P-4 If suppression chamber pressure cannot be maintained below ~~[the Pressure Suppression Pressure]~~ 29 psig, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

See Attached



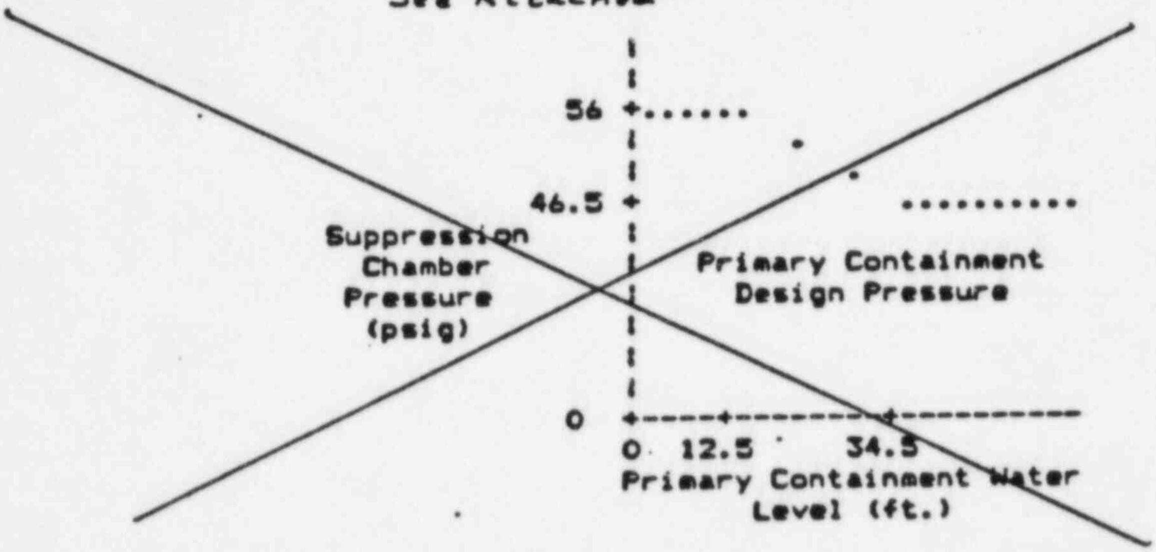
LGA - G3

D/W SPRAY INITIATION PRESSURE LIMIT



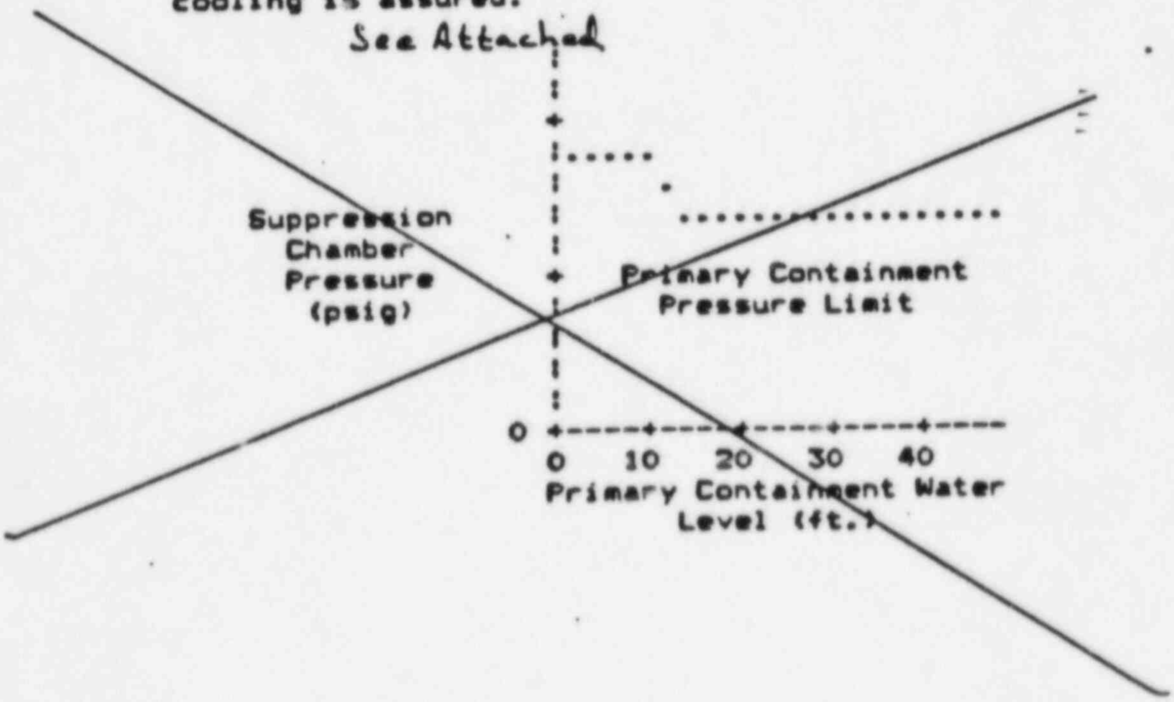
PC/P-5 If suppression chamber pressure cannot be maintained below ~~[the Primary Containment Design Pressure],~~ 41 psig RPV FLOODING IS REQUIRED.

See Attached



PC/P-6 If suppression chamber pressure cannot be maintained below ~~the [Primary Containment Pressure Limit]~~ 60 psig then irrespective of whether adequate core cooling is assured:

See Attached

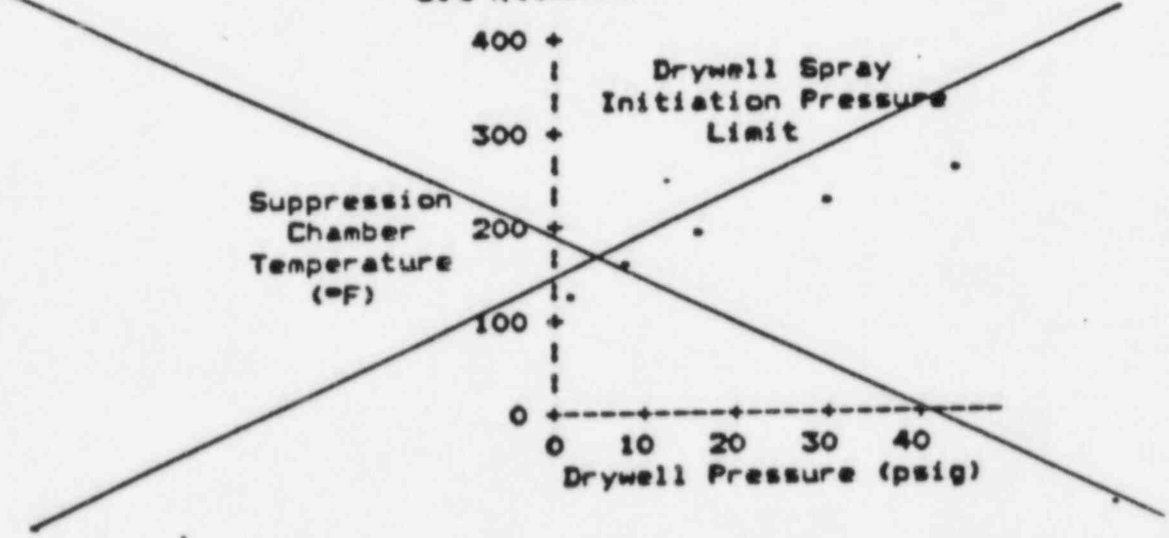


o [If suppression pool water level is below ~~24~~ 723 ft el. ~~ft. 4 in.~~ (elevation of suppression pool spray nozzles),] initiate suppression pool sprays.

o If [suppression chamber temperature and drywell pressure are below the Drywell Spray Initiation Pressure Limit], [shut down recirculation pumps and drywell cooling fans and] initiate drywell sprays ~~[restricting flow rate to less than 720 gpm (Maximum Drywell Spray Flow Rate Limit)]~~.

IA. per Calculation C8

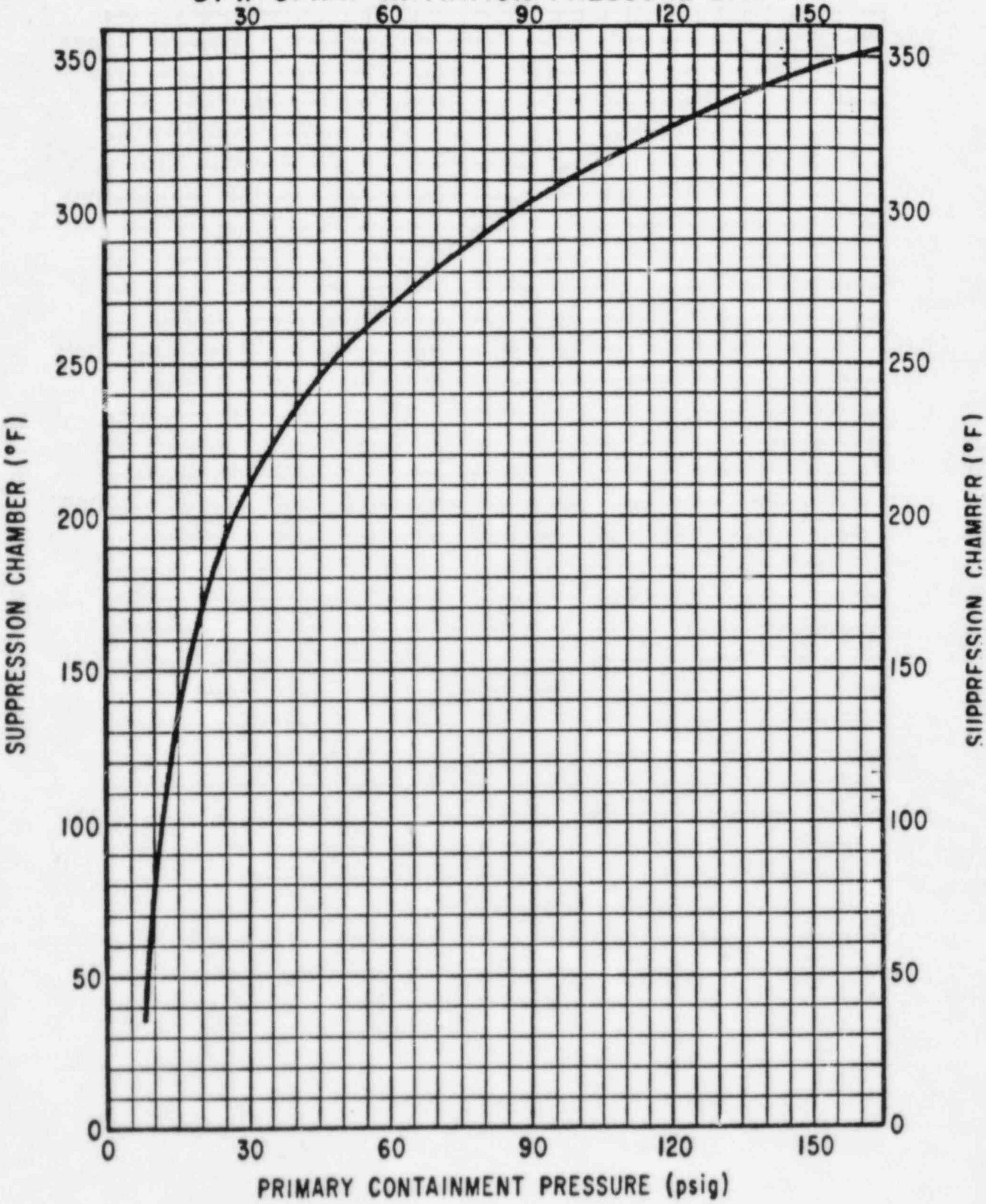
See Attached



PC/P-7 If suppression chamber pressure exceeds ~~the Primary Containment Pressure Limit~~ 60psig, vent the primary containment in accordance with [procedure for containment venting] to reduce and maintain pressure below the Primary Containment Pressure Limit. | #22 |

LGA - G3

D/W SPRAY INITIATION PRESSURE LIMIT



SP/L Monitor and control suppression pool water level.

SP/L-1 Maintain suppression pool water level between [~~12 ft. 6 in.~~ +3 in. (maximum suppression pool water level LCO)] and [~~12 ft. 2 in.~~ -4.5 in (minimum suppression pool water level LCO)]. Refer to [sampling procedure] prior to discharging water. ~~[Suppression pool makeup may be augmented by SPMS].~~ ~~#8~~ #9

MK III ONLY

~~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. 2 in. (minimum suppression pool water level LCO)].~~

If suppression pool water level cannot be maintained above [~~12 ft. 2 in.~~ -4.5 in. (minimum suppression pool water level LCO)], execute [Step SP/L-2].

MK III ONLY

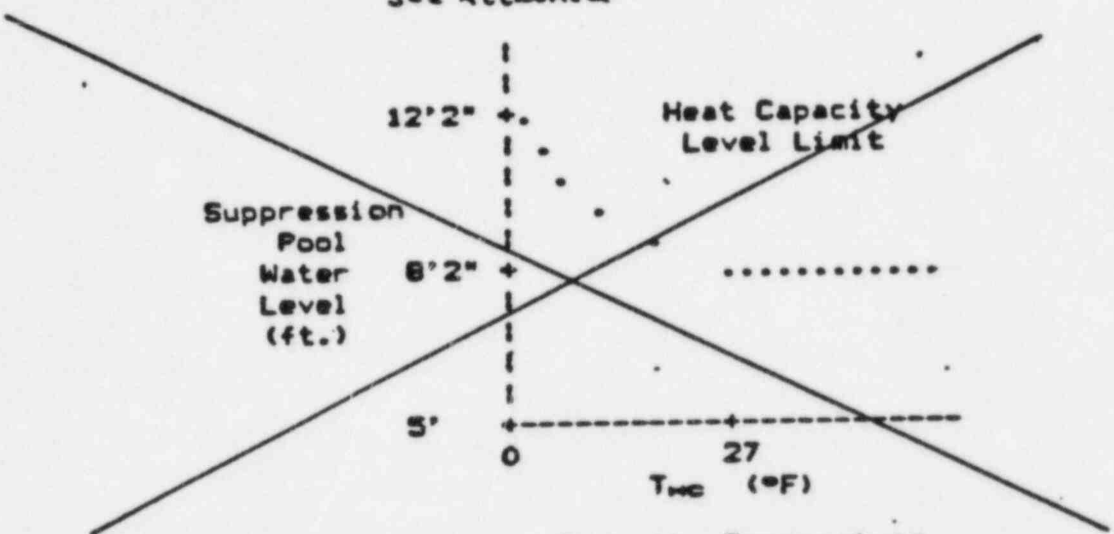
If suppression pool water level cannot be maintained below [~~12 ft. 6 in.~~ +3 in. (maximum suppression pool water level LCO)] ~~([23 ft. 9 in. (SPMS initiation setpoint plus suppression pool water level increase which results from SPMS operation)] if SPMS has been initiated)~~, execute [Step SP/L-3].

-4.5 in

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

Maintain suppression pool water level above the Heat Capacity Level Limit.

See Attached

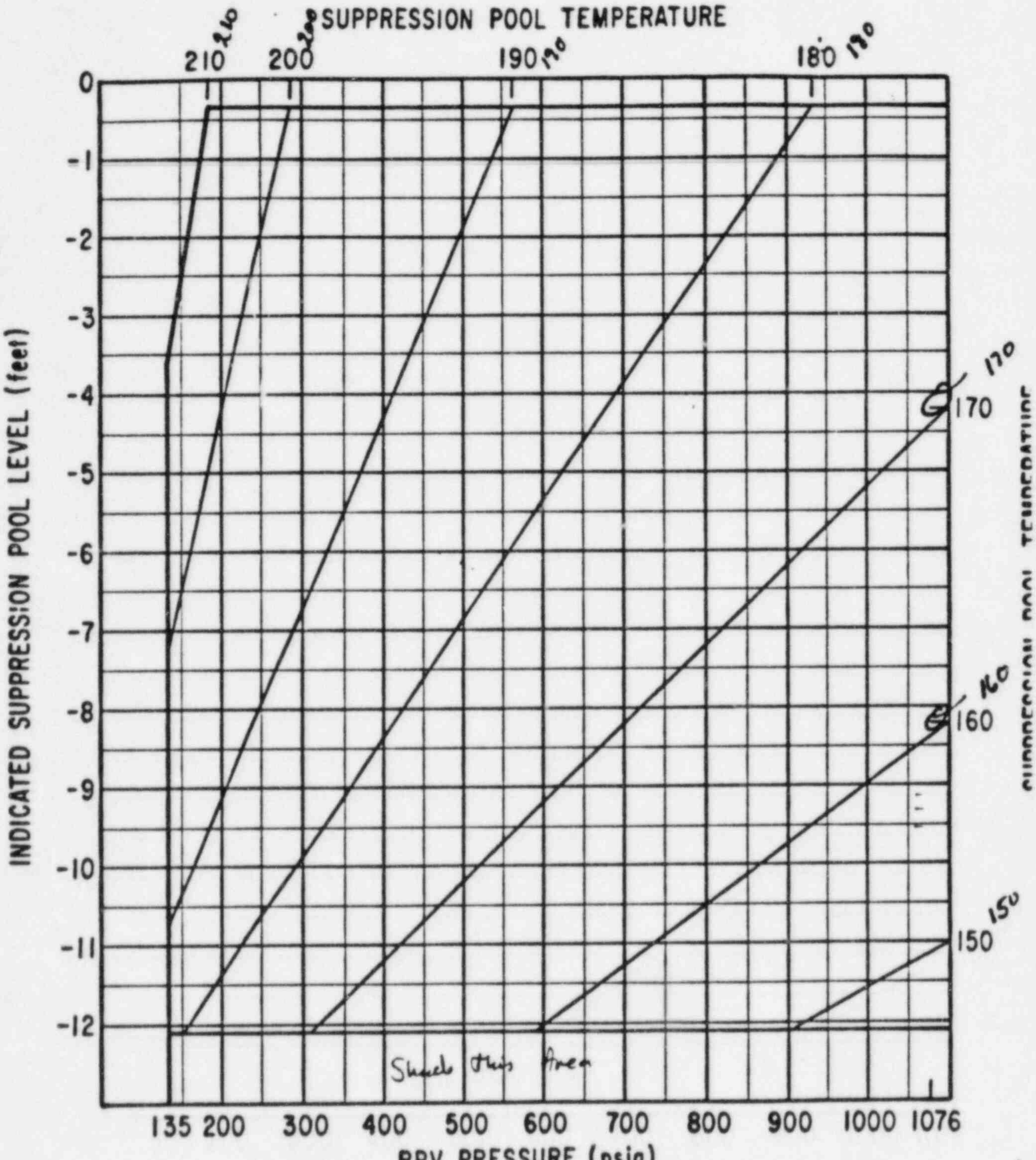


Where T_{HC} = Heat Capacity Temperature Limit minus suppression pool temperature

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.

LGA-G8

HEAT CAPACITY LEVEL LIMIT (HCLL)



NOTE: MAINTAIN LEVEL ABOVE EXISTING PRESSURE TEMPERATURE POINT

Put Margin on this Side

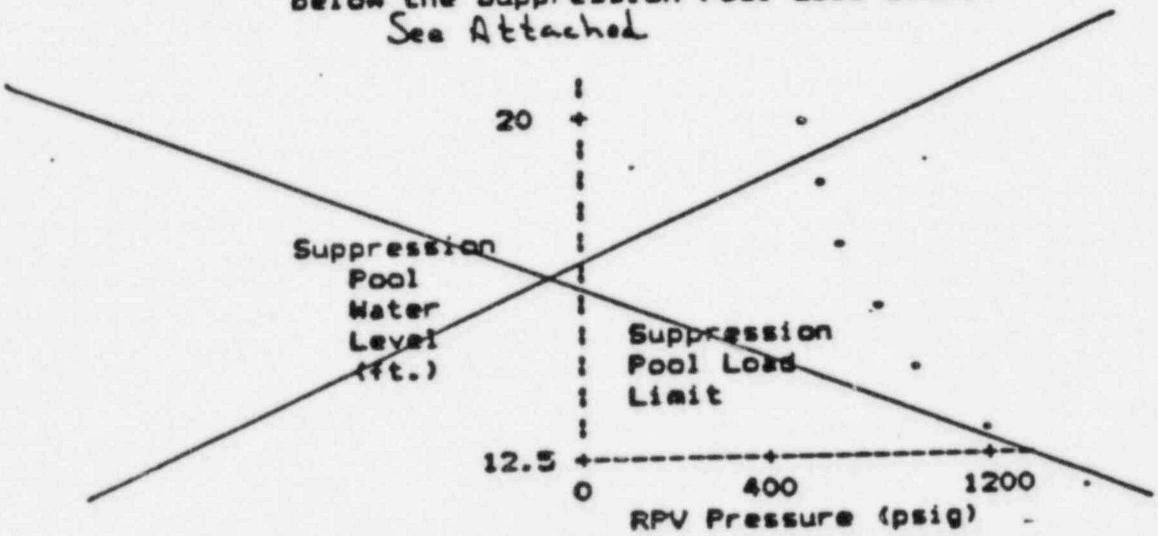
+3 in.

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 Suppression Pool Load Limit.

See Attached

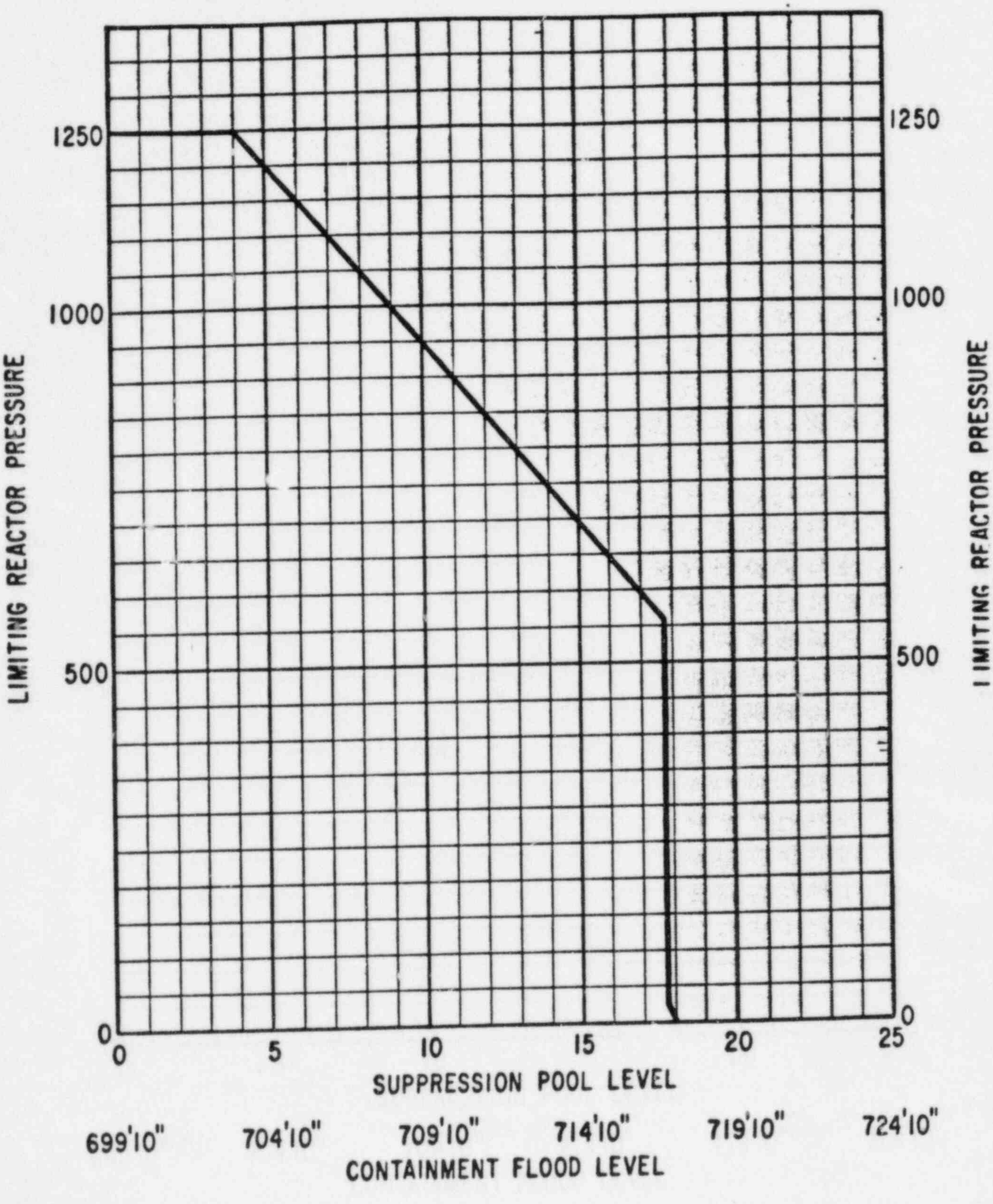


If suppression pool water level cannot be maintained below the Suppression Pool Load Limit, maintain RPV pressure below the Limit. | #13 | #14 |

If suppression pool water level and RPV pressure cannot be maintained below the Suppression Pool Load 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.

LGA - G5

SUPPRESSION POOL LOAD LIMIT



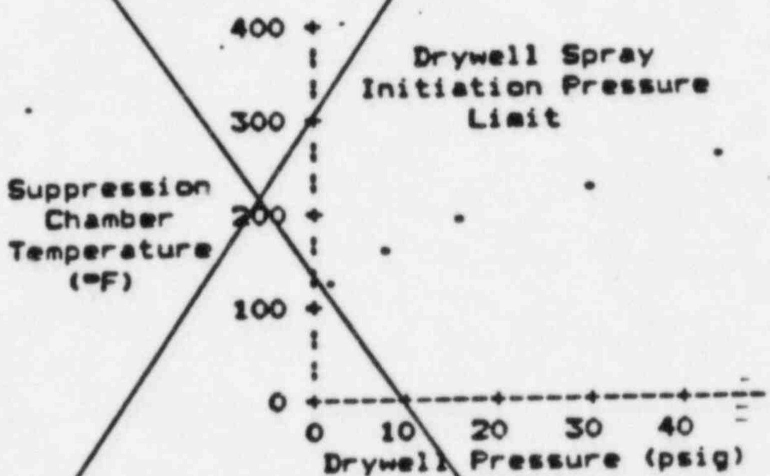
If suppression pool water level and RPV pressure cannot be restored and maintained below the Suppression Pool Load Limit, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; enter [procedure developed from RPV Control Guideline] at [Step RC-1] and execute it concurrently with this procedure.

MK I ONLY

~~SP/L-3.2 Before suppression pool water level reaches [17 ft. 2 in. (Maximum Primary Containment Water Level Limit or elevation of bottom of Mark I internal suppression chamber to drywell vacuum breakers less vacuum breaker opening pressure in feet of water, whichever is lower)] 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.~~

MK I ONLY

1. When suppression pool water level reaches [17 ft. 2 in. (elevation of bottom of Mark I internal suppression chamber to drywell vacuum breakers less vacuum breaker opening pressure in feet of water)] but only if [suppression chamber temperature and drywell pressure are below the Drywell Spray Initiation Pressure Limit], [shut down recirculation pumps and drywell cooling fans and] initiate drywell sprays [restricting flow rate to less than 720 gpm (Maximum Drywell Spray Flow Rate Limit)]. | #18 |



2. If suppression pool water level exceeds [17. ft. 2 in. (elevation of bottom of Mark I internal suppression chamber to drywell vacuum breakers less vacuum breaker opening pressure in feet of water)], continue to operate drywell sprays [below 720 gpm (Maximum Drywell Spray Flow Rate Limit)]. | #23 |

U-1 LOA-CM-01
U-2 810 ft 6 in el. <----

3. When primary containment water level reaches [~~(10) ft.~~ (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.

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.

WRITER'S GUIDE FOR LASALLE GENERAL ABNORMAL (LGA) SYMPTOM-BASED EMERGENCY PROCEDURES

COMMONWEALTH EDISON COMPANY

LASALLE COUNTY STATION

JUNE 5, 1985

DOCUMENT ID 0064d/

TABLE OF CONTENTS

Section 1 INTRODUCTION

1.1 PURPOSE

The purpose of this procedure is to provide administrative and technical guidance on the preparation of LGA's.

1.2 SCOPE

This procedure applies to the writing of all of LaSalle's symptom-based emergency procedures.

Section 2 EOP DESIGNATION AND NUMBERING

2.1 PROCEDURE DESIGNATION

Designation of the emergency procedures will be LGA - LaSalle General Abnormal.

2.2 PROCDURE NUMBERING

- o The emergency procedure numbering system is divided into two components - the procedure designator, LGA, and a serialized two digit number which identifies the LGA.

  The actions required for an ATWS (Anticipate Transient Without Scram) are significantly different and more complex than the actions required for a non-ATWS situation. Although these procedures are to be written so they are symptom oriented, they will be event specific to the extent of ATWS or non-ATWS events. Thus, two sets of procedures will be generated. One for the ATWS case and one for the non-ATWS case. They will be differentiated in the procedure numbering system by inserting "ATWS" between "LGA" and the two digit number. The same two digit number may be used twice - once for the non-ATWS procedure, and once for the corresponding ATWS procedure.

  Example: LGA-01 LGA-ATWS-01

- o Graphs shall be labeled by "LGA-GX" where "X" is a sequential number.

- o Tables shall be labeled by "LGA-TX" where "X" is a sequential number.

  Examples: LGA-G3 or LGA-T1

Section 3 FORMAT

3.1 LGA SECTIONS

Each LGA shall be divided into four sections (in order):

A. PURPOSE - defines briefly the basic purpose for the procedure.

B. ENTRY CONDITIONS - lists the entry conditions for the procedure.

C. OPERATOR ACTIONS - the body of the procedure.

D. REFERENCES - lists procedural references from the LGA's.

Procedure layout will place all conditions and actions on the right hand page. The left hand page only contains graphs, tables, overriding instructions (explained later), reminders, and any other supporting information that applies to the facing right-hand page. If no information is to be placed on a left-hand page, it should state: "This page intentionally blank".

3.2 PROCEDURE HEADING AND PAGE IDENTIFICATION

Each page of the LGA's will be identified by the procedure number, the revision number, the revision date, and the page number. Page identification shall be located at the bottom of the page in the following format:

1. The procedure number will be centered left to right on the page two lines above the bottom margin.

2. The page number will be centered left to right on the first line above the bottom margin in the format of "Page 1 of 15".

3. The revision number will be justified to the unbound edge margin on the same line as the procedure number in the format of "Rev 0".

4. The revision date will appear under the revision number on the same line as the page number and be justified to the unbound edge margin in the format of "12/19/84".

Example (for right hand page)

LGA-01 Rev 0
Page 1 of 15 12/19/84

All right hand pages will have odd page numbers and left hand pages will have even page numbers.

3.3 INSTRUCTION STEP NUMBERING

o Instruction steps will be numbered and identified as follows:

A.

1.

a.

(1)

(a)

o The first step on a page should have a complete step number. For example - step a. of the second step in Section A. If this step heads the page, it shall be labelled step A.2.a. instead of just a.

o In general, at least 2 blank spaces should follow the step number.

3.4 PAGE FORMAT

o Margins shall be as follows:

	Page (inches)	
Margin	Left hand	Right hand
Left	3/4	1
Right	1	3/4
Top: Page 1	1	1
Top: Other	1/2	1/2
Bottom	1/2	1/2

o See the example below for proper alignment. Space 4 times after "If" and 2 spaces after "Then".

C. OPERATOR ACTIONS

1. If X (start typing here)
Then X

a.

(1)

(a)

o Boxes enclosing overriding steps, cautions and notes shall extend from margin to margin in width to allow them to stand out on the page.

- o Since some steps of the LGA procedures will be long and involved, and to positively separate steps, asterisks will be used as follows:

  1. After major steps, 5 asterisks unless a sub step immediately follows, in which case no asterisk will be used.

  2. After sub steps, 3 asterisks unless it is the last sub step in which case use 5 asterisks or unless it also has a sub step in which case no asterisk will be used.

  3. Asterisks will be centered left and right and will be preceded and followed by a blank line. A blank space will separate each asterisk from another.

  Example:

  22. RESET the reactor scram.

      a. <u>If</u> The reactor scram <u>cannot</u> be reset,

         <u>Then</u>:

         (1) START <u>both</u> CRD pumps per LOA-RD-07,

             (a) <u>If</u> No CRD pump can be started,

                 <u>Then</u> EXIT this step,

                 AND

                 GO TO step 23.a.(1).

                 * * *

         (2) CLOSE 1(2)C11-F034 (HCU accumulator charging water header valve).

                 * * * * *

  23. RAPIDLY INSERT control rods manually....

- o As an aid to the operator, a short descriptive title may be placed in the right column of the right-hand page. This title may be an abbreviated version of the procedure title or it may describe the steps next to it such that their intent is conveyed to the operator. This title lettering should be 2 to 3 times the size of the text lettering for ease of recognition.

3.5 TYPE SIZE

Use pitch 10 type size so that the procedure is readable under low light conditions.

3.6 TABS & BINDING

- o To minimize tabs as much as possible, place the referenced step number in the upper right hand corner and clip that corner of the preceding pages such that the step number appears while reading the step which references it. This need only be done on the control room LGA's. Through proper placement of referenced step numbers, several levels of referencing is possible in one corner. This must be manually done on each copy made from the master. A procedure assembly check off list is to be maintained with and copied with the master to facilitate and document accurate and consistent assembly of the procedure for the control room LGA copies.

- o Each control room copy LGA procedure will be separately bound in a manila folder which is clearly marked with the procedure number and title. It will be multiply stapled along the left hand edge such that it can easily be folded open from right to left . It will be punched to fit into a 3-ring binder where it will be maintained along with all other LGA procedures, list of general precautions, flow charts, and supporting laminated graphs.

- o To allow easy differentation between ATWS and non-ATWS procedures, the folders containing ATWS procedures will be a color distinctly different from folders for non-ATWS LGA's. The selected colors will be consistently used (all ATWS procedures same color, and all non-ATWS procedures same color).

- o A checkoffs list to facilitate and document proper preparation of the LGA procedures will be maintained and revised as necessary when the LGA is revised.

- o The completed, signed, and dated Master LGA preparation checklist and LGA procedure checklists will be transmitted to the procedure manager and will be maintained as documentation of proper completion.

4.1 WRITER'S INTRODUCTION

The LGA procedures exist as an aid to the operator to provide accurate, usable direction to his actions so that he may best cope with degraded conditions that have potential to threaten the plant and the public. The LGA writer must keep this in mind whenever the LGA's are being drafted or revised. The LGA's are a tool for the operator and as such they must be usable by the operator. Of course, technical content is extremely important; but exactitude in the technical content of a procedure is of little value if it is not written in a manner that can be understood and followed by an operator during accident conditions. The LGA writer is tasked with turning a technical document (ie - Emergency Procedure Guidelines) into a functional operator's tool. To accomplish this goal he must approach this translation task from the operator's viewpoint. The writer has to ensure that the intent of the Technical Guideline is maintained, while at the same time the "usability" of the procedure is maximized.

The guidance provided by this procedure will help maintain the clarity and consistency of the LGA's. The rules set forth here are generally applicable throughout the procedure; however, there may be exceptions. If careful analysis reveals that a particular principle may not be the best rule to use for a certain circumstance, then that rule may be violated. Even though a rule may be bent to fit a special situation, it will only be intentionally violated when it promotes the overall effectiveness of the procedure.

The major task for the LGA writer is not to produce a product with absolute engineering perfection; it is not to blindly follow the writing guidance contained in this guideline; but his task is to produce a procedure that can and will be used by the operator whenever the levels of plant safety are degraded.

The LGA writer must keep in mind that these procedures may have to be performed with the minimum crew complement provided for in the technical specifications. Therefore, the LGA's should be written such that the actions can be performed by the minimum crew complement while maintaining established leadership and division of responsibility within the crew. Care also must be taken to ensure that movement and physical interference is minimized between individuals performing the LGA actions. Unnecessary duplication of tasks is also to be avoided as much as possible.

These requirements ensure the LGA procedures can be adequately performed at any time. They do not prohibit other qualified individuals from assisting the on-shift crew in the performance of the LGA procedures.

4.2 RELATIONSHIP OF LGA's TO OTHER PROCEDURES

During normal large scale plant evolutions the plant's operation is governed by the LGP's. More detailed, system-specific instructions for operation are provided by the LOP's. Alarm information is provided by the annunciator LOA's. Instructions for testing equipment is provided by the LOS's. Abnormal operating instructions for specific events are provided in the LOA's. All of these operating procedures are used in conjunction with the others; sometimes more emphasis is placed on one type of procedure than another; other times a certain type of procedure may not even apply. The crux of the matter is that all of these operating procedures have the normal function of guiding the operation of the plant safely within the bounds of the license. Whenever conditions degrade to the point where the safety of the plant is diminished, entry into another type of procedure, the LGA, is required. The LGA entry conditions do not necessarily indicate that an emergency exists but are degraded parameters which may lead to an emergency. When an LGA is entered, it will be the governing procedure. The operator will follow the directions given by the LGA. He will be using the other station procedures to support the LGA direction. For example, the operator will still be responding to annunciators and the LOA annunciator procedures.

In general, when an LGA is entered, all evolutions will cease and the plant will be returned to a safe condition until all LGA's are exited. During this time, the plant will be stabilized and will continue to be operated using the appropriate LGP in such a manner as to prevent a worsening of the then existing conditions (ex. do not raise pressure, shift RR, with draw control rods, etc.). No new evolutions are to be started unless directed by the LGA. When the LGA's are exited, the operator will return to the normal operating procedures or to special operating instructions written for recovery.

4.3 INSTRUCTIONAL STEP LENGTH AND CONTENT

Instruction steps will be concise and precise. Conciseness denotes brevity; preciseness means exactly defined. Thus, instructions should be short and exact. This is easily stated, but not so easily achieved. General rules to be used to meet these objectives are as follows:

- o Instructional steps should deal with only one idea.
- o Short, simple sentences should be used.
- o Complex evolutions should be broken down into a series of simpler steps.
- o The action the operator takes should be clear.
- o Expected results of routine tasks should not be stated.
- o Operator actions should be related to observable plant parameters. When possible, avoid using time as a key to operator actions.

- Give the operator enough information to accomplish the task but don't give him too much information to read. Don't clutter the procedure up with too much verbiage. There will be times when identical series of steps will be repated. Inclusion of these same steps at every point in the procedure would make the procedure harder to follow. In these cases, the procedure will work better if the repeated steps appear at the back of the procedure book clearly identified with a tab. Whenever a conditional statement calls for taking the action, the operator will go to the tabbed section. When he has taken the required action, he will return to the procedure from which he came.

- Unless otherwise directed by specific steps in the LGA procedure, performance of the procedures will be strictly sequential. Actions which have been completed or have been passed over are not to be performed later in the procedure, unless specifically directed. Likewise, steps that have not yet been reached will not be executed until preceding steps have been performed. The only exception to this will be special steps (overriding steps) that may apply at any time during performance of a step or steps. These will be set off from normal steps by being enclosed in a box. Wording will also be included to explain to what part of the procedure it applies.

  If the operator looses his place or feels that a step earlier in the procedure should be accomplished, he has the option of starting at the beginning of the procedure and working forward sequentially until the desired step is reached or the appropriate place in the procedure is regained. This ensures that proper conditions and sequence is verified prior to taking an action.

- Lists in general will imply no special order or preference, and no sequence will be required unless specifically stated. This does not mean that the items in a list can not be logically ordered depending on the intent of the writer. Since these procedures are symptom oriented rather than event specific, the operator makes the final judgement depending on the existing conditions as to what items to use or what order to follow.

- To minimize the possibility of producing event specific procedures, actions or conditions may be referred to by general rather than specify words. For example, "Initiate reactor scram" rather than "Arm and Depress all scram switches". This allows the operator to accomplish the stated goal by means available to him during the event rather than restricting him to actions that may not be allowable or successful in a specific event. Care must be taken to ensure the intent is clear from the wording of the step. It is then up to the operator to determine during the event which systems or indications are available to accomplish that intent.

4.4 IF/THEN LOGIC

- Whenever a condition appears in the procedure that will require prescribed operator action, the If/Then logic style should be used if it will make the procedure more clear.

- The words "If" or "When" or "Before" will normally precede the conditional statement. The word "Then" will precede the action statement.

- If, Then, When, and Before shall be underlined when they are used to begin conditional logic statements.

- The LGA's shall be written so that the If/Then logic is used consistently. The procedure shall be constructed so that the operator will take the correct actions if he enters the procedure at the proper point and follows the logic given the following guidelines.

  "IF" - The operator reads the condition which follows. If the condition applies, he takes the action which follows in the related "Then" statement and goes on to the following step. If the condition does not apply, he does not have to even look at the "Then" statement, but continues on at the following step of same or higher level in the step numbering scheme, sub-steps (subordinate steps) to a step where the condition was not met will also be passed over without examining or executing. For example:

  C.10. If Suppression Pool water level is above 6 ft.,

  Then OPEN all ADS valves.

  a. If Any ADS valve cannot be opened,

  Then OPEN other SRVs until 7 SRVs are open.

  * * * * *

  C.11. If Less than 3 SRVs are open,

  If Suppression Pool level is above 6 ft, the operator takes the action of step C.10., then goes on to step C.10.a. Then if any ADS valves can not be opened, he does the action of step C.10.a. Otherwise, he skips the action of C.10.a. and goes to the next step of higher or equal numbering level. He goes to step C.11. in this example, - He could also go to C.10.b. if it existed, but he could not go to step C.10.b.(1) because it is a sub step of C.10.b. whose condition for action was not met. However, if Suppression Pool level is not above 6 ft, the operator skips the action of step C.10. as well as the entire step C.10.a.

The writer must format the steps carefully to minimize operator confusion. The writer may also give specific direction to the operator concerning which step is to be executed next although this reduces the concept of brevety and lengthens the procedure considerably.

"Then" - The action statement which follows the "Then" will be taken by the operator if the condition (the "If", "When", or "Before" statement) applies to the plant condition. If the conditional statement does not apply, the operator does not even have to read the action statement, but goes on to the next step of same or higher level in the numbering scheme as discussed above.

"When" - The "When" conditional statement is to be used whenever it is desired that the operator stop at some point in the procedure and wait for a specified condition to occur. This statement will generally be used for steps that give action for situations that are continually degrading, requiring more severe actions determined by the extent of degradation. The operator will examine the condition(s) of the "When" statement and will not continue further in that procedure path of execution, but he will continue to do what he had been directed to do by the preceding step(s) or other procedures until the condition(s) of the "When" statement is met. He will then perform the "Then" statement and go to the next step. The "When" statement does not imply that this step may be done at some later point in the procedure when the associated condition(s) is met. As discussed in 4.3. above, step execution is strictly sequential.

"Before"- The "Before" statement is used when an action is required to be accomplished prior to the occurrence of the specified condition. It is left up to the operators judgement of the actual situation as to when he should start the action. His judgement should be based upon how fast the specified condition is changing and upon how long it will take to perform the specified action under the current situation. Use of the "Before" statement should be minimized as it places a burden on the operator to make a complex decision. The purpose of using "Before" is to accomplish an action timely but to also delay, if conditions permit, taking an action that may have severe consequences. Thus, that action may not need to be taken at all if the event turns around in a favorable direction, and the severe consequences are avoided.

- Generally, the further the operator gets into the procedure, the more degraded the conditions are; hence the actions become more drastic. These procedures are to be written such that if the operator finds that he is unable to accomplish the required action, he can continue on in the procedure and obtain proper results although the actions may be more severe than they would have been if he could have accomplished the required action.

- No step will be divided between two pages. Both the condition and the action are to be included on one page. It is also preferable to have sub steps, supporting cautions, notes, and lists also on the same page, and as a general rule, they will only be separated from a step when they are too long to fit on a single page. It is likely there will be pages containing only one step to accomplish this goal.

4.5 CAUTIONS AND NOTES

- Step specific cautions and notes should precede the steps to which they apply.

- Procedure specific cautions should precede the procedures to which they apply.

- General Precautions apply at all times during the operation of the plant, and are heavily stressed during operator training. They are to be included in a table maintained in the same binder as the LGA procedures for reference by the operators, if needed. In general, they will not be included in the specific LGA procedures.

- CAUTIONS and NOTES shall be emphasized. The heading shall be all caps and centered over the statement. The heading shall be underlined. The cautionary statement or note shall be conventionally typed using both upper and lower case letters to make it easier to read. The entire note or caution shall be fully enclosed by a box. See the example below:

CAUTION

Cooldown rates above 100°F/hr may be required to accomplish this step.

NOTE: The word processor printer is unable to print vertical lines, thus the writer will have to ensure vertical lines are drawn in by hand on the master copy of the procedures.

- CAUTIONS and NOTES should not contain action steps. They should be informational or warning devices only. In rare cases a CAUTION or NOTE may have to contain an action or inferred action. This shall only be doen after a very careful assessment of alternatives.

- o CAUTIONS and NOTES shall not be overused. If too many CAUTIONS or NOTES are used, the importance of the message may be diluted. Cautions may be minimized through training or by writing the information into the procedural step itself.

- o CAUTIONS and NOTES should appear in their entirity on a single page. Do not split CAUTIONS and NOTES between pages.

- c The step to which a step specific caution applies should appear on the same page as the caution.

4.6 GRAPHS, TABLES AND ATTACHMENTS

- o Graphs, Tables and Attachments should be easy to read and easy to use by the operators.

- o Units should be the same as those in the Control Room.

- o Graphs, Tables, and Attachments shall be labeled clearly. Graphs shall have a noun name and sequential number. An abbreviation for the noun name may also be included (ex., LGA-G10, Boron Injection Temperature, BIT).

- o The use of graphs shall be minimized. When a single value can be used, it is better than using a graph.

- o Graphs will normally appear on the left hand page facing the page where that graph is referenced. An exception may occur if an Overriding Instruction carried forward from preceding pages applies to the same page that references a graph. When an Overriding Instruction appears on the face adjacent page, the graph may be included on a foldout page to the left.

- o Where possible, use a full page for the graphs.

- o The maximum number of divisions per inch for the axes of graphs should be 10.

- o An abbreviation or acronym for a graph or table may be used in a step instead of the full noun name and sequential number if the following rules are followed:

  1. The first time the graph is referenced on each page where used, the full noun name and sequential number will be used followed by the abbreviation in parenthesis. All subsequent references to the graph on that page may simply use the abbreviation only.

2. The graph will be labelled with the abbreviation along with the noun name and sequential number.

The purpose of this is to streamline steps such that it takes less time for the operator to read and comprehend without also creating confusion. For any given page of LGA instruction there should be a minimum of curves that apply and since they will be located on the facing page, there should be no confusion. Also with exposure to these curves and their abbreviations, the operators will come to recognize them at a glance.

- o As an aid to the operators, laminated full page graphs will be maintained with the LGA procedures to aid the operator during execution. This applies only to the control room LGA copies. Upon actual execution of the LGA, the operator can spread these graphs on a table, and keep track of trends and overall big picture.

- o Specific direction is much preferable to the use of tables, and their use should be minimized. If tables are used, the following guidance should be followed:

  1. Tables should be fully enclosed in a box. The column heading should be at the top and row heading should be on the left of the box. Lines to divide rows and columns may be used if needed for separation.

  2. Tables that are specific to a single step should be incorporated into the step. In this case, no table title or number is required.

  3. Tables that are specific to a procedure will be contained after the last action step of the procedure, and will require a title as well as a table number. (Note: the Reference Section of the LGA will always be on the last page of the procedure - in this case after the tables).

- o All numbers on the graphs should be at least 4 mm high.

- o All axes of the graphs shall be clearly labeled and include the units of measure.

4.7 USE OF UNDERLINING

- o Underlining will be used for special emphasis.

- o The headings for "NOTE" and "CAUTION" shall be underlined.

- o Underlining shall be used to emphasize negatives.

- o Underlining shall be used to emphasize the logic terms, "If", "Then", "When", and "Before".

- Underlining may be used to emphasize connectors and limits such as <u>and</u>, <u>or</u>, <u>above</u>, <u>any</u>, etc., when it will increase effectiveness.

- Underlining may be used to emphasize other words in the procedure; however, the use of underlining should be limited so that the emphatic value is maintained.

4.8 REFERENCING AND BRANCHING TO OTHER PROCEDURES OR STEPS

When the term "referencing" is used in connection with another procedure, it implies that the referenced procedure will be used as a supplement to the procedure presently being used.

- Referencing other sections, pages, or steps within other procedures can result in error.

- Excessive forward and backward referencing within the same procedure can be confusing and can lead to skipping of steps, particularly since the referenced steps may not return the operator to the directing step. Also, important information preceding a referenced step can be missed.

- If operators are required to use many procedures at the same time, there is a possibility that the referenced information may not be obtained and used or the exit point from the original procedure might be forgotten. Important steps might be missed and operator delay might result.

When the term "branching" is used in connection with another procedure, it signifies that the procedure being used is to be exited and the new procedure is to be used in its entirety. Branching is an acceptable method of entering another procedure and eliminates most of the problems associated with referencing.

In determining whether to reference another part of the procedure for instructions or to repeat the instructions within the procedure, consider the following factors:

- If the referenced instructions can be repeated without greatly increasing the length of the procedure, repeat them.

- Tabbing referenced sections too long to repeat would assist the operator in locating the information quickly.

- If the procedure splits into two or more optional paths, references to other steps may be unavoidable.

- When multiple paths are taken from a single step, a matrix can be made that refers the operator to a procedure step tabbed with the same color as the matrix box.

Two types of procedure referencing are used in the LGA's.

- o One type of procedure referencing requires the operator to get out the referenced procedure, observe the precautions and limitations in the procedure, and to follow it step by step. When it is required that the operator follow the procedure this closely, he will be directed to take the action "in accordance with" or "per" the referenced procedure. An example of this kind of reference would be -

  If Drywell Pressure exceeds 45 psig,

  AND

  Containment Radiation levels indicate 10CFR100 limits will not be exceeded

  Then VENT the Drywell through valve 1(2)VQ035, Drywell Vent/Purge Outlet Downstream Isolation to SBGTS in accordance with LOA-VP-03.

  In this case, if the conditional statements were satisfied, the operator would go to LOA-VP-03, follow the procedure through (even though he is still in the LGA) until he has vented the drywell in accordance with LOA-VP-03, then he would return to the LGA from which he came and find the correct steps to take next.

- o The other type of procedure referencing is just that - a reference. It is an aid to the operator giving him a reference for more detailed information on the task. This type of referencing is done by placing the referenced procedure in parentheses. For example -

  When the RHR Shutdown Cooling interlocks clear,

  Then INITIATE the Shutdown Cooling mode of RHR (LOP-RH-07)

- o Since the LGA procedures each contain a reference section where the procedures are listed by number and title, only the procedure number need be used elsewhere in the procedure. The use of the procedure title adds little to the understanding, and usually complicates the steps by making them wordy which detracts from the desired impact of the action step. If out of curiosity or during training the operator wishes to know the title of a referenced procedure he need only to look in the reference section.

- o Other types of referencing must give explicit direction to the operator. The following examples are given to provide consistency:

  1. When it is desired to leave a step and not to return to that step, the words, "EXIT this step" should be used.

2. When branching to another step in the same procedure, the following format should be used:

EXIT this step,

AND

GO TO step C.11.

This causes step C.11. and all steps subsequent to step C.11. to be executed sequentially without return to the branching step.

3. When branching to another step in a different procedure, the following format should be used:

EXIT this step,

AND

GO TO LGA-ATWS-04, step C.6.

Alternatively, if the procedure is to be executed in its entirety, the step number may be omitted:

EXIT this step,

AND

GO TO LGA-ATWS-04.

4. When concurrent action is required, the verb to be used is "PERFORM" and the word "concurrent" should be used.

5. There is specific instances where one procedure directs another procedure to be exited and immediately re-entered at a different point. This is accomplished by the format:

"Jump in LGA-ATWS-04 to Step C.6."

4.9 COMPONENT IDENTIFICATION

- o Components identified in the LGA's shall be identified by common usage terms. The components shall be identified in the "language of the operator". When confusion may be a problem, use the nameplate terminology on the control room labels.

- o Physical location of components identified in the LGA is not necessary if a newly trained operator is expected to know the location through training or common usage, or if the name, number, or description also identifies the location. Otherwise, the specific location must be described for both units. In many cases, elevation and plant grid coordinates are sufficient. Instrument rack number, panel number, etc. are also specific enough if the operator is expected to know the location of that rack or panel.

- o In general, when referring to specific switch positions or annunciator windows or other labels to be identified, the procedure should specify the label in the exact wording, spelling, and use of capitalization as it appears on the label and enclose it in quotation marks.

- o Acronyms may be used in the LGA's when they are universally understood by the operators. A list of acronyms used in the LGA's shall be included in Table 1 of the LGA Writer's Guide. The Training Department shall be provided a copy of the Table 1 whenever the list is revised.

4.10 <u>UNITS OF MEASURE</u>

- o Quantitative values should be stated within the range and accuracy of the instruments. An exception to this rule can be made when the common usage term does not fall within the accuracy of the instrumentation. An example of an exception would be the Tech Spec value for high drywell pressure, 1.69 psig. 1.69 psig is the setpoint the operators are trained on and is the common usage term for the high drywell pressure scram and isolation setpoint.

4.11 <u>CONCURRENT ACTIONS/OVERRIDING INSTRUCTIONS</u>

- o There may be events which will require the operators to be in more than one LGA at the same time. Care must be taken to write the procedures such that the concurrent operator actions will not conflict.

- o When it is very important that the operator execute a previous step upon meeting a specified condition, this step is made an "Overriding Instruction". Overriding instructions will be set off from other steps by enclosing them in double boxes. The portion of the procedure over which that step is valid will also be stated as shown by the following example:

While executing the following steps:

<u>If</u> It is determined that the reactor <u>cannot</u> be shutdown <u>before</u> Suppression Pool temperature reaches the Boron Injection Temperature, LGA-G10,

___ <u>Then</u> PERFORM step C.11. <u>concurrently</u> with the following steps.

Overriding instructions will appear on the right-hand page with the procedural steps the first time it becomes a valid and desired action. On subsequent pages, it will appear on the left-hand page only if it applies during execution of the right-hand page. When it no longer applies, it will cease to be carried on the left hand page.

The use of overriding instructions can severly tax the memory of the operator and during a stressful event he is not likely to remember that instruction as he continues in the procedure. Therefore, it is imperative that the writer reduce the number of overriding instructions as much as possible. The goal is to place no reliance on the operators memory to obtain the desired actions. Placing overriding instructions on the left hand page will keep them before the operator as long as they are still valid. Placing them on the right hand page where they first appear in the procedure should ensure that he considers them in detail at least once. Thus he won't have to thumb back through the procedure to see which (if any) overriding instructions apply.

4.12 CONNECTORS (AND, OR) LISTS

- When a step contains more than three objects of an action, list them rather than imbedding them in a sentence.

- When three or more conditions are associated with an action, list them separately ahead of the action statement.

- When more than four items are contained in a list, the writer may single space between items of the list. Otherwise, place a blank line between the items of a list.

- When it is very important to connect two statements it may be best to separate the two statements vertically with AND emphasized by capitals and underlining. For Example --

  If the Suppression Pool water level can not be maintained below 26' 10" (+3"),

  AND

  adequate core cooling is assured,

  Then TERMINATE injection into the reactor,

- When "ands" and "ors" are mixed, care must be taken to ensure that the proper combinations are understood. Use of "ands" and "ors" is easiest to demonstrate by example. Assume there are three items A, B, and C. If we either wanted "A" or else both "B" and "C" it should be written:

  "A"
  OR
  "B" AND "C"

If we wanted "A" and also wanted either "B" or "C" it should be written:

"A"
AND
"B" OR "C"

- o Conditional connectors such as "BUT" or "UNTIL" may be used in the same format as given for "AND" and "OR" above if it adds to the clarity or to provide desired impact.

4.13 CHECKOFF BLANKS

- o Checkoff blanks shall be provided in the left hand margin where a check might help keep track of where the operator has been in the procedure. These checkoff blanks are not mandatory for the operator to complete, but are there for convenience if he thinks they will keep him on track.

  As a general rule of thumb, checkoff blanks will be provided in front of each verb to allow the operator to check them off as the action is performed. This does not preclude the use elsewhere in the procedure where they could be useful to the operator.

4.14 CAPITALIZATION

- o Conventional rules for capitalization shall be used except when special emphasis is warranted.
- o Action verbs shall be capitalized.
- o Acronyms shall be capitalized.
- o Words with a special meaning may be capitalized. An example would be NORMAL INJECTION SYSTEM.
- o Headings for CAUTIONs and NOTEs shall be capitalized but the body shall use conventional upper and lower case letters.
- o Connectors that are used to vertically separate items shall be capitalized.
- o The first letter of major systems or major component names will be capitalized (ex. Suppression Chamber).

4.15 UNIT DESIGNATION

Because of the identical nature of the two units at LaSalle, the procedures shall be written to provide guidance for both units.

- o When equipment is identified by EPN and the components for both units have identical EPN except for the unit number, the EPN will be given in the following format:

  1(2)G33-F001

- o Whenever an operational difference between Units 1 and 2 affects the emergency procedure, that difference shall be clearly addressed in the LGA. That difference shall be brought to the attention of the Training Supervisor for inclusion in the LGA training.

4.16 USE OF VERBS

- o Verbs shall be used consistently throughout the LGA's.
- o REFER to TABLE 2, definitions, for definitions of commonly used verbs.
- o If a word is used in the LGA procedure that takes on a special meaning, it should be included in TABLE 2.

4.17 FLOWCHARTS

- o Accurate, detailed flow charts of each LGA procedure will be generated. These flow charts are mainly for training purposes, but they are to be accurate enough to provide operators executing the LGA written procedure an overall view or big picture of where he has been and where he is going.
- o The flow charts will be maintained in the LGA binder with the procedures.
- o In all control room copies of the LGAs, at least two sets of flow charts will be included and easily removeable from the binder of which at least one set will be laminated.

TABLE 1

LGA Acronym List

ADS - Automatic Depressurization System

CRD - Control Rod Drive

CY - Cycled Condensate

ECCS - Emergency Core Cooling System

FW - Feedwater

GSEP - Generating Stations Emergency Plan

HPCS - High Pressure Core Spray

LGA - LaSalle General Abnormal

LGP - LaSalle General Procedure

LOA - LaSalle Operating Abnormal

LPCI - Low Pressure Coolant Injection

LPCS - Low Pressure Core Spray

MSIV - Main Steam Isolation Valve

RCIC - Reactor Core Isolation Cooling

RHR - Residual Heat Removal

RPV - Reactor Pressure Vessel

RWCU - Reactor Water Cleanup

SBGT - Standby Gas Treatment

SBLC - Standby Liquid Control

SRV - Safety Relief Valve

T.A.F. - Top of Active Fuel

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TABLE 2

Definitions

Approach - to continue on a trend such that a limit will be exceeded if more action is not taken to dampen the trend.

Avoid - to take action to prevent something from occurring.

Assure - to make certain.

Before - to wait, but the actions must be completed prior to reaching the stated condition. Do not advance to the next sequential step until the action is completed.

Check - to confirm that the desired condition or indication does exist.

Change - to shift from one condition to another.

Close - to change the physical position of a mechanical device to the CLOSE position so that it prevents fluid flow or permits passage of electrical current.

Concurrently - to do prescribed action(s) concurrently. Operator has option of determining which action requires most attention

Continue - to maintain without interruption.

Control - to regulate conditions such that a given parameter is maintained.

Cooldown - to reduce temperature by removing heat.

Decrease - DO NOT use the word "decrease". It may become confused with "increase". "Reduce" or "lower" is preferable.

Defeat - Prevent a function from occurring.

Determine - to obtain definite first hand knowledge.

Depress - to push in an inward direction.

Depressurize - to reduce pressure.

Direct - to guide such that a specific path is obtained.

Divert - to change from one path to another.

Enter - Go to the referenced procedure. Follow the applicable steps of the reference procedure.

Evacuate - to remove persons from a given area.

Exceed - to surpass a given limit.

Exit - Leave this procedure. Go to referenced procedure.

Go to - to proceed as directed. Usually used in conjunction with "exit".

Increase - DO NOT use. It may be confused with "decrease". "Raise" is preferable.

Individually - one at a time.

Initiate - to start actions to achieve a given end by whatever means available.

Isolate - to position a mechanical device to a position that will stop flow from one place to another by whatever means available.

Lower - to reduce the value of a parameter or to decrease the physical height of an object. Usually used instead of "decrease".

Maintain - to keep in existing state or specified state.

Jump - used to cause path of execution in a different procedure to discontinue execution and resume execution at another step within that same procedure.

Monitor - to repeatedly check item of interest. The item should be checked often enough to notice significant changes.

Notify - to ensure that another person receives given information.

Occur - to take place.

Open - to change the physical position of a mechanical device to an unobstructive position that permits access or flow, or prevents passage of electrical current.

Operate - to perform a manipulation or a series of manipulations such that a desired end is achieved.

Perform - to carry out a prescribed action or step.

Place - to put in a prescribed position or mode.

Prevent - to take action to ensure that a given condition will not occur.

Proceed - to go on to a desired state.

Raise - to increase a parameter.

Rapidly - as quickly as possible.

Reach - to achieve a given level or magnitude.

Reduce - to make smaller or decrease.

Refer - to look to another source for guidance to accomplish a particular task.

Reset - to place in normal or standby condition.

Restart - to reenergize a piece of equipment or again place into operation.

Restore - to put back into original state.

Return - to go back to a given point; this implies exiting the current procedure step if applied to a procedure.

Reverse - to change direction.

Scram - to rapidly insert all control rods simultaneously.

Shutdown - to Stop, to deenergize a piece of equipment.

Stabilize - to hold steady.

Start - to energize a piece of equipment or place into operation.

Sustained - to perform continuously without interruption.

Terminate - to stop a function by whatever means is appropriate. This may include placing in standby or altering its function.

Transfer - to switch from one place to another.

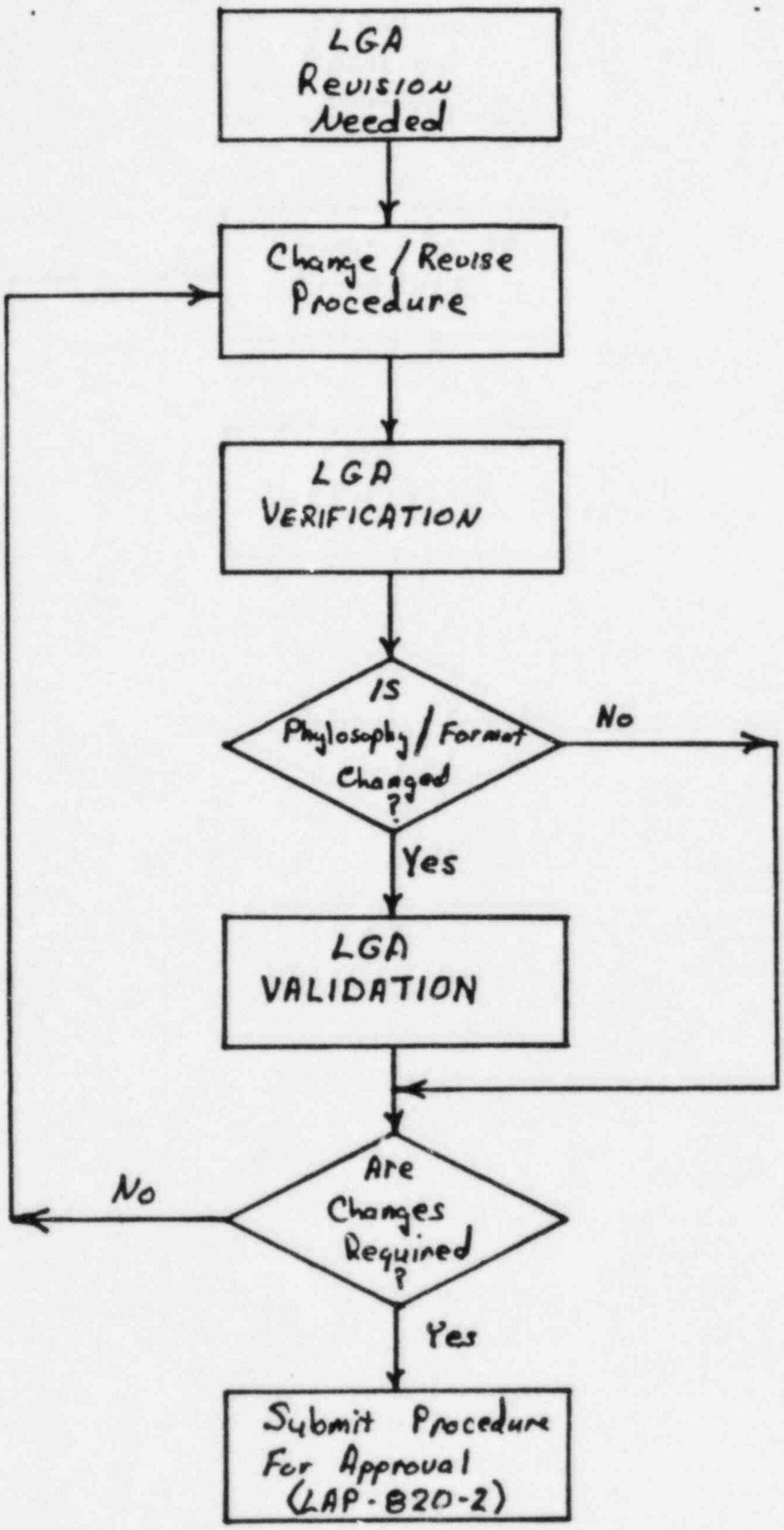
Trip - to activate a semi-automatic or automatic feature which will take a component out of its operating status.

Vent - to permit a gas or a liquid confined under pressure to escape the confining volume.

Verify - to check to ensure that the status of equipment/parameters is as indicated. If not, make it so.

When - to wait until the prescribed condition occurs before performing the action. This causes procedure execution to stop until the condition is met.

LGA REVISION PROGRAM



LGA VALIDATION PROGRAM

A. PURPOSE

The purpose of the validation program is to assure that new/revised LGA's function as required and are easy to use/understand.

B. REFERENCES

Draft Safety Evaluation Report Procedures Generation Package; LaSalle County, Units 1 and 2. April 1, 1985.

C. PREREQUISITES

Personnel involved in the validation program will be qualified in their respective positions in which they would respond in the case of LGA event. (Licensed or certified when the position requires a license.)

D. PRECAUTIONS

Slight differences between units requires that the validation take place on both units for events which cannot be simulated at the Simulator.

E. LIMITATIONS AND ACTIONS

Events which cannot be simulated at the simulator will be walked down on the respective units of the plant.

Scenarios for simulation will be selected such that minimal automatic actions will occur thereby encouraging the use of all sections of the procedures. Failures of components and/or operator errors will be used to drive the events.

Formal validations will be required only after major changes to the philosophy or format of the procedures. Annual licensed training will provide a regular informal validation of the procedures.

F. PROCEDURE

1. Simulator Validation

   a. A normal complement of control room personnel will assume the duties of evaluations at the simulator:

      1) Shift Engineer
      2) Shift Control Room Engineer
      3) Unit NSO
      4) Extra NSO (typically Center Desk)

   b. Selected scenarios will be introduced into the simulator to cause various entry conditions to be met. The procedures will be followed verbatum to the completion of the event. (Scenarios will be identified in the Training Program.)

c. After/during the validation comments/discrepancies will be noted in Attachment A, Simulator Validation and will be signed by all participants.

d. Resolutions will be made to those comments and may be incorporated into procedure revisions and noted on Attachment A.

2. Local (Unit) Validation

a. A normal complement of a shift crew will be selected to walkdown the procedures to assure the following at a minimum:

1) Proper equipment labeling/locations
2) Consistent parameter units between the procedure and instruments
3) Accessability/mobility of necessary equipment in a timely fashion

b. During/after validation, comments/discrepancies will be noted on Attachment B, Walkthrough Validation and participants will sign the Attachment (required whether or not discrepancies are noted).

c. Comments/discrepancies will be resolved and noted on Attachment B.

3. Validation attachments will be maintained with the applicable procedure approval.

ATTACHMENT A

SIMULATOR VALIDATION

Procedure Number ____________ Title ____________________
Revision ____________
Date of Validation ____________ Page ____ of ____

Comments/Deficiencies	Identified By/ Date	Resolutions Changes Made or Reason for not Changing	Resolved By/ Date

	Signature	Date
Shift Engineer:		/
Shift Control Room Engineer:		/
Unit NSO:		/
Extra NSO:		/

DOCUMENT 1407r

ATTACHMENT B

WALKTHROUGH VALIDATION UNIT ____

Procedure Number ____________________

Revision ____________________

Date of Validation ____________________

Title ____

Page _____ of _____

Comments/Deficiencies	Identified By/ Date	Resolutions Changes Made or Reason for not Changing	Resolved By/ Date

	Signature	Date
Shift Engineer:		
Shift Control Room Engineer:		
Unit NSO:		
Extra NSO:		
Equipment Operator:		
Equipment Attendant:		

DOCUMENT 1407r

LGA VERIFICATION PROGRAM

A. PURPOSE

The purpose of the Verification Program is to assure that new/revised LGA's meet the guidelines established by the BWR Owners' Group and that the source documents are provided with the most recent data.

B. REFERENCES

1. LSCS EOP Technical Guidelines
   a. Calculation Input Data
   b. Limiting Data Calculations
   c. Basis for Symptom Oriented Emergency Procedures
2. LSCS EOP Writers Guidelines
3. EOP Verification Guidelines; INPO-83-004

C. PREREQUISITES

1. Personnel conducting the Verification Program will be familiar with the concepts of the LGA's (licensed or otherwise trained on the use of the LGA's) and/or technically qualified to review the engineering calculations/concepts.

D. PRECAUTIONS

1. Changes to equipment, operating limits, experience data, etc. can effect calculations and/or validity of the procedures.

E. LIMITATIONS AND ACTIONS

1. The LGA's will be reviewed every 2 years if not revised within the last 2 years and each time source documents are revised to assure that any changes in the source documents, Plant Systems, etc. are reflected in the calculations and procedures.

2. Changes to the LGA's which deviate from the approved source documents must be justified with the justifications approved by the Director of Licensing and the Nuclear Regulatory Commission.

F. PROCEDURE

1. Review Calculation Input Data to assure that data is still accurate. Changes to the inputs will affect the calculations thereby requiring calculation revisions.

   a. Calculations will be conducted in accordance with instructions provided in the calculations portion of the Technical Guidelines. Attachment "A" will be completed by the two engineers designated to do the calculations.

   b. Attachment A will be filed with the Calculation Package.

c. New results will be incorporated into a revision of the LGA as soon as possible after the verification in accordance with LAP-820-2. (See Calculation Summary to determine procedures affected.)

2. Review the procedure for general written correctness, format, branching and general understandability as outlined in the LaSalle Writers Guidelines (LWG's).

3. Conduct a step-by-step review of the procedure to assure it meets the requirements of the LaSalle Writers and Technical Guidelines.

   a. Entry Conditions and symptoms.

   b. Proper component/instrument identification.

   c. Quantitative units with tolerances which are obtainable on Control Room and plant instruments.

   d. Equipment required is available for use (Modifications have not eliminated).

   e. Calculations to be done by operators have proper equations provided.

   f. Deficiency sheets documenting deviations from guidelines are provided and are adequately resolved.

4. Sign and Date the Verification Completion Form Attachment B and forward the procedure and verification package to the Procedure Manager for tracking.

5. The Procedure Manager records the procedure status and forwards to the Department Head.

6. The Department Head reviews the package to assure resolutions to discrepancies and required actions from the verification process have been completed. He signs and dates the Verification Form and the On Site Review portion of LAP-820-2 and forwards to the next person on On Site Review.

7. When the Station Superintendent signs for Final Approval, he also signs the LGA Verification Approval.

8. Attachments from this procedure will be filed with the respective procedure approvals.

ATTACHMENT A

CALCULATION NUMBER: ______________________________

TITLE: ______________________________

Reference Documents:

Calculation Completed By ______________________ / ____________
Signature Date

Calculation Reviewed By ______________________ / ____________
Signature Date

This form, along with the actual calculation will be maintained with the Technical Guidelines Calculations Package.

DOCUMENT ID 0554r/0008r

LGA VERIFICATION

LGA NUMBER____________

REVISION____________

TITLE ________________________

Scope of Verification:

Reference Documents

Assigned Evaluator(s)

LVR STEP	DESCRIPTION	ACCEPTABLE (v)	DISCREPANCY SHEET #
2	Reference Document Review	________	________
3	Written Correctness		
	Legibility	________	________
	Format	________	________
	Identification	________	________

This document will be maintained with the Central File copy of the procedure package and the applicable procedure.

LGA VERIFICATION

LGA____________
PAGE of

Step by Step Review

Step Caution, or Note #	Written Correctness: Acceptable (v)	Written Correctness: Discrepancy Number	Written Correctness: Resolved Date/Initial	Technical Correctness: Acceptable (v)	Technical Correctness: Discrepancy Number	Technical Correctness: Resolved Date/Initial

DOCUMENT ID 0554r/0008r

LGA VERIFICATION

Required Actions: ____

____

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Conducted BY ______________________________ / ______________

______________________________ / ______________

______________________________ / ______________

NAMES DATE

Deficiences and Required Actions are adequately resolved and procedures are acceptable for use

______________________________ / ______________

DEPARTMENT HEAD DATE

______________________________ / ______________

SUPERINTENDENT DATE

DOCUMENT ID 0554r/0008r

TRAINING DESCRIPTION FOR LASALLE GENERAL ABNORMAL (LGA) SYMPTOM-BASED EMERGENCY PROCEDURES

COMMONWEALTH EDISON COMPANY

LASALLE COUNTY STATION

JUNE 15, 1985

Training Description for LaSalle General Abnormal (LGA) Symptom-based Emergency Procedures -

FORWARD - The following text describes the training process LaSalle Station plans to use for implementing a revision to the LGA's. It is important to realize that symptom-based emergency procedures are not new to the LaSalle licensed operator; LaSalle was the first plant to implement emergency procedures based upon the symptom-oriented Emergency Procedure Guidelines published by the BWR Owners Group. During 1981, LaSalle licensed personnel and license candidates were given one week of concentrated training on the new, symptom-oriented emergency procedures (LGA's). LaSalle Unit 1 has been safely operated using the upgraded LGA's since the operating license was received in April of 1982. Unit 2 has been safely operated throughout the startup test program using the LGA's. LGA training was included in the License Requalification Program in both 1983 and 1984. The LaSalle licensed operator has already been trained on, and is using the symptom-oriented procedures mandated by NUREG 0737. The guidelines on which the LGA's were based have been revised to incorporate reactivity control, secondary containment control, and radioactive release control. Consequently, the LGA procedures are being revised to reflect these changes. Since the reactivity control changes increase the complexity of the procedures, a significant training effort is planned. The following text describes the training program which LaSalle plans to use to train licensed operators on the revised procedure. It should be noted that this training description is as we plan it in September 1984. There may be content or structure changes to the program if these changes will further our goal towards safe and practical operations of the LaSalle County Units 1 and 2.

INTRODUCTION

The revised LGA training will consist of a Classroom Training session and a Practical Training session. The two sessions together should provide the trainee with the information necessary to obtain the objectives. The training will be provided for RO and SRO licenseholders at LaSalle. The operating crew members shall receive the training before performing licensed shift duties under the revised procedures.

LGA LEARNER OBJECTIVES

State from memory the entry conditions for LGA-01 (Level/Pressure Control), LGA-03 (Containment Control), and Conditions which require exit from non-ATWS LGA's to ATWS LGA's.

Locate Control Room instrumentation that monitor parameters which are LGA entry conditions.

Determine when the LGA's may be exited to normal operating procedures.

Given the graph, discuss the basic reasons for taking actions when any of the parameters reach limits defined by graphs in the LGA's.

Given the appropriate graph and appropriate plant parameters, determine whether limits defined by graphs in the LGA's are being approached or exceeded.

Define any acronyms used in the LGA's.

Discuss any instrumentation/procedure differences between U-1 and U-2 that impact upon the LGA's.

Discuss the alternate methods for shutting down the reactor.

Using the LGA's and referenced support procedures, simulate the operator's actions required to shutdown the reactor given a failure to scram.

Using the LGA's, simulate the operator's actions required to maintain adequate core coolng given a postulated transient with coincident equipment failure.

Discuss each General Precaution outlined in LGA-T1.

Discuss selected Cautions using the LGA procedures.

Using the LGA's, simulate the operator's actions required to maintain primary or secondary contanment parameters within limits.

LGA TRAINING SESSION

The LGA Training Session will consist of a four day course combining the classroom and practical training function. Half of the day will be spent in the classroom session and the other half in the simulator.

CLASSROOM TRAINING SESSION

Each licensed operator shall receive classroom training on the LGA's. This classroom training will be considered complete when the licensed operator scores 80% or above, on the written LGA examination. Additional training will be required if the trainee scores below 80% on the written examination. The test questions should reflect the intent of the LGA learner objectives.

The classroom training session should take approximately three days. A typical day would be comprised of four hours of lecture, two hours of discussion and two hours of self study. Two hours will be allotted on the final day of training for the LGA examination.

The student materials for the course shall include:

- LGA Student Handout
- LGA procedure available for reference
- LGA Flowchart available for a graphic representation of procedural flowpath.

The LGA student handout will contain two major sections - an introductory section and a procedural step explanation section.

INTRODUCTION - Will include an overview of the revised procedural structure and a review of how to follow the LGA's. This introduction will encompass the following topics:

- General Procedure Layout
- Logic Terms
- Use of General Precautions
- Use of Step Specific Cautions
- Use of Procedure Specific Cautions
- Action Verbs
- Special Definitions
- Entry and Exit of the LGA's
- Use of Accompanying Support Procedures

PROCEDURAL STEP EXPLANATION - will cover each procedure and explain why operator actions are taken. This will be accomplished by dissecting the procedures into major subsections and explaining each evolution.

PRACTICAL TRAINING

Each licensed operator shall receive practical training on using the LGA's. The practical training will include a simulation of postulated transients which will require entry into each LGA. This training will normally be conducted on the LaSalle Simulator. Four 4-hour shifts will be scheduled for LGA simulator training for each license holder. Each licenseholder will be evaluated on his performance on the simulator. The evaluation shall include safe use of the procedures as well as an evaluation of communication skills during casualty situations. The scenarios will be run for a group of license holders functioning as a team to best develop communication and team work skills. Under special circumstances, an actual control room walkthrough may be substituted for the simulator training to fulfill the practical training requirement. This special substitution must be approved by the Training Supervisor before it will be allowed.

FEEDBACK LOOP

Each trainee shall be provided with a feedback form as a means of collecting input from the license holders not only on the course but on the procedures themselves. This feedback will be considered for changes to the lesson plans and appropriate comments will be forwarded to the Operating Department procedure writers.

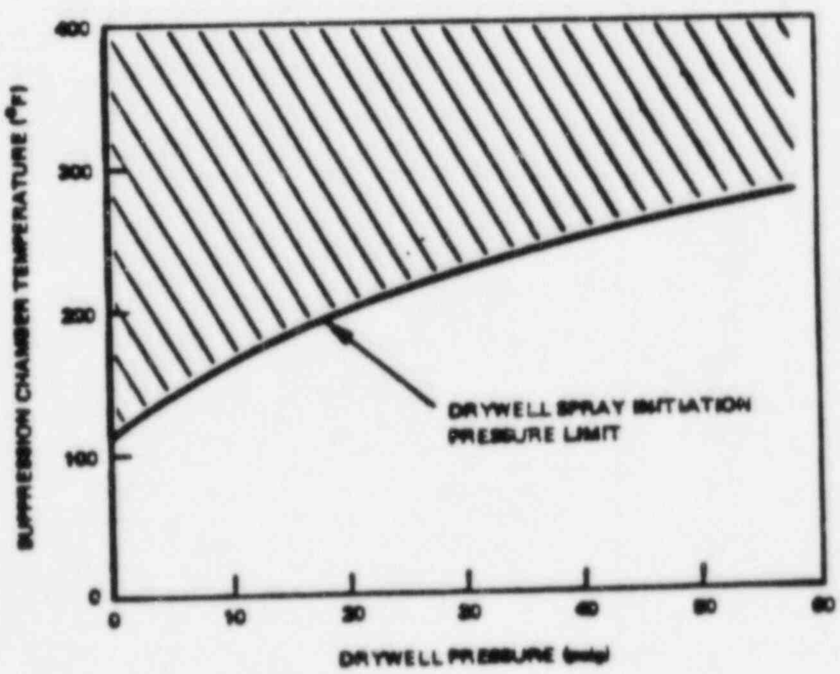
APPENDIX C

CALCULATIONAL PROCEDURE

9.0 DRYWELL SPRAY INITIATION PRESSURE LIMIT

9.1 APPLICABLE GUIDELINE STEPS

DW/T-3 *Before drywell temperature reaches [340°F (maximum temperature at which ADS qualified or drywell design temperature, whichever is lower)] but only if (suppression chamber temperature and drywell pressure are below the Drywell Spray Initiation Pressure Limit], [shut down recirculation pumps and drywell cooling fans and] initiate drywell sprays [restricting flow rate to less than 720 gpm (Maximum Drywell Spray Flow Rate Limit)].*



Revision 3A
3/1/84

PC/P-3 *If suppression chamber pressure exceeds [17.4 psig (Suppression Chamber Spray Initiation Pressure)] but only if [suppression chamber temperature and drywell pressure are below the Drywell Spray Initiation Pressure Limit], [shut down recirculation pumps and drywell cooling fans and] initiate drywell sprays (restricting flow rate to less than 720 gpm Maximum Drywell Spray Flow Rate Limit)].*

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

- *If [suppression chamber temperature and drywell pressure are below the Drywell Spray Initiation Pressure Limit], (shut down recirculation pumps and drywell cooling fans and] initiate drywell sprays [restricting flow rate to less than 720 gpm (Maximum Drywell Spray Flow Rate Limit)].*

SP/L-3.2 1. *When suppression pool water level reaches [17 ft. 2 in. (elevation of bottom of Mark I internal suppression chamber to drywell vacuum breakers less vacuum breaker opening pressure in feet of water)] but only if [suppression chamber temperature and drywell pressure are below the Drywell Spray Initiation Pressure Limit], [shut-down recirculation pumps and drywell cooling fans and] initiate drywell sprays [restricting flow rate to less than 720 gpm (Maximm Drywell Spray Flow Rate Limit)].*

9.? INPUT DATA AND PHYSICAL CONSTANTS

Note

Some input parameters must be obtained from the calculated procedure of Section 8.0 in Appendix C. It is therefore necessary to complete that section prior to calculating the Drywell Spray Initiation Pressure Limit.

T_{DS}	Lowest expected drywell spray temperature	T_{DS} = [illegible] °F
P_{CND}	Containment negative design pressure (values greater than design may be used if justified by design margin)	P_{CND} = 5 psid
T_{RB}	Temperature of the reactor building during normal operation	T_{RB} = 80 °F
V_{DW}	Total free volume in drywell and vents	V_{DW} = 22953[illegible] ft^3
V_{WW}	Total airspace volume in wetwell at normal operating suppression pool level	V_{WW} = 165[illegible] ft^3
DWSL	Reduced drywell spray flow rate from Appendix C, Section 8.0 if rate spray appropriate, no entry is required)	DWSL = [illegible] gpm

Symbol	Description	Value
$\dot{m}_{DW,SP}$	The mass flow rate of the drywell sprays at rated conditions	$\dot{m}_{DW,SP}$ = 6704 gpm
$\dot{m}_{WW,SP}$	The mass flow rate of the wetwell sprays at rated conditions	$\dot{m}_{WW,SP}$ = 450 gpm
ΔP_{VBO}	The differential pressure for the wetwell-to-reactor building vacuum breakers at which the vacuum breaker is fully open	ΔP_{VBO} = NA psid ← NO [illegible] VB @ LSCS
AVB_{C-R}	LCO area of the containment-to-reactor building vacuum breakers	AVB_{C-R} = Ø ft^2
KVB_{C-R}	Loss coefficient of each containment-to-reactor building vacuum breaker	KVB_{C-R} = NA
R_a	Gas constant for containment atmosphere, excluding water vapor	R_a = 5488 $\frac{lbf\text{-}ft}{lbm\text{-}^{\circ}F}$
$h_f(T_{DS})$	Specific enthalpy of saturated liquid at T_{DS}	$h_f(T_{DS})$ = 8.027 Btu/lbm
$v_f(T_{DS})$	Specific volume of saturated liquid at T_{DS}	$v_f(T_{DS})$ = .016019 $\frac{ft^3}{lbm}$
$P_{sat}(T_{DS})$	Saturation pressure of steam at T_{DS}	$P_{sat}(T_{DS})$ = .12163 psia

$u_a(T_{DS})$	Specific internal energy of air at T_{DS}*	$u_a(T_{DS})$ = [illegible] Btu/lbm
$u_a(T_{RB})$	Specific internal energy of air at T_{RB}*	$u_a(T_{RB})$ = 92.04 Btu/lbm

*Reference internal energy to 0.0 Btu/lbm at a temperature of 0.0°R.

Note that $u_a = h_a - Pv$ or $u_a = h_a - R_a T \left(\frac{1 \text{ Btu}}{777.66 \text{ ft-lbf}}\right)$

where h_a is the specific enthalpy of air.

For example, at 80°F = 540°R, h_a = 129.06 Btu/lbm

Therefore $u_a = 129.06 \text{ Btu/lbm} - 53.34 \frac{\text{lbf-ft}}{\text{lbm}^\circ\text{R}} * 540^\circ\text{R} \times \frac{1 \text{ Btu}}{777.66 \text{ ft lbf}}$

$= 92.02$

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3/1/84

9.3 TECHNICAL DESCRIPTION AND DERIVATION OF THE CALCULATIONAL PROCEDURE

9.3.1 Introduction

Appendix C, Sections 8.0 and 9.0 contain the calculational procedures which restrict the operation of Drywell sprays in Mark I/II containments. The procedures are:

8.0 Maximum Drywell Spray Flow Rate Limit

9.0 Drywell Spray Initiation Pressure Limit for

A. Rated drywell spray flow
B. Maximum drywell spray flow rate limit.

The plant unique implementation of the drywell spray restrictions will include either

- Spray at rated flow and a single limit curve which results from calculation 9.4A, or

- Spray at a restricted flow as calculated in Section 8.4 step 9 and a single limit curve which results from calculation 9.4B.

9.3.2 Containment-to-Reactor Building ΔP Limit for

A. Rated Drywell Spray Flow
B. Maximum Drywell Spray Flow Rate Limit

Under certain conditions the drywell and wetwell sprays could lower the total containment pressure such that the containment-to-RB negative design pressure differential limit is exceeded. The containment-to-RB vacuum breakers mitigate this effect and are factored into this

calculational procedure. This procedure calculates the initial conditions, such that after the sprays cool the entire containment to the spray temperature the containment negative design pressure is not exceeded.

The calculational procdure assumes the following

(1) Initially the wetwell is saturated and the drywell is full of steam.

(2) There are no containment-to-RB vacuum breaker failures.

(3) When the containment-to-RB vacuum breakers open, the drywell is full of saturated air.

The final condition is defined by

$$P_f = 14.7 - P_{CND} \tag{15}$$

and the air partial pressure is

$$P_{a,f} = P_f - P_{sat}(T_{DS}) \tag{16}$$

or

$$P_{a,f} = 14.7 - P_{CND} - P_{sat}(T_{DS}) \tag{17}$$

From the ideal gas law, the air mass is

$$M_{a,f} = \frac{P_{a,f}(V_{DW} + V_{WW})}{R_a(T_{DS} + 460)} \tag{18}$$

The final air mass, $M_{a,f}$, that is distributed between the drywell and wetwell at the final condition, was originally in the wetwell or was added to the containment thru the wetwell-to-RB vacuum breakers. If the total flow thru the vacuum breakers is $\dot{m}_{VB}t$, then the initial air pressure is

$$P_{a,i} = \frac{(M_{a,f} - \dot{m}_{VB}t) R_a (T_i + 460)}{V_{WW}} \qquad (19)$$

And the initial total pressure is

$$P_i = P_{a,i} + P_{sat} (T_i) - 14.7 \qquad (20)$$

where P_i is in psig.

The term $\dot{m}_{VB}t$ is the vacuum breaker flow times the time to depressurize the containment from the wetwell-to-RB vacuum breaker full open pressure to the negative design pressure. Note that the time, t, is inversely proportional to the vacuum breaker flow times internal energy plus the spray flow times enthalpy. Therefore, the calculation is performed twice; for rated spray flow and reduced spray flow.

An approximation is used for $\dot{m}_{VB}t$ where $\dot{m}_{VB}$ is for containment pressure at its design value as defined in equation (21) and t is approximated by equation (22). The approximation was developed such that this hand calculational method matches the results from the more sophisticated computer calculation which was performed by General Electric in the development of this limit. It is not intended that $\dot{m}_{VB}t$ be an exact analytic derivation, but rather that it conceptually models the phenomena and gives reasonable results.

The vacuum breaker flow is

$$\dot{m}_{VB} = \frac{A}{\sqrt{K}} \sqrt{2 g_c \rho g P}$$

where

$$\rho = \frac{M}{v} = \frac{P_{atm}}{R_a (T_{RB} + 460)}$$

and $\Delta P = P_{CND}$

$$\therefore \dot{m}_{VB} = \frac{A}{\sqrt{K}} \sqrt{\frac{2 g_c P_{CND} P_{atm}}{R_a (T_{RB} + 460)}} \quad (21)$$

The time is approximated by

$$t = \frac{M_{a,f} (u_a(T_{VBO}) - u_a (T_{DS}))}{\dot{m}_{VB} u_a (T_{RB}) + \dot{m}_{D+W\ SP} h_f (T_{DS})} \quad (22)$$

where

$u_a(T)$ = the specific energy of the air at temperature T and u_a is referenced to 0.0 Btu/lbm at 0^oR. Note that if data is available for specific enthalpy, h_a, the relationship $u_a = h_a - Pv$ or $u_a = h_a - R_a T$ may be used to determine u_a,

$\dot{m}_{D+WSp}$ = The drywell and wetwell spray flow rate ($\dot{m}_{DW,SP}$ or DWSL plus $\dot{m}_{WW,SP}$), and

P_{atm} = atmospheric pressure = 14.7 psia.

9.4 CALCULATIONAL WORKSHEET

1. Determine the final air mass

$$P_{a,f} = 14.7 - P_{CND} - P_{sat}\,(T_{DS})$$

-5.1?? .12163

$P_{a,f}$ = 9.58 ~~psig~~ psia.

9.58 (165,100 + 229,538)

$$M_{a,f} = \frac{P_{a,f} * 144\,(V_{DW} + V_{WW})}{R_a\,(T_{DS} + 460)}$$

53.38 $\frac{lbf\ ft}{lbm\ °R}$ (500°R)

$M_{a,f}$ = 198?? lbm

2. Calculate the vacuum breaker flow

$$\dot{m}_{VB} = \frac{AVB_{C-R}}{\sqrt{KVB_{C-R}}}\sqrt{\frac{2*32.2*P_{CND}*144*14.7*144}{R_a\,(T_{RB} + 460)}}$$

$\dot{m}_{VB}$ = ∅ lbm/sec

NO VB installed between WW and RB At LSCS

3. Determine the total spray flow rate

A. Rated flow

(6700 gpm + 450 gpm) * .13368

$$\dot{m}_{D+W\ SP}\,(Rated) = \frac{(\dot{m}_{DW,SP} + \dot{m}_{WW,SP}) * 0.13368}{60 * v_f\,(T_{DS})}$$

60 * .016019 $\frac{ft^3}{lbm}$

$\dot{m}_{D+W\ SP}$ (Rated) = 994.4 lbm/sec

B. Reduced flow

$$\dot{m}_{D+W\ SP}\ (\text{Reduced}) = \frac{(DWSL + \dot{m}_{WW,SP}) * 0.13368}{60 * v_f\ (T_{DS})}$$

(Rated) struck out and replaced by a handwritten "Reduced"

$\boxed{\dot{m}_{D+W\ SP}\ (\text{Reduced})}$ = ____ lbm/sec

4. Determine the conditions when the wetwell-to-RB vacuum breakers are full open

$$P_{VBO} = 14.7 - \Delta P_{VBO}$$

$\boxed{P_{VBO}}$ = NA psia

From steam tables determine

$$T_{sat}(P_{VBO}) = T_{VBO}$$

$\boxed{T_{VBO}}$ = NA °F

From air tables determine

$$u_a(T_{VBO})$$

$\boxed{u_a(T_{VBO})}$ = NA Btu/lbm

5. Calculate the depressurization time

$$t = \frac{M_{a,f}\ (u_a(T_{VBO}) - u_a\ (T_{DS}))}{\dot{m}_{VB}\ u_a\ (T_{RB}) + \dot{m}_{D+W\ SP}\ h_f(T_{DS})}$$

A. For Rated flow | t (Rated) | = NA sec

B. For Reduced flow | t (Reduced) | = NA sec

6. Select values for the initial wetwell airspace temperature and enter in Tables C9-1 or C9-2. The values should range from normal operating pool temperature to wetwell design temperature and be sufficient to define a locus of points to be plotted on Figures C9-1 or C9-2 for rated or reduced spray flow respectively. (__)

7. Calculate the initial pressure, $P_{a,i}$, for T_i in Tables C9-1 or C9-2

$$P_{a,i} = \frac{(M_{a,f} - \dot{m}_{VB} t) R_a (T_i + 460)}{144 * V_{WW}}$$ (__)

$$P_{a,i} = \frac{(19840 \text{ lbm})(54.88 \frac{\text{lbf-ft}}{\text{lbm-°R}})(T_i \; ^\circ R)}{144 * 165,110 \text{ ft}^3}$$

$$= (.04530 \frac{\text{psia}}{°R}) T_i \; °R$$

where

t = t (Rated) for rated spray flow in Table C9-3, and
t = t (Reduced) for reduced spray flow in Table C9-4.

8. Determine the saturation temperature, $P_{sat}(T_i)$, for each initial temperature and enter in Tables C9-1 or C9-2. (✓)

9. Calculate the initial total pressure in the suppression chamber, P_i, from the following equation and enter in Tables C9-1 or C9-2. (✓)

$$P_i = P_{a,i} + P_{sat}(T_i) - 14.7$$

10. Plot T_i and P_i from Table C9-1 on Figure C9-1 or from Table C9-2 on Figure C9-2. This is the Drywell Spray Initiation Pressure Limit for rated or reduced drywell spray flow rates respectively. (__)

Table C9-1

(RATED FLOW)

(6) T_1 (°F)	(7) $P_{a,1}$ (psia)	(8) $P_{sat}(T_1)$ (psia)	(9) P_1 (psig)
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
135°F	[illegible]	[illegible]	[illegible]
150°F	[illegible]	[illegible]	[illegible]
200°F	[illegible]	[illegible]	[illegible]
250°F	[illegible]	[illegible]	[illegible]
300°F	[illegible]	[illegible]	[illegible]
340°F	[illegible]	[illegible]	[illegible]

Table C9-2

(REDUCED FLOW)

(6) T_1 (°F)	(7) $P_{a,1}$ (psia)	(8) $P_{sat}(T_1)$ (psia)	(9) P_1 (psig)

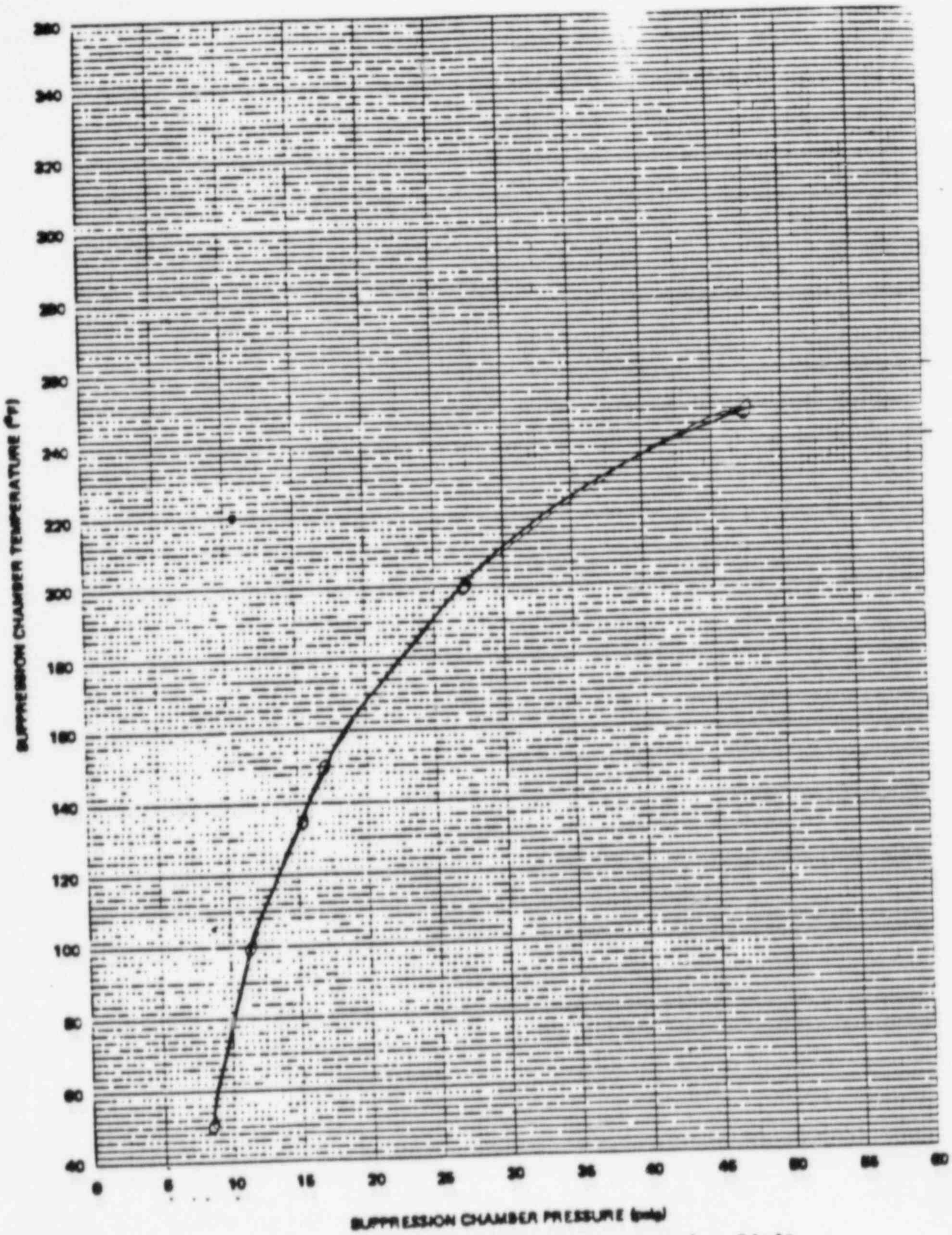


Figure C9-1. Drywell Spray Initiation Pressure Limit (C9.A Containment-to-RB ΔP Limit for Rated Spray)

Revision 3A
3/1/84

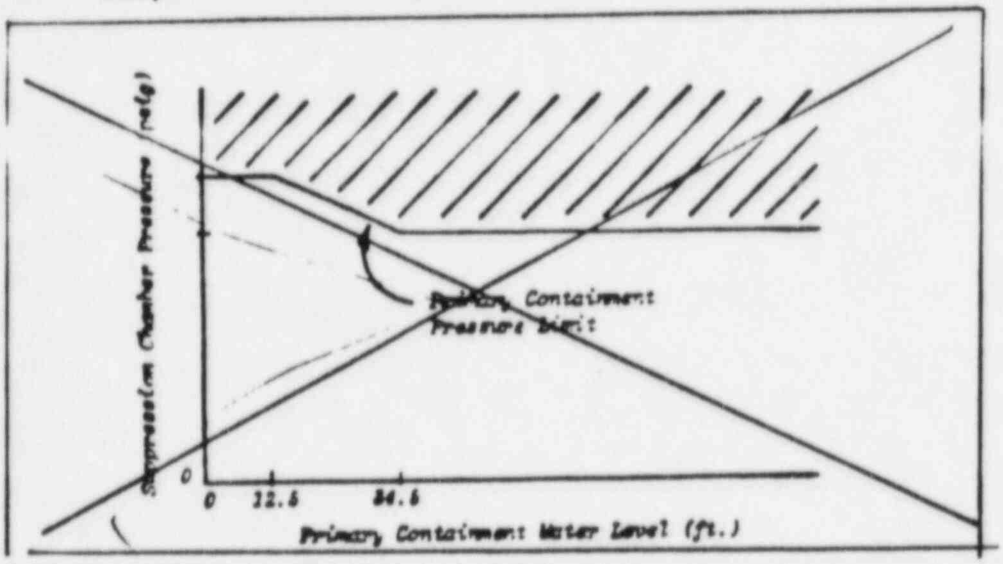
APPENDIX C

CALCULATIONAL PROCEDURES

14.0 PRIMARY CONTAINMENT PRESSURE LIMIT

14.1 APPLICABLE GUIDELINE STEPS

PC/P-6 *If suppression chamber pressure cannot be maintained below the Primary Containment Pressure Limit, then irrespective of whether adequate core cooling is assured ...*



PC/P-7 *If suppression chamber pressure exceeds the Primary Containment Pressure Limit, vent the primary containment in accordance with [procedure for containment venting] to reduce and maintain pressure below the Primary Containment Pressure Limit.*

14.3 Technical Description and Derivation of the Calculational Procedure

The Primary Containment Pressure Limit represents the sum of the most limiting values of 3 separate curves, each a function of primary containment water level. Refering to Figure C12-1, curve A defines the primary containment limiting pressure for the suppression chamber access hatches. Curve B defines the primary containment limiting pressure for the limiting vent path. Curve C defines the primary containment limiting pressure for the SRV actuating cylinders.

Calculation of the limit is based on the same considerations discussed in the Primary Containment Design Pressure calculational procedure, Appendix C, Section 13. If the maximum allowable pressure is substituted for design pressure, the curve A procedure is identical. The same is true when using the SRV operating pressure limit and the Vent Path Pressure limit.

The original calculations performed to determine the Primary Containment Pressure Limit were done using EPG calculational procedure Appendix C, Section 14. This calculational procedure assumes that the limiting component in the primary containment structure is below the normal suppression pool level. Subsequent to the PGP submittal, it has been discovered that this is not the case. It was also realized that the instrumentation (Suppression Chamber Pressure per the EPG) installed did not have adequate range to indicate above 60 psig.

No valve operability had been considered because that was not addressed or within the scope of EPG Rev. 3 to which LaSalle was committed. Since this point was mentioned by the NRC's SER of April 1, 1985, and since it does have a great effect on the PCPL, it is being addressed at this time.

By AE calculational analysis, it has been determined that as suppression pool water level is raised, the limiting structural component is the suppression pool hatches (el. 713 ft.) which can withstand a maximum pressure of 151 psig.

SRVs at LaSalle require 88 psid (design value) across the pneumatic cylinders to open and hold open the SRVs. The pneumatic supply to the ADS SRVs has a low pressure alarm setpoint of 151 psig. Thus, a conservative maximum drywell pressure (at the SRV pneumatic cylinder approximately 812 ft. el.) can be determined by subtracting the required pressure differential from the minimum normal pneumatic supply pressure. This leaves 63 psig. It can be noted that pneumatic supply pressure can be easily adjusted upward (in the reactor building) until its' reliefs lift (approximately 200 psig), and is normally set at about 170 psig.

The limiting vent path of sufficient size to pass decay heat (26 inch motor operated butterfly valve located at approximately 810 ft. el.) has a name plate ΔP of 68 psid.

It is evident from this graph that the limiting component will be the SRVs. A number of other vent paths for the primary containment exist, but they are of reduced capacity, lower in the containment or have lower operating pressure capability. The site specific venting procedure will prioritize the vent paths based upon their operability during the event and primary containment/suppression pool pressure and water level relative to the specific penetrations location. Preference will be given to suppression chamber venting first to reduce radioactivity release rates.

14.2 Input Parameters and Physical Constants

$E_{SP,LC}$	Elevation corresponding to the suppression chamber access hatches*	$E_{SP,LC}$ = 40.67 ft
$P_{SC,LC}$	Maximum pressure at which the suppression chamber access hatches are expected to fail	$P_{SC,LC}$ = 151 psig
E_{SCPI}	Elevation of the suppression chamber pressure instrument tap*	E_{SCPI} = 49.67 ft
DP_{SRV}	Design differential pressure required to open and hold open the SRV's	DP_{SRV} = [illegible] psid
$P_{DW,AIR}$	Drywell pneumatic air supply low pressure alarm setpoint	$P_{ADS,AIR}$ = 151 psig
DP_{VENT}	Design differential pressure required to open the valve in the limiting vent path	$P_{ADS,AIR}$ = 151 psig
DP_{VENT}	Design differential pressure required to open the valve in the limiting vent path	DP_{vent} = 68 psid
E_{SRV}	Elevation of SRV pneumatic cylinder*	E_{SRV} = 138.67 ft
E_{VENT}	Elevation of limiting vent path valve*	137.25 ft

*Elevation 0.0 is defined to be the bottom of the suppression pool

14.4 Calculational Worksheet

14.4.1 Curve A, Figure C11-1

1. Calculate P'limt,scpi the primary containment pressure limit at $E_{sp} = E_{scpi}$

$P'_{LIMIT,SCPS} = P_{SC,LC} - 0.433\ (E_{SCPI} - E_{SC,LC})$

$\boxed{P_{LIMIT,SCPI}}$ = (147.1 ft)

$P'_{LIMIT,SCPI} = 151 - 0.433\ (49.67 - 40.67)$
$= 151 - 0.433\ (9) = 147.1$

2. Complete curve A

Plot point 1 on figure C1-1 at coordinates ($E_{SP,LC}$, $P_{SC,LC}$) ✓

Plot point 2 on figure C1-1 at coordinate ($E_{SP,SPCI}$, [illegible]) ✓

Layout $\overline{12}$ ✓

Layout lines parallel to the x-axis to the left of point 1 and the right of point 2 on figure C14-1

14.4.2 Curve B

1. Calculate Pvent limit, the primary containment pressure limit for operability of the limiting vent line valve

$P_{VENT\ LIMIT} = P_{DW,AIR} - DP\ vent$

$\boxed{P_{VENT\ LIMIT}}$ = 83 psig

$P_{VENT\ LIMIT} = 151 - 68$
$= 83$ psig

2. Calculate P'vent limit, the primary containment pressure limit for operability of the limiting vent line value corresponding to Event.

$P'_{VENT\ LIMIT} = P_{VENT\ LIMIT} + 0.433\ (E_{VENT} - E_{SCPI})$

$\boxed{P'_{VENT\ LIMIT}}$ = 120.9[illegible] psig

$P'_{VENT\ LIMIT} = 83 + 0.433\ (137.25 - 49.67)$
$= 83 + 0.433\ (87.58)$
$= 120.92$ psig

3. Complete curve B

Plot point 1 on Figure C14-1 at coordinate (E_{SCPI}, $P_{VENT\ LIMIT}$) ✓

Plot point 2 on Figure C14-1 at coordinate (E_{VENT}, $P'_{VENT\ LIMIT}$) ✓

Layout $\overline{12}$ ✓

14.4.3 Curve C

1. Calculate Psrv limit, primary containment pressure limit for operability of the SRV pneumatic cylinders

   $P_{SRV\ LIMIT} = P_{DW\ AIR} - DP_{SRV}$

   $\boxed{P_{SRV\ LIMIT}} = 63$ psig

   $P_{SRV\ LIMIT} = 151 - 88$
   63

2. Calculate P'srv limit, primary containment pressure limit for operability of the SRV pneumatic cylinders corresponding to E_{SRV}

   $P'_{SRV\ LIMIT} = P_{SRV\ LIMIT} + 0.433\ (E_{SRV} - E_{SPCI})$

   $\boxed{P'_{SRV\ LIMIT}} = 101.54$ psig

   $P'_{SRV\ LIMIT} = 63 + 0.433\ (138.67 - 49.67)$
   $63 + 0.433\ (89)$
   101.54

3. Complete curve C

   Plot point 1 on figure C14-1 at coordinate (E_{SCPI}, $P_{SRV\ LIMIT}$) ✓

   Plot point 2 on Figure C14-1 at coordinate (E_{SRV}, $P'_{SRV\ LIMIT}$) ✓

   Layout $\overline{12}$ ✓

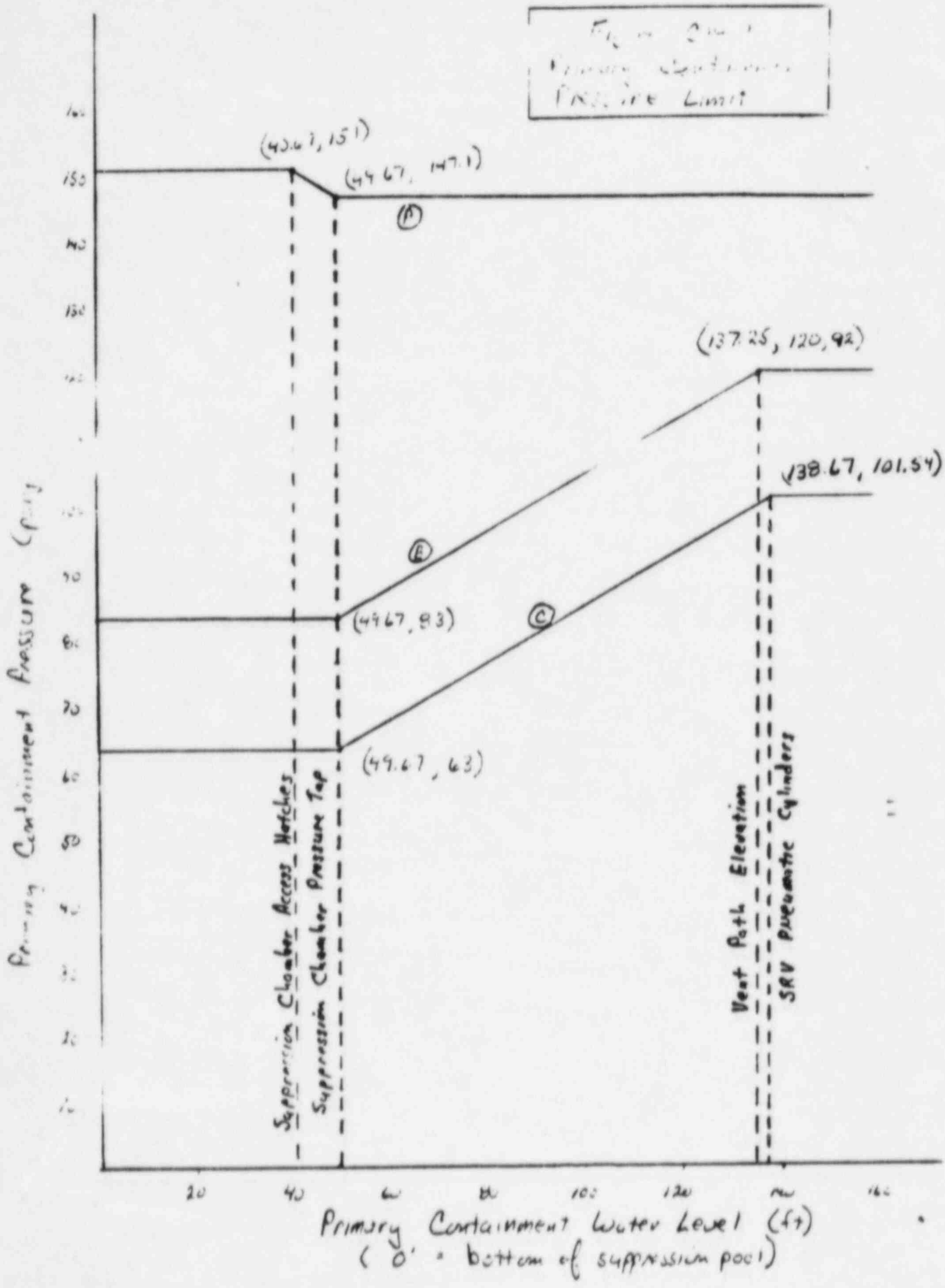
   Layout lines parallel to the X-axis to the left of point 1 and the right of point 2 on Figure C14-1 ✓

14.4.4 Primary Contain-ent Pressure Limit

1. Using Figure C14-1 determine the most limiting [illegible] B and C

   63 psig

Because the Suppression Chamber Pressure Instrument indicates a maximum of 60 psig the Primary Containment Pressure Limit is set at 60 psig


Limit
(40.67, 151)
(49.67, 147.1)
A
(137.25, 120.92)
(138.67, 101.54)
B
C
(49.67, 83)
(49.67, 63)
Suppression Chamber Access Hatches
Suppression Chamber Pressure Tap
Vent Path Elevation
SRV Pneumatic Cylinders
Primary Containment Pressure
20
40
100
120
160
Primary Containment Water Level (ft)
(0' = bottom of suppression pool)

CM·

SECONDARY CONTAINMENT CONTROL GUIDELINE

PURPOSE

The purpose of this guideline is to:

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

ENTRY CONDITIONS

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

- o Differential pressure at or above 0 in. of water
- o An area temperature above the maximum normal operating temperature
- o A HVAC cooler differential temperature above the maximum normal operating differential temperature
- o A HVAC exhaust radiation level above the maximum normal operating radiation level
- o An area radiation level above the maximum normal operating radiation level
- o A floor drain sump water level above the maximum normal operating water level
- o An area water level above the maximum normal operating water level

OPERATOR ACTIONS

If while executing the following steps secondary containment HVAC exhaust radiation level exceeds [~~20~~ 10 mr/hr (secondary containment HVAC isolation setpoint)]:

- o Confirm or manually initiate isolation of secondary containment HVAC, and
- o Confirm initiation of or manually initiate SBGT [only when the space being evacuated is below 212°F].

If while executing the following steps:

- o Secondary containment HVAC isolates, and,
- o Secondary containment HVAC exhaust radiation level is below [~~20~~ 10 mr/hr (secondary containment HVAC isolation setpoint)],

restart secondary containment HVAC. #24

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

SC/T Monitor and control secondary containment temperatures.

SC/T-1 Operate available area coolers.

SC/T-2 If secondary containment HVAC exhaust radiation level is below [10 mr/hr (secondary containment HVAC isolation setpoint)], operate available secondary containment HVAC.

SC/T-3 If any area temperature exceeds its maximum normal operating temperature, isolate all systems that are discharging into the area except systems required to shut down the reactor, assure adequate core cooling, or suppress a working fire.

SC/T-4 If a primary system is discharging into an area, then 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-5 If a primary system is discharging into an area and an area temperature exceeds its maximum safe operating temperature in more than one area, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

SC/R Monitor and control secondary containment radiation levels.

SC/R-1 If any 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 working fire.

SC/R-2 If a primary system is discharging into an area, then 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-3 If a primary system is discharging into an area and an area radiation level exceeds its maximum safe operating radiation level in more than one area, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

SC/L Monitor and control secondary containment water levels.

SC/L-1 If any 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 working fire.

SC/L-2 If a primary system is discharging into an area, then before any floor drain sump or 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-3 If a primary system is discharging into an area and a floor drain sump or area water level exceeds its maximum safe operating water level in more than one area, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

TABLE 1
OPERATING VALUES OF SECONDARY CONTAINMENT PARAMETERS

SECONDARY CONTAINMENT PARAMETER/LOCATION	ALARM	MAX NORMAL* OPERATING VALUE	MAX SAFE* OPERATING VALUE
DIFFERENTIAL PRESSURE	IN. WATER	IN. WATER	IN. WATER
[Reactor Building/ outside air	0		]
[Refuel Floor/outside air	0		]
AREA TEMPERATURE See Attached	°F	°F	°F
[RWCU "A" pump room 158'	130		]
[RWCU "B" pump room 158'	130		]
[RWCU Hx room 158' at Hx.	130		]
[RWCU Hx room 158' disch-H.W.	130		]
[RWCU phase sep. 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, westwall	200		]
[Torus room, eastwall	200		]
[Torus room, northwall	200		]
[Torus room, southwall	200		]
[Main steam tunnel	160		]
[SE, Reactor 130 elev., area A	200		]
[SE, Reactor 130 elev., area B	200		]
[NW Diagonal, area A	200		]
[NW Diagonal, area B	200		]
[NW Diagonal, area C	200		]

*Typical values not available.

Area Temp	Max Normal Op	Max Safe Op	Alarm
Steam Pipe Tunnel	176	212	130°F
RHR Equipment Room 1	206	212	120°F
RHR Equipment Room 2	206	212	120°F
RCIC Pipe Route	206	212	190°F
RCIC Equipment Area	206	212	120°F
RWCU Pump Room A	186	212	110°F
RWCU Pump Room B	186	212	110°F
RWCU Pump Room C	186	212	110°F
RWCU Hx Room A	199	212	130°F
RWCU Hx Room B	199	212	130°F

TABLE 1
OPERATING VALUES OF SECONDARY CONTAINMENT PARAMETERS (Continued)

See Attached

SECONDARY CONTAINMENT PARAMETER/LOCATION	ALARM	MAX NORMAL* OPERATING VALUE	MAX SAFE* OPERATING VALUE
HVAC COOLER DIFFERENTIAL TEMPERATURE	°F	°F	°F
[RWCU "A" Pump Room	75		]
[RWCU "B" Pump Room	75		]
[RWCU Hx Room 158' at Hxs	75		]
[RWCU Hx Room 158' disch. to Hotwell	75		]
[RWCU phase separator room 158'	75		]
[RWCU holding pump room 185'	75		]
[NE diagonal	50		]
[SE diagonal	50		]
[HPCI Room, Cooler A	40		]
[HPCI Room, Cooler B	40		]
[NW Diagonal, Cooler A	40		]
[NW Diagonal, Cooler B	40		]
[NW Diagonal, Cooler C	40		]
[Torus Room, NW	40		]
[Torus Room, West	40		]
[Torus Room, NW	40		]
[Torus Room, West	40		]
[Torus Room, NW	40		]
[Torus Room, West	40		]
[Torus Room, NW	40		]
[Torus Room, West	40		]
[Main Steam Tunnel, Cooler A	70		]
[Main Steam Tunnel, Cooler B	70		]

*Typical values not available.

Differential Temperatures	Max Norm Op	Max Safe Op	Alarm
Steam Pipe Tunnel	96	132	20°F
RHR Equipment Room 1	126	132	20°F
RHR Equipment Room 2	126	132	20°F
RCIC Pipe Route	126	132	40°F
RCIC Equipment Area	126	132	20°F
RWCU Pump Room A	106	132	34°F
RWCU Pump Room B	106	132	34°F
RWCU Pump Room C	106	132	34°F
RWCU Hx Room A	119	132	34°F
RWCU Hx Room B	119	132	34°F

TABLE 1
OPERATING VALUES OF SECONDARY CONTAINMENT PARAMETERS (Continued)

SECONDARY CONTAINMENT PARAMETER/LOCATION	ALARM	MAX NORMAL* OPERATING VALUE	MAX SAFE* OPERATING VALUE
HVAC EXHAUST RADIATION LEVEL ABOVE	MR/HR	MR/HR	MR/HR
[Reactor Building	~~20~~ 10	50	100 100]
~~[Refuel Floor~~ Fuel Pool Vent Exhaust	~~20~~ 10	50	]
AREA RADIATION LEVEL	MR/HR	MR/HR	MR/HR
[158' Southeast Area	15		]
[158' Northeast Area	15		]
[158' Northwest Area	15		]
[130' Northeast Work Area	15		]
[130' Southeast Work Area	15		]
[Decontamination Pump & Equipment Room	20		]
[South CRD Hydraulic Units	15		]
[Spent Fuel Pool Passageway	15		]
[185' Operating Floor	15		]
[185' Sample Panel Area	15		]
[CRD Repair Area	20		]
[185' RWCU Control Panel Area	15		]
[RCIC Equipment Area	20		]
[CRD Pump Room SW	20		]
[RHR & Core Spray Room Northeast	20		]
[RHR & Core Spray Room Southeast	20		]
[Fuel Pool Demin Panel Area	20		]

See Attached

*Typical values not available.

ARM

	D18 Inst MPL	(PT) alarm mr/hr	Isol mr/hr	EQ Service Rad	EQ Bound Rad	Upscale Reading	mr/hr max Normal	mr/hr max Safe
SBGT 820' El.	K602A					10^4		
RWCU Phase Sep	K602B	10	--	2E6	E7	10^4	10^2	10^3
RB Sample (832)Station	K601G	25		2E6	E7	10^3	250	10^3
AB Cont. Purge	K601I	10		---	---	10^4	10^2	10^3
RB HCU Module N.	K601C	3.5		2E6	E7	10^3	35	350
RB HCU Module S.	K601D	3.5		2E6	E7	10^3	35	350
TIP Room	K602D	100		2E6	E7	10^4	10^3	10^4
TIP Drives	K601E	7.5		2E6	E7	10^3	75	750
CRD Storage & Repair	K601T	10		2E6	E7	10^3	10^2	10^3
NW RHR Hx Rooms	K602F	100		5E5	E7	10^4	10^3	10^4
SE RHR Hx Rooms	602E	100		5E5	E7	10^4	10^3	10^4
RCIC Room	K602G	45		5E5	E7	10^4	450	4500
HPCS Room	K601H	3.5		5E5	E7	10^3	35	350
MSL Tunnel	K610A/D	3800	7500	6E6	E7	10^6		

	ARM D18 Inst MPL	(PT) alarm mr/hr	Isol mr/hr	EQ Service Rad	EQ Bound Rad	Upscale Reading	mr/hr max Normal	mr/hr max Safe
RBCT 820' El.	K602A					10^4		
RWCU Phase Sep	K602B	10	--	2E6	E7	10^4	10^2	10^3
RB Sample (832)Station	K601G	25		2E6	E7	10^3	250	10^3
AB Cont. Purge	K601I	10		---	---	10^4	10^2	10^3
RB HCU Module N.	K601C	3.5		2E6	E7	10^3	35	350
RB HCU Module S.	K601D	3.5		2E6	E7	10^3	35	350
TIP Room	K602D	100		2E6	E7	10^4	10^3	10^4
TIP Drives	K601E	7.5		2E6	E7	10^3	75	750
CRD Storage & Repair	K601T	10		2E6	E7	10^3	10^2	10^3
NW RHR Hx Rooms	K602F	100		5E5	E7	10^4	10^3	10^4
SE RHR Hx Rooms	602E	100		5E5	E7	10^4	10^3	10^4
RCIC Room	K602G	45		5E5	E7	10^4	450	4500
HPCS Room	K601H	3.5		5E5	E7	10^3	35	350
MSL Tunnel	K610A/D	3800	7500	6E6	E7	10^6		

TABLE 1
OPERATING VALUES OF SECONDARY CONTAINMENT PARAMETERS (Continued)

See Attached

SECONDARY CONTAINMENT PARAMETER/LOCATION	ALARM	MAX NORMAL* OPERATING VALUE	MAX SAFE* OPERATING VALUE
FLOOR DRAIN SUMP WATER LEVEL	IN.	IN.	IN.
[Sump A (S.E. Diagonal)	47		]
[Sump B (S.W. Diagonal)	52		]
AREA WATER LEVEL	IN.	IN.	IN.
[CRD Compartment	7		]
[RCIC Compartment	7		]
[RB NE Corner RM	7		]
[RB SE Corner RM	7		]
[HPCI Compartment	7		]
[Torus Compartment NW	7		]
[Torus Compartment NE	7		]
[Torus Compartment SE	7		]
[Torus Compartment SW	7		]

*Typical values not available.

RB Basement water levels

Area	Limiting Component	Ht. from floor (Inches)
NE	RCIC Inst. rack elect. conn. box	25
SE	RHR B&C Inst rack elect. Conn. box	25
SW	HPCS Suction P.S. E22-N015 & 14	31
NW	RHR A Inst. Rack Elect. conn. box	25
Raceway	MSIV-LC elect. conn. boxes	35

RADIOACTIVITY RELEASE CONTROL GUIDELINE

PURPOSE

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

ENTRY CONDITIONS

The entry condition for this guideline is:

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

OPERATOR ACTIONS

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

RR-2 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. Q

CONTINGENCY #1
LEVEL RESTORATION

If while executing the following steps:

- o Boron Injection is required or boron has been injected into the RPV, enter [procedure developed from CONTINGENCY #7].
- 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].

F

~~C1-1 Initiate IC.~~

C1-2 Line up for injection and start pumps in 2 or more of the following injection subsystems:

- o Condensate
- o HPCS
- o LPCI-A
- o LPCI-B
- o LPCI-C
- o LPCS-A
- ~~o 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:

- [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)]

If while executing the following steps:

- o The RPV water level trend reverses or RPV pressure changes region, return to [Step C1-3]. R
- o RPV water level drops below [-~~146~~ 129 in. (ADS initiation setpoint)], prevent automatic initiation of ADS.

C1-3 Monitor RPV pressure and water level. Continue in this procedure at the step indicated in the following table.

RPV PRESSURE REGION

[~~425~~ 440 psig][1] [~~100~~ 57 psig][2]

LEVEL		HIGH	INTERMEDIATE	LOW
	INCREASING	C1-4	C1-5	C1-6
	DECREASING	C1-7	C1-7	C1-8

[1] (RPV pressure at which LPCS shutoff head is reached)
[2] (~~HPCI or~~ RCIC low pressure isolation setpoint, ~~whichever is higher~~) R

C1-4 RPV WATER LEVEL INCREASING, RPV PRESSURE HIGH

Enter [procedure developed from the RPV Control Guideline] at [Step RC/L].

C1-5 RPV WATER LEVEL INCREASING, RPV PRESSURE INTERMEDIATE

If ~~HPCI and~~ RCIC ~~are~~ is not available and RPV pressure is increasing, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED. When RPV pressure is decreasing, enter [procedure developed from the RPV Control Guideline] at [Step RC/L].

If ~~HPCI and~~ RCIC ~~are~~ is not available and RPV pressure is not increasing, enter [procedure developed from the RPV Control Guideline] at [Step RC/L].

Otherwise, when RPV water level reaches [+~~12~~ 12.5 in. (low level scram setpoint)], enter [procedure developed from the RPV Control Guideline] at [Step RC/L].

C1-6 RPV WATER LEVEL INCREASING, RPV PRESSURE LOW

If pressure is increasing, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED. When RPV pressure is decreasing, enter [procedure developed from the RPV Control Guideline] at [Step RC/L].

Otherwise, enter [procedure developed from the RPV Control Guideline] at [Step RC/L].

C1-7 RPV WATER LEVEL DECREASING, RPV PRESSURE HIGH OR INTERMEDIATE

If ~~HPCI or~~ RCIC is not operating, restart ~~whichever is not~~ RCIC. operating.

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.

When RPV water level drops to [-~~164~~ 161 in. (top of active fuel)]:

- o If no system, injection subsystem or alternate injection subsystem is lined up with at least one pump running, STEAM COOLING IS REQUIRED. When any system, injection subsystem or alternate injection subsystem is lined up with at least one pump running, return to [Step C1-3].
- o Otherwise, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED. When RPV water level is increasing or RPV pressure drops below [~~100~~ 57 psig (~~HPCI or~~ RCIC low pressure isolation setpoint, ~~whichever is higher~~)], return to [Step C1-3].

C1-8 RPV WATER LEVEL DECREASING, RPV PRESSURE LOW

[If no HPCS or LPCS subsystem is operating,] start pumps in alternate injection subsystems which are lined up for injection.

If RPV pressure is increasing, EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

| When RPV water level drops to [-~~164~~ 161 in. (top of active fuel)], enter [procedure developed from CONTINGENCY #4]. |

CONTINGENCY #2
EMERGENCY RPV DEPRESSURIZATION

C2-1 When either: | #13 #14 |

- Boron Injection is required and all injection into the RPV except from boron injection systems and CRD has been terminated and prevented, or

- Boron Injection is not required,

C2-1.1 ~~Initiate IC~~.

C2-1.2 If suppression pool water level is above [~~4~~ 6 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.

C2-1.3 If less than [3 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs are open ~~[and RPV pressure is at least 50 psig (Minimum SRV Re-opening Pressure)~~ above suppression chamber pressure], rapidly depressurize the RPV using one or more of the following systems (use in order which will minimize radioactive release to the environment): | #22 |

Target Rock SRV's not installed

- 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 Flooding is required, enter [procedure developed |
| from CONTINGENCY #6]. |

C2-2 Enter [procedure developed from the RPV Control Guideline] at [Step RC/P-3]. S

CONTINGENCY #3
STEAM COOLING

C3-1 ~~Confirm initiation of IC~~.

If while executing this step Emergency RPV Depressurization is required 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].

T

~~If IC cannot be initiated:~~

When RPV water level drops to [-~~272~~ 276 in. (Minimum Zero-Injection RPV Water Level)] or if RPV water level cannot be determined, open one SRV.

When RPV pressure drops below [700 psig (Minimum Single SRV Steam Cooling Pressure)], enter [procedure developed from CONTINGENCY #2].

CONTINGENCY #4
CORE COOLING WITHOUT LEVEL RESTORATION

C4-1 Open all ADS valves. | #13 |

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

C4-2 Operate HPCS and LPCS subsystems with suction from the suppression pool.

When at least one core spray subsystem is operating with suction from the suppression pool and RPV pressure is below [~~310~~ 280 psig (RPV pressure for rated LPCS or HPCS flow, whichever pressure is lower)], terminate injection into the RPV from sources external to the primary containment.

C4-3 When RPV water level is restored to [-~~164~~ 161 in. (top of active fuel)], enter [procedure developed from the RPV Control Guideline] at [Step RC/L].

CONTINGENCY #5
ALTERNATE SHUTDOWN COOLING

C5-1 Initiate suppression pool cooling.

C5-2 Close the [RPV head vents,] MSIVs, main steam line drain valves, and ~~HPCI and~~ RCIC isolation valves.

C5-3 Place the control switch for [~~one~~ two (Minimum Number of SRVs Required for Alternate Shutdown Cooling)] SRV[s] in the OPEN position.

C5-4 Slowly raise RPV water level to establish a flow path through the open SRV back to the suppression pool.

C5-5 Terminate and prevent all injection into the RPV except from CRD. TT

C5-6 Start one LPCS or LPCI pump with suction from the suppression pool.

C5-7 Slowly increase LPCS or LPCI injection into the RPV to the maximum.

C5-7.1 If RPV pressure does not stabilize at least [~~94~~ 75 psig (Minimum Alternate Shutdown Cooling RPV Pressure)] above suppression chamber pressure, start another LPCS or LPCI pump.

C5-7.2 If RPV pressure does not stabilize below [~~472~~ 115 psig (Maximum Alternate Shutdown Cooling RPV Pressure)], open another SRV.

C5-7.3 If the cooldown rate exceeds [100°F/hr (maximum RPV cooldown rate LCO)], reduce LPCS or LPCI injection into the RPV until the cooldown rate decreases below [100°F/hr (maximum RPV cooldown rate LCO)] ~~[or RPV pressure decreases to within 50 psig (Minimum SRV Re-opening Pressure) of suppression chamber pressure, whichever occurs first]~~.

Target Rock SRVs not installed

C5-8 Control suppression pool temperature to maintain RPV water temperature above [~~70~~ 80°F (RPV NDTT or head tensioning limit, whichever is higher)].

C5-9 Proceed to cold shutdown in accordance with [procedure for cooldown to cold shutdown conditions].

CONTINGENCY #6
RPV FLOODING

C6-1 If at least [3 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs can be opened or if HPCS or motor driven feedwater pumps are available for injection, close the MSIVs, main steam line drain valves, ~~IC, HPCI,~~ RCIC and RHR steam condensing isolation valves.

C6-2 If any control rod is not inserted to or 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~~] 180
[6	~~135~~] 218
[5	~~165~~] 262
[4	~~210~~] 330
[3	~~280~~] 440
[2	~~430~~] 665
[1	~~870~~] 1462.96

If less than [~~1~~ 2 (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.

> If while executing the following step, RPV water level can be determined and RPV FLooding is not required, enter [procedure developed from CONTINGENCY #7] and [procedure developed from the RPV Control Guideline] at [Step RC/P-4] and execute these procedures concurrently.

C6-2.2 Commence and slowly increase injection into the RPV with the following systems until at least [4 2 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure)] SRV[s] are open and RPV pressure is above the Minimum Alternate RPV Flooding Pressure: #25

- o Motor driven feedwater pumps
- o Condensate pumps
- o CRD
- [o LPCI]

If at least [4 2 (minimum number of SRVs for which the Minimum Alternate RPV Flooding Pressure is below the lowest SRV lifting pressure)] SRV[s] are not open or RPV pressure cannot be increased to above the Minimum Alternate RPV Flooding Pressure, commence and slowly increase injection into the RPV with the following systems until at least [4 2 (minimum number of SRVs for which the Minimum Alternate RPV FLooding Pressure is below the lowest SRV lifting pressure)] SRV[s] are open and RPV pressure is above the Minimum Alternate RPV Flooding Pressure:

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

C6-2.3 Maintain at least [2 (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.

C6-2.4 When:

- o All control rods are inserted to or beyond position [06 (maximum subcritical banked withdrawal position)], or
- o The reactor is shutdown and no boron has been injected into the RPV,

continue in this procedure.

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)]

C6-3.2 Maintain at least [3 (Minimum Number of SRVs Required for Emergency Depressurization)] SRVs open and RPV pressure at least [77 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure but as low as practicable by throttling injection.

W

C6-4 If RPV water level can be determined, commence and increase injection into the RPV with the following systems until RPV water level is increasing:

- 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)]

C6-5 If RPV water level cannot be determined:

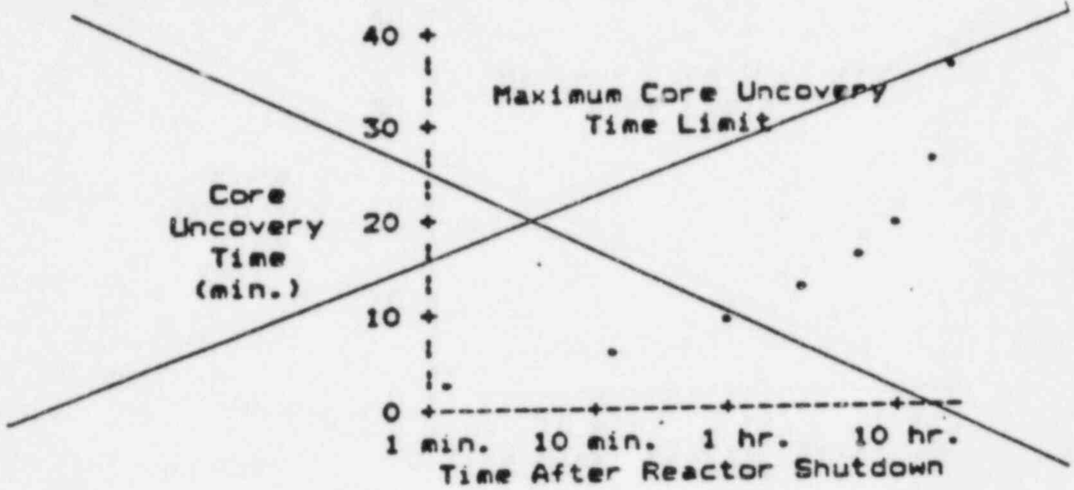
Note: Reference Leg fill not installed at LSCS.

C6-5.1 Continue injecting water into the RPV until [temperature near the cold reference leg instrument vertical runs] is below 212°F and RPV water level instrumentation is available.

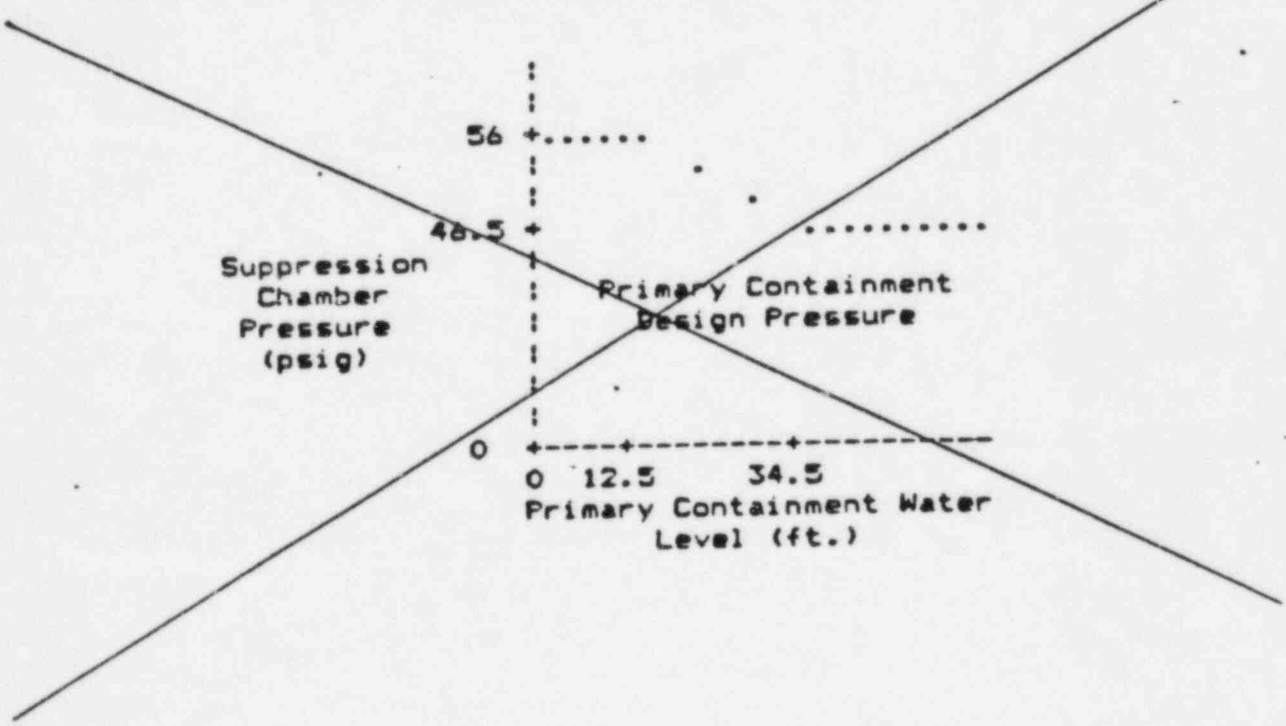
If while executing the following steps, RPV water level can be determined, continue in this procedure at [Step C6-6].

C6-5.2 If it can be determined that the RPV is filled or if RPV pressure is at least [~~77~~ 85 psig (Minimum RPV Flooding Pressure)] above suppression chamber pressure, terminate all injection into the RPV and reduce RPV water level.

C6-5.3 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 C6-3]. See Attached

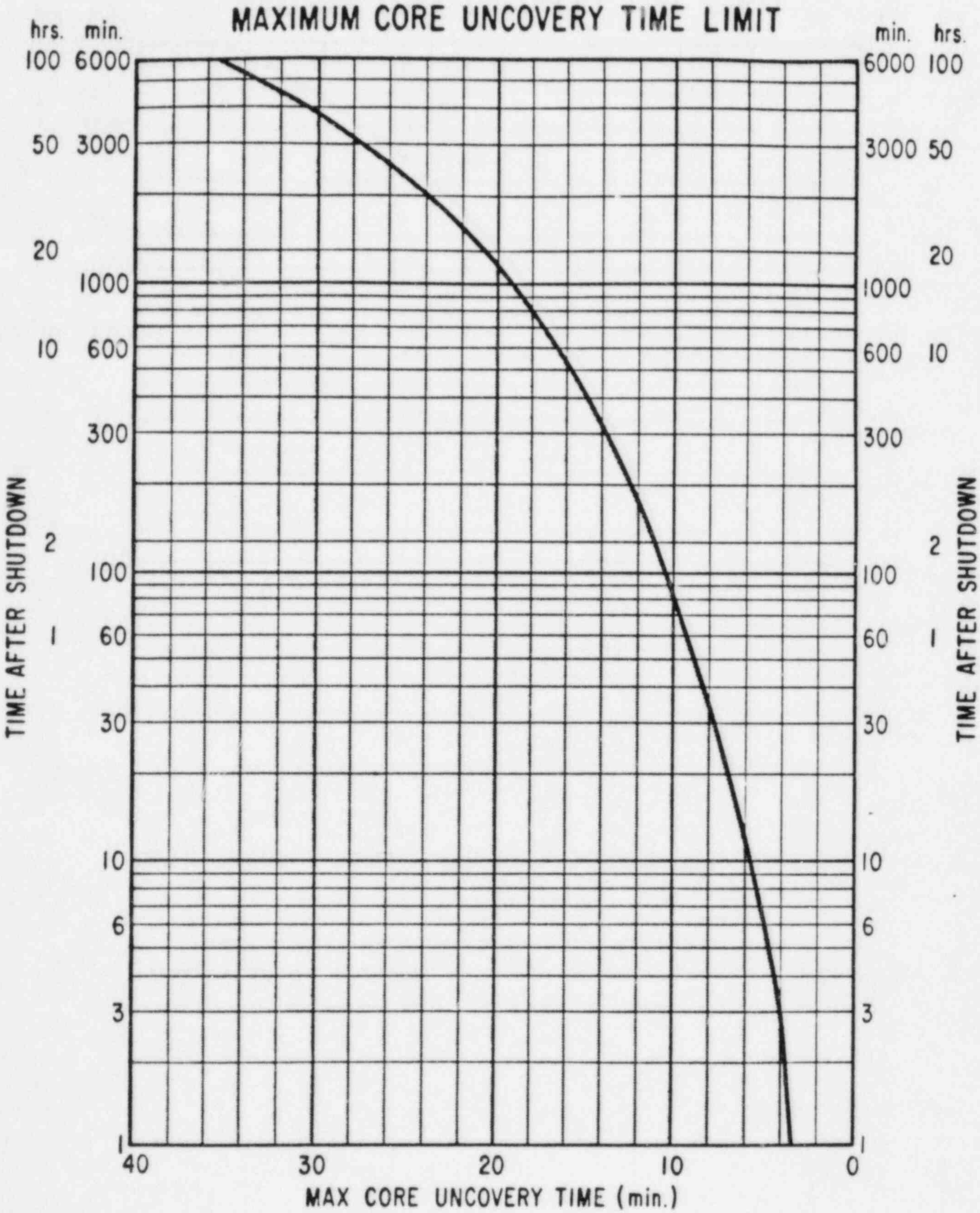


C6-6 When suppression chamber pressure can be maintained below ~~the Primary Containment Design Pressure,~~ 41 psig enter [procedure developed from the RPV Control Guideline] at [Steps RC/L and RC/P-4] and execute these steps concurrently.



LGA - G9

MAXIMUM CORE UNCOVERY TIME LIMIT



CONTINGENCY #7
LEVEL/POWER CONTROL

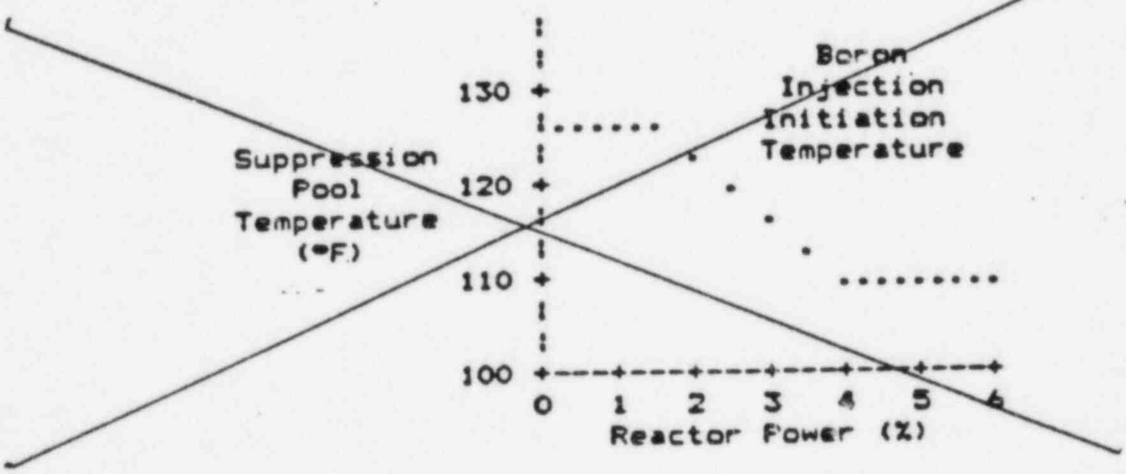
If while executing the following steps:

- 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].

X

C7-1 If:

- o Reactor power is above [3% 5 (APRM downscale trip)] or cannot be determined, and
- o Suppression pool temperature is above [the Boron Injection Initiation Temperature] 110°F, and



K

- o Either an SRV is open or opens or drywell pressure is above [2.0 1.69 psig (high drywell pressure scram setpoint)],

lower RPV water level by terminating and preventing all injection into the RPV except from boron injection systems and CRD until either: | #26 |

- o Reactor power drops below [~~3~~ 5% (APRM downscale trip)], or

- o RPV water level reaches [~~-164~~ -140 in. (Flow Stagnation Water Level)], or

- o All SRVs remain closed and drywell pressure remains below [~~2.0~~ 1.68 psig (high drywell pressure scram setpoint)].

Y

If while executing the following steps Emergency RPV Depressurization is required, continue in this procedure at [Step C7-2.1].

If while executing the following step:

- o Reactor power is above [~~3~~ 5% (APRM downscale trip)] or cannot be determined, and

- o RPV water level is above [~~-164~~ -140 in. (Flow Stagnation Water Level)], and

- o Suppression pool temperature is above [~~the Boron Injection Initiation Temperature~~ 110°F], and

- o Either an SRV is open or opens or drywell pressure is above [~~2.0~~ 1.68 psig (high drywell pressure scram setpoint)],

return to [Step C7-1].

Y

K

C7-2 Maintain RPV water level either: | #9, #10, #11, #25 |

- o If RPV water level was deliberately lowered in [Step C7-1], at the level to which it was lowered, or

- o If RPV water level was not deliberately lowered in [Step C7-1], between [+~~12~~ in. (low level scram setpoint)] and [+~~50~~ in. (high level trip setpoint)],

with the following systems:

- o Condensate/feedwater system [~~1110~~ 1076 - 0 psig (RPV pressure range for system operation)]

- o CRD system [~~1110~~ 1076 - 0 psig (RPV pressure range for system operation)]

- o RCIC system [~~1110~~ 1076 - ~~50~~ 57 psig (RPV pressure range for system operation)] | #12 |

~~[o HPCI system [1110 - 100 psig (RPV pressure range for]~~
~~[system operation)]]~~

[o LPCI system [~~250~~ 260 - 0 psig (RPV pressure range for]
[system operation)]]

If RPV water level cannot be so maintained, maintain RPV water level above [-~~164~~ in. (top of active fuel)] with these systems.

Z

If RPV water level cannot be maintained above [-~~164~~ 161 in. (top of active fuel)], EMERGENCY RPV DEPRESSURIZATION IS REQUIRED:

C7-2.1 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] 180
[6	135] 218
[5	165] 262
[4	210] 330
[3	280] 440
[2	430] 665
[1	870] 1462.96

U

If less than [~~4~~ 2 (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.

C7-2.2 Commence and slowly increase injection into the RPV with the following systems to restore and maintain RPV water level above [-~~164~~ 161 in. (top of active fuel)]: #25

- o Condensate/feedwater system
- o CRD
- o RCIC
- [o HPCI]
- [o LPCI]

If RPV water level cannot be restored and maintained above [-~~164~~ 161 in. (top of active fuel)], commence and slowly increase injection into the RPV with the following systems to restore and maintain RPV water level above [-~~164~~ 161 in. (top of active fuel)]:

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

If while executing the following step reactor power commences and continues to increase, return to [Step C7-1].

C7-3 When [~~204 pounds~~ 1695 gal (Hot Shutdown Boron ~~Weight~~ Volume)] of boron have been injected or all control rods are inserted to or beyond position [06 (maximum subcritical banked withdrawal position)], restore and maintain RPV water level between [+~~12~~ 12.5 in. (low level scram setpoint)] and [+~~58~~ 55.5 in. (high level trip setpoint)]. J

If RPV water level cannot be restored and maintained above [+~~12~~ 12.5 in. (low level scram setpoint)], maintain RPV water level above [-~~164~~ 161 in. (top of active fuel)].

If RPV water level cannot be maintained above [-~~164~~ 161 in. (top of active fuel)], EMERGENCY RPV DEPRESSURIZATION IS REQUIRED; return to [Step C7-2.1].

If Alternate Shutdown Cooling is required, enter [procedure developed from CONTINGENCY #5].

C7-4 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]. AA

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 <u>ECCS Pumps NPSH</u>

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.

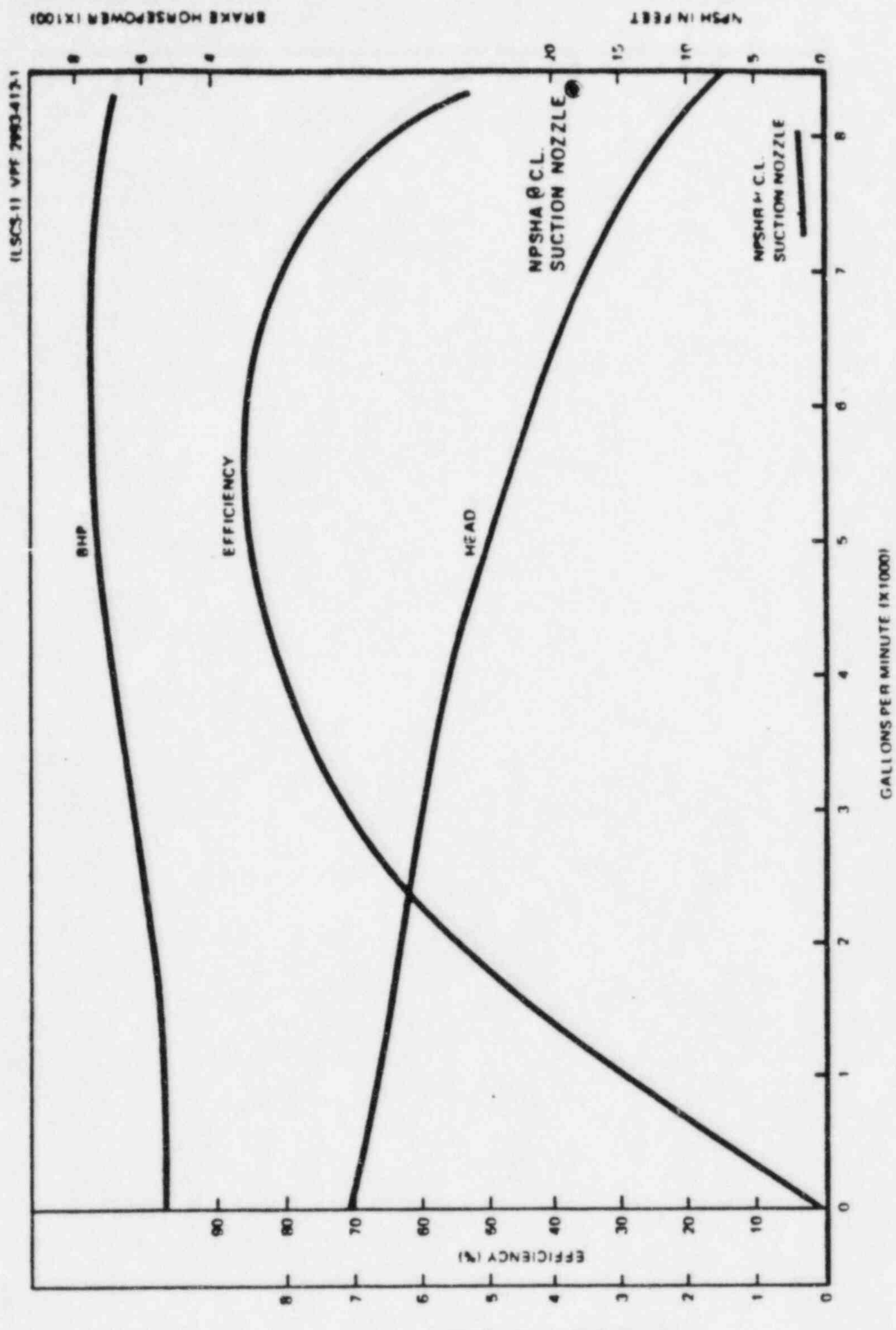


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FIGURE 6.3-9

LPCI PUMP CHARACTERISTICS

(SHEET 1 of 6)

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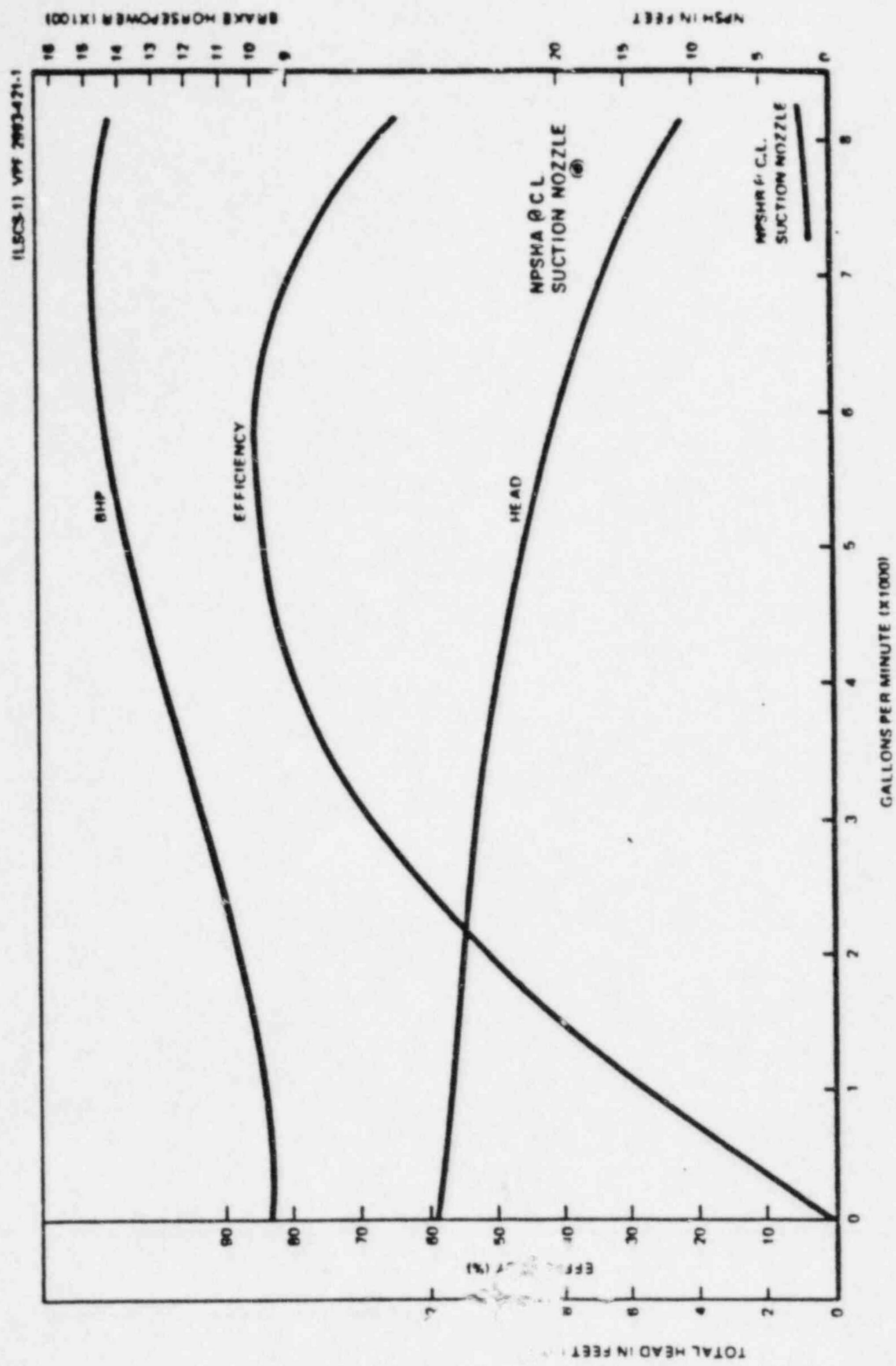

LA SALLE COUNTY STATION
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FIGURE 6.3-6

LPCS PUMP CHARACTERISTICS

(SHEET 1 of 2)

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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."

Resolved boxes
changed by addition of "or boron has been injected into into the 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.

I

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 |

```
                        :  .  .  .                       Boron
                 130 +           .                      Injection
                     :              .                  Initiation
   Suppression       :                 .               Temperature
       Pool      120 +                    .
   Temperature       :                       .
       (°F)          :                          .
                 110 +                             .......
                     :
                     :
                 100 +----+----+----+----+----+----+----+
                     0    1    2    3    4    5    6    7

                                Reactor Power (%)
```

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.

If the suppression temperature and RPV pressure cannot be restored and maintained below the Heat Capacity Temperature Limit. Emergency RPV Depressurization is required (Step SP/T-4). To avoid depressurizing the RPV with the reactor at power, it is desirable to shut down the reactor through boron injection prior to reaching the Heat Capacity Temperature Limit. The Boron Injection Initiation Temperature is defined so as to achieve this when practicable.

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

Step RC/Q-4 does not limit the operator to resetting the ADS timer as was the limited action specified in Step RC/L-2: other methods are to be employed here to permanently defeat the automatic functioning of ADS at least as long as reactor shutdown is contingent upon in-core boron concentration.

The applicability of Caution #19 is indicated at this step to preserve 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.

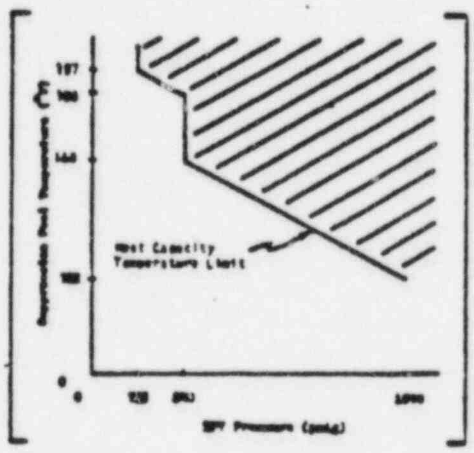
Resolved 5/10/84: step changed as proposed.

M

STEP:

SF/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.

Q

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-3].

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 (?))
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."