Comanche Peak Nuclear Power Plant Units 3 and 4

Combined License Application Emergency Plan

Revision 1

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Definitions

Accountability – The process of accounting for individuals within the Protected Area and identifying any missing individuals within 30 minutes following initiation of accountability measures.

Activation – The process where an Emergency Response Facility is staffed with sufficient qualified personnel to perform assigned functions.

Alert and Notification System – A system of fixed outdoor warning devices, mobile warning devices, institutional warning devices, and other special alerting mechanisms used to alert the public within the plume exposure emergency planning zone in the event of a declared emergency requiring public response.

Annually – For periodic emergency planning requirements, annually is defined as once during a calendar year.

As-Built Drawings- Drawings that provide location, configuration or design of buildings, systems, and components throughout Comanche Peak Nuclear Power Plant Units 3 and 4.

Assembly Areas – Locations, on-site and off-site, where personnel assemble in the event of an emergency when the Emergency Coordinator calls for a building/Protected Area evacuation.

Biennial – For periodic emergency planning requirements, biennial is defined as once every two years.

Committed Dose Equivalent – As defined by 10 CFR 20.1003

Declared Emergency – Any event classified in one of the four emergency classes: Notification of Unusual Event, Alert, Site Area Emergency, General Emergency.

Dedicated Emergency Equipment – Any items which are staged primarily for use by the Emergency Response Organization.

Drill – A supervised instruction period aimed at testing, developing and maintaining emergency response skills.

Effective Date – Date of change; implementation date assigned by approval authority; date from which 30-day Nuclear Regulatory Commission submittals are required in accordance with 10 CFR 50, Appendix E.V.

Emergency – Any situation that may result in undue risk to the health and safety of the public and/or site personnel, or significant damage to property or equipment.

Emergency Action Level – A pre-determined, site-specific, observable threshold for a plant initiating condition that places the plant in a given emergency class. An Emergency Action Level can be: an instrument reading; an equipment status indicator; a measurable parameter (on-site or off-site); a discrete observable event; results of analyses; entry into specific emergency operating procedures; or another phenomenon which, if it occurs, indicates entry into a particular emergency class.

Emergency Alert System – The national public warning system for all-hazards emergencies, administered by the Federal Communications Commission (FCC) in cooperation with the National Weather Service, the Federal Emergency Management Agency commercial broadcast stations and interconnecting facilities authorized by the FCC to operate in a controlled manner during emergencies. Formally the Emergency Broadcast System.

Emergency Coordinator – Designated on-site individual having the responsibility and authority for implementing the Comanche Peak Nuclear Power Plant Units 3 and 4 Combined License Application Emergency Plan.

Emergency Notification System – A dedicated telecommunications system that provides voice communications between the Nuclear Regulatory Commission and Comanche Peak Nuclear Power Plant.

Emergency Operating Centers – Facilities established by the State of Texas and Somervell and Hood County governments for managing resources in an emergency situation.

Emergency Operations Facility – The on-site emergency response facility from which management of the overall emergency response, including coordination with Federal, State of Texas and Somervell and Hood County officials, will occur. The Emergency Operations Facility is located in the Nuclear Operations Support Facility.

Emergency Plan Procedures – Emergency response procedures that implement the Emergency Plan.

Emergency Planning Zones – A generic area defined about a nuclear facility to facilitate off-site emergency planning and develop a significant response base. It is defined for the Plume and Ingestion Exposure Pathways. During an emergency response, best efforts are made making use of plan action criteria without regard to whether particular areas are inside or outside Emergency Planning Zones.

> Ingestion Exposure Pathway Emergency Planning Zone – An area delineated by an approximate fifty-mile radius circle around the site. The principal exposure for this pathway would be from ingestion of contaminated water or foods such as milk or fresh vegetables. The duration of exposure could range in length from hours to months.
>
> Plume Exposure Pathway Emergency Planning Zone – An area delineated by an approximate ten-mile radius circle around the site. The principal exposure sources from this pathway are: (a) whole body external exposure to gamma radiation from the plume and from deposited materials and (b) inhalation exposure from the passing radioactive plume. The duration of principal potential exposures could range in length from hours to days.

Emergency Response Equipment – Any item which is identified or made available for emergency response.

Emergency Response Organization – The organization comprised of personnel assigned to perform selected emergency response tasks during a declared emergency.

Emergency Response Organization Roster – A listing of Emergency Response Organization personnel.

Emergency Repair and Damage Control Activities – Activities required to mitigate emergency conditions.

Exclusion Area – As defined in 10 CFR 50.2

Exercise – A test of the adequacy of timing and content of implementing procedures and methods; emergency equipment and communications networks; and the public notification system. An exercise permits the evaluation of training and response to ensure that emergency response organization personnel are familiar with their duties.

Hostile Action – An act toward a nuclear power plant or its personnel that includes the use of violent force to destroy equipment, take hostages, and/or intimidates the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, projectiles, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile Action should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the nuclear power plant. Non-terrorism based Emergency Action Levels should be used to address such activities (i.e. violent acts between individuals in the owner controlled area).

Hostile Force – One or more individuals who are engaged in a determined assault, overtly or by stealth and deception, equipped with suitable weapons capable of killing, maiming, or causing destruction.

In-Plant – Buildings or structures, located inside the Protected Area, directly associated with plant primary, secondary, control, or fuel-handling system (e.g., Reactor Building, Power Source Buildings, Auxiliary Building, Access Control Building, and Turbine Building).

Joint Information Center – The single point from which information regarding a declared emergency at the site will be disseminated to the public and news media.

Monthly - For periodic emergency planning requirements, monthly is defined as once during a calendar month.

Nuclear Operations Support Facility – A Luminant controlled building located 0.1 miles west of the exclusion area boundary on the Plant Road containing the off-site decontamination facility for use during an emergency, and the Emergency Operations Facility.

Off-site – Outside the Owner Controlled Area

On-site – Within the Owner Controlled Area

Operations Support Center – An on-site assembly area separate from the Control Room and Technical Support Center where Luminant operations support personnel report in an emergency.

Owner Controlled Area – The area, outside of the Protected Area but inside the property boundary, access to which can be controlled by Luminant for any reason.

Plant Personnel – Personnel employed or contracted by Luminant who are involved in the operation, construction or maintenance at the site.

Projected Dose – An estimated dose which affected population groups could potentially receive if no protective actions are taken.

Protected Area – An area encompassed by physical barriers and to which access is controlled. For the purposes of this Emergency Plan, the Protected Area refers to the area designated in the Security Plan.

Protective Action Guides – The projected dose to individuals from an accidental release of radioactive material at which a specific protective action to reduce or avoid that dose is warranted.

Protective Actions – Those emergency measures taken before or after a release of radioactive material has occurred for the purpose of preventing or minimizing radiological exposure.

Quarterly – For periodic emergency planning requirements, quarterly is defined as once every three months, with a maximum interval of 112 days.

Recovery Actions – Those actions taken after the emergency to restore the site as nearly as possible to its pre-emergency condition.

Rem (Roentgen Equivalent Man) – As defined by 10 CFR 20.1004

Rumor Control – The process of monitoring communications and media broadcasts, identifying rumors, and making the appropriate contacts to disseminate accurate information.

Semi-annual – For periodic emergency planning requirements, semi-annual is defined as twice during a calendar year.

Shift Manager – A member of plant management assigned on each shift, holding a Senior Reactor Operator's License, in charge of Control Room functions.

Site – The site proper and the Owner Controlled Area surrounding the site.

Site Evacuation – Withdrawal of non-essential personnel from the Owner Controlled Area.

Squaw Creek Park – A Park, owned and controlled by Luminant, that provides restricted access to Squaw Creek Reservoir.

Technical Support Center – The on-site facility that provides plant management and technical support to reactor operating personnel located in the Control Room during an emergency.

Total Effective Dose Equivalent – As defined by 10 CFR 20.1003.

Acronyms and Abbreviations

ALARA	As Low As Reasonably Achievable
ANI	American Nuclear Insurers
cc	Cubic Centimeter
CDE	Committed Dose Equivalent
CFR	Code of Federal Regulations
Ci	Curie
COL	Combined License
cpm	Counts Per Minute
CPNPP	Comanche Peak Nuclear Power Plant
CR	Control Room
DCD	Design Control Document
DEM	(State of Texas) Governor's Division of Emergency Management
DHS	(U.S.) Department of Homeland Security
DOE	(U.S.) Department of Energy
dpm	Disintegrations Per Minute
DPS	(State of Texas) Department of Public Safety
EAL	Emergency Action Level
EAS	Emergency Alert System
ENS	(NRC) Emergency Notification System
EOC	Emergency Operations Center
EOF	Emergency Operations Facility
EPA	(U.S.) Environmental Protection Agency
EPP	Emergency Plan Procedure
EPZ	Emergency Planning Zone
ERDC	Emergency Response and Damage Control
ERDS	Emergency Response Data System
ERF	Emergency Response Facility
ERO	Emergency Response Organization
ERZ	Emergency Response Zone
ETE	Evacuation Time Estimate
FEMA	(U.S.) Federal Emergency Management Agency
FRMAC	Federal Radiological Monitoring and Assessment Center

FSAR	Final Safety Analysis Report
ft	Feet
FTS	Federal Telecommunications System
GE	General Emergency
HPN	Health Physics Network (Communication System)
IC	Initiating Condition
INPO	Institute of Nuclear Power Operations
JIC	Joint Information Center
KI	Potassium Iodide
m	Meter
mph	Miles per hour
MWe	Megawatt electric
MWt	Megawatt thermal
NOUE	Notification of Unusual Event
NOSF	Nuclear Operations Support Facility
NRC	(U.S.) Nuclear Regulatory Commission
NSSS	Nuclear Steam Supply System
NWS	(U.S.) National Weather Service
ODCM	Off-site Dose Calculation Manual
OFFRAC	Off-site Radiological Assessment Coordinator
ORC	Operations Review Committee
OSC	Operations Support Center
PA	Protected Area
PAG	Protective Action Guide
PAR	Protective Action Recommendation
PABX	Private Automatic Branch Telephone Exchange
PCS	Plant Computer System
RAP	Radiological Assistance Program
RCA	Radiation Controlled Area
RCP	(State of Texas) Radiation Control Program
RMS	Radiation Monitoring System
RO	Reactor Operator
RPC	Radiation Protection Coordinator
RPP	Radiation Protection Program

RPT	Radiation Protection Technician
SAE	Site Area Emergency
SCBA	Self-Contained Breathing Apparatus
SORC	Station Operations Review Committee
SPDS	Safety Parameter Display System
SPTS	Sound Powered Telephone System
SRO	Senior Reactor Operator
TDSHS	Texas Department of State Health Services
TEDE	Total Effective Dose Equivalent
TSC	Technical Support Center
U.S.	United States

I. Introduction

This Emergency Plan describes the plans established by Luminant Generation Company LLC (Luminant) for responding to a radiological emergency at the Comanche Peak Nuclear Power Plant (CPNPP) Units 3 and 4. The CPNPP Units 3 and 4 Combined License (COL) Emergency Plan (the Plan) describes the organization, facilities, emergency response measures, and functional interfaces with off-site agencies that are used to respond to a broad range of emergencies. This Emergency Plan describes the responsibilities and specific authorities which provide for effective control and coordination of the emergency response, both on-site and off-site. The on-shift plant organization is augmented by an expanded Emergency Response Organization (ERO), as required, to address situations with serious potential consequences.

The format for this Plan directly follows the format of NUREG-0654/FEMA-REP-1, Rev.1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants" (NUREG-0654) (Reference 1). Appendix 8 of this Plan provides a cross-reference between this Plan, the State of Texas Emergency Management Plan and Somervell and Hood Counties' Emergency Operations Plans, and the planning standards and evaluation criteria in NUREG-0654.

The Plan establishes an emergency response organization, defines specific duties and responsibilities, and designates points of contact between on-site and off-site supporting agencies. The on-shift plant organization is augmented by an expanded ERO, as required at "Alert" and higher emergency classification levels. Staff augmentation may occur at a Notification of Unusual Event (NOUE) at the discretion of the Emergency Coordinator. The expanded ERO includes activation of emergency response personnel, as appropriate. The Plan provides direction and coordination of the CPNPP ERO. Emergency Plan Procedures (EPPs) detail various job functions in support of the Plan and provide for a smooth transition from normal mode to emergency mode of operation. Assignment of CPNPP ERO personnel to job functions is discussed in this Plan. Provisions for prompt notification of Federal, State of Texas and local agencies are established and include information which may be required for off-site agency response. Additional assistance may be provided to the on-site ERO by off-site company personnel, Federal, State of Texas and local agencies, and contract personnel, as required.

A recovery and re-entry plan describes the management, technical, and administrative organization necessary to execute timely and effective recovery of the facility based on assessments of plant conditions and desired end states. The recovery plan provides guidance for relaxing protective measures that have been instituted and requires the periodic estimation of total population exposure.

The Plan is reviewed on a periodic basis. Periodic drills and exercises involving communications, firefighting, radiological monitoring and radiation protection activities are routinely conducted. Joint exercises involving participation by the State of Texas and local response agencies are held periodically within the State of Texas to test major elements of the Plan. Federal response agencies may also participate in these joint exercises. Critiques of each implementation of the Plan allow for critical reviews of technique, methods, and improvements.

Changes are factored into the Plan and/or implementing procedures through controlled revisions.

A. Purpose

The objective of the Plan is to describe measures to protect the health and safety of the general public, persons visiting or temporarily assigned to the site, and CPNPP employees in the event of an emergency at the site.

To meet this objective, the Plan creates a high order of preparedness and provides for an orderly and timely decision-making process. Emphasis is placed on maintaining preparedness through training, drills, and exercises. Availability of equipment, supplies, and essential services is maintained by the Plan. This Plan also provides for coordination of on-site and off-site emergency response.

This Plan describes the pre-planned facilities, equipment, response organizations, assessment and protective actions, and cooperative agreements established by Luminant to provide for adequate protection of life and property in the event of a radiological emergency at CPNPP Units 3 and 4. In this context, protection of life and property includes:

- Notifying and mobilizing affected members of the licensee staff, Federal agencies, the State of Texas, local, and private-sector response organizations, and the public;
- Limiting the radiological impact of the emergency on plant employees and affected members of the public; and
- Limiting the potential adverse impact of protective actions, such as evacuations or sheltering.

The impact of plant emergencies is limited through the implementation of pre-planned and controlled preparatory, assessment, and protective actions consistent with this Plan.

EPPs provide instructions for accomplishing certain provisions of the Plan. A list of topics covered by the EPPs is included in Appendix 5.

B. Scope

This Plan applies to preparedness and response to any radiological emergency condition at CPNPP Units 3 and 4. Section II.D of this Plan describes the emergency classification system. Appendix 1 identifies radiological emergency conditions, their initiating conditions (IC), and Emergency Action Levels (EALs).

This Plan has been coordinated with the plans of affected government agencies and private sector support organizations as listed in Section II.A of this Plan. Ongoing coordination with affected Federal, State of Texas and local agencies and private sector support organizations is imperative to provide an effective emergency response capability. The Plan is designed to complement the Texas Emergency Management Plan and to interface with Somervell and Hood County Emergency Management Plans.

C. Planning Basis and Emergency Planning Zones

1. Planning Basis

CPNPP Units 3 and 4 are licensed under the requirements of Title 10, Code of Federal Regulations (CFR), Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants." The regulations in 10 CFR Part 52 invoke the emergency planning requirements in 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." Consistent with the requirements of both 10 CFR Part 50 and 10 CFR Part 52, this Plan is based on the requirements of 10 CFR Part 50, Section 50.47, "Emergency Plans," and Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities." This plan is also based on the guidance provided in NUREG-0654. NUREG-0654 has been endorsed as an acceptable means of meeting the emergency planning requirements of 10 CFR Part 50 through NRC Regulatory Guide 1.101, Revision 3, "Emergency Planning and Preparedness for Nuclear Power Reactors" (Reference 2).

Two Westinghouse 4-loop pressurized water reactors (Units 1 and 2) are also located at CPNPP. The planning basis draws extensively on the existing Emergency Plan.

2. Emergency Planning Zones

NUREG-0654 establishes two Emergency Planning Zones (EPZs) for which planning for predetermined actions are implemented – the Plume Exposure Pathway EPZ, which has a radius of approximately ten miles, and the Ingestion Exposure Pathway EPZ, which has a radius of approximately fifty miles.

The existing EPZs established around CPNPP Units 1 and 2 have been incorporated into this Plan and serve as the EPZs for Units 3 and 4.

Plume Exposure Pathway EPZ

The Plume Exposure Pathway EPZ is that area where the principal sources of incident-related radiation exposures are likely to be whole body gamma radiation exposures and inhalation exposures from the passing radioactive plume. As a result of this exposure scenario, any exposures resulting from a radiological incident at the facility are likely to have durations of less than one hour to a few days.

The Plume Exposure Pathway EPZ consists of an area about 10 miles in radius around CPNPP. Figure I-1 provides an illustration of the Plume Exposure Pathway EPZ.

Ingestion Exposure Pathway EPZ

The Ingestion Exposure Pathway EPZ is that area where the principal sources of incident-related radiation exposures are likely to result from ingestion of contaminated water and food; including milk, fresh vegetables, and foodstuffs. As a result of this exposure

scenario, any exposures resulting from a radiological incident at the facility are likely to have durations of a few hours to months.

The Ingestion Exposure Pathway EPZ consists of an area about 50 miles in radius around CPNPP. Figure I-2 provides an illustration of the Ingestion Exposure Pathway EPZ.

3. Site and Area Description

CPNPP Units 3 and 4 consist of two units, each of which includes a Mitsubishi US-APWR. Each reactor unit is designed for a core power output of 4451 Megawatt thermal (MWt). The net electrical power rating is approximately 1600 Megawatt electric (MWe), depending on site conditions.

The location of CPNPP Units 3 and 4 is described in Subsection 2.1.1.1 of the Final Safety Analysis Report (FSAR).

Figure I-1 Plume Exposure Pathway Emergency Planning Zone

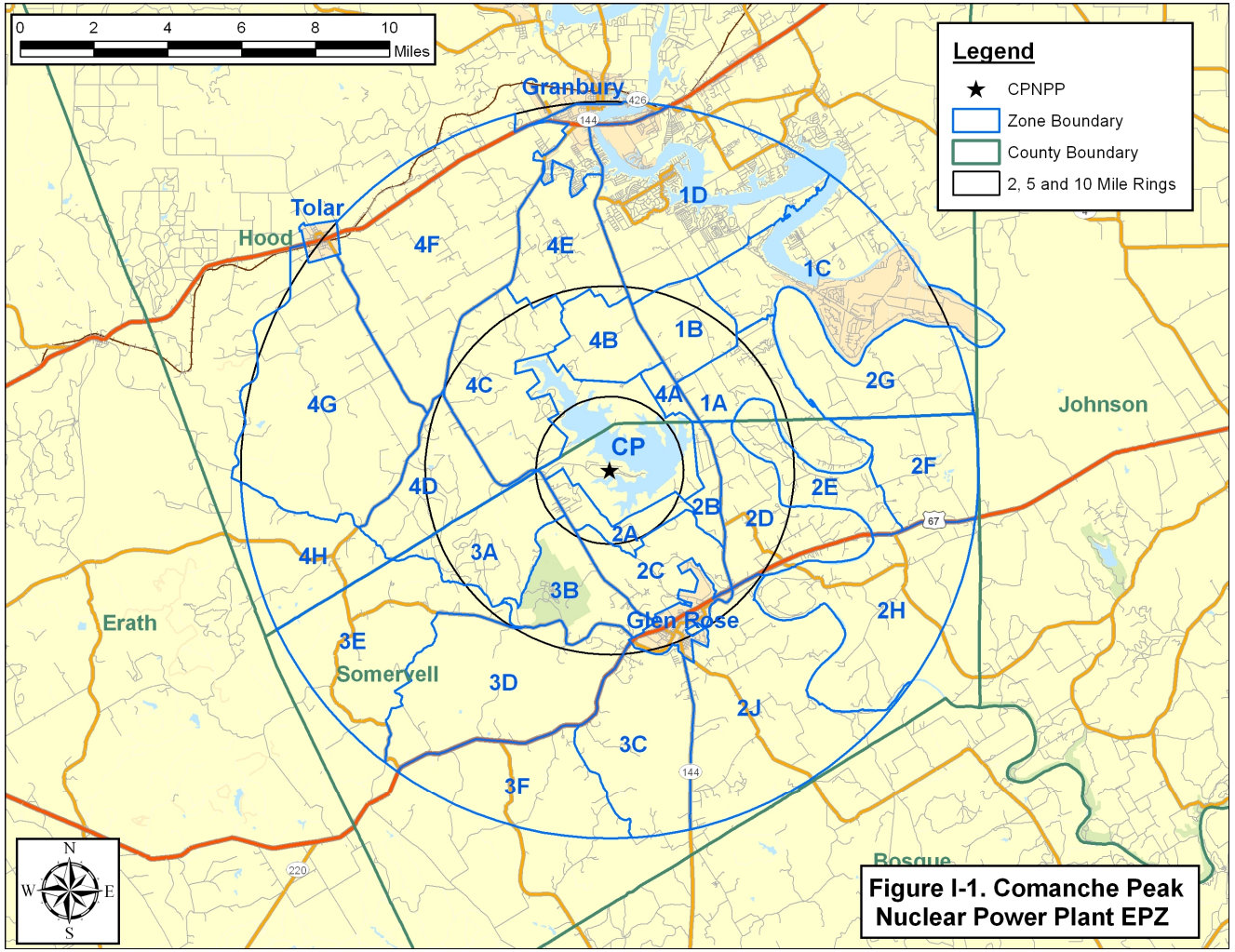
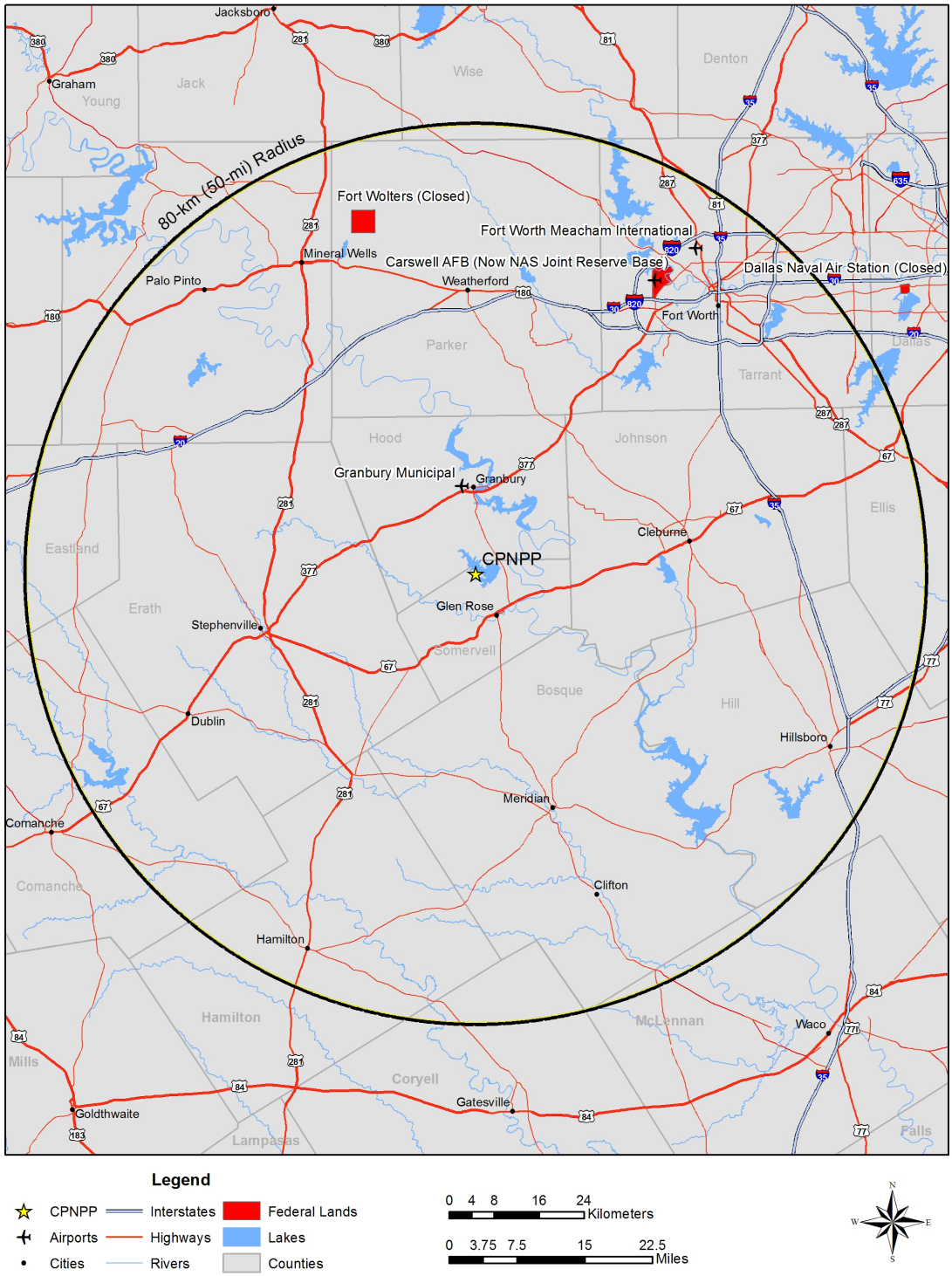


Figure I-2 Ingestion Exposure Pathway Emergency Planning Zone



II. Emergency Plan

A. Assignment of Responsibility (Organization Control)

This section of the Plan addresses primary responsibilities for emergency response by Luminant, Federal authorities, the State of Texas, and Somervell and Hood Counties. Emergency responsibilities for various supporting organizations are established and each principal organization is staffed to respond and augment its initial response on a continuous basis.

1. Emergency Organization

a. Participating Organizations

The principal organizations participating in emergency response activities at CPNPP Units 3 and 4 include:

- Luminant
- Texas Department of Public Safety (DPS), Governor's Division of Emergency Management (DEM)
- Texas Department of State Health Services (TDSHS), Radiation Control Program (RCP)
- Hood County Government
- Somervell County Government
- United States (U.S.) Nuclear Regulatory Commission (NRC)
- U.S. Department of Energy (DOE)
- U.S. Department of Homeland Security (DHS)/Federal Emergency Management Agency (FEMA)

b. Concept of Operations

Luminants' responsibilities during an emergency condition focus on taking actions to:

- Assess plant conditions.
- Classify emergency conditions.
- Notify off-site agencies of emergency conditions.
- Provide technical expertise to responsible agencies.
- Provide support for off-site assessment of radiological conditions.
- Make protective action recommendations (PARs).
- Mitigate the consequences of adverse plant conditions by monitoring and controlling plant parameters.
- Terminate emergency conditions.

State and local agencies responsible for radiological emergency response coordinate their activities through the Somervell and Hood

County Emergency Operating Centers (EOCs) and the State of Texas EOC. The Emergency Operations Facility (EOF) coordinates with the agencies necessary to support the emergency condition. Appendix 7 of this Plan contains Certification Letters with participating State of Texas and Somervell and Hood County agencies.

Appendix 8 of this Plan provides a cross-reference to these provisions regarding the State of Texas and Somervell and Hood County emergency response organization in State and local Plans, as applicable.

The Plan includes provisions for actions to be taken during the following phases of emergency management:

i. Preparedness

Actions and activities associated with this phase are described in various sections of this Plan, and include the development and maintenance of the following:

- Emergency Plan with supporting appendices, implementing procedures, facilities, and equipment.
- Training, drill, and exercise programs.
- Periodic review of the Plan

ii. Normal Operations

Normal operations at CPNPP Units 3 and 4 are conducted under the authority of the Shift Manager and are directed from the Control Room (CR). In the event of an abnormal condition, the Shift Manager directs the activities of the plant staff in performing initial assessment, corrective, and protective functions. Using approved emergency response procedures, including the EALs based on Appendix 1 of this Plan, the Shift Manager determines if an emergency condition exists and, if so, the proper emergency classification. Based on the classification and plant conditions, the Shift Manager:

- Determines if activation of the Luminant emergency response facilities (ERFs) is desirable or required.[1,2,3]
- Assumes the role of the Emergency Coordinator.

[1] If an event is transient in nature such that staffing of the ERO is not practical prior to termination of the event, then the ERO may not be staffed; however, notifications to affected authorities are completed consistent with the requirements of this Plan.

[2] Under some circumstances, such as unanticipated natural events or hostile action against the facility, the Emergency Coordinator may judge that movement of personnel as needed to staff the emergency response facilities may create undue personnel hazards. Under such circumstances, the Emergency Coordinator may elect to postpone staffing of the emergency response facilities and implement compensatory measures as needed to ensure ongoing personnel and facility safety.

[3] The ERO may be staffed prior to the declaration of an emergency situation, such as in anticipation of severe weather that is likely to result in the declaration of an emergency condition. This precautionary staffing of the ERO does not in and of itself constitute declaration of an emergency.

- Makes or directs initial notifications to affected plant staff and designated agencies as discussed in Section II.E of this Plan.

iii. Initial Emergency Operations

The CR is the initial center for coordination of emergency response during emergency conditions. For emergencies classified as Alert, Site Area Emergency (SAE) and General Emergency (GE), the Emergency Coordinator directs the activation of the ERO. Additionally, the Emergency Coordinator may direct the activation of the entire or a portion of the ERO for a NOUE, based on an assessment of plant conditions and support needs.

The response to an emergency begins with the personnel resources assigned on-shift. On-shift personnel are augmented as determined by the Emergency Coordinator and in accordance with this Plan and the emergency classification. Prior to declaring an Alert, the Shift Manager (Emergency Coordinator) has the authority to call in any portion of the augmentation staff as may be required for emergency response. The organized response of the on-shift and any augmented personnel resources identified in this Plan represents the ERO. Staffing of the entire ERO shall be initiated in the event of an Alert or higher classification. The ERO includes support as requested. Figure II-1 shows the interfaces between the various organizations.

iv. Augmented Response

1. Technical Support Center

The Technical Support Center (TSC) acts in support of the command and control function of the CR and provides an area for site personnel who have expertise in affected areas of plant operation to support the emergency response. This facility is equipped with communication equipment, computers, printers, off-site and on-site computer access, plant drawings, procedures and other materials and equipment necessary to support its function. Personnel in the TSC assess the emergency condition and make recommendations to the CR, the EOF and off-site agencies as necessary to provide for the safety of plant personnel and members of the general public. After the EOF is activated and operational, the EOF assumes many of the functions of the TSC and relies on the TSC as a vital link to the site.

Following activation of the ERFs and receipt of an adequate turnover, the TSC Manager or other designated member of the CPNPP management staff

relieves the Shift Manager of Emergency Coordinator responsibilities and directs the activities of the on-site ERO from the TSC.

2. Emergency Operations Facility

   The EOF assumes many of the functions of the TSC following turnover from the TSC. The EOF is staffed by Luminant personnel, including the EOF Manager, who directs the activities of this facility. The EOF Manager is responsible for ensuring the EOF communicates emergency status to the State and counties, directing the efforts of the off-site monitoring teams, making radiological assessments, recommending off-site protective actions to the State and counties, and arranging for dispatch of any special assistance or services requested by the TSC. Specific information relating to the staffing and reporting structure of the EOF organization is provided in EPPs.

3. Operations Support Center

   The Operations Support Center (OSC) provides an operational center to provide support to the TSC and CR. The OSC dispatches Emergency Repair and Damage Control Teams as directed by the Emergency Coordinator and provides operational information, radiological assessment, and manpower for in-plant functions.

Table II-1 summarizes the responsibilities and activities of the ERFs under the various emergency classifications.

v. Recovery

Recovery actions are actions taken to return the plant to an operational status or maintain long-term safe shutdown condition after the emergency response actions have been completed. If a recovery effort is deemed necessary, a Recovery Organization is established in accordance with Section II.M of this Plan.

Table II-1 Responsibility for Emergency Response Functions

	Emergency Classification			
Function	**NOUE**	**Alert**	**Site Area Emergency**	**General Emergency**
Supervision of reactor operations and manipulation of controls	CR	CR	CR	CR
Management of plant operations	CR (TSC)	TSC	TSC	TSC
Technical support for reactor operations	CR (TSC)	TSC	TSC	TSC
Management of corporate emergency response resources	CR (TSC) (EOF)	EOF	EOF	EOF
Monitoring of radioactive effluents and the environs; dose assessment and projection	CR (TSC) (EOF)	EOF	EOF	EOF
Provision of information to the State of Texas and Somervell and Hood County emergency response organizations, including Protective Action Recommendations	CR (TSC) (EOF)	EOF	EOF	EOF
Management of recovery operations	CR (TSC) (EOF)	TSC/EOF	TSC/EOF	TSC/EOF
Technical support for recovery operations	CR (TSC) (EOF)	TSC/EOF	TSC/EOF	TSC/EOF

Note: Listing of facilities in parentheses indicates that activation of these facilities or performance of these functions is optional, based on management assessment of plant conditions and emergency response needs.

Coordination with CPNPP Units 1 and 2

Luminant has identified the need to coordinate emergency response actions taken at CPNPP Units 3 and 4 with CPNPP Units 1 and 2. The need to coordinate activities between TSCs and OSCs has also been identified. As noted previously in this section, the Emergency Coordinator is responsible for directing notifications to affected plant staff, which may include the unaffected units' CRs. This notification, and subsequent communications, will enable the unaffected units' staff to take action, if necessary.

In the unlikely event that an emergency is declared during operations at Units 3 and/or 4 concurrent with an emergency at Units 1 and/or 2, a single Emergency Coordinator is designated from on-site shift management in accordance with EPPs. The Emergency Coordinator discharges those duties described in this Emergency Plan, as well as those described in the Units 1 and 2 Emergency Plan, and provides for coordination of activities between the on-site TSCs and OSCs in accordance with EPPs.

Additionally, there is a potential for an emergency at Units 1 and/or 2 to affect personnel and activities at Units 3 and/or 4 while one or both of these units remain under construction. Emergency actions, including requirements for notification of construction site personnel, are stipulated in EPPs. Requirements for subsequent response actions by construction site personnel are stipulated in the Construction Site Health and Safety Plan or its supporting documents.

State Agencies

The State of Texas has developed the Radiological Emergency Management Plan which is incorporated in the Texas Emergency Management Plan as Annex D: Radiological Emergency Management. The fundamental legislation providing the basis for emergency response by civil authorities is the Texas Disaster Act of 1975, as amended. This act creates a DEM. The DEM is part of the Governor's office and is placed under the Director of the DPS by an Executive Order of the Governor. The duties and responsibilities of the principal and support agencies of the State of Texas are summarized below. The Commissioners of the Texas Department of Agriculture and the TDSHS are responsible for implementing protective actions within the Ingestion Exposure Pathway EPZ in accordance with the Texas Emergency Management Plan. This plan fulfills the necessary functions of planning for a radiological emergency at commercial nuclear power plants in the State of Texas. A detailed discussion of the State's response is contained in the Texas Emergency Management Plan. Letters of Agreement are provided in Appendix 7 of this Plan.

- Governor's Division of Emergency Management

  The DEM is the agency responsible for coordinating overall response to emergency situations in the State of Texas. As the Governor's authorized representative, the Chief, DEM assumes overall direction and control of the State's response to an emergency condition at CPNPP Units 3 and 4.

- Texas Department of Public Safety

  The DPS serves as the primary communications contact and coordinates emergency communications between CPNPP Units 3 and 4, the State of Texas and Somervell and Hood Counties. The DPS coordinates with the local law enforcement officials and assists in maintaining traffic control, protecting life and property, establishing roadblocks, and alerting and warning persons in the affected area. The Highway Patrol Captain in District 1A Garland, Texas serves as Chairman of the Disaster District Committee. Requests for assistance from the local county EOCs are forwarded to District 1A. Requests that exceed the District's capability are forwarded to the State EOC in Austin. Response time for DPS personnel from the Disaster District Office in Garland to the site is approximately 2 hours.

- Texas Department of State Health Services

  The TDSHS - RCP is the responsible agency for providing technical assistance and advice to local governments, the DPS, DEM and other State agencies during a radiological emergency at CPNPP Units 3 and 4. Once notified of a SAE or GE by DEM, the TDSHS will establish a communication link from their Austin office to the site. The TDSHS dispatches response teams to the site in accordance with provisions of the Texas Radiological Emergency Management Plan. The TDSHS response is directed by a designated member of TDSHS. The response team is capable of providing environmental sampling and radiological monitoring, including a mobile radiological laboratory. This laboratory serves to analyze low-level radiological environmental samples. Work space, telephone lines and electric hook-ups have been provided in the EOF for use by the TDSHS mobile radiological laboratory response team. It is expected that TDSHS personnel and the laboratory should arrive at pre-determined locations within approximately four hours of notification. The TDSHS also provides assessment of off-site hazards and PARs.

County Governments

In an emergency situation at CPNPP Units 3 and 4, Somervell and Hood County governments are immediately notified of the event. They have the primary responsibility for the protection of the citizens within their county boundaries as described in their respective

Emergency Management Plans. The principal Luminant contact with county government is through the County Judge or designee. Initially, this contact is maintained by the CR. Following activation, contact is maintained by the TSC until relieved by EOF Communicators. Luminant sends a representative to each county EOC when the EOC is activated for an emergency at CPNPP.

Local Agency Support Services

Agencies and private sector organizations that have agreed to provide support, as necessary to CPNPP Units 3 and 4 and surrounding areas are listed below.

Law Enforcement, Emergency Traffic Control, Related Police Matters

- Hood County Sheriff's Department
- Somervell County Sheriff's Department
- DPS

Early Warning or Evacuation of the Populace

- Hood County Sheriff's Department
- Somervell County Sheriff's Department
- DPS

Radiological Emergency Monitoring Assistance

- TDSHS - RCP
- South Texas Project Nuclear Operating Company
- U.S. Environmental Protection Agency (EPA)

Hospitals, Medical Support

- Lake Granbury Medical Center
- Walls Regional Hospital

Ambulance Service

- Granbury/Hood County Emergency Medical Service, Inc.
- Somervell County Fire, Rescue, and EMS Service

Firefighting

- Somervell County Fire, Rescue, and EMS Service
- Granbury Volunteer Fire Department
- Tolar Volunteer Fire Department
- Indian Harbor Volunteer Fire Department
- DeCordova Bend Estates Volunteer Fire Department

Public Health and Safety, Evaluation of the Radiological Situation

- TDSHS - RCP
- Texas Department of Agriculture

Federal Government Emergency Response

The Emergency Coordinator is authorized to request Federal assistance on behalf of the site under provisions of the Federal Radiological Emergency Response Plan. The Emergency Coordinator requests Federal assistance by contacting the NRC. The emergency response roles of various Federal agencies are established in the National Response Framework and various agency-specific documents (e.g. NRC Incident Response Plan) supporting that plan.

CPNPP Units 3 and 4 also maintain close contact with the NRC Operations Center and/or the NRC Region IV Office in Arlington, Texas. This is an important function to provide accurate information and assessment of the emergency to the Federal Government. As a result of these communications, the NRC can best appraise their response to the emergency.

Nuclear Regulatory Commission

The response provided by the NRC is described in NUREG-0728, "NRC Incident Response Plan," Rev. 4 (Reference 4). The agency's response at the regional level is under the direction of the Region IV Administrator or designee. If an NRC site team is established and dispatched to the vicinity of CPNPP, the representative of the NRC who would provide input to the EOF Manager is the Site Team Director. A workspace and a telephone have been provided in the EOF for this NRC representative.

Methods of notifying the NRC are discussed in Section II.E of this Plan, Notification Methods and Procedures. The NRC may be expected to be on-site within four hours of receiving notification of the event.

Specific responsibilities assigned to the NRC include:

- Notification of FEMA whenever a radiological event occurs or when there is a high potential for such an event.
- Monitoring operational data and assuring that adequate information and recommendations are being provided to off-site agencies.
- As a back-up, providing technical assessment of on-site radiological and plant conditions to FEMA and other Federal agencies, and keeping the State of Texas and Somervell and Hood County agencies apprised of any operational discussions that may affect off-site protective actions.

- In coordination with CPNPP Units 3 and 4, disseminate on-site data to FEMA and Federal agencies, the news media, and the general public.

Department of Energy

The Federal Radiological Monitoring and Assessment Center (FRMAC) Operations Plan (Reference 5) provides for the coordinated management of Federal technical response activities related to a radiological emergency.

DOE is assigned responsibility to establish and manage the FRMAC. The FRMAC may be activated when a major radiological emergency exists, and the Federal government will respond when a State, other governmental entity with jurisdiction, or a regulated entity requests Federal support.

Further information concerning objectives and organization is provided in the FRMAC Operations Plan.

Environmental Protection Agency

The U.S. EPA may provide assistance in supporting environmental monitoring teams and mobile radioanalytical laboratories.

Department of Homeland Security/Federal Emergency Management Agency

DHS/FEMA bears responsibility for coordinating off-site Federal agency response for non-technical aspects of the emergency. Such support would typically be requested by the State of Texas and Somervell and Hood County agencies.

Specific responsibilities assigned to the DHS/FEMA include:

- Coordination of Federal support to the State of Texas and Somervell and Hood County officials
- Dissemination of data on off-site support actions to the Federal agencies
- FEMA may send personnel to the EOF to coordinate activities with CPNPP Units 3 and 4, the NRC, and the State of Texas.

To support the Federal emergency response efforts, the following facilities are available:

Airports:	Granbury, Cleburne, Stephenville, Meacham in Fort Worth, Forth Worth Joint Reserve Base, Love Field in Dallas, and Dallas-Fort Worth International
Motels:	Granbury, Glen Rose, Cleburne, Stephenville, Dallas, and Fort Worth
CPNPP:	Working space within the CPNPP Units 3 and 4 ERFs has been allocated for co-location of NRC personnel. Phones are available for NRC personnel within the ERFs.

Appendix 7 of this Plan contains the certification letters established between Luminant and the State and local government agencies supporting this Plan. The responsibilities of many Federal agencies are established in the National Response Framework (Reference 6) and therefore no certification letters are required for these agencies.

c. Organizational Interrelationships

The interrelationships between CPNPP Units 3 and 4, CPNPP Units 1 and 2, Federal, State, local and any private agencies are shown on in Figure II-1.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

d. Individual in Charge of Emergency Response

As discussed previously in this section, the Shift Manager assumes the role of Emergency Coordinator upon declaration of an emergency. Following activation of the ERFs and receipt of an adequate turnover, the TSC Manager or other designated member of the station management staff relieves the Shift Manager of Emergency Coordinator responsibilities. When the EOF is activated and operational, the EOF Manager assumes command and control after completing turnover from the Emergency Coordinator.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

e. 24 Hour Emergency Response Capability

Luminant maintains a response capability of 24 hours per day, including manning of communications links, through training of multiple responders for key emergency response positions, consistent with the training requirements established in Section II.O of this Plan.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

2. Functions, Responsibilities, and Legal Basis

The State of Texas and Somervell and Hood Counties' Plans establish the functions and responsibilities for major elements of the Plans and key individuals, by title, responsible for emergency response. Each Plan also contains reference to the legal basis for such authority. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

3. Written Agreements

Appendix 7 of this Plan contains certification letters established between Luminant, the State of Texas and Somervell and Hood County government agencies certifying that:

- the Proposed Emergency Plans are practicable;

- these agencies are committed to participating in further development of the plans, including any required field demonstrations; and
- these agencies are committed to executing their responsibilities under the plans in the event of an emergency.

Letters of Agreement with private sector organizations, such as fire response, emergency medical transportation, and hospitals, are provided in Appendix 7.

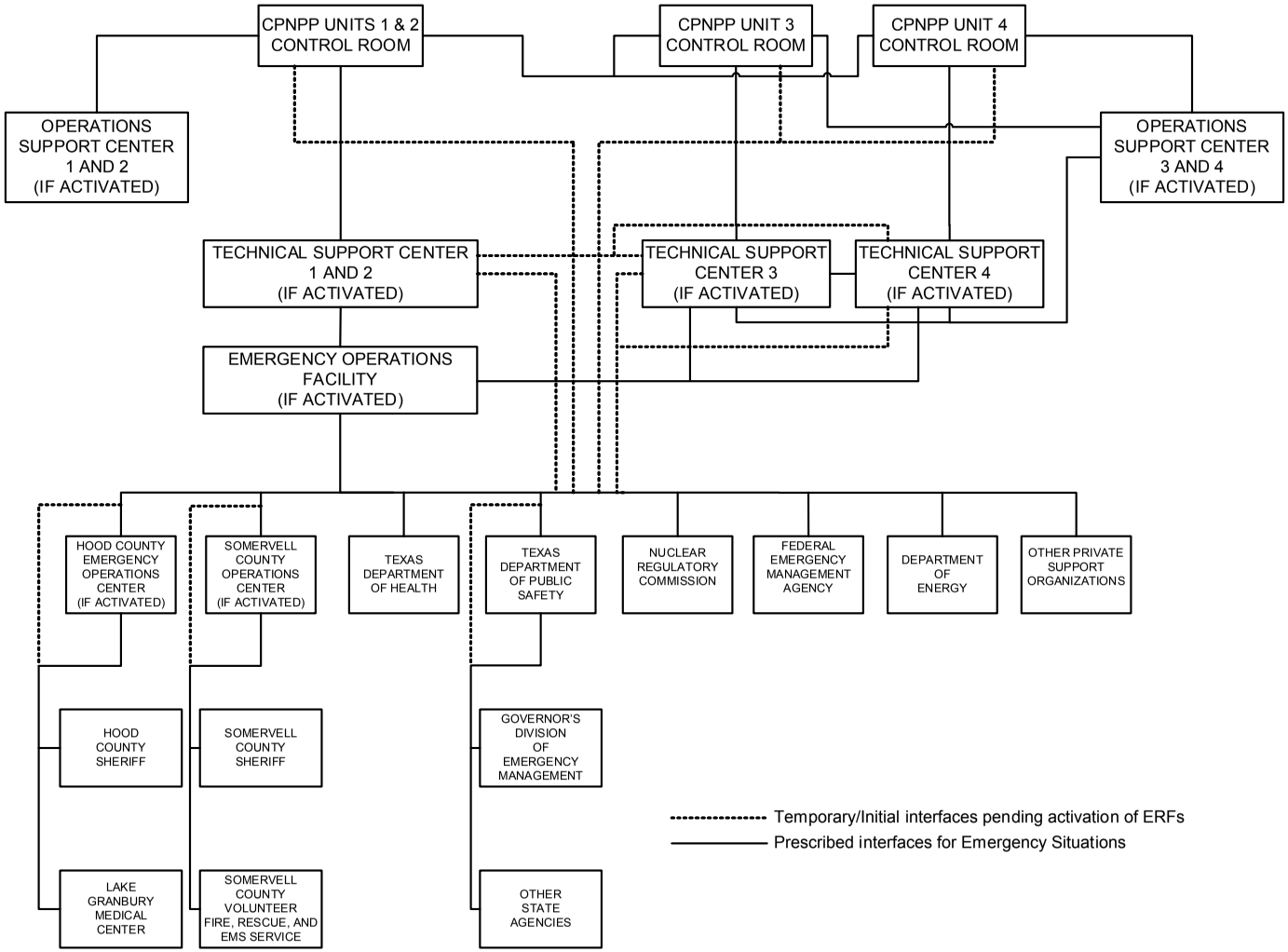
Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

4. Continuous Operations

Luminant maintains capability for continuous operations through training of multiple responders for key emergency response positions, consistent with the training requirements established in Section II.O of this Plan. The Emergency Coordinator or EOF Manager, as appropriate, bears responsibility for ensuring continuity of technical, administrative, and material resources during emergency operations.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

Figure II-1 **Emergency Response Organization Interrelationships**
(Alert, Site Area Emergency, General Emergency)



B. On-site Emergency Organization

On-shift responsibilities for Luminant emergency response are defined in this section of the Plan. Staffing for initial accident response in key functional areas is maintained continuously during the course of an emergency. Timely augmentation of response capabilities is available, and the interfaces among various on-site response activities and off-site support and response activities are described.

1. On-site Emergency Organization

Figure II-2 illustrates the CPNPP Units 3 and 4 ERO. EPPs provide details regarding ERO position functions.

The initial response starts with the normal Operations Shift. The operating organization, along with minimum on-shift complement is discussed in the FSAR, Section 13.1.

The Operations Shift is responsible for the safe operation of the plant and provides for 24-hour per day emergency response. The Operations Shift responds to abnormal and emergency events and takes action as necessary to mitigate the consequences of an event. Details regarding these actions are specified in the EPPs.

The following principal responsibilities are assigned to the Operations Shift until relieved by members of the ERO.

Shift Manager

- At the onset of an event, assess, classify, and declare the emergency.
- Assume the duties and responsibilities of the Emergency Coordinator.
- Implement response actions based upon the emergency classification declared.

Shift Technical Advisor

- Provide engineering expertise and advice regarding plant transient analysis, accident mitigation, core/thermal hydraulics, and other matters related to operational safety.
- Perform dose assessment.

Control Room Communications

- Notify the ERO of the event.
- Notify the State of Texas and Somervell and Hood County agencies by initial and follow-up notifications.
- Notify the NRC of the event.
- Notify other selected personnel.

Radiation Protection Technicians

- Perform in-plant and on-site radiological surveys.
- Provide radiological control coverage for emergency repair, search and rescue, first aid, firefighting and other activities.
- Provide radiological support to ERFs.

Chemistry Technicians

- Perform in-plant chemistry sampling and analysis.
- Function as part of the First Aid Team.

Security Shift Supervisor

- Control access to site property.
- Assist with site evacuation.
- Perform personnel accountability.

Emergency Teams

- Emergency Repair & Damage Control
    - Perform maintenance activities associated with mechanical equipment, electrical equipment, and instrumentation and control systems.
- Fire Brigade
    - Perform firefighting activities in accordance with site procedures.
    - Perform rescue activities.
- First Aid
    - Provide first aid services to injured personnel.
    - Provide transportation to local hospitals.

The Operations Shift is staffed to be self-reliant for a period of time to allow for the notification of other personnel and the staffing and activation of ERFs per Section II.H of this Plan. In addition to Operations Shift personnel, other personnel in the ERO assume roles in supporting the overall emergency response. Figures II.2 through II.6 provide illustrations of the ERO organization. ERO positions and principal responsibilities not discussed in this Section are discussed below.

Luminant maintains the minimum staff required to conduct routine and immediate emergency operations at the site consistent with Appendix E of 10 CFR Part 50. Section 13.1 of the FSAR discusses normal plant staffing. Site administrative procedures provide the details of the normal site organization, including reporting relationships.

2. Emergency Coordinator

The Shift Manager position is staffed continuously. Upon classifying an event, the Shift Manager assumes the role of the Emergency Coordinator until relieved by a qualified member of the management staff consistent with Section II.B.3 of this Plan or until termination of the emergency condition, whichever comes first.

The individual filling the Emergency Coordinator role has the responsibility and authority to initiate required emergency response actions, including notification of affected Federal, State, and local authorities and provision of PARs to off-site authorities.

3. Emergency Coordinator Line of Succession

If the Shift Manager is rendered unable to fulfill the duties and responsibilities of the Emergency Coordinator position (such as due to personal illness or injury) the Unit Supervisor (one per unit) present on shift (a position that is staffed continuously) assumes the Emergency Coordinator position until relieved by a qualified member of the site management staff.

The duties and responsibilities of the Emergency Coordinator are transferred after the successor has been briefed on current plant status and status of off-site and on-site emergency response activities.

The TSC Manager relieves the Shift Manager of Emergency Coordinator duties at an Alert or higher emergency classification. The TSC Manager may relieve the Shift Manager of Emergency Coordinator duties at a NOUE based on an assessment of plant conditions and support needs. After the EOF has been activated, the duties of the Emergency Coordinator may be transferred to the EOF Manager; however, the responsibilities to assess, classify, and declare the emergency shall remain with the TSC Manager unless the TSC and EOF Manager agree to transfer these functions.

A trained, higher level member of Luminant's management staff may assume Emergency Coordinator responsibilities from the Shift Manager after becoming fully familiar with the pertinent plant and radiological conditions, status of emergency response/accident mitigation efforts, and after determining that the ERFs are staffed to an extent necessary to allow him/her to perform the designated Emergency Coordinator functions.

4. Emergency Coordinator Responsibilities

The Emergency Coordinator has the responsibility and authority to immediately and unilaterally initiate provisions of this Plan and for evaluation, coordination and control of on-site activities related to the emergency response until the event is closed out or the Recovery Organization is formed. The responsibilities of the Emergency Coordinator include:

- Assessment, classification and declaration of an emergency.
- Ensuring notification of officials in Somervell and Hood Counties, DPS, the NRC, and other organizations as needed.
- Recommending protective actions to the State of Texas and Somervell and Hood County authorities.
- Approving shift schedules that support long-term emergency response to permit continuous operation.
- Authorizing on-site protective actions.
- Requesting support from Federal, State, and local emergency response agencies, as appropriate.
- Coordinating off-site emergency response activities with activities conducted on-site.

The Emergency Coordinator shall not delegate the decision-making authority for:

- recommending use of potassium iodide (KI)
- authorizing reentry into evacuated on-site areas
- authorizing personnel exposures in excess of 10 CFR Part 20 limits
- making PARs to off-site authorities
- notification of Texas and Somervell and Hood County authorities responsible for off-site emergency response

The Emergency Coordinator has the authority to request assistance from any organization which the Emergency Coordinator deems necessary to mitigate the conditions causing the emergency. In addition, the Emergency Coordinator may request off-site assistance in firefighting, rescue services, law enforcement, and medical support prior to activation of the on-site emergency response organization (see Figure II-1).

Should the Emergency Coordinator determine that additional emergency response personnel are needed at NOUE or the emergency classification is upgraded to Alert or higher, the Emergency Coordinator shall initiate activation of the EOF and Joint Information Center (JIC) EROs and notification of additional on-site personnel, as necessary. The goal for activation of the full on-site ERO is 70 minutes following the decision to activate.

5. Plant Emergency Response Positions

Luminant maintains emergency response staffing capability consistent with Table II-2 of this Plan, which is based on the guidance provided in Table B-1 of NUREG-0654 and the provisions of the Emergency Plans of currently-licensed Luminant nuclear facilities.

The ERO, when fully activated, includes the positions described in Table II-2. Additional personnel may be designated by site management or the EOF Manager as emergency responders providing special expertise deemed beneficial, but not mandatory, to the planned response. The individuals assigned as emergency response personnel are designated by site management or the EOF Manager based on the technical requirements of the position.

The ERO positions and principal responsibilities not previously discussed in Section II.B.1 and II.B.2 are discussed below.

Control Room Operations Advisor

The CR Operations Advisor serves as the contact point between the operating crew and the TSC staff.

Technical Support Center Manager

The TSC Manager relieves the Shift Manager of Emergency Coordinator duties. The TSC Manager is responsible for activation and control of emergency response activities conducted in the TSC. The TSC Manager relieves CR personnel of administrative functions and decisions and maintains direction and control of on-site emergency response activities conducted within the Protected Area which are required to place a plant in a safe, stable condition.

Technical Support Center Communications Coordinator

The TSC Communications Coordinator is responsible for coordinating communications activities in the TSC. Prior to EOF activation, the position is also responsible for administrative and logistical support.

Technical Support Center On-Site Radiological Assessment Coordinator

Once the TSC is activated, responsibilities for on-site and off-site radiological assessment and survey activities shall be assumed by the TSC On-Site Radiological Assessment Coordinator. The position provides backup dose assessment capabilities and is responsible for directing the on-site radiological assessment activities and ensuring the radiological safety of personnel on-site.

Once the EOF is activated, overall responsibility for off-site radiological assessment shall be assumed by the EOF Radiation Protection Coordinator (RPC).

Technical Support Center Operations Coordinator

The TSC Operations Coordinator serves as the Operations representative to the TSC staff and as the contact point between the TSC and the operating crew.

Technical Support Center Engineering Team Coordinator

The TSC Engineering Team Coordinator is responsible for directing and coordinating activities of the TSC Engineering Team to assess plant status and severity of emergency conditions.

Technical Support Center Engineering Team

The TSC Engineering Team is composed of at least four individuals with the experience and competence to provide technical support to the CR Staff in the following areas:

- Core reactivity monitoring and damage assessment
- Damage assessment (Mechanical/Electrical/I&C) and corrective action development
- Operations data and procedure interface
- Engineering data analysis, including core thermal hydraulics

With the location of the TSC being in close proximity to the CR (less than two minute transit time), contact is made with the CR staff for assistance and if necessary, or requested, an engineer(s) can promptly relocate to the CR.

Operations Support Center Manager

The OSC Manager is responsible for activation and control of emergency response activities conducted in the OSC. The OSC Manager is also responsible for dispatching and coordinating personnel to assist in emergency repair and damage control activities, performing radiological surveys, personnel rescue operations, establishing controlled areas, and implementing recovery actions.

Operations Support Center Radiation Protection Coordinator

The OSC Radiation Protection Coordinator directs the activities of the Radiation Protection Technicians and is responsible for providing radiological protective measures for teams dispatched from the OSC.

Operations Support Center Chemistry Coordinator

The OSC Chemistry Coordinator directs the activities of the Chemistry Technicians and is responsible for coordinating requests for chemical analysis and for coordinating medical response and spill control teams from the OSC.

Operations Support Center Emergency Response and Damage Control Coordinator

The OSC Emergency Response and Damage Control (ERDC) Coordinator directs the activities of the Maintenance personnel, and is responsible for coordinating emergency repair and damage control teams dispatched from the OSC.

On-Site Survey Teams

As CPNPP Units 3 and 4 Emergency Organization personnel become available, on-site radiological survey teams shall be formed as required and dispatched from the OSC. On-site Survey Teams initially shall be composed of at least two members, at least one of which shall be a Radiation Protection Technician. The On-site Survey Team(s) perform required on-site and in-plant surveys in accordance with approved EPPs.

Company Spokesperson

The Company Spokesperson is responsible for coordinating with the Emergency Coordinator and approving public information releases issued by Luminant from the JIC.

Joint Information Center Director

The JIC Director schedules, coordinates, and hosts press briefings and approves access to the JIC.

Joint Information Center Support Staff

The JIC Support Staff:

- gathers current technical event related information from the Emergency Coordinator and forwards to the Company Spokesperson and/or JIC Director
- informs corporate communications, government sources, and media news services of event developments and obtains emergency-related information from outside sources
- prepares press releases from approved information for dissemination to the media
- reviews received rumors and media broadcasts for consistency with approved information and reports findings to the Company Spokesperson
- host media representatives
- set up and monitor audio and visual equipment
- record news conferences
- monitor media broadcasts for event related information
- answer telephone requests for information from the public and the media

Emergency Operations Facility Manager

After the EOF has been activated, the duties of the Emergency Coordinator may be transferred to the EOF Manager. The EOF Manager is responsible for activation and control of emergency response activities in the EOF, ensuring the EOF communicates emergency status to the State and counties, directing the efforts of the off-site monitoring teams, making radiological assessments,

recommending off-site protective actions to the State and counties, and arranging for dispatch of any special assistance or services.

Emergency Operations Facility Communications Coordinator

The EOF Communications Coordinator is responsible for coordinating communications activities in the EOF.

Emergency Operations Facility Radiation Protection Coordinator

The EOF RPC and staff (see Figure II-5) are responsible for coordinating Luminant's off-site radiological monitoring efforts. The EOF RPC is also responsible for coordinating Luminant's off-site radiological assessment activities with those of Federal, State of Texas and Somervell and Hood County agencies.

- The EOF Off-Site Radiological Assessment Coordinator (OFFRAC), who reports to the EOF RPC, is responsible for coordinating the efforts of the off-site radiological assessment team in performing activities such as:
    - Nuclear Operations Support Facility (NOSF) habitability
    - Dose projections and assessment
- The Off-site Monitoring Team Director, who reports to the EOF RPC, is responsible for coordinating the efforts of the off-site radiological monitoring team(s) in performing activities such as:
    - Locating and tracking the off-site plume
    - Off-site monitoring team direction and control

Emergency Operations Facility Logistical Support Coordinator

The EOF Logistical Support Coordinator and his staff (see Figure II-5) coordinate requests from the ERO for administrative and logistical assistance. These requests include such items as meals, parts and supplies, transportation, and manpower issues (such as shift relief schedules).

Emergency Operations Facility/Technical Support Center Liaison

The EOF/TSC Liaison provides technical support (which includes classification input if required) to the EOF Management team and serves as a liaison between the EOF personnel and the TSC Engineering team.

Emergency Operations Facility Security Coordinator

The EOF Security Coordinator is responsible for coordinating on-site security force activities.

Emergency Response Organization Support Staff

- assist the ERO with facility activation and provide expertise and information to ERO personnel concerning both utility and

off-site supporting agency facilities, communication capabilities, personnel and equipment resources, and procedural requirements

- augment and advise State/county emergency organizations
- provide an interface between the emergency facilities, accident assessment teams, and Federal, State of Texas and Somervell and Hood County authorities
- duties such as maintaining logs, answering phones, transmitting faxes, and distributing information.
- post and update status boards within the emergency response facilities.

6. Interfaces Between Functional Areas

Figure II-1 illustrates the interfaces among ERFs of CPNPP Units 3 and 4 emergency response activity, Luminant corporate support, and State of Texas and Somervell and Hood County government response organizations.

7. Corporate (Off-site) Support for the Plant Staff

Luminant maintains sufficient management and personnel resources to effectively staff (24 hours) the ERO and its intended emergency mitigation functions. This arrangement preempts the need for a separate organization of off-site corporate personnel to be identified for, and incorporated in, the ERO; however, in the event of an emergency requiring assistance from off-site organizations, Luminant is fully committed to providing other resources to assist the ERO. Corporate capabilities that exist within Luminant include:

a. Public information services
b. Materials Procurement Services
c. Contract manpower and construction services
d. Legal and insurance services
e. Additional technical support

8. Support from Contractor and Private Organizations

Support from private sector organizations may be obtained through direct notification to the individual organization. The following organizations provide services, if requested:

<u>Mitsubishi</u>

Luminant may request that the reactor vendor, Mitsubishi Nuclear Energy Systems, Inc., provide technical support for emergency response activities. Mitsubishi Nuclear Energy Systems, Inc. will operate from its corporate offices, with a small contingent at the plant, if requested.

Institute of Nuclear Power Operations

The Institute of Nuclear Power Operations (INPO) serves as a clearinghouse for industry-wide support during an emergency. When notified of an emergency situation, INPO provides emergency response as requested. INPO provides the following emergency support functions:

- Assistance to the affected utility in locating sources of emergency manpower and equipment
- Analysis of the operational aspects of the incident
- Dissemination to member utilities of information concerning the incident
- Organization of industry experts who could advise on technical matters

If requested, one or more suitably qualified members of the INPO staff will report to the EOF Manager and assist in coordinating INPO's response to the emergency.

South Texas Project

The South Texas Project provides a backup service for analyzing Post-Accident Samples.

American Nuclear Insurers

Luminant maintains a policy with American Nuclear Insurers (ANI). ANI has agreed to assume responsibility for promptly assisting members of the public who may be adversely affected by an event at CPNPP Units 3 or 4. This insurance policy alleviates the immediate financial burden that may be incurred by members of the public due to evacuation and relocation associated with an incident. ANI will have their representatives on the scene, prepared to commence the distribution of emergency funding at the earliest possible time, on a 24-hour per day basis.

9. Local Emergency Response Support

Luminant has established and maintains agreements for local emergency response support services, including firefighting, rescue squad, medical and hospital services. The local response organizations involved with emergencies at CPNPP Units 3 and 4 are the Hood County and Somervell County Emergency Organizations. Appendix 7 of this Plan contains certification letters for organizations providing the respective services.

Figure II-2 Emergency Response Organization – Shift Manager as Emergency Coordinator

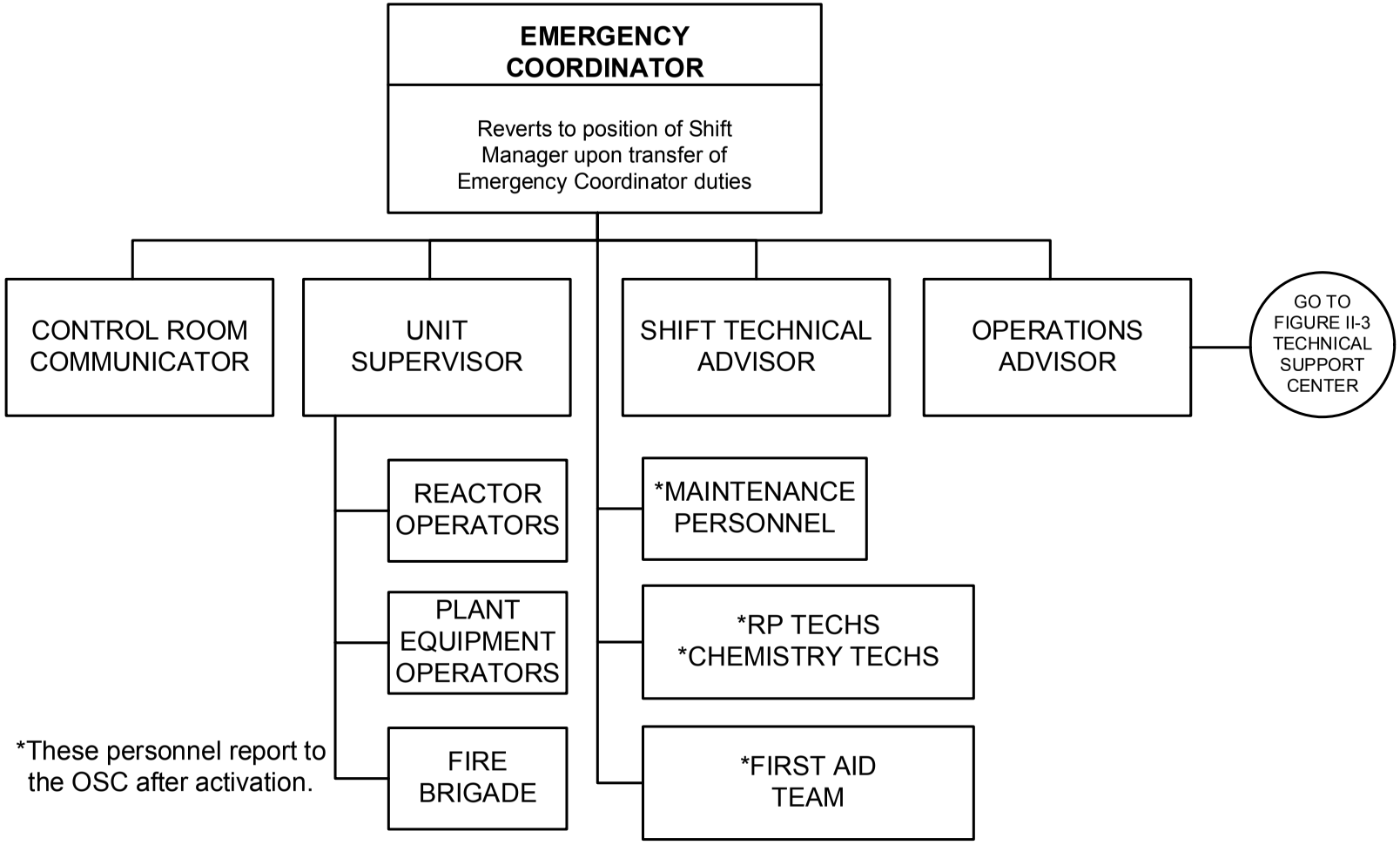


Figure II-3 Emergency Response Organization – Technical Support Center Manager as Emergency Coordinator

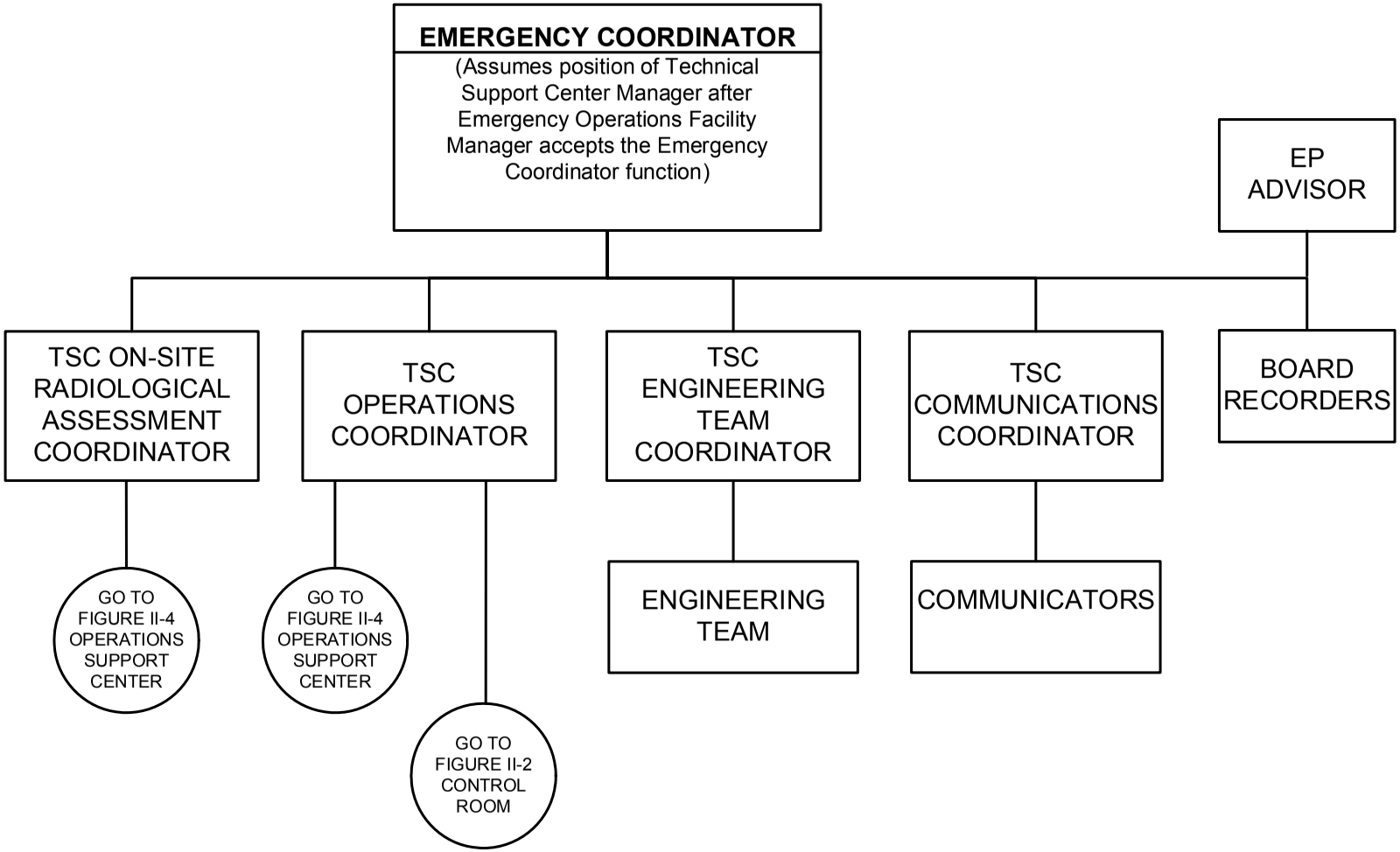


Figure II-4 Emergency Response Organization – Operations Support Center

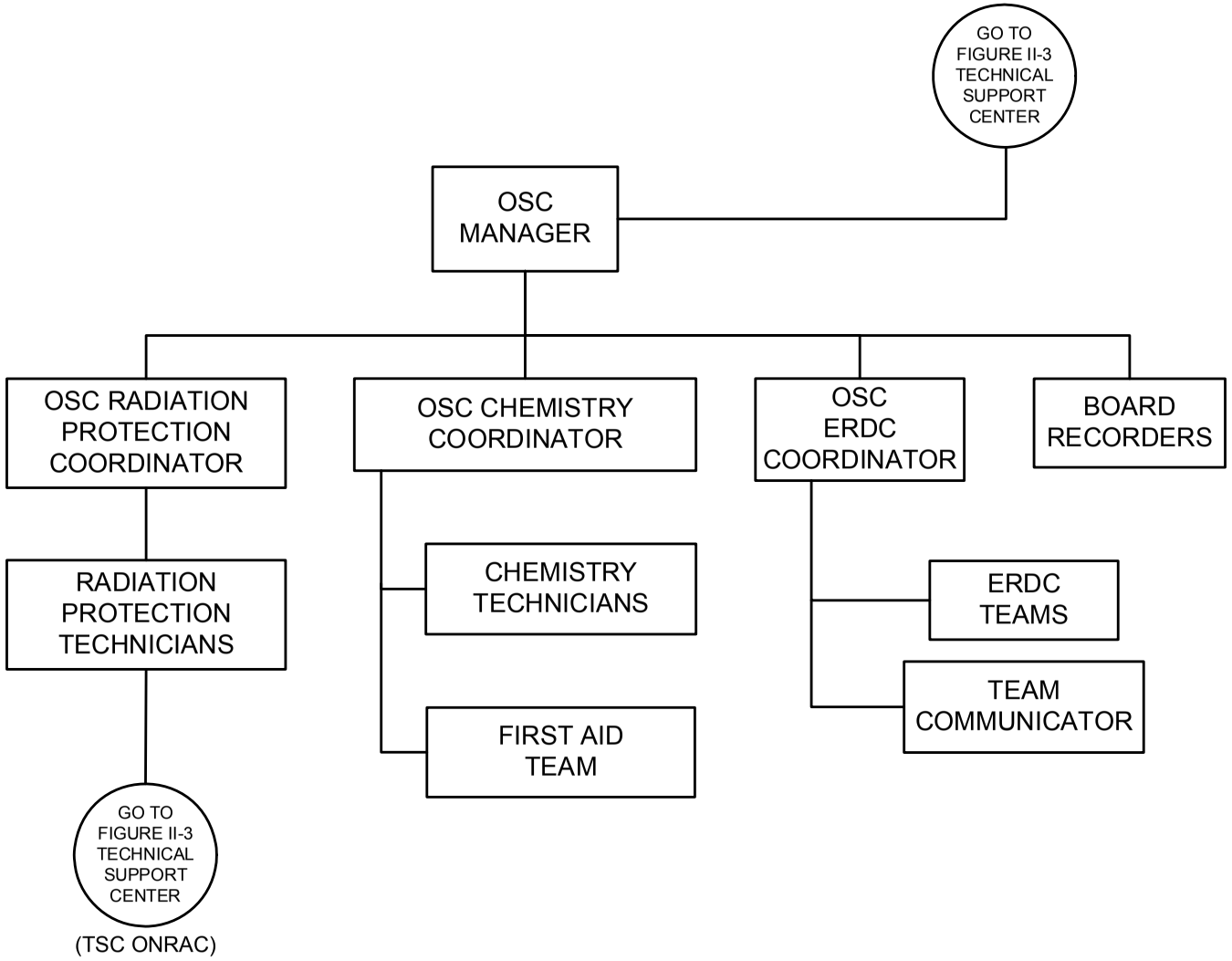


Figure II-5 Emergency Response Organization – Emergency Operations Facility Manager as Emergency Coordinator

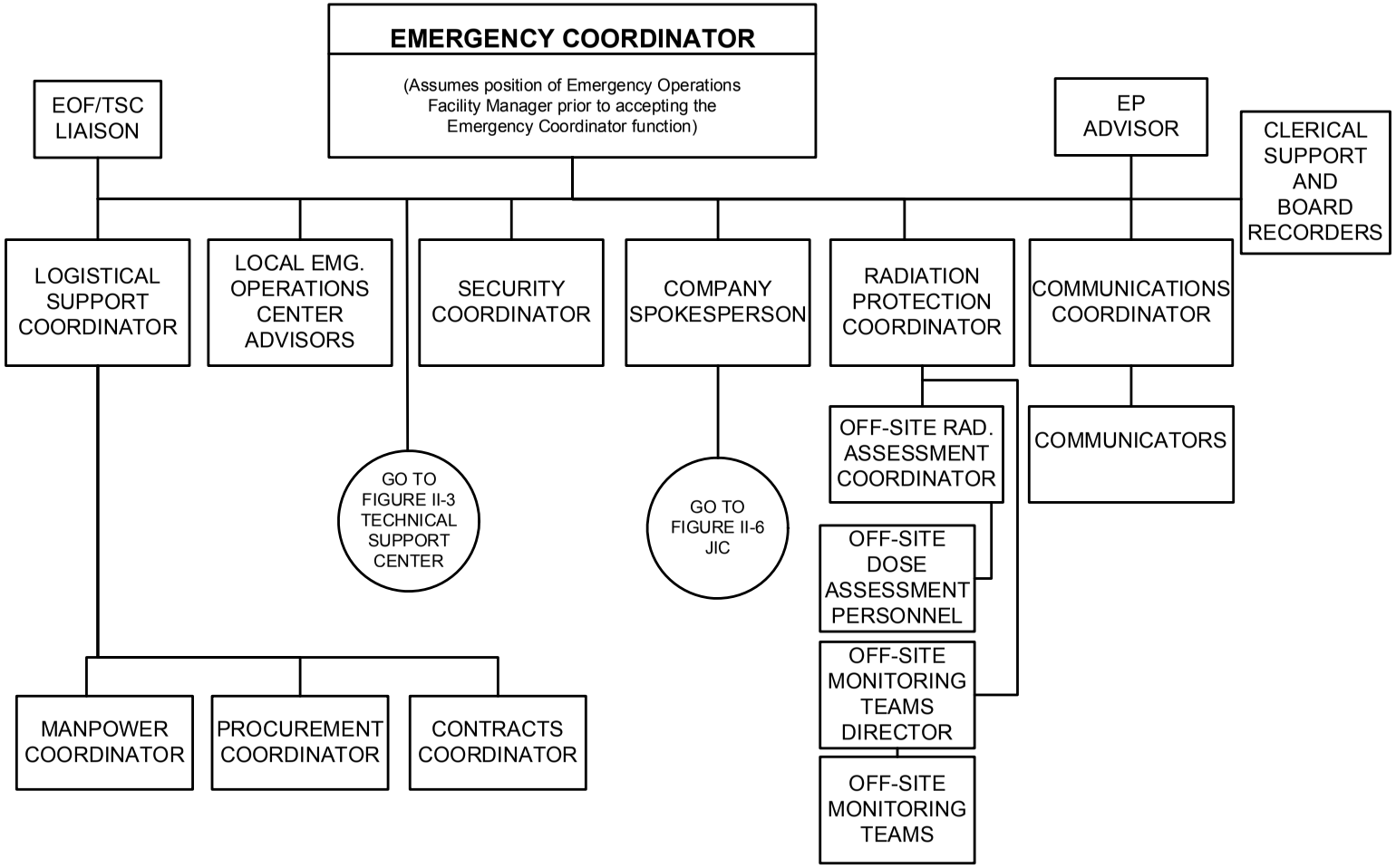


Figure II-6 Emergency Response Organization – JIC

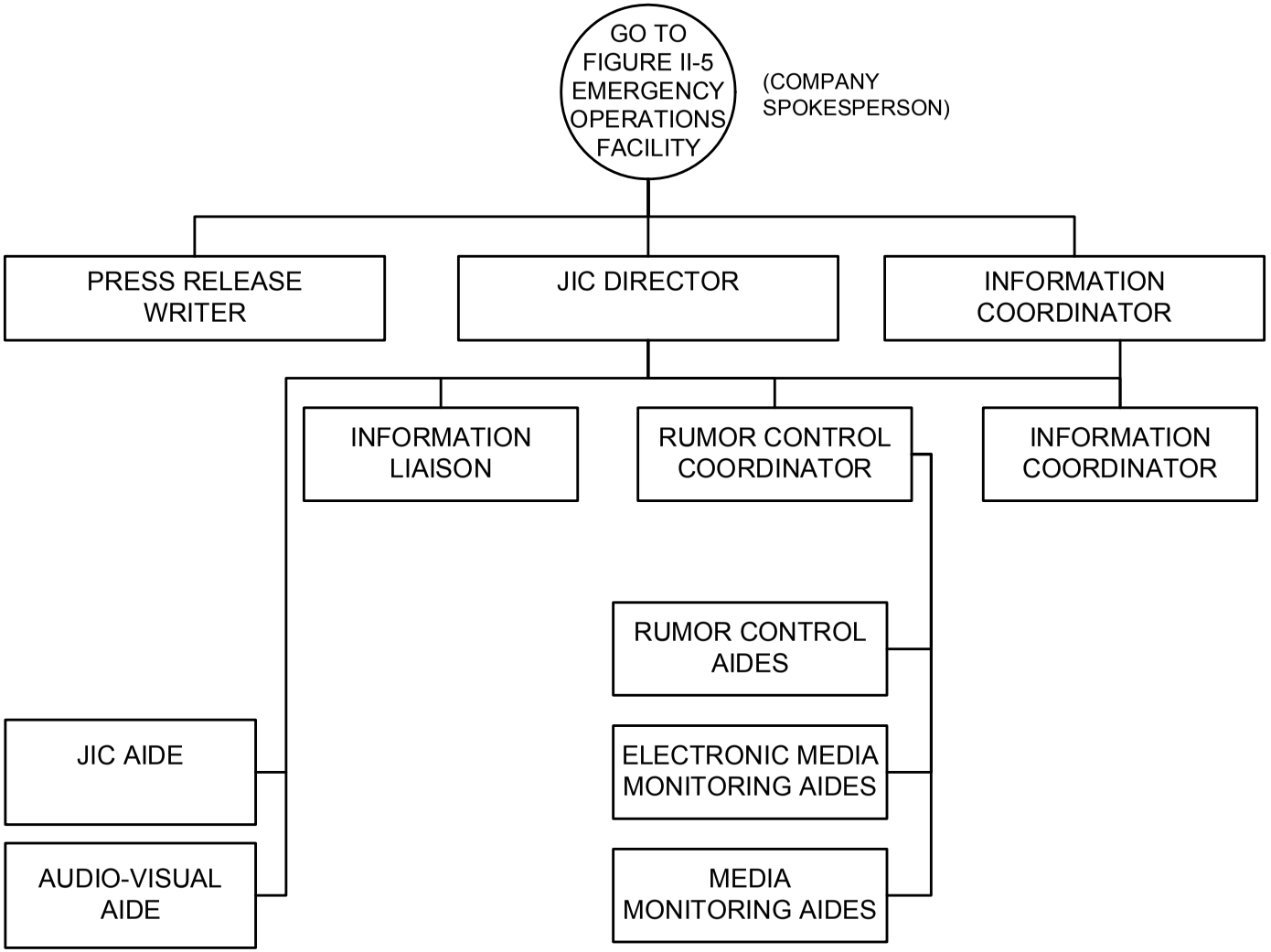


Table II-2 Plant Staffing Requirements for Emergencies

FUNCTIONAL AREA	TASK	ON-SHIFT [c]	CAPABILITIES FOR ADDITION [e]	
			40 MINUTES	70 MINUTES
Station Operations	Plant operations and assessment of operational aspects	1 – Shift Manager (SRO) [d]		
		1 – Unit Supervisor (SRO) [d]		
		2 – Reactor Operators (RO) [d]		
		2 – Plant Equipment Operators [d]		
Emergency Direction and Control	Direction and control of on-site emergency activities as Emergency Coordinator	1 – Shift Manager (SRO) [b]		1 – TSC Manager 1 – EOF Manager
Notification/Communications	Notify station, local, state and federal personnel and maintain communications	1 – Communicator [d] 1 – Communicator [a]		1 – TSC Communications Coord. 1 – TSC ENS Communicator 1 – EOF Communications Coord.
Radiological Accident Assessment and Support of Operational Accident Assessment	In-Plant Survey	Radiation Protection Technician [f]		2 – Radiation Protection Technician
	Chemistry/Radiochemistry	Chemistry Technician [f]		1 – Chemistry Technician
	On-site Surveys	Radiation Protection Technician [f]		1 – Radiation Protection Technician
	Off-site Surveys		2 – Radiation Protection Technician	2 – Vehicle Driver
	Dose Assessment	1 – Shift Technical Advisor [a]	1 – TSC OnRAC	1 – EOF Dose Assessor
	Protective Actions	2 – Radiation Protection Technician [a]	2 – Radiation Protection Technician	2 – Radiation Protection Technician
	Coordination/Control	1 – Shift Manager [a, b]	1 – TSC OnRAC [a]	1 – EOF RP Coordinator
Station System Engineering	Coordination/Control			1 – TSC Engineering Team Coord.
	Technical Support	1 – Shift Technical Advisor [a]		4 – TSC Eng. Team Members
System Repair/Corrective Action	Emergency repair and damage control			1 – OSC Manager
		1 – Radwaste Operator [a]		1 – Plant Equipment Operator
		Mechanic [f]		1 – Mechanic
		Electrician [f]		1 – Electrician
		I&C Technician [f]		1 – I&C Technician
Fire	Fire fighting and rescue operations	Per Final Safety Analysis Report	Local Support	
Medical	First Aid	2 – First Aid Team Member [a]	Local Support	
Security	Site access control and personnel accountability, security	Per Security Plan	Local Support	1 – EOF Security Coordinator
Public Information	Approve release of public information from Luminant	1 – Shift Manager [a, b]		1 – TSC Manager [a] 1 – Company Spokesperson
Logistics	Obtain/expedite needed resources for the Luminant Emergency Response Organization	1 – Shift Manager [a, b]		1- TSC Communications Coord. [a] 1 – EOF Logistical Support Coord.

(a) May be provided by on-shift or augmentation personnel assigned other functions.
(b) Shift Manager serves in this capacity until relieved by a designated individual

(c) The minimum on-shift crew composition may be one (1) less than the minimum specified for any position during normal operations for a period of time not to exceed two (2) hours in order to accommodate unexpected absence, provided immediate action is taken to fill the required position. This exception does not permit any crew composition to be unmanned upon shift turnover due to an oncoming crew member being late or absent. This exception is not applicable during declared emergencies.
(d) Indicates shift staffing level for each Unit.
(e) Capabilities for addition shown for the TSC and OSC are at Alert and for the EOF at SAE or GE.
(f) On-shift staffing is provided in Technical Specifications for these positions.

C. Emergency Response Support and Resources

Arrangements for requesting and using assistance resources are described in this section of the Plan. Arrangements for accommodating the State of Texas and Somervell and Hood County staff at the EOF are discussed. Other support organizations are described.

1. Federal Response Capability

a. Under some complex circumstances it may be necessary to obtain off-site radiological monitoring support from Federal government agencies. The Emergency Coordinator or EOF Manager is authorized to request FRMAC assistance on behalf of the site by contacting the NRC (Federal Coordinating Agency).

b. Federal radiological monitoring assistance may be provided by DOE under the DOE Radiological Assistance Program (RAP).

   Luminant estimates that a FRMAC Advance Party will arrive within three to four hours following the order to deploy, based on driving time. This response time may be shortened by use of aircraft.

   Luminant expects that NRC assistance from NRC's Region IV Office in Arlington, TX, will arrive within three to four hours following notification; the team may reduce this response time by use of aircraft.

c. Luminant provides facilities and resources needed to support the Federal response through the EOF. Available resources include office space and telephones. Luminant will also provide limited office space and telephone communications facilities for NRC personnel in the TSC.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

2. Off-site Organization Representation in the EOF

a. The Texas Emergency Management Plan and Somervell and Hood Counties' Emergency Operations Plans address dispatching representatives to the EOF if deemed advisable by the County Judge(s). Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

   Designated work areas have been provided in the EOF for the State of Texas and State Radiation Protection Liaisons.

b. In the event of an emergency requiring off-site assistance, Luminant dispatches advisers to the Texas EOC in Austin, the Hood County EOC, and the Somervell County EOC.

3. Radiological Laboratories

Radiological laboratories available to support emergency response efforts include the TDSHS mobile radiological laboratory, the DOE Radiological Assistance Team, the U.S. EPA, and the South Texas Project. Fixed facilities are available for gross counting and spectral analysis in the site counting laboratory. These radiological laboratories are available on a 24 hour per day basis and could provide their services and equipment on demand.

Appendix 8 of this Plan provides a cross-reference to these provisions in State Plans, as applicable.

4. Other Supporting Organizations

Luminant has made arrangements to obtain additional emergency response support from the INPO Fixed Nuclear Facility Voluntary Assistance Agreement signatories. Letters of Agreement, provided in Appendix 7 of this Plan, outline the scope of the expected support.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

D. Emergency Classification System

Luminant implements the standard emergency classification scheme discussed below based on system and effluent parameters, on which the State of Texas and Somervell and Hood Counties may rely for determining minimum initial off-site response measures.

The ICs include the conditions provided in NEI 99-01, "Methodology for Development of Emergency Action Levels," Rev. 5 (Reference 7) as applied to US-APWR facilities and postulated accidents identified in the FSAR. The US-APWR uses a digital control system that is not addressed in NEI 99-01. Accordingly, related guidance in NEI 07-01, "Methodology for Development of Emergency Action Levels for Advanced Passive Light Water Reactors," Rev. 0 (Reference 8) is used. EALs established for each emergency classification have been accepted by off-site authorities responsible for implementing protective measures for the population-at-risk.

The classification system is not intended to include minor deviations during normal operation. Furthermore, it may be discovered that an event or condition, which met the classification criteria had existed, but that the basis for the emergency class no longer exists at the time of discovery. For example, the event may have rapidly concluded or been discovered during a post-event review. As discussed in NUREG-1022, "Event Reporting Guidelines: 10 CFR 50.72 and 50.73," Rev. 2 (Reference 9), actual declaration of an emergency class is not necessary in these circumstances, although notification to the NRC, the State of Texas and Somervell and Hood County agencies is warranted.

1. Classification System

Appendix E of 10 CFR Part 50 identifies four distinct classes of emergencies: NOUE, Alert, SAE, and GE.

ICs that determine the appropriate classification are generally described in the following paragraphs. Appendix 1 provides detailed ICs and EALs based on specific instrument readings, parameters or equipment status used to determine whether an emergency class threshold has been reached. If plant conditions change in severity, the situation is reassessed and reclassified (if appropriate) and corresponding actions are taken.

The definitions of these emergency classes, more fully discussed in NEI 99-01, are as follows:

- NOUE – Events are in process or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring off-site response or monitoring are expected unless further degradation of safety systems occurs.
- Alert – Events are in process or have occurred which involve an actual or potential substantial degradation of the level of

safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of hostile action. Any releases are expected to be limited to small fractions of the EPA Protective Action Guide (PAG) exposure levels.

- SAE – Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or hostile actions that result in intentional damage or malicious act: 1) toward site personnel or equipment that could lead to the likely failure of or; 2) that prevent effective access to, equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA PAG exposure levels beyond the site boundary.
- GE – Events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity or hostile action that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA PAG exposure levels off-site for more than the immediate site area.

Appendix 1 of this Plan provides recognition categories, the associated IC matrices, and the EALs.

2. Emergency Action Levels

Luminant adopts the EAL methodology provided in NEI 99-01, Rev. 5. EALs contained in this Plan are subject to further review and modification to reflect additional information related to final facility design and operation as reflected in the US-APWR Design Control Document (DCD) (Reference 10) and FSAR.

The US-APWR uses a digital control system that is not addressed in NEI 99-01. Accordingly, related guidance in NEI 07-01 is used. Appendix 1 provides the parameter values and equipment status that are indicative of each emergency class.

The Emergency Coordinator or EOF Manager will close out the emergency class by providing a verbal summary to the affected off-site authorities, followed by a Licensee Event Report or written summary. The Emergency Coordinator or EOF Manager may delegate the required notifications and reports, but must approve their content.

3. State/Local Emergency Action Level Scheme

The State of Texas and Somervell and Hood Counties have adopted the emergency classification scheme and EALs established by this Plan. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

4. State/Local Emergency Action Procedures

The State of Texas and Somervell and Hood Counties have established procedures that provide for emergency actions to be taken which are consistent with emergency actions recommended by Luminant. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

E. Notification Methods and Procedures

Luminant has established procedures for notification of the State of Texas and Somervell and Hood Counties' EROs. This section discusses notification of emergency personnel, the content of initial and follow up messages to EROs and the public, and the means to provide early notification and clear instruction to the public within the Plume Exposure Pathway EPZ.

1. Notification of State and Local Authorities

The Emergency Coordinator initiates notification of the State of Texas and Somervell and Hood Counties' authorities when the following conditions occur:

- Initial declaration of an emergency classification
- Escalation of an emergency classification
- Initial PAR
- Change in a PAR
- Emergency Termination and Reclassification
- Emergency Termination (with no reclassification)

Initial notifications shall begin no later than fifteen (15) minutes after one of the above conditions are met.

Initial notifications are made to the following:

- Somervell County Sheriff or Dispatcher
- Hood County Sheriff or Dispatcher
- DPS

A dedicated line has been established that simultaneously links CPNPP with the DPS, the Somervell County EOC, and the Hood County EOC. Section II.F.1 of this Plan provides a description of the primary and back-up notification systems. Message content and verification methods are established in EPPs and agreements between the affected organizations.

The NRC is notified as soon as is practical following the notification of the State of Texas and Somervell and Hood County authorities and within one hour of the emergency declaration, including escalation or termination. The primary notification system to be used is the Emergency Notification System (ENS). Back-up notification capability is maintained through the use of commercial telephone systems.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

2. Notification and Mobilization of Licensee Response Organizations

The Emergency Coordinator directs the notification of the ERO and Security Shift Supervisor upon declaration of an Alert or higher level emergency. Although Luminant does not expect that the augmented resources of the ERO would be required for a NOUE, the entire, or a portion of the ERO may be mobilized at the NOUE level at the discretion of the Emergency Coordinator.

The plant is provided with an alarm system as described in Section II.F.1 of this Plan. This system is activated from the CR.

ERO personnel are notified of emergency conditions in accordance with the provisions of EPPs. ERO personnel are notified by either the plant page-party system or the autodial calling system utilizing commercial telephone lines. The automatic dialing system is used to call-out Emergency Response Personnel. The system is used at Alert or higher class emergency. As an individual is contacted, a message is played informing them that an emergency is in progress and of the action(s) which should be taken. This system uses multiple telephone lines to contact the response organization. Should this system fail to operate, a backup notification method is used to contact emergency personnel.

A pager system is available and serves as an alternate means to notify selected members of the ERO. Activation of the pager system is at the direction of the Emergency Coordinator and is normally carried out at an Alert or higher emergency classification.

The plant page-party system, part of the public address system, allows CR personnel to announce emergency information to plant areas and permanent buildings for both units. Similar capabilities exist in the TSC and the EOF for use by Emergency Coordinators.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

3. Message Content

Initial notifications to Somervell County EOC, Hood County EOC, and DPS have been established in conjunction with the State of Texas and Somervell and Hood Counties and provide the following information:

- CPNPP Units 3 and 4 Communicator's Name
- Emergency Classification and brief description of emergency
- Whether an emergency-related radiological release is occurring
- PARs,
- Potentially affected areas and populations

4. Follow-up Messages to Off-site Authorities

Dedicated communicators are assigned to maintain communications with designated authorities and to provide regular updates to the State of Texas and Somervell and Hood County officials approximately every 60 minutes, when conditions change, or as otherwise requested by off-site authorities.

In addition to information required for an initial notification discussed in Section II.E.3 of this Plan, the following information is provided in the follow-up notification:

- Meteorological conditions (wind velocity and direction; temperature; atmospheric stability data; and form of precipitation, if any)
- IF needed, requests for on-site support
- IF requested by RCP:

  a. Type of radiological material release (whether actual or projected): airborne, waterborne or surface spill and estimated or known release duration

  b. Estimated or known quantities of radioactive material released

  c. Point of release

  d. Chemical and physical form of released material, including estimates of relative quantities and concentrations of noble gases, radioiodines and particulates

  e. Estimates or known quantities of radioactive surface contamination, on-site or off-site

  f. Actual or projected dose rates and integrated doses at the CPNPP Units 3 and 4 site boundary and at two, five, and 10 miles, and affected sectors and Emergency Response Zones (ERZs).

  g. Prognosis for escalation or termination of emergency based on current plant information

  h. Licensee emergency response actions underway

5. Disseminating Information to the Affected Public

The State of Texas and Somervell and Hood Counties' Plans establish a system for disseminating to the public appropriate information contained in the initial and follow-up messages received from Luminant including the appropriate notification to the Emergency Alert System (EAS). Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

6. Instructions to the Public in the Plume Exposure EPZ

The primary method of alerting the resident and transient population is by sounding the Alert and Notification System. The Alert and Notification System includes an outdoor warning system, measures for notifying special facilities, and notification of the public. The system is designed to meet the acceptance criteria of Section B of Appendix 3, NUREG-0654, FEMA-REP-10, "Guidance for the Evaluation of Alert and Notification Systems for Nuclear Power Plants" (Reference 11) and FEMA CPG-17, "Outdoor Warning Systems Guide" (Reference 12).

Local officials, primarily County Judges and County Sheriffs, authorize use of and are responsible for operating the Alert and Notification System and providing messages to the EAS stations. Preformatted EAS messages are included in State and county emergency plans.

As a back-up, State and local plans maintain the alert mechanism via systems such as emergency vehicles, automated dialing systems, and public address systems to also alert the public to monitor commercial broadcasts for emergency information.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

7. Written Messages to the Public

Written pre-planned EAS messages intended for transmittal to the public via radio and television stations are consistent with the classification scheme. These messages are released to the media by the Emergency Management Director (County Judges) or their designees. The messages give instruction with regard to specific actions to be taken by the occupants of the affected area. As appropriate, the messages provide information on the nature of the emergency and recommended protective actions, including sheltering, evacuation, and the use of KI, as appropriate. Luminant supports development of these messages by providing supporting information.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

F. Emergency Communications

The CPNPP Units 3 and 4 comprehensive communications system is designed to provide prompt, reliable, redundant intraplant communications, plant-to-off-site communications, and off-site emergency response communications with the State of Texas and Somervell and Hood Counties' EROs during normal operation and during accident conditions.

1. Description of Communication Links

Luminant maintains systems and procedures that provide for rapid communications between its ERFs and between CPNPP and off-site ERFs. Dedicated communicators are available to maintain a continuous channel of communications with the NRC as requested and to provide regular updates to the State of Texas and Somervell and Hood County officials approximately every 60 minutes, when conditions change, or as otherwise agreed. The communication system consists of the following subsystems:

- Public Address System / Plant Page – Party System
- Private Automatic Branch Telephone Exchange (PABX)
- Sound Powered Telephone System (SPTS)
- Plant Radio System
- Off-Site Communication System

Communication systems vital to operation and safety are designed so that failure of one component would not impair the reliability of the total communications system.

The communication systems provide independent, alternate and redundant ability to communicate with site and off-site agencies during all operating conditions. Subsection 9.5.2 of the US-APWR DCD provides additional details regarding the communications systems.

Luminant has installed and maintains a microwave communications system between CPNPP and the Dallas Area. This system increases the reliability of the plant-to-off-site telephone system by providing an alternate off-site path from the local Glen Rose telephone system for CPNPP telephone trunks. This microwave system consists of microwave towers located at CPNPP, at Luminant facilities in the Cedar Hill area of Dallas and at two locations in between. This microwave system provides circuits to CPNPP Units 3 and 4 which are used for local Dallas commercial trunk lines, and other Luminant telephone and data circuits.

The plant is provided with an alarm system as described in Section II.F.1 of this Plan. This alarm is initiated by the CR operator in the event that a site evacuation is ordered by the Emergency Coordinator.

Luminant maintains reliable communications links both within the plant and between the plant and external EROs.

a. Luminant maintains capabilities for 24 hours per day emergency notification to the State and county emergency response organizations. The State of Texas and Hood and Somervell Counties are capable of receiving 24 hour per day emergency notifications.

b. Notification to DPS and Somervell and Hood County Sheriff's Offices is made through the following communication links:

- A dedicated circuit has been established that simultaneously links CPNPP Units 3 and 4 with the DPS, the Somervell County Sheriff's office and the Hood County Sheriff's office. When a call has been initiated, the other telephones ring until answered. Communications by CPNPP individuals, unrelated to an emergency, exercise/drill, system test or Public Information notification are not conducted on this line.

  Following activation of the local EOCs, communication with Hood and Somervell Counties is made through the respective EOC.

- Private telephone capability to the county and State warning points/Sheriff's offices serves as backup to the dedicated circuit.

- Voice and facsimile communications capability is provided via the PABX telephone system between the CR, TSC, EOF, OSC, the Luminant Corporate Office, NRC, State agencies and county Sheriff's offices.

c. Federal Telecommunications System:

The Federal Telecommunications System (FTS) is an independent phone link used for communications between CPNPP and the NRC. The FTS lines are used as the ENS, Health Physics Network (HPN), and for NRC personnel communications. Extensions to the FTS are in the Control Room, TSC and EOF. A communications equipment test shall be conducted monthly in accordance with applicable EPPs and shall involve the ENS telephone in the CR and the ENS and HPN telephones in the TSC and EOF.

d. Luminant provides capability for emergency response communications between emergency response support personnel (e.g., on-site and off-site radiological monitoring teams and emergency repair and damage control teams) and the CR, TSC and the EOF using the intraplant radio transmitter-receiver system described above. Additionally, a number of trunk lines provide direct communications between off-site locations and various CPNPP ERFs. These lines allow

State of Texas and Somervell and Hood County EROs to communicate with their personnel and facilities stationed on-site and allow CPNPP Units 3 and 4 radiological monitoring teams to transmit field data should their radio fail.

TDSHS field monitoring team communications are described in the State Plan.

The Security Organization uses separate communication channels of unique frequency to enable two-way radio communication between security posts and various plant buildings. Portable transmitter-receivers are provided to security personnel for communication between areas of the plant.

e. Notification, alerting and activation of emergency response personnel in the TSC, OSC, and EOF are described in Section II.E.2 of this Plan.

f. Communications between CR/TSC/EOF to the NRC Operations Center is via the ENS or private telephone. Communications from the CR/TSC/EOF to the regional office is via the normal private telephone capability. Communications between the TSC/EOF and off-site monitoring teams is via the radio system described in Section II.F.1.d.

g. Luminant will activate the Emergency Response Data System (ERDS) within one hour of the declaration of an Alert or higher emergency classification.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

2. Communication with Fixed and Mobile Medical Support Facilities

Emergency medical transportation, including communications capabilities, is discussed in Section II.L.4 of this Plan.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

3. Communication System Periodic Testing

Sections II.H.10, and II.N.2.a of this Plan provide additional information regarding communications systems testing.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

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G. Public Education and Information

This section of the Plan discusses information provided to the public on a periodic basis describing how they will be notified and what their initial actions should be in an emergency. Principal points of contact with the news media for dissemination of information during an emergency are established. Procedures are established for coordinated dissemination of information to the public by designated members of the Luminant, State of Texas and Somervell and Hood Counties' EROs.

1. Public Information Program

A public information program has been developed with the State of Texas and Somervell and Hood County authorities to disseminate pertinent emergency response information to members of the public in the Plume Exposure Pathway EPZ. Emergency information is provided annually to residents through the distribution of printed material by Luminant. Distribution methods include providing informational publications, such as information sections in local telephone directories and brochures or calendars via mailings to individual households in the Plume Exposure Pathway EPZ. A website also provides the information electronically.

These publications include information on how the public will be notified (e.g., primary EAS station that broadcasts emergency information) and what their actions should be in an emergency. This information also addresses the following:

a. Educational information on radiation;

b. Point of contact for additional information;

c. Immediate actions and protective measures, such as information addressing evacuation routes, reception centers, sheltering and radio-protective drugs, including an EPZ map illustrating evacuation zones and routes;

d. A method for those with special needs to inform the local responsible agency of their location and nature of the special assistance required.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

2. Distribution and Maintenance of Public Information

Written information applicable to permanent residences is provided in a form that is likely to be maintained in the residence (e.g. telephone directory inserts and advertisements, brochures, and calendars) so it is available during an emergency. As discussed above, this information is updated and distributed annually.

Information intended for the transient population (individuals on vacation in, camping in, or traveling through the Plume Exposure Pathway EPZ) may include public postings and publications provided

to selected local businesses, public buildings, recreational areas, hotels, motels, and campgrounds. This information provides transients sources for local emergency information, such as local EAS radio stations, telephone numbers for the Somervell and Hood County Sheriff's offices, instructions if asked to take shelter or evacuate, as well as maps and directions for evacuation routes and reception centers.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

3. News Media Coordination

a. During an emergency, news conferences are coordinated with Federal, State, and local public information personnel. Upon declaration of a SAE or higher emergency classification the JIC is activated in accordance with the EPPs. The JIC, located in the Granbury City Hall at 116 W. Bridge, in Granbury, TX, functions as the single contact point for dissemination of emergency-related information to the news media.

b. The JIC provides space for approximately 75 media personnel and is located outside the Plume Exposure Pathway EPZ.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

4. Information Exchange

a. A Company Spokesperson who has access to required information provides plant status and company information during scheduled news conferences and media briefings. The Information Liaison and Company Spokesperson are the primary contacts for the news media for Luminant.

b. Luminant liaisons coordinate with designated members of the State of Texas and Somervell and Hood County EROs on a periodic basis.

c. Rumor control is accomplished through ongoing contact between the designated Company Spokesperson, the State of Texas' Public Information Coordinator and Somervell and Hood County Public Information Officers. Luminant's Rumor Control Coordinator and Rumor Control Aides in the JIC monitor communications, identify rumors, and make appropriate contacts to obtain and disseminate accurate information through the representatives in the JIC. Luminant customer inquiries are handled by Customer Contact Centers. Employees are updated via the company intranet/portal. Elected officials and regulatory agencies are updated through Luminant Corporate Communications and Governmental

Affairs departments. Industry groups assist in disseminating information to other industry groups.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

5. News Media Training

The news media organizations are provided information and offered a briefing annually regarding the emergency plans, information concerning radiation hazards, and points of contact for release of public information during an emergency.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

H. Emergency Facilities and Equipment

This section of the Plan describes emergency response facilities and equipment used by the CPNPP ERO in the event an emergency is declared at CPNPP Units 3 and 4.

Facility activation is dependent on the emergency classification; however, the Emergency Coordinator has the option of activating one or all of the ERFs at an emergency classification less severe than that described in the EPPs. Details regarding activation of each ERF are provided in EPPs.

The facilities required in the implementation of the Plan consist of the:

- CRs
- OSC
- TSCs
- EOF

These facilities are designed consistent with the guidance provided in NUREG-0696 (Reference 13) and the clarification in NUREG-0737, Supplement 1 (Reference 14), as applicable.

1. On-Site Emergency Response Facilities

Control Rooms

The CR of the affected unit(s) is the initial location for command and control of the emergency response effort and is also the location where the initial assessment and coordination of corrective actions for emergency conditions takes place. The CR, because of its role in normal site operations, is continuously staffed and functional. Controls, instrumentation and displays needed to diagnose plant conditions and to take immediate actions to place the affected unit(s) in a safe condition are available in the CR. Within the CR, the Emergency Coordinator has access to the information needed to classify the emergency.

The CR has the required shielding and ventilation system to remain habitable during the emergency. The habitability system for the CR is described in Section 6.4 of the FSAR.

Access to the CR is limited to those individuals responsible for carrying out assigned emergency response tasks plus other technical advisors, as necessary.

Technical Support Centers

The CPNPP Units 3 and 4 TSCs (one for each unit) provide the following functions:

- Provide plant management and technical support to plant operations personnel during emergency conditions.
- Relieve the ROs of peripheral duties and communications not directly related to reactor system manipulations.

- Prevent congestion in the CR.
- Perform EOF functions until the EOF is activated.
- Serve as primary communications center for the plant during the emergency.
- Provide technical support during recovery operations following an emergency.

The following sections of the US-APWR DCD describe the design of the TSC:

- Section 7.1
- Section 7.5
- Section 9.4
- Section 9.5
- Section 13.3

Personnel assigned to the TSC are notified at an Alert or higher emergency classification and should activate the facility as soon as possible with a goal of sixty (60) minutes in accordance with EPPs. Once activated, the TSC provides technical support to the CR without obstructing plant manipulations or causing overcrowding in the CR.

Display capability in the TSC includes a workstation that, at a minimum, is capable of displaying the parameters that are required of a Safety Parameter Display System (SPDS). The SPDS function is described in Subsection 7.5.1.4 of the DCD.

Operations Support Center

A common OSC, separate from the CR and TSC, is located in the Maintenance Building between Units 3 and 4. The OSC provides a centralized area and the necessary supporting resources for the assembly of designated operations support personnel during emergency conditions. This permits personnel reporting to the OSC to be assigned to duties in support of emergency operations.

Designated plant support personnel, as indicated in Section II.B of this Plan, assemble in the OSC to provide support to both the CR and TSC of the affected unit. The primary function of the OSC staff is to dispatch assessment, corrective action, and rescue personnel to locations in the plant, as directed by the TSC and CR. The OSC is adequately sized to accommodate 50 emergency response support personnel.

The OSC is not designed to remain habitable under every projected emergency condition; however, EPPs make provisions for relocating the OSC as needed, based on ongoing assessments of plant conditions and facility habitability. The Emergency Coordinator directs relocation of the OSC, if required, as specified by the EPPs.

Personnel assigned to the OSC are notified at an Alert or higher emergency classification and should activate the facility as soon as possible with a goal of sixty (60) minutes in accordance with EPPs.

2. Off-site Emergency Response Facilities

Emergency Operations Facility

The EOF is located in the NOSF which is located 0.1 miles west of the exclusion area boundary on the Plant Road.

The EOF provides the following functions:

- Management of overall response during an emergency condition
- Coordination of radiological and environmental assessment
- Determination of recommended public protective actions
- Coordination of emergency response activities with Federal, State, and local agencies

Anticipated occupants of the EOF are the EOF Organization and appropriate Federal, State and local agency representatives.

The EOF working space is sized for 35 persons, including Federal, State, and local emergency response personnel. The EOF floor space is approximately 2,625 square feet (ft). The EOF has been designed and is equipped to support continuous operations over an extended period of time.

The EOF is large enough to provide the following:

- Work space for the personnel assigned to the EOF
- Space for the EOF Data Display Equipment
- Space for unhindered access to communication equipment by EOF personnel
- Space for storage of and/or access to plant records and historical data.
- A separate room for private NRC consultations

Section II.H.5 of this Plan provides a description of the radiological monitoring of the EOF.

The EOF has redundant two-way communications with the TSC and appropriate off-site support agencies. Section II.F of this Plan provides a description of the communications capabilities provided in the EOF.

The EOF is equipped with technical data displays to assist EOF personnel in diagnosis of plant conditions and to evaluate potential or actual release of radioactive materials to the environment.

The EOF has ready access to plant records, procedures, and emergency plans needed to exercise overall management of CPNPP Units 3 and 4 emergency response resources. The EOF reference material includes:

- CPNPP Units 3 and 4 FSAR
- Plant Technical Specifications
- Operating Instructions, Both Normal and Emergency
- Off-Site Population Distribution Data
- Evacuation Plans

Personnel assigned to the EOF are notified at an Alert or higher emergency classification and should activate the facility as soon as possible with a goal of sixty (60) minutes if a SAE or GE is declared in accordance with EPPs. When the EOF is activated, security protection will be upgraded to restrict access to those personnel assigned to the facility.

Should evacuation of the EOF be required, the EOC in the Hood County Law Enforcement Center may be used as an alternate location. Radiological assessment activities may also be relocated to the State's mobile radiological laboratory.

3. State/County Emergency Operating Centers

The State of Texas and Somervell and Hood Counties' Plans establish EOCs for use in directing and controlling their emergency response functions. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

4. Activation and Staffing of Emergency Response Facilities

Section II.H.2 of this Plan provides a description of the activation and staffing of the ERFs.

The State of Texas and Somervell and Hood County emergency response personnel also staff their ERFs consistent with the requirements of their respective plans. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

5. On-site Monitoring Systems

Luminant maintains and operates on-site monitoring systems needed to provide data that is essential for initiating emergency measures and performing accident assessment. This includes monitoring systems for geophysical phenomena, radiological conditions, plant processes, and fire hazards.

a. Section II.H.8 of this Plan provides a description of the meteorological instrumentation and procedures necessary to

assess and monitor actual or potential off-site consequences of a radiological emergency.

Section 2.4 of the FSAR provides details on hydrologic engineering for CPNPP Units 3 and 4.

Seismic instrumentation is provided within the plant so that in case of an earthquake, sufficient data is generated to permit verification of the dynamic analysis of the plant and evaluation of the safety of continued operation.

- Subsection 2.3 of the FSAR provides a description of the meteorological monitoring system.
- Subsection 2.4 of the FSAR provides details on hydrology for the site.
- Subsection 3.7.4 of the FSAR provides a description of the seismic monitoring system.

b. In addition to the habitability provisions provided for each facility, the TSC, OSC, and EOF are monitored for airborne radioactivity and external (gamma) radiation. For radioiodines, portable equipment capable of continuously detecting radioiodine air activity as low as 10^{-7} microcuries per cubic centimeter (micro Ci/cc) is used. Noble gas (external gamma exposure) is continuously monitored using a gamma detection device set to alarm at a predetermined exposure rate or dose.

In addition to the installed systems, the CPNPP Units 3 and 4 Radiation Protection Department maintains an adequate supply of health physics laboratory and portable radiation monitoring and sampling equipment, including dedicated emergency response equipment, consistent with Section II.H and Appendix 6 of this Plan.

Subsections 11.5 and 12.3.4 of the US-APWR DCD provide a description of the installed radiological monitoring systems.

c. Plant process monitors used for emergency classification are identified in Appendix 1 of this Plan.

d. Subsection 9.5.1 of the US-APWR DCD provides a description of the plant fire monitoring system.

6. Access to Data from Monitoring Systems

a. Section II.H.8 of this Plan provides a discussion of Luminant's on-site meteorological data collection system. In the event that data from this system are unavailable, Luminant maintains the ability to obtain meteorological data from National Weather Service (NWS) in Fort Worth, TX.

Back-up seismic data may be obtained from the U.S. Geological Survey.

Flooding data may be obtained from NOAA's Hydro-Meteorological Reports.

These data are shared with affected Federal, State of Texas and Somervell and Hood Counties' authorities via the communications links discussed in Section II.F of this Plan.

b. The CPNPP Units 3 and 4 Off-site Dose Calculation Manual (ODCM) describes the routine Radiological Environmental Monitoring Program. Equipment for the routine radiological environmental monitoring includes multiple radioiodine and particulate monitors and thermoluminescent dosimeters or other dose integrating devices. The dosimeters are posted and collected in accordance with the ODCM which provides locations of posted dosimeters and air samplers. Appendix 6 of this Plan provides a description of the types of radiological monitoring equipment provided for field team use.

c. In addition to chemical and radiochemical laboratory facilities located at CPNPP, the following resources are available to Luminant in support of emergency response activities:

- TDSHS mobile laboratory
- Chemical and radiochemical laboratory facilities of neighboring nuclear utilities as coordinated by INPO
- South Texas Project

The TDSHS staging area is the central point for receipt of field samples.

7. Off-site Radiological Monitoring Equipment

Luminant provides off-site radiological monitoring equipment suitable for assessment of the off-site radiological consequences of facility incidents, for use by its off-site monitoring field teams. Each ERF, as well as local hospitals and the NOSF, is supplied with emergency equipment and supplies suitable to the response expected from that facility. Appendix 6 of this Plan provides a description of the types of radiological monitoring equipment provided for field team use.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

8. Meteorological Instrumentation and Procedures

Luminant acquires meteorological data from on-site meteorological towers, instrumented at the 10 meter (m) and 60 m levels for winds and ambient temperatures. Atmospheric stability is determined from the vertical temperature difference between the 10 m and 60 m level temperatures (i.e. delta-T). Precipitation is measured at ground level. The CPNPP Meteorological Measurements Program is designed to measure the parameters needed to evaluate the dispersive characteristics of the site for both the routine operational and the

hypothetical accidental releases of radionuclides to the atmosphere. The program is described in section 2.3 of the FSAR. Measured data from the on-site meteorological tower is available to the plant computer(s) and ERF display systems.

The parameters monitored by the CPNPP Units 3 and 4 meteorological towers include the following:

- Wind speed in miles per hour (mph) at 10 m and 60 m heights
- Wind direction (degrees from North) at 10 m and 60 m heights
- Temperature (^{o}F) at 10 m and 60 m heights
- Precipitation (inches) at ground level

Meteorological data can also be obtained from the NWS office in Fort Worth.

9. Operations Support Center

See Section II.H.1 and Appendix 6 of this Plan.

10. Emergency Equipment and Supplies

Luminant performs inspections, inventories, and appropriate operational tests of dedicated emergency equipment and instruments at least once each calendar quarter and after each use. EPPs address specific inventories and establish requirements for performing inventories and operational tests. Luminant maintains sufficient reserves of equipment and instruments to replace items that are removed from the emergency kits for calibration or repair.

Emergency equipment shall be periodically tested to identify and correct deficiencies. The specific scope and responsibilities for performing these tests are provided in administrative procedures.

Appendix 6 of this Plan provides a description of the emergency equipment and supplies to be provided.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

11. Emergency Kits

Appendix 6 of this Plan provides a description of the emergency equipment and supplies to be provided.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

12. Receipt of Field Monitoring Data

Radiological Assessment personnel located in the NOSF are designated as the central point for the receipt of off-site monitoring data results and sample media analysis results collected by Luminant personnel. Resources exist within the organization to evaluate the

information and make recommendations based upon the evaluations. Radiological Assessment personnel perform these evaluations.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

I. Accident Assessment

This section of the Plan describes methods, systems, and equipment for assessing and monitoring actual or potential off-site consequences of a radiological emergency.

1. Parameters Indicative of Emergency Conditions

Luminant identifies plant system and effluent parameter values that are indicative of off-normal conditions. Appendix 1 of this Plan includes the various indications that correspond to the emergency ICs based on the methodology provided in NEI 99-01. Appendix 1 also specifies the instruments, and the capabilities of the instruments, used to monitor effluent parameter values.

2. Initial and Continuing Accident Assessment

Initially, during an emergency, the on-shift Radiation Protection and Chemistry Technicians perform on-site and in-plant radiological assessment, and sampling activities, respectively, as directed by the Emergency Coordinator.

Initial values and continuing assessment of plant conditions through the course of an emergency may rely on reactor coolant sample results, radiation and effluent monitors, in-plant iodine instrumentation, and containment radiation monitoring.

Subsection 9.3.2 of the US-APWR DCD describes provisions for obtaining samples under accident conditions.

Section 11.5 of the US-APWR DCD describes the process effluent radiation monitoring systems.

Subsection 12.3.4 of the US-APWR DCD describes the area radiation monitoring system.

3. Determination of Source Term and Radiological Conditions

The following paragraphs discuss methods and techniques used for radiological dose assessment.

a. Appendix 2 of this Plan describes the process for relating various measured parameters, including containment radiation monitor readings, to the source term available for release within plant systems.

b. Appendix 2 of this Plan describes the process for relating various measured parameters, including effluent monitor readings, to the magnitude of the release of radioactive materials.

4. Relationship Between Effluent Monitor Reading and Exposure and Contamination Levels

A computer-based dose projection program is used to estimate the off-site consequences of a radiological release to the surrounding

public. The dose assessment program is site-specific and consists of a straight-line Gaussian plume model for initial dose projections within the Plume Exposure Pathway EPZ and a separate segmented-plume model for providing radiological assessment due to wind shifts and plume deposition over portions of the Ingestion Exposure Pathway EPZ. This program can use system parameters from the Plant Computer System (PCS), radiation monitor instrument readings from the Radiation Monitoring System (RMS), or the results from in-plant sampling to estimate the source term and release rate. These values are then used, with meteorological parameters from the PCS, to estimate plume location and calculate projected doses to the public.

Dose projections are used by Radiation Protection personnel for development of PARs, to predict plume location for dispatching and control of off-site radiological monitoring teams, and estimating the dose received by persons exposed to the plume. Once field data become available from the radiological monitoring teams, projected dose information is reevaluated and PARs provided to off-site officials are updated as necessary.

5. Meteorological Information

Section 2.3 of the FSAR provides a description of the meteorological monitoring system used to provide initial values and continuing assessment of meteorological conditions under emergency conditions.

This data is used by dose assessment personnel to calculate off-site doses, which are provided to the Emergency Coordinator to help formulate off-site PARs. This data is available in the CR, TSC, and EOF.

6. Determination of Release Rates and Projected Doses When Installed Instruments are Inoperable or Off-Scale

Appendix 2 of this Plan provides a description of plant procedures that establish processes for estimating release rates and projected doses if the associated instrumentation is inoperable or off-scale. These procedures include the following considerations:

- Estimated releases based on field monitoring data
- Surrogate instrumentation and methods to estimate extent of fuel damage.

If system or monitor parameters are unavailable, default or estimated information can be used to generate dose projections. Once information becomes available from the off-site survey teams, these data may be used by the software to update projected doses and plume location based on field observations.

7. Field Monitoring Capability

Field monitoring teams act under the direction of Radiation Protection personnel in the TSC prior to activation of the EOF. Once the EOF is activated, the EOF Radiation Protection Coordinator assumes responsibilities for coordination of off-site radiological assessment and monitoring activities. Each off-site radiological monitoring team is typically composed of at least two members, one of which should be a Radiation Protection technician qualified in accordance with the emergency preparedness training requirements established in Section II.O of this Plan.

In the event that dose projection or on-site monitoring results indicate the potential for radioactivity release with off-site dose consequences, an off-site radiological monitoring team may be dispatched.

The EOF Radiation Protection Coordinator and his staff dispatch off-site radiological monitoring teams to preselected points in affected downwind sectors. Off-site environmental monitoring locations are identified in EPPs. At preselected points, the team performs external dose measurements; obtains air samples; determines contamination levels; and obtains vegetation and liquid samples, as directed by the EOF Radiation Protection Coordinator. From this point the team can be moved to determine the plume boundary, centerline of the plume, and other factors necessary to determine impact of the release on the public and environment. This monitoring shall continue, as required, during the emergency so the need for protective measures can be quickly addressed.

Transportation for On-site Survey Team(s) is provided in accordance with EPPs. On-site Survey Teams should be deployed within 15 to 30 minutes after arrival on-site. Deployment time may vary due to duration of on-site briefing session, time required to obtain protective clothing and equipment, and time required to prepare for entry into plant environs.

Appendix 6 of this Plan provides a listing of the types of instrumentation and supporting equipment and supplies that are provided for field monitoring and on-site surveying activities.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

8. Assessing Hazards Through Liquid or Gaseous Release Pathways

Luminant trains, designates, equips, dispatches, and coordinates field teams consistent with Section II.I.7 of this Plan. The field teams perform sampling of off-site media as needed to assess the actual or potential magnitude and locations of radiological hazards. Luminant notifies and activates field team personnel consistent with Section

II.E of this Plan. Mobilization times are consistent with Section II.B of this Plan.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

9. Measuring Radioiodine Concentrations

Luminant equips field teams with portable air samplers, appropriate sampling media, and analytical equipment capable of detecting radioiodine concentrations at or below 10^{-7} microcuries per milliliter under field conditions, taking into consideration potential interference from noble gas activity and background radiation. Appendix 6 of this Plan provides information regarding emergency supplies, equipment, and instruments.

Appendix 8 of this Plan provides a cross-reference to these provisions in State Plans, as applicable.

10. Relating Measured Parameters to Dose Rates

Appendix 2 of this Plan describes the process established to relate measured parameters, such as surface, airborne or waterborne activity levels, to dose rates for those key isotopes listed in Table 3 of NUREG-0654. Appendix 2 of this Plan also describes provisions for estimating the dose based on projected and actual dose rates. Radiation Protection personnel are responsible for directing implementation of these procedures under emergency conditions.

Appendix 8 of this Plan provides a cross-reference to these provisions in State Plans, as applicable.

11. Tracking of Plume Using Federal and State Resources

The State of Texas Plan establishes direction for locating and tracking an airborne radioactive plume using Federal and State resources. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

J. Protective Response

This section of the Plan describes protective actions that have been developed for the Plume Exposure Pathway EPZ for emergency workers and the public. Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are described. Protective actions for the Ingestion Exposure EPZ are described.

1. On-Site Notification

Luminant establishes and maintains methods to inform personnel within the site boundary of an emergency condition requiring individual action. Luminant informs individuals located within the Protected Area primarily via use of the plant public address system and audible warning systems. In addition to employees and contractors with emergency response assignments, these individuals located within the Protected Area may include:

a. Employees not having emergency assignments

b. Visitors

c. Contractor and construction personnel, and

d. Other persons who may be in the public access areas on or passing through the site or within the owner controlled area

In high noise areas or other areas where these systems may not be audible, other measures may be used.

CPNPP Units 3 and 4 inform individuals located outside of the Protected Area (PA) via audible warnings provided by warning systems and the activities of the Security Organization and, if needed, local law enforcement personnel. CPNPP Units 3 and 4 provide information regarding the meaning of the various warning systems, and the appropriate response actions, via plant training programs, visitor orientation, escort instructions, posted instructions, or within the content of audible messages.

Luminant maintains the ability to notify individuals within the Protected Area within about 15 minutes of the declaration of any emergency requiring individual response actions, such as accountability or evacuation.

Personnel arriving or remaining on-site are to be notified of protective measures and shall be provided protective equipment, as necessary, depending on the actual radiological conditions existing during the emergency.

2. Evacuation Routes and Transportation

During an emergency at CPNPP Units 3 and 4, the Emergency Coordinator may choose to evacuate certain areas, buildings, or the entire site. The decision to evacuate is based on the action that presents the least risk to affected personnel.

During an area or building evacuation, non-essential personnel should leave the affected area or building and report to the designated assembly area.

Personnel in buildings outside the PA should use normal fire evacuation assembly areas.

During evacuations, visitors should remain with their escort until they are outside the affected area.

The Emergency Coordinator or designee uses EPPs, information available from meteorological tower instruments and current radiological data for determining the appropriate evacuation route.

Affected individuals evacuate the site via personal vehicles. If any individual on-site does not have access to a personal vehicle, the Security Organization will make arrangements for transportation with another evacuating individual. Luminant directs evacuees to the designated relocation site. Luminant informs individuals of the evacuation routes and appropriate instructions via plant training programs, visitor orientation, escort instructions, posted instructions, or within the content of audible messages.

Should evacuation of CPNPP Units 3 and 4 via designated evacuation routes be determined to be inadvisable due to adverse conditions (e.g., weather-related, radiological, or traffic density conditions), Luminant will direct affected individuals to a safe on-site area (as determined by the Emergency Coordinator or his designee) for accountability and, if necessary, contamination monitoring and decontamination.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

3. Personnel Monitoring and Decontamination

Luminant has established a relocation site to provide a location for personnel monitoring and decontamination, if necessary. The Emergency Coordinator directs contamination monitoring of personnel, vehicles, and personal property arriving at the relocation site when there is a likelihood that individuals and their property may have become contaminated before or during the evacuation. Evacuees at this location are logged in/out, monitored for contamination, and decontaminated if required.

4. Non-Essential Personnel Evacuation and Decontamination

At a SAE classification or higher, the Emergency Coordinator shall order a site evacuation of CPNPP Units 3 and 4. This site evacuation includes the Exclusion Area, Squaw Creek Park, and Squaw Creek Reservoir. Should a site evacuation be ordered, non-essential personnel depart the site, preferably using normal site egress routes, as directed by the Emergency Coordinator consistent with Section II.J.2 of this Plan. Personnel with Emergency

Organization assignments report to the designated ERF, unless otherwise directed. Appropriate equipment and supplies are provided from the facility to the assembly areas to facilitate contamination monitoring.

Personnel and visitors off-site, but within the owner-controlled area, are warned of an emergency by the Security Organization or by Squaw Creek Park personnel in accordance with the Squaw Creek Park Emergency Plan (Reference 15). Security personnel are notified of the emergency by CR personnel. Squaw Creek Park personnel are notified of the emergency by the CPNPP Units 3 and 4 Security Organization in accordance with Security procedures.

Members of the general public who are on-site must be evacuated if there is a possibility of individual exposures exceeding:

- External Radiation Level = 2 mrem/hr
- Airborne Radioactivity = 1 times DAC for an unrestricted area

The designated relocation site will have decontamination and contamination control capability and equipment in the event it is needed.

5. Personnel Accountability

CPNPP Units 3 and 4 have the capability to account for individuals within the Protected Area and to identify any missing individuals within 30 minutes following initiation of accountability measures. Following this initial determination of individuals on-site, CPNPP Units 3 and 4 have the capability to continuously account for individuals within the Protected Area. CPNPP Units 3 and 4 maintain these capabilities consistent with the requirements of the Security Plan.

In the event of a hostile attack against the site, conditions may dictate initiation of protective measures other than personnel assembly, accountability and evacuation. The Emergency Coordinator makes decisions regarding appropriate protective measures based on evaluation of site conditions, including input from the Security Organization. If, based on the judgment of the Emergency Coordinator, personnel assembly, accountability, and evacuation may result in undue hazards to site personnel, the Emergency Coordinator may direct other protective measures, including:

- Evacuation of personnel from areas and buildings perceived as “high-value” targets
- Site evacuation by opening, while continuing to defend, security gates
- Dispersal of key personnel
- On-site sheltering

- Staging of ERO personnel in alternate locations pending restoration of safe conditions
- Implementation of accountability measures following restoration of safe conditions

6. Protective Measures

Luminant distributes protective equipment and supplies to on-site emergency response personnel, as necessary, to control radiological exposures or contamination. Protective measures utilized include the following:

a. Respiratory Protection and Engineering Controls:

- Protective measures are utilized to minimize the ingestion and/or inhalation of radionuclides and to maintain internal exposure below the limits specified in 10 CFR Part 20, Appendix B.
- Ventilation controls are utilized in the TSC and CR to control concentrations of radioactive material in air. Otherwise, when not practical to apply engineering controls to limit intakes of radioactive material in air, one or more of the following protective measures is utilized:
  - Control of Access
  - Limitation of exposure times
  - Use of individual respiratory protection equipment
- Self-contained breathing apparatus (SCBA) is available for use in areas that are deficient in oxygen or when fighting fires. Respiratory protective equipment is issued by Radiation Protection or Safety and Health Services. SCBAs are available with other firefighting equipment for use by the site Fire Brigade.

b. Use of Protective Clothing:

Protective clothing is issued when removable contamination levels exceed 1,000 dpm/100 cm^2 beta-gamma or 20 dpm/100 cm^2 alpha. Protective clothing is available from storage areas and Radiation Protection supplies located throughout the site. Special firefighting protective clothing and equipment is available in designated site supply storage areas for use by Fire Brigade personnel. Appendix 6 identifies types of protective clothing available or emergency response.

c. Individual Thyroid Protection:

Respiratory protection and engineering controls are used to minimize the ingestion and/or inhalation of radioactive iodine. However, if an unplanned incident involves the accidental or

potential ingestion or inhalation of radioactive iodine, KI tablets are available for distribution in accordance with EPPs.

Appendix 6 provides a description of the emergency response supplies and equipment available.

7. Protective Action Recommendations and Bases

Luminant develops PARs based on plant conditions, radiological dose estimates and meteorological conditions. These PARs are provided to the State of Texas and Somervell and Hood Counties, who, in turn determine protective actions and communicate these to the public. Luminant's' PARs are based on NUREG-0654, Supplement 3, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants" (Reference 16) and EPA 400-R-92-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents" (Reference 17) (EPA PAGs).

The initial PAR for any event classified as a GE is to evacuate in all directions out to two miles and evacuation of the downwind sector and one sector on either side of the downwind sector out to five miles. This PAR may vary depending upon meteorological conditions. Sheltering may be appropriate when a release is short term and controlled or when known conditions make evacuation dangerous, e.g., severe weather or overriding threat to public safety.

PARs may change as plant conditions, radiological dose estimates, or meteorological conditions change and may consist of sheltering, evacuation, KI, or no action. Details regarding appropriate PARs are contained in EPPs.

The EOF Radiation Protection Coordinator is responsible for making dose projections on a periodic basis. These calculations use plant procedures to calculate projected dose to the population-at-risk for either potential or actual release conditions. For conditions in which a release has not occurred, but fuel damage has taken place and radiation levels in the containment atmosphere are significant, a scoping analysis is performed to determine what recommendations would be made if containment integrity were lost at that time. A Total Effective Dose Equivalent (TEDE) and thyroid Committed Dose Equivalent (CDE) are calculated at various distances from the plant (site boundary; 2 miles; 5 miles; 10 miles and beyond, if needed). These dose projections are compared to PAGs shown in Table II-3, which are derived from EPA PAGs. Based on these comparisons, PARs are developed by the EOF Radiation Protection Coordinator. If these recommendations involve sheltering or evacuation of the public around the plant, the EOF Radiation Protection Coordinator informs the EOF Manager of the situation and recommendations for protective actions.

Table II-3 Protective Action Guides

Projected Dose		Protective Action Recommendation
Total Effective Dose Equivalent (TEDE)	**Committed Dose Equivalent Thyroid (CDE Thyroid)**	
< 1 rem	< 5 rem	No protective action required based on projected dose
≥ 1 rem	≥ 5 rem	Evacuate affected zones and shelter the remainder of the Plume Exposure Pathway EPZ
N/A	≥ 5 rem	Consider use of KI in accordance with State Plans and policy

If dose projections show that PAGs are exceeded at 10 miles, the dose assessment code and in-field measurements, when available, are used to calculate doses at various distances downwind to determine how far from the CPNPP Units 3 and 4 PAG levels are exceeded. The Radiation Protection Coordinator forwards the results to the EOF Manager who communicates this information to the off-site authorities.

8. Evacuation Time Estimates

Luminant has conducted an Evacuation Time Estimate (ETE) (Reference 18). The ETE follows the guidance provided in Appendix 4 of NUREG-0654 and NUREG/CR-6863, "Development of Evacuation Time Estimate Studies for Nuclear Power Plants" (Reference 19). The ETE did not reveal the existence of any significant impediments to the development of emergency plans.

Population distribution and a summary of the Evacuation Time Estimate are included in Appendix 4 of this Plan.

9. State and Local Government Implementation of Protective Measures

The State of Texas and Somervell and Hood Counties' Plans establish a capability for implementing protective measures based upon PAGs and other criteria consistent with the recommendations of U.S. EPA regarding exposure resulting from radioactive plumes and with the FDA regarding radioactive contamination of human food and animal feeds. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

10. Protective Measures Implementation

a. Appendix 4 provides a map of the Plume Exposure Pathway EPZ illustrating evacuation routes, evacuation areas, and locations of shelter areas and reception centers. EPPs provide locations of pre-selected radiological sampling and monitoring points. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

b. Appendix 4 provides maps of the Plume Exposure Pathway EPZ illustrating population distribution around the facility by evacuation area and in a sector format. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

c. Warnings to the public within the Plume Exposure Pathway EPZ are the responsibility of the State of Texas and Somervell and Hood County officials. The primary method of warning the public is by the use of the Alert and Notification System, which is described in Appendix 3. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

d. The State of Texas and Somervell and Hood Counties' Plans establish means for protecting those persons whose mobility may be impaired due to institutional or other confinement. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

e. The State of Texas and Somervell and Hood Counties' Plans establish provisions for the use of radioprotective drugs, particularly for state and local emergency workers, including any mobility-impaired or institutionalized members of the general public whose evacuation could not be readily effected. These provisions include quantity, storage and means of distribution. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

f. The State of Texas does not administer radioprotective drugs to the general population. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

g. The State of Texas and Somervell and Hood Counties' Plans include a means of relocating the populace within the Plume Exposure EPZ. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

h. The State of Texas and Somervell and Hood Counties' Plans include reception centers beyond the Plume Exposure EPZ.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

i. The State of Texas and Somervell and Hood Counties' Plans include projected traffic capacities of evacuation routes under emergency conditions. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

j. The State of Texas and Somervell and Hood Counties' Plans include control of access to evacuated areas and establishment of organizational responsibilities for such control. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

k. The State of Texas and Somervell and Hood Counties' Plans include the identification of and means for dealing with potential impediments to the use of evacuation routes. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

l. The State of Texas and Somervell and Hood Counties' Plans include evacuation time estimates for the Plume Exposure EPZ. Appendix 8 of this Plan provides a cross-reference to these provisions in State Plans, as applicable.

m. The choices of recommended protective actions are based on the guidance provided in NUREG-0654, Supplement 3. Section II.J.8 and Appendix 4 of this Plan provide discussion of the ETE that has been prepared for the Plume Exposure Pathway EPZ.

11. Ingestion Pathway Protective Measures

The State of Texas Plan specifies the protective measures to be used for the Ingestion Pathway, including the methods for protecting the public from consumption of contaminated foodstuffs. This includes criteria for the use of stored feed for dairy animals. The plan identifies procedures for detecting contamination, for estimating the dose commitment consequences of uncontrolled ingestion, and for imposing protection procedures. Appendix 8 of this Plan provides a cross-reference to these provisions in State Plans, as applicable.

12. Registering and Monitoring Evacuees

The State of Texas and Somervell and Hood Counties' Plans, in concert with Cleburne, Stephenville and Benbrook Emergency Management Plans, include a description of the means for registering and monitoring of evacuees at reception centers. The Plans provide for personnel and equipment capable of monitoring residents and transients in the Plume Exposure EPZ arriving at reception centers within a 12 hour period. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

K. Radiological Exposure Control

This section of the Plan describes the means for controlling radiological exposures for emergency workers in an emergency. These exposure guidelines have been established consistent with EPA PAGs.

1. On-Site Exposure Guidelines and Authorizations

CPNPP Units 3 and 4 implement on-site exposure guidelines for emergency response personnel consistent with those published in EPA PAGs. The applicable guidelines are provided in Table II-4 of this Plan. Doses to emergency response personnel shall be held as low as reasonably achievable (ALARA).

In the absence of the extenuating circumstances identified in Table II-4, the site applies the occupational radiation dose limits as established in 10 CFR Part 20 to each of the following activities:

a. Removal of injured persons

b. Undertaking corrective actions

c. Performing assessment actions

d. Providing first aid

e. Performing personnel decontamination

f. Providing ambulance service

g. Providing medical treatment services

If any of the extenuating circumstances identified in Table II-4 exist, then the associated exposure guidelines identified in Table II-4 may be applied, subject to the authorization processes discussed in Section II.K.2 of this Plan.

Table II-4 Emergency Worker Exposure Guidelines

	Dose Guideline in rem		
Activity	**TEDE**	**Lens of the Eye**	**Other Organs****
Any activity other than those specifically authorized below	5	15	50
Protecting Valuable Property	10	30	100
Lifesaving or Protection of Large Populations	25	75	250
Lifesaving or Protection of Large Populations Note 1	>25	>75	>250

Note 1: This guideline applies only to volunteers who are fully aware of the risks involved.

** Includes skin and extremities.

2. Radiation Protection Program

The Emergency Coordinator, in consultation with the TSC Radiological Assessment Coordinator and/or EOF Radiological Protection Coordinator, is responsible for authorization of any emergency exposures resulting in doses exceeding the numerical values of the occupational dose limits provided in 10 CFR Part 20.

If exposures in excess of the numerical values of the occupational dose limits provided in 10 CFR Part 20 are required, the following shall apply:

- Rescue personnel should be volunteers or professional rescue personnel.
- Rescue personnel should be familiar with consequences of exposure to radiation.
- Women capable of reproduction should not take part in these actions.
- Volunteers 45 or older, if available, should be selected.
- Planned individual emergency dose should not exceed 25 rems (TEDE).
- Internal exposure should be minimized (as long as TEDEs are maintained ALARA) by using best available respiratory protection, and contamination should be controlled by use of available protective clothing.
- Exposure under these conditions shall be limited to once in a lifetime.

For actions in less urgent emergency situations, where it is necessary to enter a hazardous area to protect facilities and

equipment, eliminate further escape of effluents, or to control fires, the following shall apply:

- Persons performing planned action should be volunteers familiar with consequences of exposure to radiation and with task to be performed.
- Women capable of reproduction should not take part in these actions.
- Planned individual emergency dose should not exceed 10 rems.
- Planned individual extremities dose should not exceed 100 rems.

Internal exposure shall be minimized (as long as TEDE is maintained ALARA) by use of respiratory protection and contamination controlled by use of protective clothing.

Chapter 12 of the CPNPP Units 3 and 4 FSAR describes the Radiation Protection Program (RPP) consistent with the requirements of 10 CFR Part 20.

3. Dosimetry and Dose Assessment

a. CPNPP Units 3 and 4 provide and distribute self-reading and permanent record dosimeters to personnel involved in on-site emergency response regardless of their affiliation. Emergency worker doses are tracked throughout the course of an emergency to control individual's doses within applicable limits.

   CPNPP maintains a personnel radiation dosimetry program that includes the capability to determine both external and internal doses consistent with the requirements of 10 CFR Part 20.

   The external dosimetry program includes provisions and requirements for use of both permanent record and self-reading dosimeters (e.g., pocket or electronic dosimeters). Dosimeter ranges are sufficient to measure both planned routine and accident doses. EPPs establish requirements for distributing dosimeters to emergency responders, including those individuals responding from off-site locations.

   Routine TLD processing is accomplished by Radiation Protection personnel using automatic equipment linked to a records management computer. Dose assessment capabilities are available on a 24-hour per day basis.

   Internal doses are typically estimated through the use of whole body counting and/or in-vitro sampling and analysis routines. Routine procedures associated with the internal dosimetry program establish requirements for determining internal doses

based on in-vivo or in-vitro analyses results or by assessment of individual exposures to airborne radioactive materials.

b. EPPs also establish requirements for wearers to periodically read their self-reading dosimeters to maintain compliance with emergency exposure guidelines. Decisions related to emergency exposure, TLD processing and exposure extensions are based on each individual's current exposure history and self-reading dosimeter data. Personnel exposure history records are available to TSC and EOF personnel.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

4. State and Local Responder Exposure Authorizations

The State of Texas and Somervell and Hood Counties' Plans establish a decision line for authorizing emergency workers to incur exposures in excess of the EPA PAGs for lifesaving activities. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

5. Decontamination Action Levels

a. Results of on-site and off-site contamination surveys, performed in accordance with approved EPPs, shall be used as the basis for determining and posting Radiation Controlled Areas (RCAs). Posting of RCAs shall be accomplished in accordance with RPP procedures.

When removable ground or surface contamination levels in unrestricted areas exceed 1,000 dpm per 100 cm^2 beta-gamma within the Owner Controlled Area, but outside the RCA, that contaminated area shall be isolated and treated as a RCA. Appropriate radiological protection and access control measures shall be implemented as described in RPP procedures. In the event contamination levels in a RCA exceed 1,000 dpm per 100 cm^2 beta-gamma removable, decontamination or other necessary protective actions shall be considered.

CPNPP Units 3 and 4 implement requirements for personnel and area decontamination, including decontamination action levels and criteria for returning areas and items to normal use, in procedures supporting the RPP.

b. Decontamination shall be directed by appropriately trained personnel. Decontamination shall be performed in accordance with approved EPPs and RPP procedures. EPPs prescribe that personnel decontamination is deemed necessary if contamination levels are found to be in excess of 1,000 dpm beta-gamma per probe area (using a "pancake" style probe or equivalent in a low background area (i.e., less than 100 counts

per minute (cpm))). EPPs and RPP procedures describe actions to be taken in the event of skin contamination or suspected internal contamination.

Procedures for the decontamination of on-site emergency personnel wounds, supplies, instruments and equipment, and for waste disposal are included in the EPPs. Appendix 6 of this Plan provides a description of the emergency equipment and decontamination supplies to be provided.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

6. Contamination Control Measures

a. During an emergency, areas of the site which are normally considered unrestricted access areas may become contaminated and as such shall be considered RCAs. Radiation Protection personnel should survey the site and make changes to RCAs as necessary during the course of the emergency. If the immediate area around the site is contaminated, then a RCA access point may be established at the NOSF. The decontamination facility at the NOSF would then be used as required to decontaminate personnel leaving the site.

   The RPP and its supporting procedures establish requirements for limiting access to areas having significant radiological hazards, consistent with the requirements of 10 CFR Part 20 and Chapter 12 of the FSAR.

b. To avoid unnecessary intakes of radioactive materials during an emergency, drinking water and food supplies that have been outside the CR ventilation envelope and within a RCA shall not be consumed without being surveyed by Radiation Protection personnel. If the potential exists for contamination of on-site food or drinking water that renders these supplies non-consumable, Luminant Nuclear Supply Chain personnel will make arrangements for transport of non-contaminated off-site supplies to CPNPP Units 3 and 4.

c. Decontamination of personnel, equipment and areas depends on conditions at the time. Personnel decontamination is given first priority to minimize exposures and to release individuals as soon as possible back to the work force. Equipment and areas are decontaminated as conditions permit, with priority given to equipment or areas essential to recovery activities. CPNPP Units 3 and 4 permit areas and items to be returned to normal (i.e., non-contaminated) use following conduct of appropriate surveys and verification that the contamination levels meet the criteria provided in the RPP or its supporting procedures.

7. Decontamination of Relocated CPNPP Units 3 and 4 Personnel

CPNPP Units 3 and 4 make provisions for protective clothing, contamination monitoring, and decontamination, including decontamination of radioiodine contamination on the skin, at the relocation site. Appendix 6 of this Plan provides a description of the emergency equipment and supplies to be provided.

Because of decontamination activities, limited amounts of radioactive waste may be generated or accumulated and may be brought to the NOSF Laboratory Facilities for temporary storage. As conditions permit, this radioactive waste shall be returned to the site for processing.

L. Medical and Public Health Support

This section of the Plan describes arrangements made for medical services for contaminated injured individuals.

1. Hospital and Medical Support

Luminant maintains agreements with Lake Granbury Medical Center (LGMC) in Granbury, Texas and Harris Methodist Walls Regional Hospital (WRH) in Cleburne, Texas, under which each hospital provides medical services for injured personnel from CPNPP Units 3 and 4. The hospitals are equipped and their personnel trained to care for contaminated injured personnel or radiological overexposure requiring medical attention. Appropriate radiological monitoring and control equipment and supplies are available at each hospital consistent with Appendix 6 of this Plan.

LGMC and WRH maintain the capability to evaluate the radiation exposure and/or uptake of accident victims and to handle contaminated victims. These capabilities are established and maintained through training courses supported by Luminant consistent with Section II.O of this Plan, periodic drills and exercises consistent with Section II.N of this Plan, and material support provided consistent with agreements between Luminant and the medical support providers.

In the event that a contaminated injured person is transported to an off-site medical facility, Luminant Radiation Protection personnel accompany the victim to support radiological monitoring and control activities during medical treatment and post-treatment efforts. Because of decontamination activities, limited amounts of radioactive waste may be generated or accumulated by the hospital, ambulance, or other emergency response function and may be brought to the NOSF Laboratory Facilities for temporary storage. As conditions permit, this radioactive waste shall be returned to the site for processing.

Appendix 7 of this Plan contains the relevant letters of agreement.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

2. On-Site First Aid Capability

A first aid station located at CPNPP Units 3 and 4 provides the normal complement of first aid supplies and equipment necessary to treat those injuries not requiring hospitalization or professional medical services. Pre-staged equipment for responders is located at the Access Building for each unit and Fire Brigade assembly areas. First aid kits with basic supplies are located throughout CPNPP Units 3 and 4. Eyewash stations are located throughout the plant at strategic locations.

Selected CPNPP Units 3 and 4 personnel are trained to provide basic first aid and patient preparation for on-site personnel who become injured or ill. In addition, selected CPNPP Units 3 and 4 ERO personnel receive annual instruction in handling contaminated injured individuals.

Luminant maintains a trained First Aid Team at the site to provide 24 hour per day first aid support. In addition, the following medical facilities and services are available:

- Granbury/Hood County Emergency Medical Service, Inc. (ambulance services; see Section II.L.4 of this Plan)
- Somervell County Fire, Rescue, and EMS Service (initial medical response services; see Section II.L.4 of this Plan)
- LGMC facilities
- WRH facilities

Luminant provides for First Aid readiness through training consistent with Section II.O of this Plan and drills and exercises consistent with Section II.N of this Plan.

3. Emergency Medical Facilities within the Affected State

The State of Texas plan contains the locations of emergency medical facilities capable of providing medical support for any contaminated injured member of the public or emergency responder. Appendix 8 of this Plan provides a cross-reference to these provisions in the State plan, as applicable.

4. Medical Emergency Transportation

CPNPP Units 3 and 4 provide a vehicle to transport injured personnel to the appropriate medical facility and agreements are in place with local ambulance services to provide assistance as needed. Off-site support for a medical emergency is provided by the Somervell County Fire, Rescue, and EMS Service and Granbury/Hood County Emergency Medical Service, Inc. (either highway vehicle or air transport, as appropriate). Any injured and contaminated individual transported from CPNPP Units 3 and 4 is accompanied by a Radiation Protection Technician (RPT) equipped with suitable radiological monitoring equipment. Any ambulance will be able to communicate with the staff at the receiving hospital. Should care beyond the capabilities of the area hospitals be required, arrangements for transporting the individual are made contingent on the injuries and radiological conditions.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

M. Recovery and Re-Entry

This section of the Plan discusses general plans for recovery and re-entry.

1. Recovery Plans and Procedures

Once the emergency has terminated and the situation is no longer considered a threat to on-site personnel or the general public, efforts are initiated to restore the affected unit(s) to full operation or place the affected unit(s) in a long-term safe shutdown condition. The scope of these efforts is dependent on the severity of the emergency, ranging from a simple close-out to a full-scale mobilization of personnel and resources to support a long-term recovery effort. If a recovery effort is deemed necessary, the CPNPP Units 3 and 4 Recovery Organization is established to provide personnel and resources to that effort.

Luminant does not expect a recovery organization to be necessary following a NOUE or Alert.

Luminant implements recovery plans and procedures that provide guidance for a range of recovery and re-entry activities, including:

- Recovery/re-entry organization;
- Responsibilities for recovery/re-entry decision-making, including decisions for relaxing protective measures based on existing and potential hazardous conditions;
- Means for informing members of the ERO that recovery operations are to be initiated and related changes in the organizational structure; and
- Methods for periodically updating estimates of total population exposure and recommending relaxation of public protective measures.

Reentry into environs of the site by selected personnel is an important source of information available to the Recovery Organization. These activities should aid in ascertaining the resources, manpower and recovery actions necessary to restore the site to operational status.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

2. Recovery Organization

If established, overall technical direction and control of the Recovery Organization is assumed by the Recovery Manager. The Recovery Organization absorbs the existing CPNPP ERO. Management of activities conducted from the EOF, as well as direction and control of the CPNPP ERO, is assumed by the Recovery Manager. During the recovery phase, Emergency Organization personnel continue their functional assignments.

The Recovery Organization is composed of CPNPP Units 3 and 4 personnel; Luminant resources are available as necessary. Contract personnel are used as needed to expand the capabilities of Luminant personnel. Because the magnitude of any recovery effort is dependent on the scope of the event, Recovery Organization staffing requirements are difficult to predict in advance; therefore, this Plan only predesignates certain management level positions in the Recovery Organization. Managers form their respective groups as appropriate to deal with recovery.

The primary positions in the Recovery Organization are described below:

Recovery Manager

A member of Luminant senior management is designated as the Recovery Manager and is responsible for directing actions of the Recovery Organization.

Responsibilities and authorities assigned to the Emergency Coordinator are transferred to the Recovery Manager when the Recovery Organization is formed, thus assuring continuity of resources, communications and other activities initiated by the ERO.

Operations Support

Operations Support personnel are responsible for analyzing and developing plans and procedures directly supporting operations with the objective of restoring the site to operational status. Their primary responsibilities include:

- Providing direct support to shift operations
- Analyzing instrument and control problems and developing modification and repair plans
- Analyzing conditions and developing guidance for shift operations personnel regarding core protection
- Developing out-of-normal and emergency procedures for operations support

Technical Support

Technical Support personnel are responsible for:

- Determining need for and providing engineering and technical specialists to support other managers as required
- Assuring design activities are adequately staffed and equipped to provide timely support
- Providing direct interface between CPNPP Units 3 and 4 personnel and others on administrative matters
- Directing, coordinating and approving engineering and design activities conducted on-site during recovery

- Developing any required modifications for radwaste systems in support of recovery operations
- Providing technical expertise for repair and modification activities in support of the resolution of mechanical and electrical problems
- Providing qualified personnel to augment emergency repair and damage control items

Corporate Support

Luminant resources and personnel are available upon request by the Recovery Manager. These resources are discussed in Section II.B.7 of this Plan.

The basic organization may be modified, as required, to address the needs of the given situation. The Recovery Manager assumes control and direction of the recovery operation with the authority and responsibilities set forth in the EPPs.

The following conditions are considered appropriate for the recommendation to relax protection measures:

- Site operational parameters no longer indicate a potential or actual emergency exists
- The release of radioactivity from the site is controllable, no longer exceeds permissible levels and does not present a credible danger to the public
- The site is capable of sustaining itself in a long term shutdown condition

Depending on plant conditions and the scope of required activities, the recovery organization may perform its activities from one or more designated ERFs or from other locations as specified by the responsible recovery organization managers. As recovery operations progress, the recovery organization may be augmented or reduced as needed to meet ongoing operational needs.

3. Notification of Initiation and Changes in Organizational Structure

The recovery process is implemented when the ERO managers, with concurrence of State and Federal agencies, have determined the site to be in a stable and controlled condition. Upon the determination, the EOF Manager notifies the NRC Operations Center, the State EOC, and the local EOCs that the emergency has been terminated and any required recovery has commenced. As appropriate, the TSC or EOF Communications Coordinator directs communication to the supporting EROs detailing the change in site status and of the organizational transition. EPPs delineate requirements and actions to be taken for recovery phase activities, including transition to the Recovery Organization.

Appendix 8 of this Plan provides a cross-reference to these provisions in State Plans, as applicable.

4. Updating Total Population Exposure During Recovery Operations

CPNPP Units 3 and 4 personnel periodically estimate total population doses in the affected sectors and zones utilizing population distribution data from within the EPZs. The State oversees this activity. It is conducted in accordance with Appendix 7 of the Texas Radiological Emergency Management Plan.

Appendix 8 of this Plan provides a cross-reference to these provisions in State Plans, as applicable.

N. Exercises and Drills

This section of the Plan describes exercises conducted to evaluate major portions of Luminant's emergency response capabilities. Periodic drills are conducted to develop and maintain key emergency response skills. Deficiencies identified as a result of exercises and drills are corrected.

1. Exercises

a. Exercise Scope and Frequency

Luminant conducts emergency exercises in accordance with NRC and FEMA requirements (e.g., 10 CFR 50.47(b)(14), 10 CFR Part 50 Appendix E.IV.F, and 44 CFR 350.9). Exercise objectives when the State of Texas and Somervell and Hood County agencies participate in an exercise are coordinated and agreed upon with State and local emergency management officials.

b. Exercise Scenarios and Participation

The State of Texas and Somervell and Hood Counties' Plans provide for the mobilization of State and local personnel and resources adequate to verify the capability to respond to an incident requiring response. Luminant conducts exercises on a periodic basis, including biennial exercises required under Appendix E of 10 CFR Part 50. Federal and State observers/evaluators are afforded the opportunity to critique the exercises. Exercises test the:

- Adequacy of timing and content of EPPs and methods
- Emergency equipment and communications networks
- Public notification system

In addition, exercises test the familiarity of emergency organization personnel with their duties.

Exercise scenarios are varied in a manner that tests each major element of the plans and preparedness organizations within a six year period.

In accordance with NUREG-0654, Supplement 1 (Reference 20), at least once every six years, the specific exercise date is unannounced. At least once every six years, an exercise is initiated during off-hours (between 6 pm and 4 am on a weekday or during a weekend). Requirements for unannounced and off-hours exercises may be satisfied concurrently.

The unannounced and/or off-hours demonstration may be conducted during or independent of the biennial exercise required by Appendix E of 10 CFR Part 50.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

2. Drills

Luminant maintains adequate emergency response capabilities between biennial exercises by conducting drills, including at least one drill involving a combination of some of the principal functional areas of on-site emergency response capabilities, including activities such as: management and coordination of emergency response, accident assessment, protective action decision-making, and plant system repair and corrective actions. The drills follow preplanned scenarios developed to thoroughly test response of personnel involved. On the spot performance corrections may be made and demonstration of proper performance offered by the drill controller during drills. Upon request, Luminant encourages the State of Texas and Somervell and Hood County governments to participate in the drills.

During these drills, activation of the ERFs may not be necessary. Luminant may use the drills to consider accident management strategies, provide supervised instruction, allow the operating staff to resolve problems and focus on internal training objectives. Luminant may include one or more drills as portions of an exercise.

The activities undertaken in the event of an actual declared emergency may be used to satisfy emergency drill requirements, provided that these activities demonstrate adequate execution of the specified activities.

The drill program includes the following:

a. Communications Drills

   Communications links between CPNPP Units 3 and 4, the DPS, and Somervell and Hood County EOCs are tested monthly. Communications between CPNPP Units 3 and 4, Federal agencies and the State of Texas are tested quarterly. Communications between CPNPP Units 3 and 4, State and local EOCs and radiological monitoring teams are tested annually. Communications tests evaluate both the operability of the system(s) and the ability to understand message content.

   Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

b. Fire Drills

   Luminant conducts fire drills as discussed in Subsection 9.5.1 of the FSAR. The Somervell County Fire, Rescue, and EMS Service are invited to participate annually in one of the periodic drills.

c. Medical Emergency Drills

   Luminant conducts medical emergency drills that include a simulated contaminated injured individual and participation by

the local support services agencies (e.g., medical transportation and off-site medical treatment facility) annually.

Medical Emergency drills include:

- A simulated contaminated-injured individual
- Transport to an off-site medical facility
- Participation by the off-site medical facility

d. Radiological Monitoring Drills

Luminant conducts radiological monitoring drills to prepare radiological monitoring teams to perform air sampling as well as dose rate and surface contamination determinations within the Plume Exposure Pathway EPZ. Radiological monitoring drills include:

- Use of the appropriate procedures for collecting and analyzing samples and recording results
- Collection and analysis of sample media for which the facility is responsible
- Communications with monitoring teams
- Recordkeeping activities

Site personnel assigned to radiological monitoring teams participate in drills to collect environmental samples such as soil, water, and vegetation. These drills maintain site personnel capable to assist State agencies, if necessary. Luminant may coordinate radiological monitoring drills with those drills conducted by the State of Texas and Somervell and Hood County or may conduct these drills independently.

e. Radiation Protection Drills

Luminant conducts on-site Radiation Protection drills at least semi-annually. Radiation Protection drills include:

- Response to and analysis of simulated elevated airborne and liquid activity levels
- Response to simulated elevated area radiation levels
- Analysis of the simulated radiological situation using the appropriate procedures.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

3. Conduct of Drills and Exercises

Drills and exercise scenarios are developed to provide a method to test and evaluate the CPNPP Units 3 and 4 Emergency Preparedness Program. These scenarios are designed to allow free play in decision-making and shall include, as appropriate:

a. Basic objective(s) of each drill and exercise, and appropriate evaluation criteria;

b. Date(s), time period(s), location(s), and participating organizations;

c. Simulated events;

d. Time schedule of real and simulated initiating events;

e. Narrative summary describing conduct of the exercise or drill which addresses simulated casualties, off-site fire department assistance, rescue of personnel, use of protective clothing, deployment of radiological monitoring teams, public information activities, and;

f. Description of arrangements for and advance materials to be provided to official observers.

The Emergency Planning Group is responsible for developing drill objectives, exercise objectives, and developing exercise programs. Scenarios and objectives developed for those exercises or drills are submitted to the NRC and/or FEMA for review and approval.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

4. Provisions for Observing, Evaluating, and Critiquing Exercises

Luminant provides the opportunity for official observers from Federal agencies (e.g., NRC and FEMA), the State of Texas and Somervell and Hood Counties to observe, evaluate, and critique exercises.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

5. Exercise Evaluation and Corrective Actions

The Emergency Planning Group is responsible for conducting exercise critiques and for preparing a written summary of each exercise critique. This summary should include objectives of the exercise, a list of participants, controllers, evaluators, observers and a list of identified deficiencies.

For each drill, the drill evaluator is responsible for preparing a written summary of the critique. This summary should include a list of participants, controllers, evaluators, observers and observed deficiencies. This summary shall be provided to the Emergency Planning Manager, who is responsible for ensuring the appropriate changes are incorporated in the Plan and EPPs.

One or more qualified instructors/evaluators supervise and evaluate drills and exercises. A qualified instructor/evaluator is an individual whose knowledge, skills, and abilities have been evaluated by the Emergency Planning Manager or his designee and determined to be

sufficient for observing and evaluating the planned activities against the established criteria. For example, a qualified instructor/evaluator may be an individual who has been trained to fill the emergency response position to be observed or may be a supervisor or instructor for the position.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

O. Radiological Emergency Response Training

This section of the Plan describes radiological emergency response training that is provided to those who may be called on to assist in an emergency.

1. General

Luminant implements a training program that provides for initial training and periodic retraining for individuals who have been assigned emergency response duties as discussed in this section.

a. Off-site Emergency Response Training

Luminant conducts, or supports the conduct of, site-specific training for off-site personnel who may be called upon to provide assistance in the event of an on-site emergency. This includes emergency responders employed by agencies identified in Section II.A of this Plan.

Training for off-site support personnel may include the following, to the extent appropriate to the assigned duties and responsibilities:

- The basic scope of the Plan
- Emergency classifications
- Notification methods
- Basic radiation protection
- Site access procedures
- The individual, by title, in the site ERO who will direct their activities on-site
- Definition of support roles

Luminant provides or supports training for affected hospital, ambulance/rescue, police, and firefighting personnel that includes their expected emergency response roles, notification procedures, and radiation protection precautions. For these and any other off-site emergency responders who may be required to enter the site under emergency conditions, Luminant provides or supports training that addresses site access procedures and identifies (by position) the individual who will control their activities on-site.

b. Mutual Aid Agreements

The State of Texas and Somervell and Hood County response organizations participate in and receive training. Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

2. On-site Emergency Response Training

Instructions for personnel who are accredited for unescorted access to the site are provided in site access training.

Emergency response training program is provided to Luminant personnel who may be called upon to respond to an emergency. The training program includes practical drills, consistent with Section II.N of this Plan; during which each individual demonstrates the ability to discharge their assigned emergency response function. The instructor/evaluator immediately corrects any erroneous performance noted during these practical drills and, as appropriate, demonstrates proper performance consistent with approved procedures and accepted standards.

Training is also provided to the CPNPP Units 3 and 4 Fire Brigade. This training is coordinated by the Nuclear Training Manager, and addresses methods and equipment used for fighting various types of fires that could occur on-site. Appropriate emphasis is placed on radiological aspects of firefighting in accordance with section 9.5.1 of the FSAR.

Security training is conducted by the CPNPP Units 3 and 4 Security Organization and is coordinated by the Security Manager. Training is provided to security personnel based on each person's specific tasks. Appropriate emphasis is placed on emergency response required within radiologically controlled environments in accordance with the Security Plan.

Personnel not assigned to CPNPP Units 3 and 4 ERO receive information on reporting emergencies and expected actions in case of an emergency.

3. First Aid Team Training

Luminant provides first aid training to First Aid Team Members in accordance with approved procedures.

4. Emergency Response Training and Qualification

Luminant conducts a program for instructing and qualifying personnel who implement this Plan. Each individual completes the required training prior to assignment to a position in the ERO. The training program establishes the scope, nature, and frequency of the required training and qualification measures.

Luminant implements a program to provide position-specific emergency response training for designated members of the ERO. The content of the training program is appropriate for the duties and responsibilities of the assigned position. The affected positions and the scope of the associated training programs include:

a. Emergency Coordinator – Emergency condition assessment and classification, notification systems and procedures,

organizational interfaces, CPNPP Units 3 and 4 evacuation, radiation exposure controls, off-site support, and recovery.

b. Accident assessment personnel - Emergency condition assessment and classification, notification systems and procedures, organizational interfaces.

c. Radiological monitoring and analysis personnel – Dose assessment, emergency exposure evaluation, protective measures, protective actions, contamination control and decontamination, monitoring systems and procedures.

d. Police, security and firefighting personnel - Notification of site personnel, facility activation, personnel accountability and evacuation, and access control. Police and Security also receive training on the Security Plan. Firefighting personnel also receive annual site orientation, communications protocol and radiation protection training. (Note: Off-site police and firefighting personnel will be offered training consistent with Section II.O.1.a of this Plan.)

e. Damage control/repair/corrective action teams - Damage control organization, communication systems, and planning and coordination of damage control tasks.

f. First aid/rescue personnel - Emergency organizational interfaces, firefighting, search and rescue procedures, and communications systems.

g. Local support services/emergency service personnel – Training consistent with Section II.O.1.a of this Plan.

h. Medical support personnel - Training consistent with Section II.O.1.a of this Plan.

i. Corporate office support personnel - Emergency condition assessment and classification, notification systems and procedures, organizational interfaces.

j. Emergency Communicators - Notifications and reports to off-site authorities and communication systems as appropriate for individual position assignments.

Section II.O.5 of this Plan discusses provisions for periodic retraining of ERO personnel.

Luminant provides training for local support services personnel, including emergency service, police, and firefighting personnel, consistent with Section II.O.1.a of this Plan.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

5. Retraining

Luminant conducts, or supports the conduct of, annual retraining for those categories of emergency response personnel listed in Section

II.O.4 of this Plan. Failure to successfully complete this training in a timely manner as specified in plant training procedures results in the individual's removal from the ERO pending completion of the required training.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

P. Responsibility for the Planning Effort

Luminant implements an organizational structure and processes to periodically review, update, audit, distribute, and control this Plan consistent with facility quality assurance and document control requirements. Luminant also implements a program to provide appropriate training to personnel responsible for the emergency planning effort.

1. Training

Luminant develops and implements a process to provide training for the Emergency Planning Manager and support staff to facilitate effective implementation of the emergency planning effort, consistent with applicable regulatory requirements and guidance, license conditions, other commitments, and accepted good practices. Training may include formal education, professional seminars, plant-specific training, industry meetings, and other activities and forums that provide for an exchange of pertinent information.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

2. Responsibility for Radiological Emergency Response Planning

The CPNPP Plant Manager holds the overall authority and responsibility for ensuring that an adequate level of emergency preparedness is maintained. The Plant Manager shall approve changes to the Plan. Responsibility for the planning effort is delegated to the Emergency Planning Manager.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

3. Emergency Planning Manager

Luminant has established an Emergency Planning Manager position. The incumbent is responsible for developing and updating the Plan and coordinating this Plan with other response organizations. The Emergency Planning Manager approves the EPPs and is responsible for maintenance and coordination of the emergency preparedness program and providing the training program for the ERO. The EPM has support staff, who, under his direction, support day-to-day and long-range emergency planning activities.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

4. Plan Reviews and Updates

This Plan shall be reviewed, updated as needed, and certified by the Plant Manager to be current on an annual basis. The review includes consideration of items identified during drills and exercises that could affect the Plan.

The Station Operations Review Committee (SORC) shall review changes to the Plan and submit recommended changes to the Operations Review Committee (ORC). Any changes identified by drills and exercises are incorporated into the Plan following approval by the Plant Manager.

On an annual basis, the Emergency Planning Manager reviews the procedures for emergency classification with the State of Texas and Somervell and Hood County. Review of the EPPs is conducted at least biennially.

Letters of Agreement with supporting agencies are maintained in the CPNPP Emergency Planning Office and are reviewed annually.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

5. Distribution of Revised Plans

Upon completion of the annual review, the Emergency Planning Manager or designee incorporates any necessary changes. These documents are controlled and revised in accordance with site administrative policies.

Following approval of the updated Plan by the Plant Manager, the document control organization distributes the updated plan to the designated organizations/individuals with emergency response/planning responsibilities.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

6. Supporting Plans

The following list identifies supporting plans and their sources.

- Texas Emergency Management Plan
  Source: Texas Department of Public Safety
- Somervell County Emergency Management Plan and Manual of Emergency Procedures
  Source: Somervell County Government
- Hood County Emergency Management Plan and Manual of Emergency Procedures
  Source: Hood County Government
- Squaw Creek Park Emergency Plan
  Source: Luminant

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

7. Implementing Procedures

Appendix 5 of this Plan provides a topical listing of EPPs that support this Plan.

Certain emergency plan features recommended by NUREG-0654 (e.g., Evaluation Criterion I.3, which addresses methods and techniques for determining source terms and the magnitude of releases) are procedural in nature and have been appropriately placed in EPPs. Changes to the affected portions of these procedures are developed and approved consistent with the requirements of 10 CFR 50.54(q) and the guidance provided in NRC Regulatory Issue Summary 2005-02, "Clarifying the Process for Making Emergency Plan Changes" (Reference 21).

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

8. Table of Contents

The format for this Plan directly follows the format of NUREG-0654. Appendix 8 of this Plan provides a cross-reference between this Plan, 10 CFR 50.47 and Appendix E to 10 CFR Part 50. Appendix 8 also provides a cross-reference from NUREG-0654 Evaluation Criteria to this Plan, the State of Texas and Somervell and Hood Counties' Plans.

9. Emergency Plan Audits

Luminant performs, or oversees the performance of, a periodic independent review of the emergency preparedness program consistent with the requirements of 10 CFR 50.54(t). The reviews include, at a minimum, the following:

- The Emergency Plan
- EPPs
- The Emergency Plan training program
- Readiness testing (e.g., drills and exercises)
- ERFs, equipment, and supplies
- Interfaces with the State of Texas and Somervell and Hood County government agencies
- Required records and documentation

Luminant applies appropriate management controls to audit findings consistent with the facility's corrective action program.

Luminant establishes and maintains the frequency of the periodic audits based on an assessment of performance as compared to performance indicators; however, each element of the emergency preparedness program is reviewed at least once every 24 months.

In addition, Luminant conducts an independent review after a change occurs in personnel, procedures, equipment, or facilities that could potentially adversely affect emergency preparedness. This review is conducted as soon as practicable but no longer than twelve months after the change occurs.

Luminant documents audit results and improvement recommendations and reports these results to the facility and Luminant management. Luminant makes those portions of the audits that address the adequacy of interfaces with the State of Texas and Somervell and Hood County governments available to the affected governments.

Records Management files and maintains the following records for five years:

- The review results and recommended improvements
- The answers to the recommended improvements
- A description of the corrective actions taken

10. Emergency Telephone Numbers

On a quarterly basis the Emergency Planning Manager or his designee is responsible for performing a review of the telephone numbers used for emergency response and for ensuring required revisions are completed.

Appendix 8 of this Plan provides a cross-reference to these provisions in State and local Plans, as applicable.

III. References and Appendices

A. Cited References

1. U.S. Nuclear Regulatory Commission, “Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants,” NUREG-0654/FEMA-REP-1, Rev. 1, October 1980.
2. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.101, “Emergency Planning and Preparedness for Nuclear Power Reactors,” Rev. 3, August 1992.
3. Luminant Generation Company LLC, “Comanche Peak Units 3 and 4 COLA Part 2 Final Safety Analysis Report,” Revision 0, September 2008.
4. U.S. Nuclear Regulatory Commission, “NRC Incident Response Plan,” NUREG-0728, Rev. 4, April 2005.
5. U. S. Department of Energy, “Federal Radiological Monitoring and Assessment Center Operations Plan,” DOE/NV 11718-080, December 2005.
6. U.S. Department of Homeland Security, “National Response Framework,” January 2008.
7. Nuclear Energy Institute, “Methodology for Development of Emergency Action Levels” NEI 99-01, Rev. 5, February 2008.
8. Nuclear Energy Institute, “Methodology for Development of Emergency Action Levels, Advanced Passive Light Water Reactors,” NEI 07-01, Rev. 0, September 2007.
9. U.S. Nuclear Regulatory Commission, “Event Reporting Guidelines: 10 CFR 50.72 and 50.73,” NUREG-1022, Rev. 2, October 2000.
10. Mitsubishi Heavy Industries, Ltd., “Design Control Document for the US-APWR, Rev. 1, August 2008.
11. FEMA-REP-10, “Guide for the Evaluation of Alert and Notification Systems for Nuclear Power Plants, FEMA, November 1985
12. FEMA CPG 1-17, “Outdoor Warning Systems Guide,” March 1980
13. U.S. Nuclear Regulatory Commission, “Functional Criteria for Emergency Response Facilities,” NUREG-0696, February 1981.
14. U.S. Nuclear Regulatory Commission, “Clarification of TMI Action Plan Requirements,” NUREG-0737, Supplement 1, January 1983.
15. Luminant Generation Company, LLC, “Squaw Creek Park Emergency Plan, January 2007.
16. U.S. Nuclear Regulatory Commission, “Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants - Criteria for

Protective Action Recommendations for Severe Accidents," NUREG-0654/FEMA-REP-1, Supplement 3, July 1996.

17. U.S. Environmental Protection Agency, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," EPA-400-R-92-001, October 1991.
18. KLD Associates, Inc., "Comanche Peak Nuclear Power Plant Units 3 and 4 Development of Evacuation Time Estimates," April 2008.
19. U.S. Nuclear Regulatory Commission, "Development of Evacuation Time Estimate Studies for Nuclear Power Plants," NUREG/CR-6863, January 2005.
20. U.S. Nuclear Regulatory Commission, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants - Criteria for Utility Offsite Planning and Preparedness," NUREG-0654/FEMA-REP-1, Supplement 1, November 1987.
21. U.S. Nuclear Regulatory Commission, "Clarifying the Process for Making Emergency Plan Changes," RIS 2005-02, February 2005.

B. Supplemental References

1. NRC IN 91-77- Shift Staffing at Nuclear Power Plants
2. NRC IN 93-81 – Implementation of Engineering Expertise On Shift
3. NRC IN 95-48 – Results of Shift Staffing Study
4. NRC IN 86-16 – NRC On-Scene Response During a Major Emergency
5. NRC RIS 2002-21 – National Guard and Other Emergency Responders Located in the Licensee's Controlled Area
6. NRC RIS 2003-18 - Use of NEI 99-01, Methodology for Development of Emergency Action Levels (including Supplements 1 and 2)
7. NRC IN 97-05 – Off-site Notification Capabilities
8. NRC RIS 00-011 – NRC Emergency Telecommunications System, including Supplement 1
9. NRC IN 87-58 – Continuous Communications Following Emergency Notifications
10. NRC IN 93-53 – Effect of Hurricane Andrew on Turkey Point Nuclear Generating Station and Lessons Learned
11. NRC IN 97-05 – Off-site Notification Capabilities
12. NRC RIS 2002-16 – Current Incident Response Issues
13. NRC IEC 80-09 – Problems with Plant Internal Communications Systems

14. NRC IN 85-44 – Emergency Communications System Monthly Test
15. NRC IN 86-16 – NRC On-Scene Response During a Major Emergency
16. NRC IN 93-53 – Effect of Hurricane Andrew on Turkey Point Nuclear Generating Station and Lessons Learned
17. NRC IN 2004-19 – Problems Associated with Back-Up Power Supplies to Emergency Response Facilities and Equipment
18. NRC IN 2002-14 – Ensuring a Capability to Evacuate Individuals, Including Members of the Public, from the Owner-Controlled Area
19. NRC IN 88-15 – Availability of USFDA-Approved Potassium Iodide for Use in Emergencies Involving Radioactive Iodine
20. NRC IN 96-19 – Failure of Tone alert Radios to Activate When Receiving a Shortened Activation Signal
21. NRC IN 2002-25 – Challenges to Licensees' Ability to Provide Prompt Public Notification and Information During an Emergency Preparedness Event
22. NRC IN 2005-06 – Failure to Maintain Alert and Notification System Tone Alert Radio Capability
23. NRC RIS 01-016 – Update of Evacuation Time Estimates
24. NRC RIS 2003-12 – Clarification of NRC Guidance for Modifying Protective Actions
25. NRC RIS 2004-13 - Consideration of Sheltering in Licensee's Range of Protective Action Recommendations, including Supplement 1
26. NRC RIS 2005-08 – Endorsement of NEI Guidance "Range of Protective Actions for Nuclear Power Plant Incidents"
27. NRC IN 98-020 – Problems with Emergency Preparedness Respiratory Protection Programs
28. NRC IN 85-41 – Scheduling of Pre-Licensing Emergency Preparedness Exercises
29. NRC IN 87-54 – Emergency Response Exercises
30. NRC Bulletin 2005-02 – Emergency Preparedness and Response Actions for Security-Based Events
31. NRC RIS 2006-02 – Good Practices for Licensee Performance During the Emergency Preparedness Component of Force-on-force Exercises
32. NRC RIS 2006-03 – Guidance on Requesting an Exemption from Biennial Emergency Preparedness Exercise Requirements
33. NRC RIS 2006-12 - Endorsement of Nuclear Energy Institute Guidance "Enhancements to Emergency Preparedness Programs for Hostile Action"

34. 44 CFR 350, Review And Approval of State and Local Radiological Emergency Plans and Preparedness

35. FEMA-REP-10 – Guide for the Evaluation of Alert and Notification systems for Nuclear Power Plants

36. FEMA-REP-11 – Guide to Preparing Emergency Public Information Materials

C. Appendices

Appendix 1	Emergency Action Levels
Appendix 2	Radiological Assessment and Monitoring
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Appendix 1 – Emergency Action Levels

Emergency Classification and Action Level Scheme Comanche Peak Units 3 & 4 Combined License Application

FOREWORD

This Emergency Classification and Action Level Scheme for the Comanche Peak Nuclear Power Plant (CPNPP) Units 3 & 4 document is based on NEI 99-01, *Methodology for Development of Emergency Action Levels*, Revision 5, Initiating Conditions associated with the digital control system were based on NEI 07-01, *Methodology for Development of Emergency Action Levels Advanced Passive Light Water Reactors*, Revision 0 (version under review by NRC in February 2008).

This document acknowledges that some detailed design information, such as setpoints and some instrument numbers are not yet available for the Mitsubishi US-APWR. In many cases this data is necessary to determine emergency action level thresholds. Appropriately, this document provides a [TBD] (i.e., “To Be Determined”) placeholder for future inclusion.

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EXECUTIVE SUMMARY

Luminant must respond to a formal set of threshold conditions that require CPNPP Units 3 & 4 personnel to take specific actions with regard to notifying state and local governments and the public when certain off-normal indicators or events are recognized. Four emergency classes are identified in 10 CFR 50. Levels of response and the conditions leading to those responses are defined in joint NRC/FEMA guidelines contained in Appendix 1 of NUREG-0654/ FEMA-REP-1, Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," October 1980. The nuclear industry developed NEI 99-01, “Methodology for Development of Emergency Action Levels,” Revision 5, which is endorsed as an alternative approach to Appendix 1 of NUREG-0654. NEI 99-01, Revision 5 was used to develop Comanche Peak Units 3 & 4 emergency action levels.

CPNPP Units 3 & 4 are Mitsubishi US-APWRs. The US-APWR is a 1,700 megawatt electric pressurized water reactor (PWR). The core is surrounded by a steel neutron reflector which increases reactivity and reduces required U-235 enrichment. In addition, the US-APWR uses more advanced SGs (compared to the current generation PWRs) which create dryer steam allowing for the use of higher efficiency turbines. Safety systems have enhanced redundancy, utilizing 4 trains each capable of supplying 50% of the needed makeup water instead of 2 trains capable of 100%. Also, more reliance is placed on the accumulators which have been redesigned and increased in size. The improvements in this passive system have led to the elimination of the LHSI System, an active system. Advancements in digital technology have been incorporated into the instrument and control system for the US-APWR.

Because the US-APWR is of conventional design, the guidance in NEI 99-01 applies with the exception of the digital control systems. NEI 07-01, “Methodology for Development of Emergency Action Levels Passive Light Water Reactors,” includes information relevant to digital control systems and was useful in developing Initiating Conditions and Emergency Action Levels for Comanche Peak Units 3 & 4. Accordingly, the emergency classification and action level scheme was developed by modifying the generic guidance in NEI 99-01 to make it applicable to the US-APWR and adapting the guidance in NEI 07-01 for the digital control system to the US-APWR design.

ACRONYMS & ABBREVIATIONS

ac.....Alternating Current
ARM ..... Area Radiation Monitor
CDE ..... Committed Dose Equivalent
CEDE .....Committed Effective Dose Equivalent
CET ..... Core Exit Thermocouple
CFR ..... Code of Federal Regulations
CPNPP .....Comanche Peak Nuclear Power Plant
CSF .....Critical Safety Function
CSFST..... Critical Safety Function Status Tree
CVCS ..... Chemical and Volume Control System
CVDT..... Containment Vessel Reactor Coolant Drain Tank
DAS .....Diverse Actuation System
dc.....Direct Current
DCD.....Design Control Document
DNBR ..... Departure from Nucleate Boiling Ratio
DPS ..... Texas Department of Public Safety
EAL..... Emergency Action Level
ECCS .....Emergency Core Cooling System
EDE .....Effective Dose Equivalent
ENS .....Emergency Notification System
EOP ..... Emergency Operating Procedure
EPA .....Environmental Protection Agency
ESW .....Essential Service Water
FAA ..... Federal Aviation Administration
FBI.....Federal Bureau of Investigation
FEMA .....Federal Emergency Management Agency
FSAR.....Final Safety Analysis Report
GE .....General Emergency
gpm ..... Gallons Per Minute
hr ..... Hour
IC..... Initiating Condition
ID..... Inner Diameter
K_{eff}..... Effective Neutron Multiplication Factor
LCO ..... Limiting Condition for Operation
LHSI ..... Low Head Safety Injection
LOCA..... Loss of Coolant Accident
µCi/gm ..... microcuries per gram
MHI..... Mitsubishi Heavy Industries
mR..... milliRoentgen
mrem ..... milliRoentgen Equivalent Man
NEI .....Nuclear Energy Institute
NPP ..... Nuclear Power Plant
NRC..... Nuclear Regulatory Commission
NORAD .....North American Aerospace Defense Command
NOUE .....Notification Of Unusual Event
OBE.....Operating Basis Earthquake
OCA..... Owner Controlled Area

ACRONYMS & ABBREVIATIONS (continued)

ODCM ..... Off-site Dose Calculation Manual
ORO ..... Off-site Response Organization
OSHA ..... Occupational Safety and Health Administration
PA/PL ..... Public Address/Page
PABX ..... Private Automatic Branch Telephone Exchange
PAG ..... Protective Action Guideline
PCMS ..... Plant Control and Monitoring System
PRA ..... Probabilistic Risk Assessment
PSMS ..... Protection and Safety Monitoring System
PWR ..... Pressurized Water Reactor
RCP ..... Reactor Coolant Pump
RCS ..... Reactor Coolant System
RHR ..... Residual Heat Removal System
rem ..... Roentgen Equivalent Man
RV ..... Reactor Pressure Vessel
RVWL ..... Reactor Vessel Water Level
SAE ..... Site Area Emergency
SG ..... Steam Generator
SI ..... Safety Injection
SFP ..... Spent Fuel Pit
T_{avg} ..... Average Reactor Coolant Temperature
TEDE ..... Total Effective Dose Equivalent
TOAF ..... Top of Active Fuel
TS ..... Technical Specifications
TSC ..... Technical Support Center
US ..... United States
V ..... Volt

1.0 Methodology for Development of Emergency Action Levels

1.1 Background

In 1980, the United States Nuclear Regulatory Commission (NRC) promulgated guidance on a standard emergency classification and action level scheme. This guidance was provided in Appendix 1 of NUREG-0654/FEMA-REP-1, Revision 1, (NUREG-0654) (Reference 1). The guidance was event-based, initiating conditions (ICs) were not systematically selected, and consistent application of the guidance was never achieved by nuclear power plant (NPP) licensees. Through the Nuclear Energy Institute (NEI), the nuclear industry initiated an effort to provide a systematic approach to developing a standard emergency classification and action level scheme resulting in a document that is now in its fifth revision: NEI 99-01, Revision 5. (Reference 2) Revision 5 was endorsed by the NRC staff in February 2008. (Reference 3)

More recently, the industry developed a separate guidance document, NEI 07-01, Revision 0 (Reference 4) applicable to passive light water reactor designs (i.e., Westinghouse AP-1000 and General Electric-Hitachi ESBWR). This document is under review by NRC with endorsement expected some time in 2008.

CPNPP Units 3 & 4 are Mitsubishi US-APWRs. The US-APWR is a 1,700 megawatt electric pressurized water reactor (PWR). The core is surrounded by a steel neutron reflector which increases reactivity and reduces required U-235 enrichment. In addition, the US-APWR uses more advanced steam generators (SG) (compared to the current generation PWRs) which create dryer steam allowing for the use of higher efficiency turbines. Safety systems have enhanced redundancy, utilizing 4 trains each capable of supplying 50% of the needed makeup water instead of 2 trains capable of 100%. Also, more reliance is placed on the accumulators which have been redesigned and increased in size. The improvements in this passive system have led to the elimination of the Low Head Safety Injection (LHSI) System, an active system. Advancements in digital technology have been incorporated into the instrument and control system for the US-APWR.

NRC has issued several guidance documents with respect to developing the emergency classification and action level scheme. Regulatory Guide 1.101, Revision 4, (Reference 5) endorses the use of NEI 99-01, Revision 4. Revision 5 of NEI 99-01 was endorsed in a letter from the NRC to NEI on February 22, 2008. Regulatory Issue Summary 2003-18 (Reference 6) and its two supplements (Reference 7, Reference 8) provides recommendations to assist licensees in submitting emergency classification and action level schemes for NRC approval.

Because the US-APWR is of conventional design, the guidance in NEI 99-01 applies with the exception of the digital control systems. NEI 07-01 includes information relevant to digital control systems and was useful in developing ICs

and Emergency Action Levels (EALs) for the US-APWR. Accordingly, the emergency classification and action level scheme was developed by modifying the generic guidance in NEI 99-01 to make it applicable to the US-APWR and adapting the guidance in NEI 07-01 for the digital control system to the US-APWR design.

This document provides information regarding what each IC and EAL addresses, and includes sufficient basis information for each EAL. The information is presented by Recognition Category:

A - Abnormal Rad Levels/Radiological Effluent

C - Cold Shutdown/Refueling System Malfunction

F - Fission Product Barrier

H - Hazards and Other Conditions Affecting Plant Safety

S - System Malfunction

Each of the EAL guides in Recognition Categories A, C, H, and S is structured in the following way:

- Recognition Category - As described above.
- Emergency Classification Levels – Notification of Unusual Event (NOUE), Alert, Site Area Emergency (SAE) or General Emergency (GE).
- Initiating Condition - Symptom- or Event-Based, Generic Identification and Title.
- Operating MODE Applicability - Power Operation, Hot Standby, Hot Shutdown, Cold Shutdown, Refueling, Defueled, All, or Not Applicable.
- Emergency Action Level Threshold(s) corresponding to the IC.
- Basis information for plant specific readings and factors that may relate to changing the generic IC or EAL to a different emergency classification level.
- EAL developer information – Information used to aid licensees in the development of site-specific EALs.

For Recognition Category F, the EAL information is presented in a matrix format. The presentation method was chosen to clearly show the synergism among the EALs and to support more accurate dynamic assessments. For category F, the EALs are arranged by safety function, or fission product barrier. Classifications are based on various combinations of function or barrier challenges.

The EAL information has the primary threshold for NOUE as operation outside the safety envelope for the plant as defined by plant Technical Specifications (TS), including Limiting Conditions for Operation (LCOs) and Action Statement Times. In addition, certain precursors of more serious events such as loss of off-site alternating current (ac) power and earthquakes are included in NOUE EALs. This provides a clear demarcation between the lowest emergency classification

level and "non-emergency" notifications as specified by Title 10, Code of Federal Regulations 50.72 (10 CFR 50.72). (Reference 9)

2.0 Changes Incorporated With Revision 0

Reserved for future changes to this document.

3.0 Development of Basis for Generic Approach

This document addresses radiological emergency preparedness. Non-radiological events are included in the classification scheme only to the extent that these events represent challenges to the continued safety of the NPP and its operators. There are existing reporting requirements (United States Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA)) under which utilities operate for non-radiological emergencies. There are also requirements for emergency preparedness involving hazardous chemical releases. While the proposed classification structure could be expanded to include these non-radiological hazards, these events are beyond the scope of this document.

This classification scheme is based on the four classification levels promulgated by the NRC as the standard for the United States (US). The NRC has determined that US nuclear facilities will continue to classify events using the four classification levels and that the NRC will re-classify the event in any international communication.

3.1 Definitions Used to Develop EAL Methodology

The following definitions apply to the CPNPP Emergency Plan and are used throughout this document:

EMERGENCY CLASSIFICATION LEVEL: One of four emergency categories established by the NRC for grouping off-normal NPP conditions according to (1) their relative radiological seriousness, and (2) the time-sensitive on-site and off-site radiological emergency preparedness actions necessary to respond to such conditions. The existing radiological emergency classification levels, in ascending order of seriousness, are:

- Notification of Unusual Event (NOUE)
- Alert
- Site Area Emergency (SAE)
- General Emergency (GE)

INITIATING CONDITION (IC): One of a predetermined subset of NPP conditions where either the potential exists for a radiological emergency, or such an emergency has occurred.

EMERGENCY ACTION LEVEL (EAL): A pre-determined, observable threshold for an IC that places the plant in a given emergency classification level. An EAL can be: an instrument reading; an equipment status indicator; a measurable parameter (on-site or off-site); a discrete, observable event; results of analyses; entry into specific emergency operating procedures (EOPs); or another phenomenon which, if it occurs, indicates entry into a particular emergency classification level.

3.2 Perspective

This document defines EALs for CPNPP Units 3 & 4 based on the methodology presented in NEI 99-01. The approach is designed to be easily understood and applied by the individuals responsible for on-site and off-site emergency preparedness and response.

3.3 Recognition Categories

ICs and EALs are grouped in one of several schemes. These classification schemes include symptom-based, event-based, and barrier-based ICs and EALs.

The symptom based category for ICs and EALs refers to those indicators that are measurable over some continuous spectrum, such as core temperature, coolant levels, containment pressure, etc. The level of seriousness these symptoms indicate depends on the degree to which they have exceeded TS limits, the other symptoms or events that are occurring contemporaneously, and the capability of the licensed operators to gain control and bring the indicator back to safe levels.

Event based EALs and ICs refer to occurrences with potential safety significance, such as the failure of a SI pump, a safety valve failure, or a loss of electric power to some part of the plant. The range of seriousness of these "events" is dependent on the location, number of contemporaneous events, remaining plant safety margin, etc.

Barrier based EALs and ICs refer to the level of challenge to principal fission product barriers used to assure containment of radioactive materials contained within a NPP. These barriers are: fuel cladding, reactor coolant system (RCS) pressure boundary, and containment. The level of challenge to these barriers encompasses the extent of damage (loss or potential loss) and the number of barriers concurrently under challenge. In reality, barrier based EALs are a subset of symptom based EALs that deal with symptoms indicating fission product barrier challenges. These barrier based EALs are primarily derived from Critical Safety Functions (CSFs) identified in EOPs. Challenge to one or more barriers generally is initially identified through instrument readings and periodic sampling. Under these barrier-based EALs, deterioration of the RCS pressure boundary or the fuel clad barrier usually indicates an Alert condition, two barriers under challenge a Site Area Emergency, and loss of two barriers with the third barrier under challenge is a General Emergency. The fission product barrier table described in Section 5-F is a hybrid approach that recognizes that some events may represent a challenge to more than one barrier, and that the containment

barrier is weighted less than the RCS pressure boundary and the fuel clad barriers.

Symptom based ICs and EALs are most easily identified when the plant is in a normal startup, operating or hot shutdown MODE of operation, with all of the barriers in place and the plant's instrumentation and emergency safeguards features fully operational as required by TS. It is under these circumstances that the operations staff has the most direct information of the plant's systems displayed in the Control Room. As the plant moves through the decay heat removal process toward cold shutdown and refueling, barriers to fission products are reduced (i.e., RCS pressure boundary may be open), and fewer of the safety systems required for power operation are required to be fully operational. Under these plant operating MODEs, the identification of an IC in the plant's operating and safety systems becomes more event based, as the instrumentation to detect symptoms of a developing problem may not be fully effective; and engineered safeguards systems, such as the Emergency Core Cooling System (ECCS), may be partially disabled as permitted by the plant's TS.

Barrier based ICs and EALs also are heavily dependent on the ability to monitor instruments that indicate the condition of plant operating and safety systems. Fuel cladding integrity and reactor coolant levels can be monitored through several indicators when the plant is in a normal operating MODE, but this capability is much more limited when the plant is in a refueling MODE, when many of these indicators are disconnected or off-scale. The need for this instrumentation is lessened when the plant is shut down.

For some operating MODEs there may not be definitive and unambiguous indicators of containment integrity available to Control Room personnel. Therefore, barrier-based EALs do not place undue reliance on assessments of containment integrity in all operating MODEs. Generally, TS relax containment integrity requirements in shutdown or refuel MODEs in order to provide flexibility in performance of specific tasks during shutdown conditions. Containment pressure and temperature indications may not increase if there is a pre-existing breach of containment integrity. For the US-APWR, a large portion of the containment's exterior cannot be monitored for leakage by radiation monitors.

Several categories of emergencies have no instrumentation to indicate a developing problem, or the event may be identified before any other indications are recognized. A reactor coolant pipe could break; FIRE alarms could sound; radioactive materials could be released; and any number of other events could occur that would place the plant in an emergency condition with little warning. For emergencies related to the reactor system and safety systems, the ICs shift to an event based scheme as the plant MODE moves toward cold shutdown and refueling MODEs. For non-radiological events, such as FIRE, external floods, wind loads, etc., event based ICs are the norm.

In many cases, a combination of symptom, event, and barrier based ICs will be present as an emergency develops. In a loss of coolant accident (LOCA), for example:

- Coolant level is dropping; (symptom)
- There is a leak of some magnitude in the system (pipe break, safety valve stuck open) that exceeds plant capabilities to make up the loss; (barrier breach or event)
- Core (coolant) temperature is rising; (symptom) and
- At some level, fuel failure begins with indicators such as high off-gas, high coolant activity samples, etc. (barrier breach or symptom)

3.4 Characteristics

Seven characteristics incorporated into the EALs are identified below:

(1) Consistency (i.e., the EALs would lead to similar decisions under similar circumstances at other plants);

(2) Human engineering and user friendliness;

(3) Potential for classification upgrade only when there is an increasing threat to public health and safety;

(4) Ease of upgrading and downgrading;

(5) Technical completeness for each classification level;

(6) A logical progression in classification for multiple events; and

(7) Objective, observable values.

3.5 Emergency Classification Level Descriptions

There are three considerations related to emergency classification levels. These are:

(1) The potential impact on radiological safety, either as known now or as can be reasonably projected;

(2) How far the plant is beyond its predefined design, safety, and operating envelopes; and

(3) Whether or not conditions that threaten health are expected to be confined to within the site boundary.

The ICs deal explicitly with radiological safety impact by escalating from levels corresponding to releases within regulatory limits to releases beyond EPA Protective Action Guideline (PAG) (Reference 10) plume exposure levels. In addition, the "Discussion" sections below include off-site dose consequence considerations that were not included in NUREG-0654 Appendix 1.

NOTIFICATION OF UNUSUAL EVENT (NOUE):

Events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring off-site response or monitoring are expected unless further degradation of safety systems occurs.

Discussion: Potential degradation of the level of safety of the plant is indicated primarily by exceeding plant TS Limiting Condition for Operation (LCO) allowable action statement time for achieving required MODE change to a condition where the LCO is no longer applicable. Precursors of more serious events are also included because precursors do represent a potential degradation in the level of safety of the plant. Minor releases of radioactive materials are included. In this emergency classification level, however, releases do not require monitoring or off-site response.

ALERT:

Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA PAG exposure levels.

Discussion: Rather than discussing the distinguishing features of "potential degradation" and "potential substantial degradation," a comparative approach would be to determine whether increased monitoring of plant functions is warranted at the Alert level as a result of safety system degradation. This addresses the operations staff's need for help, independent of whether an actual decrease in plant safety is determined. This increased monitoring can then be used to better determine the actual plant safety state, whether escalation to a higher emergency classification level is warranted, or whether de-escalation or termination of the emergency classification level declaration is warranted. Dose consequences from these events are small fractions of the EPA PAG plume exposure levels.

SITE AREA EMERGENCY (SAE):

Events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts; 1) toward site personnel or equipment that could lead to the likely failure of or; 2) that prevent effective access to, equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA PAG exposure levels beyond the site boundary.

Discussion: The discriminator (threshold) between Site Area Emergency and General Emergency is whether or not the EPA PAG plume exposure levels are expected to be exceeded outside the site boundary. This threshold, in addition to dynamic dose assessment considerations discussed in the EAL guidelines,

clearly addresses NRC and off-site emergency response agency concerns as to timely declaration of a General Emergency.

GENERAL EMERGENCY (GE):

Events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA PAG exposure levels off-site for more than the immediate site area.

Discussion: The bottom line for the General Emergency is whether evacuation or sheltering of the general public is indicated based on EPA PAGs, and therefore is interpreted to include radionuclide release regardless of cause. Uncertainties in systems or structures (e.g. containment) response, and events such as waste gas tank releases and severe spent fuel pool events postulated to occur at high population density sites are addressed. To better assure timely notification, EALs in this category are primarily expressed in terms of plant function status, with secondary reliance on dose projection. In terms of fission product barriers, loss of two barriers with loss or potential loss of the third barrier constitutes a General Emergency.

3.6 Emergency Classification Level Thresholds

The bases for establishing these emergency classification thresholds are the TS and setpoints that have been developed in the design basis calculations and the Final Safety Analysis Report (FSAR) or other appropriate indication, alarm, or assessment that represents a threshold requiring emergency classification and response..

For those conditions that are easily measurable and instrumented, the boundary is likely to be the EAL (observable by plant staff, instrument reading, alarm setpoint, etc.) that indicates entry into a particular emergency classification level. In addition to the continuously measurable indicators, such as coolant temperature, coolant levels, leak rates, containment pressure, etc., the FSAR provides indications of the consequences associated with design basis events.

The US-APWR probabilistic risk assessment (PRA) was considered in defining these boundaries. The PRA has been completed for the design as part of the licensing process. The PRA was considered in developing relevant ICs and risk associated with emergency conditions.

Another critical element of the analysis to arrive at these threshold (boundary) conditions is the time that the plant might stay in that condition before moving to a higher emergency class. The time dimension is critical to the EAL since the purpose of the emergency class for state and local officials is to notify them of the level of mobilization that may be necessary to handle the emergency. This is particularly true when a Site Area Emergency or General Emergency is IMMINENT.

3.7 Emergency Action Levels

Planned evolutions involve preplanning to address the limitations imposed by the condition, the performance of required surveillance testing, and the implementation of specific controls prior to knowingly entering the condition in accordance with the specific requirements of the plant's TS. Activities which cause the plant to operate beyond that allowed by TS, planned or UNPLANNED, may result in an EAL Threshold being met or exceeded. Planned evolutions to test, manipulate, repair, perform maintenance or modifications to systems and equipment that result in an EAL value being met or exceeded are not subject to classification and activation requirements as long as the evolution proceeds as planned and is within the operational limitations imposed by the specific operating license. However, these conditions may be subject to the reporting requirements of 10 CFR 50.72.

Classifications are to be based on VALID indications, reports or conditions. Indications, reports or conditions are considered VALID when they are verified by (1) an instrument channel check, or (2) indications on related or redundant indications, or (3) by direct observation by plant personnel, such that doubt related to the indication's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

With the emergency classes defined, the thresholds that must be met for each EAL to be placed under the emergency class were determined. Two basic approaches to determining EALs were considered:

(1) EALs and emergency class boundaries coincide for those continuously measurable, instrumented ICs, such as radioactivity, core temperature, coolant levels, etc. For these ICs, the EAL is the threshold reading that most closely corresponds to the emergency class description using the best available information.

The Emergency Coordinator must remain alert to events or conditions that lead to the conclusion that exceeding the EAL Threshold is IMMINENT. Under certain plant conditions, an alternate instrument or a temporary instrument may be installed to facilitate monitoring the parameter. In addition, visual observation may be sufficient to detect that a parameter is approaching or has reached a classifiable threshold. In these cases, the classification of the event is appropriate even if the instrument normally used to monitor the parameter is inoperable or has otherwise failed to detect the threshold. If, in the judgment of the Emergency Coordinator, an IMMINENT situation is at hand, the classification should be made as if the threshold has been exceeded.

Note: For EALs including a time qualifier, the Emergency Coordinator should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the EAL Threshold duration has exceeded, or is IMMINENT. With regard to radiological

release EALs, in the absence of data to the contrary, assume that the release duration has exceeded the applicable time if an ongoing release is detected and the release start time is unknown.

Note: Timely and accurate communication between Security Shift Supervision and the Control Room is crucial for the implementation of effective Security EALs.

(2) For discrete (discontinuous) events, the approach is somewhat different. In this category are internal and external hazards such as FIRE or earthquake. The purpose for including hazards in EALs is to assure that plant personnel and off-site emergency response organizations are prepared to deal with consequential damage these hazards may cause. If, indeed, hazards have caused damage to safety functions or fission product barriers, this should be confirmed by symptoms or by observation of such failures. Therefore, it may be appropriate to enter an Alert classification for events approaching or exceeding design basis limits such as Operating Basis Earthquake (OBE), design basis wind loads, FIRE within VITAL AREAs, etc. This would give the operating staff additional support and improved ability to determine the extent of plant damage. If damage to barriers or challenges to CSFs have occurred or are identified, then the additional support can be used to escalate or terminate the Emergency Class based on what has been found. Security events must reflect potential for increasing security threat levels.

Plant EOPs are designed to maintain and/or restore a set of CSFs which are listed in the order of priority for restoration efforts during accident conditions. While the actual nomenclature of the CSFs may vary among plants, generally the PWR CSF set includes:

- Subcriticality
- Core cooling
- Heat sink
- Pressure-temperature-stress (RCS integrity)
- Containment
- RCS inventory

There are diverse and redundant plant systems to support each CSF. By monitoring the CSFs instead of the individual system component status, the

impact of multiple events is inherently addressed, e.g., the number of OPERABLE components available to maintain the CSF.

The EOPs contain detailed instructions regarding the monitoring of these functions and provides a scheme for classifying the significance of the challenge to the functions. In providing EALs based on these schemes, the emergency classification can flow from the EOP assessment rather than being based on a separate EAL assessment. This is desirable as it reduces ambiguity and reduces the time necessary to classify the event.

PWR Owner's Group Emergency Response Guidelines (ERGs) classify challenges as YELLOW, ORANGE, and RED paths. If the core exit thermocouples (CETs) exceed [TBD-1200 degrees F (650 degrees C) or 700 degrees F (400 degrees C)] with low reactor vessel water level, a RED path condition exists. The ERG considers a RED path as an extreme challenge to a plant function necessary for the protection of the public. It reasonably follows that if any CSF enters a RED path, a Site Area Emergency exists. A General Emergency could be considered to exist if core cooling CSF is in a RED path and the EOP function restoration procedures have not been successful in restoring core cooling.

Note: AU1, AA1, AS1, and AG1 EALs, in NEI 99-01 related to perimeter radiation monitoring systems, are not included because CPNPP does not have a perimeter radiation monitoring system. Similarly, for AU1 and AA1, EALs related to real-time dose assessment have not been included because CPNPP does not have this capability.

Note: HA1, EAL #4 related to VISIBLE DAMAGE affecting safety systems from a turbine failure, identified in NEI 99-01, is not included for CPNPP Units 3 & 4, because of specific design features incorporated into the US-APWR design.

Note: SU3, SA4, and SS6 related to annunciator malfunctions have been modified as presented in NEI 99-01 to address the digital control systems in the US-APWR. Due to the similarity to the Westinghouse AP-1000 digital control system, the approach for digital control ICs/EALs presented in NEI 07-01 was generally adopted for the US-APWR.

3.8 Treatment of Multiple Events and Classification Level Upgrading

When multiple simultaneous events occur, the emergency classification level is based on the highest EAL reached. For example, two Alerts remain in the Alert category or, an Alert and a Site Area Emergency is a Site Area Emergency. Further guidance is provided in Regulatory Information Summary, RIS 2007-02, Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events (Reference 11).

Although the majority of the EALs provide very specific thresholds, the Emergency Coordinator must remain alert to events or conditions that lead to the conclusion that exceeding the EAL is IMMINENT. If, in the judgment of the Emergency Coordinator, an IMMINENT situation is at hand, the classification should be made as if the threshold has been exceeded. While this is particularly prudent at the higher emergency classification levels (as the early classification may provide for more effective implementation of protective measures), it is nonetheless applicable to all emergency classification levels.

3.9 Classifying Transient Events

There may be cases in which a plant condition that exceeded an EAL Threshold was 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. In these cases, an emergency should not be declared.

Reporting requirements of 10 CFR 50.72 are applicable and the guidance of NUREG-1022, (Reference 12) Event Reporting Guidelines 10 CFR 50.72 and 50.73 (Reference 13), should be applied.

Existing guidance for classifying transient events addresses the period of time of event recognition and classification (15 minutes). However, in cases when an EAL declaration criterion may be met momentarily during the normal expected response of the plant, declaration requirements should not be considered to be met when the conditions are a part of the designed plant response or result in appropriate operator actions.

3.10 Operating MODE Applicability

The plant operating MODE that existed at the time that the event occurred, prior to any protective system or operator action initiated in response to the condition, is compared to the MODE applicability of the EALs. If an event occurs, and a lower or higher plant operating MODE is reached before the emergency classification level can be declared, the emergency classification level shall be based on the MODE that existed at the time the event occurred.

For events that occur in Cold Shutdown or Refueling, escalation is via EALs that have Cold Shutdown or Refueling for MODE applicability, even if Hot Shutdown (or a higher MODE) is entered during any subsequent heat-up. In particular, the fission product barrier EALs are applicable only to events that initiate in Hot Shutdown or higher.

3.11 Operating MODEs

(1)	Power Operations:	Reactor Power > 5%, $K_{eff} \geq 0.99$
(2)	Startup:	Reactor Power ≤ 5%, $K_{eff} \geq 0.99$
(3)	Hot Standby:	$T_{avg} \geq 350$ °F (177 °C), $K_{eff} < 0.99$
(4)	Hot Shutdown:	200 °F (93 °C)<T_{avg} < 350 °F (177 °C), K_{eff} < 0.99
(5)	Cold Shutdown:	$T_{avg} \leq 200$ °F (93 °C), $K_{eff} < 0.99$
(6)	Refueling:	One or more vessel head closure bolts less than fully tensioned
	Defueled (None):	All reactor fuel removed from reactor pressure vessel (RV). (Full core off load during refueling or extended outage)

4.0 Human Factors Considerations

Human factor considerations discussed in NEI 99-01 were adopted in this document.

5.0 EAL Guidance

This document provides ICs and EALs for the CPNPP Units 3 & 4. Placeholders ([TBD]) identify information that is not yet available at the current stage of design for the US-APWR.

5.1 Generic Arrangement

The information is presented by Recognition Categories:

A - Abnormal Rad Levels/Radiological Effluent

C - Cold Shutdown/Refueling System Malfunction

F - Fission Product Barrier Degradation

H - Hazards and Other Conditions Affecting Plant Safety

S - System Malfunction

The ICs for each of the above Recognition Categories A, C, H, and S are in the order of NOUE, Alert, Site Area Emergency, and General Emergency. For all Recognition Categories, an IC matrix versus emergency classification level is first shown. The purpose of the IC matrices is to provide an overview of how the ICs are logically related under each emergency classification level.

EAL guides in Recognition Categories A, C, H, and S are structured in the following way:

- Recognition Category - As described above.

- Emergency Classification Level - NOUE, Alert, Site Area Emergency or General Emergency.

- Initiating Condition - Generic Identification and/or Title.

- Operating MODE Applicability - These MODEs are defined in US-APWR TS.

- Emergency Action Level Threshold(s) – these thresholds are conditions and indications that were considered to meet the criteria of the IC. The EALs are intended to be unambiguous, expressed in site-specific nomenclature, and be readily discernible from Control Room instrumentation.

- Basis – provides information that explains the IC and EALs. The bases are also written to assist the personnel implementing the guidance into site-specific procedures. Attachment A provides detailed basis for implementing the Abnormal Rad Levels/Radiological Effluent Recognition Category.

  For Recognition Category F, basis information is presented in a format consistent with Table 5-F-2. The presentation method shown for Fission Product Barrier Function Table was chosen to clearly show the synergism among the EALs and to support more accurate dynamic assessments.

5.2 Generic Bases

The ICs and EALs are based on NEI 99-01 guidance that has the primary threshold for NOUEs as operation outside the safety envelope for the plant as defined by plant TS, including LCOs and Action Statement Times. In addition, certain precursors of more serious events such as loss of off-site ac power and earthquakes are included in NOUE IC/EALs. This provides a clear demarcation between the lowest emergency classification level and "non-emergency" notifications specified by 10 CFR 50.72.

For a number of Alerts, IC/EALs are chosen based on hazards which may cause damage to plant safety functions (e.g., tornadoes, hurricanes, FIRE in VITAL AREAS) or require immediate additional help directly (Control Room evacuation) and increased monitoring of the plant. The symptom-based and barrier-based IC/EALs are sufficiently anticipatory to address the results of multiple failures, regardless of whether there is or is not a common cause. Declaration of the Alert results in the staffing of the Technical Support Center (TSC) for assistance and additional monitoring making direct escalation to the Site Area Emergency unnecessary. Other Alerts, which have been specified, correspond to conditions that are consistent with the emergency classification level description.

The basis for declaring a Site Area Emergency and General Emergency is primarily the extent and severity of fission product barrier challenges, based on plant conditions as presently known or as can be reasonably projected.

With regard to the Hazards and Other Conditions Affecting Plant Safety Recognition Category, the existence of a hazard that represents a potential degradation in the level of safety of the plant is the basis of NOUE classification. If the hazard results in VISIBLE DAMAGE to plant structures or equipment associated with safety systems, or if system performance is affected, the event may be escalated to an Alert. The reference to “duration” or to “damage” to safety systems is intended only to size the event. Consequential damage from such hazards, if observed, would be the basis for escalation to Site Area Emergency or General Emergency, by entry to System Malfunction or Fission Product Barrier IC/EALs.

Portions of the basis are specifically designated as information necessary for the development of the site-specific procedures and training. These developer information sections are in [*brackets and italicized*]. The information contained in these portions consists of references, examples, instructions for calculations, etc. These portions of the basis and applicable appendices need not be included in the technical basis document supporting the site-specific EALs. In some cases, the information developed from the developer information may be appropriate to include in the technical basis document.

5.3 Implementation at CPNPP Units 3 & 4

The information contained in this document contains CPNPP Units 3 & 4 specific ICs and EALs based on the NEI 99-01.

The ICs and EAL Thresholds serve a specific purpose. The ICs are intended to be the fundamental criteria for the declaration, whereas, the EAL Thresholds are intended to represent unambiguous conditions that meet the IC. There may be unforeseen events, or combinations of events, for which the EALs may not be exceeded, but in the judgment of the Emergency Coordinator, the intent of the IC may be met. The additional detail in the individual ICs will facilitate classifications over the broad guidance of the Emergency Coordinator judgment ICs.

These ICs and EALs have been reviewed with the Texas Governor’s Division of Emergency Management, Texas State Department of Health Services/Radiation Control Program, Somervell County Judge, and Hood County Judge.

The information contained in the bases for each EAL may assist the Emergency Coordinator in making classifications, particularly those involving judgment or multiple events. The basis information is useful in training, for explaining event classifications to off-site officials and facilitating regulatory review and approval of the classification scheme.

5.4 Definitions

In the IC/EALs, selected words have been set in all capital letters. These words are defined terms having specific meanings as they relate to this document. Definitions of these terms are provided below.

ANTICIPATED OPERATIONAL OCCURRENCE: As described in Chapter 15 of the US-APWR Design Control Document (DCD) (Reference 14), ANTICIPATED OPERATIONAL OCCURRENCEs are events in which the reactor plant conditions are disturbed beyond the normal operating range. (AOOs are equivalent to "SIGNIFICANT TRANSIENT" used in NEI 99-01.)

CONTAINMENT CLOSURE: The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under existing plant conditions.

CORE ALTERATION: As defined in TS, CORE ALTERATION is the movement of any fuel, sources, or reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.

DOSE EQUIVALENT I-131: As defined in US-APWR TS, DOSE EQUIVALENT I-131 is the concentration of I-131 (microcuries/gram) that alone would produce the same committed effective dose equivalent (CEDE) as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The dose conversion factors used for this calculation shall be those listed in Table 2.1 of EPA Federal Guidance Report No. 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," EPA-520/1-88-020, September 1988. (Reference 15)

DOSE EQUIVALENT XE-133: As defined in US-APWR TS, DOSE EQUIVALENT Xe-133 is the concentration of Xe-133 (microcuries per gram (μCi/gm)) that alone would produce the same effective dose equivalent (EDE) as the quantity and isotopic mixture of noble gases (Kr-85m, Kr-85, Kr-87, Kr-88, Xe-133, and Xe-135) actually present. The dose conversion factors used for this calculation shall be those listed in Table III.1 of EPA Federal Guidance Report No. 12, "External Exposure to Radionuclides in Air, Water, and Soil, "EPA 402-R-93-081, September 1993. (Reference 16)

EXPLOSION: A rapid, violent, unconfined combustion, or catastrophic failure of pressurized/energized equipment that imparts energy of sufficient force to potentially damage permanent structures, systems, or components.

FAULTED: The existence of secondary side LEAKAGE that results in an uncontrolled drop in SG pressure or the SG being completely depressurized.

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 flame is preferred but is NOT required if large quantities of smoke and heat are observed.

HOSTAGE: A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION: An act toward a NPP or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILEs, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area (OCA)).

HOSTILE FORCE: One or more individuals who are engaged in a determined assault, overtly or by stealth and deception, equipped with suitable weapons capable of killing, maiming, or causing destruction.

IMMINENT: Mitigation actions have been ineffective, additional actions are not expected to be successful, and trended information indicates that the event or condition will occur. Where IMMINENT timeframes are specified, they shall apply.

LEAKAGE: As defined in US-APWR Technical Specifications, LEAKAGE shall be:

a. Identified LEAKAGE

   1. LEAKAGE, such as that from pump seals or valve packing (except reactor coolant pump (RCP) seal water injection or leakoff), that is captured and conducted to collection systems or a sump or collecting tank,

   2. LEAKAGE into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be pressure boundary LEAKAGE, or

   3. RCS LEAKAGE through a SG to the Secondary System (primary to secondary LEAKAGE);

b. Unidentified LEAKAGE

   All LEAKAGE (except RCP seal water injection or leakoff) that is not identified LEAKAGE, and

c. Pressure Boundary LEAKAGE

LEAKAGE (except primary to secondary LEAKAGE) through a nonisolable fault in an RCS component body, pipe wall, or vessel wall.

MODE: As defined in US-APWR TS, MODE shall correspond to any one inclusive combination of core reactivity condition, power level, average reactor coolant temperature, and reactor vessel head closure bolt tensioning specified in Section 3.11 (Table 1.1-1 of TS) with fuel in the reactor vessel.

NORMAL PLANT OPERATIONS: Activities at the plant site associated with routine testing, maintenance, or equipment operations, in accordance with normal operating or administrative procedures. Entry into abnormal or EOPs, or deviation from normal security or radiological controls posture, is a departure from NORMAL PLANT OPERATIONS.

OPERABLE/OPERABILITY: As defined in US-APWR TS, system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s).

PROJECTILE: An object directed toward a NPP that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA: The site-specific area that encompasses all controlled areas within the security PROTECTED AREA fence.

RUPTURED: Existence of primary-to-secondary LEAKAGE in a SG of a magnitude sufficient to require or cause a reactor trip and SI.

SECURITY CONDITION: Any Security Event as listed in the approved security contingency plan that constitutes a threat/compromise to site security, threat/risk to site personnel, or a potential degradation to the level of safety of the plant. A SECURITY CONDITION does not involve a HOSTILE ACTION.

UNISOLABLE: A breach or leak that cannot be promptly isolated.

UNPLANNED: A parameter change or an event that is not the result of an intended evolution and requires corrective or mitigative actions.

VALID: An indication, report, or condition, is considered to be VALID when it is verified by (1) an instrument channel check, (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

VISIBLE DAMAGE: Damage to equipment or structure that is readily observable without measurements, testing, or analysis. Damage is sufficient to cause concern regarding the continued operability or reliability of the affected structure, system, or component. Example damage includes: deformation due to heat or impact, denting, penetration, rupture, cracking, and paint blistering. Surface blemishes (e.g., paint chipping, scratches) should not be included.

VITAL AREA: Any area, normally within the PROTECTED AREA, that contains equipment, systems, components, or material, the failure, destruction, or release of which could directly or indirectly endanger the public health and safety by exposure to radiation.

5.5 Abnormal Rad Levels/Radiological Effluent EALs

Table 5-A-1: Recognition Category "A" Initiating Condition Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
AG1 Off-site dose resulting from an actual or IMMINENT release of gaseous radioactivity greater than 1000 mrem TEDE or 5000 mrem Thyroid CDE for the actual or projected duration of the release using actual meteorology. *Op. MODEs: All*	**AS1** Off-site dose resulting from an actual or IMMINENT release of gaseous radioactivity greater than 100 mrem TEDE or 500 mrem Thyroid CDE for the actual or projected duration of the release. *Op. MODEs: All*	**AA1** Any release of gaseous or liquid radioactivity to the environment greater than 200 times the ODCM Limit for 15 minutes or longer. *Op. MODEs: All*	**AU1** Any release of gaseous or liquid radioactivity to the environment greater than 2 times the ODCM Limit for 60 minutes or longer. *Op. MODEs: All*
		AA2 Damage to irradiated fuel or loss of water level that has resulted or will result in the uncovering of irradiated fuel outside the reactor vessel. *Op. MODEs: All*	**AU2** UNPLANNED rise in plant radiation levels. *Op. MODEs: All*
		AA3 Rise in radiation levels within the facility that impedes operation of systems required to maintain plant safety functions. *Op. MODEs: All*	

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AU1

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Any release of gaseous or liquid radioactivity to the environment greater than 2 times the Off-site Dose Calculation Manual (ODCM) Limit for 60 minutes or longer.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2 or 3)

1. VALID reading on **ANY** of the following radiation monitors greater than the threshold for 60 minutes or longer:

   - High Sensitivity Main Steam Line Monitor (N-16 channel)
     [Threshold TBD (R-65A, B, R-66A, B, R-67A, B, R-68A, B)]
   - Main Steam Line monitor
     [Threshold TBD (R-87, R-88, R-89, R-90)]
   - Turbine Building Floor Drain Radiation Monitor
     [Threshold - TBD (R-58)]

2. VALID reading on **ANY** of the following effluent monitor reading greater than 2 times the alarm setpoint established by a current radioactivity discharge permit for 60 minutes or longer:

   - Plant vent radiation gas monitor
     [Threshold -TBD (R-21A, B, R-80,A, B)]
   - Liquid radwaste discharge monitor
     [Threshold -TBD (R-35)]
   - Essential Service Water (ESW) radiation monitor
     [Threshold -TBD (R-74A, B, C, D)]

3. Confirmed sample analyses for gaseous or liquid releases indicates concentrations or release rates greater than 2 times [TBD CPNPP 3/4 ODCM values] for 60 minutes or longer.

Basis:

[*Refer to Attachment A for a detailed basis of the radiological effluent IC/EALs.*]

This IC addresses a potential decrease in the level of safety of the plant as indicated by a radiological release that exceeds regulatory commitments for an extended period of time.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

The US-APWR incorporates design features intended to control the release of radioactive effluents to the environment. Administrative controls are established to prevent unintentional releases, or control and monitor intentional releases. The occurrence of extended, uncontrolled radioactive releases to the environment is indicative of a degradation in these features and/or controls. The ODCM multiples are specified in AU1 and AA1 only to distinguish between non-emergency conditions, and from each other. While these multiples obviously correspond to an off-site dose or dose rate, the emphasis in classifying these events is the degradation in the level of safety of the plant, not the magnitude of the associated dose or dose rate.

This EAL includes any release for which a radioactivity discharge permit was not prepared, or a release that exceeds the conditions on the applicable permit.

EAL #1

This EAL addresses radioactivity releases that cause effluent radiation monitor readings to exceed the threshold identified in the IC.

This EAL is for established effluent monitoring on non-routine release pathways for which a discharge permit would not normally be prepared.

EAL #2

This EAL addresses radioactivity releases that cause effluent radiation monitor readings to exceed the threshold identified in the IC established by the radioactivity discharge permit. This value may be associated with a planned batch release or a continuous release path.

EAL #3

This EAL addresses uncontrolled releases that are detected by sample analyses, particularly on unmonitored pathways, e.g., spills of radioactive liquids into storm drains, heat exchanger leakage in river water systems, etc.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AU2

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

UNPLANNED rise in plant radiation levels.

Operating MODE Applicability: All

Emergency Action Levels Thresholds: (1 or 2)

1. a. UNPLANNED water level drop in a reactor refueling pathway as indicated by :

   - Refueling Cavity Level Low [Setpoint - TBD (L-401)]
   - Spent Fuel Pit (SFP) Level Low [Setpoint - TBD (L-650)]
   - Visual observation

   AND

   b. VALID rise in Area Radiation Monitor (ARM) indication:

   - Containment High Range ARM [Setpoint- TBD, (R-91A, B, R-92A, B, R-93A, B, R-94A, B)]
   - Fuel Handling Area HVAC Radiation Gas Monitor [Setpoint - TBD, (R-49)]
   - SFP ARM [Setpoint - TBD, (R-5)]

2. UNPLANNED VALID ARM readings or survey results indicate a rise by a factor of 1000 over normal* levels in any area of the plant.

   *Normal are be considered as the highest reading in the past twenty-four hours excluding the current peak value.

Basis:

This IC addresses increased radiation levels as a result of water level decreases above irradiated fuel or events that have resulted, or may result, in UNPLANNED increases in radiation dose rates within plant buildings. These radiation increases represent a loss of control over radioactive material and represent a potential degradation in the level of safety of the plant.

EAL #1

Indications include instrumentation such as water level and local ARMs, and personnel (e.g., refueling crew) reports. If available, video cameras may allow remote observation.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

The refueling pathway is a combination of cavities, tubes, canals and pools. While a radiation monitor could detect an increase in dose rate due to a drop in the water level, it might not be a reliable indication of whether or not the fuel is covered.

For example, a refueling bridge ARM or radiation survey reading may increase due to planned evolutions such as head lift, or even a fuel assembly being raised in the manipulator mast. Also, a monitor could in fact be properly responding to a known event involving transfer or relocation of a source, stored in or near the fuel pool or responding to a planned evolution such as removal of the reactor head. Generally, increased radiation monitor indications will need to be combined with another indicator (or personnel report) of water loss.

For refueling events where the water level drops below the RV flange classification would be via CU2. This event escalates to an Alert per AA2 if irradiated fuel outside the reactor vessel is uncovered. For events involving irradiated fuel in the reactor vessel, escalation would be via the Fission Product Barrier Table for events in operating MODEs 1-4.

EAL #2

This EAL addresses increases in plant radiation levels that represent a loss of control of radioactive material resulting in a potential degradation in the level of safety of the plant.

This EAL excludes radiation level increases that result from planned activities such as use of radiographic sources and movement of radioactive waste materials. A specific list of ARMs is not required as it would restrict the applicability of the threshold. The intent is to identify loss of control of radioactive material in any monitored area.

This event escalates to an Alert per AA3 if the increase in dose rates impedes personnel access necessary for safe operation.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AA1

Initiating Condition - ALERT

Any release of gaseous or liquid radioactivity to the environment greater than 200 times the ODCM Limit for 15 minutes or longer.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2 or 3)

Note:

1. VALID reading on **ANY** of the following radiation monitors greater than the threshold for 15 minutes or longer:

   - High Sensitivity Main Steam Line Monitor(N-16 channel)
     [Threshold - TBD (R-65A, B, R-66A, B, R-67A, B, R-68A, B)]
   - Main Steam Line monitor
     [Threshold - TBD (R-87, R-88, R-89, R-90)]
   - Turbine Building Floor Drain Radiation Monitor
     [Threshold - TBD (R-58)]

2. VALID reading on **ANY** of the following effluent monitor reading greater than 200 times the alarm setpoint established by a current radioactivity discharge permit for 15 minutes or longer:

   - Plant vent radiation gas monitor
     [Threshold -TBD (R-21A, B, R-80,A, B)]
   - Liquid radwaste discharge monitor
     [Threshold -TBD (R-35)]
   - ESW radiation monitor
     [Threshold -TBD (R-74A, B, C, D)]

3. Confirmed sample analyses for gaseous or liquid releases indicates concentrations or release rates greater than 200 times [TBD-ODCM values] for 15 minutes or longer.

Basis:

[*Refer to Attachment A for a detailed basis of the radiological effluent IC/EALs.*]

This IC addresses an actual or substantial potential decrease in the level of safety of the plant as indicated by a radiological release that exceeds regulatory commitments for an extended period of time.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

The US-APWR incorporates design features intended to control the release of radioactive effluents to the environment. Administrative controls are established to prevent unintentional releases, or control and monitor intentional releases. These controls are located in the ODCM. The occurrence of extended, uncontrolled radioactive releases to the environment is indicative of a degradation in these features and/or controls.

The ODCM multiples are specified in AU1 and AA1 only to distinguish between non-emergency conditions, and from each other. While these multiples obviously correspond to an off-site dose or dose rate, the emphasis in classifying these events is the degradation in the level of safety of the plant, not the magnitude of the associated dose or dose rate.

Releases should not be prorated or averaged. For example, a release exceeding 600x ODCM for 5 minutes does not meet the threshold.

This EAL includes any release for which a radioactivity discharge permit was not prepared, or a release that exceeds the conditions on the applicable permit.

EAL #1

This EAL is intended for sites that have established effluent monitoring on non-routine release pathways for which a discharge permit would not normally be prepared.

EAL #2

This EAL addresses radioactivity releases, that for whatever reason, cause effluent radiation monitor readings to exceed the threshold identified in the IC established by the radioactivity discharge permit. This value may be associated with a planned batch release or a continuous release path.

EAL #3

This EAL addresses uncontrolled releases that are detected by sample analyses, particularly on unmonitored pathways, e.g., spills of radioactive liquids into storm drains, heat exchanger leakage in river water systems, etc.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AA2

Initiating Condition - ALERT

Damage to irradiated fuel or loss of water level that has resulted or will result in the uncovering of irradiated fuel outside the reactor vessel.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2)

1. A water level drop in the reactor refueling cavity, spent fuel pool or fuel transfer canal that will result in irradiated fuel becoming uncovered.

2. A VALID alarm or [TBD-elevated reading] on **ANY** of the following due to damage to irradiated fuel or loss of water level.

   - Containment High Range ARM [Setpoint– TBD, (R-91A, B, R-92A, B, R-93A, B, R-94A, B)]
   - Fuel Handling Area HVAC Radiation Gas Monitor [Setpoint– TBD, (R-49]
   - SFP ARM [Setpoint– TBD, (R-5)]

Basis:

This IC addresses increases in radiation dose rates within plant buildings, and may be a precursor to a radioactivity release to the environment. These events represent a loss of control over radioactive material and represent an actual or substantial potential degradation in the level of safety of the plant.

These events escalate from AU2 in that fuel activity has been released, or is anticipated due to fuel heatup. This IC applies to spent fuel requiring water coverage and is not intended to address spent fuel which is licensed for dry storage.

EAL #1

SFP level (L-650), Refueling Cavity Level (L-401), and Visual Observation are applied to EAL #1. [Measurable range of L-650 and L-401 are TBD-(Generally, the measurable range of L-650 is +/- 59 inches (1.5 meters) around normal water level).]

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

EAL #2

This EAL addresses radiation monitor indications of fuel uncovery and/or fuel damage.

Increased ventilation monitor readings may be indication of a radioactivity release from the fuel, confirming that damage has occurred. Increased background at the ventilation monitor due to water level decrease may mask increased ventilation exhaust airborne activity and needs to be considered.

While a radiation monitor could detect an increase in dose rate due to a drop in the water level, it might not be a reliable indication of whether or not the fuel is covered.

A refueling bridge ARM or radiation survey reading may increase due to planned evolutions such as head lift, or even a fuel assembly being raised in the manipulator mast. A monitor could, in fact, be properly responding to a known event involving transfer or relocation of a source stored in, or near, the fuel pool or responding to a planned evolution such as removal of the reactor head. Generally, increased radiation monitor indications will need to be combined with another indicator (or personnel report) of water loss.

[*Application of this EAL requires understanding of the actual radiological conditions present in the vicinity of the monitor. Information Notice No. 90-08, "Kr-85 Hazards from Decayed Fuel" (Reference 17) should be considered in establishing radiation monitor EALs.*]

Escalation of this emergency classification level, if appropriate, would be based on AS1 or AG1.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AA3

Initiating Condition - ALERT

Rise in radiation levels within the facility that impedes operation of systems required to maintain plant safety functions.

Operating MODE Applicability: All

Emergency Action Levels Threshold:

1. Dose rate greater than 15 milliRoentgen (mR)/hour (hr) in **ANY** of the following areas requiring continuous occupancy to maintain plant safety functions:

   - Main Control Room ARM [R-1]
   - Technical Support Center (TSC) ARM [R-9]
   - Central Alarm Station ARM [Instrument Number – TBD]
   - Secondary Alarm Station ARM [Instrument Number – TBD]

Basis:

This IC addresses increased radiation levels that impact continued operation in areas requiring
continuous occupancy to maintain safe operation or to perform a safe shutdown.

The cause and/or magnitude of the increase in radiation levels is not a concern of this IC. The Emergency Coordinator must consider the source or cause of the increased radiation levels and determine if any other IC may be involved.

At the CPNPP site, this EAL could result in declaration of an Alert at one unit due to a radioactivity release or radiation shine resulting from a major accident at another unit. This is appropriate if the increase impairs operations at any of the operating units.

[*The value of 15mR/hr is derived from the GDC 19 value of 5 rem in 30 days with adjustment for expected occupancy times. Although Section III.D.3 of NUREG-0737, "Clarification of TMI Action Plan Requirements" (Reference 18), provides that the 15 mR/hr value can be averaged over the 30 days, the value is used here without averaging, as a 30 day duration implies an event potentially more significant than an Alert*.]

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

Areas requiring continuous occupancy include the Control Room, TSC, Central Alarm Station, and Secondary Alarm Station.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AS1

Initiating Condition -- SITE AREA EMERGENCY

Off-site dose resulting from an actual or IMMINENT release of gaseous radioactivity greater than 100 mrem TEDE or 500 mrem Thyroid CDE for the actual or projected duration of the release.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2 or 3)

1. VALID reading on **ANY** of the following radiation monitors greater than the threshold for 15 minutes or longer:

   - Plant vent radiation gas monitor
     [Threshold -TBD (R-21A, B R-80,A, B)]
   - Main Steam Line monitors
     [Threshold-TBD (R-87, R-88, R-89, and R-90)]

2. Dose assessment using actual meteorology indicates doses greater than 100 mrem total effective dose equivalent (TEDE) or 500 mrem thyroid committed dose equivalent (CDE) at or beyond the site boundary.

3. Field survey results indicate closed window dose rates greater than 100 mR/hr expected to continue for 60 minutes or longer; or analyses of field survey samples indicate thyroid CDE greater than 500 mrem for one hour of inhalation, at or beyond the site boundary.

Basis:

[*Refer to Attachment A for a detailed basis of the radiological effluent IC/EALs.*]

This IC addresses radioactivity releases that result in doses at or beyond the site boundary that exceed 10% of the EPA PAGs. Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public. While these failures are addressed by other ICs, this IC provides appropriate diversity and addresses events which may not be able to be classified on the basis of plant status alone. It is important to note that for the more severe accidents the release may be unmonitored or there may be large uncertainties associated with the source term and/or meteorology.

[*While these failures are addressed by other ICs, this IC provides appropriate diversity and addresses events which may not be able to be classified on the basis of plant status alone. It is important to note that for the more severe*

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

accidents the release may be unmonitored or there may be large uncertainties associated with the source term and/or meteorology.]

[*The EPA PAGs are expressed in terms of the sum of the EDE and the CEDE, or as the thyroid CDE. For the purpose of these IC/EALs, the dose quantity TEDE, as defined in 10 CFR 20 (Reference 19), is used in lieu of "…sum of EDE and CEDE.…" The EPA PAG guidance provides for the use of adult thyroid dose conversion factors.*]

[*The TEDE dose is set at 10% of the EPA PAG, while the 500 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.*]

EAL #1

The site-specific monitor list in EAL #1 includes effluent monitors on all potential gaseous release pathways.

[*The monitor reading EALs should be determined using a dose assessment method that back calculates from the dose values specified in the IC. Since doses are generally not monitored in real-time, it is suggested that a release duration of one hour be assumed, and that the EALs be based on a site-specific boundary (or beyond) dose of 100 mrem whole body or 500 mrem thyroid in one hour, whichever is more limiting (as was done for EAL #2).*

[*The meteorology used should be the same as those used for determining AU1 and AA1 monitor reading EALs. The same source term (noble gases, particulates, and halogens) may also be used as long as it maintains a realistic and near linear escalation between the EALs for the four classifications. If proper escalations do not result from the use of the same source term, if the calculated values are unrealistically high, or if correlation between the values and dose assessment values does not exist, then consider using an accident source term for AS1 and AG1 calculations.*]

Since dose assessment is based on actual meteorology, whereas the monitor reading EAL is not, the results from these assessments may indicate that the classification is not warranted, or may indicate that a higher classification is warranted. For this reason, emergency implementing procedures should call for the timely performance of dose assessments using actual meteorology and release information. If the results of these dose assessments are available when the classification is made (e.g., initiated at a lower classification level), the dose assessment results override the monitor reading EAL.

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

AG1

Initiating Condition -- GENERAL EMERGENCY

Off-site dose resulting from an actual or IMMINENT release of gaseous radioactivity greater than 1000 mrem TEDE or 5000 mrem Thyroid CDE for the actual or projected duration of the release using actual meteorology.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2 or 3)

1. VALID reading on **ANY** of the following radiation monitors greater than the threshold for 15 minutes or longer:

   - Plant vent radiation gas monitor
     [Threshold -TBD (R-21A, B, R-80,A, B)]
   - Main Steam Line monitors
     [Threshold-TBD, (R-87, R-88, R-89, and R-90)]

2. Dose assessment using actual meteorology indicates doses greater than 1000 mrem TEDE or 5000 mrem thyroid CDE at or beyond the site boundary.

3. Field survey results indicate closed window dose rates greater than 1000 mR/hr expected to continue for 60 minutes or longer; or analyses of field survey samples indicate thyroid CDE greater than 5000 mrem for one hour of inhalation, at or beyond site boundary.

Basis:

[*Refer to Attachment A for a detailed basis of the radiological effluent IC/EALs.*]

This IC addresses radioactivity releases that result in doses at or beyond the site boundary that exceed the EPA PAGs. Public protective actions will be necessary. Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public and likely involve fuel damage. While these failures are addressed by other ICs, this IC provides appropriate diversity and addresses events which may not be able to be classified on the basis of plant status alone. It is important to note that for the more severe accidents the release may be unmonitored or there may be large uncertainties associated with the source term and/or meteorology.

[*The EPA PAGs are expressed in terms of the sum of the EDE and the CEDE, or as the thyroid committed dose equivalent (CDE). For the purpose of these*

ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

IC/EALs, the dose quantity total effective dose equivalent (TEDE), as defined in 10 CFR 20, is used in lieu of "…sum of EDE and CEDE…." The EPA PAG guidance provides for the use of adult thyroid dose conversion factors.]

[*The TEDE dose is set at the EPA PAG, while the 5000 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.*]

EAL #1

The monitor list in EAL #1 includes US-APWR effluent monitors on all potential gaseous release pathways.

[*The monitor reading EALs should be determined using a dose assessment method that back calculates from the dose values specified in the IC. Since doses are generally not monitored in real-time, it is suggested that a release duration of one hour be assumed, and that the EALs be based on a site-specific boundary (or beyond) dose of 1000 mrem whole body or 5000 mrem thyroid in one hour, whichever is more limiting (as was done for EALs #2 and #4). If individual site analyses indicate a longer or shorter duration for the period in which the substantial portion of the activity is released, the longer duration should be used.*]

[*The meteorology used should be the same as those used for determining AU1 and AA1 monitor reading EALs. The same source term (noble gases, particulates, and halogens) may also be used as long as it maintains a realistic and near linear escalation between the EALs for the four classifications. If proper escalations do not result from the use of the same source term, if the calculated values are unrealistically high, or if correlation between the values and dose assessment values does not exist, then consider using an accident source term for AS1 and AG1 calculations.*]

Since dose assessment is based on actual meteorology, whereas the monitor reading EAL is not, the results from these assessments may indicate that the classification is not warranted, or may indicate that a higher classification is warranted. For this reason, emergency implementing procedures should call for the timely performance of dose assessments using actual meteorology and release information. If the results of these dose assessments are available when the classification is made (e.g., initiated at a lower classification level), the dose assessment results override the monitor reading EAL.

5.6 Cold Shutdown/Refueling System Malfunction EALs

Table 5-C-1: Recognition Category "C" Initiating Condition Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
CG1 Loss of RCS/RV inventory affecting fuel clad integrity with containment challenged. *Op. MODEs: Cold Shutdown, Refueling*	**CS1** Loss of RCS/RV inventory affecting core decay heat removal capability. *Op. MODEs: Cold Shutdown, Refueling*	**CA1** Loss of RCS/RV inventory. *Op. MODEs: Cold Shutdown, Refueling*	**CU1** RCS LEAKAGE. *Op. MODEs: Cold Shutdown*
			CU2 UNPLANNED loss of RCS/RV inventory. *Op. MODEs: Refueling*
		CA3 Loss of all Off-site and all On-site ac power to emergency busses for 15 minutes or longer. *Op. MODEs: Cold Shutdown, Refueling, Defueled*	**CU3** AC power capability to emergency busses reduced to a single power source for 15 minutes or longer such that any additional single failure would result in station blackout. *Op. MODEs: Cold Shutdown, Refueling*
		CA4 Inability to maintain plant in cold shutdown. *Op. MODEs: Cold Shutdown, Refueling*	**CU4** UNPLANNED loss of decay heat removal capability with irradiated fuel in the RV. *Op. MODEs: Cold Shutdown, Refueling*

Table 5-C-1: Recognition Category "C" Initiating Condition Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
			CU6 Loss of all On-site or Off-site communications capabilities. *Op. MODEs: Cold Shutdown, Refueling, Defueled*
			CU7 UNPLANNED loss of required dc power for 15 minutes or longer. *Op. MODEs: Cold Shutdown, Refueling*
			CU8 Inadvertent criticality. *Op. MODEs: Cold Shutdown, Refueling*

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU1

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

RCS LEAKAGE.

Operating MODE Applicability: Cold Shutdown

Emergency Action Level Threshold:

1. RCS LEAKAGE results in the inability to maintain or restore level within [TBD-pressurizer level on L-451, L-452, L-453, L-454] for 15 minutes or longer.

Basis:

This IC is considered to be a potential degradation of the level of safety of the plant. The inability to maintain or restore level is indicative of loss of RCS inventory.

Relief valve (e.g., Residual Heat Removal (RHR), Letdown Orifice, Volume Control Tank, etc.) normal operation should be excluded from this IC. However, a Relief valve that operates and fails to close per design should be considered applicable to this IC if the Relief valve cannot be isolated.

Prolonged loss of RCS Inventory may result in escalation to the Alert emergency classification level via either CA1 or CA4.

Note: The difference between CU1 and CU2 deals with the RCS conditions that exist between cold shutdown and refueling MODEs. In the refueling MODE the RCS is not intact and RV level and inventory are monitored by different means. In cold shutdown the RCS will normally be intact and standard RCS inventory and level monitoring means are available.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU2

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

UNPLANNED loss of RCS/RV inventory.

Operating MODE Applicability: Refueling

Emergency Action Level Thresholds: (1 or 2)

1. UNPLANNED RCS/RV level drop indicated by RCS/RV water level drop below the RV flange [Threshold Value – TBD on RCS Level wide range (l-402)] for 15 minutes or longer.

2. RCS/RV level cannot be monitored with a loss of RCS/RV inventory as indicated by an unexplained level rise in **ANY** one of the following:

   - Refueling Water Storage Pit Level
     [Threshold Value – TBD on L-1400, L-1401, L-1402, L-1403]
   - Containment Vessel Reactor Coolant Drain Tank (CVDT) Level
     [Threshold Value – TBD on L-1000]
   - Pressurizer Relief Tank Level
     [Threshold Value – TBD on L-560]
   - CCW Surge Tank (Train A & B) Level
     [Threshold Value – TBD on L-1200 and L-1201 for Train A、L-1210 and L-1211 for Train B]
   - Containment Sump Level
     [Threshold Value-TBD on L-1083]

Basis:

This IC is a precursor of more serious conditions and considered to be a potential degradation of the level of safety of the plant.

Refueling evolutions that decrease RCS water level below the RV flange are carefully planned and procedurally controlled. An UNPLANNED event that results in water level decreasing below the RV flange, or the planned RCS water level for the given evolution (if the planned RCS water level is already below the RV flange), warrants declaration of a NOUE due to the reduced RCS inventory that is available to keep the core covered.

The allowance of 15 minutes was chosen because it is reasonable to assume that level can be restored within this time frame using one or more of the redundant means of refill that should be available. If level cannot be restored in this time frame then it may indicate a more serious condition exists.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

Continued loss of RCS Inventory will result in escalation to the Alert emergency classification level via either CA1 or CA4.

Note: The difference between CU1 and CU2 deals with the RCS conditions that exist between cold shutdown and refueling MODEs. In cold shutdown the RCS will normally be intact and standard RCS inventory and level monitoring means are available. In the refueling MODE the RCS is not intact and RV level and inventory are monitored by different means.

EAL #1

This EAL involves a decrease in RCS level below the top of the RV flange that continues for 15 minutes due to an UNPLANNED event. This EAL is not applicable to decreases in flooded reactor cavity level, which is addressed by AU2 EAL1 until such time as the level decreases to the level of the vessel flange.

If RV level continues to decrease and reaches the Outlet Nozzle Bottom Inner Diameter (ID) of the RCS Loop then escalation to CA1 would be appropriate.

EAL #2

This EAL addresses conditions in the refueling MODE when normal means of core temperature indication and RCS level indication may not be available. Redundant means of RV level indication is installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that RV inventory loss was occurring by observing sump and tank level changes. Sump and tank level increases must be evaluated against other potential sources of LEAKAGE such as cooling water sources inside the containment to ensure they are indicative of RCS LEAKAGE.

Escalation to the Alert emergency classification level would be via either CA1 or CA4.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU3

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

AC power capability to emergency busses reduced to a single power source for 15 minutes or longer such that any additional single failure would result in station blackout.

Operating MODE Applicability: Cold Shutdown, Refueling

Emergency Action Level Threshold:

1. a. AC power capability to Class 1E emergency busses (MC-A, MC-B, MC-C, MC-D) reduced to a single power source for 15 minutes or longer.

   AND

   b. Any additional single power source failure will result in station blackout.

Basis:

The condition indicated by this IC is the degradation of the off-site and on-site ac power systems such that any additional single failure would result in a station blackout. This condition could occur due to a loss of off-site power with a concurrent failure of all but one emergency generator to supply power to its emergency busses. The subsequent loss of this single power source would escalate the event to an Alert in accordance with CA3.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of power.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU4

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

UNPLANNED loss of decay heat removal capability with irradiated fuel in the RV.

Operating MODE Applicability: Cold Shutdown, Refueling

Emergency Action Levels Threshold: (1 or 2)

1. UNPLANNED event results in RCS temperature exceeding 200 degrees F (93 degrees C).

2. Loss of all RCS temperature and RCS/RV level indication for 15 minutes or longer.

Basis:

This IC is a precursor of more serious conditions and, as a result, is considered to be a potential degradation of the level of safety of the plant. In cold shutdown the ability to remove decay heat relies primarily on forced cooling flow. Operation of the systems that provide this forced cooling may be jeopardized due to the unlikely loss of electrical power or RCS inventory. Since the RCS usually remains intact in the cold shutdown MODE a large inventory of water is available to keep the core covered.

During refueling the level in the RV will normally be maintained above the RV flange. Refueling evolutions that decrease water level below the RV flange are carefully planned and procedurally controlled. Loss of forced decay heat removal at reduced inventory may result in more rapid increases in RCS/RV temperatures depending on the time since shutdown.

Normal means of core temperature indication and RCS level indication may not be available in the refueling MODE. Redundant means of RV level indication are therefore procedurally installed to assure that the ability to monitor level will not be interrupted. However, if all level and temperature indication were to be lost in either the cold shutdown or refueling MODEs, EAL 2 would result in declaration of a NOUE if both temperature and level indication cannot be restored within 15 minutes from the loss of both means of indication. Escalation to Alert would be via CA1 based on an inventory loss or CA4 based on exceeding its temperature criteria.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU6

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Loss of all On-site or Off-site communications capabilities.

Operating MODE Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Level Thresholds: (1 or 2)

1. Loss of all of the following on-site communication methods affecting the ability to perform routine operations:

   - Public Address/Page (PA/PL)
   - Private Automatic Branch Telephone Exchange (PABX)
   - Sound Powered Telephone System (SPTS)
   - Plant Radio System

2. Loss of all of the following off-site communication methods affecting the ability to perform off-site notifications:

   - Dedicated circuit between Control Room and TX DPS (Garland), Somervell County Sheriff, Hood County Sheriff
   - Private Telephone (backup to Dedicated Circuit)
   - Private Area Branch Exchange (PABX)
   - Emergency Notification System
   - Health Physics Network

Basis:

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

The availability of one method of ordinary off-site communications is sufficient to inform federal, state, and local authorities of plant issues. This EAL is intended to be used only when extraordinary means (e.g., relaying of information from radio transmissions, individuals being sent to off-site locations, etc.) are being utilized to make communications possible.

Notifications of emergencies to State and local off-site agencies is accomplished with the Dedicated Circuit between each Control Room and the Texas

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

Department of Public Safety Garland office. Private telephone serves as backup to the dedicated circuit. In addition, the CPNPP has a Private Branch Exchange (PABX), which is used for routine telephone serve into and around the site. Emergency Notification System and Health Physics Network are NRC telephone circuits.

EAL #2

The list for off-site communications loss encompasses the loss of all means of communications with off-site authorities. This includes the ENS, commercial telephone lines, telecopy transmissions, and dedicated phone systems that are routinely used for off-site emergency notifications.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU7

Initiating Condition – NOTIFICATION OF UNUSUAL EVENT

Loss of required direct current (dc) power for 15 minutes or longer.

Operating MODE Applicability: Cold Shutdown, Refueling

Emergency Action Level Threshold:

1. Less than 105 V on required vital DC busses (DCC-A, DCC-B, DCC-C, DCC-D) for 15 minutes or longer.

Basis:

The purpose of this IC and its associated EALs is to recognize a loss of dc power compromising the ability to monitor and control the removal of decay heat during Cold Shutdown or Refueling operations.

It is intended that the loss of the operating (OPERABLE) train is to be considered. If this loss results in the inability to maintain cold shutdown, the escalation to an Alert will be per CA4 "Inability to Maintain Plant in Cold Shutdown with Irradiated Fuel in the RV."

105V bus voltage is the minimum bus voltage necessary for the operation of safety related equipment. This voltage value incorporates a margin of at least 15 minutes of operation before the onset of inability to operate those loads.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CU8

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Inadvertent criticality.

Operating MODE Applicability: Cold Shutdown, Refueling

Emergency Action Level Threshold:

1. UNPLANNED sustained positive startup rate observed on the nuclear instrumentation.

Basis:

This IC addresses criticality events that occur in Cold Shutdown or Refueling MODEs such as fuel mis-loading events and inadvertent dilution events. This IC indicates a potential degradation of the level of safety of the plant, warranting a NOUE classification.

This condition is identified using the startup rate monitor. The term “sustained” is used in order to allow exclusion of expected short term positive startup rates from planned fuel bundle or control rod movements during CORE ALTERATION. These short term startup rates are the result of the increase in neutron population due to subcritical multiplication.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA1

Initiating Condition - ALERT

Loss of RCS/RV inventory.

Operating MODE Applicability: Cold Shutdown, Refueling

Emergency Action Level Thresholds: (1 or 2)

1. Loss of RCS/RV inventory as indicated by level less than **ANY** one of the following:

   - RCS level (wide range)
     [Threshold Value– TBD on L-402] (only available in Refueling)
   - Reactor Vessel Water Level (RVWL)
     [Threshold Value – TBD on L-571, L-572] (only available in Cold Shutdown)

2. RCS/RV level cannot be monitored for 15 minutes or longer with a loss of RCS/RV inventory as indicated by an unexplained level rise in **ANY** one of the following:

   - Refueling Water Storage Pit Level
     [Threshold Value– TBD on L-1400, L-1401, L-1402, L-1403]
   - CVDT Level
     [Threshold Value TBD on L-1000]
   - Pressurizer Relief Tank Level
     [Threshold Value– TBD on L-560]
   - CCW Surge Tank (Train A & B) Level
     [Threshold Value– TBD on L-1200 and L-1201 for Train A, L-1210 and L-1211 for Train B]
   - Containment Sump Level
     [Threshold Value-TBD on L-1083]

Basis:

These EALs serve as precursors to a loss of ability to adequately cool the fuel. The magnitude of this loss of water indicates that makeup systems have not been effective and may not be capable of preventing further RV level decrease and potential core uncovery. This condition will result in a minimum emergency classification level of an Alert.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

EAL #1

The inability to restore and maintain level after reaching this setpoint would be indicative of a failure of the RCS barrier. [TBD-*Alert will be based on alarm setpoint below Mid Loop Operation (Low-Low?), corresponding to bottom ID of RCS loop.*]

EAL #2

In the cold shutdown MODE, normal RCS level and RV level instrumentation systems will usually be available. In the refueling MODE, normal means of RV level indication may not be available. Redundant means of RV level indication will usually be installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that RV inventory loss was occurring by observing sump and tank level changes. Sump and tank level increases must be evaluated against other potential sources of LEAKAGE such as cooling water sources inside the containment to ensure they are indicative of RCS LEAKAGE.

[*The 15-minute duration for the loss of level indication was chosen because it is half of the CS1 SAE EAL duration. Significant fuel damage is not expected to occur until the core has been uncovered for greater than 1 hour per the analysis referenced in the CG1 basis. Therefore this EAL meets the definition for an Alert.*]

If RV level continues to lower then escalation to SAE will be via CS1.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA3

Initiating Condition - ALERT

Loss of all Off-site and all On-Site ac power to emergency busses for 15 minutes or longer.

Operating MODE Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Level Threshold:

1. Loss of all Off-Site and all On-Site ac Power to Class 1E emergency busses (MC-A, MC-B, MC-C, MC-D) for 15 minutes or longer.

Basis:

Loss of all ac power compromises all plant safety systems requiring electric power including RHR/Containment Spray System, ECCS, SFP Heat Removal and the Ultimate Heat Sink.

This event is classified as an Alert when in cold shutdown, refueling, or defueled MODE because of the significantly reduced decay heat and lower temperature, increasing the time available to restore one of the emergency busses.

Escalating to SAE, if appropriate, is by Abnormal Rad Levels/Radiological Effluent ICs.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Note: The companion IC is SS1.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CA4

Initiating Condition - ALERT

Inability to maintain plant in cold shutdown.

Operating MODE Applicability: Cold Shutdown, Refueling

Emergency Action Level Thresholds: (1 or 2)

1. An UNPLANNED event results in RCS temperature greater than RCS Loop T_{hot} of 200 degrees F (93 degrees C) on (T-410, T-420, T-430, T-440) for greater than the specified duration on table.

Table 5-C-2: RCS Reheat Duration Thresholds		
RCS	**CONTAINMENT CLOSURE**	**Duration**
Intact (but not RCS Reduced Inventory)	N/A	60 minutes*
Not Intact or RCS Reduced Inventory	Established	20 minutes*
	Not Established	0 minutes
* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, the EAL is not applicable.		

2. An UNPLANNED event results in RCS pressure increase greater than 10 psi due to a loss of RCS cooling. (This EAL does not apply in Solid Plant conditions.)

Basis:

For EAL 1, the RCS Reheat Duration Threshold table addresses complete loss of functions required for core cooling for greater than 60 minutes during refueling MODE and, in cold shutdown MODE when RCS integrity is established.

RCS integrity should be considered to be in place when the RCS pressure boundary is in its normal condition for the cold shutdown MODE of operation (e.g., no freeze seals or nozzle dams). The status of CONTAINMENT CLOSURE in this condition is immaterial given that the RCS is providing a high pressure barrier to fission product release to the environment.] The 60 minute time frame should allow sufficient time to restore cooling without there being a substantial degradation in plant safety.

The RCS Reheat Duration Threshold table also addresses the complete loss of functions required for core cooling for greater than 20 minutes during refueling and cold shutdown MODEs when CONTAINMENT CLOSURE is established but

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

RCS integrity is not established (when in cold shutdown) or RCS inventory is reduced (e.g., mid-loop operations). The allowed 20 minute time frame was included to allow operator action to restore the heat removal function, if possible. [*The allowed time frame is consistent with the guidance provided by Generic Letter 88-17, "Loss of Decay Heat Removal" (Reference 20) (discussed later in this basis) and is believed to be conservative given that a low pressure Containment barrier to fission product release is established*.]

Finally, complete loss of functions required for core cooling during refueling and cold shutdown MODEs when neither CONTAINMENT CLOSURE nor RCS integrity are established.

Note: RCS integrity is in place when the RCS pressure boundary is in its normal condition for the cold shutdown MODE of operation (e.g., no freeze seals or nozzle dams). No delay time is allowed because the evaporated reactor coolant that may be released into the Containment during this heatup condition could also be directly released to the environment.

The asterisk (*) in Table 5-C-2 indicates that this EAL is not applicable if actions are successful in restoring an RCS heat removal system to operation and RCS temperature is being reduced within the specified time frame.

In EAL 2, the 10 psi pressure increase addresses situations where, due to high decay heat loads, the time provided to restore temperature control, should be less than 60 minutes. The RCS pressure setpoint chosen should be 10 psi or the lowest pressure that the site can read on installed instrumentation that is equal to or greater than 10 psi.

Escalation to SAE would be via CS1 should boiling result in significant RV level loss leading to core uncovery.

[*This IC and its associated EALs are based on concerns raised by Generic Letter 88-17, "Loss of Decay Heat Removal." A number of phenomena such as pressurization, vortexing, SG U-tube draining, RCS level differences when operating at a mid-loop condition, decay heat removal system design, and level instrumentation problems can lead to conditions where decay heat removal is lost and core uncovery can occur. NRC analyses show that there are sequences that can cause core uncovery in 15 to 20 minutes and severe core damage within an hour after decay heat removal is lost*.]

A loss of TS components alone is not intended to constitute an Alert. The same is true of a momentary UNPLANNED excursion above the TS cold shutdown temperature limit when the heat removal function is available.

The Emergency Coordinator must remain alert to events or conditions that lead to the conclusion that exceeding the EAL is IMMINENT. If, in the judgment of the Emergency Coordinator, an IMMINENT situation is at hand, the classification should be made as if the threshold has been exceeded.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CS1

Initiating Condition - SITE AREA EMERGENCY

Loss of RCS/RV inventory affecting core decay heat removal capability.

Operating MODE Applicability: Cold Shutdown, Refueling

Emergency Action Level Thresholds: (1 or 2 or 3)

1. With CONTAINMENT CLOSURE not established, RCS/RV level less than:

   [TBD value on RVWL (L-571, L-572) (Cold Shutdown only)]

   [TBD value (inches above the bottom ID of the RCS loop) on RCS level – narrow range (L-404, L-405) (Refueling only)

2. With CONTAINMENT CLOSURE established, RCS/RV level less than:

   [TBD-level for top of active fuel (TOAF) on RVWL (L-571, L-572)(Cold Shutdown only)]

   [TBD-level for TOAF on RCS level - wide range (L-402) (Refueling only)].

3. RCS/RV level cannot be monitored for 30 minutes or longer with a loss of RCS/RV inventory as indicated by **ANY** of the following:

   - [TBD-radiation monitor] reading greater than TBD-value].
   - Erratic Source Range Monitor Indication.
   - Unexplained level rise in any of the following:
     - Refueling Water Storage Pit Level (–L-1401, L-1402, L-1403)
     - CVDT Level (L-1000)
     - Pressurizer Relief Tank Level (L-560)
     - CCW Surge Tank (Train A & B) Levels (L-1200 and L-1201 for Train A, L-1210 and L-1211 for Train B)
     - Containment Sump Level (L-1083)

Basis:

Under the conditions specified by this IC, continued decrease in RCS/RV level is indicative of a loss of inventory control. Inventory loss may be due to an RCS breach, pressure boundary LEAKAGE, or continued boiling in the RV. Thus, declaration of a SAE is warranted.

Escalation to a GE is via CG1 or AG1.

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

EAL #1

[*TBD - six inches (15 cm) below the bottom ID of the RCS loop is measured as TBD inches (TBD cm) above the upper core plate (TOAF) on L-402, L-404/L-405.*]

EAL #3

In the cold shutdown MODE, normal RCS level and RV level instrumentation systems will usually be available. In the refueling MODE, normal means of RV level indication may not be available. Redundant means of RV level indication will usually be installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that RV inventory loss was occurring by observing sump and tank level changes. Sump and tank level increases must be evaluated against other potential sources of LEAKAGE such as cooling water sources inside the containment to ensure they are indicative of RCS LEAKAGE.

The 30-minute duration allows sufficient time for actions to be performed to recover inventory control equipment.

As water level in the RV lowers, the dose rate above the core will increase. The dose rate due to this core shine should result in site-specific monitor indication and possible alarm.

Note: Post-TMI studies indicate that the installed nuclear instrumentation will operate erratically when the core is uncovered and source range monitors can be used as a tool for making such determinations. The instrument reported an increasing signal about 30 minutes into the TMI accident. At that time, the reactor coolant pumps were running and the core was adequately cooled as indicated by the core outlet thermocouples. Hence, the increasing signal was the result of an increasing two-phase void fraction in the reactor core and vessel downcomer and the reduced shielding that the two-phase mixture provide to the source range monitor (Reference 21)

[*This EAL should conservatively estimate a site-specific dose rate setpoint indicative of core uncovery (i.e., level at TOAF).*]

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

CG1

Initiating Condition - GENERAL EMERGENCY

Loss of RCS/RV inventory affecting fuel clad integrity with containment challenged.

Operating MODE Applicability: Cold Shutdown, Refueling

Emergency Action Level Thresholds: (1 or 2)

1. a. RCS/RV level less than [TBD-level for TOAF on RVWL (L-571, L-572) (Cold Shutdown only)] OR [TBD-level for TOAF on RCS level – wide range (L-402) (Refueling only)] for 30 minutes or longer.

   AND

   b. **ANY** containment challenge indication (see Table 5-C-3):

2. a. RCS/RV level cannot be monitored and core uncovery is indicated by **ANY** of the following for 30 minutes or longer.

   - [TBD-radiation monitor] reading greater than [TBD-setpoint].
   - CET temperature greater than [TBD value (700 degrees F (370 degrees C)) on TBD – Instrument Number] (Cold Shutdown only)
   - Erratic source range monitor indication.
   - UNPLANNED level rise in any of the following:
     - Refueling Water Storage Pit Level (–L-1400, L-1401, L-1402, L-1403)
     - CVDT Level (L-1000)
     - Pressurizer Relief Tank Level (L-560)
     - CCW Surge Tank (Train A & B) Levels (L-1200 and L-1201 for Train A, L-1210 and L-1211 for Train B)
     - Containment Sump Level (L-1083)

   AND

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

b. **ANY** containment challenge indication (see Table 5-C-3):

Table 5-C-3: Containment Challenge Indications
• CONTAINMENT CLOSURE not established.
• [TBD-Hydrogen concentration greater than 4%] inside containment.
• UNPLANNED rise in containment pressure as indicated on P-950, P-951.

Basis:

This IC represents the inability to restore and maintain RV level to above the TOAF with containment challenged. Fuel damage is probable if RV level cannot be restored, as available decay heat will cause boiling, further reducing the RV level. With the CONTAINMENT breached or challenged then the potential for unmonitored fission product release to the environment is high. This represents a direct path for radioactive inventory to be released to the environment. This is consistent with the definition of a GE. The GE is declared on the

[*These EALs are based on concerns raised by Generic Letter 88-17, Loss of Decay Heat Removal, SECY 91-283, Evaluation of Shutdown and Low Power Risk Issues (Reference 22), NUREG-1449, Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States (Reference 23), and, NUMARC 91-06, Guidelines for Industry Actions to Assess Shutdown Management (Reference 24).*]

A number of variables can have a significant impact on heat removal capability challenging the fuel clad barrier. Examples include:

- Mid-loop, reduced level/flange level, head in place, cavity flooded, RCS venting strategy, decay heat removal system design, vortexing pre-disposition, SG U-tube draining

Analysis indicates that core damage may occur within an hour following continued core uncovery, therefore, 30 minutes was conservatively chosen.

If CONTAINMENT CLOSURE is re-established prior to exceeding the 30 minute core uncovery time limit then escalation to GE would not occur.

[*Site shutdown contingency plans typically provide for re-establishing CONTAINMENT CLOSURE following a loss of heat removal or RCS inventory functions.*]

[*In the early stages of a core uncovery event, it is unlikely that hydrogen buildup due to a core uncovery could result in an explosive mixture of dissolved gasses in Containment. However, Containment monitoring and/or sampling should be*

COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

performed to verify this assumption and a GE declared if it is determined that an explosive mixture exists.]

EAL #1

TOAF for the US-APWR is considered as the upper core plate. RVWL measuring less than or equal [TBD] inches ([TBD] cm) above the upper core plate is used for this EAL.

EAL #2

Sump and tank level increases must be evaluated against other potential sources of LEAKAGE such as cooling water sources inside the containment to ensure they are indicative of RCS LEAKAGE.

Note: In the cold shutdown MODE, normal RCS level and RV level instrumentation systems will usually be available. In the refueling MODE, normal means of RV level indication may not be available. Redundant means of RV level indication will usually be installed (including the ability to monitor level visually) to assure that the ability to monitor level will not be interrupted. However, if all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that RV inventory loss was occurring by observing sump and tank level changes. Sump and tank level increases must be evaluated against other potential sources of LEAKAGE such as cooling water sources inside the containment to ensure they are indicative of RCS LEAKAGE.

As water level in the RV lowers, the dose rate above the core will increase. The dose rate due to this core shine should result in site-specific monitor indication and possible alarm.

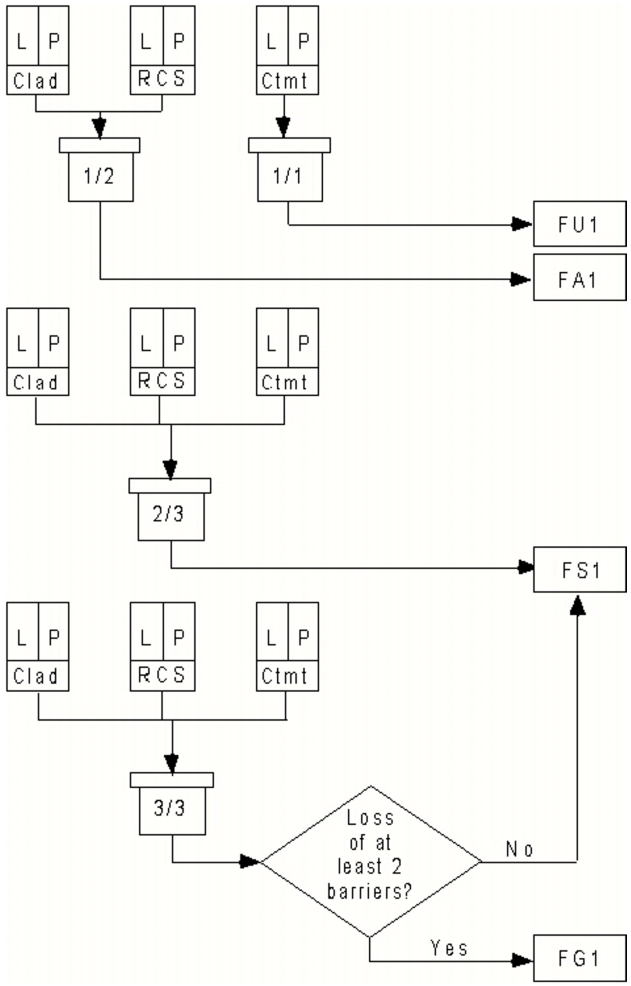
Note: Post-TMI studies indicate that the installed nuclear instrumentation will operate erratically when the core is uncovered and source range monitors can be used as a tool for making such determinations. The instrument reported an increasing signal about 30 minutes into the TMI accident. At that time, the reactor coolant pumps were running and the core was adequately cooled as indicated by the core outlet thermocouples. Hence, the increasing signal was the result of an increasing two-phase void fraction in the reactor core and vessel downcomer.

5.7 Fission Product Barrier EALs

Table 5-F-1: Recognition Category "F" Initiating Condition Matrix

See Table 5-F-2 for Thresholds

GENERAL EMERGENCY	
FG1	Loss of ANY Two Barriers AND Loss or Potential Loss of the third barrier. *Op. MODEs: Power Operation, Hot Standby, Startup, Hot Shutdown*
SITE AREA EMERGENCY	
FS1	Loss or Potential Loss of ANY two barriers. *Op. MODEs: Power Operation, Hot Standby, Startup, Hot Shutdown*
ALERT	
FA1	ANY Loss or ANY Potential Loss of EITHER Fuel Clad OR RCS. *Op. MODEs: Power Operation, Hot Standby, Startup, Hot Shutdown*
UNUSUAL EVENT	
FU1	ANY Loss or ANY Potential Loss of Containment. *Op. MODEs: Power Operation, Hot Standby, Startup, Hot Shutdown*



NOTES

The logic used for these ICs reflects the following considerations:

- The Fuel Clad Barrier and the RCS Barrier are weighted more heavily than the Containment Barrier. NOUE ICs associated with RCS and Fuel Clad Barriers are addressed under System Malfunction ICs.

- At the SAE level, there must be some ability to dynamically assess how far present conditions are from the threshold for a GE. For example, if Fuel Clad and RCS Barrier "Loss" EALs existed, that, in addition to off-site dose assessments, would require continual assessments of radioactive inventory and containment integrity. Alternatively, if both Fuel Clad and RCS Barrier "Potential Loss" EALs existed, the Emergency Coordinator would have more assurance that there was no immediate need to escalate to a GE.

- The ability to escalate to higher emergency classification levels as an event deteriorates must be maintained. For example, RCS LEAKAGE steadily increasing would represent an increasing risk to public health and safety.

- The Containment Barrier should not be declared lost or potentially lost based on exceeding TS action statement criteria, unless there is an event in progress requiring mitigation by the Containment Barrier. When no event is in progress (Loss or Potential Loss of either Fuel Clad and/or RCS) the Containment Barrier status is addressed by TS.

Table 5-F-2: EAL Fission Product Barrier Table

Thresholds for LOSS or POTENTIAL LOSS of Barriers*

*Determine which combination of the three barriers are lost or have a potential loss and use the following key to classify the event. Also, multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is IMMINENT. In this IMMINENT loss situation use judgment and classify as if the thresholds are exceeded.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Loss of ANY two barriers AND Loss or Potential Loss of third barrier.	Loss or Potential Loss of ANY two barriers.	ANY Loss or ANY Potential Loss of EITHER Fuel Clad or RCS.	ANY Loss or ANY Potential Loss of Containment.

Fuel Clad Barrier Thresholds		RCS Barrier Thresholds		Containment Barrier Thresholds	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
1. Critical Safety Function Status		**1. Critical Safety Function Status**		**1. Critical Safety Function Status**	
1. Core-Cooling Red Entry Conditions Met.	1. Core Cooling-Orange Entry Conditions Met. **OR** 2. Heat Sink-Red Entry Conditions Met.	Not Applicable	1. RCS Integrity-Red Entry Conditions Met. **OR** 2. Heat Sink-Red Entry Conditions Met.	Not Applicable	1. Containment-Red Entry Conditions Met.
2. Primary Coolant Activity Level		**2. RCS Leak Rate**		**2. Containment Pressure**	
1. DOSE EQUIVALENT I-131 of 300 µCi/gm OR [DOSE EQUIVALENT XE-133 of TBD µCi/gm] as indicated on Primary Radiation Coolant Monitor R-70 or sample results.	Not Applicable	1. RCS leak rate greater than available makeup capacity as indicated by a loss of RCS subcooling.	1. RCS leak rate indicated greater than [TBD-capacity of one charging pump in the normal charging mode] with Letdown isolated.	1. A containment pressure rise followed by a rapid unexplained drop in containment pressure. **OR** 2. Containment pressure or sump level response not consistent with LOCA conditions.	1. Containment Vessel pressure greater than 68 psig and rising. **OR** 2. Containment Vessel Hydrogen Concentration greater than [4%]. **OR** 3. a. Pressure greater than Containment Spray actuation set point [TBD-value] **AND** b. Less than two full trains of Containment Spray operating.

Table 5-F-2: EAL Fission Product Barrier Table

Thresholds for LOSS or POTENTIAL LOSS of Barriers*

*Determine which combination of the three barriers are lost or have a potential loss and use the following key to classify the event. Also, multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is IMMINENT. In this IMMINENT loss situation use judgment and classify as if the thresholds are exceeded.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Loss of ANY two barriers AND Loss or Potential Loss of third barrier.	Loss or Potential Loss of ANY two barriers.	ANY Loss or ANY Potential Loss of EITHER Fuel Clad or RCS.	ANY Loss or ANY Potential Loss of Containment.

Fuel Clad Barrier Thresholds		RCS Barrier Thresholds		Containment Barrier Thresholds	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
3. Core Exit Thermocouple Readings		**3. Not Applicable**		**3. Core Exit Thermocouple Readings**	
1. CETs reading greater than [TBD-1200 degrees F(650 degrees C)].	1. CETs reading greater than [TBD-750 degrees F (400 degrees C)].	Not Applicable	Not Applicable	Not Applicable	1.a. CETs in excess of [TBD-1200 degrees F (650 degrees C)] **AND** b. Restoration procedures not effective within 15 minutes. **OR** 2.a. CETs in excess of [TBD- 750 degrees F (400 degrees C)]. **AND** b. RVWL below [TBD-level]. **AND** c. Restoration procedures not effective within 15 minutes.

Table 5-F-2: EAL Fission Product Barrier Table

Thresholds for LOSS or POTENTIAL LOSS of Barriers*

*Determine which combination of the three barriers are lost or have a potential loss and use the following key to classify the event. Also, multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is IMMINENT. In this IMMINENT loss situation use judgment and classify as if the thresholds are exceeded.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Loss of ANY two barriers AND Loss or Potential Loss of third barrier.	Loss or Potential Loss of ANY two barriers.	ANY Loss or ANY Potential Loss of EITHER Fuel Clad or RCS.	ANY Loss or ANY Potential Loss of Containment.

Fuel Clad Barrier Thresholds		RCS Barrier Thresholds		Containment Barrier Thresholds	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
4. Reactor Vessel Water Level		**4. SG Tube Rupture**		**4. SG Secondary Side Release with P-to-S LEAKAGE**	
Not Applicable	1. RVWL indicates less than [TBD-level for TOAF].	1. RUPTURED SG results in an ECCS (SI) actuation.	Not Applicable	1. RUPTURED SG is also FAULTED outside of containment. **OR** 2.a. Primary-to-Secondary leak rate greater than 10 gpm. **AND** b. UNISOLABLE steam release from affected SG to the environment.	Not Applicable
5. Not Applicable		**5. Not Applicable**		**5. Containment Isolation Failure or Bypass**	
Not Applicable	Not Applicable	Not Applicable	Not Applicable	1.a. Failure of all valves in any one line to close. **AND** b. Direct downstream pathway to the environment exists after containment isolation signal.	Not Applicable

Table 5-F-2: EAL Fission Product Barrier Table

Thresholds for LOSS or POTENTIAL LOSS of Barriers*

*Determine which combination of the three barriers are lost or have a potential loss and use the following key to classify the event. Also, multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is IMMINENT. In this IMMINENT loss situation use judgment and classify as if the thresholds are exceeded.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Loss of ANY two barriers AND Loss or Potential Loss of third barrier.	Loss or Potential Loss of ANY two barriers.	ANY Loss or ANY Potential Loss of EITHER Fuel Clad or RCS.	ANY Loss or ANY Potential Loss of Containment.

Fuel Clad Barrier Thresholds		RCS Barrier Thresholds		Containment Barrier Thresholds	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
6. Containment Radiation Monitoring		**6. Containment Radiation Monitoring**		**6. Containment Radiation Monitoring**	
1. Containment High Range ARM reading greater than [TBD-value].	Not Applicable	1. Containment High Range ARM reading greater than [TBD-value].	Not Applicable	Not Applicable	1. Containment High Range ARM reading greater than [TBD-].
7. Other Indications		**7. Other Indications**		**7. Other Indications**	
1. Not applicable.	1. Not applicable.	1. Not applicable.	1. Not applicable.	1. Not applicable.	1. Not applicable.
8. Emergency Coordinator Judgment		**8. Emergency Coordinator Judgment**		**8. Emergency Coordinator Judgment**	
1. Any condition in the opinion of the Emergency Coordinator that indicates Loss of the Fuel Clad Barrier.	1. Any condition in the opinion of the Emergency Coordinator that indicates Potential Loss of the Fuel Clad Barrier.	1. Any condition in the opinion of the Emergency Coordinator that indicates Loss of the RCS Barrier.	1. Any condition in the opinion of the Emergency Coordinator that indicates Potential Loss of the RCS Barrier.	1. Any condition in the opinion of the Emergency Coordinator that indicates Loss of the Containment Barrier.	1. Any condition in the opinion of the Emergency Coordinator that indicates Potential Loss of the Containment Barrier.

Basis Information For
EAL Fission Product Barrier Table 5-F-2

FUEL CLAD BARRIER THRESHOLDS: (1 or 2 or 3 or 4 or 6 or 8)

The Fuel Clad Barrier consists of the zircalloy fuel bundle tubes that contain the fuel pellets.

1. Critical Safety Function Status

Loss Threshold 1

Core Cooling - RED indicates significant superheating and core uncovery and is considered to indicate Loss of the Fuel Clad Barrier.

Potential Loss Threshold 1

Core Cooling - ORANGE indicates subcooling has been lost and that some clad damage may occur.

Potential Loss Threshold 2

Heat Sink - RED when heat sink is required indicates the ultimate heat sink function is under extreme challenge.

2. Primary Coolant Activity Level

The value corresponds to DOSE EQUIVALENT I-131 of 300 µCi/gm or [TBD DOSE EQUIVALENT XE-133 of µCi/gm]. This amount of coolant activity is well above that expected for iodine spikes and corresponds to less than 5% fuel clad damage. This amount of radioactivity indicates significant clad damage and thus the Fuel Clad Barrier is considered lost.

[The value can be expressed either in mR/hr observed on the sample or as µCi/gm results from analysis.]

There is no Potential Loss Threshold associated with this item.

3. Core Exit Thermocouple Readings

The CETs provide an adequate measure of core temperatures to estimate temperatures at which potential cladding damage and core overheating may be occurring.

Loss Threshold #1

CETs with readings above [TBD-1200] degrees F ([TBD-650] degrees C) indicate significant clad heating and the Loss of the Fuel Clad Barrier. This value corresponds to significant superheating of the coolant.

Basis Information For
EAL Fission Product Barrier Table 5-F-2

Potential Loss Threshold #1

The reading corresponds to loss of subcooling.

CETs with readings greater than [TBD-700 to 900] degrees F ([TBD-370 to 480] degrees C) indicate the onset of inadequate core cooling.

4. Reactor Vessel Water Level

There is no Loss Threshold associated with this item.

The Potential Loss Threshold corresponds to the TOAF.

The value for the Potential Loss Threshold corresponds to the [TBD] the TOAF.

5. Not Applicable (included for numbering consistency between Barrier tables)

6. Containment Radiation Monitoring

The reading of [TBD-value, TBD-instrument numbers] is a value which indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the containment. This reading is based on release and dispersal of the reactor coolant noble gas and iodine inventory associated with a concentration of DOSE EQUIVALENT I-131 of 300 µCi/gm or [DOSE EQUIVALENT XE-133 of TBD µCi/gm] into the containment atmosphere.

Reactor coolant concentrations of this magnitude are several times larger than the maximum concentrations (including iodine spiking) allowed within TS and are therefore indicative of fuel damage.

This value is higher than that specified for RCS Barrier Loss Threshold #6. Thus, this threshold indicates a loss of both the Fuel Clad Barrier and RCS Barrier that appropriately escalates the emergency classification level to a SAE.

[***Caution:*** *it is important to recognize that in the event the radiation monitor is sensitive to shine from the reactor vessel or piping, spurious readings will be present and another indicator of fuel clad damage is necessary or compensated for in the threshold value.*]

There is no Potential Loss Threshold associated with this item.

7. Other Indications

This subcategory is not applicable to the CPNPP Units 3 & 4 but has been preserved for consistency with NEI 99-01.

8. Emergency Coordinator Judgment

These thresholds address any other factors that are to be used by the Emergency Coordinator in determining whether the Fuel Clad Barrier is lost or potentially lost. In addition, the inability to monitor the Barrier should also be incorporated in this threshold as a factor in Emergency Coordinator judgment that the Barrier may be considered lost or potentially lost.

Basis Information For
EAL Fission Product Barrier Table 5-F-2

RCS BARRIER THRESHOLDS: (1 or 2 or 4 or 6 or 8)

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

1. Critical Safety Function Status

Potential Loss Threshold 1

RCS Integrity - RED indicates an extreme challenge to the safety function derived from appropriate instrument readings.

Potential Loss Threshold 2

Heat Sink - RED when heat sink is required indicates the ultimate heat sink function is under extreme challenge.

There is no Loss Threshold associated with this item.

2. RCS Leak Rate

The Loss Threshold addresses conditions where LEAKAGE from the RCS is greater than available inventory control capacity such that a loss of subcooling has occurred. The loss of subcooling is the fundamental indication that the inventory control systems are inadequate in maintaining RCS pressure and inventory against the mass loss through the leak.

The Potential Loss is based on the inability to maintain normal liquid inventory within the RCS by the Chemical and Volume Control System (CVCS), which is considered to be the flow equivalent to one charging pump discharging to the charging header. Isolating letdown is a standard abnormal operating procedure action and may prevent unnecessary classifications when a non-RCS LEAKAGE path such as a CVCS leak exists. The intent of this condition is met if attempts to isolate Letdown are NOT successful. Additional charging pumps being required is indicative of a substantial RCS leak.

3. **Not Applicable** (included for numbering consistency between Barrier tables)

4. SG Tube Rupture

This threshold addresses the full spectrum of SG tube rupture events in conjunction with Containment Barrier Loss thresholds. It addresses RUPTURED SG(s) for which the LEAKAGE is large enough to cause actuation of ECCS (SI). This is consistent to the RCS Barrier Potential Loss Threshold.

By itself, this threshold will result in the declaration of an Alert. However, if the SG is also FAULTED (i.e., two barriers failed), the declaration escalates to a SAE per Containment Barrier Loss Thresholds.

There is no Potential Loss Threshold associated with this item.

5. Not Applicable (included for numbering consistency between Barrier tables)

6. Containment Radiation Monitoring

The reading of [TBD-value, TBD-instrument numbers] is a value which indicates the release of reactor coolant to the containment. The reading is based on an instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with normal operating conditions (i.e., with TS limits) into the containment atmosphere.

This reading will be less than that specified for Fuel Clad Barrier Threshold #6. Thus, this threshold would be indicative of a RCS leak only. If the radiation monitor reading increased to that specified by Fuel Clad Barrier threshold, fuel damage would also be indicated.

There is no Potential Loss Threshold associated with this item.

7. Other Indications

This subcategory is not applicable to the CPNPP Units 3 & 4 but has been preserved for consistency with NEI 99-01.

8. Emergency Coordinator Judgment

These thresholds address any other factors that are to be used by the Emergency Coordinator in determining whether the RCS Barrier is lost or potentially lost. In addition, the inability to monitor the Barrier should also be incorporated in this threshold as a factor in Emergency Coordinator judgment that the Barrier may be considered lost or potentially lost.

Basis Information For
EAL Fission Product Barrier Table 5-F-2

CONTAINMENT BARRIER THRESHOLDS: (1 or 2 or 3 or 4 or 5 or 6 or 8)

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

1. Critical Safety Function Status

RED path indicates an extreme challenge to the safety function derived from appropriate instrument readings and/or sampling results, and thus represents a Potential Loss of containment.

Conditions leading to a containment RED path result from RCS Barrier and/or Fuel Clad Barrier Loss. Thus, this threshold is primarily a discriminator between SAE and GE representing a Potential Loss of the third Barrier.

There is no Loss Threshold associated with this item.

2. Containment Pressure

Loss Thresholds #1 and #2

Rapid unexplained loss of pressure (i.e., not attributable to containment spray or condensation effects) following an initial pressure increase from a primary or secondary high energy line break indicates a loss of containment integrity. Containment pressure and sump levels should increase as a result of mass and energy release into containment from a LOCA. Thus, sump level or pressure not increasing indicates containment bypass and a loss of containment integrity.

This indicator relies on operator recognition of an unexpected response for the condition and therefore does not have a specific value associated with it. The unexpected response is important because it is the indicator for a containment bypass condition.

Potential Loss Threshold #1

The 68 psig is based on the containment design pressure for the US-APWR.

Potential Loss Threshold #2

Existence of an explosive mixture means a hydrogen and oxygen concentration of at least the lower deflagration limit curve exists.

Potential Loss Threshold #3

This threshold represents a Potential Loss of containment in that the containment heat removal/depressurization system (i.e., Containment Spray, but not including containment venting strategies) is either lost or performing in a degraded manner, as indicated by containment pressure greater than the setpoint at which the equipment was supposed to have actuated.

3. Core Exit Thermocouple Readings

There is no Loss Threshold associated with this item.

Potential Loss Threshold #1

The conditions in these thresholds represent an IMMINENT core melt sequence which, if not corrected, could lead to vessel failure and an increased potential for containment failure. In conjunction with the Fuel Barrier CET criteria and RCS Barrier RCS leak rate criteria, this threshold would result in the declaration of a GE -- Loss of two Barriers and the Potential Loss of a third. If the function restoration procedures are ineffective, there is no "success" path.

The function restoration procedures are those EOPs that address the recovery of the core cooling CSFs. The procedure is considered effective if the temperature is decreasing or if the vessel water level is increasing.

[*Severe accident analyses (e.g., NUREG-1150 (Reference 25)) have concluded that function restoration procedures can arrest core degradation within the reactor vessel in a significant fraction of the core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it is appropriate to provide a reasonable period to allow function restoration procedures to arrest the core melt sequence.*]

Whether or not the procedures will be effective should be apparent within 15 minutes. The Emergency Coordinator should make the declaration as soon as it is determined that the procedures have been, or will be ineffective.

4. SG Secondary Side Release With Primary to Secondary LEAKAGE

The Loss Threshold recognizes that SG tube LEAKAGE can represent a bypass of the Containment Barrier as well as a Loss of the RCS Barrier.

The two Loss Thresholds could be considered redundant, but the inclusion of a threshold that uses Emergency Procedure-commonly used terms like “RUPTURED and FAULTED” adds to the ease of the classification process and has been included based on this human factor concern.

This threshold results in a NOUE for smaller breaks that; (1) do not exceed the normal charging capacity threshold in RCS Barrier Potential Loss Threshold, or (2) do not result in ECCS actuation in RCS SG tube rupture Barrier Loss Threshold. For larger breaks, RCS Barrier threshold criteria would result in an Alert. For SG tube ruptures which may involve multiple SGs or UNISOLABLE secondary line breaks, this threshold would exist in conjunction with RCS Barrier thresholds and would result in a SAE. Escalation to GE would be based on "Potential Loss" of the Fuel Clad Barrier.

Loss Threshold #1

This threshold addresses the condition in which a RUPTURED SG is also FAULTED. This condition represents a bypass of the RCS and Containment Barriers and is a subset of the second threshold. In conjunction with RCS Barrier Loss Threshold, this would always result in the declaration of a SAE.

Loss Threshold #2

This threshold addresses SG tube leaks that exceed 10 gallons per minute (gpm) in conjunction with an UNISOLABLE release path to the environment from the affected SG. The threshold for establishing the UNISOLABLE secondary side release is intended to be a prolonged release of radioactivity from the RUPTURED SG directly to the environment. This could be expected to occur when the main condenser is unavailable to accept the contaminated steam (i.e., SG tube rupture with concurrent loss of off-site power and the RUPTURED SG is required for plant cooldown or a stuck open relief valve). If the main condenser is available, there may be releases via air ejectors, gland seal exhausters, and other similar controlled, and often monitored, pathways. These pathways do not meet the intent of an UNISOLABLE release path to the environment. These minor releases are assessed using Abnormal Rad Levels/Radiological Effluent ICs.

[*TS limits ([TBD-150] gallons per day) provide a defense in depth associated with alternate SG plugging criteria. The [TBD-150] gallons per day threshold is deemed too low for use as an emergency threshold. A pressure boundary LEAKAGE of 10 gpm was used as the threshold in IC SU5, RCS LEAKAGE, and is deemed appropriate for this threshold.*]

5. Containment Isolation Failure or Bypass

This threshold addresses incomplete containment isolation that allows direct release to the environment.

The use of the modifier “direct” in defining the release path discriminates against release paths through interfacing liquid systems. The existence of an in–line charcoal filter does not make a release path indirect since the filter is not effective at removing fission product noble gases. Typical filters have an

efficiency of 95-99% removal of iodine. Given the magnitude of the core inventory of iodine, significant releases could still occur. In addition, since the fission product release would be driven by boiling in the reactor vessel, the high humidity in the release stream can be expected to render the filters ineffective in a short period.

There is no Potential Loss Threshold associated with this item.

6. Containment Radiation Monitoring

There is no Loss Threshold associated with this item.

The [TBD value] reading is a value which indicates significant fuel damage well in excess of the Thresholds associated with both Loss of Fuel Clad and Loss of RCS Barriers. A major release of radioactivity requiring off-site protective actions from core damage is not possible unless a major failure of fuel cladding allows radioactive material to be released from the core into the reactor coolant.

Regardless of whether containment is challenged, this amount of activity in containment, if released, could have such severe consequences that it is prudent to treat this as a Potential Loss of containment, such that a GE declaration is warranted.

NUREG-1228, *Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents*, (Reference 26) indicates that such conditions do not exist when the amount of clad damage is less than 20%. The Containment High Range ARM reading corresponds to 20% fuel clad damage.

7. Other Indications

This subcategory is not applicable to CPNPP Units 3 & 4 but has been preserved for consistency with NEI 99-01.

8. Emergency Coordinator Judgment

These thresholds address any other factors that are to be used by the Emergency Coordinator in determining whether the Containment Barrier is lost or potentially lost. In addition, the inability to monitor the Barrier should also be incorporated in this threshold as a factor in Emergency Coordinator judgment that the Barrier may be considered lost or potentially lost.

The Containment Barrier should not be declared lost or potentially lost based on exceeding TS action statement criteria, unless there is an event in progress requiring mitigation by the Containment barrier. When no event is in progress (Loss or Potential Loss of either Fuel Clad and/or RCS) the Containment barrier status is addressed by TS.

5.8 Hazards and Other Conditions Affecting Plant Safety EALs

Table 5-H-1: Recognition Category "H" Initiating Condition Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HG1 HOSTILE ACTION resulting in loss of physical control of the facility. *Op. MODEs: All*	**HS4** HOSTILE ACTION within the PROTECTED AREA. *Op. MODEs: All*	**HA4** HOSTILE ACTION within the Owner Controlled Area or airborne attack threat. *Op. MODEs: All*	**HU4** Confirmed SECURITY CONDITION or threat which indicates a potential degradation in the level of safety of the plant. *Op. MODEs: All*
HG2 Other conditions exist which in the judgment of the Emergency Coordinator warrant declaration of a General Emergency. *Op. MODEs: All*	**HS3** Other conditions exist which in the judgment of the Emergency Coordinator warrant declaration of a Site Area Emergency. *Op. MODEs: All*	**HA6** Other conditions exist which in the judgment of the Emergency Coordinator warrant declaration of an Alert. *Op. MODEs: All*	**HU5** Other conditions exist which in the judgment of the Emergency Coordinator warrant declaration of a NOUE. *Op. MODEs: All*
	HS2 Control Room evacuation has been initiated and plant control cannot be established. *Op. MODEs: All*	**HA5** Control Room evacuation has been initiated. *Op. MODEs: All*	
		HA1 Natural or destructive phenomena affecting VITAL AREAS. *Op. MODEs: All*	**HU1** Natural or destructive phenomena affecting the PROTECTED AREA. *Op. MODEs: All*

Table 5-H-1: Recognition Category "H" Initiating Condition Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
		HA2 FIRE or EXPLOSION affecting the operability of plant safety systems required to establish or maintain safe shutdown. *Op. MODEs: All*	**HU2** FIRE within the PROTECTED AREA not extinguished within 15 minutes of detection or EXPLOSION within the PROTECTED AREA. *Op. MODEs: All*
		HA3 Access to a VITAL AREA is prohibited due to toxic, corrosive, asphyxiant or flammable gases which jeopardize operation of OPERABLE equipment required to maintain safe operations or safely shutdown the reactor. *Op. MODEs: All*	**HU3** Release of toxic, corrosive, asphyxiant, or flammable gases deemed detrimental to NORMAL PLANT OPERATIONS. *Op. MODEs: All*

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU1

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Natural or destructive phenomena affecting the PROTECTED AREA.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2 or 3 or 4)

1. Seismic event identified by **ANY** 2 of the following:

   - Seismic event confirmed by [TBD-instrument name and number]
   - Earthquake felt in plant
   - National Earthquake Center

2. Tornado striking within PROTECTED AREA boundary or sustained high winds greater than 80 mph.

3. Internal flooding that has the potential to affect safety related equipment required by TS for the current operating MODE in **ANY** of the following areas:

   - Containment Vessel
   - Reactor Building
   - Power Source Buildings

4. Turbine failure resulting in casing penetration or damage to turbine or generator seals.

Basis:

These EALs are categorized on the basis of the occurrence of an event of sufficient magnitude to be of concern to plant operators.

EAL #1

Damage may be caused to some portions of the site, but should not affect ability of safety functions to operate.

The National Earthquake Center can confirm if an earthquake has occurred in the area of the plant.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

EAL #2

This EAL is based on a tornado striking (touching down) or sustained high winds within the PROTECTED AREA. The wind speed selected is a site-specific value that can be reliably monitored by plant meteorological instrumentation. Although design basis for the US-APWR is 155 mph, this wind speed may not be available due to loss of meteorological instrumentation at sustained winds of this magnitude.

The sustained wind value used for CPNPP Units 3 & 4, 80 mph, was selected for consistency with the Units 1 & 2 EAL Threshold.

Escalation of this emergency classification level, if appropriate, would be based on VISIBLE DAMAGE, or by other in plant conditions, via HA1.

EAL #3

This EAL addresses the effect of internal flooding caused by events such as component failures, equipment misalignment, or outage activity mishaps.

Escalation of this emergency classification level, if appropriate, would be based on VISIBLE DAMAGE via HA1, or by other plant conditions.

EAL #4

This EAL addresses main turbine rotating component failures of sufficient magnitude to cause observable damage to the turbine casing or to the seals of the turbine generator. Generator seal damage observed after generator purge does not meet the intent of this EAL because it did not impact normal operation of the plant.

Of major concern is the potential for LEAKAGE of combustible fluids (lubricating oils) and gases (hydrogen cooling) to the plant environs. Actual FIRES and flammable gas build up are appropriately classified via HU2 and HU3.

This EAL is consistent with the definition of a NOUE while maintaining the anticipatory nature desired and recognizing the risk to non-safety related equipment.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU2

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

FIRE within the PROTECTED AREA not extinguished within 15 minutes of detection or EXPLOSION within the PROTECTED AREA.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2)

1. FIRE not extinguished within 15 minutes of Control Room notification of a FIRE or receipt of a Control Room FIRE alarm in **ANY** of the following areas:

   - Containment Vessel
   - Reactor Building
   - Power Source Buildings
   - Cooling Tower Structures
   - Power Source Fuel Storage Vault
   - Power Source Fuel Pipe Tunnel
   - ESW Pipe Building
   - Auxiliary Building
   - Turbine Building

2. EXPLOSION within the PROTECTED AREA.

Basis:

This EAL addresses the magnitude and extent of FIRES or EXPLOSIONS that may be potentially significant precursors of damage to safety systems. It addresses the FIRE/EXPLOSION, and not the degradation in performance of affected systems that may result.

Detection of a FIRE may be based on visual observation and report by plant personnel or sensor alarm indication.

EAL #1

The 15 minute time period begins with a credible notification that a FIRE is occurring, or indication of a fire detection system alarm/actuation. Validation of a fire detection system alarm includes actions that can be taken within the Control Room or other nearby site-specific location to ensure that it is not spurious. An alarm is assumed to be an indication of a FIRE unless it is disproved within the

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15 minute period by personnel dispatched to the scene. In other words, a personnel report from the scene may be used to disprove a sensor alarm if received within 15 minutes of the alarm, but shall not be required to verify the alarm.

The intent of this 15 minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (e.g., smoldering waste paper basket).

The list includes buildings and areas in actual contact with or immediately adjacent to VITAL AREAS or other significant buildings or areas.

EAL #2

This EAL addresses only those EXPLOSIONS of sufficient force to damage permanent structures or equipment within the PROTECTED AREA.

No attempt is made to assess the actual magnitude of the damage. The occurrence of the EXPLOSION is sufficient for declaration.

The Emergency Coordinator also needs to consider any security aspects of the EXPLOSION, if applicable.

Escalation of this emergency classification level, if appropriate, would be based on HA2.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU3

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Release of toxic, corrosive, asphyxiant, or flammable gases deemed detrimental to NORMAL PLANT OPERATIONS.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2)

1. Toxic, corrosive, asphyxiant, or flammable gases in amounts that could adversely affect NORMAL PLANT OPERATIONS.

2. Report by local, county or state officials for evacuation or sheltering of site personnel based on an off-site event.

Basis:

This EAL is based on the release of toxic, corrosive, asphyxiant, or flammable gases of sufficient quantity to affect NORMAL PLANT OPERATIONS.

The fact that SCBA may be worn does not eliminate the need to declare the event.

This IC is not intended to require significant assessment or quantification. It assumes an uncontrolled process that has the potential to affect plant operations. This precludes small or incidental releases, or releases that do not impact structures needed for plant operation.

An asphyxiant is a gas capable of reducing the level of oxygen in the body to dangerous levels. Most commonly, asphyxiants work by merely displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19%, which can lead to breathing difficulties, unconsciousness or even death.

Escalation of this emergency classification level, if appropriate, would be based on HA3.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU4

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Confirmed SECURITY CONDITION or threat which indicates a potential degradation in the level of safety of the plant.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2 or 3)

1. A SECURITY CONDITION that does NOT involve a HOSTILE ACTION as reported by the Security Shift Supervisor

2. A credible site-specific security threat notification.

3. A validated notification from NRC providing information of an aircraft threat.

Basis:

Security events which do not represent a potential degradation in the level of safety of the plant are reported under 10 CFR 73.71 (Reference 27) or in some cases under 10 CFR 50.72. Security events assessed as HOSTILE ACTIONS are classifiable under HA4, HS4 and HG1.

A higher initial classification could be made based upon the nature and timing of the security threat and potential consequences. The licensee shall consider upgrading the emergency response status and emergency classification level in accordance with the site's Safeguards Contingency Plan and Emergency Plan.

EAL #1

Reference is made to site-specific security shift supervision because these individuals are the designated personnel on-site qualified and trained to confirm that a security event is occurring or has occurred. Training on security event classification confirmation is closely controlled due to the strict secrecy controls placed on the plant Safeguards Contingency Plan.

This threshold is based on CPNPP Units 3 & 4 security plans. CPNPP Safeguards Contingency Plans are based on guidance provided by NEI 03-12 (Reference 28).

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EAL #2

This threshold is included to ensure that appropriate notifications for the security threat are made in a timely manner. This includes information of a credible threat. Only the plant to which the specific threat is made need declare the NOUE.

The determination of “credible” is made through use of information found in the Safeguards Contingency Plan.

EAL #3

The intent of this EAL is to ensure that notifications for the aircraft threat are made in a timely manner and that Off-site Response Organizations (OROs) and plant personnel are at a state of heightened awareness regarding the credible threat. It is not the intent of this EAL to replace existing non-hostile related EALs involving aircraft.

This EAL is met when a plant receives information regarding an aircraft threat from NRC. Validation is performed by calling the NRC or by other approved methods of authentication. Only the plant to which the specific threat is made need declare the Unusual Event.

The NRC Headquarters Operations Officer will communicate to the licensee if the threat involves an airliner (airliner is meant to be a large aircraft with the potential for causing significant damage to the plant). The status and size of the plane may be provided by North American Aerospace Defense Command (NORAD) through the NRC.

Escalation to Alert emergency classification level via HA4 would be appropriate if the threat involves an airliner within 30 minutes of the plant.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU5

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Other conditions exist which in the judgment of the Emergency Coordinator warrant declaration of a NOUE.

Operating MODE Applicability: All

Emergency Action Level Threshold:

1. Other conditions exist which in the judgment of the Emergency Coordinator indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring off-site response or monitoring are expected unless further degradation of safety systems occurs.

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Coordinator to fall under the NOUE emergency classification level.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA1

Initiating Condition - ALERT

Natural or destructive phenomena affecting VITAL AREAS.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2 or 3 or 4 or 5)

1. a. Seismic event greater than OBE as indicated by [TBD-seismic instrumentation] reading [TBD-based on Ultimate Heat Sink OBE limit].

   AND

   b. Earthquake confirmed by **ANY** of the following:

   - Earthquake felt in plant
   - National Earthquake Center
   - Control Room indication of degraded performance of systems required for the safe shutdown of the plant

2. Tornado striking or sustained high winds greater than 80 mph resulting in VISIBLE DAMAGE to **ANY** of the following structures containing safety systems or components **OR** Control Room indication of degraded performance of those safety systems:

   - Containment Vessel
   - Reactor Building
   - Power Source Buildings
   - Cooling Tower Structures
   - Power Source Fuel Storage Vault
   - Power Source Fuel Pipe Tunnel
   - ESW Pipe Tunnel
   - Auxiliary Building
   - Turbine Building

3. Internal flooding in **ANY** of the following areas resulting in an electrical shock hazard that precludes access to operate or monitor safety equipment **OR** Control Room indication of degraded performance of those safety systems:

   - Containment Vessel

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- Reactor Building
- Power Source Buildings

4. Vehicle crash resulting in VISIBLE DAMAGE to **ANY** of the following structures containing safety systems or components **OR** Control Room indication of degraded performance of those safety systems:

   - Containment Vessel
   - Reactor Building
   - Power Source Buildings
   - Cooling Tower Structures

5. Other occurrences resulting in VISIBLE DAMAGE to **ANY** of the following structures containing safety systems or components **OR** Control Room indication of degraded performance of those safety systems:

   - Containment Vessel
   - Reactor Building
   - Power Source Buildings
   - Cooling Tower Structure
   - Power Source Fuel Storage Vault
   - Power Source Fuel Pipe Tunnel
   - ESW Pipe Tunnel

Basis:

These EALs escalate from HU1 in that the occurrence of the event has resulted in VISIBLE DAMAGE to plant structures or areas containing equipment necessary for a safe shutdown, or has caused damage to the safety systems in those structures evidenced by Control Room indications of degraded system response or performance. The occurrence of VISIBLE DAMAGE and/or degraded system response is intended to discriminate against lesser events. The initial report should not be interpreted as mandating a lengthy damage assessment prior to classification. No attempt is made in this EAL to assess the actual magnitude of the damage. The significance here is not that a particular system or structure was damaged, but rather, that the event was of sufficient magnitude to cause this degradation.

Escalation of this emergency classification level, if appropriate, would be based on System Malfunction ICs.

EALs #2 - #5

These EALs specify site-specific structures or areas that contain safety systems, or components and functions required for safe shutdown of the plant.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

EAL #1

Seismic events of this magnitude can result in a VITAL AREA being subjected to forces beyond design limits, and thus damage may be assumed to have occurred to plant safety systems.

[*The OBE limit for other US-APWR design is 0.1g. Site-specific design of cooling towers includes an OBE limit, which may differ from US-APWR OBE limit*]. The National Earthquake Center can confirm if an earthquake has occurred in the area of the plant.

EAL #2

This EAL is based on a tornado striking (touching down) or sustained high winds that have caused VISIBLE DAMAGE to structures containing functions or systems required for safe shutdown of the plant. The wind speed selected is a value that can be reliably monitored by plant meteorological instrumentation. Although design basis for the US-APWR is 155 mph, this wind speed may not be available due to loss of meteorological instrumentation at sustained winds of this magnitude.

The sustained wind value used for CPNPP Units 3 & 4, 80 mph, was selected for consistency with the Units 1 & 2 EAL Threshold.

EAL #3

This EAL addresses the effect of internal flooding caused by events such as component failures, equipment misalignment, or outage activity mishaps. It is based on the degraded performance of systems, or has created industrial safety hazards (e.g., electrical shock) that preclude necessary access to operate or monitor safety equipment. The inability to access, operate or monitor safety equipment represents an actual or substantial potential degradation of the level of safety of the plant.

Flooding as used in this EAL describes a condition where water is entering the room faster than installed equipment is capable of removal, resulting in a rise of water level within the room. Classification of this EAL should not be delayed while corrective actions are being taken to isolate the water source.

EAL #4

This EAL addresses vehicle crashes within the PROTECTED AREA that results in VISIBLE DAMAGE to VITAL AREAS or indication of damage to safety structures, systems, or components containing functions and systems required for safe shutdown of the plant.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

EAL #5

This EAL addresses other site-specific phenomena that result in VISIBLE DAMAGE to VITAL AREAS or results in indication of damage to safety structures, systems, or components containing functions and systems required for safe shutdown of the plant (such as hurricane, flood, or seiche) that can also be precursors of more serious events.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA2

Initiating Condition - ALERT

FIRE or EXPLOSION affecting the operability of plant safety systems required to establish or maintain safe shutdown.

Operating MODE Applicability: All

Emergency Action Level Threshold:

1. FIRE or EXPLOSION resulting in VISIBLE DAMAGE to **ANY** of the following structures containing safety systems or components **OR** Control Room indication of degraded performance of those safety systems:

   - Containment Vessel
   - Reactor Building
   - Power Source Buildings
   - Cooling Tower Structures
   - Power Source Fuel Storage Vault
   - Power Source Fuel Pipe Tunnel
   - ESW Pipe Tunnel

Basis:

VISIBLE DAMAGE is used to identify the magnitude of the FIRE or EXPLOSION and to discriminate against minor FIRES and EXPLOSIONS.

The reference to structures containing safety systems or components is included to discriminate against FIRES or EXPLOSIONS in areas having a low probability of affecting safe operation. The significance here is not that a safety system was degraded but the fact that the FIRE or EXPLOSION was large enough to cause damage to these systems.

The use of VISIBLE DAMAGE should not be interpreted as mandating a lengthy damage assessment prior to classification. The declaration of an Alert and the activation of the TSC will provide the Emergency Coordinator with the resources needed to perform detailed damage assessments.

The Emergency Coordinator also needs to consider any security aspects of the EXPLOSION.

This EAL specifies structures and areas that contain safety systems, or components and functions required for safe shutdown of the plant.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

Escalation of this emergency classification level, if appropriate, will be based on System Malfunctions, Fission Product Barrier Degradation or Abnormal Rad Levels/Radiological Effluent ICs.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA3

Initiating Condition - ALERT

Access to a VITAL AREA is prohibited due to toxic, corrosive, asphyxiant or flammable gases which jeopardize operation of OPERABLE equipment required to maintain safe operations or safely shutdown the reactor.

Operating MODE Applicability: All

Emergency Action Level:

Note: If the equipment in the stated area was already inoperable, or out of service, before the event occurred, then this EAL should not be declared as it will have no adverse impact on the ability of the plant to safely operate or safely shutdown beyond that already allowed by TS at the time of the event.

1. Access to a VITAL AREA is prohibited due to toxic, corrosive, asphyxiant or flammable gases which jeopardize operation of systems required to maintain safe operations or safely shutdown the reactor.

Basis:

Gases in a VITAL AREA can affect the ability to safely operate or safely shutdown the reactor.

The fact that SCBA may be worn does not eliminate the need to declare the event.

Declaration should not be delayed for confirmation from atmospheric testing if the atmosphere poses an immediate threat to life and health or an immediate threat of severe exposure to gases. This could be based upon documented analysis, indication of personal ill effects from exposure, or operating experience with the hazards.

An asphyxiant is a gas capable of reducing the level of oxygen in the body to dangerous levels. Most commonly, asphyxiants work by merely displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19%, which can lead to breathing difficulties, unconsciousness or even death.

An uncontrolled release of flammable gasses within a facility structure has the potential to affect safe operation of the plant by limiting either operator or equipment operations due to the potential for ignition and resulting equipment

damage/personnel injury. Flammable gasses, such as hydrogen and acetylene, are routinely used to maintain plant systems (hydrogen) or to repair equipment/components (acetylene - used in welding). This EAL assumes concentrations of flammable gasses which can ignite/support combustion.

Escalation of this emergency classification level, if appropriate, will be based on System Malfunctions, Fission Product Barrier Degradation or Abnormal Rad Levels/Radioactive Effluent ICs.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA4

Initiating Condition - ALERT

HOSTILE ACTION within the Owner Controlled Area or airborne attack threat.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2)

1. A HOSTILE ACTION is occurring or has occurred within the OCA as reported by the Security Shift Supervisor.

2. A validated notification from NRC of an airliner attack threat within 30 minutes of the site.

Basis:

These EALs address the contingency for a very rapid progression of events, such as that experienced on September 11, 2001. They are not premised solely on the potential for a radiological release. Rather the issue includes the need for rapid assistance due to the possibility for significant and indeterminate damage from additional air, land or water attack elements.

The fact that the site is under serious attack or is an identified attack target with minimal time available for further preparation or additional assistance to arrive requires a heightened state of readiness and implementation of protective measures that can be effective (such as on-site evacuation, dispersal or sheltering).

EAL #1

This EAL addresses the potential for a very rapid progression of events due to a HOSTILE ACTION. It is not intended to address incidents that are accidental events or acts of civil disobedience, such as small aircraft impact, hunters, or physical disputes between employees within the OCA. Those events are adequately addressed by other EALs.

This EAL is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OCA.

[*Although nuclear plant security officers are well trained and prepared to protect against HOSTILE ACTION, it is appropriate for OROs to be notified and*

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

encouraged to begin activation (if they do not normally) to be better prepared should it be necessary to consider further actions.]

[*If not previously notified by the NRC that the airborne HOSTILE ACTION was intentional, then it would be expected, although not certain, that notification by an appropriate Federal agency would follow. In this case, appropriate federal agency is intended to be NORAD, Federal Bureau of Investigation (FBI), Federal Aviation Administration (FAA) or NRC. However, the declaration should not be unduly delayed awaiting Federal notification*.]

EAL #2

This EAL addresses the immediacy of an expected threat arrival or impact on the site within a relatively short time.

The intent of this EAL is to ensure that notifications for the airliner attack threat are made in a timely manner and that OROs and plant personnel are at a state of heightened awareness regarding the credible threat. Airliner is meant to be a large aircraft with the potential for causing significant damage to the plant.

This EAL is met when a plant receives information regarding an airliner attack threat from NRC and the airliner is within 30 minutes of the plant. Only the plant to which the specific threat is made need declare the Alert.

The NRC Headquarters Operations Officer will communicate to the licensee if the threat involves an airliner (airliner is meant to be a large aircraft with the potential for causing significant damage to the plant). The status and size of the plane may be provided by NORAD through the NRC.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA5

Initiating Condition - ALERT

Control Room evacuation has been initiated.

Operating MODE Applicability: All

Emergency Action Level Threshold:

1. [TBD-procedure] requires Control Room evacuation.

Basis:

With the Control Room evacuated, additional support, monitoring and direction through the TSC and/or other emergency response facilities may be necessary.

Inability to establish plant control from outside the Control Room will escalate this event to a SAE via HS2.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA6

Initiating Condition - ALERT

Other conditions exist which in the judgment of the Emergency Coordinator warrant declaration of an Alert.

Operating MODE Applicability: All

Emergency Action Level Threshold:

1. Other conditions exist which in the judgment of the Emergency Coordinator indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA PAG exposure levels.

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Coordinator to fall under the Alert emergency classification level.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS2

Initiating Condition - SITE AREA EMERGENCY

Control Room evacuation has been initiated and plant control cannot be established.

Operating MODE Applicability: All

Emergency Action Level Threshold:

1. a. Control Room evacuation has been initiated.

   AND

   b. Control of the plant cannot be established per [procedure TBD] within [TBD- minutes].

Basis:

The intent of this IC is to capture those events where the Control Room has been evacuated and control of the plant cannot be reestablished in a timely manner. In this case, expeditious transfer of control of safety systems has not occurred (although fission product barrier damage may not yet be indicated).

The intent of the EAL is to establish control of important plant equipment and knowledge of important plant parameters in a timely manner. Primary emphasis should be placed on those components and instruments that supply protection for and information about safety functions. Typically, these safety functions are reactivity control, RCS inventory, and secondary heat removal.

The determination of whether or not control is established at the remote shutdown panel is based on Emergency Coordinator judgment. The Emergency Coordinator is expected to make a reasonable, informed judgment within the site-specific time for transfer that the licensee has control of the plant from the remote shutdown panel.

Escalation of this emergency classification level, if appropriate, would be by Fission Product Barrier Degradation or Abnormal Rad Levels/Radiological Effluent EALs.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS3

Initiating Condition - SITE AREA EMERGENCY

Other conditions exist which in the judgment of the Emergency Coordinator warrant declaration of a Site Area Emergency.

Operating MODE Applicability: All

Emergency Action Level Threshold:

1. Other conditions exist which in the judgment of the Emergency Coordinator indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts; (1) toward site personnel or equipment that could lead to the likely failure of or; (2) that prevent effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA PAG exposure levels beyond the site boundary.

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Coordinator to fall under the emergency classification level description for SAE.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS4

Initiating Condition - SITE AREA EMERGENCY

HOSTILE ACTION within the PROTECTED AREA.

Operating MODE Applicability: All

Emergency Action Level Threshold:

1. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervisor.

Basis:

This condition represents an escalated threat to plant safety above that contained in the Alert in that a HOSTILE FORCE has progressed from the OCA to the PROTECTED AREA.

This EAL addresses the contingency for a very rapid progression of events, such as that experienced on September 11, 2001. It is not premised solely on the potential for a radiological release. Rather the issue includes the need for rapid assistance due to the possibility for significant and indeterminate damage from additional air, land or water attack elements.

The fact that the site is under serious attack with minimal time available for further preparation or additional assistance to arrive requires ORO readiness and preparation for the implementation of protective measures.

This EAL addresses the potential for a very rapid progression of events due to a HOSTILE ACTION. It is not intended to address incidents that are accidental events or acts of civil disobedience, such as small aircraft impact, hunters, or physical disputes between employees within the PROTECTED AREA. Those events are adequately addressed by other EALs.

[*Although nuclear plant security officers are well trained and prepared to protect against HOSTILE ACTION, it is appropriate for OROs to be notified and encouraged to begin preparations for public protective actions (if they do not normally) to be better prepared should it be necessary to consider further actions.*]

[*If not previously notified by NRC that the airborne HOSTILE ACTION was intentional, then it would be expected, although not certain, that notification by an appropriate Federal agency would follow. In this case, appropriate federal*

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

agency is intended to be NORAD, FBI, FAA or NRC. However, the declaration should not be unduly delayed awaiting Federal notification.]

Escalation of this emergency classification level, if appropriate, would be based on actual plant status after impact or progression of attack.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HG1

Initiating Condition - GENERAL EMERGENCY

HOSTILE ACTION resulting in loss of physical control of the facility.

Operating MODE Applicability: All

Emergency Action Level Thresholds: (1 or 2)

1. A HOSTILE ACTION has occurred such that plant personnel are unable to operate equipment required to maintain safety functions.

2. A HOSTILE ACTION has caused failure of Spent Fuel Cooling Systems and IMMINENT fuel damage is likely for a recently off-loaded reactor core in SFP.

Basis:

EAL #1

This EAL encompasses conditions under which a HOSTILE ACTION has resulted in a loss of physical control of VITAL AREAS (containing vital equipment or controls of vital equipment) required to maintain safety functions and control of that equipment cannot be transferred to and operated from another location.

These safety functions are reactivity control (ability to shut down the reactor and keep it shutdown), RCS inventory (ability to cool the core), and secondary heat removal (ability to maintain a heat sink).

[*Loss of physical control of the Control Room or remote shutdown capability alone may not prevent the ability to maintain safety functions per se. Design of the remote shutdown capability and the location of the transfer switches should be taken into account. Primary emphasis should be placed on those components and instruments that supply protection for and information about safety functions.*]

If control of the plant equipment necessary to maintain safety functions can be transferred to another location, then the threshold is not met.

EAL #2

This EAL addresses failure of spent fuel cooling systems as a result of HOSTILE ACTION if IMMINENT fuel damage is likely, such as when a recently off-loaded reactor core [e.g., TBD days following reactor shutdown] is in the SFP.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HG2

Initiating Condition - GENERAL EMERGENCY

Other conditions exist which in the judgment of the Emergency Coordinator warrant declaration of a General Emergency.

Operating MODE Applicability: All

Emergency Action Level Threshold:

1. Other conditions exist which in the judgment of the Emergency Coordinator indicate that events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA PAG exposure levels off-site for more than the immediate site area.

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Coordinator to fall under the emergency classification level description for GE.

5.9 System Malfunction EALs

Table 5-S-1: Recognition Category "S" Initiating Condition Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SG1 Prolonged loss of all Off-site and all On-site ac power to emergency busses. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*	**SS1** Loss of all Off-site AC power and On-Site ac power capability to emergency busses for 15 minutes or longer. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*	**SA5** AC power capability to emergency busses reduced to a single power source for 15 minutes or longer such that any additional single failure would result in station blackout. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*	**SU1** Loss of all Off-site ac power to emergency busses for 15 minutes or longer. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*
	SS3 Loss of all vital dc power for 15 minutes or longer. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*		
SG2 Automatic Trip and all manual actions fail to shutdown the reactor and indication of an extreme challenge to the ability to cool the core exists. *Op. MODEs: Power Operation, Startup*	**SS2** Automatic Trip fails to shutdown the reactor and manual actions taken in the Control Room are not successful in shutting down the reactor. *Op. MODEs: Power Operation, Startup*	**SA2** Automatic Trip fails to shutdown the reactor and the manual actions taken Control Room are successful in shutting down the reactor. *Op. MODEs: Power Operation, Startup*	**SU8** Inadvertent criticality. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*

Table 5-S-1: Recognition Category "S" Initiating Condition Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
	SS6 Inability to monitor an ANTICIPATED OPERATIONAL OCCURRENCE in progress. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*	**SA4** Loss of Indicating and Monitoring Capability for ALL Protection and Safety Monitoring System and Plant Control and Monitoring System with either Diverse Actuation System unavailable or ANTICIPATED OPERATIONAL OCCURRENCE in progress. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*	**SU3** Loss of Indicating and Monitoring Capability for ALL Protection and Safety Monitoring System and Plant Control and Monitoring System. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*
			SU2 Inability to reach required shutdown within Technical Specification limits. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*
			SU4 Fuel Clad degradation. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*
			SU5 RCS LEAKAGE. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*

Table 5-S-1: Recognition Category "S" Initiating Condition Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
			SU6 Loss of all On-site or Off-site communications capabilities. *Op. MODEs: Power Operation, Startup, Hot Standby, Hot Shutdown*

SYSTEM MALFUNCTIONS

SU1

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Loss of all Off-site ac power to emergency busses for 15 minutes or longer.

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Threshold:

1. Loss of all off-site ac power to Class 1E emergency busses (MC-A, MC-B, MC-C, MC-D) for 15 minutes or longer.

Basis:

Prolonged loss of off-site ac power reduces required redundancy and potentially degrades the level of safety of the plant by rendering the plant more vulnerable to a complete loss of ac power to emergency busses.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of off-site power.

SYSTEM MALFUNCTIONS

SU2

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Inability to reach required shutdown within Technical Specification limits.

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Threshold:

1. Plant is not brought to required operating MODE within TS LCO Action Statement Time.

Basis:

LCOs require the plant to be brought to a required operating MODE when the TS required configuration cannot be restored. Depending on the circumstances, this may or may not be an emergency or precursor to a more severe condition. In any case, the initiation of plant shutdown required by the site TS requires a four hour report under 10 CFR 50.72 (b) Non-emergency events. The plant is within its safety envelope when being shut down within the allowable action statement time in the TS. An immediate NOUE is required when the plant is not brought to the required operating MODE within the allowable action statement time in the TS. Declaration of a NOUE is based on the time at which the LCO-specified action statement time period elapses under the plant TS and is not related to how long a condition may have existed.

SYSTEM MALFUNCTIONS

SU3

Initiating Condition - ALERT

Loss of Indicating and Monitoring Capability for ALL Protection and Safety Monitoring System and Plant Control and Monitoring System

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Threshold:

1. Loss of All Protection and Safety Monitoring System (PSMS) and Plant Control and Monitoring System (PCMS) Indicating and Monitoring Functions for 15 minutes or longer.

Basis:

This IC recognizes the difficulty associated with monitoring changing plant conditions without the use of a major portion of the control and indication systems.

[The PSMS provides the functions necessary to protect the plant during normal operations, to shutdown the plant, and to maintain the plant in a safe shutdown condition. The PCMS includes the control functions that provide for the control of the nuclear process, conversion of nuclear energy into heat energy, and transport of the heat energy from the nuclear reactor to the main steam turbine.]

This NOUE will be escalated to an Alert if the operating crew does not have the Diverse Actuation System (DAS) available.

SYSTEM MALFUNCTIONS

SU4

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Fuel Clad degradation.

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Thresholds: (1 or 2)

1. Primary Coolant Monitor (R-70) [TBD-radiation monitor readings indicating fuel clad degradation greater than TS allowable limits.]

2. DOSE EQUIVALENT I-131 greater than 60 µCi/gm OR DOSE EQUIVALENT XE-133 greater than 300 µCi/gm for more than 6 hours as determined by sampling and analysis.

Basis:

This EAL is included because it is a precursor of more serious conditions and, as result, is considered to be a potential degradation of the level of safety of the plant.

Escalation of this EAL to the Alert level is via the Fission Product Barriers.

EAL #1

This threshold addresses site-specific radiation monitor readings that provide indication of a degradation of fuel clad integrity.

EAL #2

This threshold addresses coolant samples exceeding coolant TS for transient iodine spiking and xenon limits.

SYSTEM MALFUNCTIONS

SU5

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

RCS LEAKAGE.

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2)

1. Unidentified or pressure boundary LEAKAGE greater than 10 gpm.

2. Identified LEAKAGE greater than 25 gpm.

Basis:

This IC is included as a NOUE because it may be a precursor of more serious conditions and, as result, is considered to be a potential degradation of the level of safety of the plant. The value for the unidentified LEAKAGE (including the pressure boundary) was selected as it is observable with normal Control Room indications and is 10 times the TS limit. Lesser values must generally be determined through time-consuming surveillance tests (e.g., mass balances).

Relief valve normal operation should be excluded from this IC. However, a relief valve that operates and fails to close per design should be considered applicable to this IC if the relief valve cannot be isolated.

The EAL for identified LEAKAGE is set at a higher value due to the lesser significance of identified LEAKAGE in comparison to unidentified or pressure boundary LEAKAGE and is 2.5 times the TS limit. In either case, escalation of this IC to the Alert level is via Fission Product Barrier Degradation ICs.

SYSTEM MALFUNCTIONS

SU6

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Loss of all On-site or Off-site communications capabilities.

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Thresholds: (1 or 2)

1. Loss of all of the following on-site communication methods affecting the ability to perform routine operations.

   - PA/PL
   - PABX
   - SPTS
   - Plant Radio System

2. Loss of all of the following off-site communication methods affecting the ability to perform off-site notifications.

   - Dedicated circuit between Control Room and TX DPS (Garland), Somervell County Sheriff, Hood County Sheriff
   - Private Telephone (backup to Dedicated Circuit)
   - Private Area Branch Exchange (PABX)
   - Emergency Notification System
   - Health Physics Network

Basis:

The purpose of this IC and its associated EALs is to recognize a loss of communications capability that either defeats the plant operations staff ability to perform routine tasks necessary for plant operations or the ability to communicate issues with off-site authorities.

[*The loss of off-site communications ability is expected to be significantly more comprehensive than the condition addressed by 10 CFR 50.72.*]

The availability of one method of ordinary off-site communications is sufficient to inform federal, state, and local authorities of plant problems. This EAL is intended to be used only when extraordinary means (e.g., relaying of information from non-routine radio transmissions, individuals being sent to off-site locations, etc.) are being used to make communications possible.

SYSTEM MALFUNCTIONS

EAL #2

The list for off-site communications loss encompasses the loss of all means of communications with off-site authorities. This includes the ENS, commercial telephone lines, telecopy transmissions, and dedicated phone systems that are routinely used for off-site emergency notifications.

SYSTEM MALFUNCTIONS

SU8

Initiating Condition - NOTIFICATION OF UNUSUAL EVENT

Inadvertent criticality.

Operating MODE Applicability: Hot Standby, Hot Shutdown

Emergency Action Level Threshold:

1. UNPLANNED sustained positive startup rate observed.

Basis:

This IC addresses inadvertent criticality events. This IC indicates a potential degradation of the level of safety of the plant, warranting a NOUE classification. This IC excludes inadvertent criticalities that occur during planned reactivity changes associated with reactor startups (e.g., criticality earlier than estimated).

This condition can be identified using startup range and intermediate range rate indication.

Escalation would be by the Fission Product Barrier Table, as appropriate to the operating MODE at the time of the event.

SYSTEM MALFUNCTIONS

SA2

Initiating Condition - ALERT

Automatic Trip fails to shutdown the reactor and the manual actions taken in the Control Room are successful in shutting down the reactor.

Operating MODE Applicability: Power Operation, Startup

Emergency Action Level Threshold:

1. a. An automatic trip failed to shutdown the reactor.

   AND

   b. Manual actions taken in the Control Room successfully shutdown the reactor as indicated by [Power Range (N-41, N-42, N-43, N-44) greater than TBD%, (Intermediate Range (N-35, N-36 greater than TBD amps]

Basis:

Manual trip actions taken in the Control Room are any set of actions by the reactor operator(s) which causes or should cause control rods to be rapidly inserted into the core and shuts down the reactor.

This condition indicates failure of the automatic protection system to trip the reactor. This condition is more than a potential degradation of a safety system in that a front line automatic protection system did not function in response to a plant transient. Thus the plant safety has been compromised because design limits of the fuel may have been exceeded. An Alert is indicated because conditions may exist that lead to potential loss of fuel clad or RCS and because of the failure of the Reactor Protection System to automatically shutdown the plant.

If manual actions taken in the Control Room fail to shutdown the reactor, the event would escalate to a SAE.

SYSTEM MALFUNCTIONS

SA4

Initiating Condition - ALERT

Loss of Indicating and Monitoring Capability for ALL Protection and Safety Monitoring System and Plant Control and Monitoring System With Either Diverse Actuation System Unavailable or Anticipated Operational Occurrence in Progress

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Threshold:

1. a. UNPLANNED Loss of All PSMS and PCMS Indicating and Monitoring Functions for 15 minutes or longer

   AND

   b. **EITHER** of the following:

   - ALL DAS instrumentation is unavailable
   - An ANTICIPATED OPERATIONAL OCCURRENCE is in progress

Basis:

This IC recognizes the difficulty associated with monitoring changing plant conditions without the use of a major portion of the control and indication systems.

[The PSMS provides the functions necessary to protect the plant during normal operations, to shutdown the plant, and to maintain the plant in a safe shutdown condition. The PCMS includes the control functions that provide for the control of the nuclear process, conversion of nuclear energy into heat energy, and transport of the heat energy from the nuclear reactor to the main steam turbine.]

[The DAS provides analog control and indication backup to the digital control systems.]

The concern is included in this EAL due to difficulty associated with assessment of plant conditions. The loss of specific, or several, safety system indicators should remain a function of that specific system or component operability status. This will be addressed by the specific TS. The initiation of a TS imposed plant shutdown related to the instrument loss will be reported via 10 CFR 50.72. If the

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shutdown is not in compliance with the TS action, the NOUE is based on SU2 "Inability to Reach Required Shutdown Within Technical Specification Limits."

This Alert will be escalated to a SAE if the operating crew cannot monitor the transient in progress due to a concurrent loss of compensatory indications with an ANTICIPATED OPERATIONAL OCCURRENCE in progress during the loss of control and indication systems.

SYSTEM MALFUNCTIONS

SA5

Initiating Condition - ALERT

AC power capability to emergency busses reduced to a single power source for 15 minutes or longer such that any additional single failure would result in station blackout.

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Threshold:

1. a. AC power capability to Class 1E emergency busses (MC-A,. MC-B, MC-C, MC-D) reduced to a single power source for 15 minutes or longer.

   AND

   b. Any additional single power source failure will result in station blackout.

Basis:

[*This IC and the associated EALs are intended to provide an escalation from IC SU1, "Loss of All Off-site ac Power To Emergency Busses for Greater Than 15 Minutes."*]

The condition indicated by this IC is the degradation of the off-site and on-site ac power systems such that any additional single failure would result in a station blackout. This condition could occur due to a loss of off-site power with a concurrent failure of all but one gas turbine generator to supply power to its emergency busses. Another related condition could be the loss of all on-site gas turbine generators with only one train of emergency busses being backfed from off-site power. The subsequent loss of this single power source would escalate the event to a SAE in accordance with SS1.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of power.

SYSTEM MALFUNCTIONS

SS1

Initiating Condition - SITE AREA EMERGENCY

Loss of all Off-site ac power and On-Site ac power capability to emergency busses for 15 minutes or longer.

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Threshold:

1. Loss of all Off-Site ac power and On-site ac power capability to Class 1E emergency busses (MC-A, MC-B, MC-C, MC-D) for 15 minutes or longer.

Basis:

Loss of all off-site ac power to emergency busses compromises all plant safety systems requiring electric power including RHR, ECCS, Containment Heat Removal and the Ultimate Heat Sink. Prolonged loss of all ac power to emergency busses will lead to loss of Fuel Clad, RCS, and Containment, thus this event can escalate to a GE.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of off-site power.

Escalation to GE is via Fission Product Barrier Degradation or IC SG1, "Prolonged Loss of All Off-site Power and Prolonged Loss of All On-site ac Power."

SYSTEM MALFUNCTIONS

SS2

Initiating Condition - SITE AREA EMERGENCY

Automatic Trip fails to shutdown the reactor and manual actions taken in the Control Room are not successful in shutting down the reactor.

Operating MODE Applicability: Power Operation, Startup

Emergency Action Level Threshold:

1. a. An automatic trip failed to shutdown the reactor.

   AND

   b. Manual actions taken in the Control Room DO NOT shutdown the reactor as indicated by [Power Range (N-41, N-42, N-43, N-44) greater than [TBD%, (Intermediate Range (N-35, N-36) greater than TBD amps]

Basis:

Under these conditions, the reactor is producing more heat than the maximum decay heat load for which the safety systems are designed and efforts to bring the reactor subcritical are unsuccessful. A SAE is warranted because conditions exist that lead to IMMINENT loss or potential loss of both fuel clad and RCS.

Manual trip actions taken in the Control Room are any set of actions by the reactor operator(s) which causes or should cause control rods to be rapidly inserted into the core and shuts down the reactor.

Manual trip actions are not considered successful if action away from the Control Room is required to trip the reactor. This EAL is still applicable even if actions taken away from the Control Room are successful in shutting the reactor down because the design limits of the fuel may have been exceeded or because of the gross failure of the RPS.

Escalation of this event to a GE would be due to a prolonged condition leading to an extreme challenge to either core-cooling or heat removal.

SYSTEM MALFUNCTIONS

SS3

Initiating Condition - SITE AREA EMERGENCY

Loss of all vital dc power for 15 minutes or longer.

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Threshold:

1. Less than 105 V on ALL vital dc Busses (DCC-A, DCC-B, DCC-C, DCC-D) for 15 minutes or longer.

Basis:

Loss of all dc power compromises ability to monitor and control plant safety functions. Prolonged loss of all dc power will cause core uncovering and loss of containment integrity when there is significant decay heat and sensible heat in the reactor system.

[*105 V bus voltage is the minimum bus voltage necessary for the operation of safety related equipment. This voltage value incorporates a margin of at least 15 minutes of operation before the onset of inability to operate those loads.*]

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation to a GE would occur by Abnormal Rad Levels/Radiological Effluent, Fission Product Barrier Degradation.

SYSTEM MALFUNCTIONS

SS6

Initiating Condition - SITE AREA EMERGENCY

Inability to Monitor an ANTICIPATED OPERATIONAL OCCURRENCE in Progress.

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Threshold:

1. a. Loss of all PSMS, PCMS, and DAS Indication and Monitoring capability for 15 minutes or longer.

   AND

   b. An ANTICIPATED OPERATIONAL OCCURRENCE in progress.

Basis:

This IC recognizes the inability of the Control Room staff to monitor the plant response to a transient. A SAE is considered to exist if the Control Room staff cannot monitor safety functions needed for protection of the public.

[*As discussed in Chapter 15 of the DCD, ANTICIPATED OPERATIONAL OCCURRENCES are events in which the reactor plant conditions are disturbed beyond the normal operating range. ANTICIPATED OPERATIONAL OCCURRENCEs are expected to occur one or more times during the lifetime of the plant. During a transient caused by an assumed ANTICIPATED OPERATIONAL OCCURRENCE, the reactor core must be undamaged and be ready to return to normal operation. ANTICIPATED OPERATIONAL OCCURRENCEs generally result from one of the following:*

- *A single component failure.*
- *A single malfunction, including passive failures such as leaks or minor pipe breaks, which could occur during the life of the plant while the plant is operating.*
- *A single operator error.*

Acceptance criteria generally applied to ANTICIPATED OPERATIONAL OCCURRENCEs include the following:

- *The minimum departure from nucleate boiling ratio (DNBR) shall be greater than or equal to the 95/95 DNBR limit.*
- *Pressure in the RCS and main steam system shall be equal to or less than 1.1 times the system design pressure.*

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- *The maximum fuel centerline temperature shall be less than the fuel melting point so that the fuel cladding will not be mechanically damaged.*

An ANTICIPATED OPERATIONAL OCCURRENCE shall not generate a Postulated Accident without other faults occurring independently or result in a consequential loss of function of the RCS or Containment Barriers.]

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SG1

Initiating Condition - GENERAL EMERGENCY

Prolonged loss of all Off-site and all On-Site ac power to emergency busses.

Operating MODE Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Level Threshold:

1. a. Loss of all off-site and all on-site ac power to Class 1E emergency busses (MC-A, MC-B, MC-C, MC-D)for greater than 15 minutes.

   AND

   b. **EITHER** of the following:

   - Restoration of at least two emergency busses in less than 8 hours is not likely.
   - Indication of continuing degradation of core cooling based on Fission Product Barrier monitoring as indicated by CETs reading greater than [TBD-1200 degrees F (650 degrees C)].

Basis:

Loss of all ac power to emergency busses compromises all plant safety systems requiring electric power including RHR, ECCS, Containment Heat Removal and the Ultimate Heat Sink. Prolonged loss of all ac power to emergency busses will lead to loss of fuel clad, RCS, and containment, thus warranting declaration of a GE.

[*The 8 hours to restore ac power is based on US-APWR blackout coping analysis. Appropriate allowance for off-site emergency response including evacuation of surrounding areas should be considered. Although this IC may be viewed as redundant to the Fission Product Barrier Degradation IC, its inclusion is necessary to better assure timely recognition and emergency response.*]

This IC is specified to assure that in the unlikely event of a prolonged station blackout, timely recognition of the seriousness of the event occurs and that declaration of a GE occurs as early as is appropriate, based on a reasonable assessment of the event trajectory.

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

In addition, under these conditions, fission product barrier monitoring capability may be degraded.

[*Although it may be difficult to predict when power can be restored, it is necessary to give the Emergency Coordinator a reasonable idea of how quickly (s)he may need to declare a GE based on two major considerations:*

1. *Are there any present indications that core cooling is already degraded to the point that loss or potential loss of Fission Product Barriers is IMMINENT?*

2. *If there are no present indications of such core cooling degradation, how likely is it that power can be restored in time to assure that a loss of two barriers with a potential loss of the third barrier can be prevented?*

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

SYSTEM MALFUNCTIONS

SG2

Initiating Condition - GENERAL EMERGENCY

Automatic Trip and all manual actions fail to shutdown the reactor and indication of an extreme challenge to the ability to cool the core exists.

Operating MODE Applicability: Power Operation, Startup

Emergency Action Level Threshold:

1. a. An automatic trip failed and ALL manual actions failed to shutdown the reactor

   AND

   b. All manual actions do not shutdown the reactor as indicated by Trip Breaker Status, Control Rod Bottom Indication, Neutron Flux less than 5% (N-41, N-42, N-43, N-44).

   AND

   c. **EITHER** of the following exist or have occurred due to continued power generation:

   - Core Cooling RED with Subcriticality RED

     OR

   - Heat Sink RED with Subcriticality RED

Basis:

Under these conditions, the reactor is producing more heat than the maximum decay heat load for which the safety systems are designed and efforts to bring the reactor subcritical are unsuccessful.

[T*he reactor should be considered shutdown when it producing less heat than the maximum decay heat load for which the safety systems are designed.*]

Challenges to heat removal capability are indicated by any of the following as described in EOPs: [TBD - secondary heat removal via SG safeties and relief valves, turbine bypass, EFW flow, SG level, other indications].

In the event either of these challenges exists at a time that the reactor has not been brought below the power associated with the safety system design a core

melt sequence exists. In this situation, core degradation can occur rapidly. For this reason, the GE declaration is intended to be anticipatory of the fission product barrier table declaration in order to allow off-site agencies time to prepare for appropriate response.

References

1. U.S. Nuclear Regulatory Commission, NUREG-0654/FEMA-REP-1, Rev. 1, *Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants*, November 1980

2. Nuclear Energy Institute, NEI 99-01, Revision 5, *Methodology for Development of Emergency Action Levels*, February 2008

3. U.S. Nuclear Regulatory Commission, Letter to NEI, *U.S. Nuclear Regulatory Commission Review And Endorsement of NEI 99-01, Revision 5, Dated February 2008*, ADAMS Accession Number ML080430535, February 22, 2008

4. Nuclear Energy Institute, NEI 07-01, Revision 0 (Draft), *Methodology for Development of Emergency Action Levels, Advanced Passive Light Water Reactors*, February 2008

5. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.101, Revision 4, *Emergency Planning and Preparedness for Nuclear Power Reactors*, July 2003

6. U.S. Nuclear Regulatory Commission, NRC Regulatory Information Summary 2003-18, *Use of NEI 99-01, "Methodology for Development of Emergency Action Levels," Revision 4, Dated January 2003*, October 8, 2003

7. U.S. Nuclear Regulatory Commission, NRC Regulatory Information Summary 2003-18, Supplement 1, July 13, 2004

8. U.S. Nuclear Regulatory Commission, NRC Regulatory Information Summary 2003-18, Supplement 2, December 12, 2005

9. U.S. Nuclear Regulatory Commission, 10 CFR 50.72, *Immediate Notification Requirements for Operating Nuclear Power Plants*

10. U.S. Environmental Protection Agency, EPA-R-400-92-001, *Manual of Protective Action Guides and Protective Actions for Nuclear Incidents*, May 1992

11. U.S. Nuclear Regulatory Commission NRC Regulatory Information Summary 2007-02, *Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events*, February 2, 2007

12. U.S. Nuclear Regulatory Commission, NUREG-1022, Revision 2, *Event Reporting Guidelines 10 CFR 50.72 and 50.73*, October 2000

13. U.S. Nuclear Regulatory Commission, 10 CFR 50.73, *Licensee Event Report System*

14. Mitsubishi Heavy Industries, *US-APWR Design Control Document*, Revision 0, December 2007

15. U.S. EPA Federal Guidance Report No. 11, *Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion*, EPA-520/1-88-020, September 1988

16. EPA Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water, and Soil*, EPA 402-R-93-081, September 1993

17. U.S. Nuclear Regulatory Commission, Information Notice 90-08, *Kr-85 Hazards from Decayed Fuel*,

18. U.S. Nuclear Regulatory Commission, NUREG-0737, Revision 1, *Clarification of TMI Action Plan Requirements*, November 1980

19. U.S. Nuclear Regulatory Commission, 10 CFR 20, *Standards for Protecting Against Radiation*

20. U.S. Nuclear Regulatory Commission, Generic Letter 88-17, *Loss of Decay Heat Removal*, October 17, 1988

21. Nuclear Safety Analysis Center (NSAC), “Analysis of Three Mile Island - Unit 2 Accident,” NSAC-1, 1980

22. U.S. Nuclear Regulatory Commission, SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*, September 9, 1991

23. U.S. Nuclear Regulatory Commission, NUREG-1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*, September 1993

24. Nuclear Management and Resources Council, NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*, November 1991

25. U.S. Nuclear Regulatory Commission, NUREG-1150, *Severe Accident Risks: An Assessment of Five U.S. Nuclear Power Plants*, October 1990

26. U.S. Nuclear Regulatory Commission, NUREG-1228, *Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents*, October 1988

27. U.S. Nuclear Regulatory Commission, 10 CFR 73.71, *Reporting of Safeguards Events*

28. Nuclear Energy Institute, NEI 03-12, Revision 1, *Template for the Security Plan, Training and Qualification Plan, and Safeguards Contingency Plan and Independent Spent Fuel Storage Installation Security Program*, March 2004

Attachment A: Basis for Radiological Effluent EALs

Introduction

This appendix supplements the basis information provided in Section 5 for ICs AU1, AA1, AS1, and AG1.

This appendix contains seven major sections. They are:

1. Purpose of the effluent ICs/EALs and their relationship to other ICs/EALs
2. Explanation of the ICs
3. Explanation of the EALs and their relationship to the ICs
4. Interface between the ICs/EALs and the ODCM
5. Monitor setpoints versus EALs.
6. The impact of meteorology
7. The impact of source term

A.1 Purpose of the Effluent ICs/EALs

ICs AU1, AA1, AS1, and AG1 provide classification thresholds for UNPLANNED and/or uncontrolled releases of radioactivity to the environment. In as much as the purpose of emergency planning at NPPs is to minimize the consequences of radioactivity releases to the environment, these ICs would appear to be controlling. However, classification of emergencies on the basis of radioactivity releases is not optimum, particularly those classifications based on radiation monitor indications. Such classifications can be deficient for several reasons, including:

- In significant emergency events, a radioactivity release is seldom the initiating event, but rather, is the consequence of some other condition. Relying on an indication of a release may not be sufficiently anticipatory.

- The relationship between an effluent monitor indication caused by a release and the off-site conditions that result is a function of several parameters (e.g., meteorology, source term) which can change in value by orders of magnitude between normal and emergency conditions and from event to event. The appropriateness of these classifications is dependent on how well the parameter values assumed in pre-establishing the classification thresholds match those that are present at the time of the incident.

Accurate assessment and classification of events is extremely important in assuring the appropriate response to an emergency by the utility and ORO. It is extremely important to recognize that over-classification, as well as under-classification, should be avoided. Primary emphasis is intended to be placed on plant conditions in classifying emergency events. Effluent ICs were included, however, to provide a basis for classifying events that cannot be readily classified on the basis of plant condition alone. Plant condition ICs are included to address the precursors to radioactivity release in order to ensure anticipatory action. The effluent ICs do not stand alone, nor do the plant condition ICs. The inclusion of both categories more fully addresses the potential event spectrum and compensates for potential deficiencies in either. This is a case in which the whole is greater than the sum of the parts.

From the discussion that follows, it should become clear how the various aspects of the effluent ICs/EALs work together to provide for reasonably accurate and timely emergency classifications. While some aspects of the radiological effluent EALs may appear to be potentially non-conservative, one also needs to consider IC/EALs in other recognition categories that compensate for this condition. During site-specific implementation of these ICs/EALs, changes to some of these aspects might appear advantageous. While site-specific changes are anticipated, caution must be used to ensure that these changes do not impact the overall effectiveness of the ICs/EALs.

A.2 Initiating Conditions

The four radiological effluent ICs and the fundamental basis for the ultimate classification are:

GE (AG1)	Off-site Dose Resulting from an Actual or IMMINENT Release of Gaseous Radioactivity Exceeds 1000 mrem TEDE or 5000 mrem Thyroid CDE for the Actual or Projected Duration of the Release Using Actual Meteorology.
SAE (AS1)	Off-site Dose Resulting from an Actual or IMMINENT Release of Gaseous Radioactivity Exceeds 100 mrem TEDE or 500 mrem Thyroid CDE for the Actual or Projected Duration of the Release.
Alert (AA1)	Any Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds 200 Times Radiological TS for 15 Minutes or Longer.
NOUE (AU1)	Any Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds Two Times Radiological TS for 60 Minutes or Longer.

The fundamental basis of AU1 and AA1 ICs differs from that for AS1 and AG1 ICs. It is important to understand the differences.

- The controls in the ODCM are associated with particular off-site doses and dose rate limits. For showing compliance with these limits, facility ODCM establish methodologies for establishing effluent monitor alarm setpoints, based on defined source term and meteorology assumptions.

- AU1 and AA1 are **NOT** based on these particular values of off-site dose or dose rate but, rather, on the loss of plant control implied by a radiological release that exceeds a specified multiple of the ODCM release limits for a specified period of time.

- The ODCM multiples are specified only to distinguish AU1 and AA1 from non-emergency conditions and from each other. While these multiples obviously correspond to an off-site dose, the classification emphasis is on a release that does not comply with a license commitment for an extended period of time.

- While some of the EALs for AU1 and AA1 use indications of off-site dose rates as **symptoms** that the ODCM may be exceeded, the IC, and the classification, are **NOT** concerned with the particular value of off-site dose. While there may be quantitative inconsistencies involved with this protocol, the qualitative basis of the EAL, i.e., loss of plant control, is not affected.

- The basis of the AS1 and AG1 ICs **IS** a particular value of off-site dose for the event duration. AG1 is set to the value of the EPA PAG. AS1 is a fraction (10%) of the EPA PAG. As such, these ICs are consistent with the fundamental definitions of a SAE and GE.

A.3 Emergency Action Level Thresholds

EALs and bases are provided for each of the classifications. The EALs correspond numerically with the thresholds expressed in the respective IC. Two cases are applicable to the effluent EALs:

1. The EAL corresponds numerically to the threshold in the respective IC. For example, a field survey result of 1000 mrem/hr for a projected condition of one hour corresponds directly to AG1.

2. The EAL corresponds numerically to the threshold in the respective IC under certain assumed conditions. For example, an effluent monitor reading that equates to 100 mrem for the projected duration of the release corresponds numerically to AS1 *if* the actual meteorology, source term, and release duration matches that used in establishing the monitor thresholds.

There are four typical EALs:

- Effluent Monitor Readings: These EALs are pre-calculated values that correspond to the condition identified in the IC for a given set of assumptions.

- Field Survey Results: These EALs are included to provide a means to address classifications based on results from field surveys.

- Perimeter Monitor Indications: For sites having them, perimeter monitors can provide a direct indication of the off-site consequences of a release.

- Dose Assessment Results: These EALs are included to provide a means to address classifications based on dose assessments.

A.3.1 Effluent Monitor Readings

As noted above, these EALs are pre-calculated values that correspond to the condition identified in the IC for a given set of assumptions. The degree of correlation is dependent on how well the assumed parameters (e.g., meteorology, source term, etc.) represent the actual parameters at the time of the emergency.

AS1 and AG1

Classifications should be made under these EALs if VALID (e.g., channel check, comparison to redundant/diverse indication, etc.) effluent radiation monitor readings exceed the pre-calculated thresholds. In a change from previous versions of this methodology, confirmation by dose assessments is no longer required as a prerequisite to the classification. Nonetheless, dose assessments are important components of the overall accident assessment activities when significant radioactivity releases have occurred or are projected. Dose assessment results, when they become available, may serve to confirm the validity of the effluent radiation monitor EAL, may indicate that an escalation to a higher classification is necessary, or may indicate that the classification wasn't warranted. AS1 and AG1 both provide that, if dose assessment results are available, the classification should be based on the basis of the dose assessment result rather than the effluent radiation monitor EAL.

AU1 and AA1

ODCMs provide a methodology for determining default and batch-specific effluent monitor alarm setpoints. The applicable limits are 500 mrem/year whole body or 3000 mrem/year skin from noble gases. (Inhalation dose rate limits are not addressed here since the specified surveillance involves collection and analysis of composite samples. This after-the-fact assessment could not be made in a timely manner conducive to accident classification.) These setpoints are calculated using default source terms or batch-specific sample isotopic results and annual average χ/Q. Since the meteorology data is pre-defined, there is a direct correlation between the monitor setpoints and the ODCM limits.

Although the actual χ/Q may be different, NUREG-1022, Event Reporting Guidelines 10 CFR 50.72 and 50.73, provided *"..Annual average meteorological data should be used for determining off-site airborne concentrations of radioactivity to maintain consistency with the Technical Specifications for reportability thresholds.*" The ODCM methodology is based on long term continuous releases. However, its use here in a short term release situation is appropriate. Remember that the AU1 and AA1 ICs are based on a loss of plant control indicated by the failure to comply with a multiple of the ODCM release limits for an extended period and that the ODCM provides the methodology for showing compliance with the ODCM.

To obtain the thresholds, multiply the ODCM setpoint for each monitor by 2 (AU1) or 200 (AA1). It would be preferable to reference "*2 x ODCM Setpoint"* or *"200 x ODCM Setpoint"* as the threshold. In this manner, the EAL would always change in step with changes in the ODCM setpoint (e.g., for a batch or special release. In actual practice, there may be a "warning" and a "high" alarm setpoint. The setpoint that is closest in value to the ODCM limit should be used. Facility ODCMs may lower the actual setpoint to provide an administrative "safety margin". Also, if there is more than one unit or release stack on the site, the ODCM limits may be apportioned. Two possible approaches to obtain the thresholds are:

- The *"2x"* and *"200x"* multiples could be increased to address the reduced setpoints. For example, if the stack monitor was set to 50% of the ODCM limit, the threshold could be set to *"4x"* and *"400x"* the setpoint on that monitor.

- The reduced setpoints could be ignored and the "2x" and "200x" multiples used as specified. While numerically conservative, using a single set of multipliers would probably be desirable from a human engineering standpoint.

Confirmation by dose assessments is not required as a prerequisite to the classification. While assessments with real meteorology may have provided a basis for escalating to AS1 (or AG1), the assessments could not confirm the AU1 or AA1 classifications since compliance with the ODCM is demonstrated using *annual average* meteorology – not actual meteorology.

Nonetheless, dose assessments are important components of the overall accident assessment activities when significant radioactivity releases have occurred or are projected. Dose assessment results, when they become available, may indicate that an escalation to a higher classification is necessary. AS1 and AG1 both provide that, if dose assessment results are available, the classification should be based on the basis of the dose assessment result rather than the effluent radiation monitor EAL.

In typical practice, the radiological effluent monitor alarms would have been set, on the basis of ODCM requirements, to indicate a release that could exceed the ODCM limits. Alarm response procedures call for an assessment of the alarm to

determine whether or not ODCM limits have been exceeded. Utilities typically have methods for rapidly assessing an abnormal release in order to determine whether or not the situation is reportable under 10 CFR 50.72. Since a radioactivity release of a magnitude comparable to the ODCM limits will not create a need for off-site protective measures, it would be reasonable to use these abnormal release assessment methods to initiate dose assessment techniques using actual meteorology and projected source term and release duration.

A.3.2 Perimeter Monitor, Field Survey Results, Dose Projection Results

AS1 and AG1

The perimeter monitor and field survey results are included to provide a means for classification based on actual measurements. There is a 1:1 correlation (with consideration of release duration) between these EALs and the IC since all are dependent on actual meteorology.

Dose projection result EALs are included to provide a basis for classification based on results from assessments triggered at lower emergency classifications. If the dose assessment results are available at the time that the classification is made, the results should be used in conjunction with this EAL for classifying the event rather than the effluent radiation monitor EAL.

Although the IC references TEDE and thyroid CDE as criteria, field survey results and perimeter monitor indications will generally not be reported in these dose quantities, but rather in terms of a dose rate. For this reason, the field survey EALs are based on a β-γ dose rate and a thyroid CDE value, both assuming one hour of exposure (or inhalation). If individual site analyses indicate a longer or shorter duration for the period in which the substantial portion of the activity is released, the longer duration should be used for the field survey and/or perimeter monitor EALs.

AU1 and AA1

As discussed previously, the threshold in these ICs is based on exceeding a multiple of the ODCM for an extended period. While these three EALs are also expressed in dose rate, they are dependent on *actual* meteorology. However, compliance with the ODCM is demonstrated using *annual average* meteorology. Due to this, the only time that there would be a 1:1 correlation between the IC and these EALs is when the value of the actual meteorology matched the annual average - an unlikely situation. For this reason, these EALs can only be indirect indicators that the ODCM may be exceeded. The three EALs are consistent with the fundamental basis of AU1 and AA1, that of a uncontrolled radioactivity release that indicates a loss of plant control. A dose rate, at or beyond the site boundary, greater than 0.1 mR/hr for 60 minutes or 10.0 mR/hr for 15 minutes is consistent with this fundamental basis, regardless of the lack of numerical

correlation to the ODCM. The time periods chosen for the NOUE AU1 (60 minutes) and Alert AA1 (15 minutes) are indicative of the relative risks based on the loss of ability to terminate a release.

The numeric values shown in AU1 and AA1 are based on a release rate not exceeding 500 mrem per year, converted to a rate of: 500 ÷ 8766 = 0.057 mR/hr. If we take a multiple of 2, as specified in the NOUE threshold, this equates to a dose rate of about 0.11 mR/hr, which rounds to the 0.1 mR/hr specified in AU1. Similarly for the AA1 EALs, we obtain 10 mR/hr.

In AU1 and AA1, reference is made to *automatic real-time dose assessment capability*. In AS1 and AG1, the reference is to *dose assessment*. This distinction was made since it is unlikely that a dose assessment using manual methods would be initiated without some prior indication, e.g., a effluent monitor EAL.

A.4 Interface Between ODCM and ICs/EALs

For AU1 and AA1, a strong link was established with the facility's ODCM. The AU1 and AA1 EALs are indexed to the ODCM alarm setpoints. This was done for several reasons:

- To allow the EALs to use the monitor setpoints already in place in the facility ODCM, thus eliminating the need for a second set of values as the EALs. The EAL could reference "2x ODCM Setpoint" or "200x ODCM Setpoint" for the monitors addressed in the ODCM. Extensive calculations would only be necessary for monitors not addressed in the ODCM.

- To take advantage of the alarm setpoint calculational methodology already documented in the facility ODCM.

- To ensure that the operators had an alarm to indicate the abnormal condition. If the monitor threshold was less than the default ODCM setpoint, the operators could be in the position of having exceeded an EAL and not knowing it.

- To simplify the IC/EAL by eliminating the need to address planned and UNPLANNED releases, continuous or batch releases, monitored or unmonitored releases. Any release that complies with the ODCM controls would <u>not</u> exceed a monitor threshold.

- To eliminate the possibility of a <u>planned</u> release (e.g., containment/primary containment purge) resulting in effluent radiation monitor readings that exceed a classification threshold that was based on a different calculation method. ODCMs typically require specific alarm setpoints for such releases. If the release can be authorized under the provisions of the ODCM, an emergency classification is not warranted. If the monitor threshold is indexed to the ODCM setpoint (e.g., *"...2 x*

ODCM setpoint...") the monitor EAL will always change in step with the ODCM setpoint.

- Although the ODCM addresses long term routine releases, its use here for short term releases is appropriate. The IC is specified in terms of a release that exceeds ODCM for an extended period of time. Compliance to the ODCM is shown using the ODCM methodology.

A.5 Setpoints versus Monitor EALs

Effluent monitors have provision for two separate alarm setpoints associated with the level of measured radioactivity. (There may be other alarms for parameters such as low sample flow.) These setpoints are typically established by the facility ODCM. As such, at most sites the values of the monitor thresholds will not be implemented as actual alarm setpoints, but would be tabulated in the classification procedure. If the monitor thresholds are calculated as suggested herein they will be higher than the ODCM alarm setpoints by at least a factor of two (i.e., AU1). This alarm alerts the operator to compare the monitor indication to the thresholds.

A.6 The Impact of Meteorology

The existence of uncertainty between actual event meteorology and the meteorology assumed in establishing the EALs was identified above. It is important to note that uncertainty is present regardless of the meteorology data set assumed. The magnitude of the potential difference and, hence, the degree of conservatism will depend on the data set selected. Data sets that are intended to ensure low probability of under-conservative assessments have a high probability of being over-conservative. For NPPs, there are different sets of meteorological data used for different purposes. The two primary sets are:

- For accident analyses purposes, sector χ/Q values are set at that value that is exceeded only 0.5% of the hours wind blows into the sector. The highest of the 16 sector values is the maximum sector χ/Q value. The site χ/Q value is set at that value that is exceeded only 5% of the hours for all sectors. The higher of the sector or site χ/Q values is used in accident analyses.

- For routine release situations, annual average χ/Q values are calculated for specified receptor locations and at standard distances in each of the 16 radial sectors. In setting ODCM alarm set points, the annual average χ/Q value for the most restrictive receptor at or beyond the site boundary is used. The sector annual average χ/Q value is normalized for the percentage of time that the wind blows into that sector. In an actual event, the wind direction may be into the affected sector for the entire release duration. Many sites experience typical sector χ/Qs that are 10-20 times higher than the calculated annual average for the sector.

Annual average meteorology is used for establishing effluent monitor thresholds. This decision was based on the following considerations.

- Use of the accident χ/Qs, may be too conservative. For some sites, the difference between the accident χ/Q and the annual average χ/Q can be a factor of 100-1000. With this difference in magnitude, the calculated monitor EALs for AS1 or AG1 might actually be less than the ODCM alarm setpoints, resulting in unwarranted classifications for releases that might be in compliance with ODCM limits.

- The ODCM is based in part on annual average χ/Q (non-normalized). ODCMs provide alarm setpoints based on annual average χ/Q that could be used for AU1 and AA1.

- Use of a χ/Q more restrictive than the χ/Q used to establish ODCM alarm setpoints could create a situation in which the EAL value would be less than the ODCM setpoint. In this case, the operators would have no alarm indication to alert them of the emergency condition.

- Use of one χ/Q value for AU1 and AA1 and another for AS1 and AG1 might result in monitor EALs that would not progress from low to high classifications. Instead, the AS1 and AA1 EALs might overlap.

The impact of the differences between the assumed annual average meteorology and the actual meteorology depends on the particular EAL.

- For the AU1 and AA1 effluent monitor EALs, there is no impact since the IC and the EALs are based on annual average meteorology by definition.

- For the field survey, perimeter monitor, and dose assessment results EALs in AS1 and AG1, there is no impact since the IC and these EALs are based on actual meteorology.

- For the AS1 and AG1 effluent monitor EALs, there may be differences since the IC is based on actual meteorology and the monitor EALs are calculated on the basis of annual average meteorology or, on a site-specific basis, one of the more conservative derivatives of annual average meteorology. This is considered as acceptable in that dose assessments using actual meteorology will be initiated for significant radioactivity releases. Needed escalations can be based on the results of these assessments. As discussed previously, this delay was deemed to be acceptable since in significant release situations, the plant condition EALs should provide the anticipatory classifications necessary for the implementation of off-site protective measures.

- For the field survey, perimeter monitor, and dose assessment results EALs in AU1 and AA1, there is an impact. These three EALs are dependent on actual meteorology. However, the threshold values for all of

the AU1 and AA1 EALs are based on the assumption of annual average meteorology. If the actual and annual average meteorology were equal, the IC and all of the EALs would correlate. Since it is likely that the actual meteorology will exceed the annual average meteorology, there will be numerical inconsistencies between these EALs and the IC. The three EALs are consistent with the fundamental basis of AU1 and AA1, that of a uncontrolled radioactivity release that indicates a loss of plant control. A dose rate, at or beyond the site boundary, greater than 0.1 mR/hr for 60 minutes or 10.0 mR/hr for 15 minutes is consistent with this fundamental basis, regardless of the lack of numerical correlation to the ODCM.

A.7 The Impact of Source Term

The ODCM methodology should be used for establishing the monitor thresholds for these ICs. The ODCM provides a default source term based on expected releases. In many cases, the ODCM source term is derived from expected and/or design releases tabulated in the FSAR.

For AS1 and AG1, the bases use the same source terms used for establishing monitor thresholds for AU1 and AA1, or an accident source term if deemed appropriate. This approach promotes proper escalations, use realistic values, and correlation between radiological monitor values and dose assessment results. Other source terms may be appropriate to achieve these goals.

Even if the same source term is used for all four ICs, the analyst must consider the impact of overly conservative iodine to noble gas ratios. The AU1 and AA1 IC thresholds are based on external noble gas exposure. The AS1 and AG1 ICs are based on either TEDE or thyroid CDE. TEDE includes a contribution from inhalation exposure (i.e., CEDE) while the thyroid CDE is due solely to inhalation exposure. The inhalation exposure is sensitive to the iodine concentration in the source term. Since AU1 and AA1 are based on noble gases, and AS1 and AG1 are dependent on noble gases and iodine, an over conservative iodine to noble gas ratio could result in AS1 and AG1 monitor thresholds that either overlap or are too close to the AA1 monitor thresholds.

As with meteorology, assessment of source terms has uncertainty. This uncertainty is compensated for by the anticipatory classifications provided by ICs in other recognition categories.

Appendix 2 – Radiological Assessment and Monitoring

I. Introduction

This appendix provides information regarding the process used by CPNPP to assess radionuclide atmospheric transport and diffusion under emergency conditions as discussed in Appendix 2 to NUREG-0654/FEMA-REP-1. Appendix 2 of NUREG-0654/FEMA-REP-1 identifies three topics:

- Meteorological measurements
- Atmospheric transport and diffusion assessment
- Remote interrogation

Section 2.3 of the CPNPP FSAR provides a detailed discussion of the facility's meteorological data system and remote access to the associated data, this appendix provides only a brief discussion of these topics. Therefore, this Appendix describes the design of the atmospheric transport and diffusion assessment models for CPNPP.

II. Discussion

10 CFR 50.47(b)(9) requires that the licensee describe in its Emergency Plan methods to provide and maintain "adequate methods, systems, and equipment for assessing and monitoring actual or potential offsite consequences of a radiological emergency condition..." Appendix E to 10 CFR 50 requires that the licensee's Emergency Plans describe "equipment for determining the magnitude of and for continuously assessing the impact of the release of radioactive materials to the environment."

A. Meteorological Measurements

Appendix 2 to NUREG-0654 provides guidance for complying with the requirement in 10 CFR Part 50, Appendix E. CPNPP FSAR Subsection 2.3 discusses the design of the meteorological measurement system. This design addresses the guidance provided in Supplement 1 to NUREG-0737. The meteorological measurements program is consistent with Revision 1 to NRC Regulatory Guide 1.23[4].

B. Atmospheric Transport and Diffusion Assessment

Appendix E to 10 CFR 50 requires that licensee Emergency Plans describe, "the means to be used for determining the magnitude of and for continually assessing the impact of the release of radioactive material..." NUREG-0654/FEMA-REP-1 discuses two classes of atmospheric transport and diffusion models. The model used for CPNPP is a "Class B" model as described in Appendix 2 of NUREG-0654/FEMA-REP-1: "a numerical model which predicts the spatial and temporal variations of plume distribution and provides estimates of deposition and relative concentration of radioactivity within the plume exposure and ingestion pathway emergency planning zones for the duration of any radioactive materials releases during a declared emergency."

[4] U.S. Nuclear Regulatory Commission, Regulatory Guide 1.23, Rev. 1, "Meteorological Monitoring Programs for Nuclear Power Plants," Washington, DC, March 2007.

C. Remote Access

Appendix 2 of NUREG-0654/FEMA-REP-1 provides guidance concerning remote interrogation. The guidance supports the requirement in 10 CFR 50, Appendix E. Regulatory Guide 1.23 also discusses remote interrogation capability. FSAR Subsection 2.3 addresses provisions for remote access to the meteorological system. Remote access to meteorological data is provided to the TSC and EOF.

III. Design Description: Atmospheric Transport and Diffusion Assessment

The remainder of this appendix describes the design of the atmospheric transport and diffusion assessment models. The design addresses the following program elements for accident assessment that demonstrate compliance with requirements in 10 CFR 50.47(b)(9) and evaluation criteria from NUREG-0654/FEMA-REP-1 discussed in Section II.I of this plan:

1. The means to provide initial and continuing radiological assessment throughout the course of an accident.
2. The means to determine the source term of releases of radioactive material within plant systems, and the magnitude of the release of radioactive materials based on plant system parameters and effluent monitors.
3. The means to continuously assess the impact of the release of radioactive materials to the environment, accounting for the relationship between effluent monitor readings, and onsite and offsite exposures and contamination for various meteorological conditions.
4. The means to make rapid assessment of potential magnitude and locations of any radiological hazards through gaseous release pathways.
5. The means to estimate integrated dose from the projected and actual dose rates, and for comparing these estimates with the EPA Protective Action Guides (PAGs).

CPNPP's Radiological Assessment personnel use the Comanche Peak Assessment Model Projecting Estimated Dose Evaluation (CPAMPEDE) computer program described below to perform dose assessment calculations under emergency conditions. CPAMPEDE is a Windows-based, menu driven program which has the capability to provide near real time estimates of potential doses to individuals from releases of radioactive materials via the atmospheric pathway and to back-calculate release rates from field measurements.

CPAMPEDE uses a straight-line Gaussian plume model for initial dose projections within the Plume Exposure Pathway EPZ. It uses a segmented-plume model for tracking wind shifts and plume deposition over portions of the Ingestion Exposure Pathway EPZ. CPAMPEDE can use system parameters and radiation monitor readings from plant monitoring systems, or the results of in-plant sampling, to estimate the source term and release rate. It then uses these

values with meteorological data, which may be provided automatically or input manually, to estimate plume location and to calculate projected doses. CPAMPEDE can also use default data in the absence of plant-specific data. The program uses terminology and concepts consistent with 10 CFR Part 20 and related guidance.

Plume transport and diffusion are based on meteorological data measured on the site meteorological tower.

Following initiation of the program, dose assessment personnel have the option to accept various conservative default values or to enter measured or estimated values that are pertinent to the dose estimation process. Table A2-1 discusses the data requested by CPAMPEDE.

Table A2-1 – CPAMPEDE Data

Data	Discussion	Comment
Meteorological Data (Wind speed, wind direction, release duration, and stability class)	Dose assessment personnel may accept conservative default values or enter data provided automatically by plant monitoring systems	
Stability Class	Dose assessment personnel may accept default stability class (Class D), select known stability class, or enter meteorological data to facilitate determination of stability class.	
Release Path	Dose assessment personnel may select from:	
	1) monitored unit vent release	Prompts user to enter release rate from plant monitoring systems
	2) unmonitored containment release	Prompts user to enter secondary data (containment pressure, rate of pressure loss, containment exposure rate or noble gas activity)
	3) monitored steam generator tube rupture release	Prompts user to enter steam flow rate and activity concentration
	4) unmonitored steam generator tube rupture release	Prompts user to enter reactor coolant leak rate and activity concentration
Nuclide Mix	Dose assessment personnel choose appropriate nuclide mix: 1) noble gas; 2) noble gas + iodine; 3) coolant inventory; 4) gap inventory; 5) melt inventory; or 6) user-entered.	"User-entered" option allows user to enter data from post-accident sample.

Following completion of required data entry, dose assessment personnel may complete the dose calculations. Upon completion of the dose calculations, several output options are made available. The output options include:

- Plot map – allows the user to display a map with a plot of the dose calculation results. Based on any point in the surrounding area selected by the user, CPAMPEDE will display the distance, angle from the plant, calculated dose rates for noble gas, total effective dose equivalent, and thyroid, and concentrations of iodine and particulate airborne radioactivity. CPAMPEDE also displays the general direction of the plume and its concentration marked by isopleths.
- Preview results – allows the user to review the results prior to printing a formal report
- Preview inputs – allows the user to review the inputs used in the calculations
- Print report – allows the user to print a formal report of the dose calculations

CPAMPEDE provides an option for the user to enter field monitoring data (typically centerline distance from plant and measured exposure rate) and then back-calculate the release rate. The user may also enter the measured gross radioiodine activity to calculate the thyroid committed dose equivalent.

Following completion of a set of calculations, the user may save the results of each individual CPAMPEDE run. The user may, as needed, opt to use the results of individual runs in the Run Integrate function, which allows the user to calculate the effects of the entire event rather than an individual release period. The Integrate code provides options for five different plots: 1) an iodine deposition plot; 2) a particulate deposition plot; 3) a total effective dose equivalent plot; 4) a noble gas plot; and 5) a thyroid dose plot.

If the EOF must be evacuated in the midst of any set of emergency dose calculations, CPAMPEDE provides the capability of transferring the existing database to portable media for subsequent transfer to a computer in the designated alternate location.

Appendix 3 – Public Alert and Notification System Description

1

I. Summary

This Appendix describes the Alert and Notification System (ANS) required by 10 CFR 50.47(b) (5) to alert the public in the Comanche Peak Nuclear Power Plant (CPNPP), plume exposure pathway EPZ in the event of a declared emergency requiring public response. The Comanche Peak Steam Electric Station Alert and Notification System Final Report, updated and revised September 28, 2004 (ANS Report), submitted as supplemental information in Part 5 of the CPNPP COLA, describes the system in place for Units 1 and 2. The current system meets all related regulations and guidance. The objective of the Alert and Notification System is to alert the public in the CPNPP EPZ of an emergency requiring specific action that will be provided by State and local emergency management officials. These actions may include protective actions that may be required.

This Appendix describes the outdoor warning devices (sirens), including equipment capabilities, and details the means of satisfying the criteria provided in Appendix 3 of NUREG-0654 which references FEMA CPG 1-17, "Outdoor Warning Systems Guide." Additional guidance is also provided in FEMA-REP-10, "Guide for the Evaluation of Alert and Notification Systems for Nuclear Power Plants."

Table A8-3 in Appendix 8 of this Plan provides a cross-reference to these provisions.

II. Concept of Operations

The ANS consists of fixed sirens in the Plume Exposure Pathway EPZ that serves as the primary means of alerting the public of an emergency at CPNPP requiring public protective actions. The State of Texas and Somervell and Hood Counties' Plans describe the backup means of alerting and notifying the public (as discussed in Section II.E.6).

Somervell and Hood Counties each have the capability to control the activation of the portion of the Alert and Notification System within its respective boundaries. In addition, each County can activate all or part of the sirens located in the other County, if necessary.

The emergency plans of the State of Texas and Somervell and Hood Counties include the organizations and individuals, by title, which are responsible for decision-making regarding the Alert and Notification System. Once alerted, the public is provided emergency information and instructions on the Emergency Alert System (EAS), which is described in State and local emergency response plans. The county locations from which the sirens will be activated are manned 24 hours per day. Each organization's Plan contains provisions for disseminating emergency instructions to the public. The State of Texas Plan includes a description of the information that would be communicated to the public under various radiological emergency conditions.

III. CPNPP Alerting System Design Criteria

The existing CPNPP siren system design is consistent with the guidance provided in Appendix 3 of NUREG-0654; FEMA CPG 1-17, and FEMA-REP-10. Specifically, the system design basis incorporates the following features:

A. Capabilities

The siren system is capable of providing an alerting signal that is at least 10 dB above the ambient background noise level throughout the EPZ within 15 minutes from the time the appropriate off-site agencies have determined the need for such alerting exists. Additionally, no member of the public will be exposed to sound levels in excess of 123 dB.

B. Siren Coverage within 5-Mile Radius of CPNPP

The system provides coverage for essentially 100% of the population within 5 miles of CPNPP.

C. Special Alerting Arrangements

Parks and public recreational areas within the CPNPP EPZ are covered by the sirens. The alerting requirements for industrial sites and institutions were determined with consideration given to existing alerting mechanisms.

D. Population Density within the CPNPP EPZ

The population density within the EPZ was reviewed during preparation of the ANS Report. No population center had a density of greater than 2,000 persons per square mile. For the cities of Glen Rose and Granbury, siren sound pressure level coverage was determined in accordance with CPG 1-17 guidelines for suburban and rural areas. On this basis, the siren coverage is designed to provide an alerting signal 10 db above the average daytime ambient background. Accordingly, the applicable guidance in NUREG-0654 is satisfied.

E. Field Sound Survey

The CPNPP system was designed without a field sound survey. Over 90% of the CPNPP EPZ was designed to receive a SPL of at least 60 dB. An attenuation factor of 10 dB loss per distance doubled as discussed in FEMA CPG 1-17 was used as the design basis of siren coverage for the CPNPP alerting system. Actual placement of the sirens was determined by the local topography, demography and special requirements of a particular siren site. These details are addressed in Sections III.G, III.H, and III.I of this Appendix.

F. Maintenance and Testing Program

The maintenance and testing program is implemented to assure continued reliability and availability of the outdoor sirens. Features of the maintenance and testing program include:

- monthly activation of the entire system for a period of 30 seconds
- monthly report of the siren system effectiveness summarized quarterly and submitted to the State of Texas and FEMA
- A process to identify and implement improvements to the system

The maintenance and test program is discussed in further detail in Section VI of this Appendix.

G. Topography, Demography, and Special Facilities

1. Topography

Consideration of the topography in the EPZ was addressed in the design of the siren system.

2. Demography

The EPZ is predominately a rural agricultural area. Population density was considered when determining placement of the sirens within the EPZ.

3. Special Facilities

Industrial locations, schools, institutions, campgrounds, retail trade centers, private clubs, and public gathering facilities were collectively identified as special facilities. The alerting requirements for each facility or type of facilities was determined with consideration given to existing alerting mechanisms (e.g. page systems, intercoms, bells, and local sirens, etc.)

The siren system design includes increased alert level based upon guidance provided by Table 5.4 of NUREG/CR-2654, PNL-4227. In all cases, a minimum sound level of 70 dB SPL is designed to cover the administrative office of each facility.

Chapter 2 of the Final Safety Analysis Report (FSAR) and the Evacuation Time Estimate (ETE), Appendix 4 of the COL Emergency Plan, provide specific information regarding the site, its surrounding topography, and affected populations.

IV. Existing CPNPP Alerting System

The existing ANS consists of a network of 72 sirens located throughout the Plume Exposure Pathway EPZ. The sirens are radio controlled and activated by Federal Commander Digital Controller SS2000 encoders, which provide computer based data feedback, located in the Somervell and Hood County Sheriff's Office. A third control point, located at the CPNPP site, is used for diagnostic purposes, verification of test data and post-maintenance testing. The controllers located in the county's Sheriffs' offices are used to activate the siren system during an emergency. The siren system is divided into four quadrants, each of which could be activated from either Sheriff's Office. Each quadrant can be activated independently, or in conjunction with any other or all other quadrants. The process for activating the ANS is discussed in further detail in Section V.

A. Siren Characteristics

According to the ANS Report, as verification of the vendor's rated output, sound level measurements were taken 50 ft in the air at 100

ft from a siren. Maximum siren output was recorded to be 126 dB(C). As the data taken in the field was within 2 dB of the manufacturer's rating, the full rated siren output of 128 dB was used as the design basis for the siren SPL.

The maximum sound level to be expected at a given distance from each siren was determined based on a factor a 10 dB loss per distance doubled.

The design of the CPNPP siren system assumed a circular SPL contour for each siren. As discussed in Section III.G of this Appendix, sirens were sited with consideration given to the local topography to compensate for areas where a circular SPL was not likely to be obtained.

The alert signal is set to sound for slightly over 3 minutes and may be repeated as often as necessary.

B. Siren Installation

Siting and spacing of the devices to achieve the desired coverage considered topography and demography of the EPZ. The design coverage guidance provided in Appendix 3 of NUREG-0654.

Acceptance testing of a number of sirens determined that the maximum SPL measured around any actual siren installation location, at ground level 100 ft from the siren, was 123 dB.

V. Implementation of the Siren System

The activation of the Alert and Notification System requires procedures and relationships between Luminant, the off-site agencies that support Luminant and CPNPP.

A. Activation of the Alert and Notification System

Procedures are established to promptly notify State and local government organizations of the nature of any emergency at CPNPP and protective actions recommended by Luminant. Details regarding notification of off-site agencies are discussed in Section II.E of this Plan.

B. Ownership of the Siren System

Control of the system is maintained by local officials of Somervell and Hood Counties; however, maintenance and testing of the system is the responsibility of Luminant.

VI. Maintenance and Testing Programs

A. Annual Maintenance

The annual maintenance of each siren is performed and documented in accordance with maintenance instructions. These instructions include the following steps:

Annual Maintenance for Thunderbeam Sirens

Annual maintenance of the Thunderbeam Siren includes an inspection of physical conditions and a growl test of the siren by manual activation followed by activation by remote activation.

Annual Maintenance for Model 2001 Sirens

Annual maintenance of the Model 2001 Siren includes an inspection of physical conditions and a quiet test of the siren by manual activation followed by a quiet test of the siren by remote activation.

If any siren is found to be inoperable, or needs repair, it is reported to the Luminant Emergency Planning Siren Coordinator, repaired and returned to service as quickly as possible.

B. Siren System Performance Testing

Sirens are sounded for approximately 30 seconds the first Monday of every month except for major holidays. If the first Monday of any month is a major holiday, or if severe weather or a discretionary decision of the County Judge to cancel the test is implemented, the Sound Test is cancelled and a Quiet Test (Growl Test) is performed in lieu thereof on any day during the month. Activation of the siren system alternates between the Somervell and Hood County Sheriff's Office. The test results are forwarded to the Texas DEM and FEMA for review and reported to the NRC for inclusion in Plant Performance Indicators.

C. Silent Test

Siren testing guidance provided by Appendix 3 to NUREG-0654 included a recommendation that a "silent test" be performed on the siren system every two weeks. In lieu of the silent test discussed in NUREG-0654, monthly performance tests are conducted as described previously.

VII. Complete Design Report and FEMA Acceptance

On September 23, 2003, FEMA issued a letter stating the alert and notification system installed around CPNPP satisfies the requirements of NUREG-0654 and FEMA REP-10 and there was reasonable assurance that the system is adequate to alert and promptly notify the public in the event of a radiological emergency at the site. The ANS is recertified annually and the most recent FEMA acceptance letter is included as Supplemental Information to Part 5 of the COL Application.

Appendix 4 – Evacuation Time Estimate

Comanche Peak Nuclear Power Plant Evacuation Time Estimate

This Appendix summarizes the results of the analysis of evacuation times for the public in the Plume Exposure Pathway EPZ at the Comanche Peak Nuclear Power Plant (CPNPP). Details are published separately in report that describes the analyses undertaken and the results obtained in a study of Evacuation Time Estimates (ETE) for the proposed CPNPP Units 3 and 4 located in Somervell County, Texas. Evacuation time estimates provide State and local government with site-specific information needed for Protective Action decision-making.

In the performance of the ETE, guidance was provided by documents published by Federal Government agencies. Most important of these are:

- Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, NUREG-0654/FEMA-REP-1, Rev. 1, November 1980.
- Analysis of Techniques for Estimating Evacuation Times for Emergency Planning Zones, NUREG/CR-1745, November 1980.
- Development of Evacuation Time Estimates for Nuclear Power Plants, NUREG/CR-6863, January 2005.

Table A8-4 in Appendix 8 of this Plan provides a cross-reference to these provisions.

Planning Basis and Assumptions

The ETE project began in January 2007 and extended over a period of 15 months. The major activities performed are briefly described in chronological sequence:

- Attended “kick-off” meetings with Luminant Power personnel, Enercon Services and emergency management personnel representing State and local governments.
- Reviewed prior ETE reports prepared for CPNPP and accessed U.S. Census Bureau data files for the year 2000. Studied Geographical Information Systems (GIS) maps of the area in the vicinity of CPNPP, then conducted a field survey of the highway network.
- Synthesized this information to create an analysis network representing the highway system topology and capacities within the Plume Exposure Pathway Emergency Planning Zone (EPZ), plus a “Shadow” area extending 15 miles radially from the plant.
- Designed and sponsored a telephone survey of residents within the EPZ to gather focused data needs for this ETE study that were not contained within the Census database. The survey instrument was reviewed and modified by State and county personnel prior to the survey.
- Data collection forms (provided to the counties at the kick-off meeting) were returned with data pertaining to employment, transients, and

special facilities in each county. Phone calls were placed to recreational, medical, and day care facilities to obtain more detailed information.

- The traffic demand and trip-generation rates of evacuating vehicles were estimated from the gathered data. The trip generation rates reflected the estimated mobilization time (i.e., the time required by evacuees to prepare for the evacuation trip) that was computed using the results of the telephone survey of EPZ residents.
- Following Federal guidelines, the EPZ is subdivided into 31 zones. These zones are then grouped within circular areas or "keyhole" configurations (circles plus radial sectors) that define a total of 63 Evacuation Regions.
- The time-varying external circumstances are represented as Evacuation Scenarios, each described in terms of the following factors: (1) Season (Summer, Winter); (2) Day of Week (Midweek, Weekend); (3) Time of Day (Midday, Evening); and (4) Weather (Good, Rain). Two special scenarios were considered, one representing a large event occurring at the Texas Amphitheatre, the other involving construction of a new unit at the CPNPP site.
- The Planning Basis for the calculation of the ETE is:
    - A rapidly escalating incident at CPNPP that quickly assumes the status of General Emergency such that the Advisory to Evacuate is virtually coincident with the siren alert.
    - While an unlikely accident scenario, this Planning basis yields ETEs, measured as the elapsed time from the Advisory to Evacuate until the last vehicle exits the impacted Region, that represent "upper bound" estimates. This conservative Planning Basis is applicable for all initiating events including the prospect of a terrorist attack.
- If the emergency occurs while schools are in session, the ETE study assumes that the children are evacuated by bus directly to reception centers located outside the EPZ. Parents, relatives, and neighbors are advised to not pick up their children at school prior to the arrival of the buses dispatched for that purpose. The ETE for school children are calculated separately.
- Evacuees who do not have access to a private vehicle either ride-share with relatives, friends or neighbors, or be evacuated by buses provided as specified in the county evacuation plans. Those in special facilities likewise are evacuated with public transit, as needed: bus, van, or ambulance, as required. Separate ETE are calculated for the transit-dependent evacuees and for those evacuated from special facilities.

Computation of ETE

A total of 756 ETE were computed for the evacuation of the general public. Each ETE quantifies the aggregate evacuation time estimated for the population within one of the 63 Evacuation Regions to completely evacuate from that Region, under the circumstances defined for one of the 12 Evacuation Scenarios (63 x 12 = 756). Separate ETE are calculated for transit-dependent evacuees, including school children for applicable scenarios.

In addition, numerous cases were created to determine the sensitivity of ETE to variations in the mobilization time and extent of shadow population evacuation, and also to investigate the impact of the Granbury 4th of July celebration on ETE. The results of the Granbury 4th of July Celebration sensitivity study are discussed below.

Except for Region R03, which is the entire EPZ, only a portion of the population within the EPZ would be advised to evacuate. That is, the Advisory to Evacuate applies only to those people occupying the specified impacted region. It is assumed that 100 percent of the people within the impacted region will evacuate in response to this Advisory. The people occupying the remainder of the EPZ outside the impacted region may be advised to take shelter.

The computation of ETE assumes that a portion of the population within the EPZ but outside the impacted Region, elect to "voluntarily" evacuate. In addition, a portion of the population in the "shadow" region beyond the EPZ, but within 15 miles of CPNPP, will also elect to evacuate. These voluntary evacuees could impede those who are evacuating from within the impacted region. The impedance that could be caused by voluntary evacuees is considered in the computation of ETE for the impacted region. The computational procedure is outlined as follows:

- A link-node representation of the highway network is coded. Each link represents a unidirectional length of highway; each node typically represents an intersection or merge point. The capacity of each link is estimated based on the field survey observations and on established procedures.
- The evacuation trips are generated at location called "zonal centroids" located within the EPZ. The trip generation rates vary over time reflecting the mobilization process, and from one location (centroid) to another depending on population density and on whether a centroid is within, or outside, the impacted area.
- The computer models compute the routing patterns for evacuating vehicles that are compliant with federal guidelines (outbound relative to the location of CPNPP), then simulate the traffic flow movements over space and time. This simulation process estimates the rate that traffic flow exits the impacted region.
- The ETE statistics provide the elapsed times for 50 percent, 90 percent, 95 percent and 100 percent, respectively, of the population

within the impacted region, to evacuate from within the impacted region. These statistics are represented in tabular and graphical formats.

Traffic Management

The study includes the development of a comprehensive traffic management plan with recommendations designed to expedite the evacuation of people from within an impacted region. This plan also addresses recommendations to control access into the EPZ after returning commuters have rejoined their families. The traffic management plan does not supersede existing evacuation plans, but provides information that may be considered in updating these existing plans. This plan was reviewed with State and local law enforcement personnel.

Results

A compilation of selected information is presented in the figures and tables provided in the body of the report. The ETE indicates that the estimated evacuation time for the non-transit dependent population of the entire Plume Exposure Pathway EPZ, under adverse weather conditions, is four hours and 20 minutes. The ETE indicates that the maximum estimated evacuation time for the transit dependent population of the entire Plume Exposure Pathway EPZ, under adverse weather conditions, is three hours and 35 minutes. The average estimated evacuation time for the transit dependent population under corresponding conditions is three and one half hours.

The Granbury 4th of July sensitivity study considered an evacuation of the entire EPZ and was conducted to measure the impact of the Granbury 4th of July Celebration. The sensitivity study resulted in the following:

- The ETE for the 2-mile region is not affected,
- The ETE for the 5-mile region increases by 50 minutes,
- The ETE for the Entire EPZ increases by two hours and twenty minutes

The ETE did not identify any impediments to the development of emergency plans for the CPNPP site.

Tables A4-1 through A4-3 provide summaries of the estimated evacuation times for the general population, schools, and transit dependent populations, respectively. Table A4-4 presents the results of the Granbury 4th of July Celebration sensitivity study.

Table A4-1 – Time to Evacuate the Area of 100% of the Affected Population (Page 1 of 2)

	Summer		Summer		Summer		Winter		Winter		Winter		Summer	Summer
	Midweek		Weekend		Midweek Weekend		Midweek		Weekend		Midweek Weekend		Weekend	Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	Scenario:	(11)	(12)
Region Wind Toward:	Midday		Midday		Evening	Region Wind Toward:	Midday		Midday		Evening	Region Wind Toward:	Midday	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather		Good Weather	Rain	Good Weather	Rain	Good Weather		Event in Amphitheatre	New Plant Construction
Entire 2-Mile Region, 5-Mile Region, and EPZ														
R01 2-mile ring	3:50	3:50	2:50	3:00	3:00	R01 2-mile ring	3:50	3:50	2:50	2:50	3:00	R01 2-mile ring	2:50	3:40
R02 5-mile ring	4:10	4:10	3:10	3:10	3:10	R02 5-mile ring	4:10	4:10	3:10	3:10	3:10	R02 5-mile ring	3:10	4:10
R03 Entire EPZ	4:20	4:20	4:00	4:00	4:00	R03 Entire EPZ	4:20	4:20	4:00	4:00	4:00	R03 Entire EPZ	4:00	4:20
2-Mile Ring and Downwind to 5 Miles (3 sector groups)														
R04 N	4:10	4:10	3:10	3:10	3:00	R04 N	4:00	4:10	3:10	3:10	3:10	R04 N	3:10	4:10
R05 NNE	4:00	4:10	3:00	3:00	3:10	R05 NNE	4:00	4:10	3:00	3:10	3:00	R05 NNE	3:00	4:00
R06 NE	4:00	4:00	3:00	3:00	3:10	R06 NE	4:00	4:10	3:10	3:10	3:10	R06 NE	3:00	4:00
R07 ENE	4:00	4:00	3:00	3:00	3:00	R07 ENE	4:00	4:00	3:00	3:00	3:00	R07 ENE	3:00	4:00
R08 E	4:00	4:00	3:00	3:00	3:00	R08 E	4:00	4:00	3:00	3:00	3:00	R08 E	3:00	4:00
R09 ESE	4:00	4:00	3:00	3:00	3:00	R09 ESE	4:00	4:00	3:00	3:00	3:00	R09 ESE	3:00	4:00
R10 SE	4:00	4:00	3:00	3:00	3:00	R10 SE	4:00	4:00	3:00	3:00	3:00	R10 SE	3:00	4:00
R11 SSE, S	4:00	4:00	3:00	3:00	3:00	R11 SSE, S	4:00	4:00	2:50	3:00	3:00	R11 SSE, S	3:00	4:00
R12 SSW	4:00	4:00	3:00	3:00	3:00	R12 SSW	4:00	4:00	2:50	3:00	3:00	R12 SSW	3:00	4:00
R13 SW	4:00	4:00	3:00	3:10	3:00	R13 SW	4:00	4:00	3:10	3:10	3:00	R13 SW	3:00	4:00
R14 WSW	4:10	4:10	3:10	3:10	3:10	R14 WSW	4:00	4:10	3:10	3:10	3:10	R14 WSW	3:10	4:00
R15 W	4:10	4:10	3:10	3:10	3:10	R15 W	4:00	4:10	3:10	3:10	3:10	R15 W	3:10	4:00
R16 WNW	4:10	4:10	3:10	3:10	3:10	R16 WNW	4:00	4:10	3:10	3:10	3:10	R16 WNW	3:10	4:00
R17 NW, NNW	4:10	4:10	3:10	3:10	3:10	R17 NW, NNW	4:00	4:10	3:10	3:10	3:10	R17 NW, NNW	3:10	4:10
2-Mile Ring and Downwind to EPZ Boundary (3 sector groups)														
R18 N	4:10	4:20	4:00	4:00	4:00	R18 N	4:10	4:10	4:00	4:00	4:00	R18 N	4:00	4:10
R19 NNE	4:10	4:10	4:00	4:00	3:50	R19 NNE	4:10	4:10	4:00	4:00	4:00	R19 NNE	4:00	4:10
R20 NE	4:10	4:10	3:50	4:00	3:50	R20 NE	4:10	4:10	3:50	4:00	4:00	R20 NE	3:50	4:10
R21 ENE	4:00	4:00	3:40	3:40	3:40	R21 ENE	4:00	4:00	3:40	3:40	3:40	R21 ENE	3:40	4:00
R22 E	4:00	4:00	3:40	3:40	3:40	R22 E	4:00	4:00	3:40	3:40	3:40	R22 E	3:40	4:00
R23 ESE	4:00	4:00	3:00	3:00	3:00	R23 ESE	4:00	4:00	3:00	3:10	3:00	R23 ESE	3:00	4:00
R24 SE	4:00	4:00	3:00	3:00	3:00	R24 SE	4:00	4:00	3:00	3:10	3:00	R24 SE	3:00	4:00
R25 SSE	4:00	4:00	3:00	3:10	3:00	R25 SSE	4:10	4:10	3:10	3:10	3:10	R25 SSE	3:10	4:10
R26 S	4:00	4:00	3:00	3:10	3:00	R26 S	4:00	4:00	3:00	3:00	3:10	R26 S	3:00	4:10
R27 SSW	4:00	4:00	3:10	3:10	3:00	R27 SSW	4:00	4:10	3:00	3:00	3:00	R27 SSW	3:00	4:00
R28 SW	4:00	4:10	3:10	3:10	3:10	R28 SW	4:10	4:10	3:10	3:10	3:10	R28 SW	3:10	4:10
R29 WSW	4:10	4:10	3:10	3:10	3:10	R29 WSW	4:10	4:10	3:10	3:10	3:10	R29 WSW	3:10	4:00
R30 W	4:10	4:10	3:50	3:50	4:00	R30 W	4:10	4:10	3:50	3:50	3:50	R30 W	3:50	4:10
R31 WNW	4:20	4:20	3:50	3:50	4:00	R31 WNW	4:10	4:20	3:50	4:00	4:00	R31 WNW	3:50	4:20
R32 NW	4:20	4:20	3:50	3:50	3:50	R32 NW	4:20	4:20	3:50	4:00	3:50	R32 NW	3:50	4:20
R33 NNW	4:10	4:20	4:00	4:00	4:00	R33 NNW	4:10	4:20	4:00	4:00	4:00	R33 NNW	4:00	4:20

Table A4-1 – Time to Evacuate the Area of 100% of the Affected Population (Page 2 of 2)

	Summer		Summer		Summer		Winter		Winter		Winter		Summer	Summer
	Midweek		Weekend		Midweek Weekend		Midweek		Weekend		Midweek Weekend		Weekend	Midweek
Scenario:	(1)	(2)	(3)	(4)	(5)	Scenario:	(6)	(7)	(8)	(9)	(10)	Scenario:	(11)	(12)
Region Wind Toward:	Midday		Midday		Evening	Region Wind Toward:	Midday		Midday		Evening	Region Wind Toward:	Midday	Midday
	Good Weather	Rain	Good Weather	Rain	Good Weather		Good Weather	Rain	Good Weather	Rain	Good Weather		Event in Amphitheatre	New Plant Construction
2-Mile Ring and Downwind to 5 Miles (5 sector groups)														
R34 N	4:10	4:10	3:10	3:10	3:10	R34 N	4:00	4:10	3:10	3:10	3:10	R34 N	3:10	4:00
R35 NNE	4:10	4:10	3:10	3:10	3:10	R35 NNE	4:10	4:10	3:10	3:10	3:10	R35 NNE	3:10	4:10
R36 NE	4:00	4:00	3:00	3:00	3:10	R36 NE	4:00	4:10	3:10	3:00	3:10	R36 NE	3:00	4:00
R37 ENE	4:00	4:00	3:00	3:00	3:00	R37 ENE	4:00	4:00	3:00	3:00	3:00	R37 ENE	3:10	4:00
R38 E	4:00	4:00	3:00	3:00	3:00	R38 E	4:00	4:00	3:00	3:00	3:00	R38 E	3:10	4:00
R39 ESE	4:00	4:00	3:00	3:00	3:00	R39 ESE	4:00	4:00	3:00	3:00	3:00	R39 ESE	3:10	4:00
R40 SE	4:00	4:00	3:00	3:00	3:00	R40 SE	4:00	4:00	3:00	3:00	3:00	R40 SE	3:10	4:00
R41 SSE, S	4:00	4:00	3:00	3:00	3:00	R41 SSE, S	4:00	4:00	3:00	3:00	3:00	R41 SSE, S	3:10	4:00
R42 SSW	4:00	4:00	3:00	3:00	3:00	R42 SSW	4:00	4:00	3:00	3:00	3:00	R42 SSW	3:10	4:00
R43 SW	4:00	4:00	3:10	3:00	3:10	R43 SW	4:00	4:00	3:10	3:10	3:10	R43 SW	3:10	4:00
R44 WSW	4:10	4:10	3:10	3:10	3:10	R44 WSW	4:00	4:10	3:10	3:10	3:10	R44 WSW	3:10	4:00
R45 W	4:10	4:10	3:10	3:10	3:10	R45 W	4:10	4:10	3:10	3:10	3:10	R45 W	3:10	4:10
R46 WNW	4:10	4:10	3:10	3:10	3:10	R46 WNW	4:10	4:10	3:10	3:10	3:10	R46 WNW	3:10	4:10
R47 NW, NNW	4:10	4:10	3:10	3:10	3:10	R47 NW, NNW	4:10	4:10	3:10	3:10	3:10	R47 NW, NNW	3:10	4:10
2-Mile Ring and Downwind to EPZ Boundary (5 sector groups)														
R48 N	4:10	4:20	4:00	4:00	4:00	R48 N	4:20	4:20	4:00	4:00	4:00	R48 N	4:00	4:10
R49 NNE	4:10	4:20	4:00	4:00	4:00	R49 NNE	4:10	4:20	4:00	4:00	4:00	R49 NNE	4:00	4:10
R50 NE	4:10	4:10	4:00	4:00	4:00	R50 NE	4:10	4:10	3:50	4:00	4:00	R50 NE	4:00	4:10
R51 ENE	4:10	4:10	3:50	4:00	3:50	R51 ENE	4:10	4:10	3:50	4:00	4:00	R51 ENE	3:50	4:10
R52 E	4:10	4:10	3:40	3:40	3:40	R52 E	4:00	4:10	3:40	3:40	3:40	R52 E	3:40	4:00
R53 ESE	4:10	4:10	3:40	3:40	3:40	R53 ESE	4:00	4:00	3:40	3:40	3:40	R53 ESE	3:40	4:00
R54 SE	4:00	4:10	3:00	3:10	3:00	R54 SE	4:00	4:10	3:00	3:10	3:00	R54 SE	3:20	4:10
R55 SSE	4:00	4:00	3:00	3:10	3:00	R55 SSE	4:10	4:10	3:00	3:10	3:10	R55 SSE	3:20	4:10
R56 S	4:00	4:00	3:10	3:10	3:10	R56 S	4:10	4:00	3:00	3:10	3:10	R56 S	3:20	4:10
R57 SSW	4:00	4:10	3:10	3:10	3:10	R57 SSW	4:10	4:10	3:10	3:10	3:10	R57 SSW	3:20	4:10
R58 SW	4:10	4:10	3:10	3:10	3:10	R58 SW	4:10	4:10	3:10	3:10	3:10	R58 SW	3:20	4:00
R59 WSW	4:10	4:10	3:50	3:50	3:50	R59 WSW	4:10	4:10	3:50	3:50	3:50	R59 WSW	3:50	4:10
R60 W	4:20	4:20	3:50	3:50	4:00	R60 W	4:10	4:20	3:50	4:00	3:50	R60 W	3:50	4:10
R61 WNW	4:20	4:20	3:50	4:00	4:00	R61 WNW	4:20	4:20	3:50	3:50	4:00	R61 WNW	3:50	4:20
R62 NW	4:10	4:20	4:00	4:00	4:00	R62 NW	4:20	4:20	4:00	4:00	4:00	R62 NW	4:00	4:20
R63 NNW	4:20	4:20	4:00	4:00	4:00	R63 NNW	4:20	4:20	4:00	4:00	4:00	R63 NNW	4:00	4:20

Table A4-2 – Estimated Evacuation Times for EPZ Schools

School	Driver Mobilization Time(min)	Loading Time (min)	Dist. to EPZ Bndry (mi.)	Travel Time to EPZ Bndry (min)	ETE (hr:min)	Dist. EPZ Bndry to H.S. (mi.)	Travel Time EPZ Bndry to H.S. (min)	ETE to H.S. (hr:min)
Hood County Schools								
Brawner Intermediate School	60	5	3.0	6	**1:15**	31	47	**2:00**
Emma Roberson Elementary School	60	5	3.2	6	**1:15**	31	47	**2:00**
Mambrino Elementary School	60	5	14.0	24	**1:30**	20	30	**2:00**
Tolar Elementary School	60	5	1.2	3	**1:10**	24	36	**1:45**
Tolar Junior High School	60	5	1.2	3	**1:10**	24	36	**1:45**
Tolar High School	60	5	0.3	1	**1:10**	24	36	**1:45**
Somervell County Schools								
Brazos River Charter School	60	5	3.1	6	**1:15**	13.4	21	**1:35**
Glen Rose Elementary School	60	5	9.2	16	**1:25**	23	35	**2:00**
Glen Rose High School	60	5	8.8	15	**1:20**	23	35	**1:55**
Glen Rose Intermediate School	60	5	9.0	16	**1:25**	23	35	**2:00**
Glen Rose Junior High School	60	5	8.1	14	**1:20**	23	35	**1:55**
Happy Hills Farm	60	5	10.0	17	**1:25**	13	20	**1:45**
				Average for EPZ:	**1:20**		**Average:**	**1:55**

Table A4-3 – Estimated Evacuation Times for the Transit-Dependent Population

Route Number	Bus Number	Single Wave					Second Wave							
		Mobilization (min.)	Route Length (mi.)	Route Travel Time (min.)	Pickup Time (min.)	ETE (hr:min)	Mobilization (min.)	Unload (min.)	Driver Rest (min.)	Return Travel time to EPZ (min.)	Travel Time EPZ to Route Start (min.)	Route Travel Time (min.)	Pickup Time (min.)	ETE (hr:min)
1	1 - 4	90	10	17	30	2:20	115	5	10	35	0	15	30	3:30
	5 - 7	105	10	17	30	2:35	115	5	10	35	0	15	30	3:30
2	1 - 4	90	10	17	30	2:20	115	5	10	38	0	15	30	3:35
	5 - 7	105	10	17	30	2:35	115	5	10	38	0	15	30	3:35
3	1 - 3	90	18	31	30	2:35	115	5	10	20	0	27	30	3:30
	4, 5	105	18	31	30	2:50	115	5	10	20	0	27	30	3:30
4	1	90	8	14	30	2:15	115	5	10	27	0	12	30	3:20
Average for EPZ:						**2:30**	**Average for EPZ:**							**3:30**

Table A4-4 – Estimated Evacuation Times for the Granbury 4th of July Sensitivity Study

Transient Vehicles	Evacuation Region		
	2-Mile Region (R01)	5-Mile Region (R02)	Entire EPZ (R03)
5,362 (Base)	2:50	3:10	4:00
25,407	2:50	4:00	6:20