UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

July 14, 1993

MEMORANDUM FOR: ACRS Members

FROM: Mark Stella

SUBJECT: BWROG SIMULATOR SCENARIO DEVELOPMENT GUIDELINES

The BWROG met with the staff on June 30, 1993 to present the initial version of a document containing guidance on the development of materials useful in selecting scenarios for dynamic simulator exams of licensed operating crews. This is the first product of an industry initiative led by NUMARC known vulgarly as the "scenario template" project.

BWR simulator scenario guideline development has been supported by 18 of 22 BWR utilities. BWROG representatives present at the meeting included the Owners Group Chairman (Les Engel), the chairman of the BWROG Operator Requalification Committee (Curtiss Coggin - GPC), and the head of the ad hoc group of operations and training personnel that developed the guidelines under the aegis of the Operator Requalification Committee (Ken Rach - CECO).

The BWROG sought the staff's endorsement of the simulator scenario development guidelines as one means of satisfying the "critical task" selection requirements in ES-604 of the "Operator Licensing Examiner Standards", NUREG-1021 Revision 7.[1] As a result of this meeting, the staff agreed to participate in a BWROG workshop on the guidelines planned for November of this year. The scenario selection guidelines document presented to the staff at the June 30 meeting will be formally introduced to the BWR utility community at that workshop.

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[1] Examiner Standard ES-604 of NUREG-1021 deals specifically with the requirements for preparation and administration of dynamic simulator examinations to operating crews at licensed facilities. Relevant sections of this standard are attached as Enclosure 1.

The History

Following the introduction of the more comprehensive emergency procedures based on post-TMI EPGs, several licensees (not limited to those operating BWR plants) expressed concern that examiners often required the use of complex multiple failure - multiple event scenarios to test operating crews, that this complexity was "unrealistic", and that such unrealistic scenarios placed undue stress on operating crews, leading to errors and failures. The improved EPGs and EOPs resulting from industry's post-TMI efforts to respond to NUREG-0737 Items I.C.1 and I.C.9 were designed to provide robust operator guidance in almost any situation short of extreme core damage or loss of significant portions of the plant safety systems. The "price" of this more robust guidance was increased procedural complexity.[2]

These and other concerns led to a significant revision to the operator examination standards in January 1991, as a result of ongoing discussions between NRC and the industry. Unacceptable variations in the scope and complexity of examination scenarios were still being reported after implementation of Revision 6 to NUREG-1021, and were confirmed by a staff study of requalification examinations at several plants in the year following implementation of the revised standards. In SECY-92-154 (April 28, 1992) the staff issued revised guidance for developing and selecting dynamic simulator scenarios intended to address these remaining concerns. Revision 7 to NUREG-1021 incorporates the revised guidance of SECY-92-154.

Much of the guidance contained in SECY-92-154 was derived from a NUMARC draft document outlining the industry's proposal for improving dynamic simulator scenario development and selection for requalification examinations. The BWROG participated in the NUMARC working group that developed the draft guidelines now incorporated into NUREG-1021, Rev. 7, ES-604. BWROG participation on the NUMARC working group was motivated principally by the recent spate of unsatisfactory ratings given to BWR utility operator requalification programs during the period 1989-1991. In this period at least eight BWR utilities had their operating crew requalification programs designated unsatisfactory, principally as a result of poor operating crew

[2] The fact that utility training programs were initially not up to the task of assuring that operators could use these more complex EOPs without undue confusion has also contributed to the observed increase in errors and failures during operator requalification examinations.

performance on the dynamic simulator portion of a regularly-administered requalification examination.[3]

In its independent investigation of the causes of operating crew failures on requalification examinations, the BWROG identified at least three major concerns:

- o Inconsistent requirements and guidelines for selecting dynamic simulator examination scenarios that provide an adequate (but not unrealistic and extreme) test of an operating crew's capabilities;
- o Shortcomings in the command and control policies used in plant control rooms;
- o Lack of procedure and contingency prioritization in the BWROG Emergency Procedures Guidelines (EPGs), and in emergency operating procedures (EOPs) based on the BWROG EPGs.[4]

The first concern mentioned is obviously consistent with the concerns raised by NUMARC that resulted in the most recent revisions to NUREG-1021. One element in the selection of scenarios for the dynamic simulator evaluations is the opportunity for the examiner to observe crew performance of critical tasks (CTs). ES-604 emphasizes the importance of CTs in the evaluation of crew performance (see the marked sections of ES-604 attached). The revised version of ES-604 requires that an acceptable scenario set (usually 2 scenarios) include no fewer than 5 CTs; individual scenarios must contain at least 2 CTs to be considered acceptable for operating crew requalification exams on the simulator.

The primary criterion for identification of a CT offered in ES-604 is that the task is ". . .significant to the safety of the plant or the public". The designation of any single task as a CT therefore depends upon knowledge of the event in which a procedure is being used, and the plant conditions existing at the time the task is required to be accomplished. There are few such cues incorporated in the content of the BWROG EPGs, although cues

[3] Standards for evaluation of licensee requalification programs are found in NUREG-1021, ES-601.

[4] All domestic BWRs use the BWROG EPGs as the basis for their EOPs.

are provided in PWR guideline sets containing event diagnosis guidance and event-related guidelines. As noted in the Appendix, PWR guideline sets also have function-related guidelines, and the designation of CTs for situations that demand performance of these guidelines during the dynamic simulator portion of an operating crew requalification examination also requires the specification of particular scenarios or events separately from the content of the guidelines themselves.

Failure to perform CTs correctly and in a timely manner is used as a means of identifying deficiencies in the knowledge, skill, or ability of the crew being tested. One problem often encountered in the selection of BWR dynamic simulator scenarios is the difficulty in identifying CTs, given the logical structure of the BWR EPGs and EOPs based on them. As function-related guidelines[5], the BWR EPGs have been designed to provide guidance that is applicable without reference to any particular type of event, plant configuration, or time elapsed from the beginning of a transient. The importance of a generically applicable scenario selection process that permits unambiguous identification of CTs is thus underscored for requalification testing of crews who are required to implement function-related procedures like the utility EOPs based on the BWROG EPGs.

The Product

The product of the BWROG effort described above has been given the title "BWR Owners' Group Simulator Scenario Development Guideline - Revision 0". It is dated June 1993. A copy of the document is attached to this memorandum as Enclosure 2.

The objective of the BWROG working group that developed the BWR Owners' Group Simulator Scenario Selection Guideline was to produce a generic simulator scenario development and selection method compatible with the logical structure of the BWROG EPGs. The BWROG presenters claim that the generic simulator scenario development method presented in the June 30 meeting can be clearly understood and is simple to use.

In order to develop a single methodology acceptable for use by all BWR utility training departments, the BWROG working group was required to prepare a generic set of EPG flow charts that would

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[5] Refer to Appendix A for a brief discussion of the logical construction of the BWR EPGs and definitions of applicable terms.

apply for all GE reactor product lines (e.g., BWR2, BWR6) and containment Marks. This was the first step in the development process. Generic flow charts for each of the major operator response paths through the EPGs are shown on pages 10-12 of the attached guidelines document. Revision 4 of the BWROG EPGs was used as the reference guideline set.

The five basic flowcharts prepared were:

- Reactor pressure vessel (RPV) control;
- Containment control;
- Hydrogen control;
- Secondary containment control; and
- Radioactivity release.

From these flow charts it is possible to identify operator action objectives for every scenario contemplated for inclusion in the simulator exam bank. These objectives can be attained by designing the scenario to assure that plant symptoms motivating operating crew responses will proceed along a specific path (or event trajectory). A master template is then developed for each set of objectives, and CTs can for the most part be identified unambiguously by correlating the EOPs to be used with the plant conditions and plant configurations expected during each scenario.

Using this process a set of 19 different scenario templates, representing the entire EPG set, was generated by the BWROG working group. These templates are intended to be the fundamental resource used by utility training departments in generating dynamic simulator scenarios for requalification.[6] The templates and their supporting bases are found on pages 13-64 of the attached guidelines document.

Templates contain four basic elements of information that characterize any given scenario: the operating mode of the plant, the particular malfunctions to be inserted into the simulator, the operator actions that must be performed to step through the procedure, and the critical operator tasks (CTs) expected to be performed during the scenario. CTs are identified by application of the four criteria of NUREG-1021 (see page 1 of

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[6] Some of the templates are intended to be used only by plants of a particular design.

ES-604 in Enclosure 1 or section 3.2.3.1 of the guidelines document, Enclosure 2).

One other characteristic of the BWROG EPGs is also catered to in the design of the scenario templates. This is the fact that the symptom sets for each procedure and contingency appearing in the EPGs are not unique. Expressed in the simplest terms, the design of the BWROG EPGs may require operators to implement more than one procedure or contingency simultaneously.[7] This characteristic is reflected in the provision of transition matrices that appear to the right of the flow diagram box representing the entry condition on many of the templates. These matrices direct the scenario developer to also consider the other possible procedures or contingencies that must come into play during a scenario having the given entry conditions.

In the oral presentation made by the BWROG to the staff on June 30, the working group leader indicated that the scenario developer and examiner would be expected to know the "primary focus" of the scenario for training or examination purposes, and that this primary focus would determine which of the two or more contemporaneous paths through the procedures being implemented in parallel would be considered the most important for CT identification.

Comments

The BWROG simulator scenario selection methodology appears to be a very useful, and necessary, addition to the guidance provided utility training personnel responsible for developing exam bank scenarios for crew requalification examinations. It will also be useful for NRC examiners and other staff personnel who must obtain a working knowledge of the bases for and use of EOPs in BWR plants.

The guideline document will undoubtedly have some effect in reducing the rate of operating crew failures in dynamic simulator exams at BWR facilities. It is my opinion, however, that the

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[7] In the development of the WOG ERGs it was taken as axiomatic that the implementation of more than one procedure and step at any given time was logically incorrect. Indeed, it is possible within the BWROG EPGs to find situations in which two distinct operator guidance paths activated by the same symptom set result in conflicting guidance for operator action. Whether these situations will ever be met in the "real world" is arguable. Nonetheless, the potential for conflict exists.

most fundamental reason for these failures is the lack of a higher-level logic in the BWROG EPGs that can be used in operational situations to aid the crew in selecting the most important of several possible paths through their emergency procedures set. Until this flaw in the EPGs and EOPs is corrected, operating crews being examined will continue to encounter situations in which they must without explicit guidance choose one of several apparently equivalent paths (perhaps ignoring paths that may be of greater importance to recovering the plant or to restoring a critical safety function), or try to implement all of the equivalent paths simultaneously, thus further confusing the operational situation.

Earlier in this memo it was noted that the BWROG committee investigating the recent rash of requalification failures identified the lack of a procedures prioritization scheme as one of three key concerns contributing to the failures on dynamic simulator portions of the examination. During a break in the presentation on June 30, I asked Curtiss Coggin of the Operator Requalification Committee about plans for addressing this particular concern. He indicated that the issue was still on the table. He also stated his belief that the BWROG EPGs, as presently designed, could not be prioritized in this manner.

APPENDIX A
SYMPTOM-, FUNCTION-, AND EVENT-RELATED GUIDELINES

All EPGs in use today are symptom-related. This term is properly reserved for the identification of procedures in which directed actions are predicated on the confirmation that a given set of plant conditions exists. Often, the term is improperly used to describe procedures with logical characteristics like those of the BWROG EPGs.

The BWROG EPGs prescribe operator actions based on observation of plant parameters (symptoms or symptom sets) independently of any defined plant failures or plant operational configuration. This type of procedure (without a defined endpoint but with a well-defined functional goal, for example, maintaining core cooling) is more properly known as a function-related procedure. BWROG EPGs (and most EOPs based on them) are essentially completely function-related emergency procedures guidelines. PWR EPGs rely upon a hybrid construction that combines both event-related and function-related guidelines.

As noted, it is characteristic of function-related guidelines to exhibit poorly-defined end-points. For example, the Westinghouse Owners Group (WOG) Emergency Response Guidelines (ERGs) contain a subset of function-related guidelines called the Function Restoration Guidelines (FRGs), but plant recovery to a safe, stable condition must always be managed by use of one of the event-related guidelines having a well-defined end-point. The event-related guidelines are called, for obvious reasons, the Optimal Recovery Guidelines (ORGs).

The provision of event-related guidelines (a steam generator tube rupture recovery guideline is a classic example of an event-related guideline) in a guideline set facilitates more rapid plant recovery to a safe stable condition following a transient because

1) the subsequent response of the plant to operator actions and plant failures is more easily understood and interpreted following a specific diagnosis, and

2) guidance for recovering the plant to a safe, stable condition can be optimized for the diagnosed plant condition and operational configuration, since both the starting-point and the desired end-point of the sequence of operator actions are known before the guideline is written.

Event-related guidelines are inherently more difficult to develop and validate than function-related guidelines. Entry conditions and symptom sets used for motivating operator actions directed by event-related guidelines must be carefully defined and scrutinized against actual events, and compared with the results of better-estimate transient analyses that represent the full range of plant conditions and plant operating configurations expected. The validity of event-related guidelines must also be constantly checked during use against a set of predetermined conditions that reflect the assumptions under which the guideline response strategy was developed.

Because not all events, plant conditions, or plant configurations can be anticipated and addressed in the design of an event-related procedure set, a separate means must be provided to ensure that plant operators can always respond to mitigate potentially hazardous plant conditions not covered by event-related procedures. In the WOG ERGs, this "safety net" is provided by the function-related guidelines used in concert with critical safety function status monitoring.

Enclosures: 2, as stated

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ES-604
DYNAMIC SIMULATOR REQUALIFICATION EXAMINATION

A. PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) examiners use this standard in preparing and administering dynamic simulator requalification operating tests in accordance with the provisions of Section 55.59(a)(2)(iii) of Title 10 of the Code of Federal Regulations.

By simulating actual plant operation, the dynamic simulator test provides a comprehensive evaluation of the integrated plant knowledge and skills required of operating crews. It is effective in evaluating a crew's communication skills and team behavior and in identifying any areas in which the licensed operators (hereafter "licensees") should be retrained to improve their knowledge and abilities (K/A) in accordance with the provisions of the requalification program developed by the facility licensee.

B. SCOPE

The dynamic simulator test consists of two scenarios. Each scenario is constructed to last approximately 45 to 60 minutes. The actual time needed to complete the scenarios will depend upon the specific events within the scenarios but should allow the crew the time necessary to perform the actions required to respond to each event. To successfully complete this portion of the operating test the crew must demonstrate the ability to operate effectively as a team while completing a series of critical tasks (CTs) that measure the crew's ability to safely operate the plant during normal, abnormal, and emergency situations.

The NRC examiners evaluate the performance of each crew, using standard competency rating scales. Each competency is rated according to the crew's ability to satisfactorily complete the tasks that have been designated as "critical" within that crew's scenario set. Critical means "necessary to place and maintain the reactor in a safe operational or shutdown condition." Each valid CT must meet the following criteria: (1) be significant to the safety of the plant or public, (2) provide at least one crew member with appropriate cues, (3) have measurable performance indicators, and (4) give at least one member of the crew feedback about the effect of the crew's action or inaction. If the crew fails to correctly perform a CT, that failure would indicate a significant deficiency in the knowledge, skill, or ability of that crew to demonstrate team behavior and will be evaluated, using the behavioral anchors on the "Simulator Crew Evaluation Form," Form ES-604-2.

The facility evaluators will evaluate the performance of the licensees during the dynamic simulator test. Because the primary purpose of the dynamic simulator test is to evaluate crews, each individual is not required to perform a specific number of CTs or necessarily receive an individual evaluation by an NRC examiner. However, NRC examiners will follow up on significant individual performance deficiencies on CTs observed during the

Note: Attach a separate copy of this form to each scenario reviewed. This form is used as guidance for the examination team as they conduct their review for the proposed scenarios.

SCENARIO IDENTIFIER: ________________ REVIEWER: ______________________

Qualitative Attributes

____ 1. The scenario has clearly stated objectives in the scenario summary.

____ 2. The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue crew into expected events.

____ 3. The scenario consists mostly of related events.

____ 4. Each event description consists of--

- the point in the scenario when it is to be initiated
- the malfunction(s) that are entered to initiate the event
- the symptoms/cues that will be visible to the crew
- the expected operator actions (by shift position)
- the event termination point

____ 5. No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.

____ 6. The events are valid with regard to physics and thermodynamics.

____ 7. Sequencing/timing of events is reasonable, and allows for the examination team to obtain complete evaluation results commensurate with the scenario objectives.

____ 8. If time compression techniques are used, scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.

____ 9. The simulator modeling is not altered.

____ 10. All crew competencies can be evaluated.

____ 11. The scenario has been validated.

____ 12. If the sampling plan indicates that the scenario was used for training during the requalification cycle, evaluate the need to modify or replace the scenario.

SIMULATOR SCENARIO REVIEW CHECKLIST (CONTINUED)

Note: The following criteria list scenario traits that are numerical in nature. A second set of numbers indicates a range to be met for a set of two scenarios. Therefore, to complete this part of the review, the set of scenarios must be available. This page should be completed once per scenario set.

SCENARIO SET CONSISTS OF SCENARIO ________ AND SCENARIO ________

Quantitative Attributes

____ 13. Total malfunctions inserted: 4-8/10-14

____ 14. Malfunctions that occur after EOP entry: 1-4/3-6

____ 15. Abnormal Events: 1-2/2-3

____ 16. Major Transients: 1-2/2-3

____ 17. EOPs used beyond primary scram response EOP: 1-3/3-5

____ 18. EOP Contingency Procedures used: 0-3/1-3

____ 19. Approximate scenario run time: 45-60 minutes (one scenario may approach 90 minutes)

____ 20. EOP run time: 40-70% of scenario run time

____ 21. Crew Critical Tasks: 2-5/5-8

____ 22. Technical Specifications are exercised during the test

COMMENTS: ________

The examination team should use this evaluation form during the dynamic simulator component of the requalification examination. The rating scales on this form are for evaluating the crew as a whole rather than the individual operators. Use the following instructions when rating team performance on the simulator examination:

1. Review the rating scales before the simulator examination so that you are familiar with each competency to be evaluated.

2. Use the "Operator Actions" Form (ES-301-4), or an equivalent facility form to make notes during the examination, as described in ES-301 and ES-302.

3. Complete this form immediately after the simulator examination. Evaluate the crew's performance on each applicable rating factor by comparing the actions of the crew against the associated behavioral anchors and selecting the appropriate grade. The tasks planned and performed during the crew's scenario set may not permit you to evaluate every rating factor for every crew. Annotate those rating factors that are not used in the evaluation.

   The examination team should pay particular attention to the completion of tasks that they identified as critical to plant safety. The crew may compensate for actions performed incorrectly by individual operators, as long as the critical task was completed satisfactorily. Other less significant deficiencies should also be accounted for in the rating factor evaluations to provide a source of information for crew remedial training during subsequent requalification training.

4. Justify all rating factor grades of "1" and document each justification in the space for "Comments" on Form ES-604-2. Rating factor grades of "1" must be linked to the performance of at least one critical task.

5. Complete the examination summary sheet, recording for each scenario, the scenario name (or identifier), and the critical tasks performed by the crew. Annotate whether the critical task was performed satisfactory or unsatisfactory. Complete the crew's overall evaluation using the criteria listed in the next paragraph. Space is provided for additional comments about the crew's performance.

6. The threshold for failing the simulator portion of the examination is to receive a (behavioral anchor) score of "1" in either of the following:

   a. Any two rating factors in any one competency.

   b. Any one rating factor in any one competency if, in the judgement of the examination team, the crew's performance deficiency jeopardizes the safety of the plant or has significant safety impact on the public. NRC management will make the final decision on all crew failures resulting from a single rating factor evaluation of "1."

SIMULATOR EXAMINATION SUMMARY SHEET

Facility: ____________________ Examination Date: ______________

OVERALL DYNAMIC SIMULATOR CREW EVALUATION: SAT or UNSAT

Crew Members	Docket No.	Scenario #1 Position	Scenario #2 Position
1.	55-		
2.	55-		
3.	55-		
4.	55-		
5.	55-		
6.	55-		

Scenario #1: [Enter scenario descriptor]

Crew Critical Tasks	SAT	UNSAT
1. [Enter critical task descriptor]		
2.		
3.		
4.		
5.		

Scenario #2:

Crew Critical Tasks	SAT	UNSAT
1.		
2.		
3.		
4.		
5.		

Comments: ________________________________

BWR OWNERS' GROUP

SIMULATOR SCENARIO DEVELOPMENT GUIDELINE

REVISION 0

June - 1993

Prepared by the
Operator Requalification Committee

IMPORTANT NOTICE REGARDING THE CONTENT OF THIS REPORT

PLEASE READ CAREFULLY

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1.0 PURPOSE

The BWR Owners' Group Simulator Scenario Development Guideline provides a systematic approach for the design and development of simulator evaluation materials used to administer the BWR Licensed Operator annual operating examination. This approach relies on a set of simulator scenario templates and associated critical tasks.

The scenario templates have been designed to ensure coverage of all areas of the BWROG Emergency Procedure Guidelines (EPGs). Their use, along with the corresponding critical tasks should promote a consistent level of dynamic simulator scenario exam difficulty and evaluation between BWR facilities and NRC Regional offices.

2.0 SCOPE

This guideline includes generic EPG flowcharts that were developed from an analysis of the BWROG EPGs Revision 4. After systematically evaluating the flowcharts, endpoints were chosen and templates describing the steps to attain the endpoints were developed. Critical Tasks (CTs) were identified within the templates that satisfy NUREG-1021, Licensed Operator Examiner's Standards. The generic EPG flowcharts, templates, and CTs identified in this guideline provide the framework to construct the Emergency Operating Procedure portion of the simulator evaluation scenarios. The terminology utilized within this guideline is consistent with the BWROG EPGs.

3.0 INSTRUCTIONS

3.1 Examination Bank Review

To properly implement this guideline, a systematic review of the facility dynamic simulator scenario bank should be conducted. The objective of the review is to determine the extent of EPG coverage provided by existing examination bank scenarios. The results of this review should be used to guide the future development of scenario materials to address all appropriate areas of the EPG.

3.1.1 Compare the EPG flow charts (Attachments 2, 3, and 4) to the plant specific EOPs and identify the differences.

3.1.2 Review-each dynamic scenario in the facility examination bank and determine which template satisfies the endpoint of the scenario. If it is determined that the scenario malfunctions have created a scenario arriving at multiple endpoints in the EPGs simultaneously, the scenario falls outside the scope of the templates and shall not be used for evaluations.

3.1.3 Scenarios that do not achieve a designated endpoint may be included in the exam bank. In such scenarios, operator actions that were not identified on the template as critical should be re-evaluated to determine if they meet the requirements of a CT. The exam bank should contain a scenario that reaches each of the designated endpoints, provided it is within the capabilities of the facility's simulator, does not violate the laws of physics, and is within the scope of the facility's EOPs. The facility should consider using an alternative examination approach to achieve endpoints that would require extensive time compression, that severely reduces the effectiveness of the evaluation in the dynamic simulator scenario setting, or that results in negative training. Those skills that cannot effectively be performed in the dynamic simulator portion of the examination should be evaluated using another evaluation method.

3.1.4 Prior to admitting new scenarios to the Licensed Operator Requalification Program examination bank, each new scenario should be reviewed using the facility's established scenario validation process.

3.2 Scenario Bank Upgrade

3.2.1 Flow Charts

3.2.1.1 The BWROG EPGs were evaluated and generic EPG flow charts were created (Attachments 2, 3 and 4) to describe the basic elements required for full coverage of the BWROG EPGs and contingencies.

3.2.1.2 Five flow charts were created; RPV Control, Primary Containment Control, Hydrogen Control, Secondary Containment Control, and Radioactivity Release. These flow charts form the basis for selecting template endpoints from which all templates were developed. Flow charts were annotated to identify the extent of coverage of the EPGs provided by the templates.

3.2.1.3 Due to a wide variety of plant differences the RPV level action points identified on the flow charts correlate to:

Level 1 - Low pressure ECCS Initiation
Level 2 - High pressure ECCS Initiation
Level 3 - Reactor Scram
Level 4 - Low Level Alarm
Level 7 - High Level Alarm
Level 8 - Main Turbine Trip (Plant Specific Actions)

3.2.2 Templates

3.2.2.1 Each simulator scenario template in Attachments 5 to 23 is general enough to allow a multitude of scenarios to be developed that will exercise the defined path in the EPGs considering containment design and BWR reactor types. The names of the templates correlate to the BWROG EPG nomenclature, i.e. Reactor Pressure Vessel (RPV), Primary Containment (PC), Secondary Containment (SC), and Radioactivity Release (RR).

3.2.2.2 Three sections generally comprise an evaluation scenario; Technical Specification application, abnormal event, and major transient. The template design does not include the Technical Specification and abnormal event sections. When a scenario is constructed based upon one of the templates, include the two preceding event sections required by NUREG 1021 before initiating the major transient. The timing and sequencing for the three sections should be designed so that the crew is permitted to establish the mitigation strategy for the abnormal event prior to the initiation of the major transient.

3.2.2.3 Each template is constructed of four basic components described below:

- Mode - Identifies initial plant conditions from which a scenario can be designed to initiate.

  Mode 1 - Reactor at Power
  Mode 2 - Reactor in Startup or Hot Standby
  Mode 3 - Reactor in Hot Shutdown, All Rods In
  Mode 4 - Reactor in Cold Shutdown, All Rods In
  Mode 5 - Reactor in Refuel

- Malfunction - Identifies a potential selection of malfunctions that could be utilized to generate the conditions necessary to obtain the scenario template end-point.

- Operator Action - Identifies operator actions that are not considered critical, but are necessary for the mitigation strategy defined within the scenario path.

- Critical Task (CT) - An asterisk (*) identifies CTs contained within the scenario template which meet the criteria of NUREG 1021.

  Note: Double asterisked (**) steps within the template are plant specific. Some templates are limited to specific plant design and are annotated (e.g. PC-9).

3.2.2.4 The scenario designer should utilize the template as a guide in planning the evaluation scenario outcome. The templates are designed to allow maximum flexibility as to the scope of the evaluation scenarios with several aspects of the scenario design left to the discretion of the designer, i.e. identifying the different modes of plant operation for the initial scenario conditions, Technical Specification exercise, and the abnormal event selection. The flexibility of the templates allows for the design of several scenarios around a single EOP exercise that can be used for training and evaluation scenarios. This will prevent the examinee from anticipating EOP events based on the initial characteristics of the scenario.

3.2.2.5 The scenario designer also has the flexibility to select from a range of malfunctions in each template path. These malfunctions may be in place at the beginning of the scenario, or the malfunctions can be inserted after the operator has placed a piece of equipment in service to mitigate the event. The malfunctions that are used should drive the scenario through the selected template. The sequence of malfunctions and operator actions can be changed as long as the template endpoint is achieved. As the scenario is performed, other aspects of the EOPs may be exercised as a result of the integrated plant response. The combination of malfunctions used to develop the scenario shall not cause the scenario to be driven down parallel paths to achieve more than one endpoint.

3.2.2.6 As a result of the integrated plant response, additional templates and EOPs could be entered. Where possible, the subpaths are identified by the boxes to the right of the main path in the scenario template. These subpaths should not be the primary focus of the scenario.

3.2.3 Critical Tasks

3.2.3.1 Critical Tasks (CTs) must be performed properly to place the plant in a safe or shutdown condition. Each valid CT must satisfy the following criteria:

- be significant to the safety of the plant or public;
- provide at least one crew member with appropriate cues;
- have measurable performance indicators; and
- give at least one member of the crew feedback about the effect of the crew's action or inaction.

3.2.3.2 Whether an evolution is critical to safety is dependent upon the scenario. For example, in most scenarios the need to emergency depressurize the reactor is critical to safety. However, if the scenario involves the need to restore vessel level on a shutdown and depressurized reactor, emergency depressurization is not critical, even though the EOPs may direct the operator to perform this step. The CTs identified in the templates are based on achieving the template endpoints.

3.2.3.3 Each crew action identified in the templates was evaluated using the criteria in NUREG-1021. Those items satisfying the critical task criteria were identified with an asterisk (*). When one of the asterisked steps is incorporated into a scenario, the associated scenario step should be a CT. In many cases, other legs of the EOPs could be exercised as a secondary effect of the malfunctions inserted to produce the scenario being patterned around a template. When an asterisked step from one of the secondary paths is incorporated into the scenario, the developer must determine whether the step is critical to the scenario. Tasks not identified as critical should be evaluated as competency issues.

3.2.3.4 CTs may also be dependent upon the types of malfunctions inserted into the scenario. For example, a malfunction in the automatic isolation logic for a valve may require a manual action to stop the leakage of radioactive material to the environment. The manual action could be required in many of the templates depending on the types of malfunctions that are selected. These CTs are evaluated on a case by case basis.

3.2.3.5 The CTs identified in this guideline were developed using the process described in NUREG 1021 and the technical basis of the BWR Emergency Procedure Guidelines. The justification to support the selection of each CT includes the Safety Significance, Cue, Performance Indicators, and Performance Feedback and is included in the template basis.

3.2.3.6 Critical tasks identified for each template can be reworded to support the specific need of the utility as long as the intent of the critical task is not altered. Where standards of performance are not specified in the critical task, each utility should determine its operational standards for successful performance.

3.2.3.7 For scenarios that reach template endpoint, deviations from identified critical tasks should only be allowed when plant design prohibits complying with the critical tasks or when deviations from the EPGs are approved.

4.0 REFERENCES

4.1 NUREG 1021, Operator Licensing Examiner's Standard, Rev. 7

4.2 BWROG Emergency Procedure Guidelines (EPGs), Rev. 4

5.0 ATTACHMENTS

Attachment 1 lists the title of all scenario templates contained within this document. Attachments 2 through 4 identifies the pathways that can be taken to achieve an endpoint and show the template's scope of coverage for the BWROG EPGs. Attachments 5 through 23 provide the identified template and associated critical tasks with bases documentation.

ATTACHMENT 1

LIST OF TEMPLATES

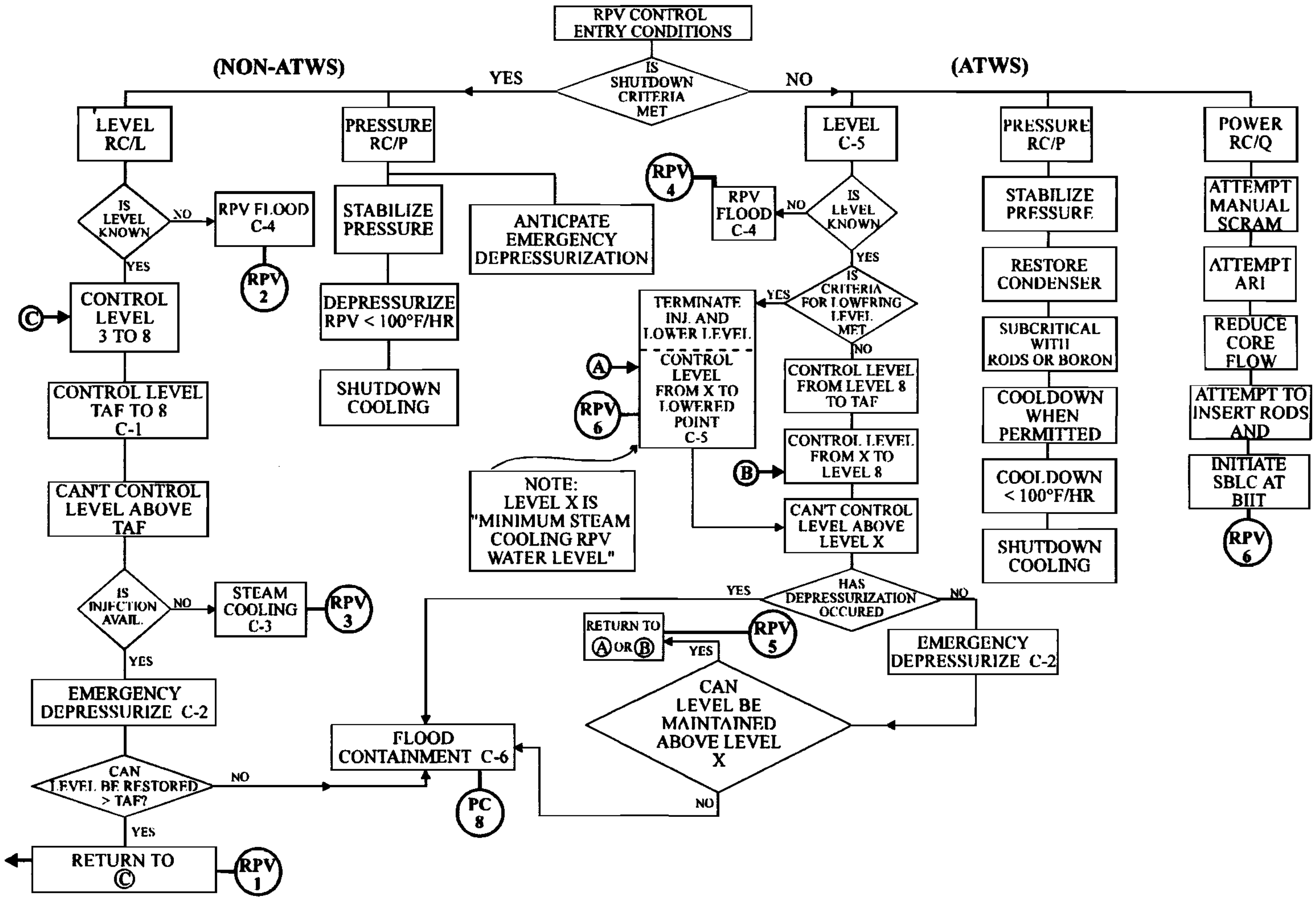
RPV-1	Loss of all High Pressure Injection - Emergency Depressurization
RPV-2	Loss of all RPV Level Instruments - RPV Flood
RPV-3	Loss of All Injection - Steam Cooling - With Level Restoration
RPV-4	ATWS - Loss of all RPV Level Instruments - RPV Flood
RPV-5	ATWS - Loss of All High Pressure Injection - Emergency Depressurization
RPV-6	ATWS - Power / Level Control

PC-1	Suppression Pool High Temperature - Emergency Depressurization
PC-2	Suppression Pool High Level - Emergency Depressurization
PC-3	Suppression Pool Low Level - Emergency Depressurization
PC-4	LOCA - Emergency Depressurization - Drywell Temperature
PC-5	LOCA - Drywell / Primary Containment Spray
PC-6	LOCA - Emergency Depressurization - Pressure Suppression Pressure
PC-7	LOCA - Vent the Primary Containment
PC-8	LOCA - Primary Containment Flooding
PC-9	LOCA - Emergency Depressurization - Containment Temperature Mark III Containments
PC-10	Containment Hydrogen Control Without Venting - Plants with Recombiners
PC-11	Containment Hydrogen Control - Vent / Purge

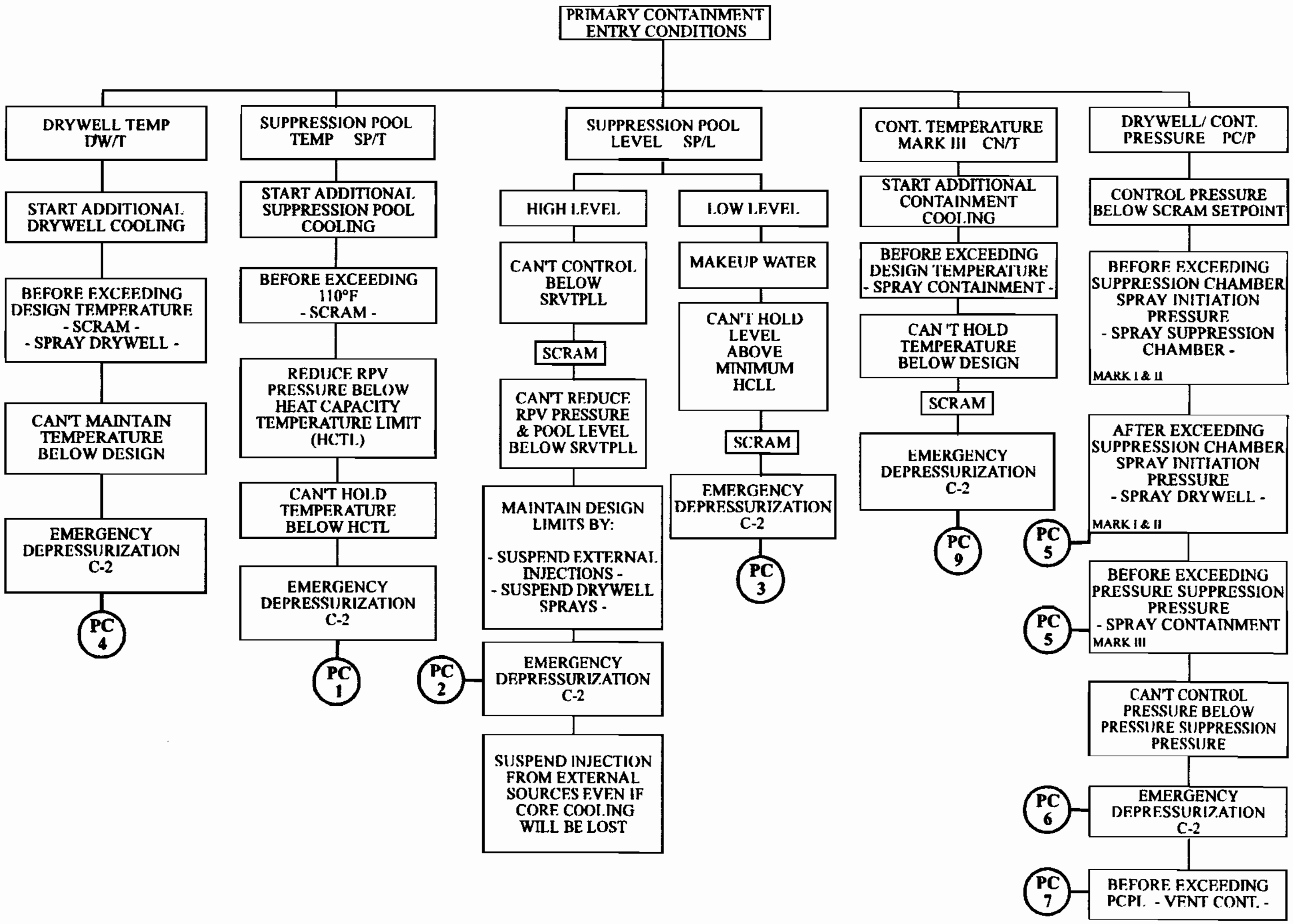
SC-1	LOCA - Secondary Containment - Emergency Depressurization

RR-1	Radiation Release - Emergency Depressurization

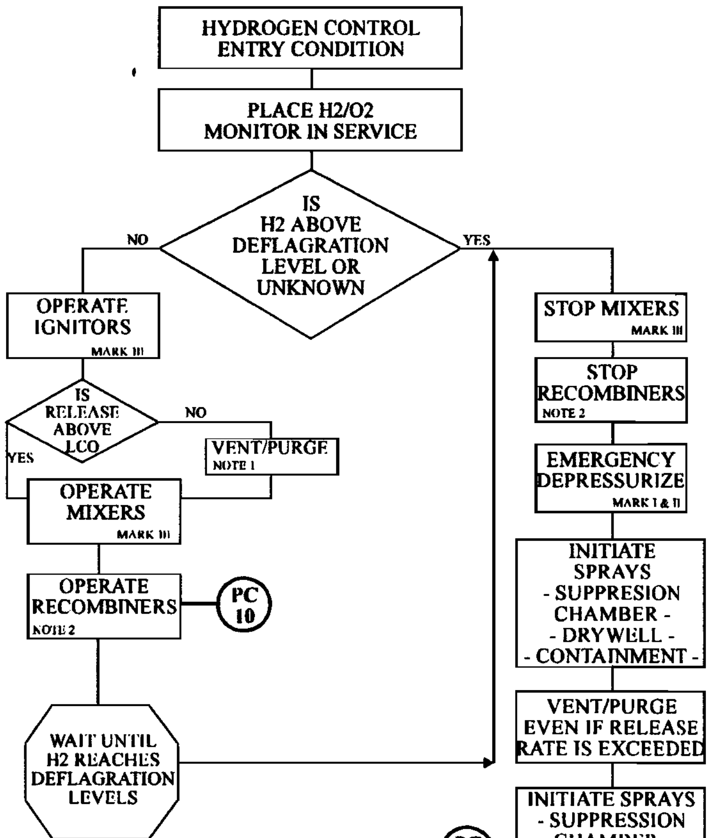
RPV CONTROL


RPV CONTROL ENTRY CONDITIONS
IS SHUTDOWN CRITERIA MET
YES
NO
(NON-ATWS)
(ATWS)
LEVEL RC/L
IS LEVEL KNOWN
NO
YES
RPV FLOOD C-4
RPV 2
CONTROL LEVEL 3 TO 8
C
CONTROL LEVEL TAF TO 8 C-1
CAN'T CONTROL LEVEL ABOVE TAF
IS INJECTION AVAIL.
NO
STEAM COOLING C-3
RPV 3
YES
EMERGENCY DEPRESSURIZE C-2
CAN LEVEL BE RESTORED > TAF?
NO
YES
RETURN TO C
RPV 1
PRESSURE RC/P
STABILIZE PRESSURE
ANTICPATE EMERGENCY DEPRESSURIZATION
DEPRESSURIZE RPV < 100°F/HR
SHUTDOWN COOLING
NOTE: LEVEL X IS "MINIMUM STEAM COOLING RPV WATER LEVEL"
FLOOD CONTAINMENT C-6
PC 8
LEVEL C-5
RPV 4
RPV FLOOD C-4
NO
IS LEVEL KNOWN
YES
IS CRITERIA FOR LOWERING LEVEL MET
YES
NO
TERMINATE INJ. AND LOWER LEVEL
CONTROL LEVEL FROM X TO LOWERED POINT C-5
A
RPV 6
CONTROL LEVEL FROM LEVEL 8 TO TAF
CONTROL LEVEL FROM X TO LEVEL 8
B
CAN'T CONTROL LEVEL ABOVE LEVEL X
HAS DEPRESSURIZATION OCCURED
YES
NO
RETURN TO A OR B
RPV 5
YES
CAN LEVEL BE MAINTAINED ABOVE LEVEL X
NO
EMERGENCY DEPRESSURIZE C-2
PRESSURE RC/P
STABILIZE PRESSURE
RESTORE CONDENSER
SUBCRITICAL WITH RODS OR BORON
COOLDOWN WHEN PERMITTED
COOLDOWN < 100°F/HR
SHUTDOWN COOLING
POWER RC/Q
ATTEMPT MANUAL SCRAM
ATTEMPT ARI
REDUCE CORE FLOW
ATTEMPT TO INSERT RODS AND
INITIATE SBLC AT BIIT
RPV 6

CONTAINMENT CONTROL

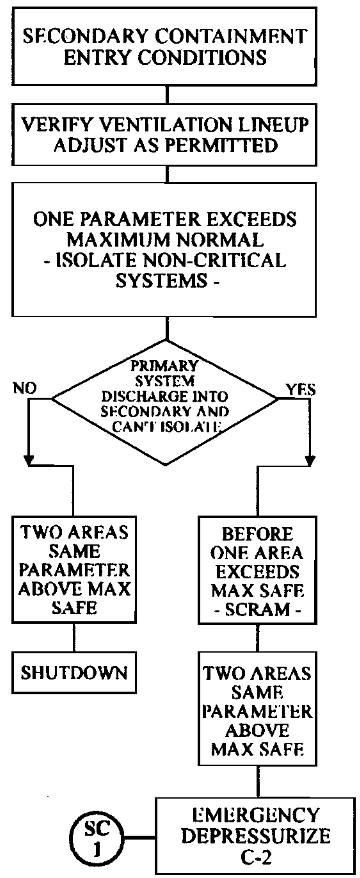


HYDROGEN CONTROL

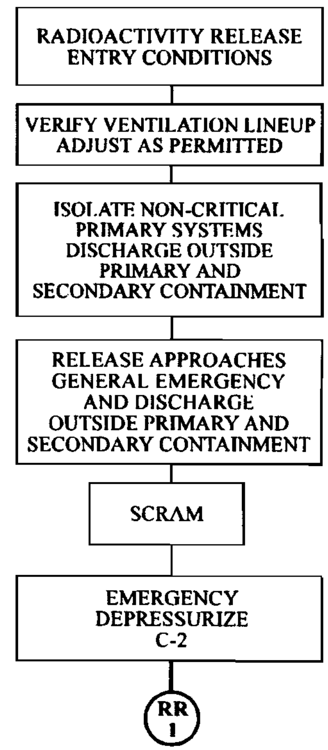


NOTE 1:
PC-11 WILL TAKE THIS PATH
NOTE 2:
APPLICABLE FOR PLANTS WITH RECOMBINERS

SECONDARY CONTAINMENT CONTROL

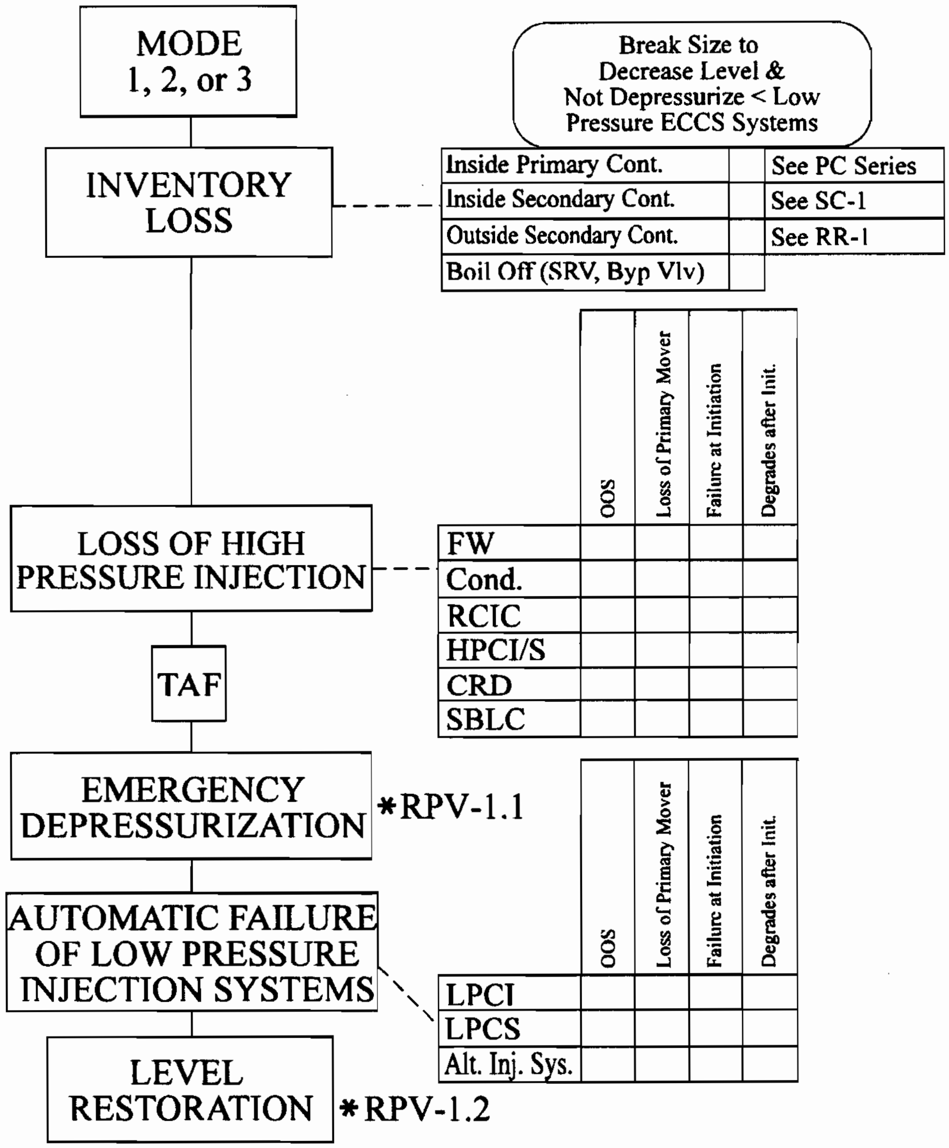


RADIOACTIVITY RELEASE CONTROL



ATTACHMENT 5

LOSS OF ALL HIGH PRESSURE INJECTION EMERGENCY DEPRESSURIZATION



*- Identifies Critical Tasks

#RPV-1

ATTACHMENT: 5

NUMBER: RPV - 1

TITLE: Loss of All High Pressure Injection - Emergency Depressurization

PURPOSE: Initiate a total loss of high pressure injection requiring the crew to perform an emergency depressurization with subsequent level restoration.

CRITICAL TASKS:

RPV-1.1. With Reactor pressure greater than shutoff head of the low pressure system(s) and when RPV water level reaches TAF, ***INITIATE*** emergency depressurization, before level reaches Minimum Zero-Injection RPV Water Level.

BASES: Safety Significant - If the decreasing RPV water trend has not been reversed before RPV water level drops to TAF and if at least one source of injection into the RPV is available, emergency depressurization is performed to maximize the injection flowrate from operating sources of injection. The consequences of not depressurizing the RPV under conditions that require emergency RPV depressurization could include a loss of adequate core cooling or failure of the primary containment.

Cue - RPV water level at TAF.

Performance Indicator - Initiate emergency depressurization, before level reaches minimum zero injection level.

Feedback - RPV pressure is decreasing.

RPV-1.2. Action is taken to restore RPV water level above TAF, by ***OPERATING*** available low pressure system(s), when RPV pressure decreases below the shutoff head of the low pressure system(s).

BASES: Safety Significant - Adequate core cooling exists so long as RPV water level remains above TAF. RPV depressurization is performed to maximize the injection flowrate from operating sources of injection.

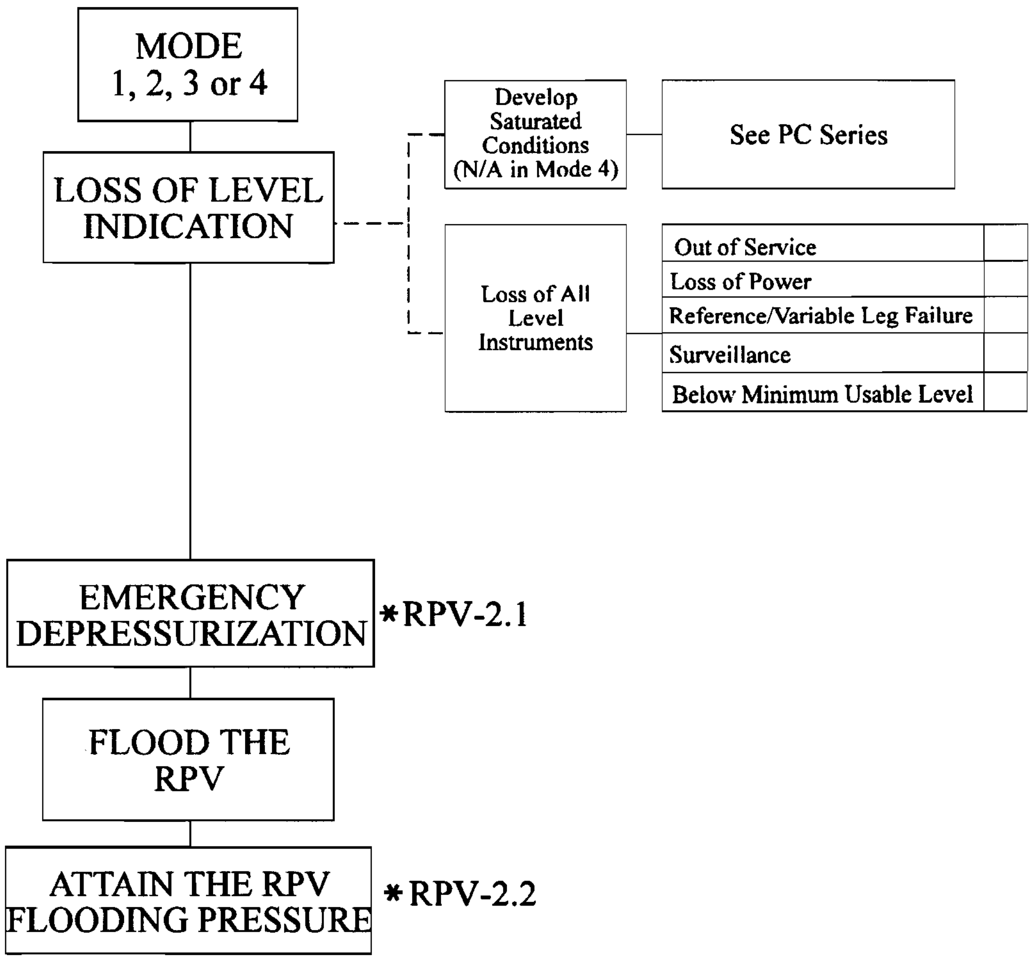
Cue - RPV pressure is below the low pressure system(s) shutoff head.

Performance Indicator - Operate available low pressure system(s), when RPV pressure decreases below the shutoff head of the low pressure system(s).

Feedback - Increasing RPV water level or injection flowrate.

ATTACHMENT 6

LOSS OF ALL RPV LEVEL INSTRUMENTS - RPV FLOOD



*- Identifies Critical Tasks

#RPV-2

ATTACHMENT: 6

NUMBER: RPV - 2

TITLE: Loss of all RPV Level Instruments - RPV Flood

PURPOSE: Initiate a total loss of all RPV level instruments requiring the crew to reflood the RPV and attain RPV flooding pressure.

CRITICAL TASKS:

RPV-2.1. When RPV water level cannot be determined, ***INITIATE*** emergency depressurization.

BASES: Safety Significant - If RPV water level cannot be determined, adequate core cooling by submergence cannot be verified. The RPV is therefore flooded to assure that adequate core cooling is established and maintained. The consequences of not depressurizing the RPV under these conditions could include a loss of adequate core cooling or failure of the primary containment.

Cue - RPV water level is unknown.

Performance Indicator - Initiate emergency depressurization, when RPV water level cannot be determined.

Feedback - RPV pressure is decreasing.

RPV-2.2. When Reactor water level cannot be determined, ***INJECT*** into the RPV to maintain RPV pressure above Minimum RPV Flooding Pressure (MRPVFP).

BASES: Safety Significant - The basis for determining the MRPVFP is the decay heat generation rate that corresponds to conditions ten minutes after shutdown from full power. Since ten minutes is the earliest that RPV flooding could reasonably be expected to be required, establishing and maintaining RPV pressure above the MRPVFP assures that more than enough steam flows through the SRVs to carry away all core decay heat.

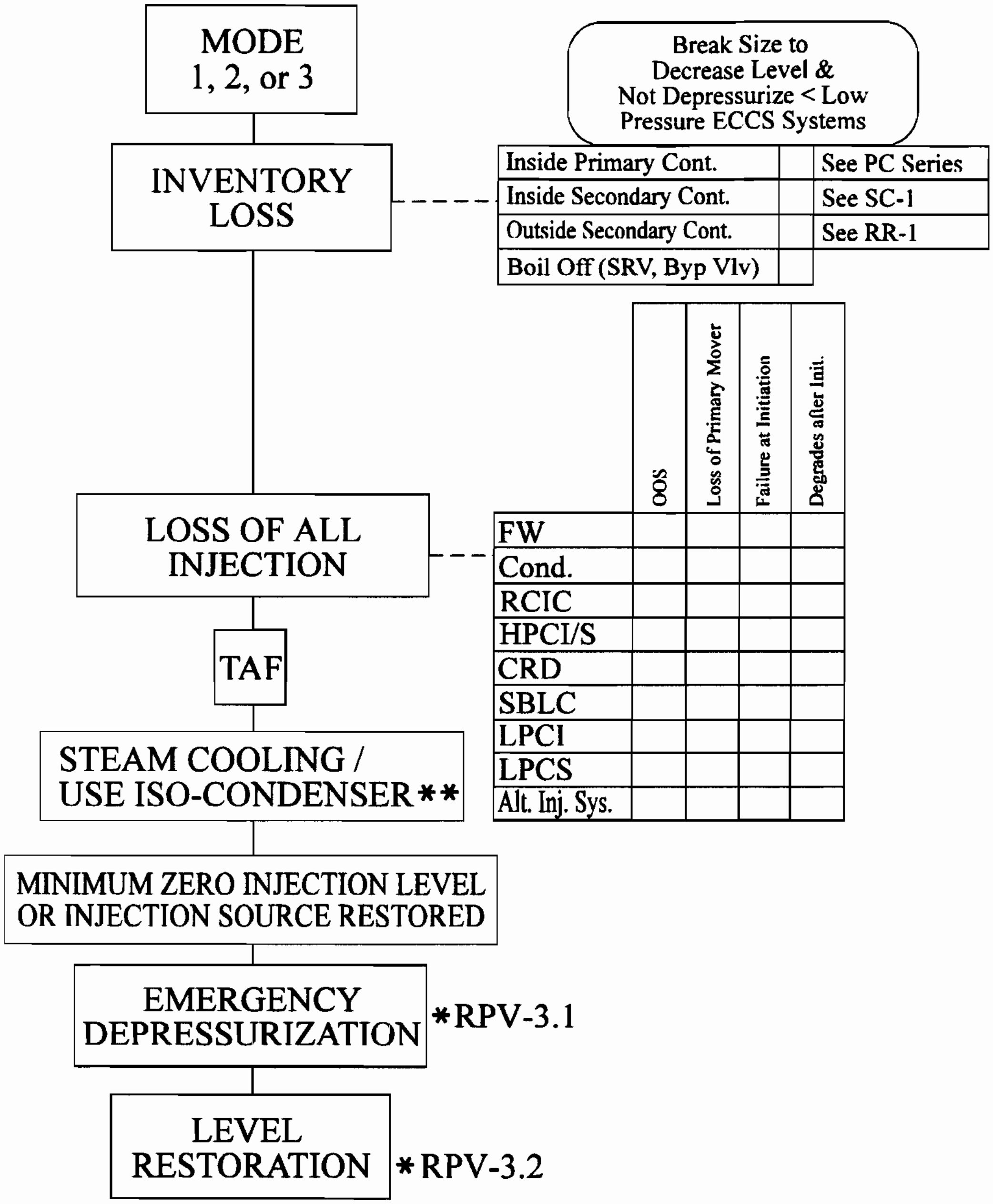
Cue - RPV water level is unknown.

Performance Indicator - Injection into the RPV to maintain RPV pressure above MRPVFP.

Feedback - RPV pressure is greater than MRPVFP.

ATTACHMENT 7

LOSS OF ALL INJECTION - STEAM COOLING WITH LEVEL RESTORATION



Inside Primary Cont.		See PC Series
Inside Secondary Cont.		See SC-1
Outside Secondary Cont.		See RR-1
Boil Off (SRV, Byp Vlv)		

	OOS	Loss of Primary Mover	Failure at Initiation	Degrades after Init.
FW				
Cond.				
RCIC				
HPCI/S				
CRD				
SBLC				
LPCI				
LPCS				
Alt. Inj. Sys.				

*- Identifies Critical Tasks

**-Plant Specfic

#RPV-3

ATTACHMENT: 7

NUMBER: RPV - 3

TITLE: Loss of all Injection - Steam Cooling - With Level Restoration

PURPOSE: Initiate a total loss of RPV injection causing RPV level to drop below TAF. This requires RPV Steam Cooling, with subsequent emergency depressurization and level restoration.

CRITICAL TASKS:

RPV-3.1. When RWL drops to Minimum Zero-Injection RPV Water Level or when injection system becomes available, ***INITIATE*** emergency depressurization.

BASES: Safety Significant - The Steam Cooling evolution is terminated when an injection system is restored to maximize injection flow from the available source(s). RPV depressurization also reverses the heatup of the upper core region by increasing the steam flow through the fuel bundles. Also when RWL reaches minimum zero-injection RPV water level, the consequences of not depressurizing the RPV could result in significant core damage due excessive fuel temperatures.

Cue - RPV water level is at the minimum zero-injection water level or any injection system becomes available.

Performance Indicator - Initiate emergency depressurization, when RPV water level is at minimum zero-injection water level or an injection system is available.

Feedback - RPV pressure is decreasing.

RPV-3.2. When injection systems become available, action is taken to ***RESTORE*** injection to the RPV and raise reactor water level.

BASES: Safety Significant - The Steam Cooling evolution is terminated when an injection system is restored to maximizing the injection flowrate from the available source(s).

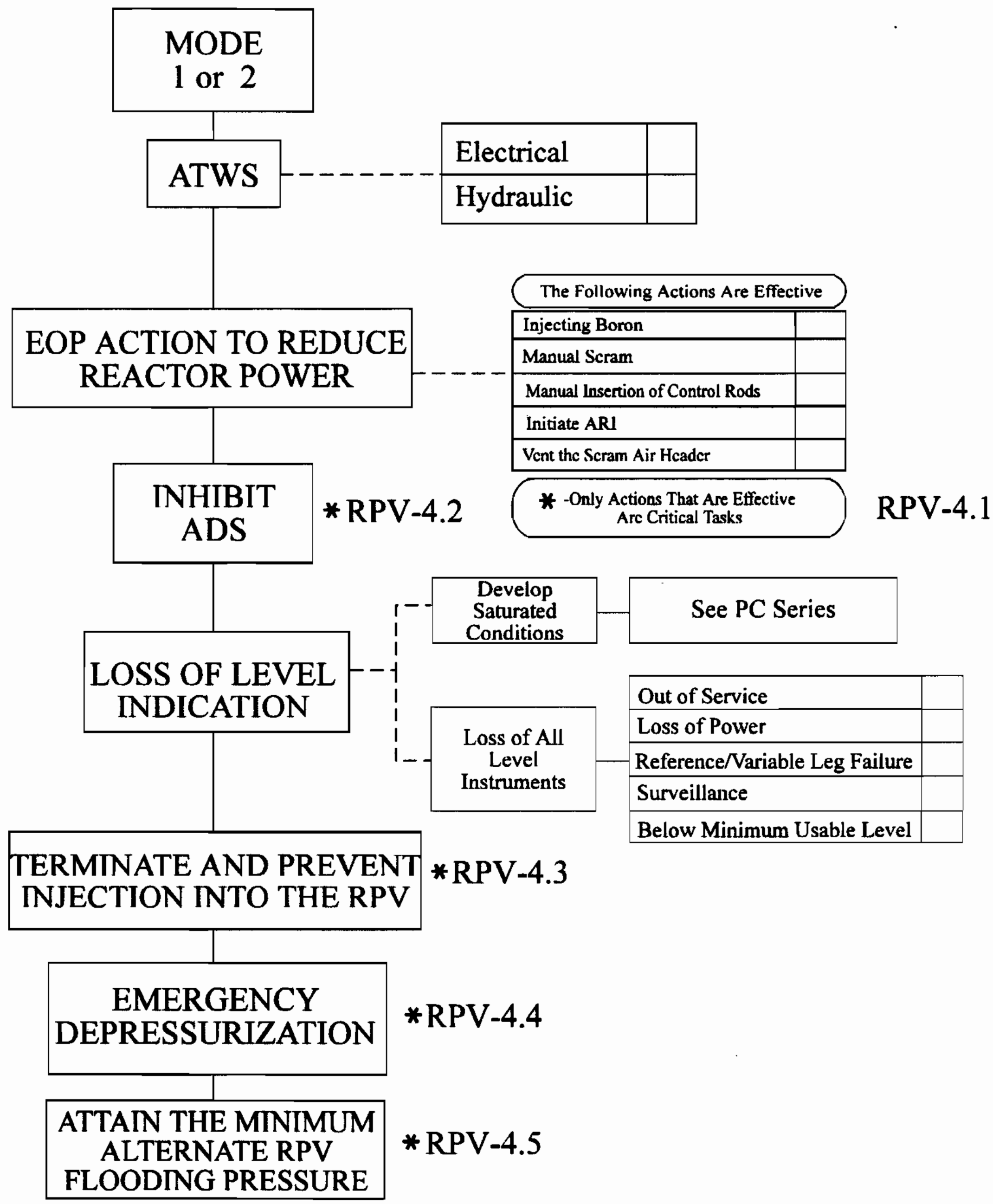
Cue - Injection systems become available.

Performance Indicator - Restore injection into the RPV and raise RPV level.

Feedback - Increasing RPV water level or injection flowrate.

ATTACHMENT 8

ATWS - LOSS OF ALL RPV LEVEL INSTRUMENTS - RPV FLOOD



* - Identifies Critical Tasks #RPV-4

ATTACHMENT: 8

NUMBER: RPV - 4

TITLE: ATWS - Loss of all RPV Level Instruments - RPV Flood

PURPOSE: With a failure to scram event and a total loss of RPV level instruments requiring RPV Flooding, attain the Minimum Alternate RPV Flooding Pressure (MARPVFP).

CRITICAL TASKS:

RPV-4.1. With a reactor scram required and the reactor not shutdown, ***TAKE ACTION TO REDUCE POWER*** by injecting boron and/or inserting control rods, to prevent exceeding the primary containment design limits.

BASES: Safety Significant - The challenge to containment becomes the limiting factor that defines the requirement for boron injection. If control rods can be inserted sufficiently to shutdown the reactor, boron injection may be terminated or avoided altogether. Thus shutting down the reactor can preclude failure of containment or equipment necessary for the safe shutdown of the plant.

Cue - Reactor scram required and the reactor not shutdown.

Performance Indicator - Reducing reactor power to prevent exceeding primary containment design limits.

Feedback - Reactor Power is decreasing.

RPV-4.2. With a reactor scram required, reactor not shutdown, and conditions for ADS blowdown met, ***INHIBIT*** ADS to prevent an uncontrolled RPV depressurization, to prevent causing a significant power excursion.

BASES: Safety Significant - In order to effect a reduction in reactor power, actions may be taken to lower RPV water level to a level below the automatic initiation setpoint of ADS. This actuation imposes a severe thermal transient on the RPV and may significantly complicate efforts to restore and maintain RPV water level. Further, rapid and uncontrolled injection of large amounts of relatively cold, unborated water from low pressure injection systems may occur. This would quickly dilute in-core boron concentration and might add sufficient positive reactivity to cause a reactor power excursion large enough to severely damage the core.

Cue - ATWS, prevent an uncontrolled RPV depressurization.

Performance Indicator - Inhibit ADS.

Feedback - ADS is inhibited.

RPV-4.3. During an ATWS with emergency depressurization required, ***TERMINATE AND PREVENT INJECTION***, with exception of boron and CRD, into the RPV until reactor pressure is below minimum alternate RPV flooding pressure (MARPVFP).

BASES: Safety Significant - A rapid depressurization of the RPV may result in rapid injection of ***LARGE*** amounts of relatively cold, unborated water from low pressure injection systems. Thus the action taken to terminate and prevent injection allows RPV depressurization to proceed safely under failure-to-scram conditions. Injection from boron systems and CRD is not terminated because operation of these systems may be needed to establish and maintain reactor shutdown.

Cue - ATWS, with emergency depressurization required.

Performance Indicator - Terminate and prevent injection into the RPV with exception of boron and CRD (RCIC site specific).

Feedback - Injection sources terminated.

RPV-4.4. With the reactor at pressure and RPV water level cannot be determined, ***INITIATE*** emergency depressurization.

BASES: Safety Significant - If RPV water level cannot be determined, adequate core cooling by submergence cannot be verified. The RPV is therefore flooded to assure that adequate core cooling is established and maintained. The consequences of not depressurizing the RPV under conditions that require emergency RPV depressurization could include a loss of adequate core cooling or failure of the primary containment.

Cue - Water level cannot be determined during an ATWS.

Performance Indicator - Initiate emergency depressurization, when RPV water level cannot be determined.

Feedback - RPV pressure is decreasing.

RPV-4.5. When RPV pressure is below MARPVFP, ***SLOWLY RAISE AND CONTROL INJECTION*** into the RPV to maintain RPV pressure above the MARPVFP.

BASES: Safety Significant - Re-establishing injection into the RPV is required in order to adequately cool the core and ultimately flood the RPV. Since the reactor may become critical during this evolution, injection into the RPV is increased slowly to preclude the possibility of large power excursions caused by rapid injection of relatively cold, unborated water. Injection at a rate sufficient to maintain RPV pressure above the MARPVFP 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.

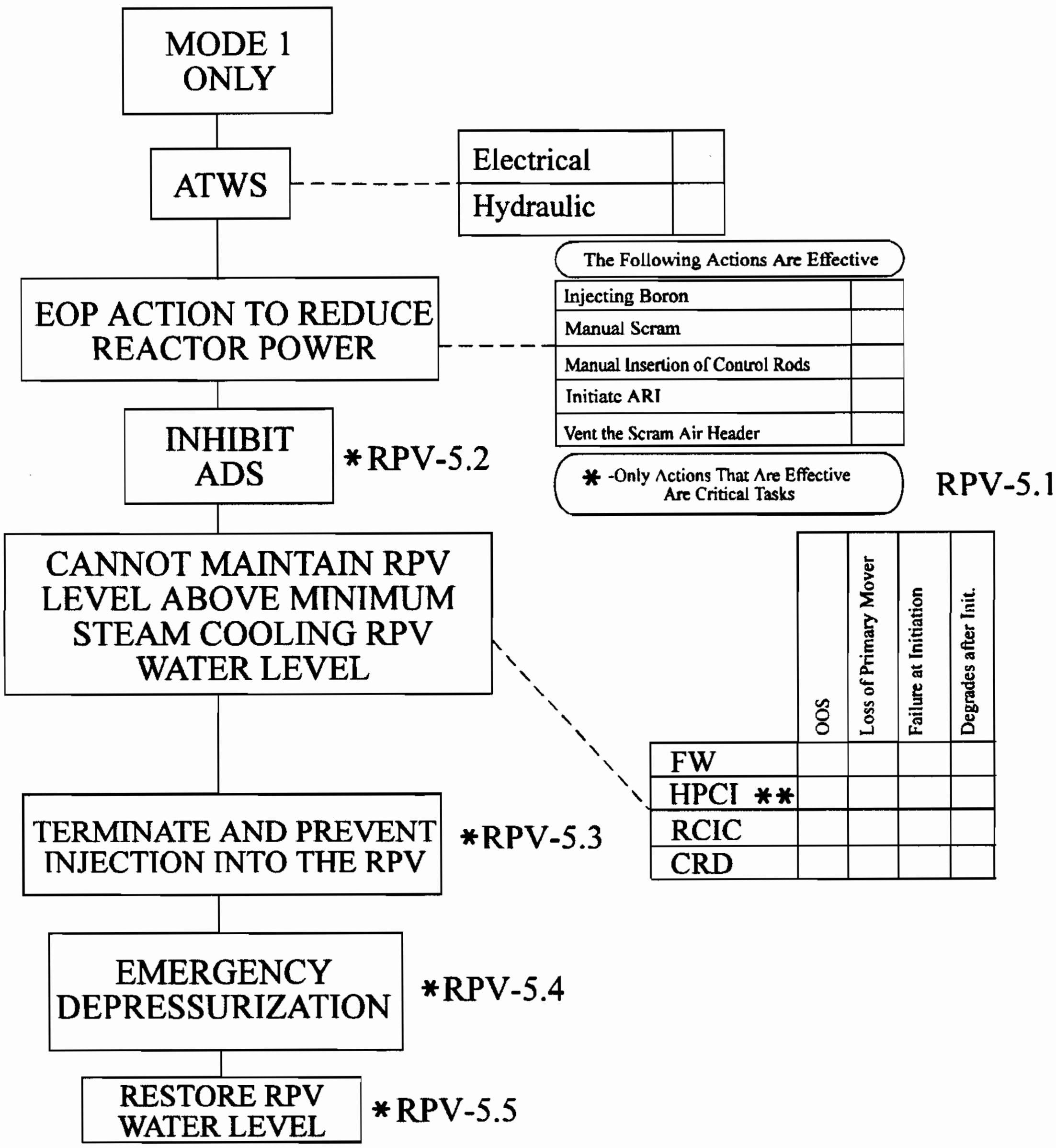
Cue - RPV pressure below MARPVFP.

Performance Indicator - Injection re-established to maintain RPV pressure above MARPVFP.

Feedback - RPV pressure is maintained above MARPVFP.

ATTACHMENT 9

ATWS - LOSS OF ALL HIGH PRESSURE INJECTION EMERGENCY DEPRESSURIZATION



* - Identifies Critical Tasks

** - Plant Specific

#RPV-5

ATTACHMENT: 9

NUMBER: RPV - 5

TITLE: ATWS - Loss of All High Pressure Injection - Emergency Depressurization

PURPOSE: With a failure to scram condition, all high pressure injection is lost requiring emergency depressurization and level restoration.

CRITICAL TASKS:

RPV-5.1. With a reactor scram required and the reactor not shutdown, ***TAKE ACTION TO REDUCE POWER*** by injecting boron and/or inserting control rods, to prevent exceeding the primary containment design limits.

BASES: Safety Significant - The challenge to containment becomes the limiting factor that defines the requirement for boron injection. If control rods can be inserted sufficiently to shutdown the reactor, boron injection may be terminated or avoided altogether. Thus shutting down the reactor can preclude failure of containment or equipment necessary for the safe shutdown of the plant.

Cue - Reactor scram required and the reactor not shutdown.

Performance Indicator - Reducing reactor power to prevent exceeding primary containment design limits.

Feedback - Reactor Power is decreasing.

RPV-5.2. With a reactor scram required, reactor not shutdown, and conditions for ADS blowdown are met, ***INHIBIT*** ADS to prevent an uncontrolled RPV depressurization, to prevent causing a significant power excursion.

BASES: Safety Significant - In order to effect a reduction in reactor power, actions may be taken to lower RPV water level to a level below the automatic initiation setpoint of ADS. This actuation imposes a severe thermal transient on the RPV and may significantly complicate efforts to restore and maintain RPV water level. Further, rapid and uncontrolled injection of large amounts of relatively cold, unborated water from low pressure injection systems may occur. This would quickly dilute in-core boron concentration and might add sufficient positive reactivity to cause a reactor power excursion large enough to severely damage the core.

Cue - ATWS, prevent an uncontrolled RPV depressurization.

Performance Indicator - Inhibit ADS.

Feedback - ADS is inhibited.

RPV-5.3. During an ATWS with emergency depressurization required, ***TERMINATE AND PREVENT INJECTION***, with exception of boron and CRD, into the RPV until reactor pressure is below minimum alternate RPV flooding pressure (MARPVFP).

BASES: Safety Significant - A rapid depressurization of the RPV may result in rapid injection of ***LARGE*** amounts of relatively cold, unborated water from low pressure injection systems. Thus the action taken to terminate and prevent injection allows RPV depressurization to proceed safely under failure-to-scram conditions. Injection from boron systems and CRD is not terminated because operation of these systems may be needed to establish and maintain reactor shutdown.

Cue - ATWS, with emergency depressurization required.

Performance Indicator - Terminate and prevent injection into the RPV with exception of boron and CRD (RCIC site specific).

Feedback - Injection sources terminated.

RPV-5.4. With the reactor at pressure and RPV water level cannot be maintained above the Minimum Steam Cooling RPV Water Level, ***INITIATE*** emergency depressurization.

BASES: Safety Significant - When RPV water level cannot be maintained above the minimum steam cooling RPV water level, emergency depressurization is required for the purpose of maximizing injection flow from low pressure systems. Adequate core cooling is maintained so long as RPV water level remains above the minimum steam cooling RPV water level.

Cue - RPV at pressure and RPV level cannot be maintained above minimum steam cooling water level.

Performance Indicator - Initiate emergency depressurization.

Feedback - RPV pressure is decreasing.

RPV-5.5 When RPV pressure is below MARPVFP ***SLOWLY RAISE AND CONTROL INJECTION*** into the RPV to maintain level above Minimum Steam Cooling RPV Water Level.

BASES: Safety Significant - Injection into the RPV is re-established to maintain adequate core cooling. Irrespective of whether the reactor is shutdown, injection is controlled to make up the mass of steam being rejected through open SRVs and to keep the core submerged. Injection is increased slowly to preclude the possibility of large power excursions due to the rapid injection of relatively cold, unborated water under conditions where the reactor may not be shutdown.

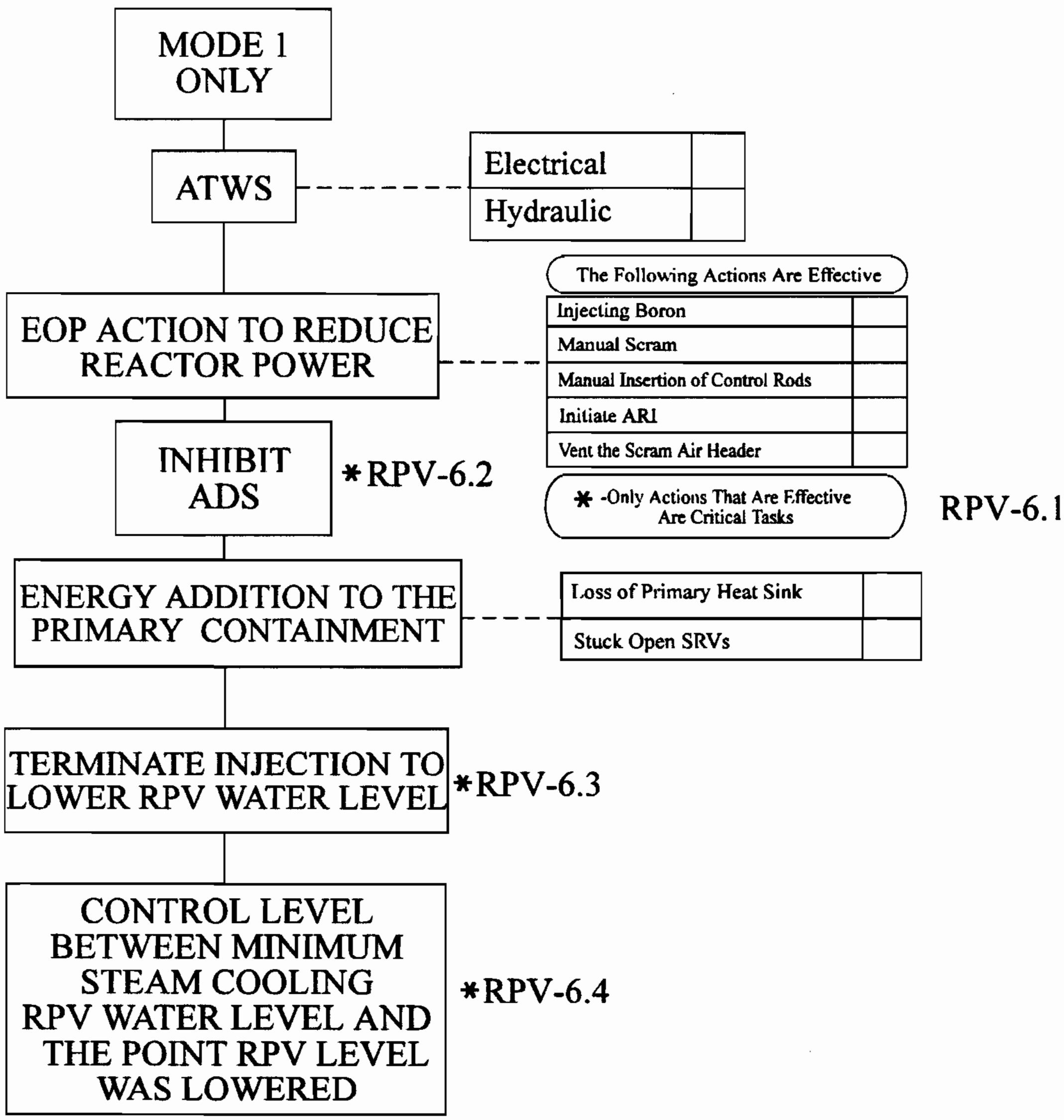
Cue - RPV pressure below MARPVFP.

Performance Indicator - Injection re-established to maintain RPV level above minimum steam cooling RPV water level.

Feedback - Increasing RPV water level or injection flowrate.

ATTACHMENT 10

ATWS - POWER / LEVEL CONTROL



* - Identifies Critical Tasks #RPV-6

ATTACHMENT: 10

NUMBER: RPV - 6

TITLE: ATWS - Power/Level Control

PURPOSE: With a failure to scram and energy addition to the containment the crew will lower level to control power.

CRITICAL TASKS:

RPV-6.1. With a reactor scram required and the reactor not shutdown, ***TAKE ACTION TO REDUCE POWER*** by injecting boron and/or inserting control rods, to prevent exceeding the primary containment design limits.

BASES: Safety Significant - The challenge to containment becomes the limiting factor that defines the requirement for boron injection. If control rods can be inserted sufficiently to shutdown the reactor, boron injection may be terminated or avoided altogether. Thus shutting down the reactor can preclude failure of containment or equipment necessary for the safe shutdown of the plant.

Cue - Reactor scram required and reactor not shutdown.

Performance Indicator - Reducing reactor power to prevent exceeding primary containment design limits.

Feedback - Reactor Power is decreasing.

RPV-6.2. With a reactor scram required, reactor not shutdown, and conditions for ADS blowdown are met, ***INHIBIT*** ADS to prevent an uncontrolled RPV depressurization, to prevent causing a significant power excursion.

BASES: Safety Significant - In order to effect a reduction in reactor power, actions may be taken to lower RPV water level to a level below the automatic initiation setpoint of ADS. This actuation imposes a severe thermal transient on the RPV and may significantly complicate efforts to restore and maintain RPV water level. Further, rapid and uncontrolled injection of large amounts of relatively cold, unborated water from low pressure injection systems may occur. This would quickly dilute in-core boron concentration and might add sufficient positive reactivity to cause a reactor power excursion large enough to severely damage the core.

Cue - ATWS, prevent an uncontrolled RPV depressurization.

Performance Indicator - Inhibit ADS.

Feedback - ADS is inhibited.

RPV-6.3. During an ATWS with conditions met to perform power/level control ***TERMINATE AND PREVENT INJECTION***, with exception of boron and CRD, into the RPV until conditions are met to re-establish injection.

BASES: Safety Significant - The combination of high reactor power, high suppression pool temperature and an open SRV or high containment pressure, are symptomatic of heat being rejection to the suppression pool at a rate in excess of that which can be removed by the suppression pool cooling system. Unless mitigated, these conditions ultimately result in loss of NPSH for ECCS pumps taking suction on the suppression pool, containment over pressurization, and loss of primary containment integrity which in turn could lead to a loss of adequate core cooling and uncontrolled release of radioactivity to the environment.

Cue - Suppression pool temperature above Boron Injection Initiation Temperature and with energy addition to containment.

Performance Indicator - Terminate and prevent injection into the RPV to preclude the loss of ECCS NPSH or exceeding Primary Containment design limits.

Feedback - RPV water level is decreasing.

RPV-6.4. When conditions are met to re-establish injection use available injection systems to ***MAINTAIN*** RPV water level above the Minimum Steam Cooling RPV Water Level.

BASES: Safety Significant - The Minimum Steam Cooling RPV water level is defined to be the lowest RWL at which the covered portion of the reactor core will generate sufficient steam to preclude any clad temperature in the uncovered portion of the core from exceeding 1500°F. When RWL is deliberately lowered, power instabilities may produce noticeable oscillations in RWL and make it difficult to maintain water level exactly at the TAF. The low end of RWL control range is therefore utilized to preclude fuel damage with RWL lowered to below the TAF.

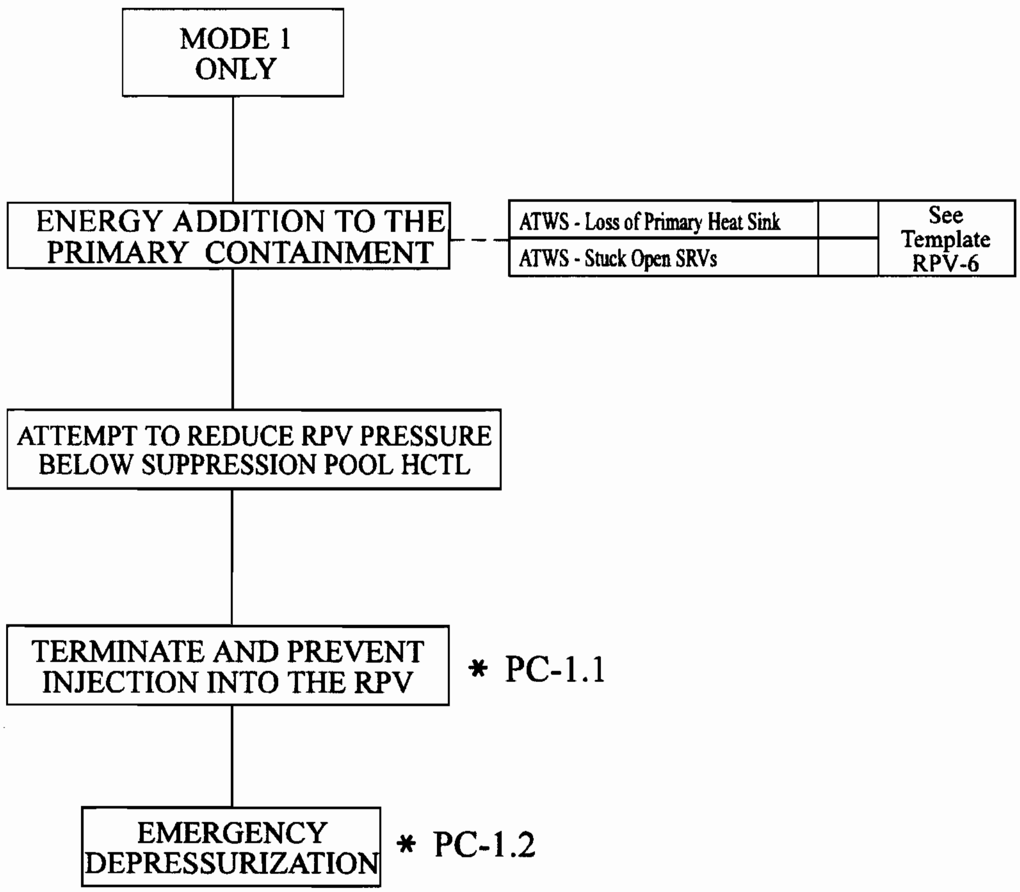
Cue - When conditions are met to re-establish injection.

Performance Indicator - RPV level is maintained above minimum steam cooling RPV water level.

Feedback - RPV level is maintained above minimum steam cooling RWL.

ATTACHMENT 11

SUPPRESSION POOL HIGH TEMPERATURE EMERGENCY DEPRESSURIZATION



* - Identifies Critical Tasks #PC-1

ATTACHMENT: 11

NUMBER: PC - 1

TITLE: Suppression Pool High Temperature - Emergency Depressurization.

PURPOSE: With an energy addition to the suppression pool an emergency depressurization will be initiated when the heat capacity temperature limit (HCTL) is approached.

CRITICAL TASKS:

PC-1.1. During an ATWS with emergency depressurization required, ***TERMINATE AND PREVENT INJECTION***, with exception of boron and CRD, into the RPV until reactor pressure is below MARPVFP.

BASES: Safety Significant - A rapid depressurization of the RPV may result in rapid injection of ***LARGE*** amounts of relatively cold, unborated water from low pressure injection systems. Thus the action taken to terminate and prevent injection allows RPV depressurization to proceed safely under failure-to-scram conditions. Injection from boron systems and CRD is not terminated because operation of these systems may be needed to establish and maintain reactor shutdown.

Cue - ATWS, with emergency depressurization required.

Performance Indicator - Terminate and prevent injection into the RPV with exception of boron and CRD (RCIC site specific).

Feedback - Injection sources terminated.

PC-1.2. With RPV at pressure and suppression pool temperature and RPV pressure cannot be maintained below heat capacity temperature limit (HCTL), ***INITIATE*** emergency depressurization.

BASES: Safety Significant - Depressurizing the RPV when suppression pool temperature and RPV pressure cannot be maintained below the heat capacity temperature limit precludes failure of the containment or equipment necessary for the safe shutdown of the plant. Unless mitigated, these conditions ultimately result in loss of NPSH for ECCS pumps taking suction on the suppression pool, containment overpressurization, and loss of primary containment integrity which in turn could lead to a loss of adequate core cooling and uncontrolled release of radioactivity to the environment.

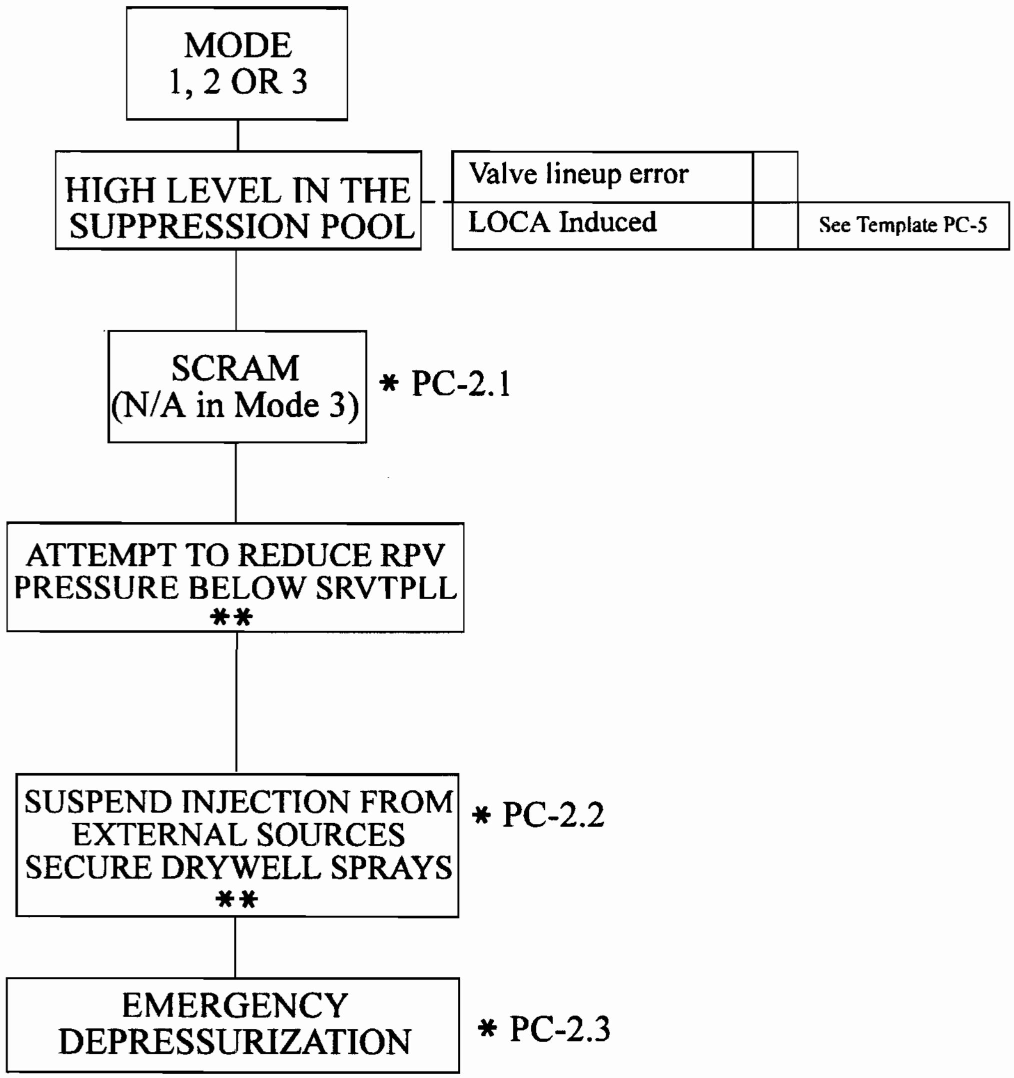
Cue - Suppression temperature approaching HCTL.

Performance Indicator - Initiating emergency depressurization when suppression pool temperature and RPV pressure cannot be maintained below the HCTL.

Feedback - RPV pressure is decreasing.

ATTACHMENT 12

SUPPRESSION POOL HIGH LEVEL
EMERGENCY DEPRESSURIZATION



* - Identifies Critical Tasks

** - Plant Specific

#PC-2

ATTACHMENT: 12

NUMBER: PC - 2

TITLE: Suppression Pool High Level - Emergency Depressurization.

PURPOSE: With suppression pool high level the crew will perform an emergency depressurization to maintain suppression pool out of the unsafe region of SRV tailpipe level limit (SRVTPLL).

CRITICAL TASKS:

PC-2.1. With reactor at power and suppression pool water level cannot be maintained below the SRV tailpipe level limit (SRVTPLL) ***MANUALLY SCRAM*** the reactor.

BASES: Safety Significant - The SRVTPLL is a function of RPV pressure. If action to control the principal parameter, suppression pool water level, is ineffective, then initiation of a reactor scram if one has not yet been initiated, will aid in reducing core heat and the steam generation rate in the RPV to decay heat levels, thereby assisting in maintaining plant conditions below the SRVTPLL.

Cue - Suppression pool level approaching SRVTPLL.

Performance Indicator - Initiate a reactor manual scram.

Feedback - Reactor scram is inserted.

PC-2.2. When suppression pool water level cannot be maintained below the level for drywell to suppression pool vacuum breakers, ***TERMINATE*** drywell/containment sprays and ***TERMINATE INJECTION*** into the RPV and containment from external sources except systems required for adequate core cooling, boron injection and CRD.

BASES: Safety Significant - The specified suppression pool water level assures that no portion of the drywell side of the vacuum breakers are submerged for any drywell below wetwell differential pressure less than or equal to the vacuum breaker opening differential pressure. Operation of drywell sprays is terminated because post spray drywell vacuum relief cannot be assured. Injection into the RPV from sources external to the primary containment is terminated to prevent future increase in suppression pool water level. Assuring adequate core cooling takes precedence over terminating injection into the RPV from external sources since additional action can still be taken to prevent SRV system damage and containment failure.

Cue - Suppression pool water level is above drywell/containment level limit.

Performance Indicator - Secure drywell/containment sprays and terminate injection into the RPV.

Feedback - Drywell/containment Sprays secured and injection to the RPV from external sources is terminated.

PC-2.3. When suppression pool water level and RPV pressure cannot be restored and maintained below the SRVTPLL, ***INITIATE*** an emergency depressurization.

BASES: Safety Significant - The RPV is not permitted to remain at pressure if operation of SRVs may cause the SRV discharge lines or associated components to fail. The consequences of operating SRVs when suppression pool water level and RPV pressure exceeds the SRVTPLL may include direct pressurization of the containment from a break in the SRV discharge line, with the resulting primary containment pressurization causing containment failure.

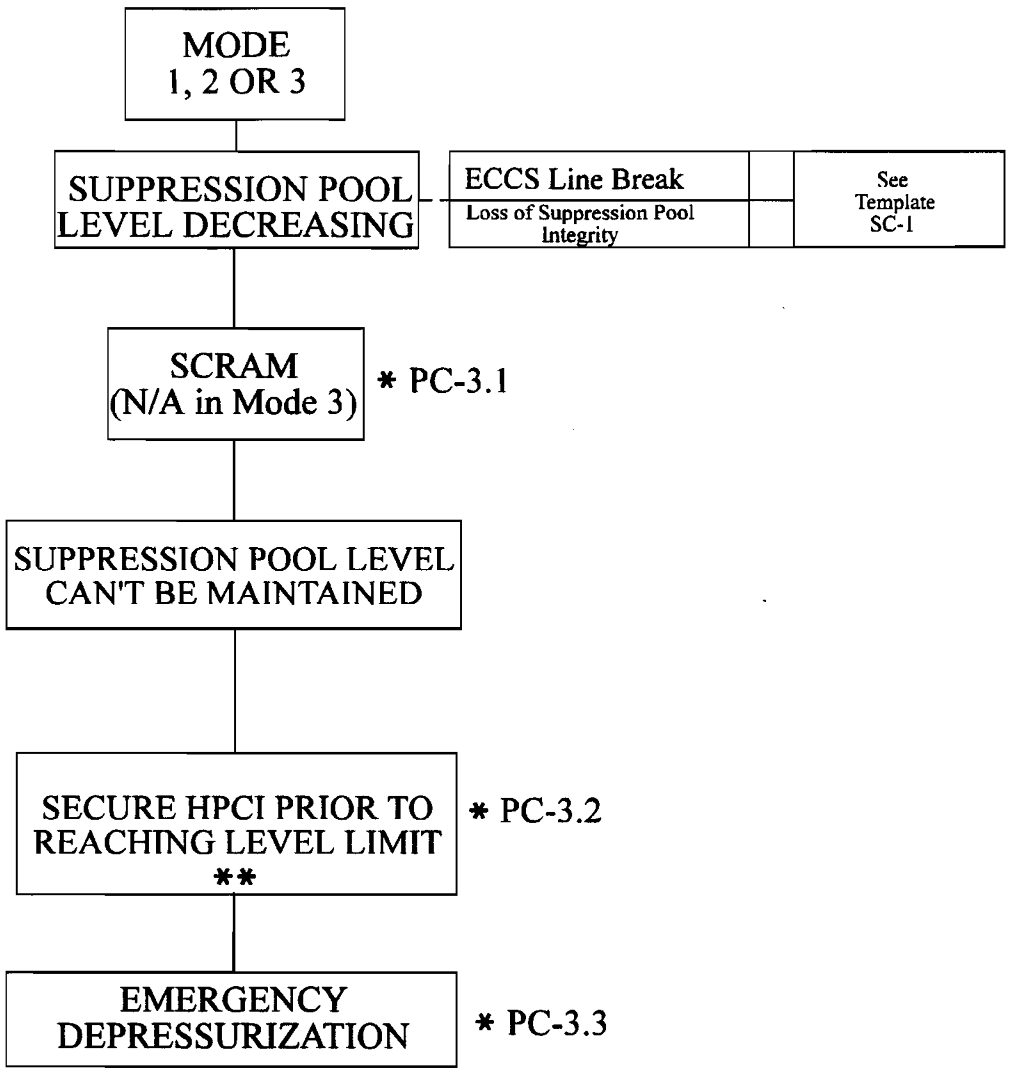
Cue - Suppression pool level and RPV pressure cannot be maintained below SRVTPLL.

Performance Indicator - Initiate emergency depressurization.

Feedback - Reactor pressure is decreasing.

ATTACHMENT 13

SUPPRESSION POOL LOW LEVEL EMERGENCY DEPRESSURIZATION



* - Identifies Critical Tasks

** - Plant Specific

#PC-3

ATTACHMENT: 13

NUMBER: PC - 3

TITLE: Suppression Pool Low Level - Emergency Depressurization.

PURPOSE: With low level in the suppression pool perform emergency depressurization to ensure availability of heat sink.

CRITICAL TASKS:

PC-3.1. With reactor at power and suppression pool water level cannot be maintained in the safe region of the heat capacity level limit (HCLL), ***MANUALLY SCRAM*** the reactor.

BASES: Safety Significant - The HCLL is a function of RPV pressure. If action to control suppression pool water level is ineffective, then initiation of a reactor scram, if one has not yet been initiated, assures the reactor is scrammed and shutdown before RPV depressurization is initiated.

Cue - Suppression pool level is approaching the HCLL.

Performance Indicator - Initiate a reactor manual scram before pressure reduction.

Feedback - Reactor scram is inserted.

PC-3.2. When suppression pool level cannot be maintained above top elevation of the HPCI exhaust, ***TRIP AND PREVENT*** HPCI operation irrespective of adequate core cooling. (Plant Specific)

BASES: Safety Significant - Operation of HPCI system with its exhaust discharge device not submerged will directly pressurize the suppression chamber and may extend to failure of the primary containment from over pressurization. Thus HPCI must be secured irrespective of adequate core cooling concerns.

Cue - Suppression pool water level approaching the top of HPCI exhaust line.

Performance Indicator - Trip and prevent HPCI operation.

Feedback - HPCI is tripped and prevented from injecting.

PC-3.3. When suppression pool water cannot be maintained in the safe region of the HCLL, ***INITIATE*** emergency depressurization.

BASES: Safety Significant - This limit is used in conjunction with the HCTL to preclude failure of the containment or equipment necessary for the safe shutdown of the plant, and to preclude loss of the suppression function of containment.

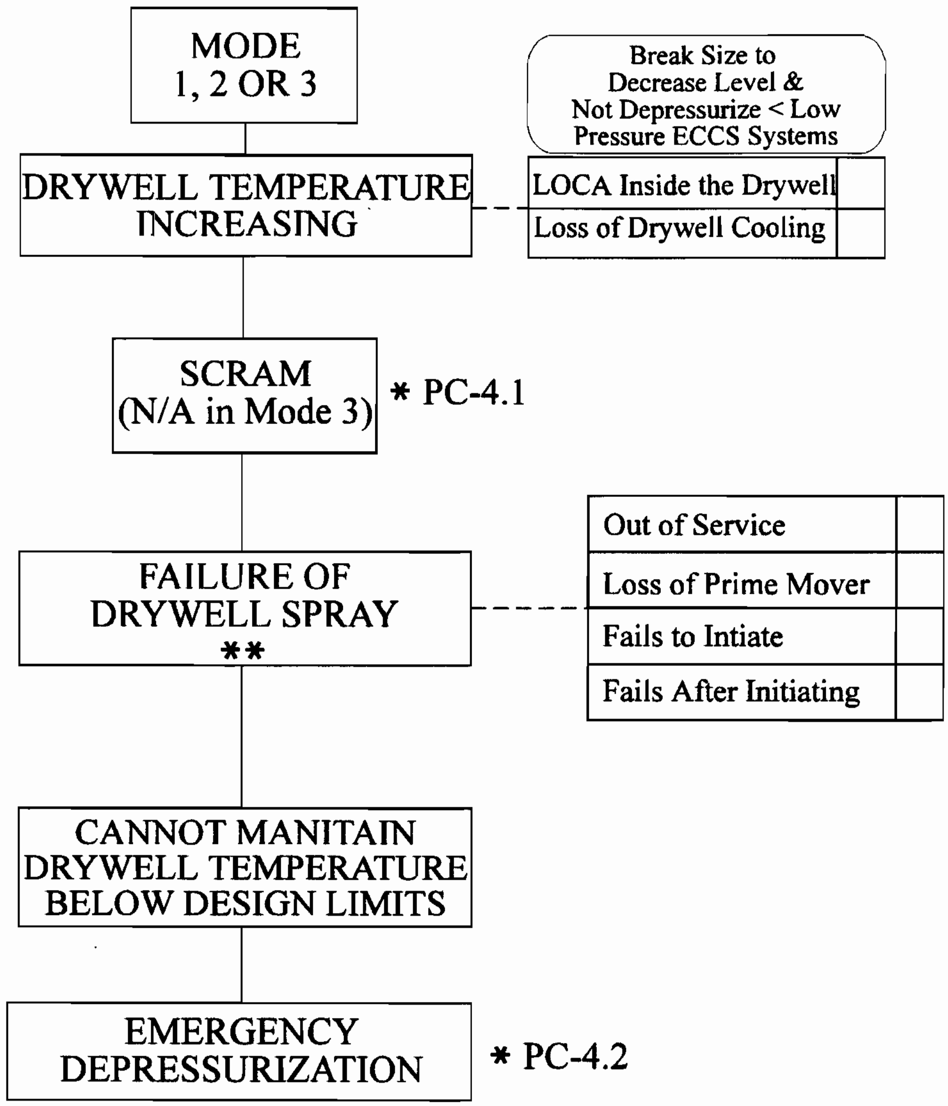
Cue - Suppression pool level and RPV pressure approaching HCLL.

Performance Indicator - Initiate emergency depressurization.

Feedback - Reactor pressure is decreasing.

ATTACHMENT 14

LOCA - EMERGENCY DEPRESSURIZATION DRYWELL TEMPERATURE



* - Identifies Critical Tasks

** - Plant Specific

#PC-4

ATTACHMENT: 14

NUMBER: PC - 4

TITLE: LOCA - Emergency Depressurization - Drywell Temperature

PURPOSE: With the energy addition to drywell and a failure of drywell sprays, emergency depressurization is performed prior to exceeding design temperatures.

CRITICAL TASKS:

PC-4.1. With reactor at power and drywell temperature increasing, ***MANUALLY SCRAM*** the reactor before drywell design temperature is exceeded.

BASES: Safety Significant - If action to control drywell temperature is ineffective, then initiation of a reactor scram if one has not yet been initiated, assures the reactor is scrammed and shutdown before RPV depressurization is initiated.

Cue - Drywell temperature is approaching design limit.

Performance Indicator - Initiate a reactor manual scram before exceeding design temperature.

Feedback - Reactor scram is inserted.

PC-4.2. When drywell temperature cannot be maintained below the drywell design temperature ***INITIATE*** emergency depressurization.

BASES: Safety Significant - When drywell cannot otherwise be maintained below applicable component qualification or structural design limits, further release of energy from the RPV to the drywell is minimized by rapidly depressurizing the RPV.

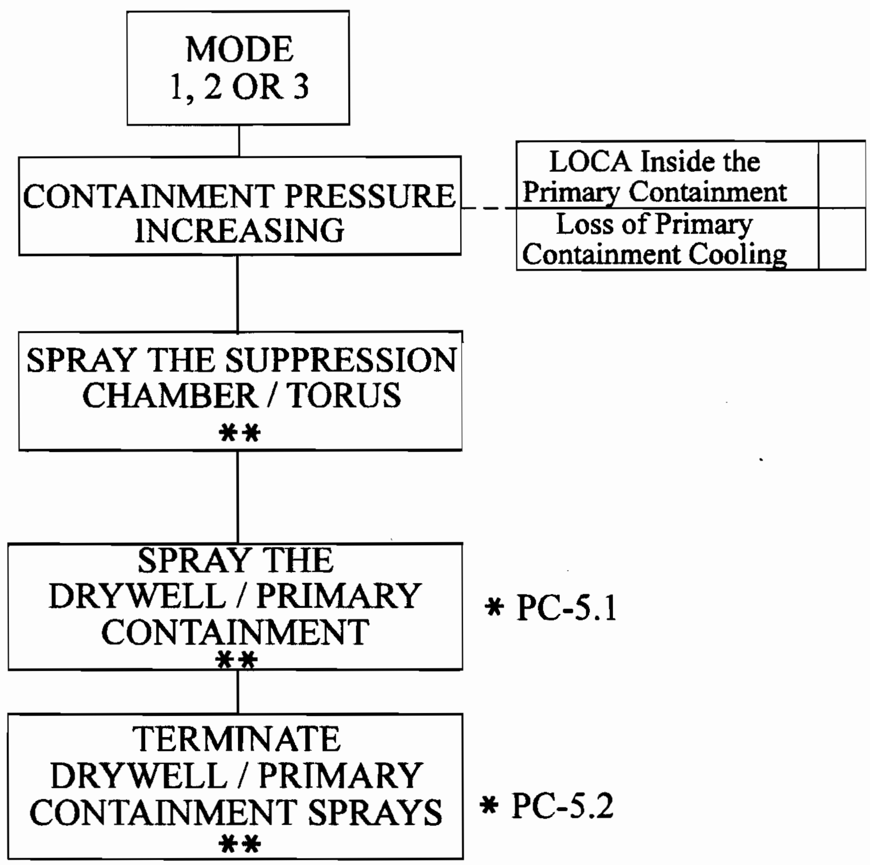
Cue - Drywell temperature is approaching the design limit.

Performance Indicator - Initiate emergency depressurization.

Feedback - Reactor pressure is decreasing.

ATTACHMENT 15

LOCA - DRYWELL / PRIMARY CONTAINMENT SPRAY



* - Identifies Critical Tasks

** - Plant Specific

#PC-5

ATTACHMENT: 15

NUMBER: PC - 5

TITLE: LOCA - Drywell/Primary Containment Spray

PURPOSE: With drywell/containment pressure increasing, the crew will reduce pressure by spraying the drywell/containment.

CRITICAL TASKS:

PC-5.1. When drywell pressure exceeds the suppression chamber spray initiation pressure (Mark I, II containments) or before containment pressure exceeds the Pressure Suppression Pressure (PSP) (Mark III containment), ***INITIATE*** drywell/containment sprays, while in the safe region of the drywell spray initiation limit (DSIL) (Mark I, II containments) or above the containment spray initiation pressure (Mark III containment).

BASES: Safety Significant - Drywell/containment sprays are initiated to effect the desired pressure reduction in the drywell/containment. This is to limit the pressure transient on the drywell/containment and reduce the possibility of exceeding the pressure suppression limit.

Cue - Drywell pressure exceeds the suppression chamber spray initiation pressure (Mark I, II containments) or containment pressure is approaching the PSP (Mark III containment).

Performance Indicator - Initiate drywell/containment sprays while in the safe region of the DSIL (Mark I, II containments) or above the containment spray initiation pressure (Mark III containment).

Feedback - Drywell/containment sprays are initiated as determined by spray flowrate and drywell/containment pressure decrease.

PC-5.2. ***TERMINATE*** drywell/containment sprays before a negative drywell/containment pressure is sustained.

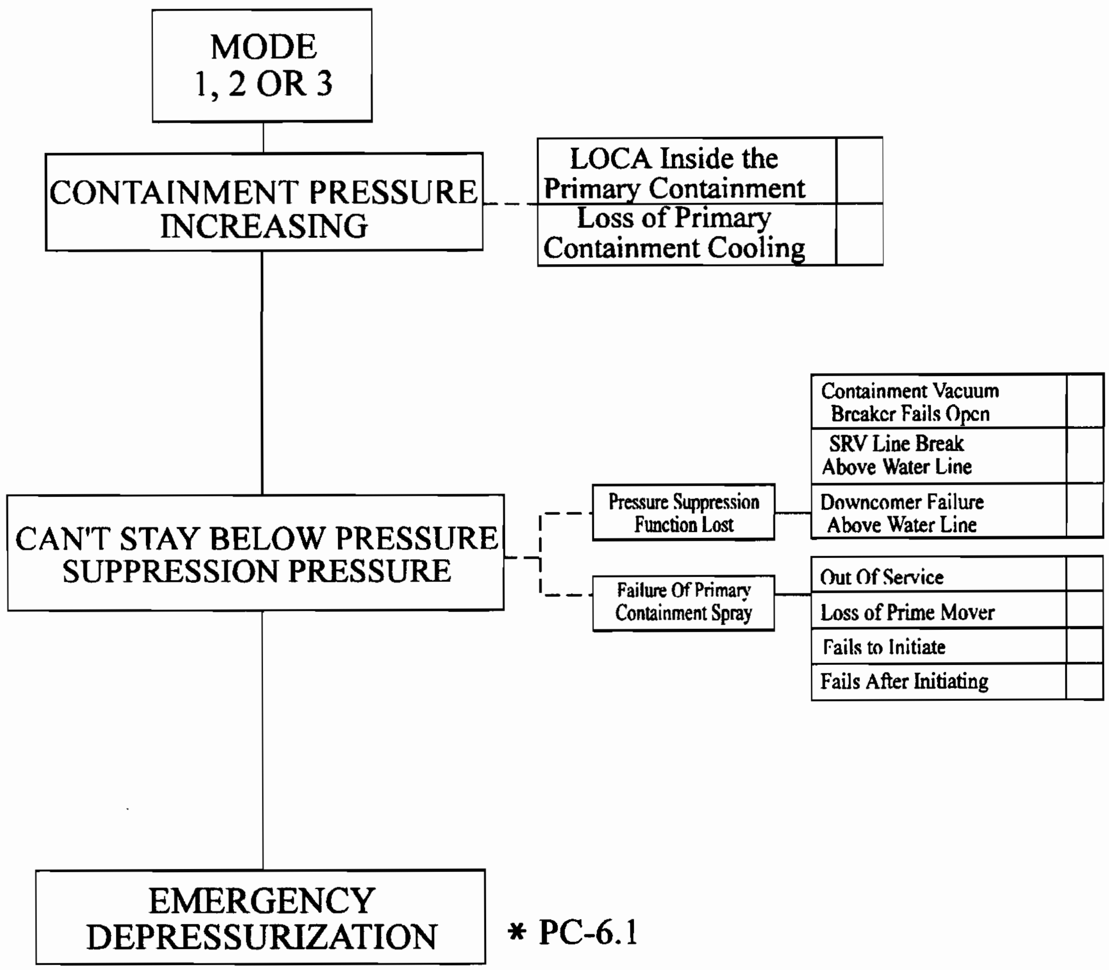
BASES: Safety Significant - Maintaining a positive drywell/containment pressure precludes air from being drawn in through the vacuum relief system to de-inert the primary containment (Mark I, II containments) , and also assures that a positive margin to the negative design pressure of the primary containment exists. This precludes possible containment failure (All containments).

Cue - The drywell/containment pressure is approaching a negative pressure.

Performance Indicator - Terminate drywell/containment sprays.

Feedback - Drywell/containment sprays are secured.

LOCA - EMERGENCY DEPRESSURIZATION
PRESSURE SUPPRESSION PRESSURE



* - Identifies Critical Tasks #PC-6

ATTACHMENT: 16

NUMBER: PC - 6

TITLE: LOCA - Emergency Depressurization - Pressure Suppression Pressure

PURPOSE: With containment pressure increasing, and with a failure of containment sprays the crew will perform an Emergency Depressurization.

CRITICAL TASKS:

PC-6.1. When suppression chamber/containment pressure cannot be maintained below the Pressure Suppression Pressure (PSP), ***INITIATE*** emergency depressurization before the drywell/containment design pressure is exceeded.

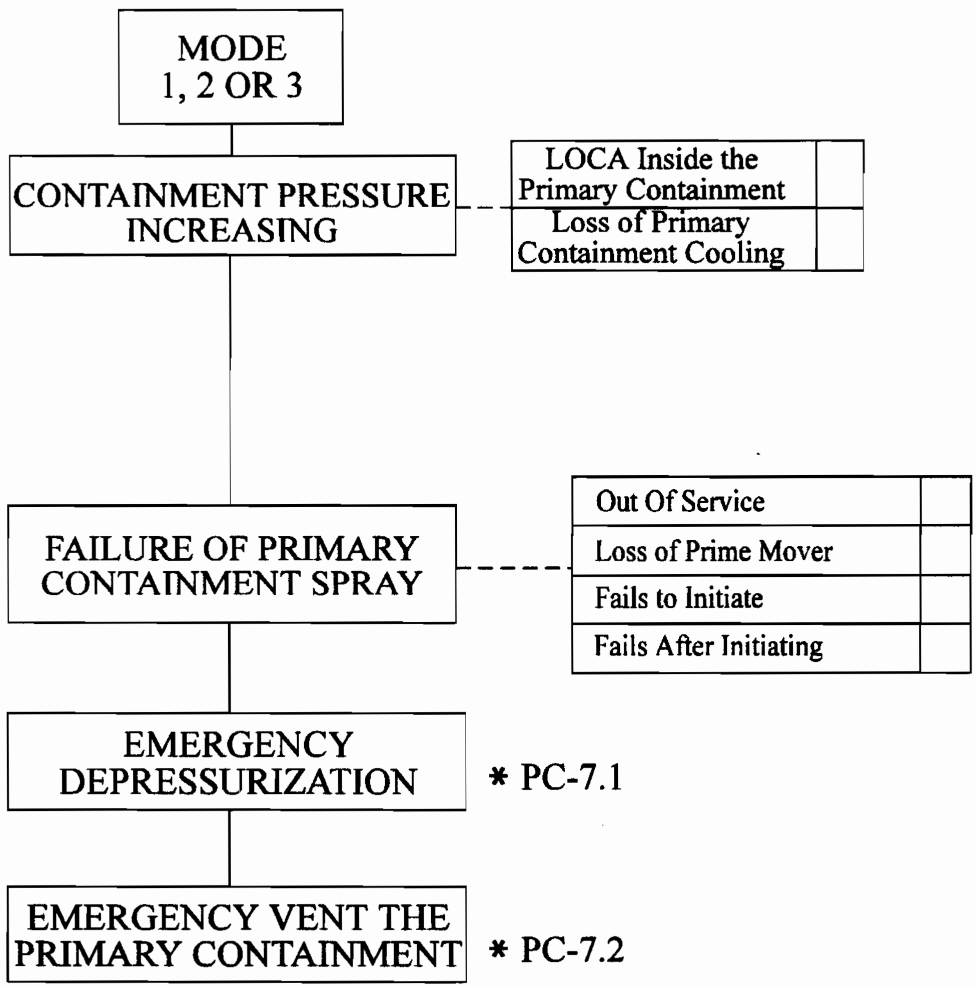
BASES: Safety Significant - The RPV is depressurized to minimize further release of energy from the RPV to the primary containment. This action serves to terminate, or reduce as much as possible, any continued primary containment pressure increase.

Cue - Containment pressure is approaching the PSP.

Performance Indicator - Initiate emergency depressurization.

Feedback - Reactor pressure is decreasing.

LOCA - VENT THE PRIMARY CONTAINMENT



* - Identifies Critical Tasks #PC-7

ATTACHMENT: 17

NUMBER: PC - 7

TITLE: LOCA - Vent the Primary Containment

PURPOSE: With containment pressure increasing, and with a failure of containment sprays the crew will perform an Emergency Depressurization and vent the primary containment.

CRITICAL TASKS:

PC-7.1. When suppression chamber/containment pressure cannot be maintained below the Pressure Suppression Pressure (PSP) ***INITIATE*** emergency depressurization, before the drywell/containment design pressure is exceeded.

BASES: Safety Significant - The RPV is depressurized to minimize further release of energy from the RPV to the primary containment. This action serves to terminate, or reduce as much as possible, any continued primary containment pressure increase.

Cue - Containment pressure is approaching the PSP.

Performance Indicator - Initiate emergency depressurization.

Feedback - Reactor pressure is decreasing.

PC-7.2. With containment pressure increasing and before suppression chamber/containment pressure reaches the primary containment pressure limit (PCPL), ***INITIATE*** venting of the suppression chamber/drywell/containment irrespective of offsite radioactivity release rates.

BASES: Safety Significant - This action to vent the primary containment is taken to assure that the integrity of the primary containment is maintained, and to prevent core damage that might be caused by the inability to vent the RPV as necessary to permit injection of water to cool the core. Venting of the primary containment is performed irrespective of the offsite radioactivity release rate that will occur, because the consequences of not doing so may be either severe core damage or loss of primary containment integrity and uncontrolled radioactive release much greater than might otherwise occur.

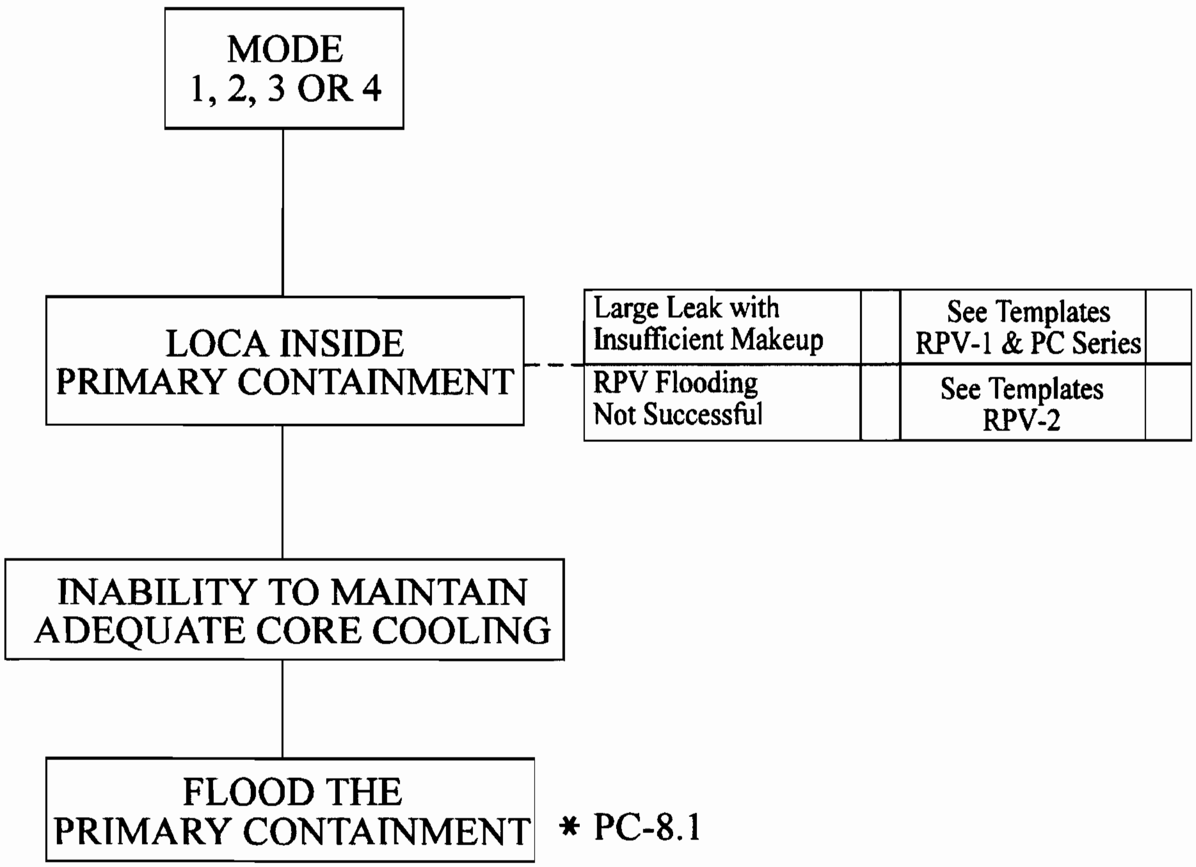
Cue - Containment pressure is approaching the PCPL.

Performance Indicator - Initiate venting of the primary containment.

Feedback - Containment pressure is decreasing.

ATTACHMENT 18

LOCA - PRIMARY CONTAINMENT FLOODING



* - Identifies Critical Tasks #PC-8

ATTACHMENT: 18

NUMBER: PC - 8

TITLE: LOCA - Primary Containment Flooding

PURPOSE: With a LOCA inside containment and an inability to maintain adequate core cooling the crew will initiate flooding of the primary containment.

CRITICAL TASKS:

PC-8.1. With the RPV depressurized and inability to maintain reactor water level above TAF or establish RPV Flooding Pressure, ***INITIATE*** Primary Containment flooding with all available systems.

BASES:

Safety Significant - Prior to entering Primary Containment Flooding, attempts were made to restore RPV water level to the TAF by injecting directly into the RPV with all available steam-driven and motor-driven systems irrespective of their safety classification and water quality. Therefore, actions are taken to restore adequate core cooling through core submergence by Primary Containment Flooding when these previous actions have been unsuccessful. This is to assure that the integrity of the primary containment is maintained and to prevent further core damage.

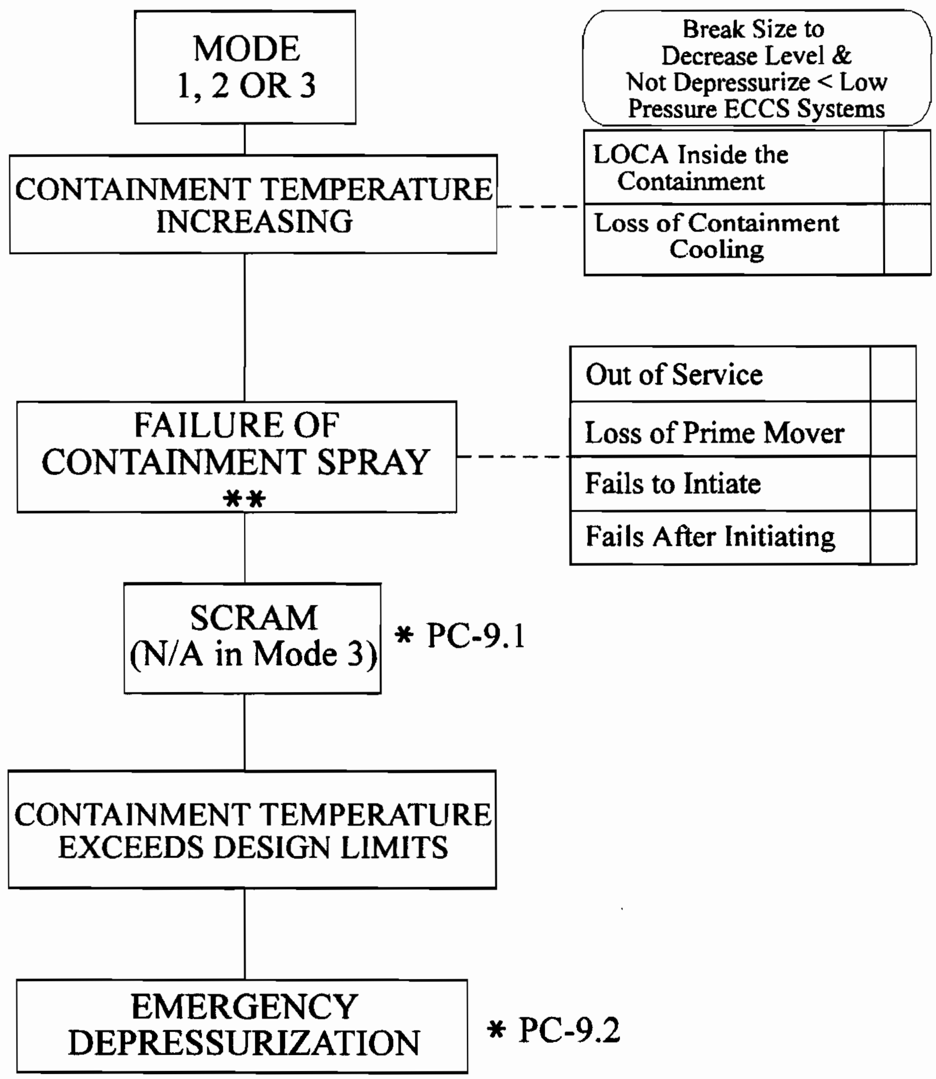
Cue - Inability to maintain RPV water level above TAF or establish RPV Flooding Pressure.

Performance Indicator - Initiate Primary Containment flooding with all available systems.

Feedback - Containment water level is increasing.

ATTACHMENT 19

LOCA - EMERGENCY DEPRESSURIZATION
CONTAINMENT TEMPERATURE
MARK III CONTAINMENT



* - Identifies Critical Tasks

** - Plant Specific

#PC-9

ATTACHMENT: 19

NUMBER: PC - 9

TITLE: LOCA - Emergency Depressurization - Containment Temperature - Mark III Containment

PURPOSE: With energy addition to Containment and a failure to spray, emergency depressurization is performed prior to exceeding design temperatures.

CRITICAL TASKS:

PC-9.1. With reactor at power and Containment temperature increasing, ***MANUALLY SCRAM*** the reactor before Containment design temperature is exceeded.

BASES: Safety Significant - The reactor is scrammed and shutdown by control rods if a scram has not yet been initiated, this ensures that the reactor is shutdown before RPV depressurization is initiated.

Cue - Containment temperature is approaching design limit.

Performance Indicator - Initiate a reactor manual scram before exceeding design temperature.

Feedback - Reactor scram is inserted.

PC-9.2. When Containment temperature cannot be maintained below the Containment design temperature, ***INITIATE*** emergency depressurization.

BASES: Safety Significant - When containment temperature cannot otherwise be maintained below the design temperature, further release from the RPV to the containment is minimized by rapidly depressurizing the RPV. This action serves to terminate, or reduce the possibility, of any continued containment temperature increase and thereby maintain equipment operability for as long as possible.

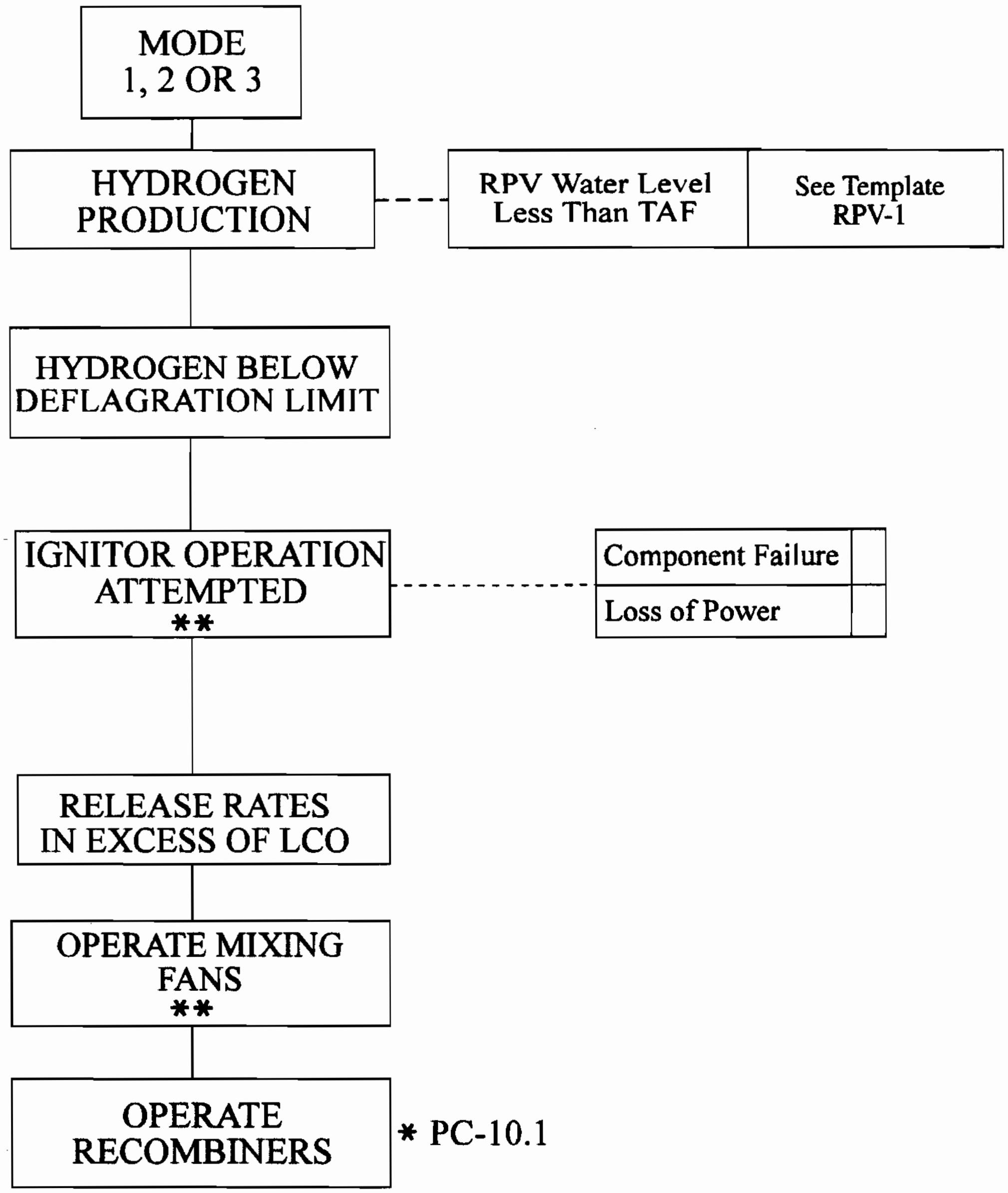
Cue - Containment temperature is approaching the design limit.

Performance Indicator - Initiate emergency depressurization.

Feedback - Reactor pressure is decreasing.

ATTACHMENT 20

CONTAINMENT HYDROGEN CONTROL
WITHOUT VENTING
PLANTS WITH RECOMBINERS



* - Identifies Critical Tasks

** - Plant Specific

#PC-10

ATTACHMENT: 20

NUMBER: PC - 10

TITLE: Containment Hydrogen Control Without Venting - Plants with Recombiners

PURPOSE: With containment hydrogen levels above the minimum but below the deflagration limits the crew will startup hydrogen igniters and hydrogen recombiners.

CRITICAL TASKS:

PC-10.1. When Hydrogen concentration in the drywell/containment reaches minimum hydrogen concentration for recombiner operation but below maximum hydrogen concentration for recombiner operation (All Containments) and below the Hydrogen Deflagration Overpressure Limit (HDOL) (Mark III containment), ***PLACE*** hydrogen recombiners in service.

BASES: Safety Significant - This step provides for the actuation of the hydrogen recombiners to control hydrogen accumulation in the drywell/containment. Actuation of the recombiners is contingent upon the drywell/containment hydrogen concentration being high enough to allow recombiner operation, but not higher than maximum hydrogen concentration for recombiner operation (All Containments) and below the Hydrogen Deflalgration Overpressure Limit (HDOL) (Mark III containment only). Starting recombiners above these limits would either create the ignition source that causes deflagration to occur, or damage the recombiners and auxiliary system components due to operation at reaction temperatures above equipment design values.

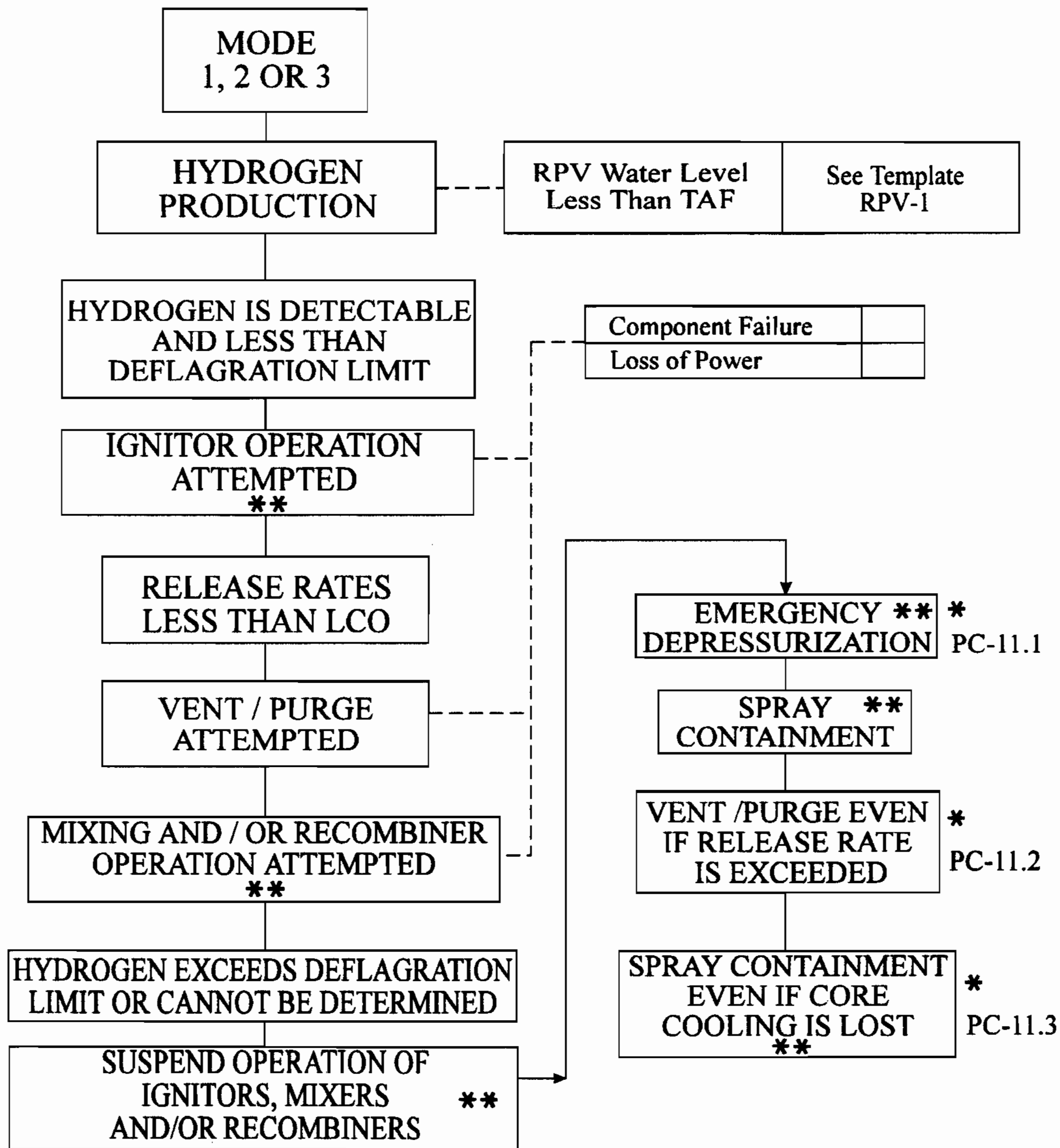
Cue - Hydrogen concentration in the drywell/containment reaches minimum hydrogen concentration for recombiner operations.

Performance Indicator - Place the Hydrogen recombiners in service.

Feedback - Hydrogen recombiners in service.

ATTACHMENT 21

CONTAINMENT HYDROGEN CONTROL
VENT / PURGE



* - Identifies Critical Tasks

** - Plant Specific #PC-11

ATTACHMENT: 21

NUMBER: PC - 11

TITLE: Containment Hydrogen Control - Vent/Purge

PURPOSE: With containment hydrogen levels greater than the deflagration limit the crew will emergency depressurize, vent/purge containment irrespective of offsite release rates and spray the containment.

CRITICAL TASKS:

PC-11.1. When suppression chamber/drywell hydrogen concentration reaches deflagration limits or cannot be determined to be below deflagration limits, ***INITIATE*** emergency depresurization (Mark I, II containments).

BASES: Safety Significant - If conditions in either the suppression chamber or drywell are such that a deflagration could occur, the RPV is rapidly depressurized to place the primary system in the safest condition (state of lowest engery).

Cue - Hydrogen concentration approaching deflagration limits in the suppression chamber/drywell.

Performance Indicator - Initiate Emergency Depressurization.

Feedback - Reactor pressure is decreasing.

PC-11.2. When deflagration concentrations are present in the suppression chamber/drywell (Mark I, II containments), or containment hydrogen concentration reaches Hydrogen Deflagration Overpressure Limit (HDOL) (Mark III containment), ***VENT AND PURGE*** the suppression chamber/drywell/containment irrespective of offsite radioactivity release rates, to prevent containment integrity from being lost.

BASES:

Safety Significant - Venting and purging the suppression chamber/drywell/containment is performed irrespective of the offsite radioactivity release rate because the consequences of either severe core damage or loss of primary containment integrity and uncontrolled release are much greater as a result of a deflagration. Venting and purging is initiated to reduce hydrogen concentrations in the suppression chamber/drywell/containment.

Cue - Deflagration concentrations are present in the suppression chamber/drywell (Mark I, II containments) or containment hydrogen concentration reaches HDOL (Mark III containment).

Performance Indicator - Vent and purge the suppression chamber/drywell/containment irrespective of offsite radioactivity release rates.

Feedback - Hydrogen concentrations in the suppression chamber/drywell/containment are decreasing.

PC-11.3 When suppression chamber/drywell hydrogen concentrations cannot be restored and maintained below deflagration levels (Mark I, II containments) or containment hydrogen concentration cannot be restored and maintained below the Hydrogen Deflagration Overpressure Limit (HDOL) (Mark III containment), ***INITIATE*** drywell/containment sprays while in the safe region of drywell spray initiation limit (DSIL) (Mark I, II containments), or if primary containment pressure is above the containment spray initiation pressure limit (Mark III containment) to prevent containment integrity from being lost.

BASES: Safety Significant - When combustible gas concentrations in the drywell and suppression chamber cannot be restored and maintained below the deflagration limits, the use of spray systems is directed irrespective of adequate core cooling to mitigate the consequences of a deflagration, should one occur. This action is performed because the consequences of not doing so may be a complete and uncontrolled loss of primary containment.

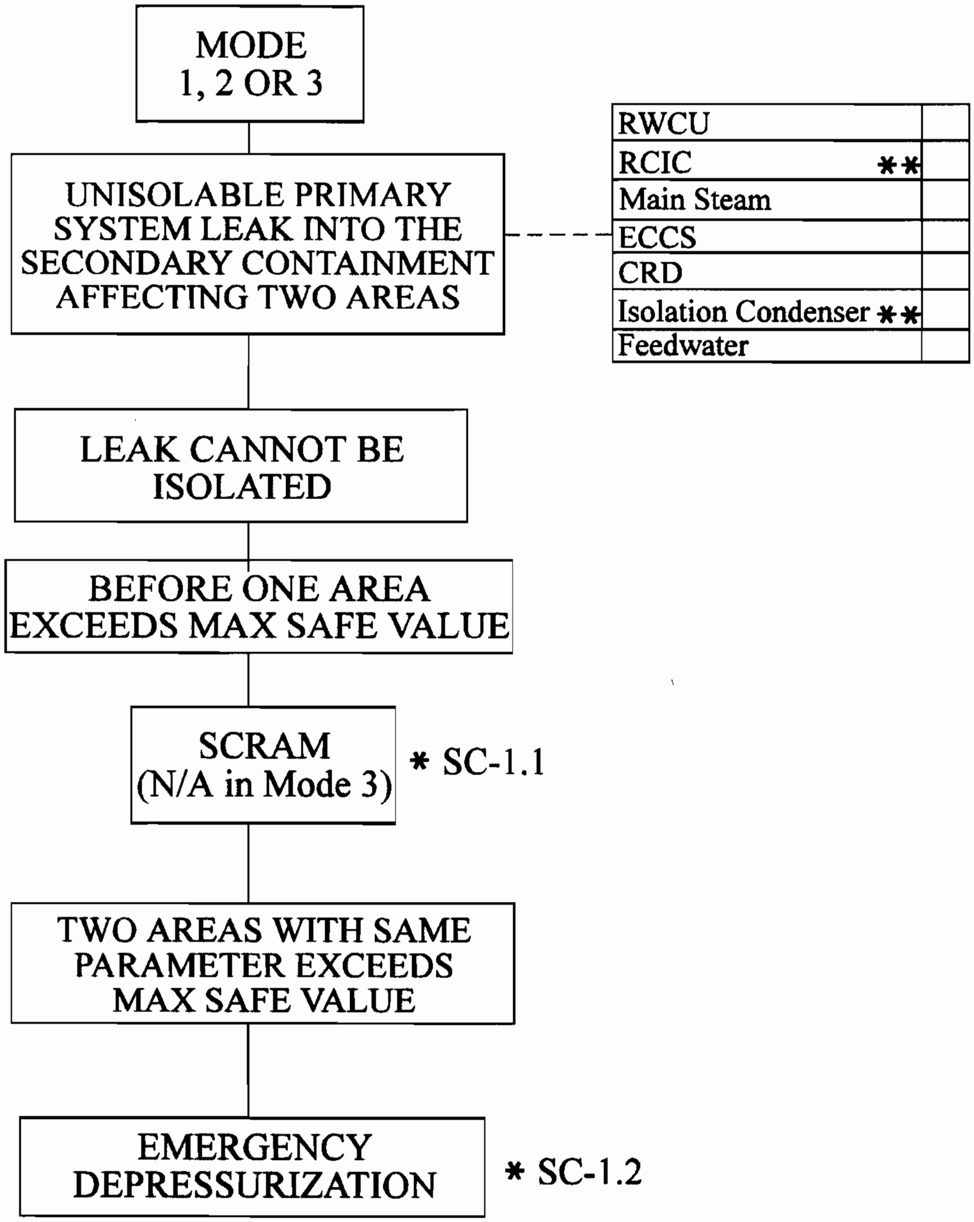
Cue - Hydrogen concentrations cannot be restored and maintained below deflagration levels (Mark I, II containments) or hydrogen concentration cannot be restored and maintained below the HDOL (Mark III containment).

Performance Indicator - Initiate drywell/containment sprays while in the safe region of the DSIL (Mark I, II containments) or above the containment initiation pressure (Mark III containment).

Feedback - Drywell/containment sprays are initiated as determined by spray flowrate and drywell/containment pressure decrease.

ATTACHMENT 22

LOCA - SECONDARY CONTAINMENT EMERGENCY DEPRESSURIZATION



* - Identifies Critical Tasks #SC-1

ATTACHMENT: 22

NUMBER: SC - 1

TITLE: LOCA Secondary Containment - Emergency Depressurization.

PURPOSE: With an inability to isolate a leak into secondary containment, the crew will shutdown the reactor and perform an emergency depressurization.

CRITICAL TASKS:

SC-1.1. With reactor at power and with a primary system discharging into the secondary containment ***MANUALLY SCRAM*** the reactor, before any area exceeds the maximum safe operating levels.

BASES: Safety Significant - Scramming the reactor reduces to decay heat levels the energy that the RPV may be discharging into the secondary containment.

Cue - Primary system discharging into the secondary containment and any area is approaching maximum safe operating levels.

Performance Indicator - Initiate a reactor manual scram.

Feedback - Reactor scram is inserted.

SC-1.2. With a primary system discharging into the secondary containment and area radiation/temperature/water levels exceed maximum safe operating levels in more than one area, ***INITIATE*** an emergency depressurization.

BASES: Safety Significant - Depressurization the RPV promptly places the primary system in the lowest possible energy state, rejects heat to the suppression pool in preference to outside the containment, and reduces the driving head and flow of primary systems that are unisolated and discharging into the secondary containment.

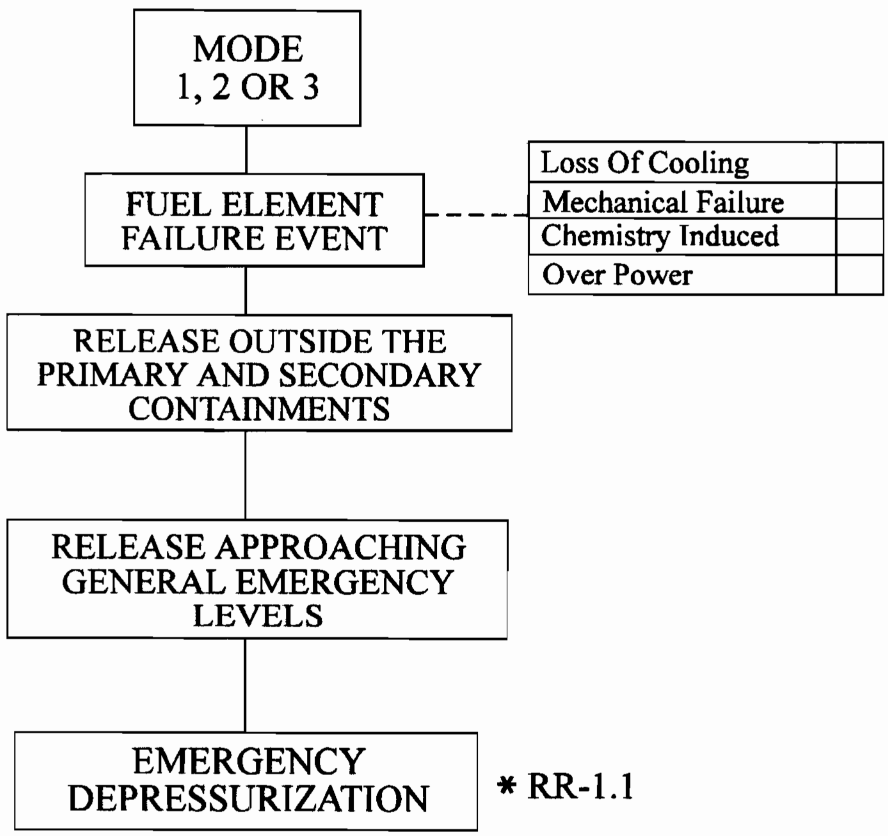
Cue - Primary system discharging into the secondary containment and area radiation/temperature/water levels exceed maximum safe operating levels in more than one area.

Performance Indicator - Initiate emergency depressurization.

Feedback - Reactor pressure is decreasing.

ATTACHMENT 23

RADIATION RELEASE
EMERGENCY DEPRESSURIZATION



* - Identifies Critical Tasks #RR-1

ATTACHMENT: 23

NUMBER: RR - 1

TITLE: Radiation Release - Emergency Depressurization.

PURPOSE: With a fuel element failure and release outside primary and secondary containment, the crew will perform an emergency depressurization as release rates approach the general emergency levels.

CRITICAL TASKS:

RR-1.1. If offsite radioactivity release rate cannot be maintained below General Emergency release level and with a primary system discharging outside the primary and the secondary containment, ***INITIATE*** an emergency depressurization.

BASES: Safety Significant - RPV depressurization places the primary system in the lowest possible energy state and reduces the driving head and flow of the primary systems that are unisolated and discharging outside the primary and secondary containment.

Cue - Radioactivity release rate cannot be maintained below General Emergency release level and a primary system is discharging outside the primary and the secondary containment.

Performance Indicator - Initiate emergency depressurization.

Feedback - Reactor pressure is decreasing.