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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

October 21, 1985

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Administrative Judge
Atomic Safety and Licensing
Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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In the Matter of
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE, et al.
(Seabrook Station, Units 1 and 2)
Docket Nos. 50-443 OL and 50-444 OL
On-site Emergency Planning and Safety Issues

Dear Administrative Judges:

In an Order dated October 4, 1985, the Board requested the Staff to provide information on various matters that were incomplete at the time hearings were held in August of 1983. The Staff response to the Board's request follows. We have attached the following documents to this response:

1. Section 4.1.4.A of Applicants' EQ Report
2. Section 5.0 of Applicants' Emergency Plan
3. Emergency Procedure ER-1.1
4. Emergency Procedure ER-5.4
5. Staff's Preliminary Review of Westinghouse Emergency Response Guidelines, Rev. 1

In response to the specific questions asked by the Board, the Staff submits the following:

1. The Applicants submitted to the NRC Staff a document entitled "Environmental Qualification of Electrical Equipment Important to Safety" on

D507

August 13, 1983. (Enclosure to SBN-549, Letter from DeVincentis to Knighton [1]). The Applicants' environmental qualification (EQ) submittal was approximately three inches thick; Section 4.1.4.A of that document addresses the operating time component of the accident environment. A copy of that Section is attached.

The Applicants' submittal of August 13th is not their final EQ submittal. On May 7, 1984, the NRC Staff sent a Request for Additional Information to the Applicants (Letter from Knighton to Harrison); the Applicants submitted a response on September 7, 1984 (SBN-710, Letter from DeVincentis to Knighton). The Staff has been subsequently informed that the Applicants will be submitting a revised version of their August 13, 1983 submittal near the end of the year. The Staff will perform its SER review on the revised submittal; the Staff has not published (and because of Applicants' intention to submit a revised report, will not publish) any SER review of the Applicants' August 13th EQ submittal.

2. On July 26, 1985, the Applicants submitted to the NRC Amendment 55 to the Seabrook FSAR (SBN-845, enclosure to Letter from Johnson to Knighton). Amendment 55 contains extensive revisions to the onsite Radiological Emergency Response Plan, including a new Section 5.0. The Staff has enclosed a copy of the new Section 5.0; the Staff review of this document should be contained in the next Supplemental Safety Evaluation Report for Seabrook, which is currently scheduled for publication in January of 1986. Applicants have also submitted Emergency Plan Implementing Procedures to the Staff. (SBN-844, Letter of July 25, 1985, from Johnson to Knighton). The Staff has attached Procedures ER-1.1 ("Classification of Emergencies") and ER-5.4 ("Protective Action Recommendations"). The Staff review of the onsite plan will include a review of the procedures. Information bearing on the

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1/ The documents submitted by the Applicants to the NRC are identified by date and "SBN" number. According to the service list appended to these documents, copies of all SBN documents are sent to all the parties in the Seabrook operating license proceeding.

questions asked by the Board can be found in the attached documents in the following areas:

(a) Set Points - Set points are set out in the status trees that are documented in Figures 5.1 through 5.5 at the end of the new Section 5.0.

(b) Additional Radiation Level Monitors - ER 1.1 lists initiating conditions and emergency action levels for miscellaneous emergency conditions. Figure 1 includes references in various locations to radiation levels as indicators of emergency conditions. 2/

(c) Correlation with NUREG-0654 - The Staff has not yet seen a correlation of Applicants' assessment/classification scheme with Appendix 1 to NUREG-0654.

(d) Recommended Protective Measures - This area is addressed in ER-5.4.

3. The Staff has performed a preliminary review of Revision 1 to the Westinghouse Owners Group Emergency Response Guidelines; a copy of the review is attached. The Staff review of Revision 1 is continuing. Revision 1 itself is being provided to the Public Document Room in Washington, D.C.

Sincerely,

Robert G. Perlis
Counsel for NRC Staff

Attachments: As stated
cc w/att: Service List

2/ Please note that the copy of ER-1.1 provided to the Board does not include Attachment 7.2, the Emergency Classification Flow Chart. The flow chart is provided as Figure 5.6 to Section 5.0 of the onsite plan.

In addition, Seabrook will have in place a rigorous equipment preventative maintenance program which will detect any equipment deterioration in a timely manner to ensure equipment performance during both normal and accident conditions. In this manner, aging beyond that predicted by the models and mechanisms utilized by the Seabrook EQ Program will not affect plant safety. The Seabrook Maintenance/Surveillance Program is discussed further in Section 5.0.

4.1.4 Accident Environments

Each piece of equipment entered into the Seabrook Program was evaluated to determine if it would function as required during exposure to postulated accident conditions. The specific environmental parameters evaluated are discussed in detail below.

A. Operating Time

All equipment in this program which is required to function in a harsh environment will be qualified for the postulated post-accident duration of one year.

In order to meet this one year operating time, Seabrook equipment must be qualified to the forty year normal plus one year accident total integrated radiation dose; and must demonstrate qualification in the harsh environment, it could be exposed to for at least the amount of time required for said environment to return to maximum normal service conditions. This is considered sufficient to demonstrate qualification since after the environmental conditions return to normal the qualification of the device for the remainder of the one year operating time will be enveloped by the qualified life of the device.

As an example, a piece of equipment with a qualified life of 20 years would be replaced after 19 years because the remainder of its qualified life would not cover the postulated post-accident duration of one year.

Should it be determined that specific pieces of equipment cannot be qualified for one year, the required operating time for that component will be determined and the component will be qualified for at least that duration plus margin.

B. DBE Testing - Temperature/Pressure/Humidity

All equipment which could be subjected to a steam (i.e., 100% relative humidity) environment during a postulated accident has been tested to demonstrate that the equipment will function as required when exposed to the accident temperature, pressure and humidity conditions. To ensure qualification, the test time-temperature profile must envelope the postulated accident profile. The test time-pressure profile should show that the test was conducted at saturated steam conditions as a minimum, in order to qualify the equipment for 100% relative humidity, and that the peak test pressure evelopes the peak postulated accident pressure.

Comparison of time dependent pressure and humidity profiles was not considered necessary since there are no recognized time dependent effects of those parameters. It was also taken into consideration that if the test temperature profile envelopes the postulated accident temperatures profile, pressure and humidity conditions would also be enveloped for saturated steam conditions.

C. Radiation

Accident radiation exposure is accounted for during equipment pre-aging as discussed in Section 4.1.3.D above.

5.0 EMERGENCY CLASSIFICATION SYSTEM

5.1 Summary

The Seabrook Station Emergency Classification System categorizes a wide spectrum of component or system failures and other occurrences that would reduce station safety margins. One of four emergency classifications is made upon the recognition of an initiating condition which indicates a degraded station status. Many of these initiating conditions are defined by five Critical Safety Function (CSF) color coded status trees which indicate the severity of an off-normal condition and are available to operators on the Safety Parameter Display System. Other initiating conditions are defined by quantitative or observable indications of station conditions called Emergency Action Levels (EAL's).

5.2 Emergency Classifications

Seabrook Station utilizes the four emergency classifications as specified in NUREG-0654/FEMA-REP-1 (November, 1980). In order of increasing severity these are: UNUSUAL EVENT, ALERT, SITE AREA EMERGENCY, and GENERAL EMERGENCY. The following definitions and descriptions of these emergency classes are used at Seabrook Station.

UNUSUAL EVENT -

AN UNUSUAL EVENT INDICATES A POTENTIAL DEGRADATION OF STATION SAFETY MARGINS. NO RELEASE OF RADIOACTIVE MATERIAL REQUIRING OFF-SITE RESPONSE OR MONITORING ARE EXPECTED.

ALERT -

AN ALERT INDICATES AN ACTUAL OR POTENTIAL SUBSTANTIAL DEGRADATION OF STATION SAFETY MARGINS. ANY RELEASES ARE EXPECTED TO BE LIMITED TO SMALL FRACTIONS OF THE EPA PROTECTIVE ACTION GUIDELINE EXPOSURE LEVELS.

SITE AREA EMERGENCY -

A SITE AREA EMERGENCY INDICATES AN EVENT WHICH INVOLVES LIKELY OR ACTUAL MAJOR FAILURES OF STATION FUNCTIONS NEEDED FOR THE PROTECTION OF THE PUBLIC. ANY RELEASES ARE NOT EXPECTED TO EXCEED EPA PROTECTIVE ACTION GUIDELINE EXPOSURE LEVELS EXCEPT NEAR THE SITE BOUNDARY.

GENERAL EMERGENCY -

A GENERAL EMERGENCY INVOLVES ACTUAL OR IMMINENT SUBSTANTIAL CORE DEGRADATION OR MELTING WITH THE POTENTIAL FOR THE LOSS OF CONTAINMENT INTEGRITY. RELEASES CAN BE REASONABLY EXPECTED TO EXCEED EPA PROTECTIVE ACTION GUIDELINE EXPOSURE LEVELS OFF-SITE FOR MORE THAN THE IMMEDIATE AREA.

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5.3 Scope of Classification System

The classification system for Seabrook Station provides the ability to classify approximately sixty discrete symptom-based or miscellaneous events. The system considers and classifies events specified in Appendix 1 of NUREG-0654/FEMA-REP-1; upset conditions defined by the Critical Safety Functions, and the discrete accidents contained in the Seabrook Station Final Safety Analysis Report, Chapter 15, Accident Analysis.

5.4 Symptomatic Approach to Classification

A symptomatic approach has been developed to assist operators in emergency recognition and classification. Critical station process data are condensed on color-coded status trees which allow the operator to recognize an off-normal condition and take appropriate actions. Symptomatic status trees are available to the operator and at the emergency response facilities on the plant process computer displays and on hardcopy.

A wide spectrum of events that represent varying degrees of safety margin reduction are illustrated on the color-coded status trees. The status trees (Figures 5.1 - 5.5) are based on the following five Critical Safety Functions:

S - Subcriticality
C - Core Cooling
H - Heat Sink
P - RCS Integrity
Z - Containment Integrity

Color coding is used to identify event priorities for the individual branches of the status trees as follows:

GREEN - The Critical Safety Function is satisfied - No operator action is called for.

YELLOW - The Critical Safety Function is not fully satisfied - Operator action may eventually be needed.

ORANGE - The Critical Safety Function is under severe challenge - Prompt operator action is necessary.

RED - The Critical Safety Function is in jeopardy - Immediate operator action is required.

If a status tree is coded in a color other than green, the control room operators will take corrective action consistent with the Emergency Operating Procedures. In addition, if a status tree (or combination of status trees) is in a condition other than green, the Shift Superintendent will use the Emergency Classification Flowchart (Figure 5.6) to determine whether an Emergency must be declared.

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Figure 5.6 presents the critical safety functions in descending order of importance as one reads down the figure. If more than one classification is reached, the emergency will be classified according to the most severe.

5.5 Miscellaneous Station Conditions

The capability also exists for the classification of emergencies based on conditions that do not challenge a Critical Safety Function. Based on the guidance of Appendix 1 of NUREG-0654/FEMA-REP-1, miscellaneous emergency conditions (e.g., fire, electrical, security, natural events) have been evaluated, initiating conditions identified and Emergency Action Levels developed. The specific miscellaneous initiating conditions are indicated on Figure 5.6.

In some cases a combination of miscellaneous conditions or a complication of a miscellaneous condition with a critical safety function are an indication that an emergency classification has been reached. These combinations and complications are also on Figure 5.6.

5.6 Classification of Emergencies

Classification of an emergency at Seabrook Station is made based on one or more of the conditions listed in Figure 5.6. Specific EAL's (color status trees, meter indications, alarms, or limits) for initiating conditions are provided in an emergency response procedure and in operator training. In all cases, if several emergency classifications are indicated, the most severe emergency classification will be made whether based upon status trees or miscellaneous initiating conditions.

5.7 Sample Classifications

To ensure understanding of the emergency classification system, the following sample classifications are presented. These examples explain the process by which the operators would come to the decision to classify an emergency.

EXAMPLE 1 - Condition - Critical Safety Function Core Cooling (Figure 5.2) indicates orange.

First locate C, Core Cooling under the Critical Safety Function column on the left of Figure 5.6. Then moving to the right, find C Orange under the appropriate emergency class, Site Area Emergency.

EXAMPLE 2 - Condition - Critical Safety Functions, Heat Sink (Figure 5.3) indicates red, and Core Cooling (Figure 5.2) indicates orange.

Combinations of separate Critical Safety Function indicators sometimes warrant a higher level emergency classification. First locate C, Core Cooling under the Critical Safety Function column on Figure 5.6. Moving to the right, find C Orange (Site Area Emergency), then C Orange plus H Red (General Emergency). Then locate H, Heat Sink. Moving to the right, find H Red (Site Area Emergency). Using the most severe classification, select General Emergency.

EXAMPLE 3 - Condition - Critical Safety Function Heat Sink (Figure 5.3) indicates red and emergency power is not restored to at least one train of operable safeguards equipment within 15 minutes.

Complications of other miscellaneous emergency conditions along with Critical Safety Function indicators may also warrant increased levels of emergency classification. From Example 2 recall that H Red indicated a Site Area Emergency.

To consider the electrical problem, locate category 6. Electrical Failures under the Miscellaneous Emergency Conditions column on the left of Figure 5.6. Moving to the right, locate condition 6e (Site Area Emergency). To consider the complication, follow the Heat Sink line to the right and find H Red plus 6e (General Emergency). Using the most severe classification, select General Emergency.

EXAMPLE 4 - Condition - Indication of a steam generator tube rupture by procedure E-3.

First locate the category of condition, Steam Generator Tube Leakage/Rupture under the column labeled Miscellaneous Emergency Conditions on Figure 5.6. Moving to the right, locate condition 7b (Alert). The condition is classified as an Alert.

EXAMPLE 5 - Condition - Indication of a steam generator tube rupture by procedure E-3 and bus E-5 and E-6 cannot be powered from an off-site source.

First locate the classification for the steam generator tube rupture, 7b, as in Example 4 (Alert). Then locate the category, Electrical Failures, and move to the right to condition 6a (Unusual Event). Following either category 6 or 7, find the combination 6a plus 7b (Site Area Emergency). Using the most severe classification, select Site Area Emergency.

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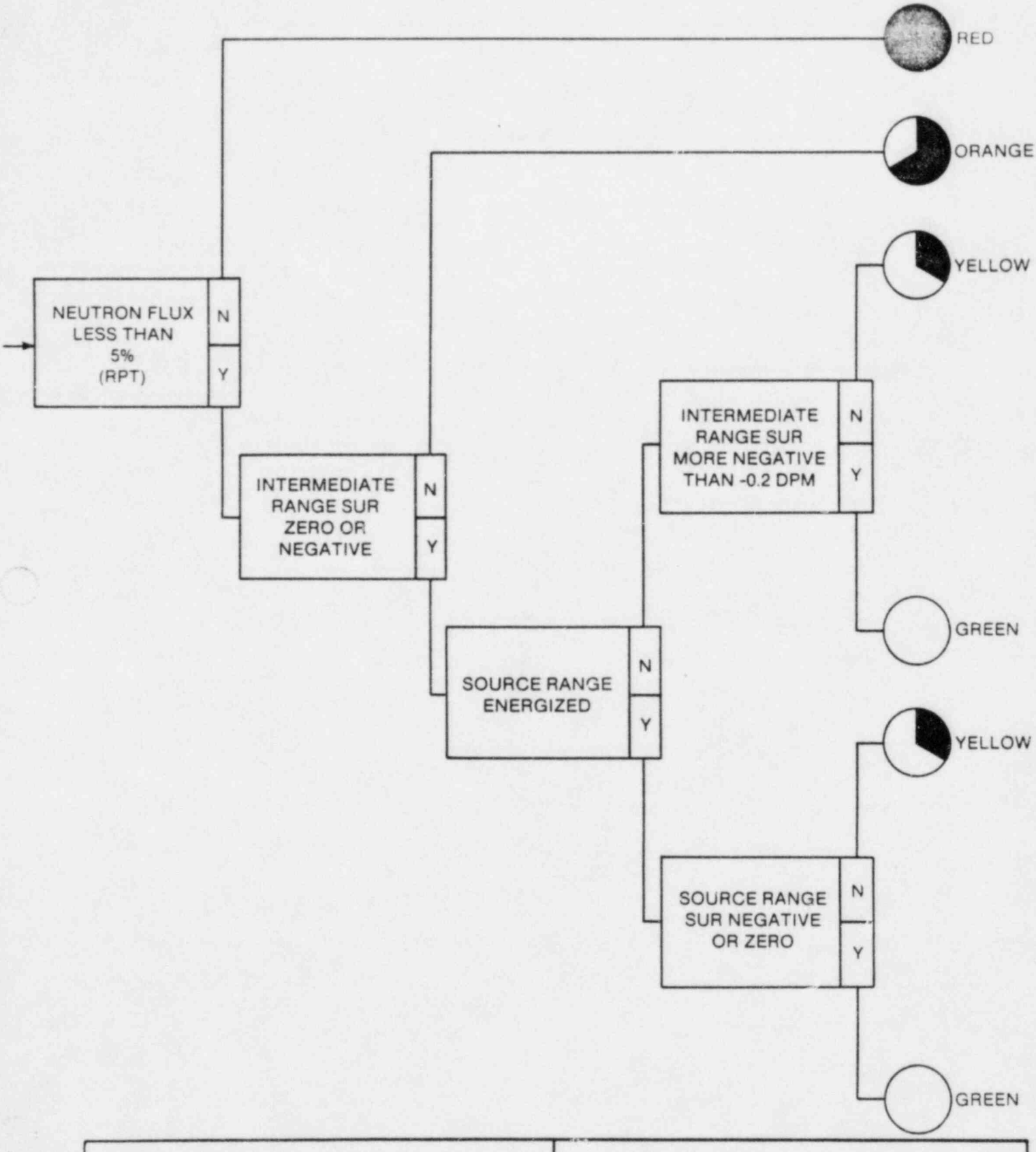
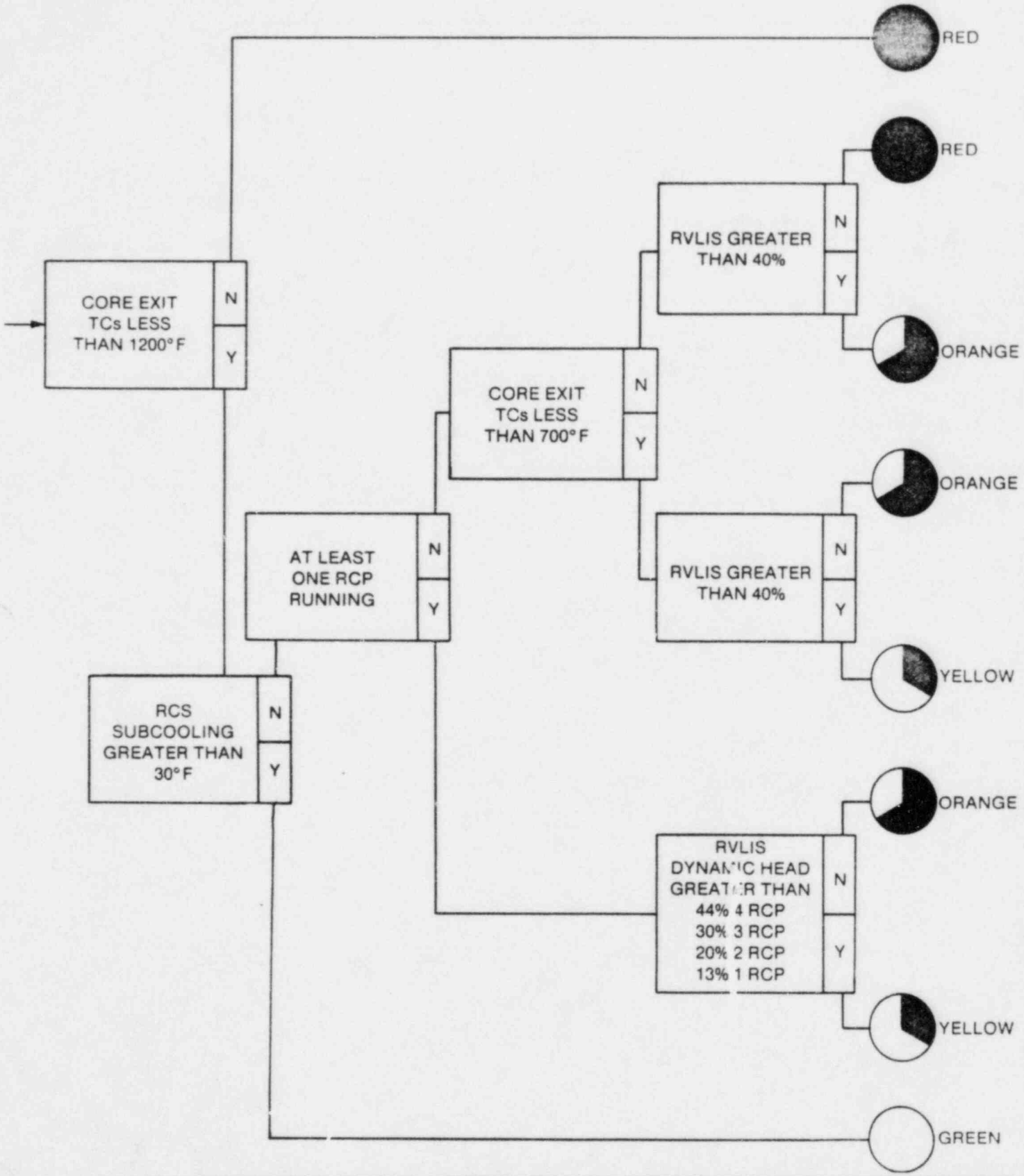
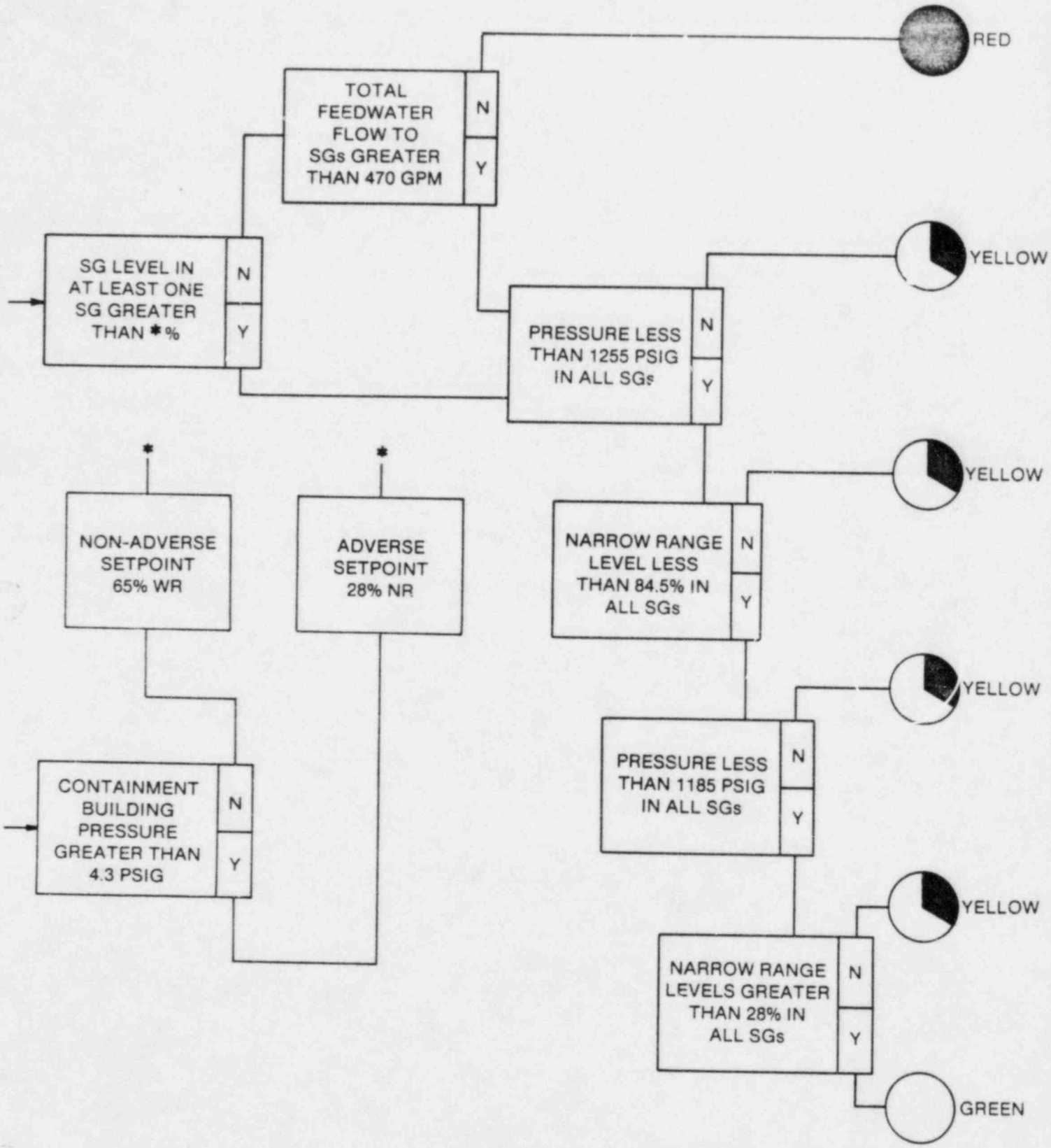


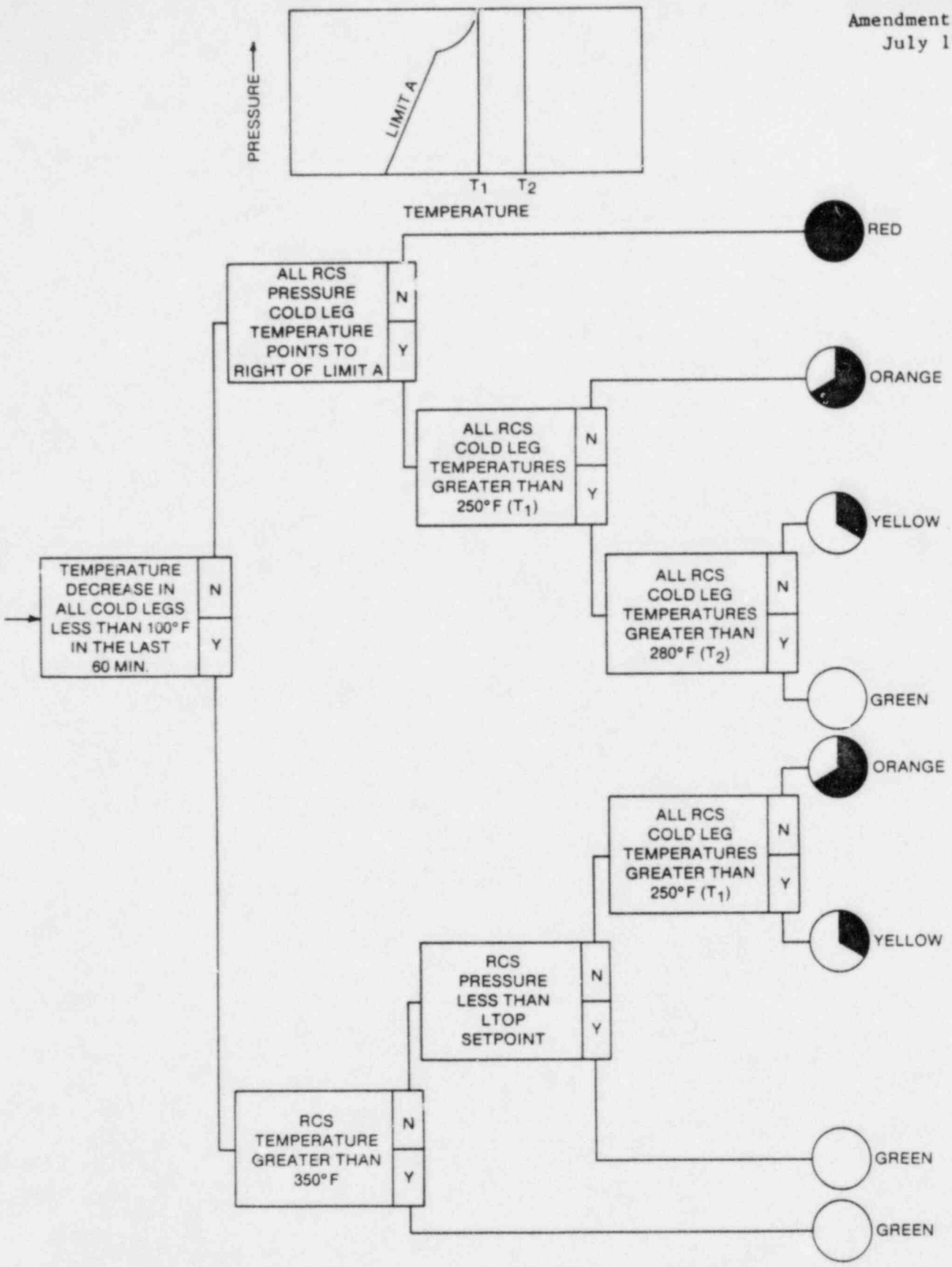
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION - UNITS 1 & 2 FINAL SAFETY ANALYSIS REPORT RADIOLOGICAL EMERGENCY PLAN	STATUS TREE FOR CRITICAL SAFETY FUNCTION NUMBER S - SUBCRITICALITY FIGURE 5.1



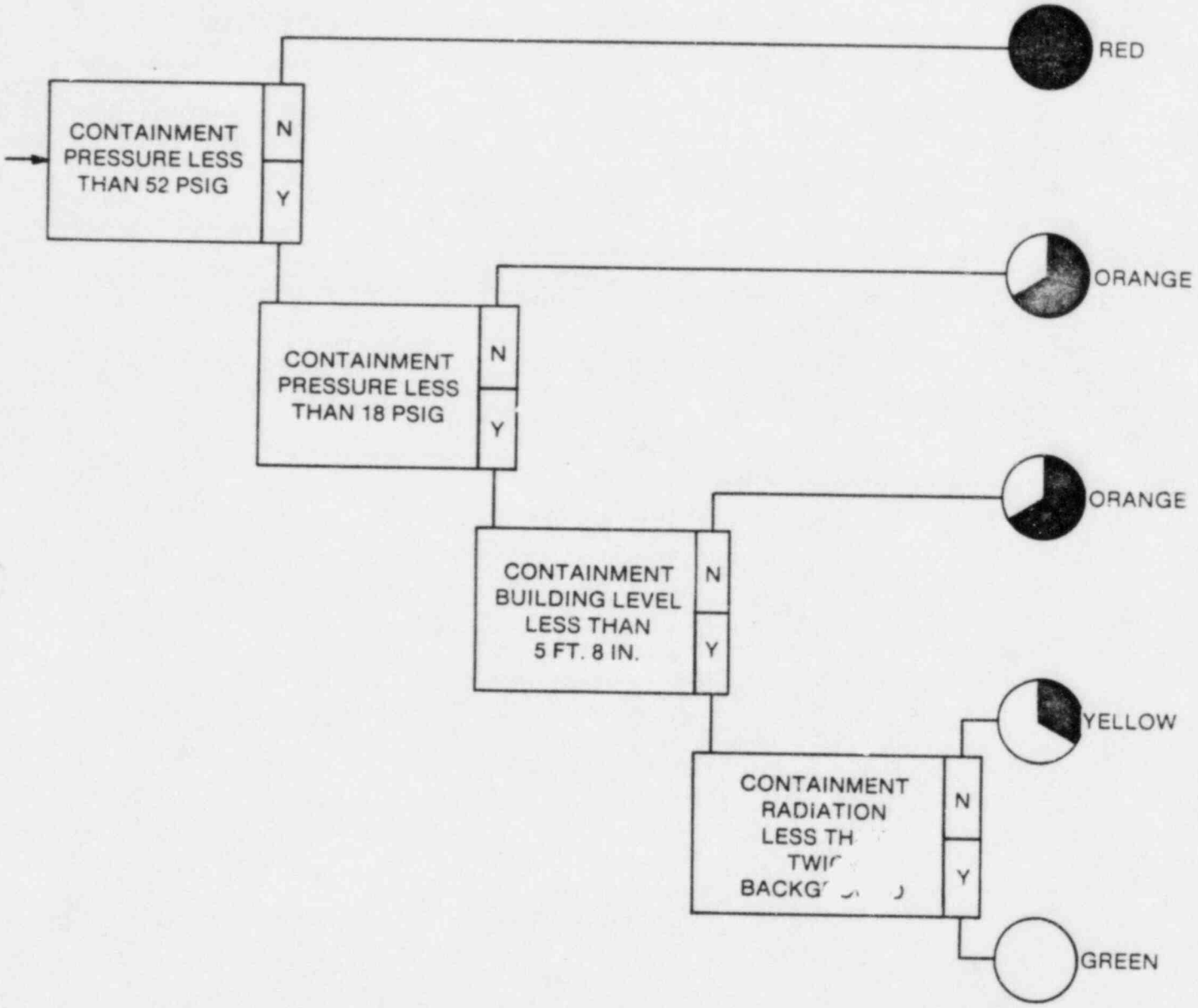
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION - UNITS 1 & 2 FINAL SAFETY ANALYSIS REPORT RADIOLOGICAL EMERGENCY PLAN	STATUS TREE FOR CRITICAL SAFETY FUNCTION NUMBER C - CORE COOLING FIGURE 5.2



PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION - UNITS 1 & 2 FINAL SAFETY ANALYSIS REPORT RADIOLOGICAL EMERGENCY PLAN	STATUS TREE FOR CRITICAL SAFETY FUNCTION NUMBER 4 - HEAT SINK
	FIGURE 5.3

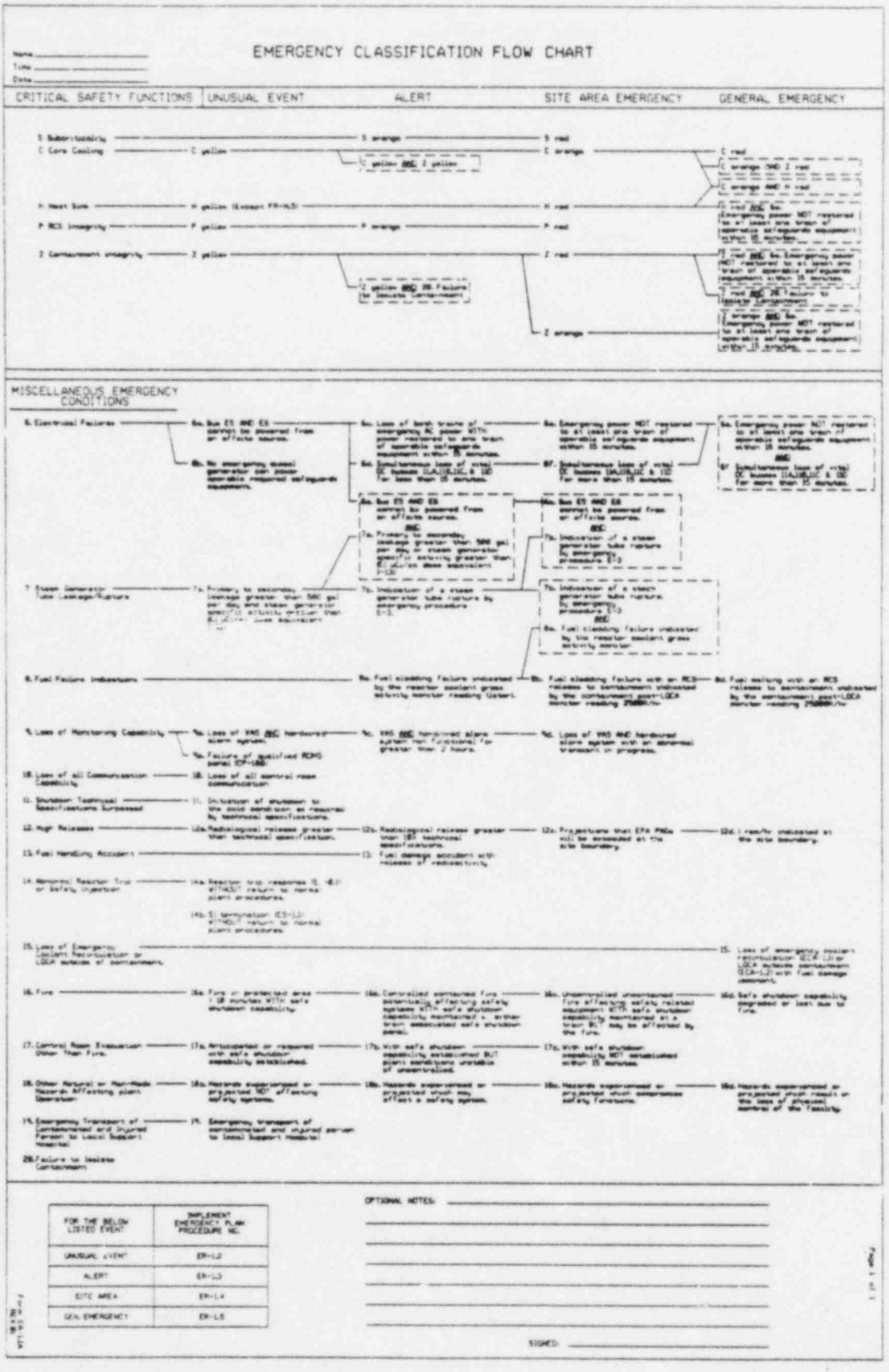


PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION - UNITS 1 & 2 FINAL SAFETY ANALYSIS REPORT RADIOLOGICAL EMERGENCY PLAN	STATUS TREE FOR CRITICAL SAFETY FUNCTION NUMBER P - RCS INTEGRITY FIGURE 5.4



PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION - UNITS 1 & 2 FINAL SAFETY ANALYSIS REPORT RADIOLOGICAL EMERGENCY PLAN	STATUS TREE FOR CRITICAL SAFETY FUNCTION NUMBER Z - CONTAINMENT FIGURE 5.5

FIGURE 5.6



PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
SEABROOK STATION - UNITS 1 & 2
FINAL SAFETY ANALYSIS REPORT
RADIOLOGICAL EMERGENCY PLAN

EMERGENCY CLASSIFICATION FLOW CHART

FIGURE 5.6

ATTACHMENT 3

EMERGENCY PLAN IMPLEMENTING PROCEDURE COVER FORM

A. IDENTIFICATION

NUMBER ER-1.1 REVISION 00

TITLE CLASSIFICATION OF EMERGENCIES

ORIGINATOR J. A. MacDonald

B. INDEPENDENT REVIEW

TITLE	SIGNATURE	DATE
Shift Superintendent	Michael R. David	8/28/84

C. RADIOLOGICAL ASSESSMENT MANAGER APPROVAL

SIGNATURE	DATE
J A MacDonald	9/7/84

D. SORC APPROVAL SORC MEETING NO. 84-17

E. APPROVAL AND IMPLEMENTATION

[signature]	10/17/84	11-23-84
STATION MANAGER	APPROVED DATE	EFFECTIVE DATE

CLASSIFICATION OF EMERGENCIES

1.0 OBJECTIVES

This procedure specifies the classification of emergencies in accordance with the Seabrook Station Radiological Emergency Plan.

2.0 RESPONSIBILITIES

2.1 Unit Shift Supervisor

Responsible for recognizing potential emergency conditions and notifying the Shift Superintendent. Should the Shift Superintendent be unable to respond to the affected control room in a prompt manner (5 minutes), the Unit Shift Supervisor will assume the duties and responsibilities of the Shift Superintendent.

2.2 Shift Superintendent

Responsible for classifying observed station conditions in accordance with the emergency classification system specified in this procedure.

2.3 Emergency Director

Responsible for analyzing changing station conditions and reclassifying the emergency classification in accordance with this procedure.

3.0 PRECAUTIONS

3.1 When two or more critical safety functions (CSF) or emergency conditions exist and different emergency classes result, the higher emergency class will be used.

3.2 Final emergency classifications and emergency plan procedures implementation is contingent upon the evaluation and discretion of the Shift Superintendent.

4.0 PREREQUISITIES

A CSF has been challenged and/or one of the miscellaneous emergency conditions has occurred.

5.0 ACTIONS

Shift Superintendent/Emergency Director

5.1 Critical Safety Function Classification

1. Determine and verify using hardwired information whether any of the following critical safety functions (CSF) are challenged:
   S. Subcriticality,
   C. Core cooling,
   H. Heat sink,
   P. RCS integrity, and
   Z. Containment integrity

> **NOTE**
>
> Following initial verification of a critical safety function, subsequent SPDS indications need not be verified.

2. If no CSF is challenged, proceed to Step 5.

3. Identify the color coded event for the challenged CSF(s) from either:
   a. The plant computer SPDS, or
   b. If the SPDS is unavailable, refer to Emergency Operating Procedures hard copy Status Trees.

4. Circle the letter and color of each CSF event or combination of events identified in step 3. on Form ER-1.1A. "Emergency Classification Flow Chart".

> **NOTE**
>
> Only CSF combinations which require emergency classification are listed on Form ER-1.1A.

5. Circle the Miscellaneous Emergency Conditions and combinations of Miscellaneous Emergency Conditions which correspond to actual station conditions on Form ER-1.1A.

> **NOTE**
>
> Only miscellaneous combinations which require emergency classification are listed on Form ER-1.1A.

> **NOTE**
>
> Emergency Action Levels pertaining to specific initiating conditions are described in Figure 1, "Miscellaneous Emergency Condition EALs".

6. Circle any complications of Miscellaneous Emergency Conditions and Critical Safety Functions which correspond to actual station conditions on Form ER-1.1A.

7. Identify the most severe emergency class which corresponds to the events circled on Form ER-1.1A.

8. Evaluate, and if appropriate, immediately implement one of the following Seabrook Station Radiological Emergency Plan Implementing Procedures in accordance with the identified emergency classification.

UNUSUAL EVENT	ER-1.2
ALERT	ER-1.3
SITE AREA EMERGENCY	ER-1.4
GENERAL EMERGENCY	ER-1.5

6.0 REFERENCES

6.1 Seabrook Station Radiological Emergency Response Plan.

7.0 ATTACHMENTS

7.1 Figure 1, "Miscellaneous Emergency Condition and Emergency Action Levels".

7.2 Form ER-1.1A, "Emergency Classification Flow Chart".

Figure 1

MISCELLANEOUS EMERGENCY CONDITIONS AND EMERGENCY ACTION LEVELS

Initiating Condition

6a. Busses E5 and E6 cannot be powered from an offsite source.

EMERGENCY ACTION LEVELS

Offsite power is not being supplied to both busses E5 and E6 and cannot be made available.

Figure 1

Initiating Condition

6b. No emergency diesel generator can power operable required safeguards equipment.

EMERGENCY ACTION LEVELS

1. Both indicating lights

MCB-HF

UL-19 "A" diesel not available

UL-20 "B" diesel not available

OR

2. Both VAS alarms

D or F Point

F6587 Train A emergency power inop

F6637 Train B emergency power inop

Figure 1

Initiating Condition

6c. Loss of both trains of emergency AC power WITH power restored to one train of operable safeguards equipment within fifteen minutes.

EMERGENCY ACTION LEVELS

1. Both Hardwire Alarms

MCB-HF

UA 54	4160V Bus 5 Volts Lo
UA 55	4160V Bus 6 Volts Lo

OR

2. Both VAS Alarms

D or F Point	Message
F7300	Bus E5 Loss of Power
F7310	Bus E6 Loss of Power

AND

3. One alarm has cleared within fifteen minutes.

Figure 1

Initiating Condition

6d. Simultaneous loss of vital DC Busses 11A, 11B, 11C and 11D for less than 15 minutes.

EMERGENCY ACTION LEVELS

1. All The Following Hardwire Alarms for less than 15 minutes

MCB-HF

UA 54	DC Bus 11A Volts Lo
	DC Bus 11C Volts Lo
UA 55	DC Bus 11B Volts Lo
	DC Bus 11D Volts Lo

OR

2. All The Following VAS Alarms for less than 15 minutes

D Point	Message
D6094	125V DC Bus 11A Volts Lo-Lo
D6095	125V DC Bus 11C Volts Lo-Lo
D6096	125V DC Bus 11B Volts Lo-Lo
D6097	125V DC Bus 11D Volts Lo-Lo

OR

3. A Loss Of Voltage Condition As Indicated By All The Following Voltmeters For Less Than 15 Minutes

MCB-HR

1-EDE-VM-9750	Battery Bus 11A Voltage
1-EDE-VM-9752	Battery Bus 11B Voltage
1-EDE-VM-9754	Battery Bus 11C Voltage
1-EDE-VM-9756	Battery Bus 11D Voltage

Figure 1

Initiating Condition

6e. Emergency power NOT restored to at least one train of operable safeguards equipment within 15 minutes.

EMERGENCY ACTION LEVELS

1. Both Hardwire Alarms

MCB-HF

UA 54	4160V Bus 5 Volts Lo
UA 55	4160V Bus 6 Volts Lo

NOTE: If one of these has cleared (light out), a bus is reenergized.

OR

2. Both VAS Alarms

D or F Point	Message
F7300	Bus E5 Loss of Power
F7310	Bus E6 Loss of Power

AND

3. No alarm has been cleared within fifteen minutes.

Figure 1

Initiating Condition

6f. Simultaneous loss of vital DC Busses 11A, 11B, 11C and 11D for more than 15 minutes.

EMERGENCY ACTION LEVELS

1. All The Following Hardwire Alarms For More Than 15 Minutes

MCB-HF

UA 54	DC Bus 11A Volts Lo
	DC Bus 11C Volts Lo
UA 55	DC Bus 11B Volts Lo
	DC Bus 11D Volts Lo

OR

2. All The Following VAS Alarms For More Than 15 Minutes

D Point	Message
D6094	125V DC Bus 11A Volts Lo-Lo
D6095	125V DC Bus 11C Volts Lo-Lo
D6096	125V DC Bus 11B Volts Lo-Lo
D6097	125V DC Bus 11D Volts Lo-Lo

OR

3. A Loss Of Voltage Condition As Indicated By All Of The Following Voltmeters For More Than 15 Minutes

MCB-HR

1-EDE-VM-9750	Battery Bus 11A Voltage
1-EDE-VM-9752	Battery Bus 11B Voltage
1-EDE-VM-9754	Battery Bus 11C Voltage
1-EDE-VM-9756	Battery Bus 11D Voltage

Figure 1

Initiating Condition

7a. Primary to secondary leakage greater than 500 gal per day OR steam generator specific activity greater than 0.1 µCi/cc dose equivalent I-131.

EMERGENCY ACTION LEVELS

1. a) Any one of the following alarms:

Monitor	Indication	Equipment Tag #	RDMS CRT Channel Display #
Steam Generator Blowdown 1	Hi Alarm	1-RM-RM-6510	1LM211
Steam Generator Blowdown 2	Hi Alarm	1-RM-RM-6511	1LM212
Steam Generator Blowdown 3	Hi Alarm	1-RM-RM-6512	1LM213
Steam Generator Blowdown 4	Hi Alarm	1-RM-RM-6513	1LM214
Steam Generator Blowdown Flash Tank Drain	Hi Alarm	1-RM-RM-6519	1LM215
Condenser Air Evac	Hi Alarm	1-RM-RM-6505	1GM810

OR

b) Any other indication of primary to secondary leakage.

AND

2. Analysis of a blowdown liquid sample by the chemistry department indicates activity greater than 0.1 µCi/cc dose equivalent I-131.

Figure 1

Initiating Condition

7b. Identification of steam generator tube rupture by Emergency Procedure E-3.

EMERGENCY ACTION LEVELS

Indication of a Steam Generator tube rupture may be determined by any of the following:

1. Condenser effluent radiation above normal.

OR

2. Steam line radiation above normal.

OR

3. Steam Generator blowdown line high radiation.

OR

4. High radiation in a Steam Generator sample.

OR

5. An unexpected rise in Steam Generator level.

Figure 1

Initiating Condition

8a. Coolant activity sample greater than 20 µCi/cc gross activity (γ).

EMERGENCY ACTION LEVELS

1. a) Letdown Monitor Lo Alarm

Equipment Tag #	RDMS CRT Display Channel #
1-RM-RM-6520-3	1LM 240

OR

b) Any indication of potential fuel clad damage.

AND

2. Analysis of a reactor coolant sample by the chemistry department indicates gross activity (γ) greater than 20 µCi/cc.

Figure 1

Initiating Condition

8b. Coolant activity sample greater than 200 µCi/cc gross activity (γ).

EMERGENCY ACTION LEVELS

1. a) Letdown Monitor Hi Alarm

Equipment Tag #	RDMS CRT Display Channel #
1-RM-RM-6520-3	1LM 240

OR

b) Any indication of potential fuel or clad damage.

OR

2. Analysis of a reactor coolant sample by the chemistry department indicates gross activity (γ) greater than 200 µCi/cc.

Figure 1

Initiating Condition

9a. Loss of VAS and hardwired alarm systems.

EMERGENCY ACTION LEVELS

1. VAS loss indicated by:

   a. Static time on CRT screen

OR

   b. Blank VAS display screen

ANL

2. The annunciator power failure lights on each of the following annunciators indicate loss of 120V AC power supply.

UA-50	MCB-BF
UA-51	MCB-BF
UA-52	MCB-DF
UA-53	MCB-FF
UA-54	MCB-HF
UA-55	MCB-HF

Figure 1

Initiating Condition

9b. Failure of qualified RDMS panel (CP-180).

EMERGENCY ACTION LEVELS

Both 1E panel Trains A and B represented on the RDMS CRT indicate:

Blank or erroneous LED displays

Figure 1

Initiating Condition

9c. VAS and hardwired alarm system not functional for more than two hours. Stable plant conditions existing throughout the two-hour restoration period.

EMERGENCY ACTION LEVELS

1. VAS loss indicated by:

   a. Static time.

OR

   b. Blank VAS display screen.

AND

2. The annunciator power failure lights on each of the following annunciators indicate loss of 120V AC power supply.

UA-50	MCB-BF
UA-51	MCB-BF
UA-52	MCB-DF
UA-53	MCB-FF
UA-54	MCB-HF
UA-55	MCB-HF

AND

3. Two hours have elapsed.

Figure 1

Initiating Condition

9d. Loss of VAS and hardwired alarm system with an abnormal transient in progress.

EMERGENCY ACTION LEVELS

1. VAS loss indicated by:

   a. Static time.

OR

   b. Blank VAS display screen.

AND

2. The annunciator power failure lights on each of the following annunciators indicate loss of 120V AC power supply.

UA-50	MCB-BF
UA-51	MCB-BF
UA-52	MCB-DF
UA-53	MCB-FF
UA-54	MCB-HF
UA-55	MCB-HF

AND

3. An abnormal transient in progress.

Figure 1

Initiating Condition

10. Loss of all communications capability.

EMERGENCY ACTION LEVELS

Complete loss of all the following control room communications.

a. Telephones

b. Radios

c. Gaitronics

d. Sound Powered Phones

Figure 1

Initiating Condition

11. Shutdown technical specifications surpassed.

EMERGENCY ACTION LEVELS

Initiation of shutdown to the cold condition as required by technical specifications.

NOTE
Initiation of shutdown does NOT include preparatory actions such as load reduction preceeding the decision that a shutdown must be performed.

Figure 1

Initiating Condition

12a. Radiological effluents exceed Technical Specification 3.11.2, Gaseous Effluents Instantaneous Limit.

EMERGENCY ACTION LEVELS

The results of chemistry department analysis of gaseous effluent releases.

Figure 1

Initiating Condition

12b. Radiological effluents greater than 10 times Technical Specification 3.11.2, Gaseous Effluents Instantaneous Limit.

EMERGENCY ACTION LEVELS

The results of chemistry department analysis of gaseous effluent releases.

Figure 1

Initiating Condition

12c. Indications that Environmental Protection Agency Protective Action Guides (EPA PAGs) are projected to be exceeded at the site boundary.

EMERGENCY ACTION LEVELS

1. a) Any one of the following alarms:

Monitor	Indication	Equipment Tag #	RDMS CRT Channel Display #	1E Panel (CP-180)	Recorder
Plant Vent Air Radiogas	Hi-Hi Alarm	1-RM-RM-6533-3 (Channel 3)	1LMI226	1-RM-RK-6533	1-RM-RR-6533
Main Steam Line Monitor Loop 2	Hi Alarm	1-RM-RM-6481-1	1GM801	---	---
Main Steam Line Monitor Loop 3	Hi Alarm	1-RM-RM-6481-2	1GM802	---	---
Main Steam Line Monitor Loop 1	Hi Alarm	1-RM-RM-6482-1	1GM803	---	---
Main Steam Line Monitor Loop 4	Hi Alarm	1-RM-RM-6482-2	1GM804	---	---
Cont Hi Range Post LOCA	Hi Alarm	1-RM-RM-6576A 1-RM-RM-6576B	1AM106 1AM107	1-RM-RK-6576A 1-RM-RK-6576B	1-RM-RR-657[illegible] 1-RM-RR-657[illegible]

AND

b) Results of ER-5.3, "Off-site Dose Estimates" which project doses at site boundary to exceed 1 rem whole body.

OR

2. Offsite monitoring results indicate doses at the site boundary which exceed 1 rem whole body.

Figure 1

Initiating Condition

12d. Indications that projected or measured does rates at site boundary exceed 1 rem/hr.

EMERGENCY ACTION LEVELS

1. a) Any one of the following alarms:

Monitor	Indication	Equipment Tag #	RDMS CRT Channel Display #	1E Panel (CP-180)	Recorder
Plant Vent Air Radiogas	Hi-Hi Alarm	1-RM-RM-6533-3 (Channel 3)	1MI226	1-RM-RK-6533	
Main Steam Line Monitor Loop 2	Hi Alarm	1-RM-RM-6481-1	1GM801	---	---
Main Steam Line Monitor Loop 3	Hi Alarm	1-RM-RM-6481-2	1GM802	---	---
Main Steam Line Monitor Loop 1	Hi Alarm	1-RM-RM-6482-1	1GM803	---	---
Main Steam Line Monitor Loop 4	Hi Alarm	1-RM-RM-6482-2	1GM804	---	---
Cont Hi Range Post LOCA	Hi Alarm	~~1-RM-RM-6576A~~ 1-RM-RM-6576B	~~1AM106~~ 1AM107	~~1-RM-RK-6576A~~ 1-RM-RK-6576B	~~1-RM-RR-657~~ 1-RM-RR-657

AND

2. Results of ER-5.3, "Off-site Dose Estimates" which project dose rates at site boundary to exceed 1 rem/hr whole body.

OR

3. Offsite monitoring results indicate dose rates at the site boundary which exceed 1 rem/hr whole body.

Figure 1

Initiating Condition

13. Fuel handling accident with release of radioactivity.

EMERGENCY ACTION LEVELS

1. Shift Superintendent has received notification from the fuel handling building that the following has occurred, resulting in fuel damage.

   a) Dropping, bumping or otherwise rough handling of an irradiated fuel bundle.

OR

   b) Dropping of a heavy object onto irradiated fuel.

AND

2. a) Containment Manipulator Crane Radiation Detectors and Monitor Hi-Hi alarms

Equipment Tag #	RDMS CRT Display Channel #	1E Panel (CP-180)
1-RM-RM-6535A	1AM102	RK-6535A
1-RM-RM-6535B	1AM103	RK-6535B

OR

   b) Spent Fuel Pool Area Monitor Hi-Hi alarms

Equipment Tag #	RDMS CRT Display Channel #	1E Panel (CP-180)
1-RM-RM-6549	1AM402	Local alarm

Figure 1

Initiating Condition

14. Reactor trip or safety injection without a return to normal plant procedures.

EMERGENCY ACTION LEVELS

A determination by the Shift Superintendent that there has been:

1. Reactor trip response (ES-0.1) WITHOUT return to normal plant procedures.

OR

2. SI termination (ES-1.1) WITHOUT return to normal plant procedures.

Figure 1

Initiating Condition

15. Loss of emergency coolant recirculation (ECA-1.1) or LOCA outside of containment (ECA-1.2) with fuel damage imminent.

EMERGENCY ACTION LEVELS

1. Initiation of one of the following emergency procedures:

   a) ECA-1.1 Emergency Coolant Recirculation

   OR

   b) ECA-1.2 LOCA Outside of Containment

AND

2. Indications of imminent fuel damage.

Figure 1

Initiating Condition

16a. Fire in the protected area lasting more than 10 minutes WITH a safe shutdown capability maintained.

EMERGENCY ACTION LEVELS

1. A fire is observed in the protected area burning for more than 10 minutes.

OR

2. a) Fire detection alarm on Main Control Board Section HR.

AND

b) Direct confirmation that the fire is still out of control 10 minutes after the alarm.

AND

3. A determination by the Shift Superintendent that safe shutdown capability is maintained.

Figure 1

Initiating Condition

16b. Controlled, contained fire, potentially affecting safety systems WITH safe shutdown capability maintained at either train associated safe shutdown panel.

EMERGENCY ACTION LEVEL

Observation of fire through fire detection equipment, operation of automatic fire fighting systems and fire fighting teams which the Shift Superintendent determines has the potential to affect safety systems.

Figure 1

Initiating Condition

16c. Uncontrolled, uncontained fire affecting safety related equiment WITH safe shutdown capability maintained at one train, BUT may be affected by the fire.

EMERGENCY ACTION LEVELS

1. Observation of a major fire by fire detection equipment, operation of automatic fire fighting systems or fire fighting teams.

AND

2. A determination by the Shift Superintendent that the safe shutdown capability is maintained at one train but may be affected by the fire.

Figure 1

Initiating Condition

16d. Safe shutdown capability degraded or lost due to fire.

EMERGENCY ACTION LEVELS

A determination by the Shift Superintendent that safe shutdown capability is degraded or lost due to fire.

Figure 1

Initiating Condition

17a. Control room evacuation anticipated or required with safe shutdown capability established.

EMERGENCY ACTION LEVELS

A determination by the Shift Superintendent that:

1. Evacuation of the control room is anticipated or required.

AND

2. Safe shutdown capability has been established.

Figure 1

Initiating Condition

17b. Control room evacuation with safe shutdown capability established BUT station conditions are unstable or uncontrolled.

EMERGENCY ACTION LEVELS

A determination by the Shift Superintendent that:

1. The control room evacuation has been initiated or completed.

AND

2. Control of systems and equipment needed for safe shutdown has been established.

AND

3. Unstable or uncontrolled station conditions warrant additional precautionary measures.

Figure 1

Initiating Condition

17c. Control room evacuation with safe shutdown capability NOT established within 15 minutes.

EMERGENCY ACTION LEVELS

A determination by the Shift Superintendent that the following conditions exist:

1. Control room evacuation has been completed.

AND

2. Control of systems and equipment needed for safe shutdown has not been established within 15 minutes of the control room evacuation.

Figure 1

Initiating Condition

18a. Hazards experienced or projected NOT affecting safety systems.

EMERGENCY ACTION LEVELS

Natural Phenomena

1. Response spectrum seismic unit triggered. Station computer alarm indicated on VAS.

D Point	Message
D5452	Seismic Instrumentation Unit Trigger

OR

2. Tornado observed to strike the site.

OR

3. A hurricane that strikes the site.

Man Made Events

Notification of the Shift Superintendent that there has been:

1. a) An aircraft crash onsite,

OR

b) Unusual aircraft activity over the site.

OR

2. Train derailment onsite,

OR

3. Near site or onsite explosion,

OR

4. Near or onsite toxic or flammable gas release.

Figure 1

Initiating Condition

18a. (Con't)

Security Events

A determination by the Shift Superintendent or notification by the Security Supervisor that there is or was:

1. A security threat in a vital area,

OR

2. An attempted entry in a vital area,

OR

3. An attempted sabotage in a vital area.

Discretionary Events

Shift Superintendent discretion that an event is in progress or has occurred which indicates a potential degradation of the level of safety of the station.

Figure 1

Initiating Condition

18b. Hazards experienced or projected which may affect safety systems.

EMERGENCY ACTION LEVELS

Natural Phenomena

1. Response spectrum seismic unit indicates earthquake greater than containment OBE levels on:

   VAS Alarm

D Point	Message
D5451	Containment foundation OBE

OR

2. Tornado striking and damaging safety structures.

OR

3. Severe weather (sustained winds exceeding 90 mph) which may affect safety systems as indicated by:

   VAS Indicators

A Point	Message
A1626	Met Tower Upper Wind Speed
A1628	Met Tower Lower Wind Speed

Man Made Events

1. Shift Superintendent observes or is notified of an aircraft crash or missile impact on plant structures or components.

OR

2. Shift Superintendent observes or receives notification of station damage caused by explosion.

Figure 1

Initiating Condition

18b. (Con't)

3. a) Shift Superintendent receives notification of gasses in concentrations which exceed the limits of toxicity within the station environs.

OR

b) Portable sampling equipment measures dangerous concentrations of toxic gas within the station.

OR

c) Gaseous concentrations exceed the limits of flamability within the station environs.

OR

d) Flammable or explosive gases are detected by portable sampling methods in any plant structure containing safety related equipment.

Security Event

An on-going security compromise in a vital area.

Discretionary Events

Shift Superintendent discretion that an event is in progress or has occurred which involves an actual or potential substantial degradation of the level of safety of the station.

Figure 1

Initiating Condition

18c. Hazards experianced or projected which compromise safety systems.

EMERGENCY ACTION LEVELS

Natural Phenomenon

1. Earthquake with potential impact on SSE, as indicated by;

	VAS ALARM	
	D Point	Message
a)	D5451	Containment Foundation OBE.

AND

b) Verification of SSE on field response recorders.

OR

2. Tornado or severe weather resulting in safety function compromise.

a) Sustained wind speeds of 100 mph as indicated by;

	VAS	
	A Point	Message
	A1626	Met Tower Upper Wind Speed
	A1628	Met Tower Lower Wind Speed

OR

b) Winds of short duration with estimated speeds in excess of 360 mph.

Man Made Events

Notification to the shift superintendent that there has been:

1. An aircraft crash causing damage or fire in any vital structures.

OR

2. Severe damage to safe shutdown equipment from missile or explosion.

OR

3. Entry of uncontrolled flammable gases into vital areas. Entry of uncontrolled toxic gases into vital areas where lack of access to the area constitutes a safety problem.

Figure 1

Initiating Condition

18c. (Con't)

Security Event

A determination by the Shift Superintendent or notification by the Security Supervisor that a physical attack on the station is in progress which will result in imminent occupation of vital areas.

Discretionary Events

Shift Superintendent discretion that an event is in progress or has occurred which involves actual or likely major failures of station functions needed for protection of the public.

Figure 1

Initiating Condition

18d. Hazards experienced or projected which result in loss of physical control of the facility.

EMERGENCY ACTION LEVELS

Natural Phenomenon

A determination by the Shift Superintendent that there has been or will be major internal or external events which could cause massive common damage to plant systems resulting in any of the General Emergency initiating conditions.

Security Threats

A determination by the Shift Superintendent or notification by the Security Supervisor that a physical attack on the plant has resulted in unauthorized personnel occupying a vital area.

Discretionary Events

Shift Superintendent discretion that an event is in progress or has occurred which involves actual or imminent substantial core degradation or melting with potential for loss of containment integrity.

Figure 1

Initiating Condition

19. Emergency transport of contaminated and injured person to local support hospital.

EMERGENCY ACTION LEVELS

Notification of the Shift Superintendent that a contaminated and injured person has been transported to a local hospital.

Figure 1

Initiating Condition

20. Failure to isolate containment requiring shutdown by Technical Specifications.

EMERGENCY ACTION LEVELS

1. Failure of Phase A valves to isolate after receiving a 'T' signal as indicated by Phase A safeguard status panel and valve(s) can not be closed by alternate means.

OR

2. Failure of Phase B valves to isolate after receiving a 'P' signal as indicated by Phase B safeguard status panel and valve(s) can not be closed by alternate means.

EMERGENCY PLAN IMPLEMENTING PROCEDURE COVER FORM

A. IDENTIFICATION

NUMBER ER-5.4 REVISION 00

TITLE PROTECTIVE ACTION RECOMMENDATIONS

ORIGINATOR A. M. Callendrello

B. INDEPENDENT REVIEW

TITLE	SIGNATURE	DATE
Health Physics Supr.	S L Brady	9/26/84

C. RADIOLOGICAL ASSESSMENT MANAGER APPROVAL

SIGNATURE	DATE
J A McDonald	12/6/84

D. SORC APPROVAL SORC MEETING NO. 85-01

E. APPROVAL AND IMPLEMENTATION

STATION MANAGER	APPROVED DATE	EFFECTIVE DATE
	1/11/85	01/25/85

PROTECTIVE ACTION RECOMMENDATIONS

1.0 OBJECTIVES

This procedure provides guidance for determining protective action recommendations to be made to state authorities.

2.0 RESPONSIBILITIES

2.1 Short Term Emergency Director

Responsible for initial protective action recommendations made to state authorities. Responsible for all subsequent protective action recommendations until relieved by the emergency director.

2.2 Emergency Director

Relieves the short term emergency director of the responsibility for recommending protective actions to state authorities.

2.3 EOF Coordinator

Responsible for the evaluation of radiological data, determination of protective action recommendations, and provision of protective action recommendations to the emergency director.

3.0 PRECAUTIONS

3.1 The dose-saving effectiveness of protective actions can be influenced by many variable factors such as expected duration of releases, affected population, weather conditions, projected evacuation times, and station conditions. When possible, the appropriate factors should all be considered prior to the recommendation of protective actions.

3.2 For an emergency that begins as a General Emergency, detailed protective action recommendation calculations will not be performed for the initial recommendation.

3.3 For an emergency that begins as a General Emergency, protective action recommendations must be made within 15 minutes.

4.0 PREREQUISITES

4.1 A General Emergency has been declared, OR

4.2 A Site Area Emergency has been declared and dose projections have been completed in accordance with ER-5.3, "Off-Site Dose Estimates".

5.0 ACTIONS

5.1 Short-Term Emergency Director or EOF Coordinator

5.1.1 Site Area Emergency

1. Obtain a copy of the Protective Action Recommendation Worksheet, Form ER-5.4A.

2. Complete Part I of the worksheet obtaining information from the Follow-Up Information Form, Form ER-2.2C.

3. For initial calculation, at Item 5, Distance to Receptor, use exclusion area boundary (0.6 miles), 2, 5, and 10 miles.

4. If information is not available, enter N/A in appropriate spaces. Example: If monitoring teams have not yet reported data, enter N/A in items 14, 15, 17, and 18.

5. When worksheet has been completed and a protective action recommendation determined, complete the Follow-Up Information Form, Form ER-2.2C.

6. Check worksheet for completeness and submit to the Emergency Director or, if completed by the Short-Term Emergency Director, notify the states in accordance with ER-2.2, "Notification of Offsite Authorities".

5.1.2 General Emergency

CAUTION
PROTECTIVE ACTION RECOMMENDATIONS MUST BE TRANSMITTED TO STATE AUTHORITIES WITHIN 15 MINUTES OF EMERGENCY DECLARATION

1. Obtain a copy of the Protective Action Recommendation Worksheet, Form ER-5.4A.

2. Complete Part II of the Protective Action Recommendation Worksheet.

3. Check worksheet for completeness and submit to the Emergency Director or, if completed by the Short-Term Emergency Director, notify the states in accordance with ER-2.2, "Notification of Offsite Authorities".

6.0 REFERENCES

6.1 USNRC IE Information Notice No. 83-28, Criteria for Protective Action Recommendations for General Emergencies; May 4, 1983.

6.2 USEPA Protective Action Guides for Exposure to Airborne Radioactive Materials.

7.0 ATTACHMENTS

7.1 Figure 1, Emergency Planning Zone With Sub-Areas and Sectors

7.2 Figure 2, Total Evacuation Clear Time

7.3 Figure 3, Protective Action Recommendation Guidance Charts

7.4 Figure 4, Post LOCA Containment Monitor Response/Personnel Hatch Area Monitor vs % of Core Activity Released

7.5 Figure 5, Predetermined Protective Action Recommendations for General Emergencies

7.6 Figure 6, Protective Action Recommendations by Sub-Area for General Emergency Classifications

7.7 Form ER-5.4A, Protective Action Recommendation Worksheet

FIGURE 1

EMERGENCY PLANNING ZONE WITH SUB-AREAS AND SECTORS

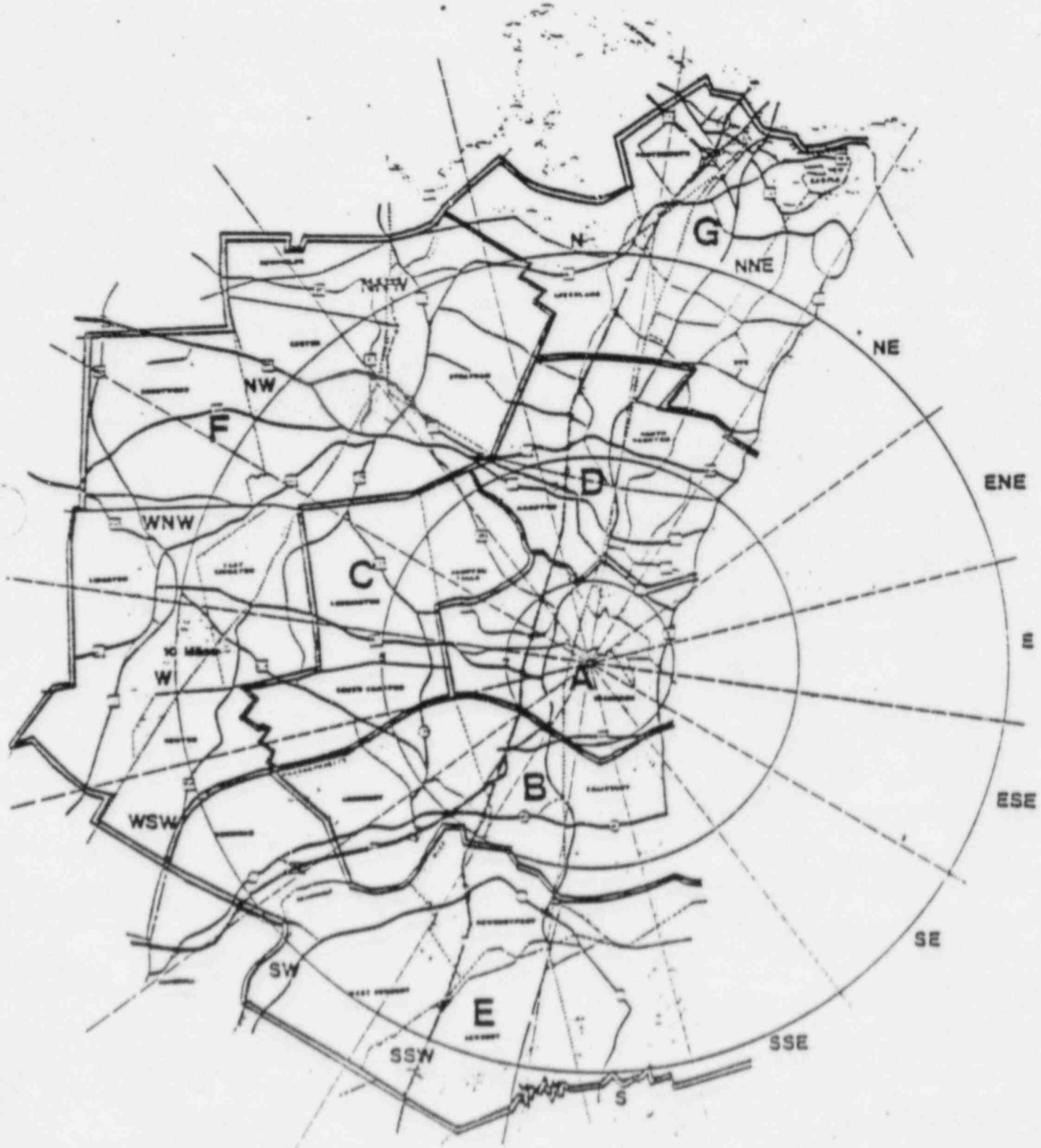


FIGURE 2

TOTAL EVACUATION CLEAR TIMES (INCLUDING NOTIFICATION) BY WIND DIRECTION

NORMAL WEATHER (1) (2)

WIND FROM (DEGREES)	0-2 Miles			0-2 Miles Plus 2-5 Miles Downwind			0-5 Miles Plus 5-EPZ Boundary Downwind		
		TIME (HOURS)			TIME (HOURS)			TIME (HOURS)	
	SUB-AREAS	WINTER(1)	SUMMER (2)	SUB-AREAS	WINTER(1)	SUMMER (2)	SUB-AREAS	WINTER(1)	SUMMER (2)
NNW, N 326 to NNE, NE 56				A, B	2.92	5.75	A, B, C, D, E	3.25	6.08
56 to ENE, E 101				A, B, C	2.92	5.75	A, B, C, D, E, F	3.25	6.08
101 to ESE 124				A, C	2.58	5.08	A, B, C, D, F	3.25	6.08
124 to SE 146				A, C, D	2.58	5.25	A, B, C, D, F	3.25	6.08
146 to SSE, S 191				A, C, D	2.58	5.25	A, B, C, D, F, G	3.25	6.08
191 to SSW, SW 236				A, D	2.58	5.25	A, B, C, D, G	3.25	6.08
236 to WSW 258				A, D	2.58	5.25	A, B, C, D	3.08	6.08
258 to W, WNW 303				A	2.58	5.75	A, B, C, D	3.08	6.08
303 to NW 326				A, B	2.92	5.75	A, B, C, D	3.08	6.08
Any Direction	A	2.58	5.75						

Notes: (1) For winter adverse weather conditions (heavy snow) add 2.5 hours
(2) For summer adverse weather conditions (heavy rain and fog) add 2.0 hours.

FIGURE 3

PROTECTIVE ACTION RECOMMENDATION GUIDANCE CHARTS

WHOLE BODY GUIDANCE CHART

IF	THEN
Projected dose (Item 16) is less than 1 rem	No action
Shelter dose (Item 21) is less than 5 rem	Shelter
Shelter dose (Item 21) is equal to or greater than 5 rem and evacuation dose (Item 19) is equal to or greater than shelter dose	Shelter
Shelter dose (Item 21) is equal to or greater than 5 rem and evacuation dose (Item 19) is less than shelter dose	Evacuate

THYROID GUIDANCE CHART

Dose (Item 18) is less than 5 rem	No action
Shelter dose (Item 22) is less than 25 rem	Shelter
Shelter dose (Item 22) is equal to or greater than 25 rem and evacuation dose (Item 20) is equal to or greater than shelter dose	Shelter
Shelter dose (Item 22) is equal to or greater than 25 rem and evacuation dose (Item 20) is less than shelter dose	Evacuate

Shelter is to be with ventilation control. Ventilation control means turning off air conditioners or fans, closing doors and windows, thus preventing access of outside air. Proceed to a basement if available.

FIGURE 4

POST LOCA CONTAINMENT MONITOR /PERSONEL HATCH AREA
VS. % OF CORE ACTIVITY RELEASED

example: POST LOCA CONTAINMENT MONITOR READS 1000 R/Hr 1 HOUR AFTER SCRAM (SHUTDOWN) WHAT IS THE PROBABLE CORE EFFECT?

ANS = 4% CLADING DAMAGE ASSUMING GAP INVENTORY 10% OF CORE INVENTORY.

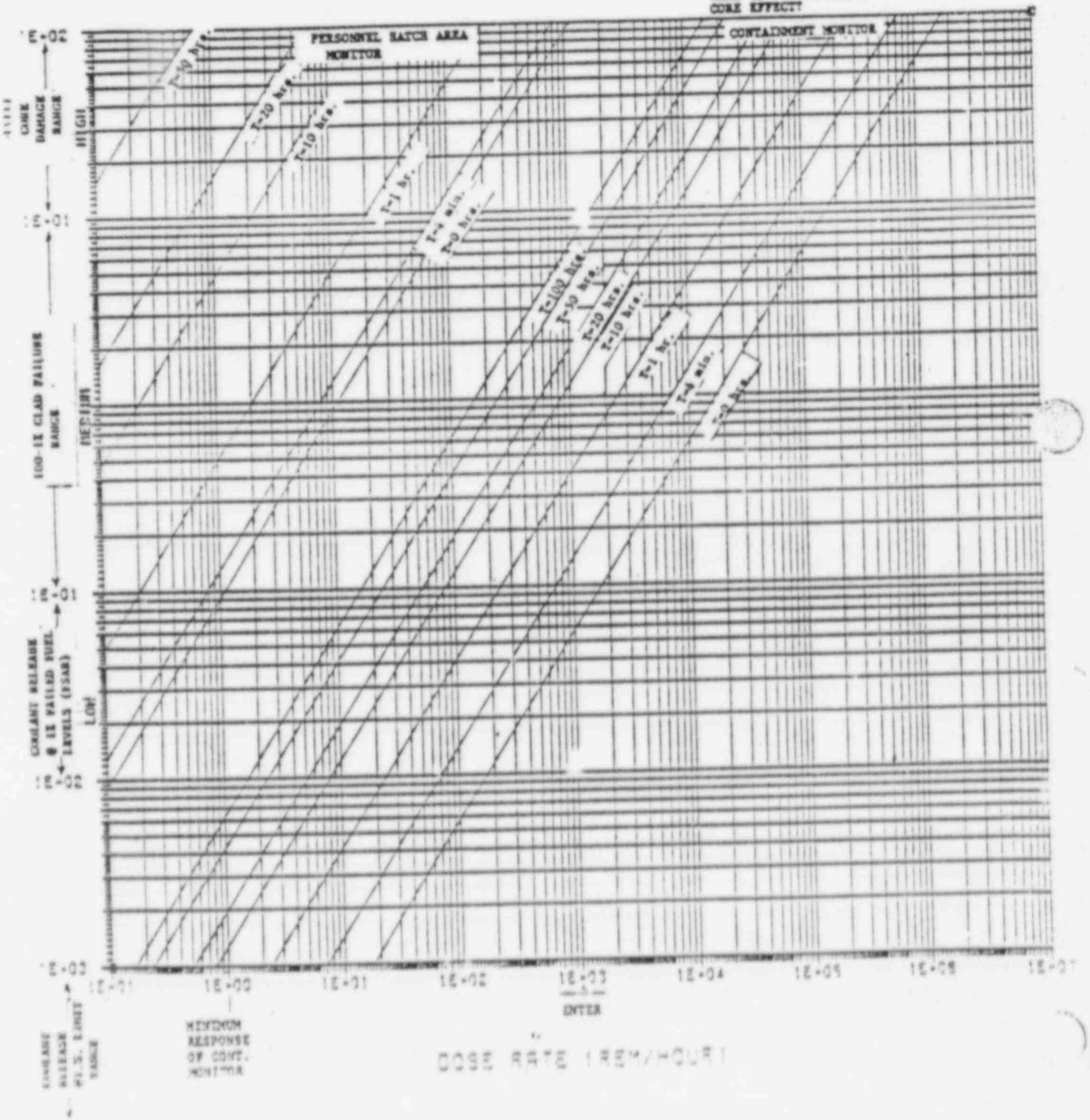


FIGURE 5

PREDETERMINED PROTECTIVE ACTION RECOMMENDATIONS
FOR GENERAL EMERGENCIES

CONDITION	ACTUAL OR POTENTIAL MAGNITUDE OF RADIATION SOURCE	IMMINENT CONTAINMENT FAILURE (≤3 HOURS) OR RELEASE UNDERWAY	RECOMMENDED PROTECTIVE ACTION*
I	Low	—	SHELTER: 0-2 miles 360° 2-5 miles downwind
II	Medium	No	EVACUATE: 0-2 miles 360° 2-5 miles downwind SHELTER: Remaining areas within EPZ
III	Medium or High	Yes	EVACUATE: 0-5 miles 360° after plume passes 5 miles - EPZ boundary downwind SHELTER: 0-5 miles any area that cannot be evacuated before plume arrival.
IV	High	No	EVACUATE: 0-5 miles 360° 5 miles - EPZ boundary downwind SHELTER: Remaining areas within EPZ

*See Figure 6 for specific sub-areas affected.

FIGURE 6

PROTECTIVE ACTION RECOMMENDATIONS BY SUB-AREA

FOR

GENERAL EMERGENCY CLASSIFICATIONS

WIND (DEGREES) FROM	CONDITION I		CONDITION II		CONDITION III (1) CONDITION IV	
	Shelter	Evacuate	Shelter	Evacuate	Shelter	Evacuate
NNW, N 326 to NNE, NE 56	A, B	—	C, D, E, F, G	A, B	F, G	A, B, C, D, E
56 to ENE, E 101	A, B, C	—	D, E, F, G	A, B, C	G	A, B, C, D, E, F
101 to ESE 124	A, C	—	B, D, E, F, G	A, C	E, G	A, B, C, D, F
124 to SE 146	A, C, D	—	B, E, F, G	A, C, D	E, G	A, B, C, D, F
146 to SSE, S 191	A, C, D	—	B, E, F, G	A, C, D	E	A, B, C, D, F, G
191 to SSW, SW 236	A, D	—	B, C, E, F, G	A, D	E, F	A, B, C, D, G
236 to WSW 258	A, D	—	B, C, E, F, G	A, D	E, F, G	A, B, C, D
258 to W, WNW 303	A	—	B, C, D, E, F, G	A	E, F, G	A, B, C, D
303 to NW 326	A, B	—	C, D, E, F, G	A, B	E, F, G	A, B, C, D

NOTE: (1) If any sub-areas within five miles cannot be evacuated prior to plume arrival, sheltering should be recommended.

PROTECTIVE ACTION RECOMMENDATION WORKSHEET

CAUTION

FOR AN EMERGENCY THAT BEGINS AS A GENERAL EMERGENCY, PROCEED DIRECTLY TO PART II OF THIS WORKSHEET.

PART I - AIRBORNE RELEASE

1. Time of calculation (use 24-hour clock) _____ hours

2. Time of release start (use 24-hour clock) _____ hours

3. Release duration _____ hours

4. a. Wind speed _____ mph (43 foot data)

   b. Wind direction from _____ degrees (43 foot data)

5. Distance to receptor _____ _____ _____ _____ miles

6. Affected evacuation subareas (Use items 4b and 5 and either page 1 or 2 of Figure 2) _____ _____ _____ _____

7. Plume travel time _____ _____ _____ _____ hours

   (Item 5/Item 4a)

8. Time until exposure begins (choose a or d)

   a. If release has begun:

   b. Difference (Item 1 - Item 2) _____ hours

   c. Time (Item 7 - Item 8b) _____ _____ _____ _____ hours

   d. If release will begin later:

   e. Difference (Item 2 - Item 1) _____ hours

   f. Time (Item 7 + Item 8e) _____ _____ _____ _____ hours

PROTECTIVE ACTION RECOMMENDATION WORKSHEET
(continued)

(Distance (from Item 5)_____ _____ _____ _____ miles

9. Evacuation Conditions

a. Season (Circle one)

1) Summer: Memorial Day - Labor Day
2) Winter:

b. Weather (Circle one)

1) Normal: Mild weather or light rain or snow
2) Adverse: Summer/Heavy rain and fog, Winter/Heavy snow (see notes on Figure 2)

10. Evacuation time (Use information recorded in Items 6 and 9, along with Figure 2 to determine evacuation time. _____ _____ _____ _____ hours

11. Exposure time

Item 10 - (Item 8c or 8f) _____ _____ _____ _____ hours

CAUTION
IF ITEM 11 IS A NEGATIVE NUMBER, ENTER ZERO HOURS.

12. Evacuation exposure period

Smaller of Item 3 or Item 11 _____ _____ _____ _____ hours

13. Projected whole body dose (ER-5.3) _____ _____ _____ _____ rem

14. Monitoring team whole body dose rate _____ _____ _____ _____ rem/hr

PROTECTIVE ACTION RECOMMENDATION WORKSHEET
(continued)

(Distance (from Item 5)_____ _____ _____ _____ miles

15. Monitoring team whole body dose (Item 14 x Item 3) _____ _____ _____ _____ rem

16. Most reliable whole body dose (Item 13 or Item 15) _____ _____ _____ _____ rem

17. Monitoring team thyroid dose rate _____ _____ _____ _____ rem/hr

18. Monitoring team thyroid dose (Item 17 x Item 3) _____ _____ _____ _____ rem

19. Whole body evacuation dose (Item 12 x Item 16/Item 3) _____ _____ _____ _____ rem

20. Thyroid evacuation dose (Item 12 x Item 18/Item 3) _____ _____ _____ _____ rem

21. Whole body shelter dose (Item 16 x 0.9*) _____ _____ _____ _____ rem
*Average shelter protection factor for wood frame home without basement

22. Thyroid shelter dose (pick a or b)

a. For release duration less than 1 hour (Item 18 x 0.5) _____ _____ _____ _____ rem

b. For release duration equal to or greater than 1 hour Item 18 x $\left[1 - \frac{0.5}{\text{Item 1}}\right]$ _____ _____ _____ _____ rem

PROTECTIVE ACTION RECOMMENDATION WORKSHEET
(continued)

(Distance (from Item 5)_____ _____ _____ _____ miles

23. Whole body indicated action - refer to whole body guidance chart (Figure 3) (Indicate no action, shelter, or evacuation _____ _____ _____ _____

24. Thyroid indicated action - refer to thyroid guidance chart (Figure 3) (Indicate no action, shelter, or evacuation)_____ _____ _____ _____

25. Recommended Protective Action

(More severe action from Item 23 or Item 24 and affected subareas from Item 6)

CAUTION

IF EVACUATION IS RECOMMENDED FOR 2-5 MILES OR 5-10 MILES IN THE DOWNWIND DIRECTION, RECOMMEND SHELTERING FOR THE REMAINDER OF THE SUBAREAS WITHIN THAT RADIAL BOUNDARY.

	0-2 miles	2-5 miles	5-10 miles
Evacuate - circle affected subarea(s)	A	B C D	E F G
Shelter - circle affected subarea(s)	A	B C D	E F G

Approved by Emergency Director_____ _____

Time_____ Date_____

PROTECTIVE ACTION RECOMMENDATION WORKSHEET
(continued)

PART II - GENERAL EMERGENCY

26. Time_____ Date_____ General Emergency Declared.

27. Wind direction (VAS D point A1630)

43 foot level (from) _____ degrees

28. Has there been a loss of physical control of the facility to intruders?
Yes_____ No_____

If yes, recommend:
Evacuate - Subarea : A

29. Has there been a release of fission products into containment?

Indicated by:

1. Containment High Range Post-LOCA Monitor RDMS 1AM106,1AM107 and

2. Personnel Hatch Monitor RDMS 1RM-RM-6536

Yes_____ No_____

30. What is the estimated magnitude of the radiation source (from Containment high range post-LOCA monitor reading, personnel hatch monitor reading, and Figure 4)?

_____
If the radiation source is low, go to step 33 and make minimum protective actions in accordance with Condition I of Figure 6 .

31. Is a breach of containment anticipated within the next 3 hours (As determined by 1) status tree: containment integrity - red, with pressure increasing or 2) containment isolation not indicated)?

Yes_____ No_____

If yes, anticipated time _____

PROTECTIVE ACTION RECOMMENDATION WORKSHEET
(continued)

32. Condition:

Use information from Items 30 and 31 to determine the appropriate condition from Figure 5.

33. Protective Action Recommendation:

Using wind direction (Item 27) and condition (Item 32), determine protective action from Figure 6. If Item 28 also indicates a protective action, enter the more severe of the protective actions.

	0-2 miles	2-5 miles	5-10 miles
Evacuate - subarea(s) (circle):	A	B C D	E F G
Shelter - subarea(s) (circle):	A	B C D	E F G

Approved by Emergency Director:_____

Time_____ Date_____

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

December 27, 1984

ATTACHMENT 5

Mr. J. J. Sheppard, Chairman
Westinghouse Owners Group
Carolina Power & Light Company
411 Fayetteville Street
Post Office Box 1551
Raleigh, North Carolina 27602

Dear Mr. Sheppard:

We have received your letter of August 15, 1984, transmitting the comparison of Revision 1 of the Emergency Response Guidelines (ERGs) with the approved BASIC (Revision 0) version. This information was helpful in expediting a preliminary staff assessment of Revision 1 pending a more detailed, long term review. Our immediate effort was limited to a determination of whether technical differences of Revision 1 from the approved BASIC version could influence plant licensing decisions. Accordingly, we conducted a limited review of the significant differences. Based on the enclosed discussion, we believe that reasonable assurance exists that the identified emergency guideline changes would not result in a violation of approved plant licensing design bases and may be implemented.

This approval does not preclude the need to pursue resolution of the open issues defined in our generic safety evaluation of the approved BASIC version and the recommendations of the ERG Validation Report. The outstanding comments and recommendations for enhancement together with further comments resulting from the completion of our more detailed review are to be resolved within the continuous program for maintaining ERGs.

Sincerely,

Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation

Enclosure:
Preliminary Review of Westinghouse
Emergency Response Guidelines,
Revision 1

PRELIMINARY REVIEW OF WESTINGHOUSE EMERGENCY RESPONSE GUIDELINES REVISION 1

INTRODUCTION

The NRC staff has reviewed the August 15, 1984 transmittal from the Westinghouse Owners Group providing a comparison of Revision 1 of the Emergency Response Guidelines (ERG) with the approved BASIC version of the ERGs. The staff also has considered the findings of the ERG Validation Program (WCAP 10599, June 1984). The purpose of this review was to determine whether the Revision 1 ERG's contained sufficient differences from the approved BASIC version to influence plant licensing decisions prior to completion of a detailed, long-term review.

The staff's limited review of major changes incorporated in the Revision 1 guidelines included consideration of changes to Safety Injection (SI) Termination Criteria, SI Reduction Method, Loss of Heat Sink Guidelines and Reactor Coolant Pump Trip Criteria. The staff's evaluation of each of these changes follows.

DISCUSSION

Safety Injection Termination Criteria

The SI Termination Criteria in BASIC included, as a necessary condition for SI termination, that Reactor Coolant (RC) pressure achieve either an established value or a 200 psi increase. In Revision 1, this criterion was reduced to "stable or increasing" pressure to avoid unnecessary RC pressure increases during a steam generator tube rupture and thus avoid the unnecessary flow of RC into the steam generator. Since the modified criteria

still require adequate RC subcooling, RC inventory and secondary heat sink, the modified criteria provide adequate assurance of core cooling under accident and transient conditions, and are therefore acceptable.

SI Reduction Method

In response to transients which require the reduction of SI flow in combination with cooldown and depressurization of the RCS, an SI Reduction Sequence is accomplished in Revision 1 by a series of pump trips. The BASIC version of the guidelines required the "throttling" of SI flow. This change to the guidelines is desirable because the throttling would be typically performed by an operator stationed at the valve location which could become a high radiation area under accident conditions. Tripping pumps will accomplish the desired flow reduction and therefore is the preferred method.

Revision 1 presents the methodology for calculating appropriate subcooling criteria, and for evaluating on a plant specific basis, a sequence for reducing safety injection flow in coincidence with RCS cooldown. The REDUCE computer model was developed by Westinghouse for the utilities to use in the determination of the amount of subcooling required prior to the reduction of SI flow by shutting off an SI pump. The methodology is presented for optimizing the series of SI reductions during a cooldown while maintaining a minimum value of subcooling. This refined cooldown technique is used in Emergency Response Guidelines ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION; ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED; ECA-3.2, SGTR WITH LOSS OF REACTOR COOLANT - SATURATED RECOVERY DESIRED; and FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK.

We have not completed the review of the REDUCE computer model, but we have considered the changes to the guidelines that are based on these analyses. We note that even if the numerical values of subcooling were in error for the pump shutoff sequence, the guidelines contain sufficient overriding criteria in the foldouts and Functional Recovery Guidelines such that the resulting operator actions would not result in a significant adverse effect on the course of an accident or transient. On the basis of this limited review, we find this method of SI reduction acceptable for implementation pending completion of our longer-term review.

Response to Loss of Secondary Heat Sink

This guideline has been supplemented by the inclusion of a SI flow reduction and PORV closure sequence to restore the plant to controlled conditions after bleed and feed has been initiated. Greater attention is given in the background document to the need for prompt entry into bleed and feed cooling.

The background document in Revision 1 contains the methodology for determining the plant-specific operational response to loss of all feedwater that would be necessary to avoid drying out the steam generators before the bleed and feed operations could be effective in preventing a condition of inadequate core cooling (ICC). The required operational response is sensitive to the capacity of the pressurizer relief valves and the mass of water in the steam generators. This guidance also includes Reactor Coolant Pumps (RCP) trip criteria specifically for this transient. Supportive analyses are presented in the background material as well as in referenced documentation (WCAP 9914:"PORV Sensitivity Study for LOFW-LOCA Analyses").

While we have not completed our review of these analyses, our review of the related guidelines indicates generally that Revision 1 requires more prompt response and greater attention to symptoms of a loss of secondary heat sink. Based on this limited review, we find the Revision 1 guidelines acceptable for implementation pending completion of our longer term review.

The background material in Revision 1 also indicates that for plants with low capacity pressurizer relief valves, the loss of heat sink could lead to a condition of ICC. Because of this close relationship between the loss of heat sink and ICC, the importance of the Heat Sink Critical Safety Function was increased. Accordingly, in Revision 1 the order of priority of operator response to alarm conditions is as follows: Subcriticality, Core Cooling, Heat Sink, Integrity, Containment, and Inventory, whereas in the BASIC version, the Integrity and Heat Sink functions were third and fourth respectively.

The staff considered the effect that this interchange might have on the Integrity critical Safety Function. The relative risk from thermal stresses resulting from various transients is given in the background material regarding stagnant RC loops. The data presented shows a much lower risk of flaw extension resulting from a loss of heat sink than that which would result from a LOCA or SGTR. This indicates that the actions taken to restore the steam generator heat sink or implement bleed and feed operation should not significantly affect the parameters that signal the need for integrity function actions. Therefore, we find this change in priorities acceptable for implementation pending completion of our longer term review of the Emergency Response Guidelines.

Reactor Coolant Pump Trip Criteria

Revision 1 background material also contains an evaluation of alternate RCP trip parameters to establish a variable which will reduce the probability of unnecessary RCP trip for SGTRs and non-LOCAs, while still providing for timely RCP trip for small break LOCAs. The results of this evaluation can be used by utilities to establish the appropriate RCP trip parameter and setpoints for use in Plant Specific Emergency Operating Procedures based on the Emergency Response Guidelines.

The relevant parameters evaluated are RCS pressure, RC subcooling and RC-to-Steam Generator (SG) pressure differential. The resulting trip parameter selection is expected to result in improved operation of the RC pumps over a wide range of accident conditions. This background material is relevant to the NRC staff's continuing review of this generic issue pursuant to NRC Generic Letter No. 83-10d:"Automatic Trip of Reactor Coolant Pumps"(Resolution of TMI Action Item II. K. 3.5). Accordingly, we conclude that, pending completion of our more detailed review of this matter, the RC Pump Trip Criteria methodology presented in Revision 1, together with the guidance provided in NRC Generic Letter No 83-10d, represents an acceptable basis for the implementation of plant-specific pump trip criteria.

Validation Program

In addition to reviewing the Westinghouse Owners Group comparison of the Revision 1 guidelines with the approved BASIC version, the staff considered the findings of the ERG Validation Program (WCAP 10599, June 1984). This documentation indicates that the actual validation of the Revision 1 ERGs was conducted on a plant-specific, full-scale control room simulator and that a

normal operating crew complement used simulator-specific EOPs to guide their actions in response to control room (plant/simulator) indications during major plant casualties. The report further states that the EOPs used were based on, and closely resembled, the ERG Revision 1 set, and that the training involved was developed for the same Revision 1 set. Thirty-five casualties were imposed on the plant including all major events and many events with multiple failures. Observations of operator response resulted in 39 recommendations for enhancement of the generic guidelines, to be addressed by the Owner Group as part of the continuous ERG maintenance program. The report states that no Safety-related technical deficiencies in the ERGs were observed during the test program and concludes that the Revision 1 version of the ERGs represents a substantial improvement over the BASIC version.

The staff concludes that the results of the ERG Validation Program support implementation of the Revision 1 ERGs while the recommendations for enhancement are resolved as part of the long-term program for maintaining ERGs.

CONCLUSION

Based on our review of the August 15, 1984 "Emergency Response Guidelines Comparison of Revision 1 with BASIC", our audit of strategies related to this comparison, and our examination of the results of the ERG Validation Program (WCAP 10599), we conclude that reasonable assurance exists that the identified emergency guideline changes would not result in a violation of approved plant licensing design bases and implementation may proceed.

The outstanding comments and recommendations for enhancement together with further comments resulting from the completion of our more detailed review are to be resolved within the continuous ERG maintenance program for maintaining ERGs. This approval does not preclude the need to pursue resolution of the open issues defined in our generic safety evaluation of the approved BASIC version. Based on our preliminary review, implementation of Revision 1 pending completion of a detailed evaluation is believed to be in the best interest of overall plant operational safety.