Duke Power®
A Duke Energy Company

Duke Power
4800 Concord Rd.
York, SC 29710
(803) 831-4251 OFFICE
(803) 831-3221 FAX
grpeters@duke-energy.com

Gary R. Peterson
Vice President
Catawba Nuclear Station

March 4, 2002

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Subject: Duke Energy Corporation
Catawba Nuclear Station Units 1 and 2
Docket Nos. 50-413 and 50-414
Emergency Plan Implementing Procedures

Please find enclosed for NRC Staff use and review the following Emergency Plan Implementing Procedures:

RP/0/A/5000/001, Classification of Emergency (Rev. 015)

RP/0/A/5000/015, Core Damage Assessment (Rev. 005)

These revisions are being submitted in accordance with 10CFR 50.54(q) and do not decrease the effectiveness of the Emergency Plan Implementing Procedures or the Emergency Plan.

By copy of this letter, two copies of the above documents are being provided to the NRC, Region II.

If there are any questions, please call Tom Beadle at 803-831-4027.

Very truly yours,

Gary R. Peterson

Attachments

A045

xc (w/attachments):

L. A. Reyes
U.S. Nuclear Regulatory Commission
Regional Administrator, Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, GA 30303

(w/o attachments):

C. P. Patel
NRC Senior Project Manager (CNS)
U.S. Nuclear Regulatory Commission
Mail Stop O-8 H12
Washington, DC 20555-0001

D. J. Roberts
Senior Resident Inspector (CNS)
U.S. Nuclear Regulatory Commission
Catawba Nuclear Site

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
EMERGENCY PLAN IMPLEMENTING PROCEDURES INDEX

VOLUME I

PROCEDURE	TITLE
RP/0/A/5000/001	Classification of Emergency (Rev. 015)
RP/0/A/5000/002	Notification of Unusual Event (Rev. 035)
RP/0/A/5000/003	Alert (Rev. 037)
RP/0/A/5000/004	Site Area Emergency (Rev. 039)
RP/0/A/5000/005	General Emergency (Rev. 039)
RP/0/A/5000/06	Deleted
RP/0/A/5000/006 A	Notifications to States and Counties from the Control Room (Rev. 014)
RP/0/A/5000/006 B	Notifications to States and Counties from the Technical Support Center (Rev. 014)
RP/0/A/5000/006 C	Deleted
RP/0/A/5000/007	Natural Disaster and Earthquake (Rev. 021)
RP/0/A/5000/08	Deleted
RP/0/B/5000/008	Spill Response (Rev. 020)
RP/0/A/5000/009	Collision/Explosion (Rev. 006)
RP/0/A/5000/010	Conducting A Site Assembly or Preparing the Site for an Evacuation (Rev. 014)
RP/0/A/5000/11	Deleted
RP/0/B/5000/12	Deleted
RP/0/B/5000/013	NRC Notification Requirements (Rev. 029)
RP/0/B/5000/14	Deleted
RP/0/A/5000/015	Core Damage Assessment (Rev. 005)
RP/0/B/5000/016	Deleted
RP/0/B/5000/17	Deleted

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
EMERGENCY PLAN IMPLEMENTING PROCEDURES INDEX

VOLUME I

PROCEDURE	TITLE
RP/0/A/5000/018	Emergency Worker Dose Extension (1/15/96)
RP/0/B/5000/019	Deleted
RP/0/A/5000/020	Technical Support Center (TSC) Activation Procedure (Rev. 015)
RP/0/A/5000/021	Deleted
RP/0/B/5000/022	Evacuation Coordinator Procedure (Rev. 004)
RP/0/B/5000/023	Deleted
RP/0/A/5000/024	OSC Activation Procedure (Rev. 009)
RP/0/B/5000/025	Recovery and Reentry Procedure (Rev. 003)
RP/0/B/5000/026	Site Response to Security Events (Rev. 003)
RP/0/B/5000/028	Communications and Community Relations EnergyQuest Emergency Response Plan (Rev. 001)

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
EMERGENCY PLAN IMPLEMENTING PROCEDURES INDEX

VOLUME II

PROCEDURE	TITLE
HP/0/B/1000/006	Emergency Equipment Functional Check and Inventory (Rev. 053)
HP/0/B/1009/001	Radiation Protection Recovery Plan (Rev. 008)
HP/0/B/1009/003	Radiation Protection Response Following a Primary to Secondary Leak (Rev. 008)
HP/0/B/1009/004	Environmental Monitoring for Emergency Conditions Within the Ten-Mile Radius of CNS (Rev. 028)
HP/0/B/1009/005	Personnel/Vehicle Monitoring for Emergency Conditions (Rev. 016)
HP/0/B/1009/006	Alternative Method for Determining Dose Rate Within the Reactor Building (Rev. 008)
HP/0/B/1009/007	In-Plant Particulate and Iodine Monitoring Under Accident Conditions (Rev. 019)
HP/0/B/1009/008	Contamination Control of Injured Individuals (Rev. 015)
HP/0/B/1009/009	Guidelines for Accident and Emergency Response (Rev. 039)
HP/0/B/1009/014	Radiation Protection Actions Following an Uncontrolled Release of Radioactive Material (Rev. 008)
HP/0/B/1009/016	Distribution of Potassium Iodide Tablets in the Event of a Radioiodine Release (Rev. 011)
HP/0/B/1009/017	Deleted
HP/1/B/1009/017	Deleted
HP/2/B/1009/017	Deleted
HP/0/B/1009/018	Deleted
HP/0/B/1009/019	Emergency Radio System Operation, Maintenance and Communication (Rev. 010)
HP/0/B/1009/024	Implementing Procedure for Estimating Food Chain Doses Under Post-Accident Conditions (Rev. 002)

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
EMERGENCY PLAN IMPLEMENTING PROCEDURES INDEX

VOLUME II

PROCEDURE	TITLE
HP/0/B/1009/025	Deleted
HP/0/B/1009/026	On-Shift Offsite Dose Projections (Rev. 003)
SH/0/B/2005/001	Emergency Response Offsite Dose Projections (Rev. 001)
SH/0/B/2005/002	Protocol for the Field Monitoring Coordinator During Emergency Conditions (Rev. 002)
OP/0/A/6200/021	Post Accident Liquid Sampling System II+ (Rev. 034)
SR/0/B/2000/001	Standard Procedure for Public Affairs Response to the Emergency Operations Facility (Rev. 003)
SR/0/B/2000/002	Standard Procedure for EOF Services (Rev. 002)
SR/0/B/2000/003	Activation of the Emergency Operations Facility (Rev. 008)
SR/0/B/2000/004	Notification to States and Counties from the Emergency Operations Facility (Rev. 004)

(R04-01)

Duke Power Company
PROCEDURE PROCESS RECORD

(1)ID No. RP/0/A/5000/015
Revision No. 5

PARATION

(2) Station CATAWBA NUCLEAR STATION

(3) Procedure Title Core Damage Assessment

(4) Prepared By D A Well Date 2/27/02

(5) Requires NSD 228 Applicability Determination?
☒ Yes (New procedure or revision with major changes)
☐ No (Revision with minor changes)
☐ No (To incorporate previously approved changes)

(6) Reviewed By L. G. Ade (QR) Date 2/28/02

Cross-Disciplinary Review By _____ (QR) NA SGA Date 2/28/02

Reactivity Mgmt. Review By _____ (QR) NA SGA Date 2/28/02

Mgmt. Involvement Review By _____ (Ops. Supt.) NA SGA Date 2/28/02

(7) Additional Reviews

Reviewed By Gary L Mitchell (GP) Date 2-28-02

Reviewed By _____ Date _____

(8) Temporary Approval *(if necessary)*

By _____ (OSM/QR) Date _____

By _____ (QR) Date _____

(9) Approved By Richard L Swiggart Date 2-28-02

PERFORMANCE (Compare with control copy every 14 calendar days while work is being performed.)

(10) Compared with Control Copy _____ Date _____

Compared with Control Copy _____ Date _____

Compared with Control Copy _____ Date _____

(11) Date(s) Performed _____

Work Order Number (WO#) _____

COMPLETION

(12) Procedure Completion Verification
☐ Yes ☐ N/A Check lists and/or blanks properly initialed, signed, dated, or filled in N/A, as appropriate?
☐ Yes ☐ N/A Required enclosures attached?
☐ Yes ☐ N/A Data sheets attached, completed, dated, and signed?
☐ Yes ☐ N/A Charts, graphs, etc. attached, dated, identified, and marked?
☐ Yes ☐ N/A Procedure requirements met?

Verified By _____ Date _____

(13) Procedure Completion Approved _____ Date _____

(14) Remarks *(attach additional pages, if necessary)*

Duke Power Company Catawba Nuclear Station **Core Damage Assessment** **--E.P.I.P--** **Continuous Use**	Procedure No. RP/0/A/5000/015 Revision No. 005 Electronic Reference No. CN005GNY

Core Damage Assessment

1. Symptoms

NOTE: This procedure will normally be performed by Nuclear Engineers while in the Technical Support Center (TSC) to provide a means of determining the status of the core based on various parameters.

1.1 1(2) EMF 53, "Containment Radiation Monitor" in alarm.

1.2 High Core Exit Thermocouple (CET) readings.

1.3 Low Reactor Vessel Level Indication System (RVLIS) levels.

1.4 High containment hydrogen concentrations.

1.5 Any condition in which failed fuel is suspected.

2. Immediate Actions

None

3. Subsequent Actions

3.1 Identify Current Plant Status

_____ 3.1.1 Complete the following table based on current plant data.

Time of data, (mm/dd/yy hh:mm)		
Time of Reactor Shutdown, T_0		Hours
Core Exit Thermocouples (CET) (GD ERORXG, P0828)		Deg F
RVLIS (GD ERORXG, P0180 or P0181)		%
Containment Radiation Monitors 1(2)EMF 53A or B (GD ERORXG, A1308 or A1314)		R/hr

_____3.1.2 Determine possible status of reactor core using table below:

Plant Status	Fuel Rod Fission Product Status
CET less than 700 °F **AND** Containment radiation less than Figure 1 **AND** RVLIS greater than 55%	No core damage
CET less than 2000 °F **AND** Containment radiation less than Figure 2 **AND** RVLIS greater than 40%	Possible fuel rod clad damage
CET greater than 2000 °F **OR** Containment radiation greater than Figure 2 **OR** RVLIS less than 40%	Possible fuel overtemperature damage

Figure 1
Containment Radiation Level vs. Time for RCS Release

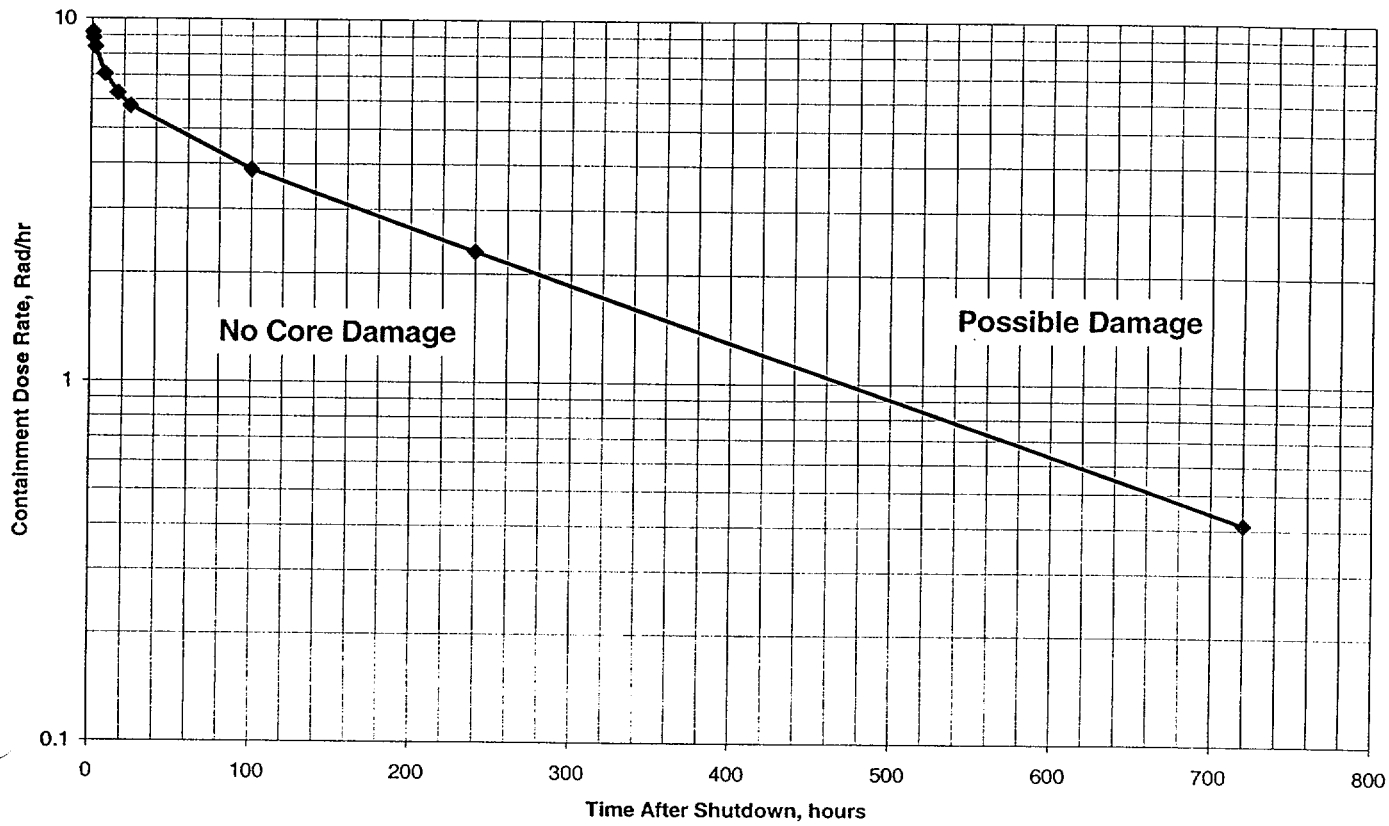

Figure 1	Containment Radiation Level vs. Time for RCS Release
Time After Shutdown (hrs)	Containment Dose Rate (Rad/hr)
0.5	9.1808
1	8.8621
2	8.3792
8	7.0574
16	6.2611
24	5.7672
100	3.8545
240	2.3002
720	0.41169

Figure 2
Containment Radiation Level vs. Time for 1% Fuel Overtemperature Release

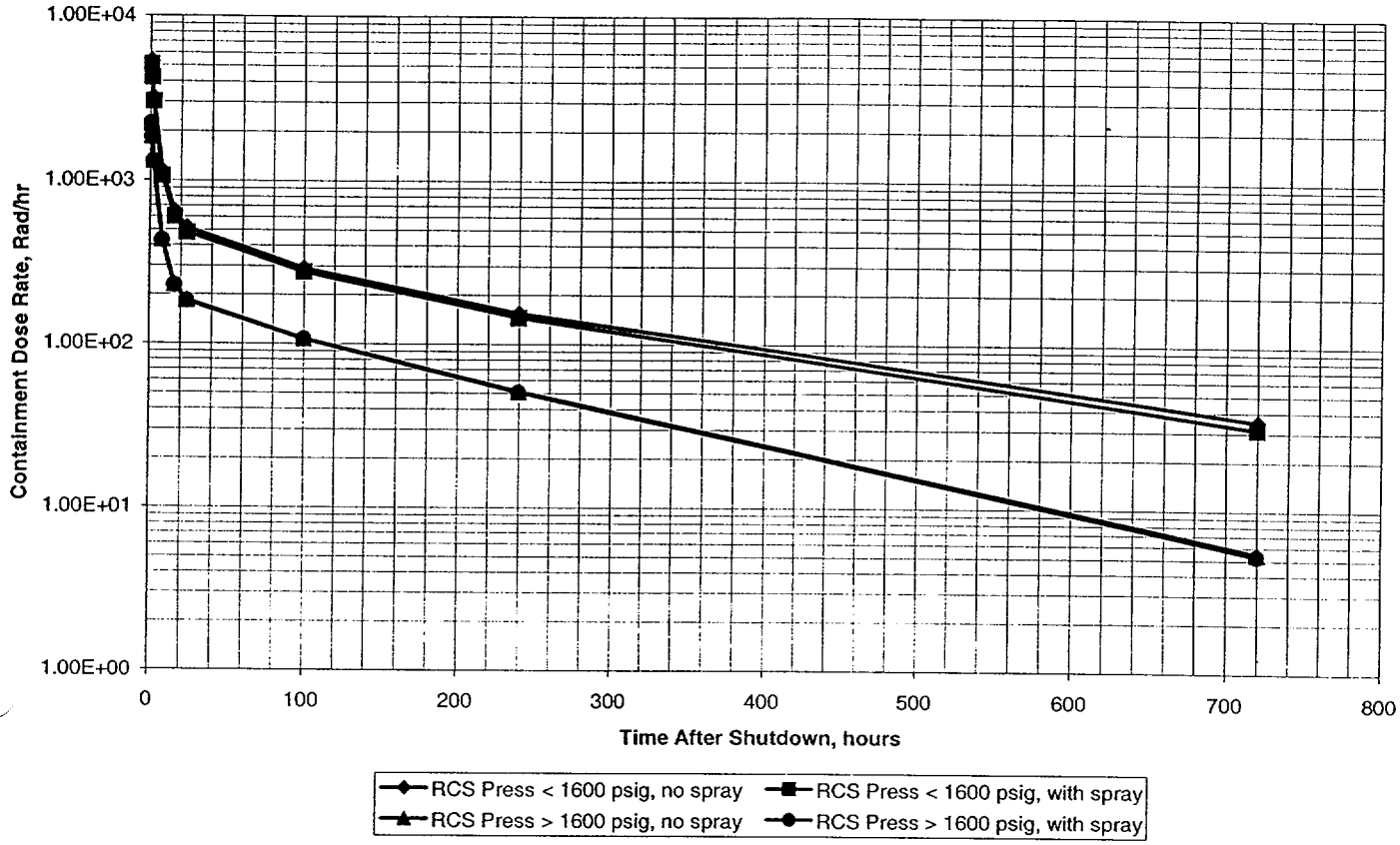

Figure 2	Containment Radiation Level vs. Time for 1% Fuel Overtemperature Release			
Time After Shutdown (hrs)	RCS Pressure < 1600 psig, no Spray (Rad/Hr)	RCS Pressure < 1600 psig, with Spray (Rad/Hr)	RCS Pressure > 1600 psig, no Spray (Rad/Hr)	RCS Pressure > 1600 psig, with Spray (Rad/Hr)
0.5	5.30E+03	5.07E+03	2.23E+03	2.21E+03
1	4.39E+03	4.20E+03	1.85E+03	1.84E+03
2	3.16E+03	3.02E+03	1.32E+03	1.31E+03
8	1.13E+03	1.06E+03	4.32E+02	4.29E+02
16	6.45E+02	5.97E+02	2.30E+02	2.27E+02
24	5.15E+02	4.79E+02	1.84E+02	1.82E+02
100	2.90E+02	2.76E+02	1.08E+02	1.07E+02
240	1.54E+02	1.45E+02	5.11E+01	5.06E+01
720	3.49E+01	3.13E+01	5.44E+00	5.26E+00

_____ 3.1.3 **IF** status of core is "no core damage", exit this procedure and continue to monitor plant conditions. If conditions warrant, re-run this procedure.

IF status of core is "possible fuel rod cladding damage", proceed to Step 3.2.

IF status of core is "possible fuel overtemperature damage", proceed to Step 3.3.

3.2 Clad Damage Assessment

NOTE: EMF 53 may not be useful to assess core damage for containment bypass sequences (e.g., S/G tube ruptures).

_____ 3.2.1 Record 1(2)EMF 53 reading and other data:

_____ R/hr at _____ hours after shutdown.

Containment Spray: ☐ ON ☐ OFF

RCS Pressure: _____ psig

_____ 3.2.2 Determine "Predicted Containment Radiation Level at 100% Clad Damage" using Figure 3.

Predicted Containment Radiation Level at 100% Clad Damage:

_____ R/Hr

_____ 3.2.3. Estimate clad damage:

% Clad Damage_{CRM} = (EMF 53 ÷ Predicted Cont. Rad Level at 100%) * 100

% Clad Damage_{CRM} = (_____ ÷ _____) * 100 = _____ %

Figure 3
Containment Radiation Level vs. Time for 100% Clad Damage Release

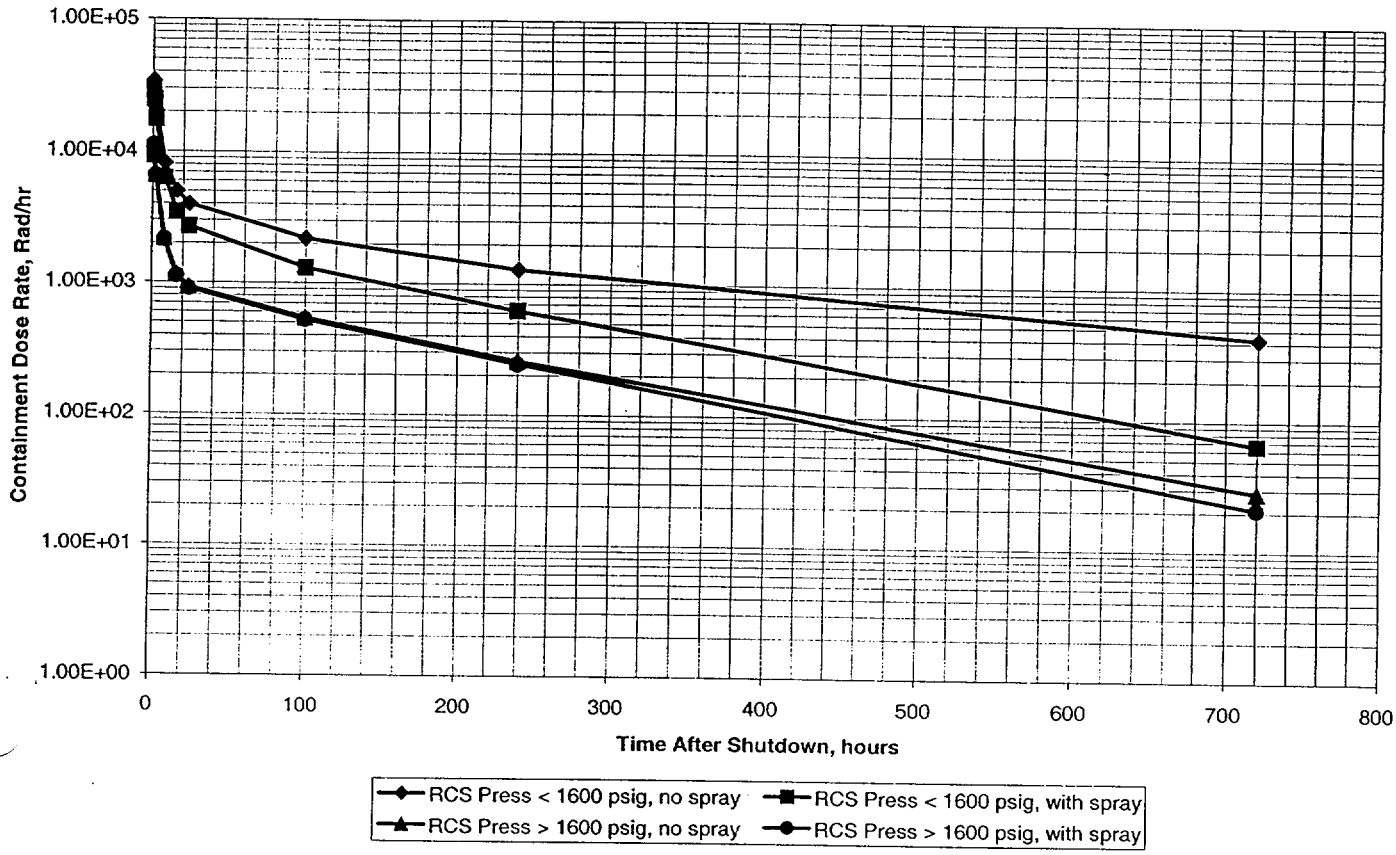

Figure 3	Containment Radiation Level vs. Time for 100% Clad Damage Release			
Time After Shutdown (hrs)	RCS Pressure < 1600 psig, no Spray (Rad/Hr)	RCS Pressure < 1600 psig, with Spray (Rad/Hr)	RCS Pressure > 1600 psig, no Spray (Rad/Hr)	RCS Pressure > 1600 psig, with Spray (Rad/Hr)
0.5	3.37E+04	2.91E+04	1.11E+04	1.10E+04
1	2.78E+04	2.42E+04	9.24E+03	9.17E+03
2	2.03E+04	1.75E+04	6.58E+03	6.52E+03
8	8.09E+03	6.25E+03	2.17E+03	2.13E+03
16	4.96E+03	3.48E+03	1.15E+03	1.12E+03
24	3.98E+03	2.68E+03	9.24E+02	8.98E+02
100	2.19E+03	1.30E+03	5.40E+02	5.22E+02
240	1.29E+03	6.23E+02	2.57E+02	2.44E+02
720	4.22E+02	6.54E+01	2.81E+01	2.10E+01

_____ 3.2.4 Record number of available core exit thermocouples(CETs)(GD EROCORE1(2,3)): _____

_____ 3.2.5 **IF** RCS pressure is greater than 1600 psig, record number of CETs greater than 1400 °F: _____

_____ 3.2.6 **IF** RCS pressure is less than 1600 psig, record number of CETs greater than 1200 °F: _____

_____ 3.2.7 Estimate clad damage:

% Clad $Damage_{CET}$ = (3.2.5 **OR** 3.2.6 ÷ 3.2.4) * 100

% Clad $Damage_{CET}$ = (_____ ÷ _____)* 100 = _____ %

_____ 3.2.8 Confirm reasonableness of clad damage estimates using expected responses below:

- RVLIS less than 54% **AND** greater than 39%
- Hot Leg RTD greater than T_{sat} **AND** less than 650°F
- Source Ranges greater than 10^4 cps
- Difference in clad damage estimates from Containment Radiation Monitor (EMF 53) and CETs less than 50%, using:

$$ABS\left[\frac{\%CladDamage_{CRM} - \%CladDamage_{CET}}{\%CladDamage_{CRM}}\right]$$

_____ 3.2.9 **IF** the expected response is not obtained, determine if the deviation can be explained from the accident progression

- Injection of water to the RCS
- Bleed Paths from the RCS
- Direct radiation to the containment radiation monitors

OR

from conservatism in the predictive model

- fuel burnup
- fission product retention in the RCS
- fission product removal from containment

_____ 3.2.10 Report estimate of clad damage to TSC Engineering Manager and to EOF Reactor Physics.

3.3 Fuel Overtemperature Damage Assessment

_____ 3.3.1 Record 1(2)EMF 53 reading and other data:

_____ R/hr at _____ hours after shutdown.

Containment Spray: ☐ ON ☐ OFF

RCS Pressure: _____ psig

_____ 3.3.2 Determine "Predicted Containment Radiation Level at 100% Overtemp Damage" using Figure 4.

Predicted Containment Radiation Level at 100% Overtemp Clad Damage:

_____ R/Hr

_____ 3.3.3 Estimate core damage:

% Core Damage_{CRM} = (EMF 53 ÷ Predicted Cont. Rad Level at 100%) * 100

% Core Damage_{CRM} = (_____ ÷ _____) * 100 = _____ %

Figure 4
Containment Radiation Level vs. Time for 100% Fuel Overtemperature Release

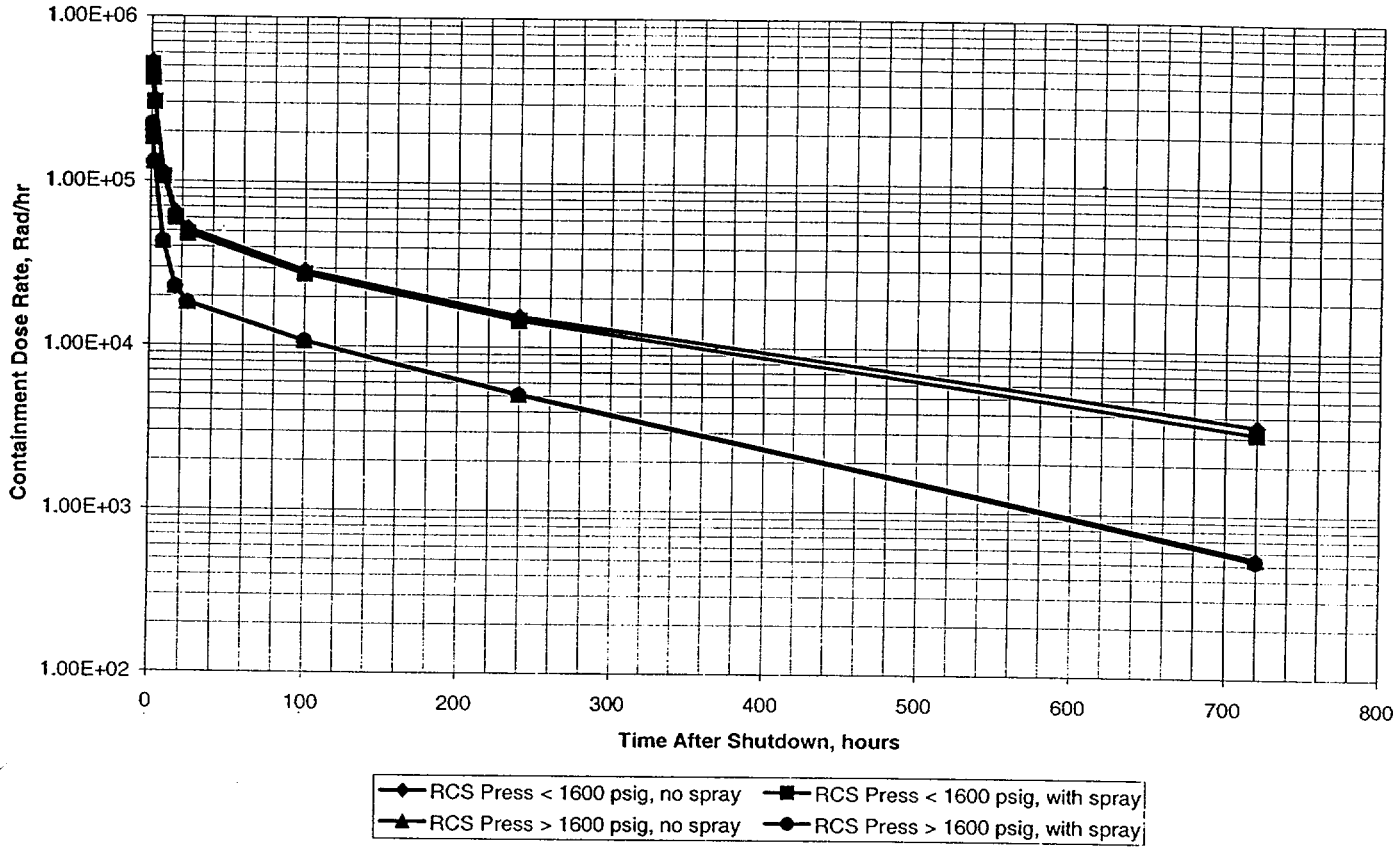

Figure 4	Containment Radiation Level vs. Time for 100% Fuel Overtemperature Release			
Time After Shutdown (hrs)	RCS Pressure < 1600 psig, no Spray (Rad/Hr)	RCS Pressure < 1600 psig, with Spray (Rad/Hr)	RCS Pressure > 1600 psig, no Spray (Rad/Hr)	RCS Pressure > 1600 psig, with Spray (Rad/Hr)
0.5	5.30E+05	5.07E+05	2.23E+05	2.21E+05
1	4.39E+05	4.20E+05	1.85E+05	1.84E+05
2	3.16E+05	3.02E+05	1.32E+05	1.31E+05
8	1.13E+05	1.06E+05	4.32E+04	4.29E+04
16	6.45E+04	5.97E+04	2.30E+04	2.27E+04
24	5.15E+04	4.79E+04	1.84E+04	1.82E+04
100	2.90E+04	2.76E+04	1.08E+04	1.07E+04
240	1.54E+04	1.45E+04	5.11E+03	5.06E+03
720	3.49E+03	3.13E+03	5.44E+02	5.26E+02

_____ 3.3.4 Record number of available core exit thermocouples(CETs)(GD EROGROUP1(2,3)): _____

_____ 3.3.5 Record number of CETs greater than 2000 °F: _____

_____ 3.3.6 Estimate core damage:

% Core $Damage_{CET}$ = (3.3.5 ÷ 3.3.4) * 100

% Core $Damage_{CET}$ = (_____ ÷ _____)* 100 = _____ %

_____ 3.3.7 Confirm reasonableness of core damage estimates using expected responses below.

- RVLIS less than 39%
- Hot Leg RTD greater than 650°F
- Source Ranges greater than 10^4 cps
- Difference in core damage estimates from Containment Radiation Monitors (CRM) and CET's less than 50%, using:

$$ABS\left[\frac{\%\ \text{Core Damage}_{CRM} - \%\ \text{Core Damage}_{CET}}{\%\ \text{Core Damage}_{CRM}}\right]$$

_____ 3.3.8 **IF** the expected response is not obtained, determine if the deviation can be explained from the accident progression

- Injection of water to the RCS
- Bleed Paths from the RCS
- Direct radiation to the containment radiation monitors

OR

from conservatism in the predictive model

- fuel burnup
- fission product retention in the RCS
- fission product removal from containment

_____ 3.3.9 Report estimate of core damage to TSC Engineering Manager and to EOF Reactor Physics.

4. Enclosures

None

5. References

5.1 Duke Power Calculation DPC-1229.00-00-0006, "Estimated Sample Dose and CDAG Setpoint Calculations in Support of PASS Removal", Rev 0, 6/01/01.

5.2 WCAP-14696-A, " Westinghouse Owners Group Core Damage Assessment Guidance", Revision 1, November, 1999.

5.3 Unit Data Book.

5.4 MNS procedure RP/0/A/5700/019, Core Damage Assessment.

(R04-01)

Duke Power Company

PROCEDURE PROCESS RECORD

(1) ID No. RP/0A/5000/001
Revision No. 015

PREPARATION

(2) Station Catawba

(3) Procedure Title Classification of Emergency

(4) Prepared By C.T. Beall by T. Williams Date 2/27/02

(5) Requires NSD 228 Applicability Determination?

- ☒ Yes (New procedure or revision with major changes)
- ☐ No (Revision with minor changes)
- ☐ No (To incorporate previously approved changes)

(6) Reviewed By GAM for Mitchell (QR) Date 2/28/02
Cross-Disciplinary Review By LB Baumgarner (QR) NA___ Date 2/28/02
Reactivity Mgmt. Review By _____ (QR) NA GM Date 2/28/02
Mgmt. Involvement Review By _____ (Ops. Supt.) NA GM Date 2/28/02

(7) Additional Reviews
Reviewed By _____ Date _____
Reviewed By _____ Date _____

(8) Temporary Approval *(if necessary)*
By _____ (OSM/QR) Date _____
By _____ (QR) Date _____

(9) Approved By Richard L Swiggart Date 2/28/02

PERFORMANCE *(Compare with control copy every 14 calendar days while work is being performed.)*

(10) Compared with Control Copy _____ Date _____
Compared with Control Copy _____ Date _____
Compared with Control Copy _____ Date _____

(11) Date(s) Performed _____
Work Order Number (WO#) _____

COMPLETION

(12) Procedure Completion Verification:

- ☐ Yes ☐ NA Check lists and/or blanks initialed, signed, dated, or filled in NA, as appropriate?
- ☐ Yes ☐ NA Required enclosures attached?
- ☐ Yes ☐ NA Data sheets attached, completed, dated, and signed?
- ☐ Yes ☐ NA Charts, graphs, etc. attached, dated, identified, and marked?
- ☐ Yes ☐ NA Procedure requirements met?

Verified By _____ Date _____

(13) Procedure Completion Approved _____ Date _____

(14) Remarks *(Attach additional pages, if necessary)*

Duke Power Company Catawba Nuclear Station **Classification of Emergency** **Multiple Use**	Procedure No. RP/**0**/A/5000/001 Revision No. 015 Electronic Reference No. CN005GNK

Classification of Emergency

1. 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 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 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 Guidelines exposure levels offsite for more than the immediate site area.

2. 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 <u>IF</u> the plant was in Mode 1-4 and a valid condition affects fission product barriers, proceed to Enclosure 4.1.

_____ 2.3 **IF** a General Emergency is **NOT** declared in Step 2.2 **OR** the condition does not affect fission product barriers, review the listing of enclosures to determine if the event is applicable to one 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/5000/002
Alert	RP/0/A/5000/003
Site Area Emergency	RP/0/A/5000/004
General Emergency	RP/0/A/5000/005

3. 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. Enclosures

4.1 Fission Product Barrier Matrix
4.2 System 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
4.10 Radiation Monitor Reading for Enclosure 4.3 EALs

Fission 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 IMMINENT (i.e., within 1-3 hours). In this IMMINENT LOSS situation, use judgement and classify as if the thresholds are exceeded.

Note 3: When determining Fission Product Barrier status, the Fuel Clad Barrier should be considered to be lost or potentially lost if the conditions for the Fuel Clad Barrier loss or potential loss EALs were met previously during the event, even if the conditions do not currently exist.

Note 4: 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. The STA should be consulted to affirm that a CSF has been validated and the appropriate functional restoration procedure has been implemented prior to the CSF being used as a basis to classify an emergency.

EAL #	Unusual Event	EAL #	Alert	EAL #	Site Area Emergency	EAL #	General Emergency
4.1.U.1	Potential Loss of Containment	4.1.A.1	Loss **OR** Potential Loss of Nuclear Coolant System	4.1.S.1	Loss **OR** Potential Loss of Both Nuclear Coolant System **AND** Fuel Clad	4.1.G.1	Loss of All Three Barriers
4.1.U.2	Loss of Containment	4.1.A.2	Loss **OR** Potential Loss of Fuel Clad	4.1.S.2	Loss **AND** Potential Loss Combinations of Both Nuclear Coolant System **AND** Fuel Clad	4.1.G.2	Loss of Any Two Barriers **AND** Potential Loss of the Third
		4.1.A.3	Potential Loss of Containment **AND** Loss **OR** Potential Loss of Any Other Barrier	4.1.S.3	Loss of Containment **AND** Loss **OR** Potential Loss of Any Other Barrier		

NOTE: If a barrier is affected, it has a single point value based on a "potential loss" or a "loss". "Not Applicable" is included in the table as a place holder only, and has no point value assigned.

Barrier	Points (1-5)	Potential Loss (X)	Loss (X)	Total Points	Classification
Containment		1	3	1 – 3	Unusual Event
NCS		4	5	4 – 6	Alert
Fuel Clad		4	5	7 – 10	Site Area Emergency
Total Points				11 - 13	General Emergency

1. Compare plant conditions against the Fission Barrier Matrix on pages 3 through 6 of 6.
2. Determine the "potential loss" or "loss" status for each barrier (Containment, NCS and Fuel Clad) based on the EAL symptom description.
3. For each barrier, write the highest single point value applicable for the barrier in the "Points" column and mark the appropriate "loss" column.
4. Add the points in the "Points" column and record the sum as "Total Points".
5. Determine the classification level based on the number of "Total Points".
6. In the table on page 1 of 6, under the "classification" column, select the event number (e.g. 4.1.A.1 for Loss of Nuclear Coolant System) that best fits the loss of barrier descriptions.
7. Using the number (e.g. 4.1.A.1) select the preprinted notification form and complete the required information for Emergency Coordinator approval and transmittal.

4.1.C CONTAINMENT BARRIER

POTENTIAL LOSS - (1 Point)	LOSS – (3 Points)
1. Critical Safety Function Status	
• Containment-RED • Core cooling-RED Path is indicated for >15 minutes	• Not applicable
2. Containment Conditions	
• Containment Pressure > 15 PSIG • H2 concentration > 9% • Containment pressure greater than 3 psig with less than one full train of NS and a VX-CARF operating.	• Rapid unexplained decrease in containment pressure following initial increase • Containment pressure or sump level response not consistent with LOCA conditions.

CONTINUED

4.1.N NCS BARRIER

POTENTIAL LOSS - (4 Points)	LOSS – (5 Points)
1. Critical Safety Function Status	
• NCS Integrity-Red • Heat Sink-Red	• Not applicable
2. NCS Leak Rate	
• Unisolable 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.

CONTINUED

4.1.F FUEL CLAD BARRIER

POTENTIAL LOSS - (4 Points)	LOSS – (5 Points)
1. Critical Safety Function Status	
• Core Cooling-Orange • Heat Sink-Red	• Core Cooling-Red
2. Primary Coolant Activity Level	
• Not applicable	• Coolant Activity GREATER THAN 300 μCi/cc Dose Equivalent Iodine (DEI) I-131

CONTINUED

4.1.C CONTAINMENT BARRIER

POTENTIAL LOSS - (1 Point)	LOSS – (3 Points)
3. Containment Isolation Valves Status After Containment Isolation Actuation	
• Not applicable	• Containment isolation is incomplete and a release path from containment exists
4. SG Secondary Side Release With Primary-to-Secondary Leakage	
• Not applicable	• Release of secondary side to the environment with primary to secondary leakage GREATER THAN Tech Spec allowable

CONTINUED

4.1.N NCS BARRIER

POTENTIAL LOSS - (4 Points)	LOSS – (5 Points)
3. SG Tube Rupture	
• 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 Ruptured and has a Non-Isolable secondary line fault • Indication that a SG is ruptured and a prolonged release of contaminated secondary coolant is occurring from the affected SG to the environment
4. Containment Radiation Monitoring	
• Not applicable	• Not applicable

CONTINUED

4.1.F FUEL CLAD BARRIER

POTENTIAL LOSS - (4 Points)	LOSS – (5 Points)
3. Containment Radiation Monitoring	
• Not applicable	• Containment radiation monitor 53 A or 53 B reading >117 R/hr
4. 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 fuel clad barrier.	

END

Enclosure 4.1
Fission Barrier Matrix

4.1.C CONTAINMENT BARRIER

POTENTIAL LOSS - (1 Point)	LOSS – (3 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. 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 containment barrier. END	

4.1.N NCS BARRIER

POTENTIAL LOSS - (4 Points)	LOSS – (5 Points)
5. 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	

4.1.F FUEL CLAD BARRIER

POTENTIAL LOSS - (4 Points)	LOSS – (5 Points)

System Malfunctions

UNUSUAL EVENT

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

OPERATING MODE: 1, 2, 3, 4

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

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: 1 , 2, 3, 4

4.2.U.2-1 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 compliment) to safely operate the unit.

CONTINUED

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: 1, 2, 3, 4

4.2.A.1-1 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 compliment) 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

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

OPERATING MODE: 1, 2, 3, 4

4.2.S.1-1 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

UNUSUAL EVENT | ALERT | SITE AREA EMERGENCY | GENERAL EMERGENCY

4.2.U.3 Fuel Clad Degradation.

OPERATING MODE: 1, 2, 3*

4.2.U.3-1 Dose Equivalent I-131 greater than the Technical Specifications allowable limit. (*Mode 3 with TAV >500° F)

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

OPERATING MODE: 1, 2, 3, 4

4.2.U.4-1 Unidentified leakage ≥ 10 gpm.

4.2.U.4-2 Pressure boundary leakage ≥ 10 gpm.

4.2.U.4-3 Identified leakage ≥ 25 gpm

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

OPERATING MODE: ALL

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 ETS lines, offsite radio system, commercial phone system) affecting the ability to communicate with offsite authorities.

END

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: ALL

4.3.U.1-1 A **valid** Trip 2 alarm on radiation monitor EMF-49L or EMF-57 for ≥ 60 minutes or will likely continue for ≥ 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/1009/014.

4.3.U.1-2 A **valid** indication on radiation monitor EMF- 36L of ≥ 3.00E+04 cpm for ≥ 60 minutes or will likely continue for ≥ 60 minutes, which indicates that the release may have exceeded the initiating condition and indicates the need to assess the release with procedure SH/0/B/2005/001.

(Continued)

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: ALL

4.3.A.1-1 A **valid** indication on radiation monitor EMF- 49L or EMF-57 of ≥ 1.2E+05 cpm for ≥ 15 minutes or will likely continue for ≥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/1009/014.

(Continued)

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: ALL

4.3.S.1-1 A **valid** indication on radiation monitor EMF-36L of ≥ 2.7E+06 cpm sustained for ≥ 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**.

(Continued)

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: ALL

4.3.G.1-1 A **valid** indication on radiation monitor EMF-36H of ≥ 8.3E+03 cpm sustained for ≥ 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**.

(Continued)

Abnormal Rad Levels/Radiological Effluent

UNUSUAL EVENT

4.3.U.1-3 Gaseous effluent being released exceeds two times **SLC** 16.11-6 for ≥ 60 minutes as determined by RP procedure.

4.3.U.1-4 Liquid effluent being released exceeds two times **SLC** 16.11-1 for ≥ 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.

(Continued)

ALERT

4.3.A.1-2 A **valid** indication on radiation monitor EMF- 36L of ≥ 5.4E+05 cpm for ≥ 15 minutes or will likely continue for ≥15 minutes, which indicates that the release may have exceeded the initiating condition and indicates the need to assess the release with procedure SH/0/B/2005/001.

4.3.A.1-3 Gaseous effluent being released exceeds 200 times the level of **SLC** 16.11-6 for ≥ 15 minutes as determined by RP procedure.

4.3.A.1-4 Liquid effluent being released exceeds 200 times the level of **SLC** 16.11-1 for ≥ 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.

(Continued)

SITE AREA EMERGENCY

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 reading should be used for emergency classification.

END

GENERAL EMERGENCY

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 reading should be used for emergency classification.

END

Abnormal Rad Levels/Radiological Effluent

UNUSUAL EVENT

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

OPERATING MODE: ALL

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 EMF reading increases by a factor of 1000 over normal levels as shown in Enclosure 4.10.

END

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: ALL

4.3.A.2-1 An **unplanned valid** trip II 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 (applies to Mode 6 and No Mode Only)
1EMF-17
2EMF-2

Containment Noble Gas Monitor (Applies to Mode 6 and No Mode Only)
1EMF-39
2EMF-39

(Continued)

SITE AREA EMERGENCY

GENERAL EMERGENCY

Abnormal Rad Levels/Radiological Effluent

UNUSUAL EVENT	ALERT	SITE AREA EMERGENCY	GENERAL EMERGENCY
	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.		
	4.3.A.2-4 Spent Fuel Pool or Fuel Transfer Canal level decrease of >2 feet after initiation of makeup. **AND** Any irradiated fuel assembly not capable of being fully lowered into the spent fuel pool racks or transfer canal fuel transfer system basket.		

(Continued)

UNUSUAL EVENT | ALERT | SITE AREA EMERGENCY | GENERAL EMERGENCY

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: ALL

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 Valid radiation monitor reading exceeds the levels shown in Enclosure 4.10.

END

Loss of Shutdown Functions

UNUSUAL EVENT

END

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: 1, 2, 3

4.4.A.1-1 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 is successful and reactor power is less than 5% and decreasing.

(Continued)

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: 1

4.4.S.1-1 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.

(Continued)

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: 1

4.4.G.1-1 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

Loss of Shutdown Functions

UNUSUAL EVENT

ALERT

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

OPERATING MODE: 5, 6

4.4.A.2-1 Total loss of ND and/or RN and/or 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

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

OPERATING MODE: 1, 2, 3, 4

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

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

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

OPERATING MODE: 5, 6

4.4.S.3-1 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.

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

AND

Reactor Coolant (NC) system mid or wide range level less than 11% and decreasing after initiation of NC system makeup.

(Continued)

GENERAL EMERGENCY

UNUSUAL EVENT	ALERT	SITE AREA EMERGENCY	GENERAL EMERGENCY
		4.4.S.3-3 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	

Loss of Power

UNUSUAL EVENT

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

OPERATING MODE: 1, 2, 3, 4

4.5.U.1-1 The following conditions exist:

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

AND

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

OPERATING MODE: 5, 6, No Mode

(Continued)

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: 5, 6, No Mode

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

Loss of power on essential buses ETA and ETB.

AND

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

(Continued)

SITE AREA EMERGENCY

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

OPERATING MODE: 1, 2, 3, 4

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

Loss of power on essential buses ETA and ETB.

AND

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

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

OPERATING MODE: 1, 2, 3, 4

(Continued)

GENERAL EMERGENCY

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

OPERATING MODE: 1, 2, 3, 4

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

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

AND

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

AND

At least one of the following conditions exist:

- Restoration of at least one essential bus within 4 hours is *NOT* likely

(Continued)

Loss of Power

UNUSUAL EVENT

4.5.U.1-2 The following conditions exist:
Loss of offsite power to essential buses ETA and ETB for greater than 15 minutes.

AND

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

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

OPERATING MODE: 5, 6

4.5.U.2-1 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

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: 1, 2, 3, 4

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.

END

SITE AREA EMERGENCY

4.5.S.2-1 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

GENERAL EMERGENCY

- Indication of continuing degradation of core cooling based on Fission Product Barrier monitoring.

END

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: ALL

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
- SSF
- CAS
- SAS
- Doghouses
- FWST
- Turbine Building
- Service Building
- Interim Radwaste Building
- Equipment Staging Building.
- Monitor Tank Building

(Continued)

ALERT

4.6.A.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

4.6.A.1-1 The following conditions exist: (Non-security events)
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

One of the following:

- Affected safety system parameter indications show degraded performance

(Continued)

SITE AREA EMERGENCY

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

OPERATING MODE: ALL

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.

END

GENERAL EMERGENCY

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

OPERATING MODE: ALL

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 ASP due to security event.

END

Fire/Explosion and Security Events

UNUSUAL EVENT

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.

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

OPERATING MODE: All

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.

4.6.U.2-4 A **credible terrorist threat** as determined by security.

END

ALERT

- Plant personnel report **visible damage** to permanent structures or equipment within the specified area required to establish or maintain safe shutdown within the specifications.

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

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

OPERATING MODE: No Mode

4.6.A.2-1 The following conditions exist: (Non-security events)
Fire or **explosion** in any of the following areas:
- Spent Fuel Pool
- Auxiliary Building.
- RN Pumphouse

AND

One of the following:
- Spent Fuel Pool level and/or temperature show degraded performance

(Continued)

SITE AREA EMERGENCY

GENERAL EMERGENCY

Fire/Explosion and Security Events

UNUSUAL EVENT	ALERT	SITE AREA EMERGENCY	GENERAL EMERGENCY
	• Plant personnel report **visible damage** to permanent structures or equipment supporting spent fuel pool cooling.		
	4.6.A.3 **Security Event in a Plant Protected Area.**		
	OPERATING MODE: ALL		
	4.6.A.3-1 **Intrusion** into plant **Protected Area** by a hostile force.		
	END		

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: ALL

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.

(Continued)

ALERT

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

OPERATING MODE: ALL

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
- FWST
- Diesel Generator Rooms
- Control Room
- RN Pumphouse
- SSF
- Doghouses
- CAS
- SAS.

OR

sustained winds ≥ 74 mph for > 15 minutes.

(Continued)

SITE AREA EMERGENCY

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

OPERATING MODE: ALL

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

Control Room evacuation has been initiated per AP/1(2)/A/5500/017

AND

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

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

OPERATING MODE: ALL

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

END

GENERAL EMERGENCY

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

OPERATING MODE: ALL

4.7.G.1-1 Other conditions exist which in the Judgement 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

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: ALL

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.

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

OPERATING MODE: ALL

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

END

ALERT

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
- FWST
- Diesel Generator Rooms
- Control Room
- RN Pumphouse
- SSF
- Doghouses
- CAS
- SAS

(Continued)

SITE AREA EMERGENCY

GENERAL EMERGENCY

Natural Disasters, Hazards, And Other Conditions Affecting Plant Safety

UNUSUAL EVENT	ALERT	SITE AREA EMERGENCY	GENERAL EMERGENCY
	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: ALL		
	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 the above EALs: • Reactor Building • Auxiliary Building • Diesel Generator Rooms • Control Room • RN Pumphouse • SSF • CAS • SAS		

(Continued)

Natural Disasters, Hazards, And Other Conditions Affecting Plant Safety

UNUSUAL EVENT | ALERT | SITE AREA EMERGENCY | GENERAL EMERGENCY

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

OPERATING MODE: ALL

4.7.A.3-1 Control Room evacuation has been initiated per AP/1(2)/A/5500/017.

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

OPERATING MODE: ALL

4.7.A.4-1 Other conditions exist which in the Judgement 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 ten (10) or more 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.

CREDIBLE THREAT - A threat should be considered credible when:

- Physical evidence supporting the threat exists.
- Information independent (law enforcement) from the actual threat message exists that supports the threat.
- A specific group or organization claims responsibility for the threat.

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 (e.g., a steamline or feedwater line break) that imparts energy sufficient to potentially damage or creates shrapnel to actually damage permanent structures, systems or components. An electrical breaker flash that creates shrapnel and results in damage to other components beyond scorching should also be considered.

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. An electrical breaker flash that creates high temperatures for a short duration and merely localized scorching to that breaker and its compartment should be considered a fire.

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 of 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.

INOPERABLE – A component does not meet Technical Specifications. The component may be functional, capable of meeting its design.

INABILITY TO DIRECTLY MONITOR - Operational Aid Computer data points are unavailable or gauges/panel indications are not readily available to the operator.

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: (l) Automatic turbine runback >25% thermal reactor power, (2) Electrical load rejection >25% full electrical load; (3) Reactor Trip, (4) Safety Injection, (5) Thermal power oscillations >10%.

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 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.

Enclosure 4.9

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.

- Emergencies are declared for the site. If an event results in multiple emergency action levels on a unit or different emergency action levels on each unit, then the emergency declaration shall be based on the higher classification. Information relating to the unit with the lesser classification will be noted as additional information on the Emergency Notification Form (ENF).

- 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 other 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 that a condition exist for a specific duration prior to declaration.

        a. 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.

        b. 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.

    2. 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.

3. If an emergency classification is warranted, but the plant condition is corrected prior to declaration and notification, the Emergency Coordinator must consider the potential that the initiating condition (e.g. Failure of Reactor Protection System or earthquake) may have caused plant damage that warrants augmenting the on-shift personnel via activation of the Emergency Response Organization. The following action shall be taken:

    a. For UNUSUAL EVENTS, the condition shall be declared and notifications made. 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/E-0 (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/E-0 (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 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.

Radiation Monitor Readings for Enclosure 4.3

Note: These values are not intended to apply to anticipated temporary increases due to planned events (e.g. incore detector movement, radwaste container movement, depleted resin transfers, etc.)

Detector	Elevation	Column	Identifier	Unusual Event mRad/hr	Alert mRad/hr
1EMF-1	522'	FF, 57	Auxiliary Building Corridor	500	5000
1EMF-3	543'	GG, 55	Unit 1 Charging Pump Area	100	5000
1EMF-4	543'	GG, 59	Unit 2 Charging Pump Area	100	5000
1EMF-7	560'	NN, 55	Unit 1 Auxiliary Building Corridor	1500	5000
1EMF-8	560'	NN, 59	Unit 2 Auxiliary Building Corridor	500	5000
1EMF-9	577'	LL, 55	Unit 1 Aux. Building Filter Hatch	100	5000
1EMF-10	577'	LL, 58	Unit 2 Aux. Building Filter Hatch	100	5000
1EMF-22	594'	KK, 53	Containment Purge Filter Area	100	5000
2EMF-9	594'	KK, 61	Containment Purge Filter Area	100	5000