MANUAL HARD COPY DISTRIBUTION
DOCUMENT TRANSMITTAL 2003-29884

USER INFORMATION:

Name: GERLACH*ROSE M EMPL#: 28401 CA#: 0363

Address: NUCSA2

Phone#: 254-3194

TRANSMITTAL INFORMATION:

TO: [redacted] 06/24/2003
LOCATION: DOCUMENT CONTROL DESK
FROM: NUCLEAR RECORDS DOCUMENT CONTROL CENTER (NUCSA-2)
THE FOLLOWING CHANGES HAVE OCCURRED TO THE HARDCOPY OR ELECTRONIC MANUAL ASSIGNED TO YOU:

100 - 100 - EMERGENCY DIRECTOR/CONTROL ROOM: EMERGENCY PLAN-POSITION SPECIFIC PROCEDURE

REMOVE MANUAL TABLE OF CONTENTS DATE: 04/16/2003

ADD MANUAL TABLE OF CONTENTS DATE: 06/23/2003

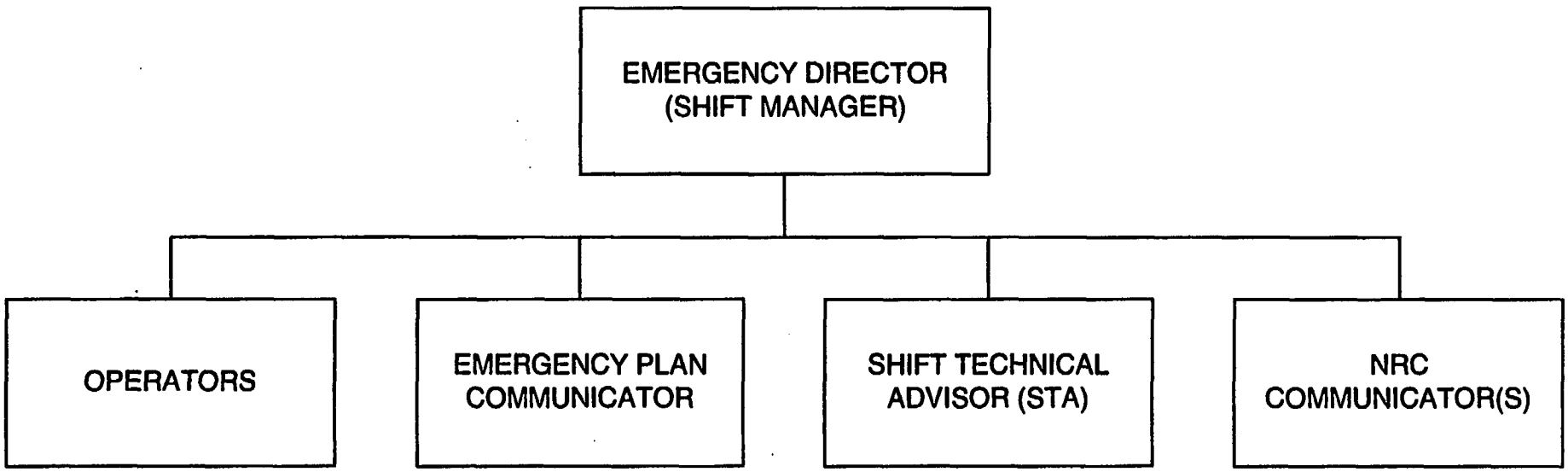
CATEGORY: PROCEDURES TYPE: EP
ID: EP-PS-100
REPLACE: REV:17

REPLACE: REV:17

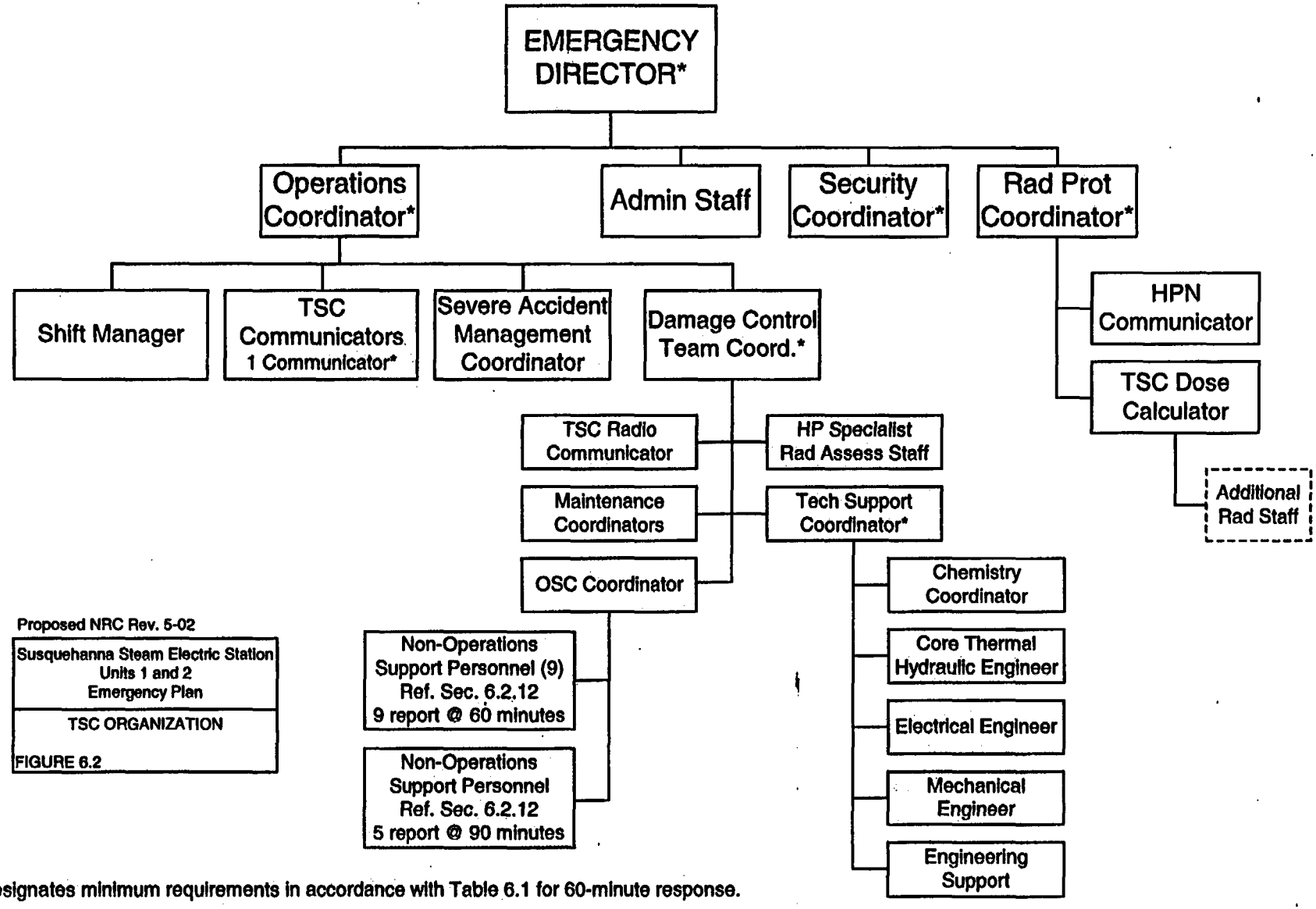
UPDATES FOR HARD COPY MANUALS WILL BE DISTRIBUTED WITHIN 5 DAYS IN ACCORDANCE WITH DEPARTMENT PROCEDURES. PLEASE MAKE ALL CHANGES AND ACKNOWLEDGE COMPLETE IN YOUR NIMS INBOX UPON RECEIPT OF HARD COPY. FOR ELECTRONIC MANUAL USERS, ELECTRONICALLY REVIEW THE APPROPRIATE DOCUMENTS AND ACKNOWLEDGE COMPLETE IN YOUR NIMS INBOX.

A045

EMERGENCY ORGANIZATION CONTROL ROOM



TSC ORGANIZATION



Proposed NRC Rev. 5-02

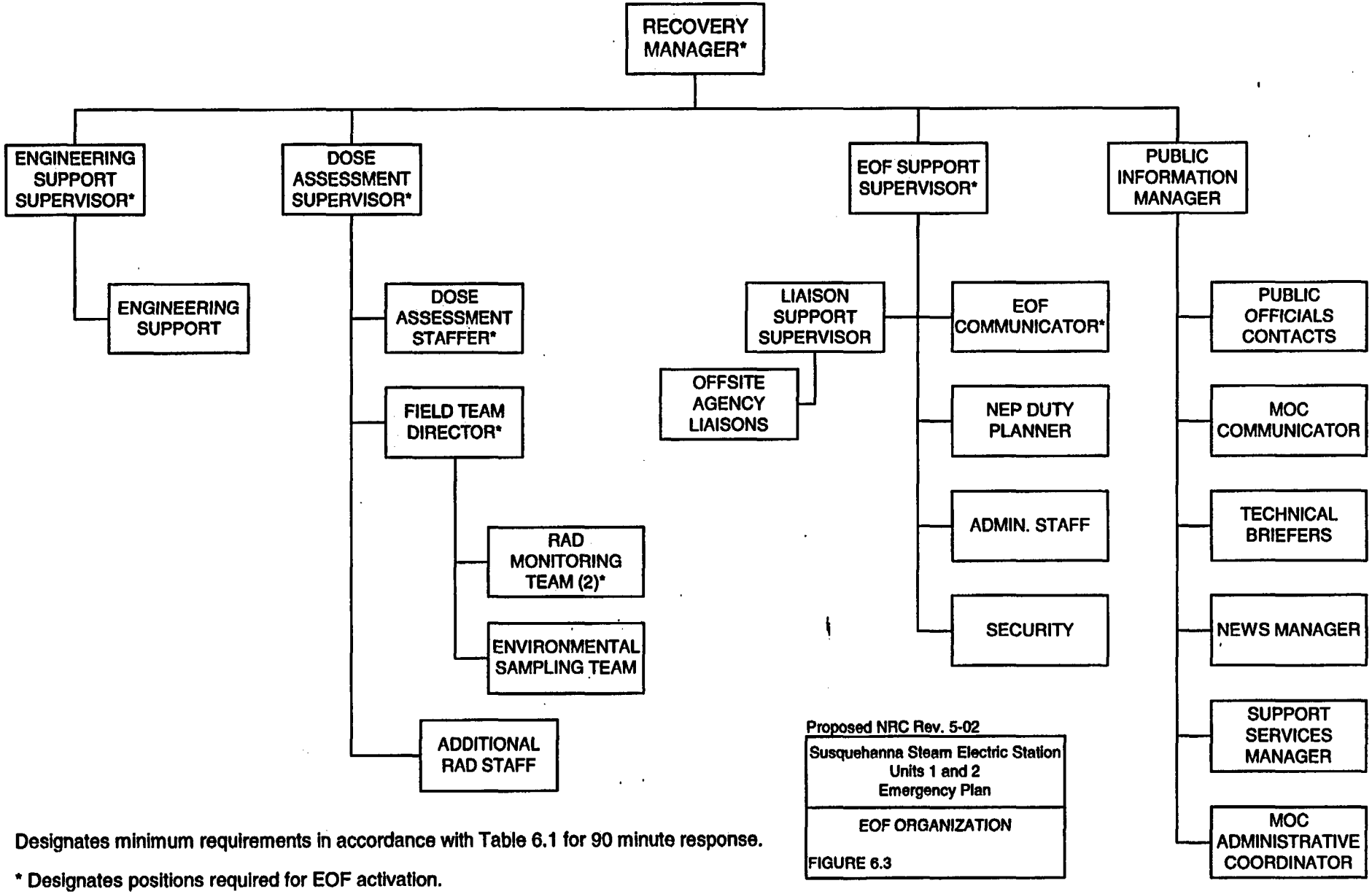
Susquehanna Steam Electric Station Units 1 and 2 Emergency Plan
TSC ORGANIZATION
FIGURE 6.2

Designates minimum requirements in accordance with Table 6.1 for 60-minute response.

- - - - - Individuals may be located in the OSC, TSC, or Field.

* Designates positions required for TSC activation.

EOF ORGANIZATION



Proposed NRC Rev. 5-02

Susquehanna Steam Electric Station
Units 1 and 2
Emergency Plan

EOF ORGANIZATION

FIGURE 6.3

Designates minimum requirements in accordance with Table 6.1 for 90 minute response.

* Designates positions required for EOF activation.

EMERGENCY CLASSIFICATION

CHECK ☑

1.0 TIMING OF CLASSIFICATION

☐ 1.1 **UNUSUAL EVENT**

An **UNUSUAL EVENT** shall be declared within 15 minutes of having information necessary to make a declaration.

☐ 1.2 **ALERT**

An **ALERT** shall be declared within 15 minutes of having information necessary to make a declaration.

☐ 1.3 **SITE AREA EMERGENCY**

A **SITE AREA EMERGENCY** shall be declared within 15 minutes of having information necessary to make a declaration.

☐ 1.4 **GENERAL EMERGENCY**

A **GENERAL EMERGENCY** shall be declared within 15 minutes of having information necessary to make a declaration.

CLASSIFICATION OF EMERGENCY CONDITIONS

USE OF EMERGENCY CLASSIFICATION MATRIX

NOTE: CONFIRM THAT INDICATORS AND/OR ALARMS REFLECT ACTUAL CONDITIONS PRIOR TO TAKING ACTION BASED ON THE INDICATOR OR ALARM.

The matrix is worded in a manner that assumes parameter values indicated are the actual conditions present in the plant.

The matrix is designed to make it possible to precisely classify an abnormal occurrence into the proper emergency classification based on detailed Emergency Action Level (EAL) descriptions. It is impossible to anticipate every abnormal occurrence. Therefore, before classifying any abnormal occurrence based on the EALs in the matrix, one should verify that the general conditions prevalent in-plant and offsite meet the general class description of the emergency classification. In addition, prior to classification, one should be aware of the ramifications in-plant and particularly offsite of that classification. Special consideration of offsite consequences should be made prior to declaring a **GENERAL EMERGENCY**.

CLASS DESCRIPTIONS

UNUSUAL EVENT - Events that are occurring 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.

ALERT - Events that are occurring 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.

SITE AREA EMERGENCY - Events that are occurring or have occurred which involve actual or imminent major failures of plant functions needed for protection of the public. Any releases are not expected to exceed EPA Protective Action Guideline exposure levels except inside the emergency planning boundary.

GENERAL EMERGENCY - Events that are occurring or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity. Expectation is that releases will exceed EPA Protective Action Guideline exposure levels beyond the emergency planning boundary.

CATEGORY INDEX TO THE MATRIX FOR THE CLASSIFICATION OF EMERGENCY CONDITIONS TABLE OF CONTENTS

CATEGORY	EVENT	PAGE
1	AIRCRAFT/TRAIN ACTIVITY	5
2	CONTROL ROOM EVACUATION	6
3	FUEL CLADDING DEGRADATION	7
4	GENERAL	10
5	INJURED/CONTAMINATED PERSONNEL	11
6	IN-PLANT HIGH RADIATION	12
7	LOSS OF AC POWER	13
8	LOSS OF CONTROL ROOM ALARMS AND ANNUNCIATORS	14
9	LOSS OF DC POWER	15
10	LOSS OF DECAY HEAT REMOVAL CAPABILITY	16
11	LOSS OF REACTIVITY CONTROL	17
12	LOSS OF REACTOR VESSEL INVENTORY	19
13	NATURAL PHENOMENA	21
14	ONSITE FIRE/EXPLOSION	23
15	RADIOLOGICAL EFFLUENT	25
16	SECURITY EVENT	29
17	SPENT FUEL RELATED INCIDENT	31
18	STEAM LINE BREAK	33
19	TOXIC/FLAMMABLE GASES	36
20	TECHNICAL SPECIFICATION SAFETY LIMIT	37
21	DRY FUEL STORAGE	38

1 - AIRCRAFT/TRAIN ACTIVITY

UNUSUAL EVENT

EAL# 1.1 Aircraft crash or train derailment onsite as indicated by:

Visual observation or notification received by control room operator.

ALERT

EAL# 1.2 Aircraft or missile strikes a station structure as indicated by:

Direct observation or notification received by control room operator.

SITE AREA EMERGENCY

EAL# 1.3 Severe damage to safe shutdown equipment from aircraft crash or missile impact when not in cold shutdown, determined by:

(A *and* B *and* C)
A. Direct observation or notification received by control room operator.
and
B. Shift Supervisor evaluation.
and
C. Reactor Coolant temperature greater than 200°F as indicated on Panel 1C651 (2C651).

GENERAL EMERGENCY

EAL# 1.4 None.

2 - CONTROL ROOM EVACUATION

UNUSUAL EVENT

EAL# 2.1 None.

ALERT

EAL# 2.2 Control Room evacuation as indicated by:

(A *and* B)
A. Initiation of control room evacuation procedures.
and
B. Establishment of control of shutdown systems from local stations.

SITE AREA EMERGENCY

EAL# 2.3 Delayed Control Room Evacuation as indicated by:

(A *and* B)
A. Initiation of control room evacuation procedures.
and
B. Shutdown systems control at local stations not established within 15 minutes.

GENERAL EMERGENCY

EAL# 2.4 None.

3 - FUEL CLADDING DEGRADATION

UNUSUAL EVENT

EAL# 3.1 Core degradation as indicated by:

(A *or* B)

A. Valid Off-gas Pre-treatment Monitor high radiation alarm annunciation on Panel 1C651 (2C651) or indication on Panel 1C600 (2C600).

or

B. Reactor coolant activity, determined by sample analysis greater than or equal to 2 µCi/cc of I-131 equivalent.

ALERT

EAL# 3.2 Severe fuel cladding degradation as indicated by:

(A *or* B *or* C *or* D)

A. Valid Off-gas Pre-treatment monitor High-High radiation alarm annunciation on Panel 1C651 (2C651) or indication on Panel 1C600 (2C600).

or

B. Valid Reactor coolant activity greater than 300 µCi/cc of equivalent I-131, as determined by sample analysis.

or

C. Valid Main Steam Line High radiation trip annunciation or indication on Panel 1C651 (2C651).

or

D. Valid containment post accident monitor indication on Panel 1C601 (2C601) greater than 200 R/hr. (An 8R/hr correction factor must be added manually to the indication to offset a downscale error if primary containment temperature exceeds 225 degrees Fahrenheit. Reference EC-079-0521.)

(CONTINUED ON NEXT PAGE)

3 - FUEL CLADDING DEGRADATION (continued)

SITE AREA EMERGENCY

EAL# 3.3 Severely degraded core as indicated by:

(A *or* B)

A. Reactor coolant activity greater than 1,000 µCi/cc of equivalent I-131 as determined by sample analysis.

or

B. Valid containment post accident monitor indication on Panel 1C601 (2C601) greater than 400 R/hr. (An 8 R/hr correction factor must be added manually to the indication to offset a downscale error if primary containment temperature exceeds 225 degrees Fahrenheit. Reference EC-079-0521.)

(CONTINUED ON NEXT PAGE)

3 - FUEL CLADDING DEGRADATION (continued)

GENERAL EMERGENCY

EAL# 3.4.a Fuel cladding degradation. Loss of 2 out of 3 fission product barriers (fuel cladding and reactor coolant pressure boundary) with potential loss of the third barrier (primary containment) as indicated by:

(A *or* B)

A. (1 *and* 2)
   1. Valid containment post accident monitor indication on Panel 1C601 (2C601) greater than 400 R/hr. (An 8 R/hr correction factor must be added manually to the indication to offset a downscale error if primary containment temperature exceeds 225 degrees Fahrenheit. Reference EC-079-0521.)

   and

   2. (a *or* b *or* c)
      a. Containment pressure greater than 40.4 PSIG, indicated on Panel 1C601 (2C601).

      or

      b. A visual inspection of the containment indicates a potential for loss of containment (e.g. anchorage or penetration failure, a crack in containment concrete at tendon).

      or

      c. Other indications of potential or actual loss of primary containment.

or

B. (1 *and* 2)
   1. Reactor coolant activity greater than 1,000 µCi/cc of equivalent I-131 as determined by sample analysis.

   and

   2. Actual or potential failure of reactor coolant isolation valves to isolate a coolant leak outside containment as determined by valve position indication on Panel 1C601 (2C601) or visual inspection.

OR

EAL# 3.4.b Core melt as indicated by:

(A *and* B)

A. Valid containment post accident monitor indication on Panel 1C601 (2C601) greater than 2000 R/hr. (An 8 R/hr correction factor must be added manually to the indication to offset a downscale error if primary containment temperature exceeds 225 degrees Fahrenheit. Reference EC-079-0521.)

and

B. Containment high pressure indication or annunciation on Panel 1C601 (2C601).

4 - GENERAL

UNUSUAL EVENT

EAL# 4.1 Plant conditions exist that warrant increased awareness on the part of plant operating staff or state and/or local offsite authorities as indicated by:

Events that are occurring 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.

ALERT

EAL# 4.2 Other plant conditions exist that warrant precautionary activation of PPL, State, County, and local emergency centers as indicated by:

Events that are occurring 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.

SITE AREA EMERGENCY

EAL# 4.3 Other plant conditions exist that warrant activation of emergency centers and monitoring teams or a precautionary notification to the public near the site as indicated by:

Events that are occurring or have occurred which involve actual or imminent major failures of plant functions needed for protection of the public. Any releases are not expected to exceed EPA Protective Action Guideline exposure levels except inside the emergency planning boundary.

GENERAL EMERGENCY

EAL# 4.4 Other plant conditions exist, from whatever, source, that make release of large amounts of radioactivity in a short time period available as indicated by:

Events that are occurring or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity. Expectation is that releases will exceed EPA Protective Action Guideline exposure levels beyond the emergency planning boundary.

5.- INJURED/CONTAMINATED PERSONNEL

UNUSUAL EVENT

EAL# 5.1 Transportation of externally contaminated injured individual from site to offsite medical facility as deemed appropriate by Shift Supervisor.

ALERT

EAL# 5.2 None.

SITE AREA EMERGENCY

EAL# 5.3 None.

GENERAL EMERGENCY

EAL# 5.4 None.

6 - IN-PLANT HIGH RADIATION

UNUSUAL EVENT

EAL# 6.1 Unanticipated or unplanned concentrations of airborne activity exist in normally accessible areas, which are not due to planned maintenance activities, as indicated by:

Concentrations exceed 500 times the DAC values of 10CFR20 Appendix B, Table I values for a single isotope, or for multiple isotopes where

$$\frac{C_A}{DAC_A} + \frac{C_B}{DAC_B} + \frac{C_C}{DAC_C} \ldots \frac{C_N}{DAC_N} \geq 500$$

ALERT

EAL# 6.2 Unexpected in-plant high radiation levels or airborne contamination which indicates a severe degradation in the control of radioactive material as indicated by:

Area Radiation Monitor reading 1000 times normal annunciation on Panel 1C601 (2C601) or indication on Panel 1C600 (2C600).

SITE AREA EMERGENCY

EAL# 6.3 None.

GENERAL EMERGENCY

EAL# 6.4 None.

7 - LOSS OF AC POWER

UNUSUAL EVENT

EAL# 7.1 Loss of offsite power **or** loss of all onsite AC power supplies as indicated by:

(A *or* B)
A. Loss of power to Startup Transformer 10 **and** 20 annunciation or indication on Panel 0C653.
or
B. Failure of all diesel generators to start or synchronize to the emergency buses by indication or annunciation on Panel 0C653.

ALERT

EAL# 7.2 Loss of all offsite power **and** all onsite AC power supplies as indicated by:

(A *and* B)
A. Loss of power to Startup Transformer 10 **and** 20 annunciation or indication on Panel 0C653.
and
B. Failure of all diesel generators to start or synchronize to the emergency buses by annunciation or indication on Panel 0C653.

SITE AREA EMERGENCY

EAL# 7.3 Loss of all offsite power and loss of all onsite AC power supplies for greater than 15 minutes as indicated by:

(A *and* B *and* C)
A. Loss of offsite power.
and
B. Failure of **all** diesel generators to startup or synchronize to the emergency buses by indication or annunciation on 0C653.
and
C. The above conditions exist for greater than 15 minutes.

GENERAL EMERGENCY

EAL# 7.4 None.

8 - LOSS OF CONTROL ROOM ALARMS AND ANNUNCIATORS

UNUSUAL EVENT

EAL# 8.1 None.

ALERT

EAL# 8.2 Loss of all control room annunciators as indicated by:

In the opinion of the Shift Supervisor, all Control Room annunciators and the Plant Process Computer are lost, or insufficient annunciators are available to safely operate the unit(s) without supplemental observation of plant systems.

SITE AREA EMERGENCY

EAL# 8.3 All annunciators lost and plant transient initiated while annunciators are lost as indicated by:

(A *and* B)

A. In the opinion of the Shift Supervisor, all Control Room annunciators and the Plant Process Computer are lost, or insufficient annunciators are available to safely operate the unit(s) without supplemental observation of plant systems.

and

B. (1 *or* 2 *or* 3 *or* 4)
   1. Low-Low reactor water level indication on Panel 1C651 (2C651) followed by ECCS initiation on Panel 1C601 (2C601).

   or

   2. Reactor coolant temperature change greater than 100°F per hour indication on recorder TR-1R006 on Panel 1C007 (2C007) (Reactor Building elevation 683').

   or

   3. High reactor pressure indication on Panel 1C651 (2C651) and followed by scram indication on Panel 1C651 (2C651).

   or

   4. Any indication that transient has occurred or is in progress.

GENERAL EMERGENCY

EAL# 8.4 None.

9 - LOSS OF DC POWER

UNUSUAL EVENT

EAL# 9.1 None.

ALERT

EAL# 9.2 Loss of onsite vital DC power as indicated by:

(A *and* B)
A. Less than 210 volts on the 250 VDC main distribution Panel buses, 1D652 (2D652) and 1D662 (2D662) as indicated by trouble alarms on Panel 1C651 (2C651).
and
B. Less than 105 volts on the 125 VDC main distribution buses 1D612 (2D612), 1D622 (2D622), 1D632 (2D632), and 1D642 (2D642) as indicated by trouble alarms on Panel 1C651 (2C651).

NOTE: Buses are not tripped on undervoltage condition.

SITE AREA EMERGENCY

EAL# 9.3 Loss of all vital onsite DC power sustained for greater than 15 minutes as indicated by:

(A *and* B *and* C)
A. Less than 210 volts on the 250 VDC main distribution Panel buses, 1D652 (2D652) and 1D662 (2D662) as indicated by trouble alarms on Panel 1C651 (2C651).
and
B. Less than 105 volts on the 125 VDC main distribution buses 1D612 (2D612), 1D622 (2D622), 1D632 (2D632), and 1D642 (2D642) as indicated by trouble alarms on Panel 1C651 (2C651).
and
C. The above condition exists for greater than 15 minutes.

NOTE: Buses are not tripped on undervoltage condition.

GENERAL EMERGENCY

EAL# 9.4 None.

10 - LOSS OF DECAY HEAT REMOVAL CAPABILITY

UNUSUAL EVENT

EAL# 10.1 None.

ALERT

EAL# 10.2 Inability to remove decay heat while in plant condition 4, inability to maintain the plant in cold shutdown as indicated by:

Inability to maintain reactor coolant temperature less than 200°F with the reactor mode switch in shutdown; exception is when testing per Special Test Exception TS 3.10.1 which allows maximum temperature of 212°F.

SITE AREA EMERGENCY

EAL# 10.3 Inability to remove decay heat while the plant is shutdown as indicated by:

(A *and* B *and* C)
A. Reactor Mode switch in shutdown.
and
B. Reactor Coolant System temperature greater than 200°F and rising.
and
C. Suppression Pool temperature greater than 120°F and rising.

GENERAL EMERGENCY

EAL# 10.4 Inability to remove decay heat while the plant is shutdown with possible release of large amounts of radioactivity as indicated by:

(A *and* B *and* C)
A. Reactor mode switch in shutdown.
and
B. Reactor coolant system temperature greater than 200°F and rising.
and
C. Suppression pool temperature greater than 290°F indicated on the computer output (MAT 12,13,14,15 or 16).

11 - LOSS OF REACTIVITY CONTROL

UNUSUAL EVENT

EAL# 11.1 Inadvertent Criticality as indicated by:

Unexpected increasing neutron flux indication on Panel 1C651 (2C651).

ALERT

EAL# 11.2 Failure of the Reactor Protection System or the Alternate Rod Insertion System to initiate and complete a scram that brings the reactor subcritical as indicated by:

(A *or* B) *and* (C *and* D *and* E)

A. Trip of at least one sub-channel in each trip system (RPS A and RPS B) as indicated by annunciators and trip status lights on Panel 1C651 (2C651).

or

B. Trip of both trip systems (ARI A and ARI B) as indicated by annunciators on Panel 1C601 (2C601).

and

C. Failure of control rods to insert, confirmed by the full core display indication on Panel 1C651 (2C651) or process computer indications.

and

D. Failure to bring the reactor subcritical confirmed by neutron count rate on the neutron monitoring indication on Panel 1C651 (2C651).

and

E. Reactor power >5% as indicated on Panel 1C651 (2C651).

(CONTINUED ON NEXT PAGE)

11 - LOSS OF REACTIVITY CONTROL (continued)

SITE AREA EMERGENCY

EAL# 11.3 Loss of functions needed to bring the reactor subcritical and loss of ability to bring the reactor to cold shutdown as indicated by:

(A *and* B *and* C *and* D)

A. Inability to insert sufficient control rods to bring the reactor subcritical as indicated by count rate on the neutron monitoring instrumentation on Panel 1C651 (2C651).

and

B. (1 *or* 2)
   Failure of both loops of standby liquid control to inject into the vessel indicated by:
   1. Low pump discharge pressure indication on Panel 1C601 (2C601).

   or

   2. Low flow indication on Panel 1C601 (2C601).

and

C. Reactor coolant temperature greater than 200°F, indicated on Panel 1C651 (2C651).

and

D. Reactor power >5% indicated on Panel 1C651 (2C651).

GENERAL EMERGENCY

EAL# 11.4 Loss of functions needed to bring the reactor subcritical and transient in progress that makes release of large amounts of radioactivity in a short period possible as indicated by:

(A *or* B) *and* (C *and* D)

A. Trip of at least one sub-channel in each trip system (RPS A and RPS B), indicated by annunciation or trip status lights on Panel 1C651 (2C651).

or

B. Trip of both systems (ARI A and ARI B) as indicated by annunciators on Panel 1C601 (2C601).

and

C. Loss of SLC system capability to inject, indicated by instrumentation on Panel 1C601 (2C601).

and

D. Reactor power greater than 25% of rated, indicated on Panel 1C651 (2C651).

12 - LOSS OF REACTOR VESSEL INVENTORY

UNUSUAL EVENT

EAL# 12.1 Valid initiation of an Emergency Core Cooling System (ECCS) System as indicated by:

(A *or* B)

A. Initiation of an ECCS System and low, low, low reactor water level (-129) annunciation or indication on Panel 1C651 (2C651).

or

B. Initiation of an ECCS System and High Drywell Pressure annunciation or indication on Panel 1C601 (2C601).

ALERT

EAL# 12.2 Reactor coolant system leak rate greater than 50 gpm as indicated by:

(A *or* B)

A. Drywell floor drain sump A or B Hi-Hi alarm on Panel 1C601 (2C601) and 2 or more drywell floor drain pumps continuously running as indicated on Panel 1C601 (2C601).

or

B. Other estimates of Reactor coolant system leakage indicating greater than 50 gpm.

SITE AREA EMERGENCY

EAL# 12.3 Known loss of coolant accident greater than make-up capacity as indicated by:

Water level below (and failure to return to) top of active fuel for greater than three minutes as indicated on fuel zone level indicator on Panel 1C601 (2C601).

(CONTINUED ON NEXT PAGE)

12 - LOSS OF REACTOR VESSEL INVENTORY (continued)

GENERAL EMERGENCY

EAL# 12.4.a Loss of coolant accident with possibility of imminent release of large amounts of radioactivity as indicated by:

Water level below (and failure to return to) top of active fuel for greater than 20 minutes as indicated on fuel zone level indicator on Panel 1C601 (2C601).

OR

EAL# 12.4.b Loss of Reactor Vessel inventory. Loss of 2 out of 3 fission product barriers (fuel cladding & reactor coolant pressure boundary) with potential loss of the third barrier (primary containment), as indicated by:

(A *or* B)

A. (1 *and* 2 *and* 3)
   1. High drywell pressure annunciation or indication on Panel 1C601 (2C601).

   and

   2. (a *or* b *or* c)
      a. Containment pressure exceeds 40.4 PSIG as indicated on Panel 1C601 (2C601).

      or

      b. A visual inspection of the containment indicates a potential or actual loss of containment (e.g. anchorage or penetration failure).

      or

      c. Containment isolation valve(s) fail to close as indicated by valve position indication on Panel 1C601 (2C601).

   and

   3. Reactor Vessel level drops below (and fails to return to) top of active fuel for greater than three minutes as indicated on fuel zone level indicator on Panel 1C601 (2C601).

or

B. (1 *and* 2)
   1. Failure of reactor pressure vessel isolation valves to isolate coolant break outside containment as indicated by valve position indication on Panel 1C601 (2C601) or visual inspection.

   and

   2. Reactor vessel level drops below (and fails to return to) top of active fuel for greater than three minutes as indicated on fuel zone level indicator on Panel 1C601 (2C601).

13 - NATURAL PHENOMENA

UNUSUAL EVENT

EAL# 13.1 Natural phenomenon occurrence as indicated by:

(A *or* B *or* C)
A. Tornado impact on site.
or
B. Hurricane impact on site.
or
C. Earthquake detected by seismic instrumentation systems on Panel 0C696.

ALERT

EAL# 13.2 Natural Phenomenon Occurrence as indicated by:

(A *or* B *or* C)
A. Tornado with reported wind velocities greater than 200 mph impacting on site.*
or
B. Reported hurricane or sustained winds greater than 70 mph.*
or
C. Earthquake at greater than operating basis earthquake (OBE) levels as indicated on Panel 0C696.

* **Telephone numbers for the National Weather Bureau are located in the Emergency Telephone Directory.**

(CONTINUED ON NEXT PAGE)

13 - NATURAL PHENOMENA (continued)

SITE AREA EMERGENCY

EAL# 13.3 Severe natural phenomenon occurrence, with plant not in cold shutdown, as indicated by:

(A *and* B)

A. Reactor Coolant Temperature greater than 200°F as indicated on Panel 1C651 (2C651).

and

B. (1 *or* 2 *or* 3)
   1. Reported hurricane or sustained winds greater than 80 mph.*

   or

   2. Earthquake with greater than Safe Shutdown Earthquake (SSE) levels as indicated on Panel 0C696.

   or

   3. Tornado with reported wind velocities greater than 220 mph impacting on site.*

GENERAL EMERGENCY

EAL# 13.4 None.

* **Telephone numbers for the National Weather Bureau are located in the Emergency Telephone Directory.**

14 - ONSITE FIRE/EXPLOSION

UNUSUAL EVENT

EAL# 14.1 Significant fire within the plant as indicated by:

(A *and* B)
A. Activation of fire brigade by Shift Supervisor.
and
B. Duration of fire longer than 15 minutes after time of notification.

OR

Explosion inside security protected area, with no significant damage to station facilities, as indicated by:

Visual observation or notification received by control room operator and Shift Supervisor evaluation.

ALERT

EAL# 14.2 On-site Fire/Explosion as indicated by:

(A *or* B)
A. Fire lasting more than 15 minutes and fire is in the vicinity of equipment required for safe shutdown of the plant and the fire is damaging or is threatening to damage the equipment due to heat, smoke, flame, or other hazard.
or
B. (1 *and* 2)
Explosion damage to facility affecting plant operation as determined by:
1. Direct observation or notification received by control room operator.
and
2. Shift Supervisor observation.

(CONTINUED ON NEXT PAGE)

14 - ONSITE FIRE/EXPLOSION (continued)

SITE AREA EMERGENCY

EAL# 14.3 Damage to safe shutdown equipment due to fire or explosion has occurred when plant is not in cold shutdown, and damage is causing or threatens malfunction of equipment required for safe shutdown of the plant as determined by:

(A *and* B *and* C)
A. Direct observation or notification received by control room operator.
and
B. Shift Supervisor evaluation.
and
C. Reactor Coolant Temperature greater than 200°F as indicated on Panel 1C651 (2C651).

GENERAL EMERGENCY

EAL# 14.4 None.

15 - RADIOLOGICAL EFFLUENT

UNUSUAL EVENT

EAL# 15.1 Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 2 times the Technical Requirements Manual limits for 60 minutes or longer.

EAL# 15.1 (1 or 2 or 3)

1. Valid Noble Gas vent stack monitor reading(s) that exceeds a total site release rate of 2.0E+6 µCi/min and that is sustained for 60 minutes or longer.

OR

2. Confirmed sample analyses for airborne releases indicates total site release rates at the site boundary with a release duration of 60 minutes or longer resulting in dose rates of:

   a) Noble gases >1000 mrem/year whole body, **or**
   b) Noble gases >6000 mrem/year skin, **or**
   c) I-131, I-133, H-3, and particulates with half lives >8 days >3000 mrem/year to any organ (inhalation pathways only).

OR

3. Confirmed sample analyses for liquid releases indicates concentrations with a release duration of 60 minutes or longer in excess of two time the Technical Requirements Manual liquid effluent limits.

(CONTINUED ON NEXT PAGE)

15 - RADIOLOGICAL EFFLUENT (continued)

ALERT

EAL# 15.2 Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times Technical Requirement Manual limits for 15 minutes or longer.

EAL# 15.2 (1 or 2 or 3)

1. Valid Noble Gas vent stack monitor reading(s) that exceeds a total site release rate of 2E+8 µCi/min and that is sustained for 15 minutes or longer.

OR

2 Confirmed sample analyses for airborne releases indicates total site release rates at the site boundary for 15 minutes or longer resulting in dose rates of:

   a) Noble gases >1.0E+5 mrem/year whole body, **or**
   b) Noble gases >6.0E+5 mrem/year skin, **or**
   c) I-131, I-133, H-3, and particulates with half-lives >8 days >3.0E+5 mrem/year to any organ (inhalation pathways only).

OR

3. Confirmed sample analyses for liquid releases indicates concentrations in excess of 200 times the Technical Requirements Manual liquid effluent limits for 15 minutes or longer.

(CONTINUED ON NEXT PAGE)

15 - RADIOLOGICAL EFFLUENT (continued)

SITE AREA EMERGENCY

EAL# 15.3 Dose at the Emergency Plan boundary resulting from an actual or imminent release of gaseous radioactivity exceeds 100 mrem whole body TEDE or 500 mrem child thyroid CDE for the actual or projected duration of release.

EAL# 15.3 (1 or 2 or 3 or 4 or 5)

1. Valid Noble Gas vent stack monitor readings(s) that exceeds a total release rate 6.2E8 µCi/min for greater than 15 minutes and Dose Projections are not available.

   Note: If the required dose projection cannot be completed within the 15 minute period, then the declaration must be made based on a valid sustained monitor reading(s).

OR

2. Valid dose assessment using actual meteorology indicates projected doses greater than 100 mrem whole body TEDE or 500 mrem child thyroid CDE at or beyond the EPB.

OR

3. A valid reading sustained for 15 minutes or longer on the RMS perimeter radiation monitoring system greater than 100 mR/hr.

OR

4. Field survey results indicate Emergency Planning boundary dose rates exceeding 100 mR/hr expected to continue for more than one hour.

OR

5. Analyses of field survey samples indicate child thyroid dose commitment at the Emergency Planning Boundary of 500 mrem for one hour of inhalation.

(CONTINUED ON NEXT PAGE)

15 - RADIOLOGICAL EFFLUENT (continued)

GENERAL EMERGENCY

EAL# 15.4 Dose at the Emergency Planning Boundary resulting from an actual or imminent release of gaseous radioactivity exceeds 1000 mrem whole body TEDE or 5000 mrem child thyroid CDE for the actual or projected duration of the release using actual meteorology.

EAL# 15.4 (1 or 2 or 3 or 4 or 5)

1. Valid Noble Gas vent stack monitor readings(s) that exceed a total release rate of 6.2E9 µCi/min for greater that 15 minutes and Dose Projections are not available.

   Note: If the required dose projection cannot be completed within the 15 minute period, then the declaration must be made based on a valid sustained monitor reading(s).

OR

2. Valid dose assessment using actual meteorology indicates projected doses greater than 1000 mrem whole body TEDE or 5000 mrem child thyroid CDE at or beyond the EPB.

OR

3. A valid reading sustained for 15 minutes or longer on the RMS perimeter radiation monitoring system greater than 1000 mR/hr.

OR

4. Field survey results indicate Emergency Planning Boundary dose rates exceeding 1000 mR/hr expected to continue for more than one hour.

OR

5. Analyses of field survey samples indicate child thyroid dose commitment at the Emergency Planning Boundary of 5000 mrem for one hour of inhalation.

16 - SECURITY EVENT

UNUSUAL EVENT

EAL# 16.1 Security threat or attempted entry or attempted sabotage as indicated by:

(A *or* B *or* C)

A. A report from Security of a security threat, attempted entry, or attempted sabotage of the owner controlled area adjacent to the site.

or

B. Any attempted act of sabotage which is deemed legitimate in the judgment of the SHIFT SUPERVISOR/EMERGENCY DIRECTOR, and affects plant operation.

or

C. A site specific credible security threat notification.

ALERT

EAL# 16.2 Ongoing Security Compromise as indicated by:

(A *or* B)

A. A report from Security that a security compromise is at the site but no penetration of protected areas has occurred.

or

B. Any act of sabotage which results in an actual or potential substantial degradation of the level of safety of the plant as judged by the SHIFT SUPERVISOR/EMERGENCY DIRECTOR.

SITE AREA EMERGENCY

EAL# 16.3 An ongoing adversary event threatens imminent loss of physical control of plant as indicated by:

(A *or* B)

A. Report from Security that the security of the plant vital area is threatened by unauthorized (forcible) entry into the protected area.

or

B. Any act of sabotage which results in actual or likely major failures of plant functions needed for protection of the public as judged by the SHIFT SUPERVISOR/EMERGENCY DIRECTOR.

(CONTINUED ON NEXT PAGE)

16 - SECURITY EVENT (continued)

GENERAL EMERGENCY

EAL# 16.4 Loss of physical control of facilities as indicated by:

(A *or* B)

A. Report from Security that a loss of physical control of plant vital areas has occurred.

or

B. Any act of sabotage which results in imminent significant cladding failure or fuel melting with a potential for loss of containment integrity or the potential for release of significant amounts of radioactivity in a short time as judged by the SHIFT SUPERVISOR/EMERGENCY DIRECTOR.

17 - SPENT FUEL RELATED INCIDENT

UNUSUAL EVENT

EAL# 17.1 Unanticipated or unplanned concentrations of airborne activity exist in normally accessible areas, which is not due to planned maintenance activities, as indicated by:

Concentrations exceed 500 times the DAC values of 10CFR20 Appendix B, Table I values for a single isotope, or full multiple isotopes where

$$\frac{C_A}{DAC_A}+\frac{C_B}{DAC_B}+\frac{C_C}{DAC_C}\ldots\frac{C_N}{DAC_N}\geq 500$$

ALERT

EAL# 17.2 Unexpected in-plant high radiation levels or airborne contamination which indicates a severe fuel handling accident as indicated by:

Refuel floor area radiation monitor reading 1000 times normal annunciation on Panel 1C601 (2C601) or indication on Panel 1C600 (2C600).

(CONTINUED ON NEXT PAGE)

17 - SPENT FUEL RELATED INCIDENT (continued)

SITE AREA EMERGENCY

EAL# 17.3.a Major damage to irradiated fuel with actual or clear potential for significant release of radioactive material to the environment as indicated by:

(A *and* B)
A. Dropping, bumping, or otherwise rough handling of a new **OR** irradiated fuel bundle with irradiated fuel in the pool.
and
B. (1 *or* 2)
1. Refueling floor area radiation monitor reading 1000 times normal annunciation on Panel 1C601 (2C601) or indication on Panel 1C600 (2C600).
or
2. Reactor Building vent stack monitoring system high radiation annunciation or indication on Panel 0C630 or 0C677.

OR
EAL# 17.3.b Damage to irradiated fuel due to uncontrolled decrease in the fuel pool level to below the level of the fuel as indicated by:

(A *and* B)
A. (1 *or* 2)
1. Uncovering of irradiated fuel confirmation by verification of significant leakage from spent fuel pool.
or
2. Visual observation of water level below irradiated fuel in the pool.
and
B. (1 *or* 2)
1. Refueling floor area radiation monitor annunciation on Panel 1C651 (2C651) or indication on Panel 1C600 (2C600).
or
2. Reactor Building vent stack monitoring system high radiation annunciation or indication on Panel 0C630 or 0C677.

GENERAL EMERGENCY

EAL# 17.4 None.

18 - STEAM LINE BREAK

UNUSUAL EVENT

EAL# 18.1 None.

ALERT

EAL# 18.2 MSIV malfunction causing leakage as indicated by:

(A *and* B)
A. Valid MSIV closure signal or indication on Panel 1C601 (2C601).
and
B. (1 *or* 2)
1. Valid Main Steam Line flow indication on Panel 1C652 (2C652).
or
2. Valid Main Steam Line radiation indication on Panel 1C600 (2C600).

(CONTINUED ON NEXT PAGE)

18 - STEAM LINE BREAK (continued)

SITE AREA EMERGENCY

EAL# 18.3 Steam line break occurs outside of containment without isolation as indicated by:

(A *or* B *or* C *or* D)

A. (1 *and* 2)
   1. Failure of both MSIVs in the line with the leak to close as indicated by position indication on Panel 1C601 (2C601).

   and

   2. (a *or* b)
      a. High MSL flow annunciation on Panel 1C601 (2C601) or indication on Panel 1C652 (2C652).

      or

      b. Other indication of main steam leakage outside containment.

or

B. (1 *and* 2)
   1. Failure of RCIC steam isolation valves HV-F008 and HV-F007 to close as indicated on Panel 1C601 (2C601).

   and

   2. (a *or* b *or* c *or* d *or* e *or* f)
      a. RCIC steamline pipe routing area high temperature annunciation on Panel 1C601 (2C601), or indication on Panel 1C614 (2C614).

      or

      b. RCIC equipment area high temperature annunciation on Panel 1C601 (2C601) or indication on Panel 1C614 (2C614).

      or

      c. RCIC steamline high flow annunciation on Panel 1C601 (2C601).

      or

      d. RCIC steamline tunnel ventilation high delta temperature annunciation on Panel 1C601 (2C601).

      or

      e. RCIC turbine exhaust diaphragm high pressure annunciation on Panel 1C601 (2C601).

      or

      f. Other indication of steam leakage from the RCIC system.

(CONTINUED ON NEXT PAGE)

18 - STEAM LINE BREAK (continued)

SITE AREA EMERGENCY (continued)

or

C. (1 *and* 2)
   1. Failure of HPCI steam isolation valves HV-F002 and HV-F003 to close as indicated by position indicator on Panel 1C601 (2C601).

   and

   2. (a *or* b *or* c *or* d *or* e *or* f)
      a. HPCI steamline pipe routing area high temperature annunciation on Panel 1C601 (2C601), or indication on Panel 1C614 (2C614).

      or

      b. HPCI equipment area high temperature annunciation on Panel 1C601 (2C601) or indication on Panel 1C614 (2C614).

      or

      c. HPCI steamline high flow annunciation on Panel 1C601 (2C601).

      or

      d. HPCI steamline tunnel ventilation high delta temperature annunciation on Panel 1C601 (2C601).

      or

      e. HPCI turbine exhaust diaphragm high pressure annunciation on Panel 1C601 (2C601).

      or

      f. Other indication of steam leakage from the HPCI system.

or

D. Any other un-isolatable steam line breaks.

GENERAL EMERGENCY

EAL# 18.4 None.

19 - TOXIC/FLAMMABLE GASES

UNUSUAL EVENT

EAL# 19.1 Nearby or onsite release of potentially harmful quantifies of toxic or flammable material as indicated by:

Visual observation or notification received by the control room operator.

ALERT

EAL# 19.2 Entry of toxic or flammable gases into the facility, with subsequent habitability problem as indicated by:

Visual observation, direct measurement, or notification received by the control room operator.

SITE AREA EMERGENCY

EAL# 19.3 Toxic or flammable gases enter vital areas, restricting access and restricted access constitutes a safety problem, as determined by:

(A *and* B)
A. Shift Supervisor's evaluation.
and
B. Visual observation, direct measurement, or notification received by control room operator.

GENERAL EMERGENCY

EAL# 19.4 None.

20 - TECHNICAL SPECIFICATION SAFETY LIMIT

UNUSUAL EVENT

EAL# 20.1 Abnormal occurrences which result in operator complying with any of the Technical Specification SAFETY LIMIT ACTION statements indicated by:

(A *or* B *or* C *or* D)

A. Exceeding THERMAL POWER, low pressure or low flow safety limit 2.1.1.1.

or

B. Exceeding THERMAL POWER, high pressure and high flow safety limit 2.1.1.2.

or

C. Exceeding REACTOR VESSEL WATER LEVEL safety limit 2.1.1.3.

or

D. Exceeding REACTOR COOLANT SYSTEM PRESSURE safety limit 2.1.2.

ALERT

EAL# 20.2 None.

SITE AREA EMERGENCY

EAL# 20.3 None.

GENERAL EMERGENCY

EAL# 20.4 None.

21 – DRY FUEL STORAGE

UNUSUAL EVENT

EAL# 21.1.a. Situations are occurring or have occurred during the transport of the irradiated spent fuel to the onsite storage facility, which jeopardize the integrity of the spent fuel or its container as indicated by:

(A *or* B)

A. Radiological readings exceed 2 R/hour at the external surface of any transfer cask or horizontal storage module.

or

B. Radiological readings exceed 1 R/hour one foot away from the external surface of any transfer cask or horizontal storage module.

OR

EAL# 21.1.b. Situations are occurring or have occurred at the irradiated spent fuel storage facility, which jeopardize the integrity of the dry cask storage system as indicated by:

(A *or* B)

A. Radiological readings exceed 2 R/hour at the external surface of any transfer cask or horizontal storage module.

or

B. Radiological readings exceed 1 R/hour one foot away from the external surface of any transfer cask or horizontal storage module.

ALERT

EAL# 21.2 None.

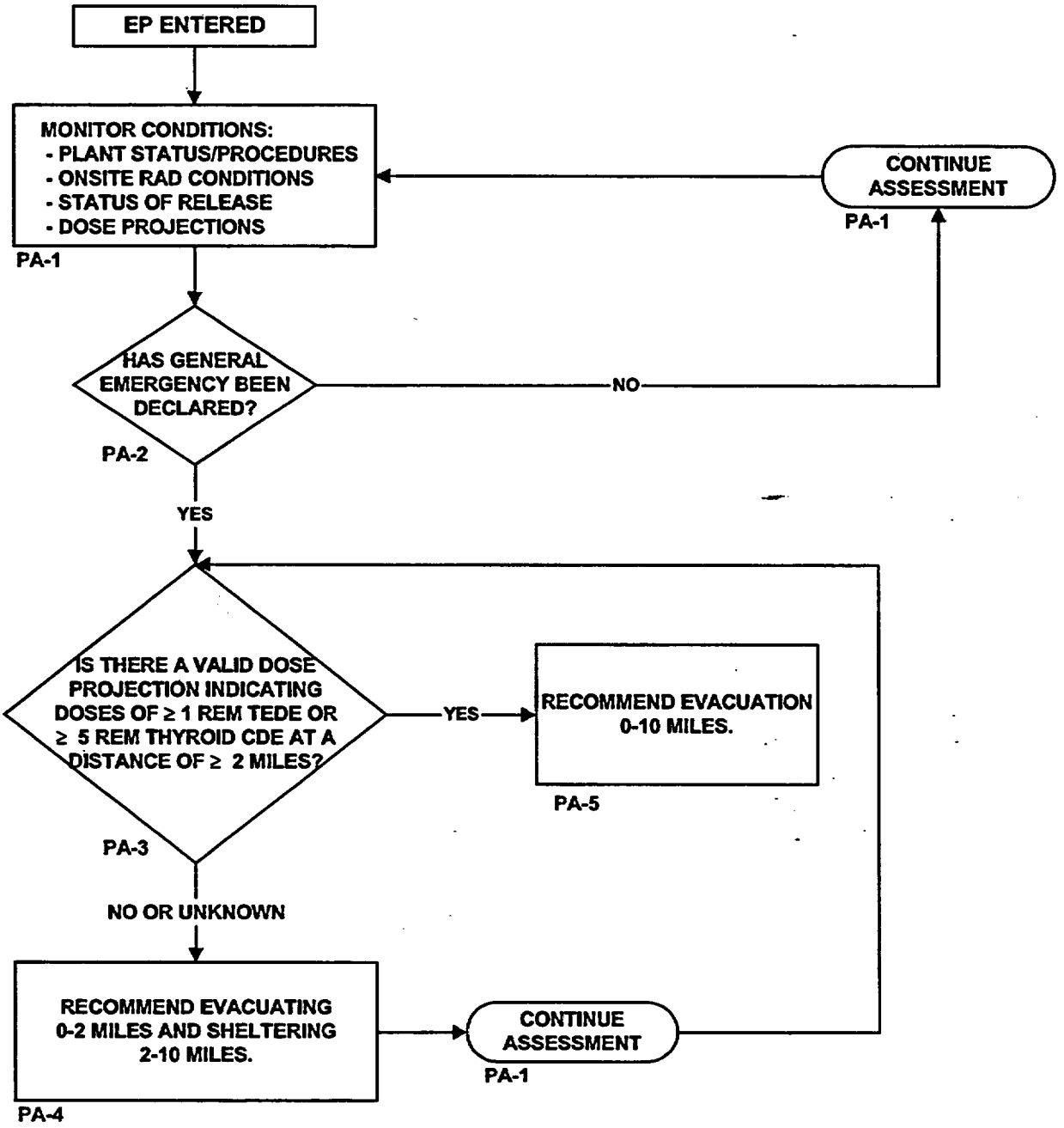
SITE AREA EMERGENCY

EAL# 21.3 None.

GENERAL EMERGENCY

EAL# 21.4 None

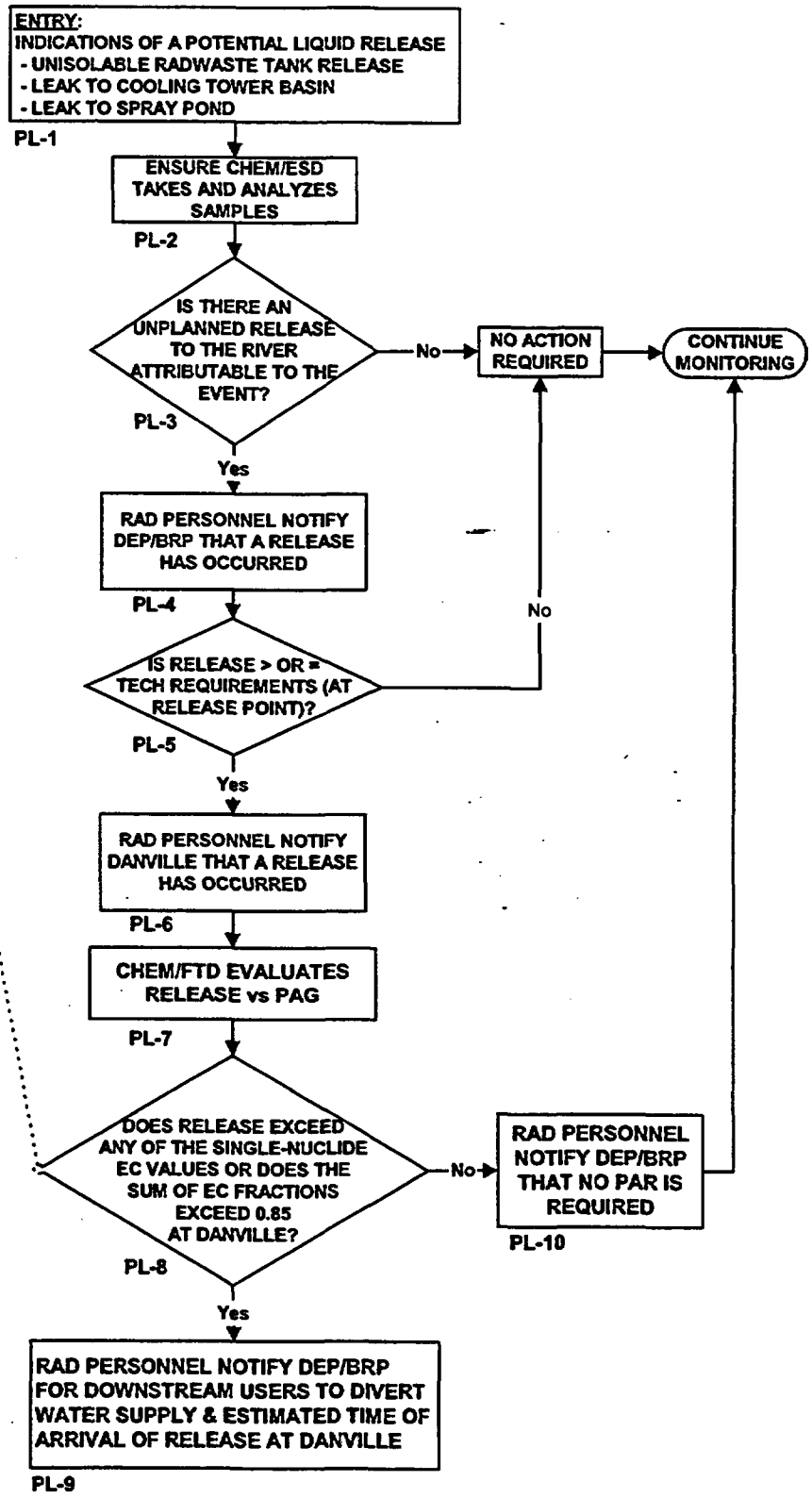
PAR AIRBORNE RELEASES



NOTES:

1. PA-# CAN BE USED TO REFER TO PROCEDURE STEPS FOR MORE DETAILED INFORMATION ON THE ACTION TO BE TAKEN.
2. DOSE PROJECTIONS DO NOT INCLUDE DOSE ALREADY RECEIVED.
3. TEDE - WHOLE BODY (TEDE) IS THE SUM OF EFFECTIVE DOSE EQUIVALENT RESULTING FROM EXPOSURE TO EXTERNAL SOURCES. THE COMMITTED EFFECTIVE DOSE EQUIVALENT (CEDE) FROM ALL SIGNIFICANT INHALATION PATHWAYS AND THE DOSE DUE TO GROUND DEPOSITION.
4. CDE - COMMITTED DOSE EQUIVALENT TO THE CHILD THYROID.

PAR LIQUID RELEASES



RADIONUCLIDE	EC Values (µCi/ml)
Co-60	$3E^{-4}$
Sr-91	$2E^{-5}$
Mo-99	$2E^{-5}$
Te-132	$9E^{-6}$
I-131	$1E^{-6}$
I-133	$7E^{-6}$
I-134	$4E^{-4}$
I-135	$3E^{-5}$
Cs-134	$9E^{-7}$
Cs-136	$6E^{-6}$
Cs-137	$1E^{-6}$
Ba-139	$2E^{-4}$
Ba-140	$8E^{-6}$
Ba-141	$3E^{-4}$
Np-239	$2E^{-5}$

NOTES:
1. PL-# CAN BE USED TO REFER TO PROCEDURE STEPS FOR MORE DETAILED INFORMATION ON THE ACTION TO BE TAKEN.
2. CALLS TO DANVILLE ARE COURTESY INFORMATION CALLS ONLY. PROTECTIVE ACTION RECOMMENDATION CALLS MUST BE MADE BY DEP/BRP.

PUBLIC PROTECTIVE ACTION RECOMMENDATION GUIDE

AIRBORNE RELEASES

☐ PA-1 MONITOR CONDITIONS FOR PAR APPLICATION

The following conditions should be continuously evaluated to determine if a PAR should be implemented or changed:

- Plant status and prognosis for changes in conditions
- Onsite radiological conditions
- Status of actual or potential radioactive releases
- Offsite dose projections or actual offsite radiological conditions
- Escalation in Emergency Classification (i.e., General)

(Go to PA-2)

PA-2 HAS A GENERAL EMERGENCY BEEN DECLARED?

☐ **YES —** If a GENERAL EMERGENCY has been declared, a PAR must be made within 15 minutes of the emergency declaration. The PAR requirement is found in NUREG-0654. **(Go to PA-3)**

☐ **NO —** If a GENERAL EMERGENCY has not been declared, continue to monitor plant status, parameter trends, and prognosis for termination or escalation of the event. **(Go to PA-1)**

PA-3 IS THERE A VALID DOSE PROJECTION INDICATING DOSES OF ≥ 1 REM TEDE OR ≥ 5 REM CDE CHILD THYROID AT A DISTANCE OF > 2 MILES?

☐ **YES —** If the projected doses at 2 miles are ≥ 1 REM TEDE or ≥ 5 REM CDE child thyroid, then full evacuation (0-10 miles) is recommended. **(Go to PA-5)**

☐ **NO/UNKNOWN — (Go to PA-4)**

☐ PA-4 RECOMMEND EVACUATION 0-2 MILES; SHELTER 2-10 MILES

Limited Evacuation (0-2 miles) and sheltering is appropriate for events that are significant enough to cause a General Emergency classification and dose projections are low, unknown, or below full evacuation guidelines.

☐ PA-5 EVACUATE 0-10 MILES

Full evacuation of members of the general public is recommended at this point based on the emergency classification and dose projections.

LIQUID

☐ PL-1 ENTRY

This section is entered when there are indications of a potential unplanned radioactive liquid release.

Indications of potential unplanned releases include:

- an unisolable radwaste tank release
- leaks to cooling tower basin
- leak to spray pond

(Go to PL-2)

☐ PL-2 CHEMISTRY/ENVIRONMENTAL SAMPLING DIRECTOR (ESD) TAKES AND ANALYZES SAMPLE

(Go to PL-3)

PL-3 IS THERE AN UNPLANNED RELEASE TO THE RIVER?

☐ **YES —** An unplanned release to the river has occurred when event-related radioactive materials are released to the river that are not controlled by the release methodologies described in the ODCM and applicable Chemistry procedures.

(Go to PL-4)

☐ **NO —** If there is no unplanned release to the river, then no notifications are required and monitoring should continue.

☐ PL-4 RAD PERSONNEL NOTIFY DEP/BRP THAT A RELEASE HAS OCCURRED

Depending on which facility is activated, the notification to BRP will be made by the RPC (TSC), Dose Assessment Supervisor, or Radiological Liaison at the EOF.

DO NOT MAKE ANY PROTECTIVE ACTION RECOMMENDATIONS AT THIS TIME.

(Go to PL-5)

LIQUID (CONT'D)

PL-5 IS RELEASE ≥ TECHNICAL REQUIREMENTS LIMITS (AT THE RELEASE POINT)?

☐ **YES —** Releases are at or greater than Technical Requirements limits when Chemistry determines that the limits are exceeded based on methodologies described in the ODCM and applicable Chemistry procedures.

(Go to PL-6)

☐ **NO —** If the release is < Technical Requirements limits, then no further notifications are required and monitoring should continue.

☐ PL-6 RAD PERSONNEL NOTIFY DANVILLE THAT A RELEASE HAS OCCURRED

Depending on which facility is activated, the notification to Danville will be made by the RPC (TSC), Dose Assessment Supervisor, or Radiological Liaison at the EOF.

DO NOT MAKE ANY PROTECTIVE ACTION RECOMMENDATIONS AT THIS TIME.

(Go to PL-7)

☐ PL-7 CHEM/FTD EVALUATES RELEASE VERSUS PAGs

The results of the sample analysis are compared to the PAGs for radionuclides in drinking water. The analysis calculates the expected concentration at Danville, taking into account the dilution afforded by the river.

PL-8 DOES RELEASE EXCEED PAGs (AT DANVILLE)?

☐ **YES —** If a single isotope exceeds its effluent concentration (EC) value or the sum of EC fractions exceeds 0.85, then a protective action recommendation should be made for downstream water users (e.g., Danville) to **DIVERT DRINKING WATER** supply to a backup supply or terminate user intake until the release has passed.

(Go to PL-9)

☐ **NO —** If the PAGs are not exceeded, monitoring should continue and the State should be notified that no PAR for the liquid release is required.

(Go to PL-10)

LIQUID (CONT'D)

☐ PL-9 RAD PERSONNEL NOTIFY DEP/BRP OF PAR

Depending on which facility is activated, the PAR notification to DEP/BRP will be made by the RPC (TSC), Dose Assessment Supervisor, or Radiological Liaison at the EOF. **The PAR FORM shall be used to document the PAR.**

DO NOT COMMUNICATE THE PROTECTIVE ACTION RECOMMENDATION TO DANVILLE. THE DEP/BRP IS RESPONSIBLE FOR THIS COMMUNICATION AND ANY COMMUNICATION TO OTHER DRINKING WATER SUPPLIERS OR WATER USERS.

☐ PL-10 RAD PERSONNEL NOTIFY DEP/BRP

No PAR is required. Depending on which facility is activated, the RPC (TSC), Dose Assessment Supervisor, or Radiological Liaison at the EOF shall notify DEP/BRP that no PAR is required.

PPL EMERGENCY PERSONNEL DOSE ASSESSMENT AND PROTECTIVE ACTION RECOMMENDATION (PAR) GUIDE

TABLE OF CONTENTS

SECTION		PAGE
1.0	EMERGENCY DOSE LIMITS	2
2.0	EMERGENCY EXPOSURE/ACCIDENTAL OVEREXPOSURE	3
3.0	PROTECTIVE ACTIONS	3
4.0	EMERGENCY EXPOSURE NOTIFICATION AND HEALTH CONSEQUENCE INVESTIGATION	7
EMERGENCY EXPOSURE EXTENSIONS		8
HEALTH PHYSICS AND ALARA CONSIDERATIONS DURING AN EMERGENCY		12

NOTE: **EMERGENCY EXPOSURE EXTENSION REQUEST FORM** and **POTASSIUM IODIDE TRACKING FORM** can be found as Forms EP-AD-000-135 and EP-AD-000-141, respectively.

PPL EMERGENCY PERSONNEL DOSE ASSESSMENT AND PROTECTIVE ACTION RECOMMENDATION (PAR) GUIDE

CHECK ☐

1.0 Limits for **EMERGENCY** doses.

☐ 1.1 An **EMERGENCY DOSE AUTHORIZATION** (see EMERGENCY EXPOSURE EXTENSIONS) may be granted in order to protect facilities, and or equipment to substantially limit the escape of radioactive effluents or control fires. The maximum planned doses are:

1.1.1 Whole body (TEDE)[1] dose shall not exceed 10 rem.

1.1.2 Dose to any organ (CDE)[2], including the skin and extremity (SDE)[3], shall not exceed 100 rem.

1.1.3 Dose to the lens of the eye shall not exceed 30 rem (LDE)[4].

☐ 1.2 An **EMERGENCY** dose authorization may be granted for life-saving actions or protection of large populations. The maximum doses are:

1.2.1 Planned whole body (TEDE)[1] doses shall not exceed 25 rem.

1.2.2 Planned dose to any organ (CDE)[2], including skin and extremity doses, shall not exceed 250 rem.

1.2.3 Dose to the lens of the eye shall not exceed 75 rem (LDE)[4].

1.3 **RARE** situations may occur in which a dose **GREATER THAN** those specified in SECTION 1.2 above for emergency dose would be unavoidable to carry out a lifesaving operation or to avoid extensive exposure of large populations. It is not possible to prejudge the risk that one should be allowed to take to save lives of others, therefore no upper limit has been established.

(1) The sum of the Effective Dose Equivalent resulting from the exposure to external sources and the Committed Effective Dose Equivalent incurred from all significant inhalation pathways during the early phase.

(2) The Committed Dose Equivalent to the thyroid from radioiodine.

(3) Shallow Dose Equivalent.

(4) Lens Dose Equivalent.

PPL EMERGENCY PERSONNEL DOSE ASSESSMENT AND PROTECTIVE ACTION RECOMMENDATION (PAR) GUIDE

CHECK ☐

2.0 For any **EMERGENCY EXPOSURE OR ACCIDENTAL OVEREXPOSURE**, the assessment actions in step 2 of the EMERGENCY EXPOSURE EXTENSIONS must be performed.

3.0 **PROTECTIVE ACTIONS**

☐ 3.1 Potassium Iodide

3.1.1 For thyroid doses that are strongly expected to exceed 10 rem (CDE) [2], ingestion of a KI dose of 130 mg (100mg - iodine) should be recommended, except as noted in paragraph 3.1.2, to personnel whose emergency assignment or qualifications do not allow other protective measures to be taken (e.g. respiratory protection, evacuation, relocation, etc.) to maintain the dose to the thyroid at less than 10 rem.

NOTE: HHS/FDA guidance is that adults over 40 years of age need take KI only in the case of a projected large internal radiation dose to the thyroid (> 500 rem) to prevent hypothyroidism; the guidance is 10 rem for adults over age 18 to age 40.

3.1.2 KI should not be administered to any emergency worker who:

a. does not concur with its use, or

b. has a known allergic reaction to iodine and/or foods containing iodine such as shellfish, or

c. has been directed by their Physician or Pharmacist to avoid ingestion of iodine and/or foods containing iodine such as shellfish.

[2] The Committed Dose Equivalent to the thyroid from radioiodine.

PPL EMERGENCY PERSONNEL DOSE ASSESSMENT AND PROTECTIVE ACTION RECOMMENDATION (PAR) GUIDE

CHECK ☐

3.1.3 Onsite issuance of KI for iodine prophylaxis requires the approval of the **EMERGENCY DIRECTOR**. Issuance to EOF and FIELD EMERGENCY MONITORING/SAMPLING TEAM personnel requires the approval of the **RECOVERY MANAGER** when the EOF has relieved the TSC of emergency management activities. The **EMERGENCY DIRECTOR** will approve issuance prior to that time. These approvals must be documented on the **POTASSIUM IODIDE (KI) TRACKING FORM.**

3.1.4 Unless the EMERGENCY DIRECTOR or RECOVERY MANAGER instructs personnel to do otherwise, the KI tablets should generally be taken as soon as possible after thyroid dose exceeding 10 rem CDE [2] is projected.

NOTE: Stable iodine (KI) is most effective when administered immediately prior to exposure to radioiodine. Significant blockage of the thyroid dose can be provided by administration within a few hours after uptake of radioiodine.

3.15 In the event a significant exposure to the thyroid is projected to continue over a period of several days the CONSULTING RADIOLOGICAL PHYSICIAN should be requested to provide a recommended KI dosage for subsequent KI usage. (See Emergency Telephone Directory for telephone number.)

3.16 Until input/advice from the CONSULTING RADIOLOGICAL PHYSICIAN is available, a quarter of a tablet should be taken on days of exposure that follow the day on which the initial full tablet dose (130 mg) was taken.

3.17 If a worker expresses concern with the use of KI and/or is unsure if it will interact with his/her current medication,

a. the CONSULTING RADIOLOGICAL PHYSICIAN should be requested to provide input/advice to the individual concerning the administration and cessation of KI use prior to its ingestion by the individual. (See Emergency Telephone Directory for telephone number.)

[2] The Committed Dose Equivalent to the thyroid from radioiodine.

PPL EMERGENCY PERSONNEL DOSE ASSESSMENT AND PROTECTIVE ACTION RECOMMENDATION (PAR) GUIDE

CHECK ☐

b. control and track workers' dose, to limit their projected thyroid dose to 40 rem total organ dose. As warranted, ensure adjusted RWP controls and dose extensions are in place.

3.1.8 Should the projected dose to the thyroid not exceed 10 rem CDE [2] but the worker expresses the strong desire to use KI, the worker may do so at his/her own risk. In such case, the RPC or DASU as appropriate will inform the worker of the potential risks and benefits as described below and will recommend the person contact the CONSULTING RADIOLOGICAL PHYSICIAN for further guidance.

NOTE: Radiation exposure to the thyroid glands of adults does not appear to lead to cancer but has been shown to cause other deterministic effects (such as hypothyroidism resulting from thyroid ablation) from very high radiation doses to the thyroid.

For persons over 40 years of age, HHS/FDA recommends KI only for projected doses to the thyroid of above 500 rem, to prevent hypothyroidism.

The National Council on Radiation Protection and Measurement (NCRP Report No. 55) concludes that the risk of adverse effects from use of KI is on the order of 5 in 10 million.

In some cases, hyperthyroidism (excessive functional activity of the thyroid gland) is possible. Those most at risk are patients with thyroid pathologies. This is most common in patients with goiter. This complication can be serious when the person also has heart disease. The risk of adverse effects is higher in adults of age 45 years and older, due to the frequency of diagnosed and sub-clinical thyroid disease and the use of certain prescription pharmaceuticals that would lead to a drug interaction.

[2] The Committed Dose Equivalent to the thyroid from radioiodine.

PPL EMERGENCY PERSONNEL DOSE ASSESSMENT AND PROTECTIVE ACTION RECOMMENDATION (PAR) GUIDE

CHECK ☐

HHS/FDA observes that short-term administration of KI at thyroid blocking doses is safe. The risks of stable iodine administration include sialadenitis (an inflammation of the salivary gland), gastrointestinal disturbances, allergic reactions, and minor rashes. Other risks may apply if repeated doses of KI are ingested.

3.1.9 If the individual states the intent to take KI absent a projected dose of 10 rem (CDE)[2] or more, the RPC or DASU will document in his/her logbook that individual's intent, that information on risks and benefits was described to the individual, and the statement that the individual was notified that ingestion was at the individual's own risk.

3.1.10 For an injured and/or contaminated worker sent to a hospital for treatment, the patient will be under the care of the attending physician. As such, plant procedures no longer apply and KI issuance will be at the discretion of the attending physician. The physician can rely on a senior Health Physics Technician Level II or Health Physics Management to provide the in-plant radiological data on which to base their decision.

☐ 3.2 Protective measures should be implemented for EOF personnel at the direction of the **DOSE ASSESSMENT SUPERVISOR**, within the bounds of RWPs #8001 and #8002. Consultation with and approval by the RPC is needed for RWP revisions.

☐ 3.3 Exposures to members of local offsite support groups, (ambulance workers, fire fighters) shall not exceed 500 mrem (TEDE)[1] for the performance of support duties on the site of the Susquehanna SES.

(2) The Committed Dose Equivalent to the thyroid from radioiodine.

(1) The sum of the Effective Dose Equivalent resulting from the exposure to external sources and the Committed Effective Dose Equivalent incurred from all significant inhalation pathways during the early phase.

PPL EMERGENCY PERSONNEL DOSE ASSESSMENT AND PROTECTIVE ACTION RECOMMENDATION (PAR) GUIDE

CHECK ☐

4.0 **EMERGENCY EXPOSURE NOTIFICATIONS AND A HEALTH CONSEQUENCE INVESTIGATION** must be conducted for any emergency exposure as outlined in step 6 of the Emergency Exposure Extensions.

NOTE: Reference for section 3.1 are as follows:

1. HHS/FDA Guidance-Potassium Iodide as a Thyroid Blocking Agent in Radiation Emergencies, December 2001.

2. LeGuen, B. et.al., French Approach for the Distribution of Iodine Tablets in the Vicinity of Nuclear Power Plants, Health Physics 2002.

3. PEMA, Report to the REPAC from the Potassium Iodide Working Group, January 2001.

EMERGENCY EXPOSURE EXTENSIONS

CHECK ☐

1. Fill out the attached **EMERGENCY EXPOSURE EXTENSION REQUEST** Form.

2. Review the following factors:

   ☐ Rescue personnel should be volunteers or professional rescuers.

   ☐ Other considerations being equal (e.g., skill, potential need for person on another mission) personnel above the age of 45 are preferred.

   ☐ Rescue personnel should be familiar and briefed with the consequences of exposure.

   ☐ Women capable of reproduction should not take part in an effort requiring EMERGENCY exposure.

   ☐ Use of personnel with high lifetime cumulative exposure should be discouraged.

   ☐ All reasonable measures must be taken to control contamination and internal exposure.

   ☐ Exposure under these conditions shall be limited to once in a lifetime.

   ☐ For exposures greater than 25 rem whole body (TEDE), the persons undertaking any emergency operation in which the dose will exceed 25 rem to the whole body (TEDE) should do so only on a voluntary basis and with full awareness of the risks involved, including the numerical levels of dose at which acute effects of radiation will be incurred and numerical estimates of the risk of delayed effects. See the following two tables for general information concerning Health Effects & Cancer Risks.

EMERGENCY EXPOSURE EXTENSIONS

CHECK ☐

Health Effects Associated with Whole Body Absorbed Doses Received Within a Few Hours[a]

Whole Body Absorbed Dose (rad)	Early Fatalities[b] (percent)	Whole Body Absorbed Dose (rad)	Prodromal Effects[c] (percent affected)
140	5	50	2
200	15	100	15
300	50	150	50
400	85	200	85
460	95	250	98

(a) Risks will be lower for protracted exposure periods.
(b) Supportive medical treatment may increase the dose at which these frequencies occur by approximately 50 percent.
(c) Symptoms (nausea, vomiting) which occur within a few hours after exposure to large doses of radiation and which usually precede more serious health effects.

Approximate Cancer Risk to Average Individuals from 25 Rem Effective Dose Equivalent Delivered Promptly

Age at Exposure (years)	Approximate Risk of Premature Death (deaths per 1,000 persons exposed)	Average Years of Life Lost if Premature Death Occurs (years)
20 to 30	9.1	24
30 to 40	7.2	19
40 to 50	5.3	15
50 to 60	3.5	11

3. Review the **HEALTH PHYSICS AND ALARA CONSIDERATIONS DURING EMERGENCIES** which is attached.

4. Obtain appropriate approval signatures as outlined in the table below.

EXTENSION		APPROVAL	ACTIONS
FROM mrem (TEDE)	TO mrem (TEDE)		
4000	<25000	(ED or RM) and RPC	ALARA REVIEW AND APPLY EMERGENCY EXPOSURE CONSIDERATIONS
>25000		(ED or RM) and RPC	ALL OF ABOVE AND BRIEFING ON RISKS

EMERGENCY EXPOSURE EXTENSIONS

CHECK ☐

5. If the Emergency Dose Extension is for greater that 4 rem (TEDE), have the volunteer sign the **EMERGENCY EXPOSURE REQUEST** Form acknowledging that they are a volunteer and are fully aware of the radiological risks of acute and delayed effects.

6. Upon completion of the activity requiring the Emergency Exposure perform the following:

   ☐ Collect, process, and evaluate personnel dosimetry devices when technically appropriate.

   ☐ Investigate the circumstances of all emergency exposures and confirm the dose received.

   ☐ Notify the NRC of emergency exposure as follows:

   Immediate notification of the NRC is required for:

   a. Exposure of the whole body of greater than 25 rem (TEDE); or
   b. Exposure of the skin of the whole body of greater than 150 rem (SDE); or
   c. Exposure of the extremities of greater than 375 rem (SDE).

   Notification of the NRC **within 24 hours** is required for:

   a. Exposure of the whole body of greater than 5 rem (TEDE); or
   b. Exposure of the skin of the whole body of greater than 30 rem (SDE); or
   c. Exposure of the extremities of greater than 75 rem (SDE).

   ☐ Assess the health consequences of all emergency exposures. Consult with a physician to determine the need for and extent of physical and biochemical examinations.

   ☐ Whole body greater than 25 rem (TEDE) should result in an examination of the exposed person by a physician.

   ☐ If internal exposure is suspected, quantitative measurements should be made as soon as reasonably feasible. Bioassays are required based on the following:

   - Nasal smear or facial contamination greater than 1,000 cpm above background.
   - Greater than 4 DAC-HRS in a day or less, or 20 DAC-HRS in a week or less.

HEALTH PHYSICS AND ALARA CONSIDERATIONS DURING EMERGENCIES

CHECK ☐

1.0 Evaluate radiological conditions.

1.1 Obtain detailed survey data to ascertain:

1.1.1 Beta-Gamma radiation levels

1.1.2 Need for neutron measurements

1.1.3 Contamination levels and protective clothing requirements

1.1.4 Airborne radioactive materials

1.1.5 Variability of conditions over space and time

1.2 Evaluate personnel status.

1.2.1 Determine available dose under normal administrative dose objectives.

1.2.2 If essential, obtain approval from **RADIATION PROTECTION COORDINATOR/EMERGENCY DIRECTOR** for persons expected to exceed administrative objectives.

1.2.3 Follow criteria in PPL Emergency Personnel Dose Assessment and Protective Action Recommendation Guide when emergency exposures are deemed appropriate by **EMERGENCY DIRECTOR**.

1.2.4 Assess individual's history of exposure to airborne materials.

1.2.5 Assess individual's skills in relation to proposed task.

1.2.6 Assess individual's lifetime exposure history.

HEALTH PHYSICS AND ALARA CONSIDERATIONS DURING EMERGENCIES

CHECK ☐

1.3 Determine proper type and placement of dosimeters.

1.3.1 Evaluate need for additional whole body dosimeters.

NOTE: For emergency exposures above 4 rem, the placement of several dosimeters on an individual is recommended to determine spatial distribution of dose to the individual.

1.3.2 Evaluate need and placement of extremity dosimeters.

1.3.3 Evaluate need for additional dosimetry devices such as high range self-reading dosimeters, electronic dosimeters, and neutron dosimeters.

1.3.4 Evaluate need for time keeping.

1.4 Determine proper respirator equipment required to perform task.

NOTE: For tasks expected to last more than several hours, consider need for relief of team members.

1.5 Review the following ALARA items:

NOTE: The detail and scope of ALARA reviews are to be commensurate with the magnitude of doses expected, numbers of people involved, and urgency of required task.

1.5.1 Consider the trend of exposures vs. the importance of the task:

a. Important and critical task with rising exposure rates will require the dispatch of teams as quickly as possible to reduce exposures.

b. Unimportant or less critical task could be delayed until exposure rates begin to trend downward.

HEALTH PHYSICS AND ALARA CONSIDERATIONS DURING EMERGENCIES

CHECK ☐

1.5.2 When time permits the following should be included in the ALARA review:

a. Consider the use of remote handling devices or other special tools.

b. Consider the use of portable shielding.

c. Consider the need for mock-ups or other practice exercises.

d. Assess the number of people required to assure all have essential productive roles.

e. Consider the magnitude of doses received by team members in transit to work location.

Control # _____

EMERGENCY NOTIFICATION REPORT

☐ THIS IS A DRILL ☐ THIS IS NOT A DRILL

1. This is: _____ at Susquehanna Steam Electric Station.
(Communicator's Name)
My telephone number is: _____. The time is _____.
(Callback telephone number) (Time notification initiated)

2. **EMERGENCY CLASSIFICATION:**
☐ UNUSUAL EVENT ☐ SITE AREA EMERGENCY
☐ ALERT ☐ GENERAL EMERGENCY
☐ The event has been terminated.

UNIT: ☐ ONE ☐ TWO ☐ ONE & TWO
TIME: _____ (Time classification/ termination declared)
DATE: _____ (Date classification/ termination declared)

THIS REPRESENTS A/AN: ☐ INITIAL DECLARATION ☐ ESCALATION ☐ NO CHANGE } IN CLASSIFICATION STATUS

3. **BRIEF NON-TECHNICAL DESCRIPTION OF THE EVENT:**

- For initial declaration, static update, or escalation, provide current EAL number only.
- For status reports, significant events, or when directed by the ED, RM, or EOFSS, provide a brief description.
- For termination, write emergency has been terminated.

_____
_____
_____

4. THERE IS: ☐ NO ☐ AN AIRBORNE ☐ A LIQUID } NON-ROUTINE RADIOLOGICAL RELEASE IN PROGRESS

5. **WHEN GENERAL EMERGENCY IS THE INITIAL EVENT, PROVIDE PROTECTIVE ACTION RECOMMENDATIONS BELOW:** (Control Room Use only, TSC and EOF mark N/A.)

_____
_____

6. **WIND DIRECTION IS FROM:** _____. **WIND SPEED IS:** _____ **mph.**
(Data from 10 meter meteorological tower, available on PICSY.)

☐ THIS IS A DRILL ☐ THIS IS NOT A DRILL

APPROVED: _____ (ED, RM, or EOFSS) **Time:** _____ (Time form approved) **Date:** _____ (Date form approved)

PROTECTIVE ACTION RECOMMENDATION STATE NOTIFICATION FORM

☐ THIS IS A DRILL ☐ THIS IS NOT A DRILL

(This form is to be used to communicate PPL's Protective Action to the senior state official at 717-651-2148.)

1. This is _____ of the Susquehanna Steam Electric Station.
   (Fill in your name)

2. I am the: ☐ Emergency Director at the Susquehanna SES Control Room
   ☐ Emergency Director at the Technical Support Center
   ☐ Recovery Manager at the Emergency Operations Facility

3. I am about to provide a Protective Action Recommendation. Do I have the Senior State Official on the line?
   Name _____

4. A General Emergency has been declared as of _____.

5. This declaration was made due to:

   _____

   _____

6. The PPL Susquehanna Protective Action Recommendation is:

   ☐ Evacuate 0-10 miles
   ☐ Evacuate 0-2 miles and shelter 2-10 miles
   ☐ Divert Danville drinking water supply from the Susquehanna River
   ☐ Evacuate beyond 10 miles (specify distance _____)

7. Date/Time: _____

POTASSIUM IODIDE (KI) TRACKING FORM

(Recommended dose: 1 tablet/day = 130 mg)

KI ISSUED TO: (NAME)	SOCIAL SECURITY #	EST. DATE/TIME OF EXPOSURE		START		KI INTAKE STOP		DOSAGE (Tablets)
		DATE	TIME	DATE	TIME	DATE	TIME	

Approved by:_____ Date _____
Emergency Director - or - Recovery Manager