



**DUKE POWER**

March 29, 1997

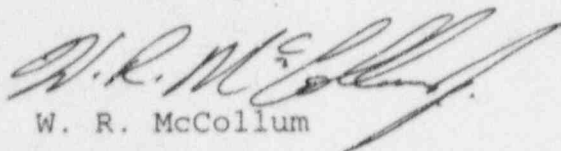
U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, DC 20555

Subject: Catawba Nuclear Station  
Docket Nos. 50-413, 50-414  
License Nos. NPF-35, NPF-52  
Classification Scheme of Emergency Action Levels  
(NRC TAC M96519 and M96520)

Ref.: Emergency Plan Change Submittal dated August 29, 1996

Attached is our response to the issues regarding our Emergency Plan submittal as requested in your January 14, 1997, letter. Please contact Gary Mitchell at (803) 831-3235 if there are any questions on this information.

Yours truly,



W. R. McCollum

WRM/GLM

Attachments:

- 1) Responses to Issues 1-17 from January 14, 1997, letter
- 2) Revised Disposition of NUMARC/NESP-007, Rev. 2 Initiating Conditions and Emergency Action Levels in the Catawba EAL Submittal
- 3) Revised Catawba Emergency Plan Section D pages with Revision Marks
- 4) Revised Catawba Emergency Plan Section D pages without Revision Marks
- 5) Revised Catawba Procedure RP/0/A/5000/01 "Classification of Emergency"
- 6) Selected Pages from Critical Safety Function Status Trees Procedure EP/1/A5000/F-0

9704090066 970329  
PDR ADDCK 05000413  
F PDR



XC:

L. A. Reyes, Regional Administrator  
USNRC, Region II (2 copies)

P. S. Tam, Project Manager  
USNRC, ONRR

R. J. Freudenberger, Senior Resident Inspector  
Catawba Nuclear Station

**ATTACHMENT 1**

**Responses to Issues 1-17 from January 14, 1997 Letter**

## Attachment 1

### Deletion of EAL 4.1.N.4

During our review of the NUMARC EAL package following the Request for Additional Information, a problem was discovered with EAL 4.1.N.4. This EAL is being deleted for the following reasons. The containment process radiation monitors (EMF-38, -39, and -40) serve to provide early indication of reactor coolant (NC) leaks in containment to ensure compliance with Technical Specifications and Selected Licensee Commitments. These monitors alarm on small NC leaks in and below the Unusual Event (IC 4.2.U.4) range. Also, these monitors automatically isolate on a safety injection. For these reasons, it is not appropriate to use these monitors as an indication of a loss of the reactor coolant system barrier.

The reactor building monitors (EMF-53A and -53B) used for the Fuel Clad EAL 4.1.F.3 are not able to indicate clearly the lower levels of activity in containment resulting from a leak of reactor coolant with normal activity levels. Thus, this EAL will be omitted and other indication will be used to determine a potential loss or loss of the Reactor Coolant System Barrier.

### Issue 1

At the time of the Emergency Action Level (EAL) submittal, the Emergency Plan for Catawba Nuclear Site did not require on-shift dose assessment. Duke Power, in a letter dated January 15, 1997, has committed to augmenting the capability for on-shift dose assessment using effluent release information and real-time meteorology by August 1, 1997. **Procedure HP/O/B/1009/26**, "On-Shift Off-Site Dose Projections" will provide guidance for on-shift offsite dose assessment. Duke Power will not implement NUMARC/NESP-007 EALs prior to this date. Catawba EALs 4.3.U.1-1, 4.3.U.1-2, 4.3.A.1-1, and 4.3.A.1-2 have been revised to match the NUMARC/NESP-007 guidance.

The Unusual Event and Alert EALs have been revised to indicate the event should be declared as soon as it is determined that the release duration has or will likely exceed 60 minutes (Unusual Event) or 15 minutes (Alert).

### Issue 2

Catawba EAL 4.3.A.2-2 actually corresponds to NUMARC EAL AA2.2. The Catawba EAL which corresponds to NUMARC EAL AA.2.4 is 4.3.A.2-3. The cross reference document in the original submittal was incorrect.



Due to concerns for ALARA and personnel safety, Duke Power did not wish for personnel to remain in the area to observe that irradiated fuel was uncovered. Personnel should exit the area as quickly as possible and report the occurrence to the Control Room. This statement has been added to the basis for EAL 4.3.A.2-2.

Also, EAL 4.3.A.2-2 has been reworded to clarify that it applies to any irradiated fuel.

### Issue 3

Catawba EAL 4.3.A.3-1 has been revised to read:

- 4.3.A.3-1        Valid reading on EMF-12 greater than 15 mR/hr in the Control Room.
- 4.3.A.3-2        Valid indication of radiation levels greater than 15 mR/hr in the Central Alarm Station (CAS) or Secondary Alarm Station (SAS).

The previous EAL 4.3.A.3-2 has been renumbered to EAL 4.3.A.3-3.

The phrase "valid indication" is used instead of a radiation monitor reading for the CAS and SAS because these areas have no area monitors. The CAS and the SAS have replaced the PAP. The CAS and SAS are the security alarm stations which are continuously occupied. The following sentence has been added to the basis for this EAL.

"The Control Room, CAS, and SAS are areas that require continuous occupancy. The value of 15mR/hr is derived from the GDC 19 value of 5 Rem in 30 days with adjustment for expected occupancy times."

### Issue 4

It was decided to eliminate the 5 R/Hr value and use normal occupational exposure limits of 5 Rem per year TEDE for EAL 4.3.A.3-2. This decision was made after research of the basis for EAL 4.3.A.3-2 and discussions with Radiation Protection Personnel.

Catawba EAL 4.3.A.3-2 has been renumbered to 4.3.A.3-3 and revised to read as follows:

- EAL 4.3.A.3-3    Radiation Levels in areas requiring infrequent access are such that tasks needed to maintain safe operations or to establish or maintain cold shutdown cannot be performed within normal occupational exposure limits of 5 Rem per year TEDE.

The basis for this as follows:

"Radiation levels in the facility such that tasks cannot be performed without exceeding 5 Rem per year TEDE will impede access due to the need for a Planned Special Exposure or Planned Emergency Exposure. This situation is indicative of a significant radiological problem that warrants additional resources to assess and mitigate."

#### Issue 5

The following is the derivation for the monitor thresholds for EAL 4.3.S.1-1 and EAL 4.3.G.1-1

The NUMARC EAL document, NUMARC/NESP-007, gives several methods for initiating a particular Emergency Action Level. These methods include using Radiation Monitor (EMF) trigger values and using site boundary dose rate values that have either been calculated or actually measured. The Raddose-V model uses the site boundary dose method for identifying the EAL based on effluent releases and real-time meteorology.

The gaseous effluent Selected Licensee Commitment and Technical Specification are based on limiting gaseous activity release rates to a site boundary total body dose rate of 500 mrem/year ( $\approx 0.05$  mrem/hour).

The 0.05 mrem/hr Tech Spec site boundary dose rate forms the basis of the NUMARC EALs for gas releases, since each of the four EALs are initiated from multiples of that dose rate, i.e.:

**Unusual Event:**  $2 * 0.05 = 0.10$  mrem/hr ( $\geq 60$  minutes)

**Alert:**  $200 * 0.05 = 10$  mrem/hr ( $\geq 15$  minutes)

**Site Area Emergency:** 100 mrem/hr whole body ( $2000 * 0.05$ )  
500 mrem/hr thyroid\*  
( $\geq 15$  minutes)

**General Emergency:** 1000 mrem/hr whole body ( $20000 * 0.05$ )  
5000 mrem/hr thyroid\*  
( $\geq 15$  minutes)

\* Used in the site boundary dose method only.

Therefore, the first step in coming up with the EAL EMF trigger values is to calculate the Tech Spec release rate and then prorate multiples of that release rate to get the monitor readings for each EAL.

## **I. Calculate the Tech Spec Release Rate ( $\mu\text{Ci/sec Xe-133 eq.}$ )**

From page C-5 of the ODCM the release rate limit equation for noble gases is as follows:

$$K * \chi/Q * Q < 500 \text{ mrem/yr}$$

where:

K = the total body dose factor due to gamma emissions,

$$= 2.06\text{E}+02 \text{ mrem/yr per } \mu\text{Ci/m}^3 \text{ for Xe-133}$$

$\chi/Q$  = the highest calculated annual average relative concentration for any area at or beyond the unrestricted area boundary for ground level releases

$$= 3.51\text{E}-05 \text{ sec/m}^3$$

Q =  $\mu\text{Ci/sec Xe-133 eq.}$  release rate

Substituting the values into the setpoint equation gives a release rate of  $6.915\text{E}+04 \mu\text{Ci/sec Xe-133 equivalent}$ .

## **II. Calculate the EAL EMF Trigger Values**

Reference data from HP/0/B/1000/10:

<u>Monitor</u>	<u>Range</u>	<u>Correlation Factor</u> (cpm/ $\mu\text{Ci/ml Xe-133eq.}$ )
EMF36(L)	$10^1 - 10^7$	$2.7\text{E}+07$
EMF36(H)	$10^1 - 10^6$	$4.3\text{E}+03$

Average Unit Vent Flow Rate:  $1.9\text{E}+05 \text{ cfm}$

Factor to convert  $\mu\text{Ci/sec}$  to cpm:

$$\#(\mu\text{Ci/sec}) * CF(\text{cpm}/\mu\text{Ci/ml}) * 60 \text{ sec/m}^3 * 3.531\text{E}-05 \text{ cf/ml} + 1.9\text{E}+05 \text{ cfm} =$$

$$\#(\mu\text{Ci/sec}) * CF(\text{cpm}/\mu\text{Ci/ml}) * 1.115\text{E}-08$$

### Unusual Event

$$\begin{aligned}\text{EMF36(L)} &= 2 * 6.915\text{E}+04 \mu\text{Ci/sec} * 2.7\text{E}+07 \text{cpm}/\mu\text{Ci/ml} * 1.115\text{E}-08 \\ &= 4.16\text{E}+04 \text{ cpm}\end{aligned}$$

### Alert

$$\begin{aligned}\text{EMF36(L)} &= 200 * 6.915\text{E}+04 \mu\text{Ci/sec} * 2.7\text{E}+07 \text{cpm}/\mu\text{Ci/ml} * 1.115\text{E}-08 \\ &= 4.16\text{E}+05 \text{ cpm}\end{aligned}$$

### Site Area Emergency

$$\begin{aligned}\text{EMF36(H)} &= 2000 * 6.915\text{E}+04 \mu\text{Ci/sec} * 4.3\text{E}+03 \text{cpm}/\mu\text{Ci/ml} * 1.115\text{E}-08 \\ &= 6.63\text{E}+03 \text{ cpm}\end{aligned}$$

### General Emergency

$$\begin{aligned}\text{EMF36(H)} &= 20000 * 6.915\text{E}+04 \mu\text{Ci/sec} * 4.3\text{E}+03 \text{cpm}/\mu\text{Ci/ml} * 1.115\text{E}-08 \\ &= 6.63\text{E}+04 \text{ cpm}\end{aligned}$$

The EALs and notes have been revised to indicate that the EMF readings are sustained for greater than or equal to 15 minutes, like the Alert, rather than being based upon a 60 minute release duration. The EMF readings are based on dose rates, as described above.

### Issue 6

The Fission Product Barrier Matrix has been corrected to show that a Containment radiation monitor 53A or 53B reading of > 117 R/hr represents a **LOSS** of the fuel clad barrier.

### Issue 7

Initiating condition 4.6.U.1 has been reworded to say

"Fire Within the Protected Area Boundary Not Extinguished Within 15 Minutes of Detection **OR** Explosion Within the Protected Area Boundary"

The Secondary Alarm Station (SAS) has been added to the list of areas for EALs 4.6.U.1-1 and 4.6.A.1-1.

### Issue 8

EAL 4.7.A.1-2 has been revised to include a list of areas similar to EAL 4.7.A.1-3.

The Secondary Alarm Station (SAS) has been added to the list of areas for both EALs 4.7.A.1-2 and 4.7.A.1-3.

#### Issue 9

EAL 4.7.A.1-1 has been revised to read as follows:

Valid "OBE Exceeded" Alarm on 1AD-4, B/8  
This identifies the instrumentation used to determine if OBE is exceeded.

#### Issue 10

Defueled is not a defined operating mode per Technical Specifications. The unit is considered to be in "No Mode" when the core is defueled. Duke Power has reviewed the Operating Mode applicability of the NUMARC EALs and has made changes as follows:

- 1) EAL 4.2.U.3-1 applies in Modes 1, 2, 3, 4, and 5 only, as the Technical Specification only applies in these modes.
- 2) EAL 4.5.U.1-1 has been split into two EALs. In Modes 1-4, both diesel generators must start and load for the unit to be in an Unusual Event. In Modes 5, 6, and No Mode (Defueled), only one diesel generator is required. These events would escalate to an Alert if a diesel failed via EAL 4.5.A.2-1 in Modes 1, 2, 3, and 4, and EAL 4.5.A.1-1 in Modes 5, 6, and No Mode (Defueled).
- 3) EALs 4.6.A.1-1 and 4.6.A.2-1 have been recombined into EAL 4.6.A.1-1. This revised EAL 4.6.A.1-1 applies in Modes 1, 2, 3, 4, 5, and 6, except that doghouses are an area of interest only in Modes 1, 2, 3, and 4. A new EAL 4.6.A.2-1 has been written specifically for No Mode (Defueled). This EAL focuses on Spent Fuel Pool cooling and supporting systems. (as per NUMARC/NESP-007 IC HA2)

The Definition/Acronyms Enclosure 4.8 of RP/0/A/5000/01 has been revised to include "Operability Mode Applicability" per page 5-1 of the NUMARC/NESP-007 DOCUMENT Revision 2. This definition refers to ALL as meaning "Modes 1 through 6" and includes "No Mode" (defueled).

#### Issue 11

EAL 4.7.A.3-1 has been revised to read:

Control Room evacuation has been initiated per  
AP/1(2)/A/5500/17

EAL 4.7.S.1-1 part a has been revised to read:

- a. Control Room evacuation has been initiated per AP/1(2)/A/5500/17

#### Issue 12

EAL 4.4.A.1-1 part a, 4.4.S.1-1 part a and 4.4.G.1-1 part a have been revised to read:

- a. Valid reactor trip signal received or required and automatic reactor trip was not successful

#### Issue 13

EAL 4.4.A.2-1 has been revised to read

4.4.A.2-1 Total loss of Residual Heat Removal (ND) and/or Nuclear Service Water (RN) and/or Component Cooling (KC)

AND

One of the following:

- Inability to maintain reactor coolant temperature below 200°F
- Uncontrolled reactor coolant temperature rise to >180°F

#### Issue 14

EAL 4.5.S.2-1 part a has been revised to delete the term "Unplanned".

#### Issue 15

The order of EALs 4.4.S.2-1 through 4.4.S.2-3 have been revised to put them in the same priority as the critical safety function status trees (subcriticality, core cooling, and heat sink).

Duke Power does not agree with NRC'S interpretation of the NUMARC guidance for this issue. The basis in NUMARC/NESP-007, Rev. 2 (IC SS4) indicates that "This EAL addresses complete loss of functions ... required for hot shutdown" and that "there is an actual major failure of a system intended for protection of the public." The Critical Safety Function red paths (see attachment 6) indicate a loss of function needed to protect a Fission Product Barrier, not necessarily the loss of the Fission Product Barrier itself. The NUMARC document does not explain this EAL as being a precursor to Fission Product Barrier challenges.



This EAL is applicable in Modes 1-4. The heat sink in these modes is steam generator cooling. The Heat Sink CSF-Red adequately addresses ultimate heat sink concerns.

#### Issue 16

EAL 4.2.S.1-1 part a has been revised to read:

Loss of most (>50%) annunciators associated with safety systems.

Also, part d has been revised for clarity to read:

Inability to provide manual monitoring of any of the following Critical Safety Functions:

- subcriticality
- core cooling
- heat sink
- containment

#### Issue 17

EAL 4.5.G.1-1 part b has been revised to provide specific SSF success criteria and now reads

Standby Shutdown Facility (SSF) fails to supply NC pump seal injection **OR** CA supply to Steam Generators

The first sentence in the second paragraph of the Basis for this EAL has been revised to read

The SSF is capable of providing the necessary functions (reactor coolant pump seal injection and auxiliary feedwater supply to the steam generators) to maintain a hot shutdown condition for up to 72 hours.

## **ATTACHMENT 2**

**Revised Disposition of NUMARC/NESP-007, Rev. 2  
Initiating Conditions and Emergency Action Levels  
in Catawba 'EAL' Submittal**

## Disposition of NUMARC/NESP-007, Rev. 2 IC/EAL in Catawba EAL Submittal

<b>NUMARC IC/EAL</b>	<b>Catawba EAL Recognition Category and EAL Number</b>
<i>Recognition Category A</i>	
AU1/1	Abnormal Rad Levels/Radiological Effluent 4.3.U.1-1 and -2
AU1/2	Abnormal Rad Levels/Radiological Effluent 4.3.U.1-3 and -4
AU1/3	Deleted -- Catawba does not have perimeter monitors
AU1/4	Deleted -- Catawba does not have automatic real time dose assessment
AU2/1	Abnormal Rad Levels/Radiological Effluent 4.3.U.2-1
AU2/2	Abnormal Rad Levels/Radiological Effluent 4.3.U.2-2
AU2/3	Deleted -- Catawba does not have dry fuel storage
AU2/4	Abnormal Rad Levels/Radiological Effluent 4.3.U.2-3
AA1/1	Abnormal Rad Levels/Radiological Effluent 4.3.A.1-1 and -2
AA1/2	Abnormal Rad Levels/Radiological Effluent 4.3.A.1-3 and -4
AA1/3	Deleted -- Catawba does not have perimeter monitors
AA1/4	Deleted -- Catawba does not have automatic real time dose assessment
AA2/1	Abnormal Rad Levels/Radiological Effluent 4.3.A.2-1
AA2/2	Abnormal Rad Levels/Radiological Effluent 4.3.A.2-2
AA2/3	Abnormal Rad Levels/Radiological Effluent 4.3.A.2-3
AA2/4	Abnormal Rad Levels/Radiological Effluent 4.3.A.2-3
AA3/1	Abnormal Rad Levels/Radiological Effluent 4.3.A.3-1 and -2
AA3/2	Abnormal Rad Levels/Radiological Effluent 4.3.A.3-3
AS1/1	Abnormal Rad Levels/Radiological Effluent 4.3.S.1-1
AS1/2	Deleted -- Catawba does not have perimeter monitors
AS1/3	Abnormal Rad Levels/Radiological Effluent 4.3.S.1-2
AS1/4	Abnormal Rad Levels/Radiological Effluent 4.3.S.1-3
AG1/1	Abnormal Rad Levels/Radiological Effluent 4.3.G.1-1
AG1/2	Deleted -- Catawba does not have perimeter monitors
AG1/3	Abnormal Rad Levels/Radiological Effluent 4.3.G.1-2
AG1/4	Abnormal Rad Levels/Radiological Effluent 4.3.G.1-3

## Disposition of NUMARC/NESP-007, Rev. 2 IC/EAL in Catawba EAL Submittal

<b>NUMARC IC/EAL</b>	<b>Catawba EAL Recognition Category and EAL Number</b>
<i>Recognition Category F</i>	
FPB Fuel/1	Fission Product Barrier 4.1.F.1
FPB Fuel/2	Fission Product Barrier 4.1.F.2
FPB Fuel/3	Deleted -- Core exit thermocouples are monitored as part of Critical Safety Function (CSF) status. If the OAC is not available, manual monitoring is done per F/0, "Critical Safety Function Status" and will be used to classify.
FPB Fuel/4	Deleted -- Reactor Vessel level is monitored as part of CSF status. If the OAC is not available, manual monitoring is done per F/0, "Critical Safety Function Status" and will be used to classify.
FPB Fuel/5	Fission Product Barrier 4.1.F.3
FPB Fuel/6	Deleted -- Catawba does not believe additional indications are needed to determine Fuel Clad Barrier status. Air sampling (PAGS) results are not used, as containment monitors can be used to determine Fuel Clad status.
FPB Fuel/7	Fission Product Barrier 4.1.F.4
FPB RCS/1	Fission Product Barrier 4.1.N.1
FPB RCS/2	Fission Product Barrier 4.1.N.2
FPB RCS/3	Fission Product Barrier 4.1.N.3 Note: The classification procedure does not provide site specific criteria that a steam generator is ruptured. Duke Power's philosophy is that diagnostic information of this type belongs in the Emergency Operating Procedures. Once the Emergency Coordinator/EOF Director determines that a steam generator is ruptured, the classification procedure can be used to determine the correct classification.
FPB RCS/4	DELETED Containment Radiation Monitors (4.1.N.4) Containment process monitors alarm at too low a leak rate for NCS barrier loss and auto-isolate on safety injection. Reactor Building monitors cannot indicate clearly activity levels from loss of coolant with normal activity.
FPB RCS/5	Deleted -- Catawba does not believe additional indications are needed to determine Reactor Coolant System Barrier status. Air sampling (PAGS) results are not used, as containment monitors can be used to determine Reactor Coolant System Barrier status.
FPB RCS/6	Fission Product Barrier 4.1.N.5
FPB Containment/1	Fission Product Barrier 4.1.C.1
FPB Containment/2	Fission Product Barrier 4.1.C.2
FPB Containment/3	Fission Product Barrier 4.1.C.3
FPB Containment/4	Fission Product Barrier 4.1.C.4
FPB Containment/5	Fission Product Barrier 4.1.C.5

Disposition of NUMARC/NESP-007, Rev. 2 IC/EAL in Catawba EAL Submittal

FPB Containment/6	Fission Product Barrier 4.1.C.6 Core exit thermocouples are monitored as part of CSF status. If the OAC is not available, manual monitoring is done per F/O, "Critical Safety Function Status" and will be used to classify.
FPB Containment/7	Deleted -- no additional indications needed
FPB Containment/8	Fission Product Barrier 4.1.C.7

## Disposition of NUMARC/NESP-007, Rev. 2 IC/EAL in Catawba EAL Submittal

**NUMARC IC/EAL***Recognition Category H***Catawba EAL Recognition Category and EAL Number**

HU1/1	Natural Disasters, Hazards, etc. 4.7.U.1-1 and -2
HU1/2	Natural Disasters, Hazards, etc. 4.7.U.1-3
HU1/3	Deleted -- Catawba considers this redundant to Emergency Director Judgement
HU1/4	Natural Disasters, Hazards, etc. 4.7.U.1-4
HU1/5	Fire and Security 4.6.U.1-2
HU1/6	Natural Disasters, Hazards, etc. 4.7.U.1-5
HU1/7	Deleted -- Catawba believes no additional items are needed based on current EAL experience
HU2/1	Fire and Security 4.6.U.1-1
HU3/1	Natural Disasters, Hazards, etc. 4.7.U.2-1
HU3/2	Natural Disasters, Hazards, etc. 4.7.U.2-2
HU4/1	Fire and Security 4.6.U.2-1
HU4/2	Fire and Security 4.6.U.1-2 and -3
HU5/1	Natural Disasters, Hazards, etc. 4.7.U.3-1
HA1/1	Natural Disasters, Hazards, etc. 4.7.A.1-1
HA1/2	Natural Disasters, Hazards, etc. 4.7.A.1-2
HA1/3	Natural Disasters, Hazards, etc. 4.7.A.1-3
HA1/4	Natural Disasters, Hazards, etc. 4.7.A.1-3
HA1/5	Natural Disasters, Hazards, etc. 4.7.A.1-3
HA1/6	Natural Disasters, Hazards, etc. 4.7.A.1-3
HA1/7	Natural Disasters, Hazards, etc. 4.7.A.1-3
HA2/1	Fire and Security 4.6.A.1-1 and 4.6.A.2-1
HA3/1	Natural Disasters, Hazards, etc. 4.7.A.2-1
HA3/2	Natural Disasters, Hazards, etc. 4.7.A.2-2
HA4/1	Fire and Security 4.6.A.3-1
HA4/2	Deleted -- Catawba believes no others Security Event EALs necessary based on current EAL experience
HA5/1	Natural Disasters, Hazards, etc. 4.7.A.3-1
HA6/1	Natural Disasters, Hazards, etc. 4.7.A.4-1
HS1/1	Fire and Security 4.6.S.1-1
HS1/2	Fire and Security 4.6.S.1-2 and -3
HS2/1	Natural Disasters, Hazards, etc. 4.7.S.1-1
HS3/1	Natural Disasters, Hazards, etc. 4.7.S.2-1
HG1/1	Fire and Security 4.6.G.1-1
HG1/2	Fire and Security 4.6.G.1-2
HG2/1	Natural Disasters, Hazards, etc. 4.7.G.1-1



## Disposition of NUMARC/NESP-007, Rev. 2 IC/EAL in Catawba EAL Submittal

NUMARC IC/EAL <i>Recognition Category S</i>	Catawba EAL Recognition Category and EAL Number
SU1/1	Loss of Power 4.5.U.1-1
SU2/1	System Malfunction 4.2.U.1-1
SU3/1	System Malfunction 4.2.U.2-1
SU4/1	Deleted -- Catawba has no failed fuel monitor. Reactor coolant sampling is used to determine fuel clad degradation.
SU4/2	System Malfunction 4.2.U.3-1 -- <u>Applies in Modes 1-5 only because the Technical Specification applies only in these modes.</u>
SU5/1	System Malfunction 4.2.U.4-1, -2, and -3
SU6/1	System Malfunction 4.2.U.5-1 and -2
SU7/1	Loss of Power 4.5.U.2-1
SA1/1	Loss of Power 4.5.A.1-1
SA2/1	Loss of Shutdown Function 4.4.A.1-1
SA3/1	Loss of Shutdown Function 4.4.A.2-1
SA4/1	System Malfunction 4.2.A.1-1
SA5/1	Loss of Power 4.5.A.2-1
SS1/1	Loss of Power 4.5.S.1-1
SS2/1	Loss of Shutdown Function 4.4.S.1-1
SS3/1	Loss of Power 4.5.S.2-1
SS4/1	Loss of Shutdown Function 4.4.S.2-1, -2, and -3
SS5/1	Loss of Shutdown Function 4.4.S.3-1, -2, and -3
SS6/1	System Malfunction 4.2.S.1-1
SG1/1	Loss of Power 4.5.G.1-1
SG2/1 and 2	Loss of Shutdown Function 4.4.G.1-1

# ENCLOSURE 4.1 FISSION PRODUCT BARRIER MATRIX

Catawba Nuclear Site

Use EALs to determine Fission Product Barrier status (Intact, Potential Loss, or Loss). Add points for all 3 barriers. Classify according to the table below.

**Note 1:** This table is only applicable in Modes 1-4.

**Note 2:** Also, an event (or multiple events) could occur which results in the conclusion that exceeding the Loss or Potential Loss thresholds is **IMMINENT** (i.e., within 1-3 hours). In this **IMMINENT** loss situation, use judgement and classify as if the thresholds are exceeded.

Unusual Event (1 - 3 Points)		Alert (4 - 6 Points)		Site Area Emergency (7 - 10 Points)		General Emergency (11 - 13 Points)	
• Any Potential Loss of Containment		• Any Potential Loss or Loss of the NCS		• Loss of both NCS and Fuel Clad		• Loss of all three barriers	
• Any Loss of Containment		• Any Potential Loss or Loss of Fuel Clad		• Potential Loss of both NCS and Fuel Clad		• Loss of any two barriers and the Potential Loss of the third barrier	
				• Potential Loss of either the NCS or Fuel Clad and Loss of any additional barrier			

CONTAINMENT BARRIER		NCS BARRIER		FUEL CLAD BARRIER	
POTENTIAL LOSS - (1 Point(s))	LOSS - (3 Point(s))	POTENTIAL LOSS - (4 Point(s))	LOSS - (5 Point(s))	POTENTIAL LOSS - (4 Point(s))	LOSS - (5 Point(s))
<b>1. Critical Safety Function Status</b>		<b>1. Critical Safety Function Status</b>		<b>1. Critical Safety Function Status</b>	
• Containment-RED	• Not applicable	• NCS Integrity-Red	• Not applicable	• Core Cooling-Orange	• Core Cooling-Red
		• Heat Sink-Red		• Heat Sink-Red	
<b>2. Containment Conditions</b>		<b>2. NCS Leak Rate</b>		<b>2. Primary Coolant Activity Level</b>	
• Containment Pressure > 15 PSIG	• Rapid unexplained decrease in containment pressure following initial increase	• Isolable leak exceeding the capacity of one charging pump in the normal charging mode with letdown isolated.	• GREATER THAN available makeup capacity as indicated by a loss of NCS subcooling.	• Not applicable	• Coolant Activity GREATER THAN 300 µCi/cc Dose Equivalent Iodine (DEI) I-131
• H <sub>2</sub> concentration > 9%					
• Containment pressure greater than 3 psig with less than one full train of NS and a VX-CARF operating.	• Containment pressure or sump level response not consistent with LOCA conditions.				

**ENCLOSURE 4.1  
FISSION PRODUCT BARRIER MATRIX**

**Catawba Nuclear Site**

<b>CONTAINMENT BARRIER</b>		<b>NCS BARRIER</b>		<b>FUEL CLAD BARRIER</b>	
<b>POTENTIAL LOSS - (1 Point(s))</b>	<b>LOSS - (3 Point(s))</b>	<b>POTENTIAL LOSS - (4 Point(s))</b>	<b>LOSS - (5 Point(s))</b>	<b>POTENTIAL LOSS - (4 Point(s))</b>	<b>LOSS - (5 Point(s))</b>
<b>3. Containment Isolation Valves Status After Containment Isolation Activation</b> <ul style="list-style-type: none"> <li>Not applicable</li> <li>Containment isolation is incomplete and a release path from containment exists</li> </ul>		<b>3. SG Tube Rupture</b> <ul style="list-style-type: none"> <li>Primary-to-Secondary leak rate exceeds the capacity of one charging pump in the normal charging mode with letdown isolated.</li> <li>Indication that a SG is ruptured and has a Non-Isolable secondary line fault</li> <li>Indication that a SG is ruptured and a prolonged release of contaminated secondary coolant is occurring from the affected SG to the environment</li> </ul>		<b>3. Containment Radiation Monitoring</b> <ul style="list-style-type: none"> <li>Containment radiation monitor 53 A or 53 B reading &gt;117 R/hr</li> </ul>	
<b>4. SG Secondary Side Release With Primary-to-Secondary Leakage</b> <ul style="list-style-type: none"> <li>Not applicable</li> <li>Release of secondary side to atmosphere with primary to secondary leakage GREATER THAN Tech Spec allowable</li> </ul>		<b>4. Containment Radiation Monitoring</b> <ul style="list-style-type: none"> <li>Not applicable</li> <li>Not Applicable</li> </ul>		<b>4. Emergency Coordinator/EOF Director Judgement</b> <ul style="list-style-type: none"> <li>Any condition, including inability to monitor the barrier, that in the opinion of the Emergency Coordinator/EOF Director indicates LOSS or POTENTIAL LOSS of the fuel clad barrier.</li> </ul>	
<b>5. Significant Radioactive Inventory in Containment</b> <ul style="list-style-type: none"> <li>Containment Rad. Monitor EMF53A or 53B Reading @ time since shutdown: <ul style="list-style-type: none"> <li>&gt; 470 R/hr @ 0 - 0.5 hr</li> <li>&gt; 170 R/hr @ 0.5 - 2 hr</li> <li>&gt; 125 R/hr @ 2 - 4 hr</li> <li>&gt; 90 R/hr @ 4 - 8 hr</li> <li>&gt; 53 R/hr @ &gt; 8 hr</li> </ul> </li> <li>Not applicable</li> </ul>		<b>5. Emergency Coordinator/EOF Director Judgement</b> <ul style="list-style-type: none"> <li>Any condition, including inability to monitor the barrier, that in the opinion of the Emergency Coordinator /EOF Director indicates LOSS or POTENTIAL LOSS of the NCS barrier.</li> </ul>			
<b>6. Core Cooling</b> <ul style="list-style-type: none"> <li>Core cooling - RED path is indicated for &gt; 15 min.</li> <li>Not applicable</li> </ul>					
<b>7. Emergency Coordinator /EOF Director Judgement</b> <ul style="list-style-type: none"> <li>Any condition, including inability to monitor the barrier, that in the opinion of the Emergency Coordinator/EOF Director indicates LOSS or POTENTIAL LOSS of the containment barrier.</li> </ul>					

## **ENCLOSURE 4.2**

### **SYSTEM MALFUNCTION**

#### **UNUSUAL EVENT**

4.2.U.1 Inability to Reach Required Shutdown Within Technical Specification Limits

4.2.U.2 Unplanned Loss of Most or All Safety System Annunciation or Indication in the Control Room for Greater Than 15 Minutes

4.2.U.3 Fuel Clad Degradation

4.2.U.4 Reactor Coolant (NCS) System Leakage

4.2.U.5 Unplanned Loss of All Onsite or Offsite Communications

#### **ALERT**

4.2.A.1 Unplanned Loss of Most or All Safety System Annunciation or Indication in Control Room With Either:  
(1) a Significant Transient in Progress, or  
(2) Compensatory Non-Alarming Indicators Unavailable

#### **SITE AREA EMERGENCY**

4.2.S.1 Inability to Monitor a Significant Transient in Progress

#### **GENERAL EMERGENCY**

## ENCLOSURE 4.3

### ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

UNUSUAL EVENT	ALERT	SITE AREA EMERGENCY	GENERAL EMERGENCY
4.3.U.1 Any Unplanned Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds Two Times the SLC Limits for 60 Minutes or Longer	4.3.A.1 Any Unplanned Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds 200 Times the SLC Limits for 15 Minutes or Longer	4.3.S.1 Boundary Dose Resulting from an Actual or Imminent Release of Radioactivity Exceeds 100 mRem TEDE or 500 mRem CDE Adult Thyroid for the Actual or Projected Duration of the Release	4.3.G.1 Boundary Dose Resulting from an Actual or Imminent Release of Radioactivity that Exceeds 1000 mRem TEDE or 5000 mRem CDE Adult Thyroid for the Actual or Projected Duration of the Release
4.3.U.2 Unexpected Increase in Plant Radiation or Airborne Concentration	4.3.A.2 Major Damage to Irradiated Fuel or Loss of Water Level that Has or Will Result in the Uncovering of Irradiated Fuel Outside the Reactor Vessel		
	4.3.A.3 Release of Radioactive Material or Increases in Radiation Levels Within the Facility That Impedes Operation of Systems Required to Maintain Safe Operations or to Establish or Maintain Cold Shutdown		

## **ENCLOSURE 4.4**

### **LOSS OF SHUTDOWN FUNCTION**

**UNUSUAL EVENT****ALERT****SITE AREA EMERGENCY****GENERAL EMERGENCY**

4.4.A.1 Failure of Reactor Protection System Instrumentation to Complete or Initiate an Automatic Reactor Trip Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Trip Was Successful

4.4.A.2 Inability to Maintain Plant in Cold Shutdown

4.4.S.1 Failure of Reactor Protection System Instrumentation to Complete or Initiate an Automatic Reactor Trip Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Trip Was NOT Successful

4.4.S.2 Complete Loss of Function Needed to Achieve or Maintain Hot Shutdown

4.4.S.3 Loss of Water Level in the Reactor Vessel That Has or Will Uncover Fuel in the Reactor Vessel

4.4.G.1 Failure of the Reactor Protection System to Complete an Automatic Trip and Manual Trip was NOT Successful and There is Indication of an Extreme Challenge to the Ability to Cool the Core



## **ENCLOSURE 4.5**

### **LOSS OF POWER**

<b>UNUSUAL EVENT</b>	<b>ALERT</b>	<b>SITE AREA EMERGENCY</b>	<b>GENERAL EMERGENCY</b>
4.5.U.1 Loss of All Offsite Power to Essential Busses for Greater Than 15 Minutes	4.5.A.1 Loss of All Offsite Power and Loss of All Onsite AC Power to Essential Busses During Cold Shutdown Or Refueling Mode	4.5.S.1 Loss of All Offsite Power and Loss of All Onsite AC Power to Essential Busses	4.5.G.1 Prolonged Loss of All (Offsite and Onsite) AC Power
4.5.U.2 Unplanned Loss of Required DC Power During Cold Shutdown or Refueling Mode for Greater than 15 Minutes	4.5.A.2 AC power to essential busses reduced to a single power source for greater than 15 minutes such that an additional single failure could result in station blackout	4.5.S.2 Loss of All Vital DC Power	

**ENCLOSURE 4.6**  
**FIRE/EXPLOSION AND SECURITY EVENTS**

<b>UNUSUAL EVENT</b>	<b>ALERT</b>	<b>SITE AREA EMERGENCY</b>	<b>GENERAL EMERGENCY</b>
4.6.U.1 Fire Within Protected Area Boundary Not Extinguished Within 15 Minutes of Detection or Explosion Within Protected Area Boundary	4.6.A.1 Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown	4.6.S.1 Security Event in a Plant Vital Area	4.6.G.1 Security Event Resulting in Loss Of Ability to Reach and Maintain Cold Shutdown
4.6.U.2 Confirmed Security Event Which Indicates a Potential Degradation in the Level of Safety of the Plant	4.6.A.2 Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown		
	4.6.A.3 Security Event in a Plant Protected Area		

**ENCLOSURE 4.7**  
**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS**  
**AFFECTING PLANT SAFETY**

<b>UNUSUAL EVENT</b>	<b>ALERT</b>	<b>SITE AREA EMERGENCY</b>	<b>GENERAL EMERGENCY</b>
4.7.U.1 Natural and Destructive Phenomena Affecting the Protected Area	4.7.A.1 Natural and Destructive Phenomena Affecting the Plant Vital Area	4.7.S.1 Control Room Evacuation Has Been Initiated and Plant Control Cannot Be Established	4.7.G.1 Other Conditions Existing Which in the Judgement of the Emergency Coordinator/EOF Director Warrant Declaration of General Emergency
4.7.U.2 Release of Toxic or Flammable Gases Deemed Detrimental to Safe Operation of the Plant	4.7.A.2 Release of Toxic or Flammable Gases Within a Facility Structure Which Jeopardizes Operation of Systems Required to Maintain Safe Operations or to Establish or Maintain Cold Shutdown	4.7.S.2 Other Conditions Existing Which in the Judgement of the Emergency Coordinator/EOF Director Warrant Declaration of Site Area Emergency	
4.7.U.3 Other Conditions Existing Which in the Judgement of the Emergency Coordinator/EOF Director Warrant Declaration of an Unusual Event	4.7.A.3 Control Room Evacuation Has Been Initiated		
	4.7.A.4 Other Conditions Existing Which in the Judgement of the Emergency Coordinator/EOF Director Warrant Declaration of an Alert		

**ATTACHMENT 3**

**Revised Catawba Emergency Plan Section "D"**  
**Pages WITH Revision Marks**

A tube rupture with an unisolable secondary line fault is generally indicated by a reduction in primary coolant inventory, increased secondary radiation levels, and an uncontrolled or complete depressurization of the ruptured SG. This set of conditions represents a loss of the NCS and containment fission product barriers. In conjunction with containment barrier loss #4, this condition will result in the declaration of a Site Area Emergency. Escalation to a General Emergency would be indicated by at least a potential loss of the fuel clad barrier.

Secondary radiation increases should be observed via radiation monitoring of Condenser Air Ejector Discharge, SG Blowdown, Main Steam, and/or SG Sampling System. Determination of the "uncontrolled" depressurization of the ruptured SG should be based on indication that the pressure decrease in the ruptured steam generator is not a function of operator action. This should prevent declaration based on a depressurization that results from an EOP induced cooldown of the NCS that does not involve the prolonged release of contaminated secondary coolant from the affected SG to the environment. This EAL should encompass steam breaks, feed breaks, and stuck open safety or relief valves. These conditions represent a loss of the NCS and containment fission product barriers.

#### **4.1.N.5 Emergency Coordinator/EOF Director Judgment**

This EAL addresses any other factors that are to be used by the Emergency Coordinator/EOF Director in determining whether the NCS barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in Emergency Coordinator/EOF Director judgment that the barrier may be considered lost or potentially lost.

**FUEL CLAD BARRIER EALs: (F.1 or F. 2 or F. 3 or F. 4)**

The Fuel Clad Barrier is the zircalloy tubes that contain the fuel pellets.

**4.1.F.1 Critical Safety Function Status**

Core Cooling - ORANGE indicates subcooling has been lost and that some clad damage may occur. Heat Sink - RED indicates the ultimate heat sink function is under extreme challenge. Either of these conditions indicate a potential loss of the Fuel Clad Barrier.

Core Cooling - RED indicates significant reactor coolant superheating and core uncover. Clad damage under these conditions is likely; therefore, this is indication of loss of the Fuel Clad Barrier.

**4.1.F.2 Primary Coolant Activity Level**

The value of 300  $\mu\text{Ci/cc}$   $\text{I}_{131}$  equivalent coolant activity is well above that expected for iodine spikes and corresponds to about 2% to 5% fuel clad damage. This amount of clad damage indicates significant clad damage and thus the Fuel Clad Barrier is considered lost.

There is no equivalent "Potential Loss" EAL for this item.

**4.1.F.3 Containment Radiation Monitoring**

A reading of 117 R/hr on EMF-53A or 53B is a value which indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the containment. Reactor coolant concentrations of this magnitude are several times larger than the maximum concentrations (including iodine spiking) allowed within technical specifications and are therefore indicative of fuel damage (approximately 5% clad failure depending on core inventory and NCS volume). This EAL indicates a loss of both the fuel clad barrier and a loss of NCS barrier. +

There is no "Potential Loss" EAL associated with this item.

NOTE: If EMF-53A and EMF-53B are unavailable, readings can be calculated from procedure HP/0/B/1009/06, "Alternative Method for Determining Dose Rates within the Reactor Building."



**SYSTEM MALFUNCTION****UNUSUAL EVENT****4.2.U.3 Fuel Clad Degradation.**

**OPERATING MODE APPLICABILITY:**    Mode 1 (Power Operation)  
   Mode 2 (Startup)  
   Mode 3 (Hot Standby)  
   Mode 4 (Hot Shutdown)  
   Mode 5 (Cold Shutdown)

**EMERGENCY ACTION LEVEL:**

**4.2.U.3-1** Dose Equivalent I-131 greater than the Technical Specification allowable limit.

**BASIS:**

This IC is included as an Unusual Event because it is considered to be a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. The EAL addresses coolant samples exceeding coolant technical specifications for iodine spike. Escalation of this IC to the Alert level is via the Fission Product Barrier Degradation Monitoring ICs. This EAL applies in Modes 1, 2, 3, 4, and 5 only because the Technical Specification applies only in these modes.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SU4*

## SYSTEM MALFUNCTION

### **SITE AREA EMERGENCY**

#### **4.2.S.1 Inability to Monitor a Significant Transient in Progress.**

**OPERATING MODE APPLICABILITY:** Mode 1 (Power Operation)  
Mode 2 (Startup)  
Mode 3 (Hot Standby)  
Mode 4 (Hot Shutdown)

#### **EMERGENCY ACTION LEVEL:**

##### **4.2.S.1-1 The following conditions exist:**

- a. Loss of most (>50%) annunciators associated with safety systems.

**AND**

- b. A significant plant transient is in progress.

**AND**

- c. Loss of the OAC.

**AND**

- d. Inability to provide manual monitoring of any of the following Critical Safety Functions:
- subcriticality
  - core cooling
  - heat sink
  - containment

#### **BASIS:**

This IC and its associated EAL are intended to recognize the inability of the control room staff to monitor the plant response to a transient. A Site Area Emergency is considered to exist if the control room staff cannot monitor safety functions needed for protection of the public.

**ENCLOSURE 4.3**  
**ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT**

**UNUSUAL EVENT**

- 4.3.U.1 Any Unplanned Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds Two Times the SLC Limits for 60 Minutes or Longer.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

- 4.3.U.1-1** A valid Trip 2 alarm on radiation monitor EMF-49L or EMF-57 for  $\geq 60$  minutes or will likely continue for  $\geq 60$  minutes which indicates that the release may have exceeded the initiating condition and indicates the need to assess the release with procedure HP/O/B/1009/14.
- 4.3.U.1-2** A valid indication on radiation monitor EMF-36L of  $\geq 1.08\text{E}+04$  cpm for  $\geq 60$  minutes or will likely continue for  $\geq 60$  minutes which indicates that the release may have exceeded the initiating condition and indicates the need to assess the release with procedure HP/O/B/1009/25.
- 4.3.U.1-3** Gaseous effluent being released exceeds two times SLC 16.11-1 for  $\geq 60$  minutes as determined by Radiation Protection (RP) procedure.
- 4.3.U.1-4** Liquid effluent being released exceeds two times SLC 16.11-6 for  $\geq 60$  minutes as determined by RP procedure.

NOTE: If monitor reading is sustained for the time period indicated in the EAL **and** the required assessments (procedure calculations) cannot be completed within this time period, declaration must be made based on the valid radiation monitor reading.

**BASIS:**

The term "Unplanned", as used in this context, includes any release for which a liquid waste release (LWR) or gaseous waste release (GWR) package was not prepared, or a release that exceeds the conditions (e.g., minimum dilution flow, maximum discharge flow, alarm set points) on the applicable package.

Valid means that a radiation monitor reading has been confirmed to be correct.

Unplanned releases in excess of two times the site Selected Licensee Commitments (SLC) that continue for 60 minutes or longer represent an uncontrolled situation and hence, a potential degradation in the level of safety. It is not intended that the release be averaged over 60 minutes. The event should be declared as soon as it is determined that the release duration has or will likely exceed 60 minutes.

The gaseous release rate SLC are based on limiting gaseous release rates to the SITE BOUNDARY to 500 mri/year total body.

The liquid release rate SLC are based on limiting liquid release rates to the UNRESTRICTED AREA to 10 times the Effluent Concentration (EC) values given in 10CFR20.1001-20.2401, Appendix B, Table 2, Column 2. Radiation Protection will use HP/0/B/1009/14, "Radiation Protection Actions Following An Uncontrolled Release of Liquid Radioactive Material" to quantify a release.

Monitor setpoints are based on the methodology of the site Offsite Dose Calculation Manual (ODCM) using annual average meteorology dispersion coefficient of  $3.51\text{E-}5 \text{ sec/m}^3$ . Radiation Protection will use HP/0/B/1009/25, "Emergency Response Off-Site Dose Projections" to quantify a release.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, AUI*

**ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT****ALERT**

- 4.3.A.1 Any Unplanned Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds 200 Times the SLC limits for 15 Minutes or Longer.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

- 4.3.A.1-1** A valid indication on radiation monitor EMF-49L or EMF-57 of  $\geq 1.2\text{E}+05$  cpm for  $\geq 15$  minutes or will likely continue for  $\geq 15$  minutes which indicates that the release may have exceeded the initiating condition and indicates the need to assess the release with procedure HP/0/B/1009/14.
- 4.3.A.1-2** A valid indication on radiation monitor EMF-36L of  $\geq 1.08\text{E}+06$  cpm for  $\geq 15$  minutes or will likely continue for  $\geq 15$  minutes which indicates that the release may have exceeded the initiating condition and indicates the need to assess the release with procedure HP/0/B/1009/25.
- 4.3.A.1-3** Gaseous effluent being released exceeds 200 times the level of SLC 16.11-1 for  $\geq 15$  minutes as determined by RP procedure.
- 4.3.A.1-4** Liquid effluent being released exceeds 200 times the level of SLC 16.11-6 for  $\geq 15$  minutes as determined by RP procedure.

NOTE: If monitor reading is sustained for the time period indicated in the EAL and the required assessments (procedure calculations) cannot be completed within this time period, declaration must be made based on the valid radiation monitor reading.

**BASIS:**

The term "Unplanned", as used in this context, includes any release for which a liquid waste release (LWR) or gaseous waste release (GWR) package was not prepared, or a release that exceeds the conditions (e.g., minimum dilution flow, maximum discharge flow, alarm set points) on the applicable package.

Valid means that a radiation monitor reading has been confirmed to be correct.

This event escalates from the Unusual Event by escalating the magnitude of the release by a factor of 100.

It is not intended that the release be averaged over 15 minutes. The event should be declared as soon as it is determined that the release duration has or will likely exceed 15 minutes.

The gaseous release rate SLC are based on limiting gaseous release rates to the SITE BOUNDARY to 500 mr/year total body.

The liquid release rate SLC are based on limiting liquid release rates to the UNRESTRICTED AREA to 10 times the Effluent Concentration (EC) values given in 10CFR20.1001-20.2401, Appendix B, Table 2, Column 2. Radiation Protection will use HP/O/B/1009/14, "Radiation Protection Actions Following An Uncontrolled Release of Liquid Radioactive Material" to quantify a release.

Monitor setpoints are based on the methodology of the site Offsite Dose Calculation Manual (ODCM) using annual average meteorology dispersion coefficient of  $3.51\text{E-}5 \text{ sec/m}^3$ . Radiation Protection will use HP/O/B/1009/25, "Emergency Response Off-Site Dose Projections" to quantify a release.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, AA1*



**ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT**

**ALERT**

- 4.3.A.2 Major Damage to Irradiated Fuel or Loss of Water Level that Has or Will Result in the Uncovering of Irradiated Fuel Outside the Reactor Vessel.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

- 4.3.A.2-1** An unplanned valid trip II alarm on any of the following radiation monitors:

- a. Spent Fuel Building Refueling Bridge

1EMF-15

2EMF-4

- b. Spent Fuel Pool Ventilation

1EMF-42

2EMF-42

- c. Reactor Building Refueling Bridge

1EMF-17

2EMF-2

- d. Containment Noble Gas Monitors

1EMF-39

2EMF-39

- 4.3.A.2-2** Plant personnel report that water level drop in reactor refueling cavity, spent fuel pool, or fuel transfer canal has or will exceed makeup capacity such that any irradiated fuel will become uncovered.

- 4.3.A.2-3** NC system wide range level < 95 % after initiation of NC system make-up

**AND**

Any irradiated fuel assembly not capable of being lowered into spent fuel pool or reactor vessel

**AND**

KF-122 cannot be closed.

**BASIS:**

This IC applies to spent fuel requiring water coverage. There is time available to take corrective actions, and there is little potential for substantial fuel damage. Thus, an Alert Classification for this event is appropriate. Escalation, if appropriate, would occur via Abnormal Rad Level/Radiological Effluent or Emergency Coordinator/EOF Director Judgment.

EAL 2: Due to concerns for ALARA and personnel safety, personnel should not remain in the area to observe that irradiated fuel is uncovered. Personnel should exit the area as quickly as possible and report the occurrence to the Control Room.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, AA2*

**ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT****ALERT**

- 4.3.A.3 Release of Radioactive Material or Increase in Radiation Levels Within the Facility That Impedes Operation of Systems Required to Maintain Safe Operations or to Establish or Maintain Cold Shutdown.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

- 4.3.A.3-1** Valid reading on EMF-12 greater than 15 mR/hr in the Control Room.
- 4.3.A.3-2** Valid indication of radiation levels greater than 15 mR/hr in the Central Alarm Station (CAS) or Secondary Alarm Station (SAS).
- 4.3.A.3-3** Radiation levels in areas requiring infrequent access are such that tasks needed to maintain safe operations or to establish or maintain cold shutdown cannot be performed within normal occupational exposure limits of 5 Rem per year TEDE.

**BASIS:**

Valid means that a radiation monitor reading has been confirmed to be correct.

This initiating condition (IC) addresses increased radiation levels that impede necessary access to operating stations, or other areas containing equipment that must be operated manually, in order to maintain safe operation or perform a safe shutdown. It is this impaired ability to operate the plant that results in the actual or potential substantial degradation of the level of safety of the plant. Radiation levels in the facility such that tasks cannot be performed without exceeding 5 Rem per year TEDE will impede access due to the need for a Planned Special Exposure or Planned Emergency Exposure. This situation is indicative of a significant radiological problem that warrants additional resources to assess and mitigate.

This IC is not intended to apply to anticipated temporary increases due to planned events (e.g., incore detector movement, radwaste container movement, depleted resin transfers, etc.)

The Control Room, CAS, and SAS are areas that require continuous occupancy. The value of 15 mR/hr is derived from the GDC 19 value of 5 Rem in 30 days with adjustment for expected occupancy times.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, AA3*

## **ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT**

### **SITE AREA EMERGENCY**

- 4.3.S.1 Boundary Dose Resulting from an Actual or Imminent Release of Radioactivity Exceeds 100 mRem TEDE or 500 mRem CDE Adult Thyroid for the Actual or Projected Duration of the Release.**

**OPERATING MODE APPLICABILITY: All**

### **EMERGENCY ACTION LEVELS:**

- 4.3.S.1-1** A valid indication on radiation monitor EMF-36H  $\geq 6.63E +03$  cpm sustained for  $\geq 15$  minutes.
- 4.3.S.1-2** Dose assessment team calculations indicate dose consequences greater than 100 mRem TEDE or 500 mRem CDE Adult Thyroid at the site boundary.
- 4.3.S.1-3** Analysis of field survey results or field survey samples indicates dose consequences greater than 100 mRem TEDE or 500 mRem CDE Adult Thyroid at the site boundary.

NOTE 1: These EMF readings are calculated based on average annual meteorology, site boundary dose rate, and design unit vent flow rate. Calculations by the dose assessment team use actual meteorology, release duration, and unit vent flow rate. Therefore, these EMF readings should not be used if dose assessment team calculations are available.

NOTE 2: If dose assessment team calculations cannot be completed in 15 minutes, then valid monitor readings should be used for emergency classification.

### **BASIS:**

Valid means that a radiation monitor reading has been confirmed to be correct.

The 100 mRem integrated dose in this initiating condition is based on 10 CFR 20 annual average population exposure. This value also provides a desirable gradient (one order of magnitude) between the Alert, Site Area Emergency, and General Emergency classes. These values are 10% of the EPA Protective Action Guide (PAG) values given in EPA-400-R-92-001.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, ASI*

**ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT****GENERAL EMERGENCY**

- 4.3.G.1 Boundary Dose Resulting from an Actual or Imminent Release of Radioactivity that Exceeds 1000 mRem TEDE or 5000 mRem CDE Adult Thyroid for the Actual or Projected Duration of the Release.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

- 4.3.G.1-1** A valid indication on radiation monitor EMF-36H  $\geq 6.63E +04$  cpm sustained for  $\geq 15$  minutes.
- 4.3.G.1-2** Dose assessment team calculations indicate dose consequences greater than 1000 mRem TEDE or 5000 mRem CDE Adult Thyroid at the site boundary.
- 4.3.G.1-3** Analysis of field survey results or field survey samples indicates dose consequences greater than 1000 mRem TEDE or 5000 mRem CDE Adult Thyroid at the site boundary.

NOTE 1: These EMF readings are calculated based on average annual meteorology, site boundary dose rate, and design unit vent flow rate. Calculations by the dose assessment team use actual meteorology, release duration, and unit vent flow rate. Therefore, these EMF readings should not be used if dose assessment team calculations are available.

NOTE 2: If dose assessment team calculations cannot be completed in 15 minutes, then valid monitor readings should be used for emergency classification.

**BASIS:**

Valid means that a radiation monitor reading has been confirmed to be correct.

The 1000 mRem TEDE and 5000 mRem CDE thyroid integrated doses are based on the EPA PAG values given in EPA-400-R-92-001, which indicates that public protective actions are indicated if doses exceed these values. This is consistent with the emergency class description of a general emergency.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, AGI*

**OPERATING MODE APPLICABILITY:** Mode 1 (Power Operation)  
Mode 2 (Startup)  
Mode 3 (Hot Standby)

4.4.A.1-1 The following conditions exist:

a. Valid reactor trip signal received or required and automatic reactor trip was not successful.

AND

b. Manual reactor trip from the control room is successful and reactor power is less than 5% and decreasing.

**BASIS:**

This condition indicates failure of the automatic protection system to trip the reactor. This condition is more than a potential degradation of a safety system in that a front line automatic protection system did not function in response to a plant transient and thus the plant safety has been compromised, and design limits of the fuel may have been exceeded. An Alert is indicated because conditions exist that lead to potential loss of fuel clad or NCS. Reactor protection system setpoint being exceeded (rather than limiting safety system setpoint being exceeded) is specified here because failure of the automatic protection system is the issue. A manual trip is any set of actions by the reactor operator(s) at the reactor control console which causes control rods to be RAPIDLY inserted into the core and brings the reactor subcritical. Operator action to drive rods does NOT constitute a reactor trip, i.e. does not meet the rapid insertion criterion.

Failure of manual trip would escalate the event to a Site Area Emergency.

REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SA2



## LOSS OF SHUTDOWN FUNCTIONS

## ALERT

#### 4.4.A.2 Inability to Maintain Plant in Cold Shutdown.

**OPERATING MODE APPLICABILITY:** Mode 5 (Cold Shutdown)  
Mode 6 (Refueling)

### EMERGENCY ACTION LEVELS:

**4.4.A.2-1** Total loss of Residual Heat Removal (ND) and/or Nuclear Service Water (RN) and/or Component Cooling (KC)

AND

One of the following:

- Inability to maintain reactor coolant temperature below 200°F.
- Uncontrolled reactor coolant temperature rise to >180°F

**BASIS:**

This EAL addresses loss of functions required for core cooling during cold shutdown and refueling conditions. This IC and associated EALs are based on concerns raised by Generic Letter 88-17, "Loss of Decay Heat Removal." A number of phenomena such as pressurization, vortexing, steam generator U-tube draining, NCS level differences when operating at a mid-loop condition, decay heat removal system design, and level instrumentation problems can lead to conditions where decay heat removal is lost and core uncover can occur. NRC analyses show that sequences that can cause core uncover in 15 to 20 minutes and severe core damage within an hour after decay heat removal is lost.

Escalation to the Site Area Emergency is by, "Loss of Water Level in the Reactor Vessel That Has or Will Uncover Fuel in the Reactor Vessel," or by Abnormal Rad Levels/Radiological Effluent ICs.

REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SA3

## **LOSS OF SHUTDOWN FUNCTIONS**

### **SITE AREA EMERGENCY**

**4.4.S.1 Failure of Reactor Protection System Instrumentation to Complete or Initiate an Automatic Reactor Trip Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Trip WAS NOT Successful.**

**OPERATING MODE APPLICABILITY: Mode 1 (Power Operation)**

### **EMERGENCY ACTION LEVEL:**

**4.4.S.1-1** The following conditions exist:

- a. Valid reactor trip signal received or required and automatic reactor trip was not successful.

**AND**

- b. Manual reactor trip from the control room was not successful in reducing reactor power to less than 5% and decreasing.

### **BASIS:**

Automatic and manual trip are not considered successful if action away from the reactor control console is required to trip the reactor. This EAL is equivalent to the Subcriticality CSF-RED.

Under these conditions, the reactor is producing more heat than the maximum decay heat load for which the safety systems are designed. A Site Area Emergency is indicated because conditions exist that lead to imminent loss or potential loss of both fuel clad and NCS. Although this IC may be viewed as redundant to the Fission Product Barrier Degradation IC, its inclusion is necessary to better assure timely recognition and emergency response. Escalation of this event to a General Emergency would be via Fission Product Barrier Degradation or Emergency Coordinator/EOF Director Judgment ICs.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SS2*

## **LOSS OF SHUTDOWN FUNCTIONS**

### **SITE AREA EMERGENCY**

#### **4.4.S.2 Complete Loss of Function Needed to Achieve or Maintain Hot Shutdown.**

**OPERATING MODE APPLICABILITY:**    Mode 1 (Power Operation)  
   Mode 2 (Startup)  
   Mode 3 (Hot Standby)  
   Mode 4 (Hot Shutdown)

### **EMERGENCY ACTION LEVELS:**

**4.4.S.2-1 Subcriticality CSF-RED**

**4.4.S.2-2 Core Cooling CSF-RED**

**4.4.S.2-3 Heat Sink CSF-RED**

### **BASIS:**

This EAL addresses complete loss of functions, including ultimate heat sink and reactivity control, required for hot shutdown with the reactor at pressure and temperature. Under these conditions, there is an actual major failure of a system intended for protection of the public. Thus, declaration of a Site Area Emergency is warranted. Escalation to General Emergency would be via Abnormal Rad Levels/Radiological Effluent, Emergency Coordinator/EOF Director Judgment, or Fission Product Barrier Degradation ICs.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SS4*

## **LOSS OF SHUTDOWN FUNCTIONS**

### **GENERAL EMERGENCY**

- 4.4.G.1 Failure of the Reactor Protection System to Complete an Automatic Trip and Manual Trip was NOT Successful and There is Indication of an Extreme Challenge to the Ability to Cool the Core.**

**OPERATING MODE APPLICABILITY: Mode 1 (Power Operation)**

### **EMERGENCY ACTION LEVEL:**

**4.4.G.1-1** The following conditions exist:

- a. Valid reactor trip signal received or required and automatic reactor trip was not successful.

**AND**

- b. Manual reactor trip from the control room was not successful in reducing reactor power to less than 5% and decreasing.

**AND**

- c. Either of the following conditions exist:
  - Core Cooling CSF-RED
  - Heat Sink CSF-RED

### **BASIS**

Automatic and manual trip are not considered successful if action away from the reactor control console is required to trip the reactor.

Under the conditions of this IC and its associated EALs, the efforts to bring the reactor subcritical have been unsuccessful and, as a result, the reactor is producing more heat than the maximum decay heat load for which the safety systems were designed.

The extreme challenge to the ability to cool the core is intended to mean that the core exit temperatures are at or approaching 1200°F or that the reactor vessel water level is below the top of active fuel. This equates to a Core Cooling-RED condition.

**ENCLOSURE 4.5**  
**LOSS OF POWER**

**UNUSUAL EVENT**

**4.5.U.1 Loss of All Offsite Power to Essential Busses for Greater Than 15 Minutes.**

**EMERGENCY ACTION LEVEL:**

**4.5.U.1-1 OPERATING MODE APPLICABILITY:**    **Mode 1 (Power Operation)**  
   **Mode 2 (Startup)**  
   **Mode 3 (Hot Standby)**  
   **Mode 4 (Hot Shutdown)**

The following conditions exist:

- a. Loss of offsite power to essential buses ETA and ETB for greater than 15 minutes.

**AND**

- b. Both emergency diesel generators are supplying power to their respective essential busses.

**4.5.U.1-2 OPERATING MODE APPLICABILITY:**    **Mode 5 (Cold Shutdown)**  
   **Mode 6 (Refueling)**  
   **No Mode (Defueled)**

The following conditions exist:

- a. Loss of offsite power to essential buses ETA and ETB for greater than 15 minutes.

**AND**

- b. One emergency diesel generator is supplying power to its respective essential bus.

**BASIS:**

Prolonged loss of AC power reduces required redundancy and potentially degrades the level of safety of the plant by rendering the plant more vulnerable to a complete Loss of AC Power (Station Blackout). When in cold shutdown, refueling, or defueled mode the event can be classified as an Unusual Event, because of the significantly reduced decay heat, lower temperature and pressure, increasing the time to restore one of the essential busses, relative to that specified for the Alert EAL. The event will escalate to an Alert in these modes if both essential busses are lost. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SUI*



## LOSS OF POWER

### SITE AREA EMERGENCY

#### 4.5.S.2 Loss of All Vital DC Power.

<b>OPERATING MODE APPLICABILITY:</b>	<b>Mode 1 (Power Operation)</b>
	<b>Mode 2 (Startup)</b>
	<b>Mode 3 (Hot Standby)</b>
	<b>Mode 4 (Hot Shutdown)</b>

#### EMERGENCY ACTION LEVEL:

##### 4.5.S.2-1 The following conditions exist:

- a. Loss of both unit related busses: EBA and EBD both < 112 VDC, and EBB and EBC both < 109 VDC.

#### AND

- b. Failure to restore power to at least one required DC bus within 15 minutes from the time of loss.

#### BASIS:

Loss of all DC power compromises ability to monitor and control plant safety functions. Prolonged loss of all DC power will cause core uncovering and loss of containment integrity when there is significant decay heat and sensible heat in the reactor system. Escalation to a General Emergency would occur by Abnormal Rad Levels/Radiological Effluent, Fission Product Barrier Degradation, or Emergency Coordinator/EOF Director Judgment ICs. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SS3*

## LOSS OF POWER

### GENERAL EMERGENCY

#### 4.5.G.1 Prolonged Loss of All (Offsite and Onsite) AC Power.

**OPERATING MODE APPLICABILITY:**    Mode 1 (Power Operation)  
    Mode 2 (Startup)  
    Mode 3 (Hot Standby)  
    Mode 4 (Hot Shutdown)

#### EMERGENCY ACTION LEVEL:

##### 4.5.G.1-1 Prolonged loss of all offsite and onsite AC power as indicated by:

- a. Loss of power on essential buses ETA and ETB for greater than 15 minutes.

**AND**

- b. Standby Shutdown Facility (SSF) fails to supply NC pump seal injection  
**OR** CA supply to steam generators.

**AND**

- c. At least one of the following conditions exist:
- Restoration of at least one essential bus within 4 hours is *NOT* likely.
  - Indication of continuing degradation of core cooling based on Fission Product Barrier monitoring.

#### **BASIS:**

Loss of all AC power compromises all plant safety systems requiring electric power including RHR, ECCS, Containment Heat Removal and the Ultimate Heat Sink. Prolonged loss of all those functions necessary to maintain hot shutdown will lead to loss of fuel clad, NCS, and containment.

The SSF is capable of providing the necessary functions (reactor coolant pump seal injection and auxiliary feedwater supply to the steam generators) to maintain a hot shutdown condition for up to 72 hours. No fission product barrier degradation would be expected if the SSF is functioning as intended.

**ENCLOSURE 4.6**  
**FIRE/EXPLOSION AND SECURITY EVENTS**

**UNUSUAL EVENT**

**4.6.U.1 Fire Within Protected Area Boundary Not Extinguished Within 15 Minutes of Detection or Explosion Within the Protected Area Boundary.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVEL:**

**4.6.U.1-1** Fire in any of the following areas not extinguished within 15 minutes of control room notification or verification of a control room fire alarm.

- Reactor Building
- Auxiliary Building
- Diesel Generator Rooms
- Control Room
- RN Pumphouse
- Standby Shutdown Facility (SSF)
- Central Alarm Station (CAS)
- Secondary Alarm Station (SAS)
- Doghouses
- Refueling Water Storage Tank (FWST)
- Turbine Building
- Service Building
- Interim Radwaste Building

**4.6.U.1-2** Report by plant personnel of an unanticipated explosion within protected area boundary resulting in visible damage to permanent structure or equipment.

**BASIS:**

EAL 1: The purpose of this EAL is to address the magnitude and extent of fires that may be potentially significant precursors to damage to safety systems. Fire is combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do not constitute fires. Observation of flames is preferred but is NOT required if large quantities of smoke and heat are observed. This excludes such items as fires within administration buildings outside the protected area. Waste-basket fires, and other small fires of no safety consequence should easily be extinguished within 15 minutes of detection. This IC applies to buildings and areas contiguous to plant vital areas or other significant buildings or areas. Verification of the alarm in this context means those actions taken in the control room to determine that the control room alarm is not spurious.

EAL 2: Only those explosions of sufficient force to damage permanent structures or equipment within the protected area should be considered. As used here, an explosion is a rapid, violent, unconfined combustion, or a catastrophic failure of pressurized equipment, that potentially imparts significant energy to near-by structures and materials. No attempt is made in this EAL to assess the actual magnitude of the damage. The occurrence of the explosion with reports of evidence of damage (e.g., deformation, scorching) is sufficient for declaration. The Emergency Coordinator/EOF Director also needs to consider any security aspects of the explosion, if applicable.

Escalation to a higher emergency class is by, "Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown".

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HU1 & HU2*

## **FIRE/EXPLOSION AND SECURITY EVENTS**

### **ALERT**

#### **4.6.A.1 Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown.**

**OPERATING MODE APPLICABILITY:**

- Mode 1 (Power Operation)**
- Mode 2 (Startup)**
- Mode 3 (Hot Standby)**
- Mode 4 (Hot Shutdown)**
- Mode 5 (Cold Shutdown)**
- Mode 6 (Refueling)**

#### **EMERGENCY ACTION LEVEL:**

##### **4.6.A.1-1 The following conditions exist:**

- a. Fire or explosion in any of the following areas:
  - Reactor Building
  - Auxiliary Building
  - Diesel Generator Rooms
  - Control Room
  - RN Pumphouse
  - SSF
  - CAS
  - SAS
  - FWST
  - Doghouses (Applies In Mode 1, 2, 3, 4 only)

#### **AND**

- b. One of the following:
  - Affected safety system parameter indications show degraded performance
  - Plant personnel report visible damage to permanent structures or equipment within the specified area.

Note: Only one train of a system needs to be affected or damaged in order to satisfy this condition.

## **FIRE/EXPLOSION AND SECURITY EVENTS**

### **ALERT**

#### **4.6.A.2 Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown.**

**OPERATING MODE APPLICABILITY:** No Mode (Defueled)

**EMERGENCY ACTION LEVEL:**

#### **4.6.A.2-1 The following conditions exist:**

- a. Fire or explosion in any of the following areas:
  - Spent Fuel Pool
  - Auxiliary Building
  - RN Pumphouse

**AND**

- b. One of the following:
  - Spent Fuel Pool level and/or temperature show degraded performance.
  - Plant personnel report visible damage to permanent structures or equipment supporting Spent Fuel Pool cooling.

Note: Only one train of a system needs to be affected or damaged in order to satisfy this condition.

### **BASIS:**

In a Defueled condition, the plant safety systems of interest are those that support Spent Fuel Pool inventory and cooling.

With regard to explosions, only those explosions of sufficient force to damage permanent structures or equipment required for safe operation within the identified plant area should be considered. As used here, an explosion is a rapid, violent, unconfined combustion, or a catastrophic failure of pressurized equipment, that potentially imparts significant energy to nearby structures and materials. Fire is combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do not constitute fires. Observation of flames is preferred but is NOT required if large quantities of smoke and heat are observed. The inclusion of a "report of visible damage" should not be interpreted as mandating a lengthy damage assessment prior to classification.



## **FIRE/EXPLOSION AND SECURITY EVENTS**

### **SITE AREA EMERGENCY**

#### **4.6.S.1 Security Event in a Plant Vital Area.**

**OPERATING MODE APPLICABILITY: All**

#### **EMERGENCY ACTION LEVELS:**

##### **4.6.S.1-1 Intrusion into any of the following plant areas by a hostile force:**

- Reactor Building
- Auxiliary Building
- Diesel Generator Rooms
- Control Room
- RN Pumphouse
- SSF
- Doghouses
- CAS
- SAS

##### **4.6.S.1-2 Security confirmed bomb discovered/exploded in a vital area.**

##### **4.6.S.1-3 Security confirmed sabotage in a plant vital area.**

#### **BASIS:**

This class of security events represents an escalated threat to plant safety above that contained in the Alert IC in that a hostile force has progressed from the Protected Area to the Vital Area.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HSI*

**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS  
AFFECTING PLANT SAFETY**

**ALERT**

**4.7.A.1 Natural and Destructive Phenomena Affecting the Plant Vital Area.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

**4.7.A.1-1 Valid "OBE Exceeded" Alarm on 1AD-4,B/8**

**4.7.A.1-2 Tornado or high winds:**

Tornado striking plant structures within the vital area:

- Reactor Building
- Auxiliary Building
- Refueling Water Storage Tank (FWST)
- Diesel Generator Rooms
- Control Room
- RN Pumphouse
- Standby Shutdown Facility (SSF)
- Doghouses
- Central Alarm Station (CAS)
- Secondary Alarm Station (SAS)

**OR**

sustained winds  $\geq$  74 mph for > 15 minutes.

**4.7.A.1-3 Turbine failure generated missiles, vehicle crashes or other catastrophic events causing visible structural damage on any of the following plant structures:**

- Reactor Building
- Auxiliary Building
- Refueling Water Storage Tank (FWST)
- Diesel Generator Rooms
- Control Room
- RN Pumphouse
- Standby Shutdown Facility (SSF)
- Doghouses
- Central Alarm Station (CAS)
- Secondary Alarm Station (SAS)

**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS**  
**AFFECTING PLANT SAFETY**

**ALERT**

- 4.7.A.2 Release of Toxic or Flammable Gases Within a Facility Structure Which Jeopardizes Operation of Systems Required to Maintain Safe Operations or to Establish or Maintain Cold Shutdown.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

- 4.7.A.2-1** Report or detection of toxic gases within a Facility Structure in concentrations that will be life threatening to plant personnel.
- 4.7.A.2-2** Report or detection of flammable gases within a Facility Structure in concentrations that will affect the safe operation of the plant.

Structures for above EALs:

- Reactor Building
- Auxiliary Building
- Diesel Generator Rooms
- RN Pumphouse
- Control Room
- SSF
- CAS
- SAS

**BASIS:**

This IC is based on gases that have entered a plant structure affecting the safe operation of the plant. Safe operations are affected when the area can not be accessed by plant personnel to ensure continued operability or availability of safety systems/components. This IC applies to buildings and areas contiguous to plant Vital Areas or other significant buildings or areas. The intent of this IC is not to include buildings (i.e., warehouses) or other areas that are not contiguous or immediately adjacent to plant Vital Areas. It is appropriate that increased monitoring be done to ascertain whether consequential damage has occurred. Escalation to a higher emergency class, if appropriate, will be based on System Malfunction, Fission Product Barrier Degradation, Abnormal Rad Levels/Radioactive Effluent, or Emergency Coordinator/EOF Director Judgment ICs.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HA3*

**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS**  
**AFFECTING PLANT SAFETY**

**ALERT**

**4.7.A.3 Control Room Evacuation Has Been Initiated.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVEL:**

**4.7.A.3-1** Control Room evacuation has been initiated per AP/1(2)/A/5500/17.

**BASIS:**

With the control room evacuated, additional support, monitoring and direction through the Technical Support Center and/or Emergency Operations Facility is necessary. Inability to establish plant control from outside the control room, as evidenced by the inability to maintain NCS or SG inventories, will escalate this event to a Site Area Emergency.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HA5*

**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS**  
**AFFECTING PLANT SAFETY**

**SITE AREA EMERGENCY**

**4.7.S.1 Control Room Evacuation Has Been Initiated and Plant Control Cannot Be Established.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVEL:**

**4.7.S.1-1** The following conditions exist:

- a. Control room evacuation has been initiated per AP/1(2)/A/5500/17.

**AND**

- b. Control of the plant cannot be established from the ASP or the SSF within 15 minutes.

**BASIS:**

The timely transfer of control to alternate control area has not been accomplished. This failure to transfer control would be evidenced by deteriorating reactor coolant system or steam generator parameters. For purposes of classification, the 15 minutes begins at the time that the determination to staff the alternate location is made. For most conditions, Reactor Coolant Pump seal LOCAs or steam generator dryout would be indications of failure to accomplish the transfer in the necessary time.

Escalation of this event, if appropriate, would be by Fission Product Barrier Degradation, Abnormal Rad Levels/Radiological Effluent, or Emergency Coordinator/EOF Director Judgment ICs.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HS2*

**ATTACHMENT 4**

**Revised Catawba Emergency Plan Section "D"**  
**Pages WITHOUT Revision Marks**



D. EMERGENCY CLASSIFICATION SYSTEM

Regulatory Guide 1.101, Rev. 3, August 1992, approved the guidance provided by NUMARC/NESP-007, Revision 2, as an alternative methodology for the development of Emergency Action Levels. Catawba Nuclear Site will use the NUMARC guidance for the development of initiating conditions and emergency action levels.

The emergency classification system utilizes four categories for classification of emergency events.

D.1.a UNUSUAL EVENT

Events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

The purpose of this class is to provide notification of the emergency to the station staff, State and Local Government representatives, and the NRC.

Specific initiating conditions and their corresponding emergency action levels are provided in the Basis Document beginning on page D-4.

D.1.b ALERT

Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

The purpose of this class is to assure that emergency personnel are readily available to:

1. Activate the onsite response centers
2. Respond if the situation becomes more serious or to perform confirmatory radiation monitoring if required
3. Provide offsite authorities current status information

Specific initiating conditions and their corresponding emergency action levels are provided in the Basis Document beginning on page D-4.

D.1.c. SITE AREA EMERGENCY

Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels except near the site boundary.

The purpose of the Site Area Emergency is to:

1. Activate the offsite response centers
2. Assure that monitoring teams are mobilized
3. Assure that personnel required for taking protective actions of near site areas are at duty stations should the situation become more serious.
4. Provide current information to the public and be available for consultation with offsite authorities

Specific initiating conditions and their corresponding emergency action levels are provided in the Basis Document beginning on page D-4.

D.1.d. GENERAL EMERGENCY

Events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

The purpose of the General Emergency is to:

1. Initiate predetermined protective actions for the public
2. Provide continuous assessment of information from onsite and offsite measurements
3. Initiate additional measures as indicated by event releases or potential releases
4. Provide current information to the public and be available for consultation with offsite authorities

Specific initiating conditions and their corresponding emergency action levels are provided in the Basis Document beginning on page D-4.

D.2. INITIATING CONDITIONS

The initiating conditions and their corresponding emergency actions levels are contained in the BASIS document beginning on page D-4. A classification procedure (RP/0/A/5000/01) will be used to classify events as they occur. Specific response procedures are in place which delineate the required response during the appropriate classification.

**ENCLOSURE 4.1**  
**BASIS INFORMATION FOR**  
**FISSION PRODUCT BARRIER REFERENCE TABLE**

**CONTAINMENT BARRIER EALs: (C. 1 or C. 2 or C. 3 or C. 4 or C. 5 or C. 6 or C. 7)**

The Containment Barrier includes the containment building, its connections up to and including the outermost containment isolation valves. This barrier also includes the main steam, feedwater, and blowdown line extensions outside the containment building up to and including the outermost secondary side isolation valve.

Critical Safety Function (CSF) indications are not meant to include transient alarm conditions which may appear during the start-up of engineered safeguards equipment. A CSF condition is satisfied when the alarmed state is valid and sustained.

**4.1.C.1 Critical Safety Function Status**

Containment - RED indicates containment conditions which may challenge the containment integrity. Therefore, this condition represents a potential loss of the containment barrier.

There is no "Loss" EAL associated with this item.

**4.1.C.2 Containment Conditions**

Containment pressure above 15 psig (the design pressure) indicates that the containment or its heat removal systems are not functioning as intended. This degradation of containment pressure control represents a potential loss of containment integrity.

A containment hydrogen concentration of 9 volume percent is sufficient to expect that any ignition would result in complete combustion of the hydrogen in containment and a significant pressure rise. At some initial containment pressures, this pressure rise may exceed the capacity of the containment. Therefore, this level of hydrogen in the containment represents a potential loss of containment integrity.

Containment heat removal systems are actuated at the high-high containment pressure setpoint of 3 psig. At least one train of Containment Spray (NS) and one Containment Air (VX) Return Fan (CARF) should be actuated at that time (the CARF with a 10 minute delay). A failure to actuate the design basis heat removal capability or assure proper containment mixing represents a degradation in the control of the

containment conditions. Therefore, this situation represents a potential loss of containment integrity.

Rapid unexplained loss of pressure (i.e., not attributable to containment spray or condensation effects) following an initial pressure increase indicates a loss of containment integrity.

Containment pressure and sump levels should increase as a result of the mass and energy release into containment from a Loss of Coolant Accident (LOCA). Thus, sump level or containment pressure not increasing indicates an interfacing systems LOCA which is a containment bypass and a loss of containment integrity, or some other containment pressure boundary failure.

#### **4.1.C.3 Containment Isolation Valve Status After Containment Isolation Actuation**

Failure to isolate those containment pathways which would allow containment atmosphere to be released from containment is a loss of the containment barrier.

There is no "Potential Loss" EAL associated with this item.

#### **4.1.C.4 Steam Generator (SG) Secondary Side Release With Primary To Secondary Leakage**

Secondary side releases to atmosphere include those from the condenser air ejector, SG Power Operated Relief Valves (PORVs), atmospheric dump valves, faulted steam lines, and main steam safety valves. Steam releases, in combination with primary to secondary leakage, constitute a bypass of the containment and, therefore, a loss of the containment barrier.

The appropriate classification can be determined in combination with the SG Tube Rupture EAL under the Reactor Coolant System (NCS) barrier.

There is no "Potential Loss" EAL associated with this item.

#### **4.1.C.5 Significant Radioactive Inventory in Containment**

These values indicate significant fuel damage well in excess of the EALs associated with both loss of Fuel Clad and loss of NCS Barriers. NUREG-1228, *Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents*, indicates that such conditions do not exist when the amount of clad damage is less

than 20%. This amount of activity in containment, if released, could have such severe consequences that it is prudent to treat this as a potential loss of containment.

By treating the radioactive inventory in containment as a potential loss, a General Emergency will be declared when the conditions of the fuel clad and NCS barriers are included in the evaluation. This will allow the appropriate protective actions to be recommended.

There is no "Loss" EAL associated with this item.

NOTE: If EMF-53A and EMF-53B are unavailable, readings can be calculated from procedure HP/O/B/1009/06, "Alternative Method for Determining Dose Rates within the Reactor Building."

#### **4.1.C.6 Core Cooling**

Core Cooling - RED for greater than 15 minutes in this potential loss EAL represents imminent core damage that, if not terminated, could lead to reactor vessel failure and an increased potential for containment failure. The potential for containment challenge as a result of events at reactor vessel failure makes it prudent to consider an unmitigated core damage condition as a potential loss of the containment barrier.

Severe accident analyses (e.g., NUREG-1150) have concluded that function restoration procedures can arrest core degradation within the reactor vessel in a significant fraction of the core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it is appropriate to provide a reasonable period to allow function restoration procedures to arrest the core melt sequence. Whether or not the procedures will be effective should be apparent within 15 minutes. The Emergency Coordinator/EOF Director should make the declaration as soon as it is determined that the procedures have been, or will be, ineffective.

There is no "Loss" EAL associated with this item.

#### **4.1.C.7 Emergency Coordinator/EOF Director Judgment**

This EAL addresses any other factors that are to be used by the Emergency Coordinator/EOF Director in determining whether the containment barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in Emergency Coordinator/EOF Director judgment that the barrier may be considered lost or potentially lost.



**REACTOR COOLANT SYSTEM (NCS) BARRIER EALs: (N.1 or N. 2 or N. 3 or N.4 or N.5)**

The NCS Barrier includes the NCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.

**4.1.N.1 Critical Safety Function Status**

NCS Integrity - RED indicates NCS pressure and temperature conditions which may challenge the Reactor Vessel integrity. Heat Sink - RED indicates the ultimate heat sink function is under extreme challenge. Either of these conditions indicate a potential loss of the NCS Barrier.

There is no "Loss" EAL associated with this item.

**4.1.N.2 NCS Leak Response**

Small leaks may result in the inability to maintain normal liquid inventory within the NCS by operation of the Chemical and Volume Control System, which is considered as one centrifugal charging pump discharging to the charging header with the letdown line isolated. If letdown cannot be isolated, and a second charging pump is required, this is still considered a potential loss of the NCS barrier. The need for compensatory action to maintain normal liquid inventory is an indication of a degraded NCS barrier and is considered to be a potential loss of the barrier.

The loss of subcooling is the fundamental indication that the inventory loss from the primary system exceeds the capacity of the inventory control systems. If the loss of subcooling is indicated, the NCS barrier is considered lost.

**4.1.N.3 SG Tube Rupture**

Small Steam Generator tube leaks may result in the inability to maintain normal liquid inventory within the Reactor Coolant System (NCS) by operation of the Chemical and Volume Control System, which is considered as one centrifugal charging pump discharging to the charging header with the letdown line isolated. If letdown cannot be isolated, and a second charging pump is required, this is still considered a potential loss of the NCS barrier. The need for compensatory action to maintain normal liquid inventory is an indication of a degraded NCS barrier and is considered to be a potential loss of the barrier.

A tube rupture with an unisolable secondary line fault is generally indicated by a reduction in primary coolant inventory, increased secondary radiation levels, and an uncontrolled or complete depressurization of the ruptured SG. This set of conditions represents a loss of the NCS and containment fission product barriers. In conjunction with containment barrier loss #4, this condition will result in the declaration of a Site Area Emergency. Escalation to a General Emergency would be indicated by at least a potential loss of the fuel clad barrier.

Secondary radiation increases should be observed via radiation monitoring of Condenser Air Ejector Discharge, SG Blowdown, Main Steam, and/or SG Sampling System. Determination of the "uncontrolled" depressurization of the ruptured SG should be based on indication that the pressure decrease in the ruptured steam generator is not a function of operator action. This should prevent declaration based on a depressurization that results from an EOP induced cooldown of the NCS that does not involve the prolonged release of contaminated secondary coolant from the affected SG to the environment. This EAL should encompass steam breaks, feed breaks, and stuck open safety or relief valves. These conditions represents a loss of the NCS and containment fission product barriers.

#### **4.1.N.5 Emergency Coordinator/EOF Director Judgment**

This EAL addresses any other factors that are to be used by the Emergency Coordinator/EOF Director in determining whether the NCS barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in Emergency Coordinator/EOF Director judgment that the barrier may be considered lost or potentially lost.

**FUEL CLAD BARRIER EALs: (F.1 or F. 2 or F. 3 or F. 4)**

The Fuel Clad Barrier is the zircalloy tubes that contain the fuel pellets.

**4.1.F.1 Critical Safety Function Status**

Core Cooling - ORANGE indicates subcooling has been lost and that some clad damage may occur. Heat Sink - RED indicates the ultimate heat sink function is under extreme challenge. Either of these conditions indicate a potential loss of the Fuel Clad Barrier.

Core Cooling - RED indicates significant reactor coolant superheating and core uncover. Clad damage under these conditions is likely; therefore, this is indication of loss of the Fuel Clad Barrier.

**4.1.F.2 Primary Coolant Activity Level**

The value of 300  $\mu\text{Ci/cc}$  I<sub>131</sub> equivalent coolant activity is well above that expected for iodine spikes and corresponds to about 2% to 5% fuel clad damage. This amount of clad damage indicates significant clad damage and thus the Fuel Clad Barrier is considered lost.

There is no equivalent "Potential Loss" EAL for this item.

**4.1.F.3 Containment Radiation Monitoring**

A reading of 117 R/hr on EMF-53A or 53B is a value which indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the containment. Reactor coolant concentrations of this magnitude are several times larger than the maximum concentrations (including iodine spiking) allowed within technical specifications and are therefore indicative of fuel damage (approximately 5% clad failure depending on core inventory and NCS volume). This EAL indicates a loss of both the fuel clad barrier and a loss of NCS barrier.

There is no "Potential Loss" EAL associated with this item.

NOTE: If EMF-53A and EMF-53B are unavailable, readings can be calculated from procedure HP/0/B/1009/06, "Alternative Method for determining Dose Rates within the Reactor Building."

**4.1.F.4 Emergency Coordinator/EOF Director Judgment**

This EAL addresses any other factors that are to be used by the Emergency Coordinator/EOF Director in determining whether the Fuel Clad barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in Emergency Coordinator/EOF Director judgment that the barrier may be considered lost or potentially lost.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, BASIS INFORMATION FOR TABLE 4*

**ENCLOSURE 4.2**  
**SYSTEM MALFUNCTION**

**UNUSUAL EVENT**

**4.2.U.1 Inability to Reach Required Shutdown Within Technical Specification Limits.**

**OPERATING MODE APPLICABILITY:** Mode 1 (Power Operation)  
Mode 2 (Startup)  
Mode 3 (Hot Standby)  
Mode 4 (Hot Shutdown)

**EMERGENCY ACTION LEVEL:**

**4.2.U.1-1** Plant is not brought to required operating mode within Technical Specifications LCO Action Statement Time.

**BASIS:**

Limiting Conditions of Operation (LCOs) require the plant to be brought to a required shutdown mode when the Technical Specification required configuration cannot be restored. Depending on the circumstances, this may or may not be an emergency or precursor to a more severe condition. In any case, the initiation of plant shutdown required by the site Technical Specifications requires a one hour report under 10 CFR 50.72 (b) Non-emergency events. The plant is within its safety envelope when being shut down within the allowable action statement time in the Technical Specifications. An immediate Notification of an Unusual Event is required when the plant is not brought to the required operating mode within the allowable action statement time in the Technical Specifications. **Declaration of an Unusual Event is based on the time at which the LCO-specified action statement time period elapses under the site Technical Specifications and is not related to how long a condition may have existed.** Other required Technical Specification shutdowns that involve precursors to more serious events are addressed by other System Malfunction, Hazards, or Fission Product Barrier Degradation ICs.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SU2*

**SYSTEM MALFUNCTION****UNUSUAL EVENT****4.2.U.2 Unplanned Loss of Most or All Safety System Annunciation or Indication in the Control Room for Greater Than 15 Minutes.****OPERATING MODE APPLICABILITY: Mode 1 (Power Operation)****Mode 2 (Startup)****Mode 3 (Hot Standby)****Mode 4 (Hot Shutdown)****EMERGENCY ACTION LEVEL:****4.2.U.2-1** The following conditions exist:

- a. Unplanned loss of most (>50%) annunciators associated with safety systems for greater than 15 minutes.

**AND**

- b. In the opinion of the Operations Shift Manager/Emergency Coordinator/EOF Director, the loss of the annunciators or indicators requires additional personnel (beyond normal shift compliment) to safely operate the unit.

**BASIS:**

This Initiating Condition (IC) and its associated EAL are intended to recognize the difficulty associated with monitoring changing plant conditions without the use of a major portion of the annunciation or indication equipment. "Unplanned" loss of annunciators or indicator excludes scheduled maintenance and testing activities. Quantification of "most" is arbitrary; however, this judgment is supported by the specific opinion of the Operations Shift Manager/Emergency Coordinator/EOF Director that additional operating personnel will be required to provide increased monitoring of system operation to safely operate the unit. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

This Unusual Event will be escalated to an Alert if a transient is in progress during the loss of annunciation or indication.

Due to the limited number of safety systems in operation during cold shutdown, refueling, and defueled modes, no IC is indicated during these modes of operation.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SUS*



**SYSTEM MALFUNCTION****UNUSUAL EVENT****4.2.U.3 Fuel Clad Degradation.**

**OPERATING MODE APPLICABILITY:**    **Mode 1 (Power Operation)**  
   **Mode 2 (Startup)**  
   **Mode 3 (Hot Standby)**  
   **Mode 4 (Hot Shutdown)**  
   **Mode 5 (Cold Shutdown)**

**EMERGENCY ACTION LEVEL:**

**4.2.U.3-1** Dose Equivalent I-131 greater than the Technical Specification allowable limit.

**BASIS:**

This IC is included as an Unusual Event because it is considered to be a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. The EAL addresses coolant samples exceeding coolant technical specifications for iodine spike. Escalation of this IC to the Alert level is via the Fission Product Barrier Degradation Monitoring ICs. This EAL applies in Modes 1, 2, 3, 4, and 5 only because the Technical Specification applies only in these modes.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SU4*

## SYSTEM MALFUNCTION

### UNUSUAL EVENT

#### 4.2.U.4 Reactor Coolant System (NCS) Leakage.

**OPERATING MODE APPLICABILITY:** Mode 1 (Power Operation)  
Mode 2 (Startup)  
Mode 3 (Hot Standby)  
Mode 4 (Hot Shutdown)

#### EMERGENCY ACTION LEVELS:

4.2.U.4-1 Unidentified leakage  $\geq 10$  gpm

4.2.U.4-2 Pressure boundary leakage  $\geq 10$  gpm

4.2.U.4-3 Identified leakage  $\geq 25$  gpm

#### BASIS:

This IC is included as an Unusual Event because it may be a precursor of more serious conditions and, as a result, is considered to be a potential degradation of the level of safety of the plant. The 10 gpm value for the unidentified and pressure boundary leakage was selected as it is observable with normal control room indications. Lesser values must generally be determined through time-consuming surveillance tests (e.g., mass balances). The EAL for identified leakage is set at a higher value due to the lesser significance of identified leakage in comparison to unidentified or pressure boundary leakage. In either case, escalation of this IC to the Alert level is via Fission Product Barrier Degradation ICs or IC, "Inability to Maintain Plant in Cold Shutdown "

REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SU5

## **SYSTEM MALFUNCTION**

### **UNUSUAL EVENT**

#### **4.2.U.5    Unplanned Loss of All Onsite or Offsite Communications.**

**OPERATING MODE APPLICABILITY:    All**

#### **EMERGENCY ACTION LEVELS:**

- 4.2.U.5-1** Loss of all onsite communications capability (internal phone system, PA system, onsite radio system) affecting the ability to perform routine operations.
- 4.2.U.5-2** Loss of all offsite communications capability (Selective Signaling, NRC FTS lines, offsite radio system, commercial phone system) affecting the ability to communicate with offsite authorities.

#### **BASIS:**

The purpose of this IC and its associated EALs is to recognize a loss of communications capability that either defeats the plant operations staff ability to perform routine tasks necessary for plant operations or the ability to communicate problems with offsite authorities. The loss of offsite communications ability is expected to be significantly more comprehensive than the condition addressed by 10 CFR 50.72.

This EAL is intended to be used only when extraordinary means are being utilized to make communications possible (relaying of information from radio transmissions, individuals being sent to offsite locations, etc.).

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SU6*

**SYSTEM MALFUNCTION****ALERT**

- 4.2.A.1**    **Unplanned Loss of Most or All Safety System Annunciation or Indication in Control Room With Either (1) a Significant Transient in Progress, or (2) Compensatory Non-Alarming Indicators Unavailable.**

**OPERATING MODE APPLICABILITY:**    **Mode 1 (Power Operation)**  
   **Mode 2 (Starup)**  
   **Mode 3 (Hot Standby)**  
   **Mode 4 (Hot Shutdown)**

**EMERGENCY ACTION LEVEL:**

- 4.2.A.1-1**    The following conditions exist:

- a.    Unplanned loss of most (>50%) annunciators associated with safety systems for greater than 15 minutes.

**AND**

- b.    In the opinion of the Operations Shift Manager/Emergency Coordinator/EOF Director, the loss of the annunciators or indicators requires additional personnel (beyond normal shift compliment) to safely operate the unit.

**AND**

- c.    Either of the following:
- A significant plant transient is in progress.
  - Loss of the Operator Aid Computer (OAC).

**BASIS:**

This IC and its associated EAL are intended to recognize the difficulty associated with monitoring changing plant conditions without the use of a major portion of the annunciation or indication equipment during a transient. Quantification of "Most" is arbitrary; however, this judgment is supported by the specific opinion of the Operations Shift Manager/Emergency Coordinator/EOF Director that additional operating personnel will be required to provide increased monitoring of system operation to safely operate the unit. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Refer to Operations Procedure OP/1(2)/A/6700/03, "Operating with OAC Out of Service."

"Significant Transient" includes response to automatic or manually initiated functions such as reactor trips, runbacks involving greater than 25% thermal power change, ECCS injections, or thermal power oscillations of 10% or greater.

Significant indication is available from the OAC. Loss of the OAC in conjunction with the loss of other indications would further impair the ability to monitor plant parameters.

Due to the limited number of safety systems in operation during cold shutdown, refueling and defueled modes, no IC is indicated during these modes of operation.

This Alert will be escalated to a Site Area Emergency if the operating crew cannot monitor the transient in progress.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SA4*

## SYSTEM MALFUNCTION

### **SITE AREA EMERGENCY**

#### **4.2.S.1 Inability to Monitor a Significant Transient in Progress.**

**OPERATING MODE APPLICABILITY:** Mode 1 (Power Operation)  
Mode 2 (Startup)  
Mode 3 (Hot Standby)  
Mode 4 (Hot Shutdown)

#### **EMERGENCY ACTION LEVEL:**

##### **4.2.S.1-1 The following conditions exist:**

- a. Loss of most (>50%) annunciators associated with safety systems.

**AND**

- b. A significant plant transient is in progress.

**AND**

- c. Loss of the OAC.

**AND**

- d. Inability to provide manual monitoring of any of the following Critical Safety Functions:
  - subcriticality
  - core cooling
  - heat sink
  - containment

#### **BASIS:**

This IC and its associated EAL are intended to recognize the inability of the control room staff to monitor the plant response to a transient. A Site Area Emergency is considered to exist if the control room staff cannot monitor safety functions needed for protection of the public.



"Significant Transient" includes response to automatic or manually initiated functions such as trips, runbacks involving greater than 25% thermal power change, ECCS injections, or thermal power oscillations of 10% or greater.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SS6*

**ENCLOSURE 4.3**  
**ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT**

**UNUSUAL EVENT**

- 4.3.U.1 Any Unplanned Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds Two Times the SLC Limits for 60 Minutes or Longer.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

- 4.3.U.1-1** A valid Trip 2 alarm on radiation monitor EMF-49L or EMF-57 for  $\geq 60$  minutes or will likely continue for  $\geq 60$  minutes which indicates that the release may have exceeded the initiating condition and indicates the need to assess the release with procedure HP/O/B/1009/14.
- 4.3.U.1-2** A valid indication on radiation monitor EMF-36L of  $\geq 1.08\text{E}+04$  cpm for  $\geq 60$  minutes or will likely continue for  $\geq 60$  minutes which indicates that the release may have exceeded the initiating condition and indicates the need to assess the release with procedure HP/O/B/1009/25.
- 4.3.U.1-3** Gaseous effluent being released exceeds two times SLC 16.11-1 for  $\geq 60$  minutes as determined by Radiation Protection (RP) procedure.
- 4.3.U.1-4** Liquid effluent being released exceeds two times SLC 16.11-6 for  $\geq 60$  minutes as determined by RP procedure.

NOTE: If monitor reading is sustained for the time period indicated in the EAL and the required assessments (procedure calculations) cannot be completed within this time period, declaration must be made based on the valid radiation monitor reading.

**BASIS:**

The term "Unplanned", as used in this context, includes any release for which a liquid waste release (LWR) or gaseous waste release (GWR) package was not prepared, or a release that exceeds the conditions (e.g., minimum dilution flow, maximum discharge flow, alarm set points) on the applicable package.

Valid means that a radiation monitor reading has been confirmed to be correct.

Unplanned releases in excess of two times the site Selected Licensee Commitments (SLC) that continue for 60 minutes or longer represent an uncontrolled situation and hence, a potential degradation in the level of safety. It is not intended that the release be averaged over 60 minutes. The event should be declared as soon as it is determined that the release duration has or will likely exceed 60 minutes.

The gaseous release rate SLC are based on limiting gaseous release rates to the SITE BOUNDARY to 500 mr/year total body.

The liquid release rate SLC are based on limiting liquid release rates to the UNRESTRICTED AREA to 10 times the Effluent Concentration (EC) values given in 10CFR20.1001-20.2401, Appendix B, Table 2, Column 2. Radiation Protection will use HP/0/B/1009/14, "Radiation Protection Actions Following An Uncontrolled Release of Liquid Radioactive Material" to quantify a release.

Monitor setpoints are based on the methodology of the site Offsite Dose Calculation Manual (ODCM) using annual average meteorology dispersion coefficient of  $3.51\text{E-}5 \text{ sec/m}^3$ . Radiation Protection will use HP/0/B/1009/25, "Emergency Response Off-Site Dose Projections" to quantify a release.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, AUI*

## ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

### UNUSUAL EVENT

#### 4.3.U.2 Unexpected Increase in Plant Radiation or Airborne Concentration.

OPERATING MODE APPLICABILITY: All

#### EMERGENCY ACTION LEVELS:

- 4.3.U.2-1 Indication of uncontrolled water level decrease of greater than 6 inches in the reactor refueling cavity with all irradiated fuel assemblies remaining covered by water.
- 4.3.U.2-2 Uncontrolled water level decrease of greater than 6 inches in the spent fuel pool and fuel transfer canal with all irradiated fuel assemblies remaining covered by water.
- 4.3.U.2-3 Unplanned **valid** area radiation monitor (EMF) reading increases by a factor of 1000 over normal levels.

#### BASIS:

Valid means that a radiation monitor reading has been confirmed to be correct.

All of the above events tend to have long lead times relative to potential for radiological release outside the site boundary; thus, impact to public health and safety is very low.

In light of reactor cavity seal failure incidents, explicit coverage of these types of events via EALs 1 and 2 is appropriate given their potential for increased doses to plant staff. A threshold value of 6 inches is used to allow time for mitigating actions to successfully terminate the inventory loss. Credit should not be taken for inventory additions to maintain level above the 6 inch threshold. Classification as an Unusual Event is warranted as a precursor to a more serious event.

EAL 3 addresses unplanned increases in in-plant radiation levels that represent a degradation in the control of radioactive material, and represent a potential degradation in the level of safety of the plant. This EAL escalates to an Alert if the increases impair safe operation.

REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, AU2

## **ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT**

### **ALERT**

- 4.3.A.1 Any Unplanned Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds 200 Times the SLC limits for 15 Minutes or Longer.**

**OPERATING MODE APPLICABILITY: All**

### **EMERGENCY ACTION LEVELS:**

- 4.3.A.1-1** A valid indication on radiation monitor EMF-49L or EMF-57 of  $\geq 1.2\text{E}+05$  cpm for  $\geq 15$  minutes or will likely continue for  $\geq 15$  minutes which indicates that the release may have exceeded the initiating condition and indicates the need to assess the release with procedure HP/O/B/1009/14.
- 4.3.A.1-2** A valid indication on radiation monitor EMF-36L of  $\geq 1.08\text{E}+06$  cpm for  $\geq 15$  minutes or will likely continue for  $\geq 15$  minutes which indicates that the release may have exceeded the initiating condition and indicates the need to assess the release with procedure HP/O/B/1009/25.
- 4.3.A.1-3** Gaseous effluent being released exceeds 200 times the level of SLC 16.11-1 for  $\geq 15$  minutes as determined by RP procedure.
- 4.3.A.1-4** Liquid effluent being released exceeds 200 times the level of SLC 16.11-6 for  $\geq 15$  minutes as determined by RP procedure.

NOTE: If monitor reading is sustained for the time period indicated in the EAL and the required assessments (procedure calculations) cannot be completed within this time period, declaration must be made based on the valid radiation monitor reading.

### **BASIS:**

The term "Unplanned", as used in this context, includes any release for which a liquid waste release (LWR) or gaseous waste release (GWR) package was not prepared, or a release that exceeds the conditions (e.g., minimum dilution flow, maximum discharge flow, alarm set points) on the applicable package.

Valid means that a radiation monitor reading has been confirmed to be correct.

This event escalates from the Unusual Event by escalating the magnitude of the release by a factor of 100.

It is not intended that the release be averaged over 15 minutes. The event should be declared as soon as it is determined that the release duration has or will likely exceed 15 minutes.

The gaseous release rate SLC are based on limiting gaseous release rates to the SITE BOUNDARY to 500 mr/year total body.

The liquid release rate SLC are based on limiting liquid release rates to the UNRESTRICTED AREA to 10 times the Effluent Concentration (EC) values given in 10CFR20.1001-20.2401, Appendix B, Table 2, Column 2. Radiation Protection will use HP/O/B/1009/14, "Radiation Protection Actions Following An Uncontrolled Release of Liquid Radioactive Material" to quantify a release.

Monitor setpoints are based on the methodology of the Late Offsite Dose Calculation Manual (ODCM) using annual average meteorology dispersion coefficient of  $3.51\text{E-}5 \text{ sec/m}^3$ . Radiation Protection will use HP/O/B/1009/25, "Emergency Response Off-Site Dose Projections" to quantify a release.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, AA1*



**ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT**

**ALERT**

- 4.3.A.2 Major Damage to Irradiated Fuel or Loss of Water Level that Has or Will Result in the Uncovering of Irradiated Fuel Outside the Reactor Vessel.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

- 4.3.A.2-1** An unplanned valid trip II alarm on any of the following radiation monitors:

- a. Spent Fuel Building Refueling Bridge  
1EMF-15  
2EMF-4
- b. Spent Fuel Pool Ventilation  
1EMF-42  
2EMF-42
- c. Reactor Building Refueling Bridge  
1EMF-17  
2EMF-2
- d. Containment Noble Gas Monitors  
1EMF-39  
2EMF-39

- 4.3.A.2-2** Plant personnel report that water level drop in reactor refueling cavity, spent fuel pool, or fuel transfer canal has or will exceed makeup capacity such that any irradiated fuel will become uncovered.

- 4.3.A.2-3** NC system wide range level < 95 % after initiation of NC system make-up

**AND**

Any irradiated fuel assembly not capable of being lowered into spent fuel pool or reactor vessel

**AND**

KF-122 cannot be closed.

**BASIS:**

This IC applies to spent fuel requiring water coverage. There is time available to take corrective actions, and there is little potential for substantial fuel damage. Thus, an Alert Classification for this event is appropriate. Escalation, if appropriate, would occur via Abnormal Rad Level/Radiological Effluent or Emergency Coordinator/EOF Director Judgment.

EAL 2: Due to concerns for ALARA and personnel safety, personnel should not remain in the area to observe that irradiated fuel is uncovered. Personnel should exit the area as quickly as possible and report the occurrence to the Control Room.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, AA2*

**ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT**

**ALERT**

- 4.3.A.3 Release of Radioactive Material or Increases in Radiation Levels Within the Facility That Impedes Operation of Systems Required to Maintain Safe Operations or to Establish or Maintain Cold Shutdown.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

- 4.3.A.3-1** Valid reading on EMF-12 greater than 15 mR/hr in the Control Room.
- 4.3.A.3-2** Valid indication of radiation levels greater than 15 mR/hr in the Central Alarm Station (CAS) or Secondary Alarm Station (SAS).
- 4.3.A.3-3** Radiation levels in areas requiring infrequent access are such that tasks needed to maintain safe operations or to establish or maintain cold shutdown cannot be performed within normal occupational exposure limits of 5 Rem per year TEDE.

**BASIS:**

Valid means that a radiation monitor reading has been confirmed to be correct.

This initiating condition (IC) addresses increased radiation levels that impede necessary access to operating stations, or other areas containing equipment that must be operated manually, in order to maintain safe operation or perform a safe shutdown. It is this impaired ability to operate the plant that results in the actual or potential substantial degradation of the level of safety of the plant. Radiation levels in the facility such that tasks cannot be performed without exceeding 5 Rem per year TEDE will impede access due to the need for a Planned Special Exposure or Planned Emergency Exposure. This situation is indicative of a significant radiological problem that warrants additional resources to assess and mitigate.

This IC is not intended to apply to anticipated temporary increases due to planned events (e.g., incore detector movement, radwaste container movement, depleted resin transfers, etc.)

The Control Room, CAS, and SAS are areas that require continuous occupancy. The value of 15 mR/hr is derived from the GDC 19 value of 5 Rem in 30 days with adjustment for expected occupancy times.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, AA3*

## **ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT**

### **SITE AREA EMERGENCY**

- 4.3.S.1 Boundary Dose Resulting from an Actual or Imminent Release of Radioactivity Exceeds 100 mRem TEDE or 500 mRem CDE Adult Thyroid for the Actual or Projected Duration of the Release.**

**OPERATING MODE APPLICABILITY: All**

### **EMERGENCY ACTION LEVELS:**

- 4.3.S.1-1** A valid indication on radiation monitor EMF-36H  $\geq 6.63E +03$  cpm sustained for  $\geq 15$  minutes.
- 4.3.S.1-2** Dose assessment team calculations indicate dose consequences greater than 100 mRem TEDE or 500 mRem CDE Adult Thyroid at the site boundary.
- 4.3.S.1-3** Analysis of field survey results or field survey samples indicates dose consequences greater than 100 mRem TEDE or 500 mRem CDE Adult Thyroid at the site boundary.

NOTE 1: These EMF readings are calculated based on average annual meteorology, site boundary dose rate, and design unit vent flow rate. Calculations by the dose assessment team use actual meteorology, release duration, and unit vent flow rate. Therefore, these EMF readings should not be used if dose assessment team calculations are available.

NOTE 2: If dose assessment team calculations cannot be completed in 15 minutes, then valid monitor readings should be used for emergency classification.

### **BASIS:**

Valid means that a radiation monitor reading has been confirmed to be correct.

The 100 mRem integrated dose in this initiating condition is based on 10 CFR 20 annual average population exposure. This value also provides a desirable gradient (one order of magnitude) between the Alert, Site Area Emergency, and General Emergency classes. These values are 10% of the EPA Protective Action Guide (PAG) values given in EPA-400-R-92-001.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, ASI*

## ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

### GENERAL EMERGENCY

- 4.3.G.1 Boundary Dose Resulting from an Actual or Imminent Release of Radioactivity that Exceeds 1000 mRem TEDE or 5000 mRem CDE Adult Thyroid for the Actual or Projected Duration of the Release.**

**OPERATING MODE APPLICABILITY: All**

### EMERGENCY ACTION LEVELS:

- 4.3.G.1-1** A valid indication on radiation monitor EMF-36H  $\geq 6.63E +04$  cpm sustained for  $\geq 15$  minutes.
- 4.3.G.1-2** Dose assessment team calculations indicate dose consequences greater than 1000 mRem TEDE or 5000 mRem CDE Adult Thyroid at the site boundary.
- 4.3.G.1-3** Analysis of field survey results or field survey samples indicates dose consequences greater than 1000 mRem TEDE or 5000 mRem CDE Adult Thyroid at the site boundary.

NOTE 1: These EMF readings are calculated based on average annual meteorology, site boundary dose rate, and design unit vent flow rate. Calculations by the dose assessment team use actual meteorology, release duration, and unit vent flow rate. Therefore, these EMF readings should not be used if dose assessment team calculations are available.

NOTE 2: If dose assessment team calculations cannot be completed in 15 minutes, then valid monitor readings should be used for emergency classification.

### BASIS:

Valid means that a radiation monitor reading has been confirmed to be correct.

The 1000 mRem TEDE and 5000 mRem CDE thyroid integrated doses are based on the EPA PAG values given in EPA-400-R-92-001, which indicates that public protective actions are indicated if doses exceed these values. This is consistent with the emergency class description of a general emergency.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, AG1*

**ENCLOSURE 4.4**  
**LOSS OF SHUTDOWN FUNCTIONS**

**ALERT**

- 4.4.A.1 Failure of Reactor Protection System Instrumentation to Complete or Initiate an Automatic Reactor Trip Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Trip Was Successful.**

**OPERATING MODE APPLICABILITY:**    **Mode 1 (Power Operation)**  
   **Mode 2 (Startup)**  
   **Mode 3 (Hot Standby)**

**EMERGENCY ACTION LEVEL:**

- 4.4.A.1-1** The following conditions exist:

- a. Valid reactor trip signal received or required and automatic reactor trip was not successful.

**AND**

- b. Manual reactor trip from the control room is successful and reactor power is less than 5% and decreasing.

**BASIS:**

This condition indicates failure of the automatic protection system to trip the reactor. This condition is more than a potential degradation of a safety system in that a front line automatic protection system did not function in response to a plant transient and thus the plant safety has been compromised, and design limits of the fuel may have been exceeded. An Alert is indicated because conditions exist that lead to potential loss of fuel clad or NCS. Reactor protection system setpoint being exceeded (rather than limiting safety system setpoint being exceeded) is specified here because failure of the automatic protection system is the issue. A manual trip is any set of actions by the reactor operator(s) at the reactor control console which causes control rods to be RAPIDLY inserted into the core and brings the reactor subcritical. Operator action to drive rods does NOT constitute a reactor trip, i.e. does not meet the rapid insertion criterion.

Failure of manual trip would escalate the event to a Site Area Emergency.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SA2*



## LOSS OF SHUTDOWN FUNCTIONS

## ALERT

#### 4.4.A.2 Inability to Maintain Plant in Cold Shutdown.

**OPERATING MODE APPLICABILITY:** Mode 5 (Cold Shutdown)  
Mode 6 (Refueling)

### EMERGENCY ACTION LEVELS:

**4.4.A.2-1** Total loss of Residual Heat Removal (ND) and/or Nuclear Service Water (RN) and/or Component Cooling (KC)

AND

One of the following:

- Inability to maintain reactor coolant temperature below 200°F.
- Uncontrolled reactor coolant temperature rise to >180°F

**BASIS:**

This EAL addresses loss of functions required for core cooling during cold shutdown and refueling conditions. This IC and associated EALs are based on concerns raised by Generic Letter 88-17, "Loss of Decay Heat Removal." A number of phenomena such as pressurization, vortexing, steam generator U-tube draining, NCS level differences when operating at a mid-loop condition, decay heat removal system design, and level instrumentation problems can lead to conditions where decay heat removal is lost and core uncover can occur. NRC analyses show that sequences that can cause core uncover in 15 to 20 minutes and severe core damage within an hour after decay heat removal is lost.

Escalation to the Site Area Emergency is by, "Loss of Water Level in the Reactor Vessel That Has or Will Uncover Fuel in the Reactor Vessel," or by Abnormal Rad Levels/Radiological Effluent ICs.

REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SA3

## **LOSS OF SHUTDOWN FUNCTIONS**

### **SITE AREA EMERGENCY**

**4.4.S.1 Failure of Reactor Protection System Instrumentation to Complete or Initiate an Automatic Reactor Trip Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Trip WAS NOT Successful.**

**OPERATING MODE APPLICABILITY: Mode 1 (Power Operation)**

### **EMERGENCY ACTION LEVEL:**

**4.4.S.1-1** The following conditions exist:

- a. Valid reactor trip signal received or required and automatic reactor trip was not successful.

**AND**

- b. Manual reactor trip from the control room was not successful in reducing reactor power to less than 5% and decreasing.

### **BASIS:**

Automatic and manual trip are not considered successful if action away from the reactor control console is required to trip the reactor. This EAL is equivalent to the Subcriticality CSF-RED.

Under these conditions, the reactor is producing more heat than the maximum decay heat load for which the safety systems are designed. A Site Area Emergency is indicated because conditions exist that lead to imminent loss or potential loss of both fuel clad and NCS. Although this IC may be viewed as redundant to the Fission Product Barrier Degradation IC, its inclusion is necessary to better assure timely recognition and emergency response. Escalation of this event to a General Emergency would be via Fission Product Barrier Degradation or Emergency Coordinator/EOF Director Judgment ICs.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SS2*

## **LOSS OF SHUTDOWN FUNCTIONS**

### **SITE AREA EMERGENCY**

#### **4.4.S.2 Complete Loss of Function Needed to Achieve or Maintain Hot Shutdown.**

**OPERATING MODE APPLICABILITY:**    **Mode 1 (Power Operation)**  
   **Mode 2 (Startup)**  
   **Mode 3 (Hot Standby)**  
   **Mode 4 (Hot Shutdown)**

#### **EMERGENCY ACTION LEVELS:**

**4.4.S.2-1 Subcriticality CSF-RED**

**4.4.S.2-2 Core Cooling CSF-RED**

**4.4.S.2-3 Heat Sink CSF-RED**

#### **BASIS:**

This EAL addresses complete loss of functions, including ultimate heat sink and reactivity control, required for hot shutdown with the reactor at pressure and temperature. Under these conditions, there is an actual major failure of a system intended for protection of the public. Thus, declaration of a Site Area Emergency is warranted. Escalation to General Emergency would be via Abnormal Rad Levels/Radiological Effluent, Emergency Coordinator/EOF Director Judgment, or Fission Product Barrier Degradation ICs.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SS4*

## LOSS OF SHUTDOWN FUNCTIONS

## SITE AREA EMERGENCY

#### 4.4.S.3 Loss of Water Level in the Reactor Vessel That Has or Will Uncover Fuel in the Reactor Vessel.

**OPERATING MODE APPLICABILITY:** Mode 5 (Cold Shutdown)  
Mode 6 (Refueling)

### EMERGENCY ACTION LEVELS:

- 4.4.S.3-1** a. Failure of heat sink causes loss of cold shutdown conditions.

AND

- b. Lower range Reactor Vessel Level Indication System (RVLIS) decreasing after initiation of NC system makeup.

- 4.4.S.3-2** a. Failure of heat sink causes loss of cold shutdown conditions.

AND

- b. Reactor Coolant (NC) system narrow range level less than 11% and decreasing after initiation of NC system makeup.

- 4.4.S.3-3** a. Failure of heat sink causes loss of cold shutdown conditions.

AND

- b. Either train ultrasonic level indication less than 7.25% and decreasing after initiation of NC system makeup.

**BASIS:**

Under the conditions specified by this IC, severe core damage may be imminent due to prolonged boiling following loss of decay heat removal.

Thus, declaration of a Site Area Emergency is warranted under the conditions specified by the IC. Escalation to a General Emergency is via radiological effluent IC.

REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SS5

## **LOSS OF SHUTDOWN FUNCTIONS**

### **GENERAL EMERGENCY**

**4.4.G.1 Failure of the Reactor Protection System to Complete an Automatic Trip and Manual Trip was NOT Successful and There is Indication of an Extreme Challenge to the Ability to Cool the Core.**

**OPERATING MODE APPLICABILITY: Mode 1 (Power Operation)**

### **EMERGENCY ACTION LEVEL:**

**4.4.G.1-1** The following conditions exist:

- a. Valid reactor trip signal received or required and automatic reactor trip was not successful.

**AND**

- b. Manual reactor trip from the control room was not successful in reducing reactor power to less than 5% and decreasing.

**AND**

- c. Either of the following conditions exist:
  - Core Cooling CSF-RED
  - Heat Sink CSF-RED

### **BASIS**

Automatic and manual trip are not considered successful if action away from the reactor control console is required to trip the reactor.

Under the conditions of this IC and its associated EALs, the efforts to bring the reactor subcritical have been unsuccessful and, as a result, the reactor is producing more heat than the maximum decay heat load for which the safety systems were designed.

The extreme challenge to the ability to cool the core is intended to mean that the core exit temperatures are at or approaching 1200°F or that the reactor vessel water level is below the top of active fuel. This equates to a Core Cooling-RED condition.

Another consideration is the inability to initially remove heat during the early stages of this sequence. If emergency feedwater flow is insufficient to remove the amount of heat required by design from at least one steam generator, an extreme challenge should be considered to exist. This equates to a Heat Sink-RED condition.

In the event either of these challenges occurs during or following a time that the reactor has not been brought below the power associated with the safety system design, core damage may be imminent. For this reason, the General Emergency declaration is intended to be anticipatory of the fission product barrier matrix declaration to permit maximum offsite intervention time.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SG2*



**ENCLOSURE 4.5**  
**LOSS OF POWER**

**UNUSUAL EVENT**

**4.5.U.1 Loss of All Offsite Power to Essential Busses for Greater Than 15 Minutes.**

**EMERGENCY ACTION LEVEL:**

**4.5.U.1-1 OPERATING MODE APPLICABILITY:**    **Mode 1 (Power Operation)**  
   **Mode 2 (Startup)**  
   **Mode 3 (Hot Standby)**  
   **Mode 4 (Hot Shutdown)**

The following conditions exist:

- a. Loss of offsite power to essential buses ETA and ETB for greater than 15 minutes.

**AND**

- b. Both emergency diesel generators are supplying power to their respective essential busses.

**4.5.U.1-2 OPERATING MODE APPLICABILITY:**    **Mode 5 (Cold Shutdown)**  
   **Mode 6 (Refueling)**  
   **No Mode (Defueled)**

The following conditions exist:

- a. Loss of offsite power to essential buses ETA and ETB for greater than 15 minutes.

**AND**

- b. One emergency diesel generator is supplying power to its respective essential bus.

**BASIS:**

Prolonged loss of AC power reduces required redundancy and potentially degrades the level of safety of the plant by rendering the plant more vulnerable to a complete Loss of AC Power (Station Blackout). When in cold shutdown, refueling, or defueled mode the event can be classified as an Unusual Event, because of the significantly reduced decay heat, lower temperature and pressure, increasing the time to restore one of the essential busses, relative to that specified for the Alert EAL. The event will escalate to an Alert in these modes if both essential busses are lost. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SUI*

## **LOSS OF POWER**

### **UNUSUAL EVENT**

#### **4.5.U.2   Unplanned Loss of Required DC Power During Cold Shutdown or Refueling Mode for Greater than 15 Minutes.**

**OPERATING MODE APPLICABILITY:**   Mode 5 (Cold Shutdown)  
Mode 6 (Refueling)

### **EMERGENCY ACTION LEVEL:**

#### **4.5.U.2-1   The following conditions exist:**

- a.   Unplanned loss of both unit related busses: EBA and EBD both < 112 VDC, and EBB and EBC both < 109 VDC.

#### **AND**

- b.   Failure to restore power to at least one required DC bus within 15 minutes from the time of loss.

### **BASIS:**

The purpose of this IC and its associated EALs is to recognize a loss of DC power compromising the ability to monitor and control the removal of decay heat during Cold Shutdown or Refueling operations. This EAL is intended to be anticipatory in as much as the operating crew may not have necessary indication and control of equipment needed to respond to the loss.

"Unplanned" is included in this IC and EAL to preclude the declaration of an emergency as a result of planned maintenance activities.

If this loss results in the inability to maintain cold shutdown, the escalation to an Alert is via "Inability to Maintain Plant in Cold Shutdown."

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SU7*

## **LOSS OF POWER**

### **ALERT**

#### **4.5.A.1 Loss of All Offsite Power and Loss of All Onsite AC Power to Essential Busses During Cold Shutdown Or Refueling Mode.**

**OPERATING MODE APPLICABILITY:**    Mode 5 (Cold Shutdown)  
   Mode 6 (Refueling)  
   No Mode (Defueled)

### **EMERGENCY ACTION LEVEL:**

#### **4.5.A.1-1 Loss of all offsite and onsite AC power as indicated by:**

- a. Loss of power on essential busses ETA and ETB.

### **AND**

- b. Failure to restore power to at least one essential bus within 15 minutes.

### **BASIS:**

Loss of all AC power compromises all plant safety systems requiring electric power including Residual Heat Removal (RHR), Emergency Core Cooling Systems (ECCS), Containment Heat Removal, Spent Fuel Heat Removal and the Ultimate Heat Sink. When in cold shutdown, refueling, or defueled mode the event can be classified as an Alert, because of the significantly reduced decay heat, lower temperature and pressure, increasing the time to restore one of the essential busses, relative to that specified for the Site Area Emergency EAL. Escalating to Site Area Emergency, if appropriate, is by Abnormal Rad Levels/Radiological Effluent, or Emergency Coordinator/EOF Director Judgment ICs. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SAI*

**LOSS OF POWER****ALERT**

- 4.5.A.2** AC power to essential busses reduced to a single power source for greater than 15 minutes such that an additional single failure could result in station blackout.

**OPERATING MODE APPLICABILITY:**    Mode 1 (Power Operation)  
   Mode 2 (Startup)  
   Mode 3 (Hot Standby)  
   Mode 4 (Hot Shutdown)

**EMERGENCY ACTION LEVEL:**

- 4.5.A.2-1** The following condition exists:

AC power capability has been degraded to one essential bus powered from a single power source for > 15 min. due to the loss of all but one of:

SATA  
SATB  
ATC  
ATD  
D/G A  
D/G B

**BASIS:**

This IC and the associated EAL is intended to provide an escalation from IC, "Loss of All Offsite Power To Essential Busses for Greater Than 15 Minutes." The condition indicated by this IC is the degradation of the offsite and onsite power systems such that an additional single failure could result in a station blackout. This condition could occur due to a loss of offsite power with a concurrent failure of one emergency generator to supply power to its essential busses. Another related condition could be the loss of all offsite power and loss of onsite emergency diesels with only one train of essential busses being back fed from the unit main generator, or the loss of onsite emergency diesels with only one train of essential busses being back fed from offsite power. The subsequent loss of this single power source would escalate the event to a Site Area Emergency in accordance with IC, "Loss of All Offsite and Loss of All Onsite AC Power to Essential Busses."

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SA5*

## **LOSS OF POWER**

### **SITE AREA EMERGENCY**

#### **4.5.S.1 Loss of All Offsite Power and Loss of All Onsite AC Power to Essential Busses.**

**OPERATING MODE APPLICABILITY:**    Mode 1 (Power Operation)  
   Mode 2 (Startup)  
   Mode 3 (Hot Standby)  
   Mode 4 (Hot Shutdown)

#### **EMERGENCY ACTION LEVEL:**

##### **4.5.S.1-1 Loss of all offsite and onsite AC power as indicated by:**

- a. Loss of power on essential buses ETA and ETB.

**AND**

- b. Failure to restore power to at least one essential bus within 15 minutes.

#### **BASIS:**

Loss of all AC power compromises all plant safety systems requiring electric power including RHR, ECCS, Containment Heat Removal and the Ultimate Heat Sink. Prolonged loss of all AC power will cause core uncovering and loss of containment integrity; thus, this event can escalate to a General Emergency.

Escalation to General Emergency is via Fission Product Barrier Degradation or IC, "Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power."

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SSI*



**LOSS OF POWER****SITE AREA EMERGENCY****4.5.S.2 Loss of All Vital DC Power.**

**OPERATING MODE APPLICABILITY:**    Mode 1 (Power Operation)  
Mode 2 (Startup)  
Mode 3 (Hot Standby)  
Mode 4 (Hot Shutdown)

**EMERGENCY ACTION LEVEL:****4.5.S.2-1** The following conditions exist:

- a. Loss of both unit related busses: EBA and EBD both < 112 VDC, and EBB and EBC both <109 VDC.

**AND**

- b. Failure to restore power to at least one required DC bus within 15 minutes from the time of loss.

**BASIS:**

Loss of all DC power compromises ability to monitor and control plant safety functions. Prolonged loss of all DC power will cause core uncovering and loss of containment integrity when there is significant decay heat and sensible heat in the reactor system. Escalation to a General Emergency would occur by Abnormal Rad Levels/Radiological Effluent, Fission Product Barrier Degradation, or Emergency Coordinator/EOF Director Judgment ICs. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SS3*

## LOSS OF POWER

## GENERAL EMERGENCY

#### 4.5.G.1 Prolonged Loss of All (Offsite and Onsite) AC Power.

**OPERATING MODE APPLICABILITY:**

Mode 1 (Power Operation)
Mode 2 (Startup)
Mode 3 (Hot Standby)
Mode 4 (Hot Shutdown)

**EMERGENCY ACTION LEVEL:**

**4.5.G.1-1** Prolonged loss of all offsite and onsite AC power as indicated by:

- a. Loss of power on essential buses ETA and ETB for greater than 15 minutes.

AND

- b. Standby Shutdown Facility (SSF) fails to supply NC pump seal injection  
**OR** CA supply to steam generators.

AND

- c. At least one of the following conditions exist:
- Restoration of at least one essential bus within 4 hours is *NOT* likely.
  - Indication of continuing degradation of core cooling based on Fission Product Barrier monitoring.

**BASIS:**

Loss of all AC power compromises all plant safety systems requiring electric power including RHR, ECCS, Containment Heat Removal and the Ultimate Heat Sink. Prolonged loss of all those functions necessary to maintain hot shutdown will lead to loss of fuel clad, NCS, and containment.

The SSF is capable of providing the necessary functions (reactor coolant pump seal injection and auxiliary feedwater supply to the steam generators) to maintain a hot shutdown condition for up to 72 hours. No fission product barrier degradation would be expected if the SSF is functioning as intended.

Analysis in support of the station blackout coping study indicates that the plant can cope with a station blackout for 4 hours without core damage.

The likelihood of restoring at least one essential bus should be based on a realistic appraisal of the situation since a delay in an upgrade decision based on only a chance of mitigating the event could result in a loss of valuable time in preparing and implementing public protective actions.

In addition, under these conditions, fission product barrier monitoring capability may be degraded. Although it may be difficult to predict when power can be restored, it is necessary to give the Emergency Coordinator/EOF Director a reasonable idea of how quickly (s)he may need to declare a General Emergency based on two major considerations:

1. Are there any present indications that core cooling is already degraded to the point that Loss or Potential Loss of Fission Product Barriers is IMMINENT?
2. If there are no present indications of such core cooling degradation, how likely is it that power can be restored in time to assure that a loss of two barriers with a potential loss of the third barrier can be prevented?

Thus, indication of continuing core cooling degradation must be based on Fission Product Barrier monitoring with particular emphasis on Emergency Coordinator/EOF Director judgment as it relates to IMMINENT Loss or Potential Loss of fission product barriers and degraded ability to monitor fission product barriers.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, SG1*

## **ENCLOSURE 4.6**

### **FIRE/EXPLOSION AND SECURITY EVENTS**

#### **UNUSUAL EVENT**

**4.6.U.1 Fire Within Protected Area Boundary Not Extinguished Within 15 Minutes of Detection or Explosion Within the Protected Area Boundary.**

**OPERATING MODE APPLICABILITY: All**

#### **EMERGENCY ACTION LEVEL:**

**4.6.U.1-1** Fire in any of the following areas not extinguished within 15 minutes of control room notification or verification of a control room fire alarm.

- Reactor Building
- Auxiliary Building
- Diesel Generator Rooms
- Control Room
- RN Pumphouse
- Standby Shutdown Facility (SSF)
- Central Alarm Station (CAS)
- Secondary Alarm Station (SAS)
- Doghouses
- Refueling Water Storage Tank (FWST)
- Turbine Building
- Service Building
- Interim Radwaste Building

**4.6.U.1-2** Report by plant personnel of an unanticipated explosion within protected area boundary resulting in visible damage to permanent structure or equipment.

#### **BASIS:**

EAL 1: The purpose of this EAL is to address the magnitude and extent of fires that may be potentially significant precursors to damage to safety systems. Fire is combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do not constitute fires. Observation of flames is preferred but is NOT required if large quantities of smoke and heat are observed. This excludes such items as fires within administration buildings outside the protected area. Waste-basket fires, and other small fires of no safety consequence should easily be extinguished within 15 minutes of detection. This IC applies to buildings and areas contiguous to plant vital areas or other significant buildings or areas. Verification of the alarm in this context means those actions taken in the control room to determine that the control room alarm is not spurious.

EAL 2: Only those explosions of sufficient force to damage permanent structures or equipment within the protected area should be considered. As used here, an explosion is a rapid, violent, unconfined combustion, or a catastrophic failure of pressurized equipment, that potentially imparts significant energy to near-by structures and materials. No attempt is made in this EAL to assess the actual magnitude of the damage. The occurrence of the explosion with reports of evidence of damage (e.g., deformation, scorching) is sufficient for declaration. The Emergency Coordinator/EOF Director also needs to consider any security aspects of the explosion, if applicable.

Escalation to a higher emergency class is by, "Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown".

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HU1 & HU2*

**FIRE/EXPLOSION AND SECURITY EVENTS**

**UNUSUAL EVENT**

- 4.6.U.2    Confirmed Security Event Which Indicates a Potential Degradation in the Level of Safety of the Plant.**

**OPERATING MODE APPLICABILITY:    All**

**EMERGENCY ACTION LEVELS:**

- 4.6.U.2-1    Security confirmed bomb device discovered within plant Protected Area and outside Vital Areas.**
- 4.6.U.2-2    Hostage situation/extortion**
- 4.6.U.2-3    A violent civil disturbance within the owner controlled area.**

**BASIS:**

The above situations represent a potential degradation in the level of safety of the plant.

A civil disturbance is to be considered violent when force has been used in an attempt to injure site personnel or damage plant property.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HU4*



**FIRE/EXPLOSION AND SECURITY EVENTS****ALERT****4.6.A.1 Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown.**

**OPERATING MODE APPLICABILITY:**    **Mode 1 (Power Operation)**  
   **Mode 2 (Startup)**  
   **Mode 3 (Hot Standby)**  
   **Mode 4 (Hot Shutdown)**  
   **Mode 5 (Cold Shutdown)**  
   **Mode 6 (Refueling)**

**EMERGENCY ACTION LEVEL:****4.6.A.1-1** The following conditions exist:

- a. Fire or explosion in any of the following areas:
  - Reactor Building
  - Auxiliary Building
  - Diesel Generator Rooms
  - Control Room
  - RN Pumphouse
  - SSF
  - CAS
  - SAS
  - FWST
  - Doghouses (Applies In Mode 1, 2, 3, 4 only)

**AND**

- b. One of the following:
  - Affected safety system parameter indications show degraded performance
  - Plant personnel report visible damage to permanent structures or equipment within the specified area.

Note: Only one train of a system needs to be affected or damaged in order to satisfy this condition.

**BASIS:**

With regard to explosions, only those explosions of sufficient force to damage permanent structures or equipment required for safe operation within the identified plant area should be considered. As used here, an explosion is a rapid, violent, unconfined combustion, or a catastrophic failure of pressurized equipment, that potentially imparts significant energy to nearby structures and materials. Fire is combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do not constitute fires. Observation of flames is preferred but is NOT required if large quantities of smoke and heat are observed. The inclusion of a "report of visible damage" should not be interpreted as mandating a lengthy damage assessment prior to classification.

The key to classifying fires/explosions as an Alert is the damage as a result of the incident. The fact that safety-related equipment required for safe shutdown of the unit has been affected or damaged as a result of the fire/explosion is the driving force for declaring the Alert. **It is important to note that this EAL addresses a fire/explosion and not just the degradation of a safety system. The reference to damage of the systems is used to identify the magnitude of the fire/explosion and to discriminate against minor fires/explosions.**

Escalation to a higher emergency class, if appropriate, will be based on System Malfunction, Fission Product Barrier Degradation, Abnormal Rad Levels/Radiological Effluent, or Emergency Coordinator/EOF Director Judgment ICs.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HA2*

## **FIRE/EXPLOSION AND SECURITY EVENTS**

### **ALERT**

#### **4.6.A.2 Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown.**

**OPERATING MODE APPLICABILITY:** No Mode (Defueled)

**EMERGENCY ACTION LEVEL:**

#### **4.6.A.2-i The following conditions exist:**

- a. Fire or explosion in any of the following areas:
  - Spent Fuel Pool
  - Auxiliary Building
  - RN Pumphouse

**AND**

- b. One of the following:
  - Spent Fuel Pool level and/or temperature show degraded performance.
  - Plant personnel report visible damage to permanent structures or equipment supporting Spent Fuel Pool cooling.

Note: Only one train of a system needs to be affected or damaged in order to satisfy this condition.

### **BASIS:**

In a Defueled condition, the plant safety systems of interest are those that support Spent Fuel Pool inventory and cooling.

With regard to explosions, only those explosions of sufficient force to damage permanent structures or equipment required for safe operation within the identified plant area should be considered. As used here, an explosion is a rapid, violent, unconfined combustion, or a catastrophic failure of pressurized equipment, that potentially imparts significant energy to nearby structures and materials. Fire is combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do not constitute fires. Observation of flames is preferred but is NOT required if large quantities of smoke and heat are observed. The inclusion of a "report of visible damage" should not be interpreted as mandating a lengthy damage assessment prior to classification.

The key to classifying fires/explosions as an Alert is the damage as a result of the incident. The fact that safety-related equipment required for safe shutdown of the unit has been affected or damaged as a result of the fire/explosion is the driving force for declaring the Alert. **It is important to note that this EAL addresses a fire/explosion and not just the degradation of a safety system. The reference to damage of the systems is used to identify the magnitude of the fire/explosion and to discriminate against minor fires/explosions.**

Escalation to a higher emergency class, if appropriate, will be based on System Malfunction, Fission Product Barrier Degradation, Abnormal Rad Levels/Radiological Effluent, or Emergency Coordinator/EOF Director Judgment ICs.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HA2*

**FIRE/EXPLOSION AND SECURITY EVENTS**

**ALERT**

**4.6.A.3 Security Event in a Plant Protected Area.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVEL:**

**4.6.A.3-1** Intrusion into plant protected area by a hostile force.

**BASIS:**

This class of security events represents an escalated threat to plant safety above that contained in the Unusual Event. A civil disturbance which penetrates the protected area boundary can be considered a hostile force. Intrusion into a vital area by a hostile force will escalate this event to a Site Area Emergency.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HA4*

## **FIRE/EXPLOSION AND SECURITY EVENTS**

### **SITE AREA EMERGENCY**

#### **4.6.S.1 Security Event in a Plant Vital Area.**

**OPERATING MODE APPLICABILITY: All**

#### **EMERGENCY ACTION LEVELS:**

##### **4.6.S.1-1 Intrusion into any of the following plant areas by a hostile force:**

- Reactor Building
- Auxiliary Building
- Diesel Generator Rooms
- Control Room
- RN Pumphouse
- SSF
- Doghouses
- CAS
- SAS

##### **4.6.S.1-2 Security confirmed bomb discovered/exploded in a vital area.**

##### **4.6.S.1-3 Security confirmed sabotage in a plant vital area.**

#### **BASIS:**

This class of security events represents an escalated threat to plant safety above that contained in the Alert IC in that a hostile force has progressed from the Protected Area to the Vital Area.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HSI*



**FIRE/EXPLOSION AND SECURITY EVENTS**

**GENERAL EMERGENCY**

**4.6.G.1 Security Event Resulting in Loss Of Ability to Reach and Maintain Cold Shutdown.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

**4.6.G.1-1** Loss of physical control of the control room due to security event.

**4.6.G.1-2** Loss of physical control of the SSF and Auxiliary Shutdown Panel (ASP) due to security event.

**BASIS:**

This IC encompasses conditions under which a hostile force has taken physical control of vital area required to reach and maintain safe shutdown.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HGI*

**ENCLOSURE 4.7**  
**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS**  
**AFFECTING PLANT SAFETY**

**UNUSUAL EVENT**

**4.7.U.1 Natural and Destructive Phenomena Affecting the Protected Area.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

- 4.7.U.1-1** Tremor felt and valid alarm on the "strong motion accelerograph".
- 4.7.U.1-2** Tremor felt and valid alarm on the "Peak shock annunciator".
- 4.7.U.1-3** Report by plant personnel of tornado striking within protected area boundary.
- 4.7.U.1-4** Vehicle crash into plant structures or systems within protected area boundary.
- 4.7.U.1-5** Report of turbine failure resulting in casing penetration or damage to turbine or generator seals.

**BASIS:**

The protected area boundary is typically that part within the security isolation zone and is defined in the site security plan.

EALs 1&2: Damage may be caused to some portions of the site, but should not affect ability of safety functions to operate. Method of detection can be based on instrumentation, validated by a reliable source, or operator assessment. As defined in the EPRI-sponsored "Guidelines for Nuclear Plant Response to an Earthquake", dated October 1989, a "felt earthquake" is:

An earthquake of sufficient intensity such that: (a) the vibratory ground motion is felt at the nuclear plant site and recognized as an earthquake based on a consensus of control room operators, and (b) valid alarm on seismic instrumentation occurs.

EAL 3: A tornado striking (touching down) within the protected boundary may have potentially damaged plant structures containing functions or systems required for safe shutdown of the plant. If such damage is confirmed visually or by other in-plant indications, the event may be escalated to Alert.

EAL 4: Addresses such items as a car, truck, plane, helicopter, or train crash that may potentially damage plant structures containing functions and systems required for safe shutdown of the plant. If the crash is confirmed to affect a plant vital area, the event may be escalated to Alert.

EAL 5: Addresses main turbine rotating component failures of sufficient magnitude to cause observable damage to the turbine casing or to the seals of the turbine generator. Of major concern is the potential for leakage of combustible fluids (lubricating oils) and gases (hydrogen cooling) to the plant environs. Actual fires and flammable gas build up are appropriately classified via other EALs. This EAL is consistent with the definition of an Unusual Event while maintaining the anticipatory nature desired and recognizing the risk to non-safety related equipment. Escalation of the emergency classification is based on potential damage done by the missiles generated by the failure or by the radiological releases in conjunction with a steam generator tube rupture. These latter events would be classified by the Radiological ICs or Fission Product Barrier ICs.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HUI*

*NOTE: NUMARC EAL #5 moved to Fire/Security Recognition Category*

**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS**  
**AFFECTING PLANT SAFETY**

**UNUSUAL EVENT**

- 4.7.U.2 Release of Toxic or Flammable Gases Deemed Detrimental to Safe Operation of the Plant.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

- 4.7.U.2-1** Report or detection of toxic or flammable gases that could enter within the site area boundary in amounts that can affect safe operation of the plant.
- 4.7.U.2-2** Report by Local, County or State Officials for potential evacuation of site personnel based on offsite event.

**BASIS:**

This IC is based on releases in concentrations within the site boundary that will affect the health of plant personnel or the safe operation of the plant with the plant being within the evacuation area of an offsite event (i.e., tanker truck accident releasing toxic gases, etc.).

Gases within the owner controlled area that are below life threatening or flammable concentration do not meet this EAL.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HU3*

**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS**  
**AFFECTING PLANT SAFETY**

**UNUSUAL EVENT**

**4.7.U.3 Other Conditions Existing Which in the Judgment of the Emergency Coordinator/EOF Director Warrant Declaration of an Unusual Event.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVEL:**

**4.7.U.3-1** Other conditions exist which in the judgment of the Emergency Coordinator/EOF Director indicate a potential degradation of the level of safety of the plant.

**BASIS:**

This EAL is intended to address unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Coordinator/EOF Director to fall under the Unusual Event emergency class.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HU5*

**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS**  
**AFFECTING PLANT SAFETY**

**ALERT**

**4.7.A.1 Natural and Destructive Phenomena Affecting the Plant Vital Area.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

**4.7.A.1-1 Valid "OBE Exceeded" Alarm on 1AD-4,B/8**

**4.7.A.1-2 Tornado or high winds:**

Tornado striking plant structures within the vital area:

- Reactor Building
- Auxiliary Building
- Refueling Water Storage Tank (FWST)
- Diesel Generator Rooms
- Control Room
- RN Pumphouse
- Standby Shutdown Facility (SSF)
- Doghouses
- Central Alarm Station (CAS)
- Secondary Alarm Station (SAS)

**OR**

sustained winds  $\geq 74$  mph for  $> 15$  minutes.

**4.7.A.1-3 Turbine failure generated missiles, vehicle crashes or other catastrophic events causing visible structural damage on any of the following plant structures:**

- Reactor Building
- Auxiliary Building
- Refueling Water Storage Tank (FWST)
- Diesel Generator Rooms
- Control Room
- RN Pumphouse
- Standby Shutdown Facility (SSF)
- Doghouses
- Central Alarm Station (CAS)
- Secondary Alarm Station (SAS)



**BASIS:**

EAL 1: Based on the FSAR design basis. Seismic events of this magnitude (> OBE) can cause damage to safety functions.

EAL 2: Based on the available instrumentation ( 90 mph maximum range) and the FSAR design basis, which is 95 mph. Wind loads of this magnitude (74 mph hurricane force winds) are approaching speeds that could cause damage to safety functions.

EAL 3: This EAL is intended to address the threat to safety related structures or equipment from uncontrollable and possibly catastrophic events. This list of areas includes areas containing safety-related equipment, their controls, and their power supplies. This EAL is, therefore, consistent with the definition of an ALERT in that if events have damaged areas containing safety-related equipment the potential exists for substantial degradation of the level of safety of the plant.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HAI*

**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS**  
**AFFECTING PLANT SAFETY**

**ALERT**

- 4.7.A.2 Release of Toxic or Flammable Gases Within a Facility Structure Which Jeopardizes Operation of Systems Required to Maintain Safe Operations or to Establish or Maintain Cold Shutdown.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVELS:**

- 4.7.A.2-1** Report or detection of toxic gases within a Facility Structure in concentrations that will be life threatening to plant personnel.
- 4.7.A.2-2** Report or detection of flammable gases within a Facility Structure in concentrations that will affect the safe operation of the plant.

Structures for above EALs:

- Reactor Building
- Auxiliary Building
- Diesel Generator Rooms
- RN Pumphouse
- Control Room
- SSF
- CAS
- SAS

**BASIS:**

This IC is based on gases that have entered a plant structure affecting the safe operation of the plant. Safe operations are affected when the area can not be accessed by plant personnel to ensure continued operability or availability of safety systems/components. This IC applies to buildings and areas contiguous to plant Vital Areas or other significant buildings or areas. The intent of this IC is not to include buildings (i.e., warehouses) or other areas that are not contiguous or immediately adjacent to plant Vital Areas. It is appropriate that increased monitoring be done to ascertain whether consequential damage has occurred. Escalation to a higher emergency class, if appropriate, will be based on System Malfunction, Fission Product Barrier Degradation, Abnormal Rad Levels/Radioactive Effluent, or Emergency Coordinator/EOF Director Judgment ICs.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HA3*

**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS**  
**AFFECTING PLANT SAFETY**

**ALERT**

**4.7.A.3 Control Room Evacuation Has Been Initiated.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVEL:**

**4.7.A.3-1** Control Room evacuation has been initiated per AP/1(2)/A/5500/17.

**BASIS:**

With the control room evacuated, additional support, monitoring and direction through the Technical Support Center and/or Emergency Operations Facility is necessary. Inability to establish plant control from outside the control room, as evidenced by the inability to maintain NCS or SG inventories, will escalate this event to a Site Area Emergency.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HA5*

**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS**  
**AFFECTING PLANT SAFETY**

**ALERT**

- 4.7.A.4 Other Conditions Existing Which in the Judgment of the Emergency Coordinator/EOF Director Warrant Declaration of an Alert.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVEL:**

- 4.7.A.4-1** Other conditions exist which in the Judgment of the Emergency Coordinator/EOF Director indicate that plant safety systems may be degraded and that increased monitoring of plant functions is warranted.

**BASIS:**

This EAL is intended to address unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Coordinator/EOF Director to fall under the Alert emergency class.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HA6*

**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS**  
**AFFECTING PLANT SAFETY**

**SITE AREA EMERGENCY**

**4.7.S.1 Control Room Evacuation Has Been Initiated and Plant Control Cannot Be Established.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVEL:**

**4.7.S.1-1** The following conditions exist:

- a. Control room evacuation has been initiated per AP/1(2)/A/5500/17.

**AND**

- b. Control of the plant cannot be established from the ASP or the SSF within 15 minutes.

**BASIS:**

The timely transfer of control to alternate control areas has not been accomplished. This failure to transfer control would be evidenced by deteriorating reactor coolant system or steam generator parameters. For purposes of classification, the 15 minutes begins at the time that the determination to staff the alternate location is made. For most conditions, Reactor Coolant Pump seal LOCAs or steam generator dryout would be indications of failure to accomplish the transfer in the necessary time.

Escalation of this event, if appropriate, would be by Fission Product Barrier Degradation, Abnormal Rad Levels/Radiological Effluent, or Emergency Coordinator/EOF Director Judgment ICs.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HS2*

**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS**  
**AFFECTING PLANT SAFETY**

**SITE AREA EMERGENCY**

**4.7.S.2 Other Conditions Existing Which in the Judgment of the Emergency Coordinator/EOF Director Warrant Declaration of Site Area Emergency.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVEL:**

**4.7.S.2-1** Other conditions exist which in the Judgment of the Emergency Coordinator/EOF Director indicate actual or likely major failures of plant functions needed for protection of the public.

**BASIS:**

This EAL is intended to address unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Coordinator/EOF Director to fall under the emergency class description for Site Area Emergency.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HS3*



**NATURAL DISASTERS, HAZARDS AND OTHER CONDITIONS**  
**AFFECTING PLANT SAFETY**

**GENERAL EMERGENCY**

**4.7.G.1 Other Conditions Existing Which in the Judgment of the Emergency Coordinator/EOF Director Warrant Declaration of General Emergency.**

**OPERATING MODE APPLICABILITY: All**

**EMERGENCY ACTION LEVEL:**

**4.7.G.1-1** Other conditions exist which in the Judgment of the Emergency Coordinator/EOF Director indicate:

- Actual or imminent substantial core degradation with potential for loss of containment

**OR**

- Potential for uncontrolled radionuclide releases. These releases can reasonably be expected to exceed Environmental Protection Agency Protective Action Guideline levels outside the site boundary.

**BASIS:**

This EAL is intended to address unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Coordinator/EOF Director to fall under the General Emergency class.

*REFERENCE: NUMARC/NESP-007, REV. 2, 01/92, HG2*

**ATTACHMENT 5**

**Revised Catawba Procedure RP/0/A/5000/01,  
“Classification of Emergency”**

DUKE POWER COMPANY  
CATAWBA NUCLEAR SITE  
CLASSIFICATION OF EMERGENCY

1.0 SYMPTOMS

1.1 Notification of Unusual Event

- 1.1.1 Events are in process or have occurred which indicate a potential degradation of the level of safety of the plant.
- 1.1.2 No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

1.2 Alert

- 1.2.1 Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant.
- 1.2.2 Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

1.3 Site Area Emergency

- 1.3.1 Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public.
- 1.3.2 Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels except near the **site boundary**.

1.4 General Emergency

- 1.4.1 Events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity.
- 1.4.2 Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

## 2.0 IMMEDIATE ACTIONS

- 2.1 Determine operating mode that existed at the time the event occurred prior to any protection system or operator action initiated in response of the event.
- 2.2 If the plant was in Mode 1-4 and a **valid** condition affects fission product barriers, then proceed to Enclosure 4.1.
- 2.3 If the condition does not affect fission product barriers, then review the listing of enclosures to determine if the event is applicable to one of the categories shown.
- 2.4 Compare actual plant conditions to the Emergency Action Levels listed, then declare the appropriate Emergency Class as indicated.
- 2.5 Implement the applicable Emergency Response Procedure (RP) for that classification and continue with subsequent steps of this procedure.

Notification of Unusual Event	RP/0/A/5000/02
Alert	RP/0/A/5000/03
Site Area Emergency	RP/0/A/5000/04
General Emergency	RP/0/A/5000/05

## 3.0 SUBSEQUENT ACTIONS

- 3.1 To escalate, de-escalate, or terminate the Emergency, compare plant conditions to the Initiating Conditions of Enclosures 4.1 through 4.7.
- 3.2 Refer to enclosure 4.9, Emergency Declaration Guidelines, as needed.

## 4.0 ENCLOSURES

- 4.1 Fission Product Barrier Matrix
- 4.2 Systems Malfunctions
- 4.3 Abnormal Rad Levels/Radiological Effluent
- 4.4 Loss of Shutdown Functions
- 4.5 Loss of Power
- 4.6 Fires/ Explosions and Security Events
- 4.7 Natural Disasters, Hazards and Other Conditions  
Affecting Plant Safety
- 4.8 Definitions/Acronyms
- 4.9 Emergency Declaration Guidelines

**CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
FISSION PRODUCT BARRIER MATRIX**

Use EALs to determine Fission Product Barrier status (Intact, Potential Loss, or Loss). Add points for all 3 barriers. Classify according to the table below.

Note 1: This table is only applicable in Modes 1-4.

Note 2: Also, an event (or multiple events) could occur which results in the conclusion that exceeding the Loss or Potential Loss thresholds is IMMEDIATE (i.e., within 1-3 hours). In this IMMEDIATE Loss Situation, use judgement and classify as if the thresholds are exceeded.

<u>Unusual Event (1 - 3 Points)</u>	<u>Alert (4 - 6 Points)</u>	<u>Site Area Emergency (7 - 10 Points)</u>	<u>General Emergency (11 - 13 Points)</u>
<ul style="list-style-type: none"> <li>Any Potential Loss of Containment</li> <li>Any Loss of Containment</li> </ul>	<ul style="list-style-type: none"> <li>Any Potential Loss or Loss of the NCS</li> <li>Any Potential Loss or Loss of Fuel Clad</li> </ul>	<ul style="list-style-type: none"> <li>Loss of both NCS and Fuel Clad</li> <li>Potential Loss of both NCS and Fuel Clad</li> <li>Potential Loss of either the NCS or Fuel Clad and Loss of any additional barrier</li> </ul>	<ul style="list-style-type: none"> <li>Loss of all three barriers</li> <li>Loss of any two barriers and the Potential Loss of the third barrier</li> </ul>

NOTE: Take highest points for each barrier and add together in chart below. Do not take more than one number for each barrier. "Not applicables" are included in this table as place holders only, and no points are assigned.

Containment	_____	<u>TOTAL POINTS</u>
NCS	_____	1-3 Unusual Event
Fuel Clad	_____	4-6 Alert
Total Points	_____	7-10 Site Area Emergency
		11-13 General Emergency

# CATAWBA NUCLEAR SITE EMERGENCY ACTION LEVELS FISSION PRODUCT BARRIER MATRIX

CONTAINMENT BARRIER		NCS BARRIER		FUEL CLAD BARRIER	
POTENTIAL LOSS - (1 Point)	LOSS - (3 Points)	POTENTIAL LOSS - (4 Points)	LOSS - (5 Points)	POTENTIAL LOSS - (4 Points)	LOSS - (5 Points)
<b>1. Critical Safety Function Status</b>		<b>1. Critical Safety Function Status</b>		<b>1. Critical Safety Function Status</b>	
• Containment-RED	• Not applicable	• NCS Integrity-Red	• Not applicable	• Core Cooling-Orange	• Core Cooling-Red
		• Heat Sink-Red		• Heat Sink-Red	
<b>2. Containment Conditions</b>		<b>2. NCS Leak Rate</b>		<b>2. Primary Coolant Activity Level</b>	
• Containment Pressure > 15 PSIG	• Rapid unexplained decrease in containment pressure following initial increase	• Unsolvable leak exceeding the capacity of one charging pump in the normal charging mode with letdown isolated.	• GREATER THAN available makeup capacity as indicated by a loss of NCS subcooling.	• Not applicable	• Coolant Activity GREATER THAN 300 µCi/cc Dose Equivalent Iodine (DEI) I-131
• H2 concentration > 9%	• Containment pressure or sump level response not consistent with LOCA conditions.				
• Containment pressure greater than 3 psig with less than one full train of NS and a VX-CARF operating.					
<b>3. Containment Isolation Valves Status After Containment Isolation Actuation</b>		<b>3. SG Tube Rupture</b>		<b>3. Containment Radiation Monitoring</b>	
• Not applicable	• Containment isolation is incomplete and a release path from containment exists	• Primary-to-Secondary leak rate exceeds the capacity of one charging pump in the normal charging mode with letdown isolated.	• Indication that a SG is <b>Ruptured</b> and has a Non-Isolable secondary line fault	• Not applicable	• Containment radiation monitor 53A or 53B reading >117 R/hr
			• Indication that a SG is <b>Ruptured</b> and a prolonged release of contaminated secondary coolant is occurring from the affected SG to the environment		
<b>4. SG Secondary Side Release w/ith Primary-to-Secondary Leakage</b>		<b>4. Containment Radiation Monitoring</b>		<b>4. Emergency Coordinator/EOF Director Judgement</b>	
• Not applicable	• Release of secondary side to atmosphere with primary to secondary leakage GREATER THAN Tech Spec allowable	• Not applicable	• Not applicable	• Any condition including inability to monitor the barrier, that in the opinion of the Emergency Coordinator/EOF Director incites LOSS or POTENTIAL LOSS of the Fuel Clad barrier	

END



**CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
FISSION PRODUCT BARRIER MATRIX**

CONTAINMENT BARRIER		NCS BARRIER		FUEL CLAD BARRIER	
POTENTIAL LOSS - (1 Point)	LOSS - (3 Points)	POTENTIAL LOSS - (4 Points)	LOSS - (5 Points)	POTENTIAL LOSS - (4 Points)	LOSS - (5 Points)

5. Significant Radioactive Inventory In Containment

- Containment Rad. Monitor EMF53A or 53B  
Reading @ time since shutdown:  
 >470 R/hr @ 0 - 0.5 hr  
 >170 R/hr @ 0.5 - 2 hr  
 >125 R/hr @ 2 - 4 hr  
 > 90 R/hr @ 4 - 8 hr  
 > 53 R/hr @ > 8 hr
- Not applicable

6. Core Cooling

- Core cooling -RED path is indicated for > 15 min.
- Not applicable

7. Emergency Coordinator /EOF Director Judgement

- Any condition, including inability to monitor the barrier, that in the opinion of the Emergency Coordinator/EOF Director indicates a LOSS or POTENTIAL LOSS of the Containment barrier.

END

8. Emergency Coordinator/EOF Director Judgement

Any condition, including inability to monitor the barrier, that in the opinion of the Emergency Coordinator/EOF Director indicates LOSS or POTENTIAL LOSS of the NCS barrier.

END

**CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
SYSTEM MALFUNCTION**

RP/0/A/5000/01  
Enclosure 4.2  
Page 1 of 2

UNUSUAL EVENT

1. Inability to Reach Required Shutdown Within Technical Specification Limits.

OPERATING MODE: 1, 2, 3, 4

- Plant is not brought to required operating mode within Technical Specifications LCO Action Statement Time.

2. Unplanned Loss of Most or All Safety System Annunciation or Indication in the Control Room for Greater Than 15 Minutes.

OPERATING MODE: 1, 2, 3, 4

- The following conditions exist:

Unplanned loss of most (>50%) annunciators associated with safety systems for greater than 15 minutes.

**AND**

In the opinion of the Operations Shift Manager/Emergency Coordinator/EOF Director, the loss of the annunciators or indicators requires additional personnel (beyond normal shift complement) to safely operate the unit.

3. Fuel Clad Degradation.

OPERATING MODE: 1,2,3,4,5

- Dose Equivalent I-131 greater than the Technical Specification allowable limit.

ALERT

1. Unplanned Loss of Most or All Safety System Annunciation or Indication in Control Room With Either:  
(1) a Significant Transient in Progress, or  
(2) Compensatory Non-Alarming Indicators Unavailable.

OPERATING MODE: 1, 2, 3, 4

- The following conditions exist:

Unplanned loss of most (>50%) annunciators associated with safety systems for greater than 15 minutes.

**AND**

In the opinion of the Operations Shift Manager/Emergency Coordinator/EOF Director, the loss of the annunciators or indicators requires additional personnel (beyond normal shift complement) to safely operate the unit.

**AND**

**EITHER** of the following:

- A significant plant transient is in progress.
- Loss of the OAC.

END

SITE AREA EMERGENCY

1. Inability to Monitor a Significant Transient in Progress.

OPERATING MODE: 1, 2, 3, 4

- The following conditions exist:

Loss of most (>50%) annunciators associated with safety systems.

**AND**

A significant plant transient is in progress.

**AND**

Loss of the OAC.

**AND**

Inability to provide manual monitoring of any of the following Critical Safety Functions:

- subcriticality
- core cooling
- heat sink
- containment

END

GENERAL EMERGENCY

END

CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
SYSTEM MALFUNCTION

RP/0/A/5000/01  
Enclosure 4.2  
Page 2 of 2

UNUSUAL EVENT

ALERT

SITE AREA EMERGENCY

GENERAL EMERGENCY

4. Reactor Coolant System (NCS)  
Leakage.

OPERATING MODE: 1, 2, 3, 4

- Unidentified leakage  $\geq 10$  gpm
- Pressure boundary leakage  $\geq 10$  gpm
- Identified leakage  $\geq 25$  gpm

5. Unplanned Loss of All Onsite or Offsite  
Communications.

OPERATING MODE: ALL

- Loss of all onsite communications capability (internal phone system, PA system, onsite radio system) affecting the ability to perform routine operations.
- Loss of all offsite communications capability (Selective Signaling, NRC FTS lines, offsite radio system, commercial phone system) affecting the ability to communicate with offsite authorities.

END

**CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT**

RP/0/A/5000/01  
Enclosure 4.3  
Page 1 of 3

**UNUSUAL EVENT**

1. Any Unplanned Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds Two Times the SLC Limits for 60 Minutes or Longer.

OPERATING MODE: **ALL**

- A valid Trip 2 alarm on radiation monitor EMF-49L or EMF-57 for  $\geq 60$  minutes or will likely continue for  $\geq 60$  minutes which indicates that the release may have exceeded the initiating condition and indicates the need to assess the release with procedure HP/0/B/1009/14.
- A valid indication on radiation monitor EMF-36L of  $\geq 1.08E+04$  cpm for  $\geq 60$  minutes or will likely continue for  $\geq 60$  minutes which indicates that the release may have exceeded the initiating condition and indicates the need to assess the release with procedure HP/0/B/1009/25.
- Gaseous effluent being released exceeds two times SLC 16.11-1 for  $\geq 60$  minutes as determined by Radiation Protection (RP) procedure.
- Liquid effluent being released exceeds two times SLC 16.11-6 for  $\geq 60$  minutes as determined by RP procedure.

**Note:**

If the monitor reading is sustained for the time period indicated in the EAL and the required assessments (procedure calculations) cannot be completed within this time period, declaration must be made based on the **valid** radiation monitor reading.

**ALERT**

1. Any Unplanned Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds 200 Times the SLC limits for 15 Minutes or Longer.

OPERATING MODE: **ALL**

- A valid indication on radiation monitor EMF-49L or EMF-57 of  $\geq 1.2E+05$  cpm for  $\geq 15$  minutes or will likely continue for  $\geq 15$  minutes which indicates that the release may have exceeded the initiating condition and indicates the need to assess the release with procedure HP/0/B/1009/14.
- A valid indication on radiation monitor EMF-36L of  $\geq 1.08E+06$  cpm for  $\geq 15$  minutes or will likely continue for  $\geq 15$  minutes which indicates that the release may have exceeded the initiating condition and indicates the need to assess the release with procedure HP/0/B/1009/25.
- Gaseous effluent being released exceeds 200 times the level of SLC 16.11-1 for  $\geq 15$  minutes as determined by RP procedure.
- Liquid effluent being released exceeds 200 times the level of SLC 16.11-6 for  $\geq 15$  minutes as determined by RP procedure.

**Note:**

If the monitor reading is sustained for the time period indicated in the EAL and the required assessments (procedure calculations) cannot be completed within this time period, declaration must be made based on the **valid** radiation monitor reading.

**SITE AREA EMERGENCY**

1. Boundary Dose Resulting from an Actual or Imminent Release of Radioactivity Exceeds 100 mRem TEDE or 500 mRem CDE Adult Thyroid for the Actual or Projected Duration of the Release.

OPERATING MODE: **ALL**

- A valid indication on radiation monitor EMF-36H  $\geq 6.63E+03$  cpm sustained for  $\geq 15$  minutes.
- Dose assessment team calculations indicate dose consequences greater than 100 mRem TEDE or 500 mRem CDE Adult Thyroid at the **site boundary**.
- Analysis of field survey results or field survey samples indicates dose consequences greater than 100 mRem TEDE or 500 mRem CDE Adult Thyroid at the **site boundary**.

Note 1: These EMF readings are calculated based on average annual meteorology, site boundary dose rate, and design unit vent flow rate. Calculations by the dose assessment team use actual meteorology, release duration, and unit vent flow rate. Therefore, these EMF readings should not be used if dose assessment team calculations are available.

**GENERAL EMERGENCY**

1. Boundary Dose Resulting from an Actual or Imminent Release of Radioactivity that Exceeds 1000 mRem TEDE or 5000 mRem CDE Adult Thyroid for the Actual or Projected Duration of the Release.

OPERATING MODE: **ALL**

- A valid indication on radiation monitor EMF-36H  $\geq 6.63E+04$  cpm sustained for  $\geq 15$  minutes.
- Dose assessment team calculations indicate dose consequences greater than 1000 mRem TEDE or 5000 mRem CDE Adult Thyroid at the **site boundary**.
- Analysis of field survey results or field survey samples indicates dose consequences greater than 1000 mRem TEDE or 5000 mRem CDE Adult Thyroid at the **site boundary**.

Note 1: These EMF readings are calculated based on average annual meteorology, site boundary dose rate, and design unit vent flow rate. Calculations by the dose assessment team use actual meteorology, release duration, and unit vent flow rate. Therefore, these EMF readings should not be used if dose assessment team calculations are available.

**CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT**

RP/Q/A/5000/01  
Enclosure 4.3  
Page 2 of 3

UNUSUAL EVENT

2. Unexpected Increase in Plant Radiation or Airborne Concentration.

OPERATING MODE:        ALL

- Indication of **uncontrolled** water level decrease of greater than 6 inches in the reactor refueling cavity with all irradiated fuel assemblies remaining covered by water.
- **Uncontrolled** water level decrease of greater than 6 inches in the spent fuel pool and fuel transfer canal with all irradiated fuel assemblies remaining covered by water.
- **Unplanned valid** area EMF reading increases by a factor of 1000 over normal levels.

END

ALERT

2. Major Damage to Irradiated Fuel or Loss of Water Level that Has or Will Result in the Uncovering of Irradiated Fuel Outside the Reactor Vessel.

OPERATING MODE:        ALL

- An **unplanned valid** trip or alarm on any of the following radiation monitors:
  - Spent Fuel Building Refueling Bridge
    - 1EMF-15
    - 2EMF-4
  - Spent Fuel Pool Ventilation
    - 1EMF-42
    - 2EMF-42
  - Reactor Building Refueling Bridge
    - 1EMF-17
    - 2EMF-2
  - Containment Noble Gas Monitor
    - 1EMF-39
    - 2EMF-39
- Plant personnel report that water level drop in reactor refueling cavity, spent fuel pool, or fuel transfer canal has or will exceed makeup capacity such that any irradiated fuel will become uncovered.

SITE AREA EMERGENCY

Note 2:

If dose assessment team calculations cannot be completed in 15 minutes, then **valid** monitor readings should be used for emergency classification.

END

GENERAL EMERGENCY

Note 2:

If dose assessment team calculations cannot be completed in 15 minutes, then **valid** monitor readings should be used for emergency classification.

END



**CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT**

RP/0/A/5000/01  
Enclosure 4.3  
Page 3 of 3

UNUSUAL EVENT

ALERT

SITE AREA EMERGENCY

GENERAL EMERGENCY

- NC system wide range level <95 %  
after initiation of NC system make-up

**AND**

Any irradiated fuel assembly not capable  
of being lowered into spent fuel pool or  
reactor vessel

**AND**

KF-122 cannot be closed.

3. **Release of Radioactive Material or  
Increases in Radiation Levels  
Within the Facility That Impedes  
Operation of Systems Required to  
Maintain Safe Operations or to  
Establish or Maintain Cold  
Shutdown.**

**OPERATING MODE:      ALL**

- **Valid** reading on EMF-12 greater  
than 15 mR/hr in the Control Room.
- Valid indication of radiation levels  
greater than 15 mR/hr in the Central  
Alarm Station (CAS) or Secondary  
Alarm Station (SAS).
- Radiation levels in areas requiring  
infrequent access are such that tasks  
needed to maintain safe operations  
or to establish or maintain cold  
shutdown cannot be performed  
within normal occupational exposure  
limits of 5 Rem per year TEDE.

**END**



CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
LOSS OF SHUTDOWN FUNCTIONS

RP/Q/A/5000/01  
Enclosure 4.4  
Page 1 of 2

UNUSUAL EVENT

END

ALERT

1. Failure of Reactor Protection System Instrumentation to Complete or Initiate an Automatic Reactor Trip Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Trip WAS Successful.

OPERATING MODE: 1, 2, 3

- The following conditions exist:

Valid reactor trip signal received or required and automatic reactor trip was not successful.

AND

Manual reactor trip from the control room is successful and reactor power is less than 5% and decreasing.

SITE AREA EMERGENCY

1. Failure of Reactor Protection System Instrumentation to Complete or Initiate an Automatic Reactor Trip Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Trip WAS NOT Successful.

OPERATING MODE: 1

- The following conditions exist:

Valid reactor trip signal received or required and automatic reactor trip was not successful.

AND

Manual reactor trip from the control room was not successful in reducing reactor power to less than 5% and decreasing.

2. Complete Loss of Function Needed to Achieve or Maintain Hot Shutdown.

OPERATING MODE: 1, 2, 3, 4

- Subcriticality CSF-RED
- Core Cooling CSF-RED
- Heat Sink CSF-RED

GENERAL EMERGENCY

1. Failure of the Reactor Protection System to Complete an Automatic Trip and Manual Trip was NOT Successful and There is Indication of an Extreme Challenge to the Ability to Cool the Core.

OPERATING MODE: 1

- The following conditions exist:

Valid reactor trip signal received or required and automatic reactor trip was not successful.

AND

Manual reactor trip from the control room was not successful in reducing reactor power to less than 5% and decreasing.

AND

EITHER of the following conditions exist:

- Core Cooling CSF-RED
- Heat Sink CSF-RED

END

**CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
LOSS OF SHUTDOWN FUNCTIONS**

RP/0/A/5000/01  
Enclosure 4.4  
Page 2 of 2

UNUSUAL EVENT

ALERT

2. Inability to Maintain Plant in Cold Shutdown.

OPERATING MODE: 5, 6

- Total loss of:  
Residual Heat Removal (ND) and/or  
Nuclear Service Water (RN) and/or  
Component Cooling (KC)

**AND**

One of the following:

- Inability to maintain reactor coolant temperature below 200°F.
- Uncontrolled reactor coolant temperature rise to >180°F

**END**

SITE AREA EMERGENCY

3. Loss of Water Level in the Reactor Vessel That Has or Will Uncover Fuel in the Reactor Vessel.

OPERATING MODE: 5, 6

- Failure of heat sink causes loss of cold shutdown conditions.

**AND**

Lower range Reactor Vessel Level Indication System (RVLIS) decreasing after initiation of NC system makeup.

- Failure of heat sink causes loss of cold shutdown conditions.

**AND**

Reactor Coolant (NC) system narrow range level less than 11% and decreasing after initiation of NC system makeup.

- Failure of heat sink causes loss of cold shutdown conditions.

**AND**

Either train ultrasonic level indication less than 7.25% and decreasing after initiation of NC system makeup.

**END**

**CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
LOSS OF POWER**

RP/0/A/5000/01  
Enclosure 4.5  
Page 1 of 2

<u>USUAL EVENT</u>	<u>ALERT</u>	<u>SITE AREA EMERGENCY</u>	<u>GENERAL EMERGENCY</u>
<p>1. Loss of All <u>Offsite</u> Power to Essential Busses for Greater Than 15 Minutes.</p> <p>OPERATING MODE: 1,2,3,4</p> <ul style="list-style-type: none"><li>The following conditions exist:</li></ul> <p>Loss of offsite power to essential buses ETA and ETB for greater than 15 minutes.</p> <p style="text-align: center;"><b>AND</b></p> <p>Both emergency diesel generator are supplying power to their respective essential busses.</p> <p>OPERATING MODE: 5, 6, No Mode</p> <ul style="list-style-type: none"><li>The following conditions exist:</li></ul> <p>Loss of offsite power to essential buses ETA and ETB for greater than 15 minutes.</p> <p style="text-align: center;"><b>AND</b></p> <p>One emergency diesel generator is supplying power to its respective essential bus.</p>	<p>1. Loss of All <u>Offsite</u> Power and Loss of All <u>Onsite</u> AC Power to Essential Busses During Cold Shutdown Or Refueling Mode.</p> <p>OPERATING MODE: 5, 6, No Mode</p> <ul style="list-style-type: none"><li>Loss of all offsite and onsite AC power as indicated by:</li></ul> <p>Loss of power on essential buses ETA and ETB.</p> <p style="text-align: center;"><b>AND</b></p> <p>Failure to restore power to at least one essential bus within 15 minutes.</p> <p>2. AC power to essential busses reduced to a single power source for greater than 15 minutes such that an additional single failure could result in station blackout.</p> <p>OPERATING MODE: 1, 2, 3, 4</p> <ul style="list-style-type: none"><li>The following condition exists:</li></ul> <p>AC power capability has been degraded to one essential bus powered from a single power source for &gt; 15 min. due to the loss of all but one of:</p> <p style="margin-left: 40px;">SATA SATB ATC ATD D/G A D/G B</p>	<p>1. Loss of All <u>Offsite</u> Power and Loss of All <u>Onsite</u> AC Power to Essential Busses.</p> <p>OPERATING MODE: 1, 2, 3, 4</p> <ul style="list-style-type: none"><li>Loss of all offsite and onsite AC power as indicated by:</li></ul> <p>Loss of power on essential buses ETA and ETB.</p> <p style="text-align: center;"><b>AND</b></p> <p>Failure to restore power to at least one essential bus within 15 minutes.</p> <p>2. Loss of All Vital DC Power.</p> <p>OPERATING MODE: 1, 2, 3, 4</p> <ul style="list-style-type: none"><li>The following conditions exist:</li></ul> <p>Loss of both unit related busses: EBA and EBD both &lt;112 VDC, and EBB and EBC both &lt;109 VDC.</p> <p style="text-align: center;"><b>AND</b></p> <p>Failure to restore power to at least one required DC bus within 15 minutes from the time of loss.</p> <p style="text-align: center;"><b>END</b></p>	<p>1. Prolonged Loss of All (<u>Offsite</u> and <u>Onsite</u>) AC Power.</p> <p>OPERATING MODE: 1, 2, 3, 4</p> <ul style="list-style-type: none"><li>Prolonged loss of all offsite and onsite AC power as indicated by:</li></ul> <p>Loss of power on essential buses ETA and ETB for greater than 15 minutes.</p> <p style="text-align: center;"><b>AND</b></p> <p>Standby Shutdown Facility (SSF) fails to supply NC pump seal injection OR CA supply to steam generators.</p> <p style="text-align: center;"><b>AND</b></p> <p>At least one of the following conditions exist:</p> <ul style="list-style-type: none"><li>Restoration of at least one essential bus within 4 hours is <i>NOT</i> likely.</li><li>Indication of continuing degradation of core cooling based on Fission Product Barrier monitoring.</li></ul> <p style="text-align: center;"><b>END</b></p>

**END**

CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
LOSS OF POWER

RP/0/A/5000/01  
Enclosure 4.5  
Page 2 of 2

USUAL EVENT

ALERT

SITE AREA EMERGENCY

GENERAL EMERGENCY

2. Unplanned Loss of Required DC Power During Cold Shutdown or Refueling Mode for Greater than 15 Minutes.

OPERATING MODE: 5, 6

- The following conditions exist:

Unplanned loss of both unit related busses: EBA and EBD both <112 VDC, and EBB and EBC both <109 VDC.

AND

Failure to restore power to at least one required DC bus within 15 minutes from the time of loss.

END

**CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
FIRE/EXPLOSION AND SECURITY EVENTS**

RP/O/A/5000/01  
Enclosure 4.6  
Page 1 of 2

UNUSUAL EVENT

1. Fire Within Protected Area Boundary Not Extinguished Within 15 Minutes of Detection or Explosion Within the Protected Area Boundary

OPERATING MODE: ALL

- Fire in any of the following areas not extinguished within 15 minutes of control room notification or verification of a control room fire alarm.

- Reactor Building
- Auxiliary Building
- Diesel Generator Rooms
- Control Room
- RN Pump House
- SSF
- CAS
- SAS
- Doghouses
- FWST
- Turbine Building
- Service Bldg.
- Interim Radwaste Bldg.

- Report by plant personnel of an unanticipated **explosion** within protected area boundary resulting in **visible damage** to permanent structure or equipment.

ALERT

1. Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown.

OPERATING MODE: 1, 2, 3, 4, 5, 6

- The following conditions exist:

**Fire or explosion** in any of the following areas:

- Reactor Building
- Auxiliary Building
- Diesel Generator Rooms
- Control Room
- RN Pump House
- SSF
- CAS
- SAS
- FWST
- Doghouses (Applies in Modes 1, 2, 3, 4 Only)

**AND**

One of the following:

- Affected safety system parameter indications show degraded performance
- Plant personnel report **visible damage** to permanent structures or equipment within the specified area.

Note: Only one train of a system needs to be affected or damaged in order to satisfy this condition.

SITE AREA EMERGENCY

1. Security Event in a Plant Vital Area.

OPERATING MODE: ALL

- Intrusion into any of the following plant areas by a hostile force:

- Reactor Building
- Auxiliary Building
- Diesel Generator Rooms
- Control Room
- RN Pump House
- SSF
- Doghouses
- CAS
- SAS

- Security confirmed **bomb** discovered/exploded in a vital area.
- Security confirmed **sabotage** in a plant vital area.

END

GENERAL EMERGENCY

1. Security Event Resulting in Loss Of Ability to Reach and Maintain Cold Shutdown.

OPERATING MODE: ALL

- Loss of physical control of the control room due to security event.
- Loss of physical control of the SSF and ASP due to security event.

END



CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
FIRE/EXPLOSION AND SECURITY EVENTS

R:7/0/A/5000/01

Enclosure 4.6

Page 2 of 2

UNUSUAL EVENT

2. Confirmed Security Event Which Indicates a Potential Degradation in the Level of Safety of the Plant.

OPERATING MODE: All

- Security confirmed bomb device discovered within plant Protected Area and outside Vital Areas.
- Hostage situation/extortion
- A violent civil disturbance within the owner controlled area.

END

ALERT

2. Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown.

OPERATING MODE: No Mode

- The following conditions exist:  
**Fire or explosion** in any of the following areas:
  - Spent Fuel Pool
  - Auxiliary Building
  - RN Pump House

AND

One of the following:

- Spent Fuel Pool level and/or temperature show degraded performance
- Plant personnel report **visible damage** to permanent structures or equipment supporting Spent Fuel Pool Cooling.

3. Security Event in a Plant Protected Area.

OPERATING MODE: ALL

- Intrusion into plant Protected Area by a hostile force.

END

SITE AREA EMERGENCY

GENERAL EMERGENCY



**CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
NATURAL DISASTERS, HAZARDS, AND OTHER CONDITIONS  
AFFECTING PLANT SAFETY**

RP/CA/5000/01  
Enclosure 4.7  
Page 1 of 3

UNUSUAL EVENT

1. Natural and Destructive Phenomena Affecting the Protected Area.

OPERATING MODE: ALL

- Tremor felt and valid alarm on the "strong motion accelerograph".
  - Tremor felt and valid alarm on the "Peak shock annunciator".
  - Report by plant personnel of tornado striking within protected area boundary.
  - Vehicle crash into plant structures or systems within protected area boundary.
  - Report of turbine failure resulting in casing penetration or damage to turbine or generator seals.
2. Release of Toxic or Flammable Gases Deemed Detrimental to Safe Operation of the Plant.

OPERATING MODE: ALL

- Report or detection of **toxic** or flammable **gases** that could enter within the site area boundary in amounts that can affect safe operation of the plant.

ALERT

1. Natural and Destructive Phenomena Affecting the Plant Vital Area.

OPERATING MODE: ALL

- Valid "OBE Exceeded" Alarm on 1AD-4,B/8
- Tornado or high winds:
  - Tornado striking plant structures within the vital area
  - Reactor Building
  - Auxiliary Building
  - FWST
  - Diesel Generator Rooms
  - Control Room
  - RN Pumphouse
  - SSF
  - Doghouses
  - CAS
  - SAS

OR

Sustained winds  $\geq 74$  mph for  $> 15$  minutes.

SITE AREA EMERGENCY

1. Control Room Evacuation Has Been Initiated and Plant Control Cannot Be Established.

OPERATING MODE: ALL

- The following conditions exist:
    - Control room evacuation has been initiated per AP/1(2)/A/5000/17
    - AND**
    - Control of the plant cannot be established from the ASP or the SSF within 15 minutes.
2. Other Conditions Existing Which in the Judgment of the Emergency Coordinator/EOF Director Warrant Declaration of Site Area Emergency.

OPERATING MODE: ALL

- Other conditions exist which in the Judgment of the Emergency Coordinator/EOF Director indicate actual or likely major failures of plant functions needed for protection of the public.

END

GENERAL EMERGENCY

1. Other Conditions Existing Which in the Judgment of the Emergency Coordinator/EOF Director Warrant Declaration of General Emergency.

OPERATING MODE: ALL

- Other conditions exist which in the Judgment of the Emergency Coordinator/EOF Director indicate:
  - (1) Actual or imminent substantial core degradation with potential for loss of containment,
  - OR
  - (2) Potential for uncontrolled radionuclide releases. These releases can reasonably be expected to exceed Environmental Protection Agency Protective Action Guideline levels outside the site boundary.

END

**CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
NATURAL DISASTERS, HAZARDS, AND OTHER CONDITIONS  
AFFECTING PLANT SAFETY**

RP/D/A/5000/01  
Enclosure 4.7  
Page 2 of 3

UNUSUAL EVENT

- Report by Local, County or State Officials for potential evacuation of site personnel based on offsite event.
- 3. Other Conditions Existing Which in the Judgment of the Emergency Coordinator/EOF Director Warrant Declaration of an Unusual Event.

OPERATING MODE: ALL

- Other conditions exist which in the Judgment of the Emergency Coordinator/EOF Director indicate a potential degradation of the level of safety of the plant.

END

ALERT

- Turbine failure generated missiles, vehicle crashes or other catastrophic events causing visible structural damage on any of the following plant structures:

- Reactor Building
- Auxiliary Building
- FWST
- Diesel Generator Rooms
- Control Room
- RN Pump House
- SSF
- Doghouses
- CAS
- SAS

2. Release of Toxic or Flammable Gases Within a Facility Structure Which Jeopardizes Operation of Systems Required to Maintain Safe Operations or to Establish or Maintain Cold Shutdown.

OPERATING MODE: ALL

- Report or detection of **toxic gases** within a Facility Structure in concentrations that will be life threatening to plant personnel.

SITE AREA EMERGENCY

GENERAL EMERGENCY

**CATAWBA NUCLEAR SITE  
EMERGENCY ACTION LEVELS  
NATURAL DISASTERS, HAZARDS, AND OTHER CONDITIONS  
AFFECTING PLANT SAFETY**

RP/0/A/5000/01  
Enclosure 4.7  
Page 3 of 3

UNUSUAL EVENT

ALERT

SITE AREA EMERGENCY

GENERAL EMERGENCY

- Report or detection of flammable gases within a Facility Structure in concentrations that will affect the safe operation of the plant:

- Reactor Building
- Auxiliary Building
- Diesel Generator Rooms
- RN Pump House
- Control Room
- SSF
- CAS
- SAS

3. Control Room Evacuation Has Been Initiated.

OPERATING MODE: ALL

- Control Room evacuation has been initiated per AP/1(2)/A5500/17
4. Other Conditions Existing Which in the Judgment of the Emergency Coordinator/EOF Director Warrant Declaration of an Alert.

OPERATING MODE: ALL

- Other conditions exist which in the Judgment of the Emergency Coordinator/EOF Director indicate that plant safety systems may be degraded and that increased monitoring of plant functions is warranted.

END

## DEFINITIONS/ACRONYMS

**ALERT**- Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the EPA protective action guideline exposure levels.

**ALL** (As relates to Operating Mode Applicability) - Modes 1, 2, 3, 4, 5, 6 and No Mode (Defueled).

**BOMB**- A fused explosive device

**CARF** - Containment Air Return Fan

**CIVIL DISTURBANCE** - A group of people violently protesting station operations or activities at the site. A civil disturbance is considered to be violent when force has been used in an attempt to injure site personnel or damage plant property.

**EPA PAG** - Environmental Protection Agency Protective Action Guidelines for exposure to a release of radioactive material.

**EXPLOSION** - A rapid, violent unconfined combustion, or a catastrophic failure of pressurized equipment that imparts energy of sufficient force to potentially damage permanent structures, systems or components.

**EXTORTION** - An attempt to cause an action at the site by threat of force.

**FIRE** - Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do not constitute fires. Observation of flames is preferred but is NOT required if large quantities of smoke and heat are observed.

**FUNCTIONAL** - A component is fully capable of meeting its design function. It would be declared **INOPERABLE** if unable to meet Technical Specifications.

**GENERAL EMERGENCY**- Events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA protective action guideline exposure levels outside the Site Boundary.

**HOSTAGE** - A person or object held as leverage against the site to ensure demands will be met by the site.

**HOSTILE FORCE** - One or more individuals present in a **PROTECTED AREA** without authorization that may have or have threatened to use force in an attempt to injure site personnel or damage plant property.

**IMMINENT** - Expected to occur within 1-3 hours.

**INABILITY TO DIRECTLY MONITOR** - Operational Aid Computer data points are unavailable or gauges/panel indications are not readily available to the operator.

**INOPERABLE** - A component does not meet Technical Specifications. The component may be functional, capable of meeting its design.

**INTRUSION/INTRUDER** - Suspected hostile individual present in a **PROTECTED AREA** without authorization.

**LOSS** - A component is **INOPERABLE** and not **FUNCTIONAL**.

**PROLONGED** - A duration beyond normal limits, defined as "greater than 15 minutes" or as determined by the judgement of the Emergency Coordinator.

**PROTECTED AREA** - Encompasses all owner controlled areas within the security perimeter fence.

**RUPTURED** (As relates to Steam Generator) - Existence of primary to secondary leakage of a magnitude sufficient to require or cause a reactor trip and safety injection.

**SABOTAGE** - Deliberate damage, misalignment, or misoperation of plant equipment with the intent to render the equipment unavailable.

**SIGNIFICANT TRANSIENT**- An unplanned event involving one or more of the following: (1) Automatic turbine runback >25% thermal reactor power, (2) Electrical load rejection >25% full electrical load; (3) Reactor Trip, (4) Safety Injection

**SITE AREA EMERGENCY** - Events are in process or have occurred which involve actual or likely major failures of plant functions needed for the protection of the public. Any releases are **NOT** expected to result in exposure levels which exceed EPA protective action guideline exposure levels outside the Site Boundary.

**SITE BOUNDARY** - That area, including the protected area, in which Duke Power Company has the authority to control all activities, including exclusion or removal of personnel and property.

**SLC** - Selected Licensee Commitments

**SECURITY EVENT** - A security related emergency situation for which prompt response by the Security Force, immediate action by plant personnel, and/or assistance from offsite agencies may be required to apprehend intruders and mitigate the effects of or prevent radiological sabotage.

**SUSTAINED** - A duration of time long enough to confirm that the CSF is valid (not momentary).

**TERMINATION** - Exiting the emergency condition.

**TOTAL EFFECTIVE DOSE EQUIVALENT (TEDE)** - The sum of external dose exposure to radioactive plume, to radionuclides deposited on the ground by the plume, and the internal exposure inhaled radionuclides deposited in the body.

**TOXIC GAS** - A gas that is dangerous to life or health by reason of inhalation or skin contact (e.g. chlorine).

**UNCONTROLLED** - Event is not the result of planned actions by the plant staff.

**UNPLANNED** - An event or action is UNPLANNED if it is not the expected result of normal operations, testing, or maintenance. Events that result in corrective or mitigative actions being taken in accordance with abnormal or emergency procedures are UNPLANNED.

**UNUSUAL EVENT** - Events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

**VALID** - An indication or report or condition is considered to be VALID when it is conclusively verified by: (1) an instrument channel check, or (2) indications on related or redundant instrumentation, or (3) by direct observation by plant personnel such that doubt related to the instrument's operability, the condition's existence or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

**VIOLENT** - Force has been used in an attempt to injure site personnel or damage plant property.

**VISIBLE DAMAGE** - Damage to equipment or structure that is readily observable without measurements, testing, or analyses. Damage is sufficient to cause concern regarding the continued operability or reliability of affected safety structure, system, or component. Example damage: deformation due to heat or impact, denting, penetration, rupture, cracking, paint blistering.



VITAL AREA - Areas within the PROTECTED AREA that house equipment important for nuclear safety. Access to a VITAL AREA is allowed only if an individual has been authorized to be in that area.

## EMERGENCY DECLARATION GUIDELINES

THE FOLLOWING GUIDANCE IS TO BE USED BY THE EMERGENCY COORDINATOR IN ASSESSING EMERGENCY CONDITIONS.

- The Emergency Coordinator shall review all applicable initiating events to ensure proper classification.
- The BASIS Document (located in Section D of the Catawba Nuclear Site Emergency Plan) is available for review if any questions arise over proper classification.
- If an event occurs on more than one unit concurrently, the event with the higher classification will be classified on the emergency notification form. Information relating to the problem on the other unit will be captured on the emergency notification form.
- If an event occurs, and a lower or higher plant operating mode is reached before the classification can be made, the classification shall be based on the mode that existed at the time the event occurred.
- The fission product barrier matrix is applicable only to those events that occur at (Mode 1-4) hot shutdown or higher. An event that is recognized at cold shutdown or lower (Mode 5 or 6) shall not be classified using the fission product barrier matrix. Reference would be made to the additional enclosures that provide emergency action levels for specific events (e.g. severe weather, fire, security).
- If a transient event should occur, the following guidance is provided.
  1. Some emergency action levels specify a specific duration. For these EALs, the classification is made when the Emergency Coordinator assessment concludes that the specified duration is exceeded or will be exceeded (i.e. condition cannot be reasonably corrected before the duration elapses), whichever is sooner.
  2. If a plant condition exceeding EAL criteria is corrected before the specified duration time is exceeded, the event is NOT classified by that EAL. Lower Severity EALs, if any, shall be reviewed for possible applicability in these cases.
  3. If a plant condition exceeding EAL criteria is not recognized at the time of occurrence, but is identified well after the condition has occurred (e.g. as a result of routine log or record review) and the condition no longer exists, an emergency shall NOT be declared. Reporting under 10CFR50.72 may be required. Such a condition could occur, for example, if a follow-up evaluation of an abnormal condition uncovers evidence that the condition was more severe than earlier believed.

4. If an emergency classification was warranted, but the plant condition has been corrected prior to declaration and notification, the Emergency Coordinator must consider the potential that the initiating condition (e.g. Failure of Reactor Protection System) may have caused plant damage that warrants augmenting the on-shift personnel via activation of the Emergency Response Organization. The following are applicable:
  - a. For UNUSUAL EVENTS, the condition shall be reported. The event may be terminated in the same notification or in a follow-up notification.
  - b. For ALERT, SITE AREA EMERGENCY, and GENERAL EMERGENCY, the event shall be declared and the emergency response organization activated.

#### DETERMINATION OF "EVENT TIME" (TIME THE 15 MINUTE CLOCK STARTS)

1. If plant conditions require implementation of EP/1 or 2/A/5000/E0 (Reactor Trip or Safety Injection), increased emphasis shall be given to evaluation of plant conditions for determination of EAL(s) when "kickout" of the diagnostic procedure occurs. "Event Time" is the time at which the EAL(s) is determined.
2. If plant conditions do not require implementation of EP/1 or 2/A/5000/E0 (Reactor Trip or Safety Injection), and conditions of a specific EAL are met, the "Event Time" is the time at which the EAL(s) is determined.
3. The time the event is classified shall be entered on the initial emergency notification form.

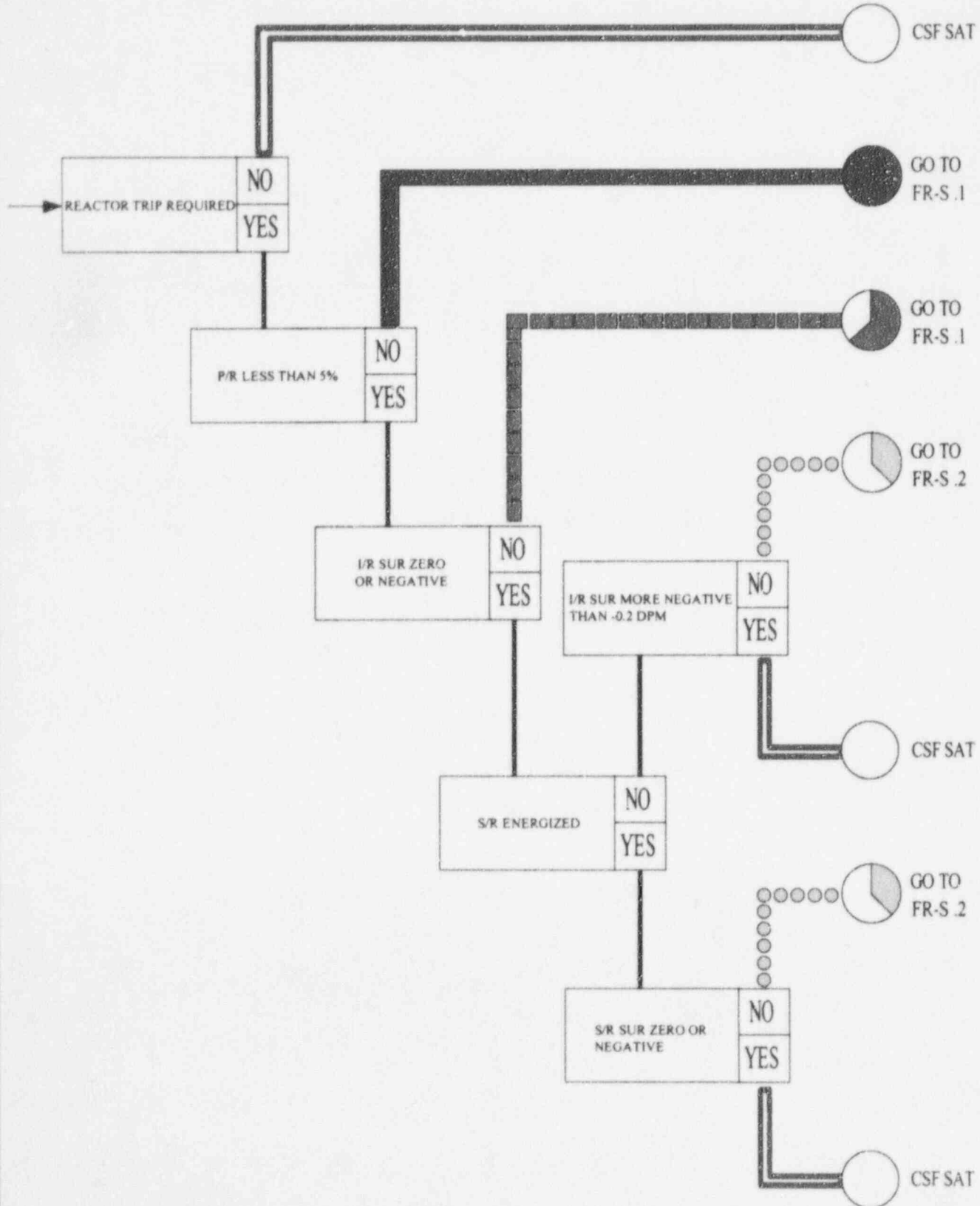
#### MOMENTARY ENTRY INTO A HIGHER CLASSIFICATION

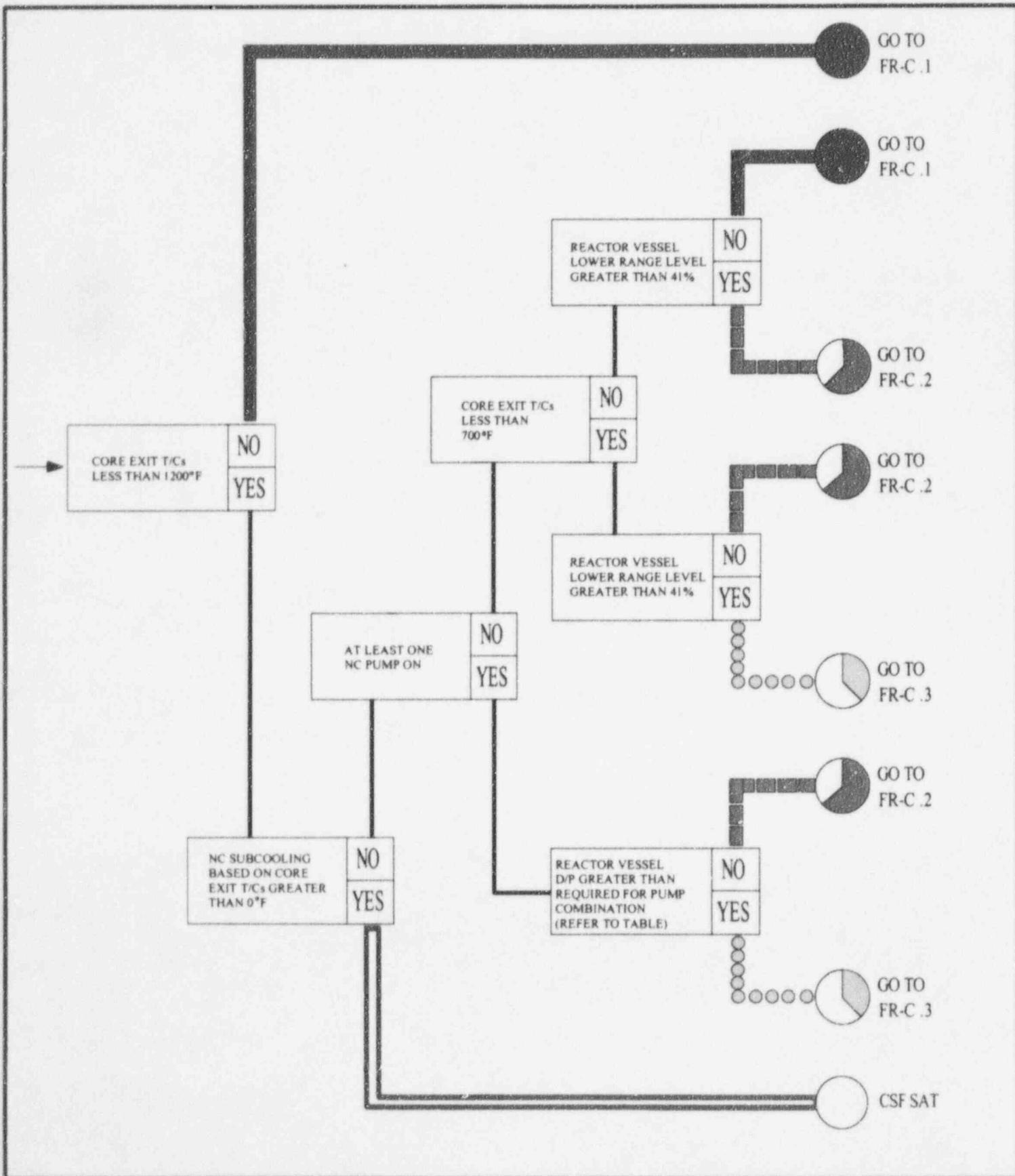
If, while in an emergency classification, the specified EALs of a higher classification are met momentarily, and in the judgment of the Emergency Coordinator are not likely to recur, the entry into the higher classification must be acknowledged. Acknowledgment is performed as follows:

If this condition occurs prior to the initial notification to the emergency response organization and off site agencies, the initial message should note that the site is currently in the lower classification, but had momentarily met the criteria for the higher classification. It should also be noted that plant conditions have improved and stabilized to the point that the criteria for the higher classification are not expected to be repeated.

## **ATTACHMENT 6**

**Selected pages from the "Critical Safty Function Status Tree"  
Procedure EP/1A/5000/F-0**







FOR INFORMATION ONLY

CNS  
EP/1/A/5000/F-0

CRITICAL SAFETY FUNCTION STATUS TREES  
Heat Sink - Page 1 of 1

PAGE NO.  
5 of 10  
Retype #3

