FISSION PRODUCT BARRIER DEGRADATION

Fuel Clad Barrier Emergency Action Levels:

Emergency Coordinator/EOF Director Judgment (FCB5)

Any condition in the opinion of the Emergency Coordinator/EOF Director that indicates Loss or Potential Loss of the Fuel Clad Barrier.

Basis:

This EAL addresses any other factors that are to be used by the Emergency Coordinator/EOF Director in determining whether the Fuel Clad barrier is lost or potentially lost. An event or multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is imminent (i.e., within 1 to 2 hours). In this imminent loss situation, use judgment and classify as if the thresholds are exceeded. In addition, the inability to monitor the barrier is also incorporated in this EAL as a factor in Emergency Coordinator/EOF Director judgment that the barrier may be considered lost or potentially lost. *(See also SG1, "Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power", for additional information.)*

FISSION PRODUCT BARRIER DEGRADATION

RCS Barrier Emergency Action Levels:

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.

RCS Leak Rate (RCB1)

Loss: RCS leak rate GREATER THAN available makeup capacity as indicated by RCS subcooling < 28° F.

Potential Loss: Unisolable RCS leak > 44 gpm.

Basis:

The "Loss" EAL 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" EAL is based on the inability to maintain normal liquid inventory within the RCS by normal operation of the Chemical and Volume Control System which is considered as one charging pump discharging to the charging header. A second charging pump being required is indicative of a substantial RCS leak.

FISSION PRODUCT BARRIER DEGRADATION

RCS Barrier Emergency Action Levels:

SG Tube Rupture (RCB2)

Loss: SGTR that results in an ECCS (SI) actuation

Potential Loss: Not Applicable

Basis:

This EAL is intended to address the full spectrum of Steam Generator (SG) tube rupture events in conjunction with Containment Barrier "Loss" EAL **CNB3** and Fuel Clad Barrier EALs. The "Loss" EAL 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" EAL **RCB1**. By itself, this EAL 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 Site Area Emergency in accordance with Containment Barrier "Loss" EAL **CNB3**.

There is no "Potential Loss" EAL.

FISSION PRODUCT BARRIER DEGRADATION

RCS Barrier Emergency Action Levels:

Containment Radiation Monitoring (RCB3)

Loss: Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 100 R/hr.

Potential Loss: Not Applicable

Basis:

The specific radiation monitor reading is a value which indicates the release of reactor coolant to the containment. The reading was calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with normal operating concentrations (i.e., within Technical Specifications) into the containment atmosphere. Reference Waterford 3 Engineering Calculation EC-S03-008. Source documents used for the determination of this monitor reading are NUREG 1228, "Source Term Estimation During Incident Response to Severe Nuclear Power Plant Accidents" and EC-S98-002, "Waterford 3 Chapter 15 Non-LOCA Dose Calculation." This reading is less than that specified for Fuel Clad Barrier EAL **FCB4**. Thus, this EAL is indicative of a RCS leak only. If the radiation monitor reading increased to that specified by Fuel Clad Barrier EAL **FCB4**, then fuel damage is indicated.

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

FISSION PRODUCT BARRIER DEGRADATION

RCS Barrier Emergency Action Levels:

Other Indications (RCB4)

Loss: Not Applicable

Potential Loss: RCS pressure dropping due to primary relief not reseating

Basis:

The setpoint for the pressurizer code safety valves is 2500 psia +/- 3%. Their purpose is to provide RCS overpressure protection. The safety valves pass sufficient pressurizer steam to limit the RCS pressure to 2750 psia (110 % of design) following a complete loss of turbine generator load without simultaneous reactor trip. In the event of a primary relief valve lifting and not reseating the loss of mass inventory of the RCS is large enough to uncover the core in a short period of time.
Source document: Technical Specifications sections 3.4.2.1 and 3.4.2.2.

FISSION PRODUCT BARRIER DEGRADATION

RCS Barrier Emergency Action Levels:

Other Indications (RCB4)

Emergency Coordinator/EOF Director Judgment (RCB5)

Any condition in the opinion of the Emergency Coordinator/EOF Director that indicates Loss or Potential Loss of the RCS Barrier.

Basis:

This EAL addresses any other factors that are to be used by the Emergency Coordinator/EOF Director in determining whether the RCS barrier is lost or potentially lost. An event or multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is imminent (i.e., within 1 to 2 hours). In this imminent loss situation, use judgment and classify as if the thresholds are exceeded. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in Emergency Coordinator/EOF Director judgment that the barrier may be considered lost or potentially lost. *(See also SG1, "Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power", for additional information.)*

FISSION PRODUCT BARRIER DEGRADATION

Containment Barrier Emergency Action Levels:

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

Containment Pressure (CNB1)

Loss: Rapid unexplained drop following initial rise

OR

Containment parameters not consistent with LOCA conditions

Potential Loss:

Containment pressure 50 PSIA and rising

OR

Explosive mixture exists
OR

Containment pressure > 17.7 PSIA with LESS THAN one full train of Containment Spray operating (1750 gpm)

Basis:

Rapid unexplained loss of pressure (i.e., not attributable to containment spray or condensation effects) following an initial pressure increase indicates a loss of containment integrity. Containment pressure and sump levels should increase as a result of the mass and energy release into containment from a LOCA. Thus, sump level or pressure not increasing indicates containment bypass and a loss of containment integrity.

The Containment pressure used for potential loss of containment is based on the containment design pressure. Existence of an explosive mixture means a hydrogen and oxygen concentration of at least the lower deflagration limit curve exists. This EAL is primarily a discriminator between Site Area Emergency and General Emergency representing a potential loss of the third barrier following a LOCA.

FISSION PRODUCT BARRIER DEGRADATION

Containment Barrier Emergency Action Levels:

Containment Pressure (CNB1)

The last potential loss EAL represents a potential loss of containment in that the containment heat removal/depressurization system (Containment Spray, but not including containment venting strategies) are 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 or Containment Spray pump providing LESS THAN 1750 gpm flow. Credit is not taken for Containment Fan Coolers in this EAL as mitigating Containment Spray losses.

FISSION PRODUCT BARRIER DEGRADATION

Containment Barrier Emergency Action Levels:

Core Exit Thermocouples (CNB2)

Loss: Not Applicable

Potential Loss:

Core exit thermocouples >1200 degrees F and restoration procedures not effective within 15 minutes

OR

Core exit thermocouples > 700 degrees F with RVLMS upper plenum level equal to 0% or LOWER and restoration procedures not effective within 15 minutes

Basis:

In this EAL, the functional restoration procedures are those emergency operating procedures that address the recovery of the core cooling critical safety functions. 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) have concluded that function restoration procedures can arrest core degradation within the reactor vessel in a significant fraction of the core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it is appropriate to provide a reasonable period to allow function restoration procedures to arrest the core melt sequence. Whether or not the procedures will be effective should be apparent within 15 minutes. The Emergency Coordinator/EOF Director should make the declaration as soon as it is determined that the procedures have been, or will be ineffective.

The conditions in this potential loss EAL 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 Core Cooling and Heat Sink criteria in the Fuel and RCS barrier columns, this EAL would result in the declaration of a General Emergency – loss of two barriers and the potential loss of a third. If the function restoration procedures are ineffective, then there is no "success" path.

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

FISSION PRODUCT BARRIER DEGRADATION

Containment Barrier Emergency Action Levels:

SG Secondary Side Release With Primary to Secondary Leakage (CNB3)

Loss: Ruptured S/G is also faulted outside containment

OR

Loss: Primary-to-Secondary leakrate >10 gpm with nonisolable steam release from affected S/G to the environment

Potential Loss: Not Applicable

Basis:

This "loss" EAL recognizes that SG tube leakage can represent a bypass of the containment barrier as well as a loss of the RCS barrier. The first "loss" EAL addresses the condition in which a RUPTURED (primary-to-secondary leakage of a magnitude sufficient to require or cause a reactor trip and safety injection) steam generator is also FAULTED (secondary side leakage that results in an uncontrolled decrease in steam generator pressure or the steam generator being completely depressurized). This condition represents a bypass of the RCS and containment barriers. In conjunction with RCS Barrier "loss" EAL **RCB2**, this would always result in the declaration of a Site Area Emergency.

The second "loss" EAL addresses SG tube leaks that exceed 10 gpm in conjunction with a nonisolable release path to the environment from the affected steam generator. The threshold for establishing the nonisolable secondary side release is intended to be a prolonged release of radioactivity from the RUPTURED steam generator directly to the environment. This could be expected to occur when the main condenser is unavailable to accept the contaminated steam (i.e., SGTR with concurrent loss of offsite power and the RUPTURED steam generator is required for plant cooldown or a stuck open relief valve or failed open atmospheric dump valve).

If the main condenser is available, then there may be releases via air ejectors, gland seal exhausters, and other similar controlled, and often monitored, pathways. Also, releases from the Steam Driven Emergency Feedwater Pump Turbine result in a very small minor release that can be isolated with the MS-401A and B valves. These pathways do **not** meet the intent of a nonisolable release path to the environment. These minor releases are assessed using Abnormal Radiation Levels / Radiological Effluents EALs.

A pressure boundary leakage of 10 gpm was used as the threshold in SU7 and is deemed appropriate for this EAL. For smaller breaks, not exceeding the normal

FISSION PRODUCT BARRIER DEGRADATION

Containment Barrier Emergency Action Levels:

SG Secondary Side Release With Primary to Secondary Leakage (CNB3)

charging capacity threshold in RCS Barrier "Potential Loss" EAL **RCB1** (RCS Leak Rate) or not resulting in ECCS actuation in EAL **RCB2** (SG Tube Rupture), this EAL results in a NOUE. For larger breaks, RCS barrier EALs **RCB1** and **RCB2** would result in an Alert. For SG tube ruptures which may involve multiple steam generators or unisolable secondary line breaks, this EAL would exist in conjunction with RCS barrier "Loss" EAL **RCB2** and would result in a Site Area Emergency. Escalation to General Emergency would be based on "Potential Loss" of the Fuel Clad Barrier.

FISSION PRODUCT BARRIER DEGRADATION

Containment Barrier Emergency Action Levels:

Containment Isolation Valve Status After Containment Isolation (CNB4)

Loss: Unisolable breach of containment with a direct release path to the environment following containment isolation actuation.

Potential Loss: Not Applicable

Basis:

This EAL is intended to address incomplete containment isolation that allows direct release to the environment. It represents a loss of the containment barrier.

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 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. Therefore, a failure of a containment penetration in the annulus with frequent cycling of the shield building ventilation system (a filtered release path) meets the loss criteria of this EAL and constitutes a loss of the containment barrier.

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

FISSION PRODUCT BARRIER DEGRADATION

Containment Barrier Emergency Action Levels:

Significant Radioactive Inventory in Containment (CNB5)

Loss: Not Applicable

Potential Loss: Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 4000 R/hr.

Basis:

The containment high range radiation monitor reading is a value which indicates significant fuel damage well in excess of the EALs associated with both loss of Fuel Clad and loss of RCS Barriers. A major release of radioactivity requiring offsite 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 General Emergency declaration is warranted. Because the monitor reading exceeds the readings for Fuel Clad Barrier loss in **FCB4** and RCS Barrier loss in **RCB3**, the Emergency Coordinator/EOF Director should declare a General Emergency when this value on the Containment High Range Radiation Monitor is exceeded as a loss of two barriers (fuel clad and RCS) and potential loss of the third (containment). NUREG-1228, "Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents," indicates that such conditions do not exist when the amount of clad damage is less than 20%. The radiation monitor reading specified corresponds to approximately 20% fuel clad damage. Reference Waterford 3 Engineering Calculation EC-S03-008.

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

FISSION PRODUCT BARRIER DEGRADATION

Containment Barrier Emergency Action Levels:

Emergency Coordinator/EOF Director Judgment (CNB6)

Any condition in the opinion of the Emergency Coordinator/EOF Director that indicates Loss or Potential Loss of the Containment barrier.

Basis:

This EAL addresses any other factors that are to be used by the Emergency Coordinator/EOF Director in determining whether the Containment barrier is lost or potentially lost. An event or multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is imminent (i.e., within 1 to 2 hours). In this imminent loss situation, use judgment and classify as if the thresholds are exceeded. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in Emergency Coordinator/EOF Director judgment that the barrier may be considered lost or potentially lost. *(See also SG1, "Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power", for additional information.)*

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU1

Confirmed security event which indicates a potential degradation in the level of safety of the plant.

Operating Mode Applicability: **All**

Emergency Action Level(s): (1 or 2)

1. Security events as determined from the Waterford 3 Safeguards Contingency Plan and reported by the Waterford 3 Security Shift Supervision

OR

2. A credible site specific security threat notification.

Basis:

The Security Shift Supervisor is the designated individual 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 Security Contingency Plan.

EAL 1 is based on the Security Contingency Plan. Security events which do not represent a potential degradation in the level of safety of the plant, are reported under 10 CFR 73.71 or in some cases under 10 CFR 50.72. Examples of security events that indicate Potential Degradation in the Level of Safety of the Plant are provided below for consideration.

Consideration should be given to the following types of events when evaluating an event against the criteria of the Security Contingency Plan: SABOTAGE, HOSTAGE / EXTORTION, CIVIL DISTURBANCE, and STRIKE ACTION.

INTRUSION into the plant PROTECTED AREA by a HOSTILE FORCE would result in EAL escalation to an ALERT.

The intent of EAL 2 is to ensure that appropriate notifications for the security threat are made in a timely manner. The determination of "credible" is made through use of information found in the Safeguards Contingency Plan. In general, this EAL is for a credible threat notification received from, or validated by, a trustworthy source (FBI, NRC, Federal or State Office of Homeland Security, St. Charles Parish officials, plant management, site security, etc.) Example: A report from site security of an unauthorized attempted PA entry should be considered a credible threat.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU1

A higher initial classification could be made based upon the nature and timing of the threat and potential consequences. Consideration shall be given to upgrading the emergency response status and emergency classification in accordance with the Safeguards Contingency Plan and Emergency Plan.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU2

Other conditions existing which in the judgment of the Emergency Coordinator warrant declaration of an Unusual Event.

Operating Mode Applicability: **All**

Emergency Action Level(s):

1. Other conditions exist which, in the judgment of the Emergency Coordinator, indicate that events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

Basis:

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

From a broad perspective, one area that may warrant Emergency Coordinator judgment is related to likely or actual breakdown of site-specific event mitigating actions. Examples to consider include inadequate emergency response procedures, transient response either unexpected or not understood, failure or unavailability of emergency systems during an accident in excess of that assumed in accident analysis, or insufficient availability of equipment and/or support personnel.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU4

FIRE within PROTECTED AREA boundary not extinguished within 15 minutes of detection.

Operating Mode Applicability: **All**

Emergency Action Level(s):

1. FIRE in or contiguous to Condensate Polisher Building, Containment, Fuel Handling Building, Reactor Auxiliary Building, Cooling Tower Areas or Turbine Building not extinguished within 15 minutes of Control Room notification or verification of a Control Room alarm.

Basis:

The purpose of this IC is to address the magnitude and extent of FIREs that may be potentially significant precursors to damage to safety systems. As used here, *Detection is* visual observation and report by plant personnel or sensor alarm indication. The 15-minute time period begins with a credible notification that a FIRE is occurring, or indication of a VALID fire detection system alarm. Verification of a fire detection system alarm includes actions that can be taken within the Control Room to ensure that the alarm is not spurious. A verified alarm is assumed to be an indication of a FIRE unless it is disproved within the 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 buildings listed are limited and ONLY include buildings and areas contiguous (in actual contact with or immediately adjacent) to plant VITAL AREAs or other significant buildings or areas. The intent of this EAL is not to include buildings (i.e., MSB, Service Building, Construction Support Building, Chiller Building, etc.) or areas that are not contiguous to plant VITAL AREAs. This IC excludes FIREs within administration buildings, waste-basket FIREs, and other small FIREs of no safety consequence.

Escalation to a higher emergency class is by IC HA4. "FIRE or EXPLOSION affecting the operability of plant safety systems required to establish or maintain safe shutdown."

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU5

Release of toxic or flammable gases deemed detrimental to normal operation of the plant.

Operating Mode Applicability: **All**

Emergency Action Level(s): (1 or 2)

1. Report or detection of toxic or flammable gases that has or could enter the Exclusion Area Boundary in amounts that can affect NORMAL PLANT OPERATIONS.

OR

2. Report by St. Charles Parish for evacuation or sheltering of site personnel based on an offsite event.

Basis:

This IC is based on the existence of uncontrolled releases of toxic or flammable gas that may enter the EAB and affect normal plant operations. It is intended that releases of toxic or flammable gases are of sufficient quantity, and the release point of such gases is such that normal plant operations would be affected. This would preclude small or incidental releases, or releases that do not impact structures needed for plant operation. The EALs are intended to not require significant assessment or quantification. The EALs assume an uncontrolled process that has the potential to affect plant operations or personnel safety. Information from a neighboring plant provided over the Taft Industrial Complex Communication (TICC) radio in the Control Room meets the intent of the term "report" as used in EAL #1 and is considered to be information from a credible source.

Escalation is via HA5, which involves a quantified release of toxic or flammable gas affecting VITAL AREAS.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU6

Natural and destructive phenomena affecting the PROTECTED AREA

Operating Mode Applicability: **All**

Emergency Action Level(s): (1 or 2 or 3 or 4 or 5 or 6 or 7 or 8)

1. Earthquake felt in plant and detected on station seismic instrumentation.

OR

2. Report by plant personnel of tornado or high winds > 100 mph striking within PROTECTED AREA boundary.

OR

3. Vehicle crash into plant structures or systems within PROTECTED AREA boundary.

OR

4. Report by plant personnel of an unanticipated EXPLOSION within PROTECTED AREA boundary resulting in VISIBLE DAMAGE to permanent structure or equipment.

OR

5. Report of turbine failure resulting in casing penetration or damage to turbine or generator seals.

OR

6. Uncontrolled flooding in Reactor Auxiliary Building or Cooling Tower Areas that has the potential to affect safety related equipment needed for the current operating mode.

OR

7. Site predicted to experience a hurricane with hurricane force winds ($\geq$ 74 mph) on site in $\leq$ 12 hours as projected by the National Weather Service.

OR

8. River water level at the intake structure > +27 FT MSL.

Basis:

An Unusual Event in this IC would be declared on the basis of the occurrence of an event of sufficient magnitude to be of concern to plant operators. Areas identified in the EALs define the location of the event based on the potential for damage to equipment contained therein. Escalation of the event to an Alert occurs when the magnitude of the event is sufficient to result in damage to equipment contained in the specified location.

EAL #1 is based on damage that may be caused to some portions of the site, but should not affect ability of safety functions to operate. The method of detection is based on instrumentation, validated by a reliable source, or operator assessment.

As defined in the EPRI sponsored "Guidelines for Nuclear Plant Response to an Earthquake", dated October 1989, a "felt earthquake" is: An earthquake of sufficient intensity such that: (a) the vibratory ground motion is felt at the nuclear plant site and recognized as an earthquake based on a consensus of control room operators on duty at the time, and (b) for plants with operable seismic instrumentation, the seismic switches of the plant are activated.

EAL #2 is based on the assumption that a tornado striking (touching down) or high winds within the PROTECTED AREA may have potentially damaged plant structures containing functions or systems required for safe shutdown of the plant. The high wind value in EAL#2 is based on the FSAR design basis 100 year recurrence interval projected wind velocity of 100 miles per hour. The actual site design basis for Seismic Class one structures is 200 mph. If damage is confirmed visually or by other plant indications, then the event may be escalated to Alert.

EAL #3 is intended to address crashes of vehicle types large enough to cause significant damage to plant structures containing functions and systems required for safe shutdown of the plant. Minor accidents involving smaller vehicles or golf carts where the potential for significant damage to site structures is not a concern or "fender bender" type accidents do **not** warrant declaration under this EAL. If the crash is confirmed to affect a plant VITAL AREA, the event may be escalated to Alert.

For EAL #4 only those EXPLOSIONs of sufficient force to damage permanent structures or equipment within the PROTECTED AREA should be considered. No attempt is made in this EAL to assess the actual magnitude of the damage. The occurrence of the EXPLOSION with reports of evidence of damage is sufficient for declaration. The Emergency Coordinator also needs to consider any security aspects of the EXPLOSION, if applicable.

EAL #5 is based on main turbine rotating component failures of sufficient magnitude to cause observable damage to the turbine casing or to the seals of the turbine generator. Of major concern is the potential for leakage of combustible fluids (lubricating oils) and gases (hydrogen cooling) to the plant environs. Actual FIREs and flammable gas build up are appropriately classified via HU4 and HU5. 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. 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. Escalation of the emergency classification is based on potential damage done by missiles generated by the failure or in conjunction with a steam generator tube rupture. The latter event would be classified by the radiological EALs or Fission Product Barrier EALs.

EAL #6 is based on the effect of flooding caused by internal events such as component failures, equipment misalignment, or outage activity mishaps. The areas noted include those areas that contain systems required for safe shutdown of the plant, and that are not designed to be wetted or submerged. Site specific areas containing functions and systems required for safe shutdown of the plant are taken from the Waterford 3 Post-Fire Safe Shutdown Analysis, EC-F00-026 for this EAL. These areas are reflected in FP-001-022, Design Change Fire Protection/Safe Shutdown Review. The Containment Building is not included in the EAL because of the guidance in the NEI 99-01 basis that this EAL applies to areas not designed to be wetted or submerged. Escalation of the emergency classification is based on the damage caused or by access restrictions that prevent necessary plant operations or systems monitoring.

EAL #7 addresses the potential for the site to experience high level (hurricane force) winds and associated flooding and storm surge over an extended period of time (usually several hours). This EAL is selected because it will generally be associated with significant levels of site severe weather response such as a potential precautionary shutdown, diesel testing, staff call-outs, etc. The site experiencing a hurricane can also be a precursor of more serious events. It is not necessary to declare this event based on issuance of a Hurricane Warning for St. Charles Parish alone.

EAL #8 addresses Mississippi River flooding. The levee system is designed to protect people and property from the most severe effects of river flooding. The Waterford 3 UFSAR section 2.4 indicates that a flood less severe than the Probable Maximum Flood (PMF) but more severe than the Project Design Flood (PDF) may pose the greatest threat to the site in the event of a nearby levee failure. The UFSAR refers to Mississippi River water level of +27 ft. MSL as that corresponding level for such an event that includes appropriate conservatism. Therefore, this level of flooding can also be a precursor of more serious events and is used as an EAL here.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA1

Initiating Condition -- ALERT

Confirmed security event in a plant PROTECTED AREA

Operating Mode Applicability: **All**

Emergency Action Level(s): (1 or 2)

1. INTRUSION into the plant PROTECTED AREA by a HOSTILE FORCE.

OR

2. Other security events as determined from the Waterford 3 Safeguards Contingency Plan and reported by the Waterford 3 Security Shift Supervision

Basis:

This class of security events represents an escalated threat to plant safety above that contained in the NOUE. A confirmed INTRUSION report is satisfied if physical evidence indicates the presence of a HOSTILE FORCE within the PROTECTED AREA.

Consideration should be given to the following types of events when evaluating an event against the criteria of the Security Contingency Plan: SABOTAGE, HOSTAGE / EXTORTION, and STRIKE ACTION. The Safeguards Contingency Plan identifies numerous events/conditions that constitute a threat/compromise to a Station's security. Only those events that involve Actual or Potential Substantial degradation to the level of safety of the plant need to be considered. A specific example would be an armed adversary attempting to or has crossed the Protected Area fence. The following events would not normally meet this requirement; (e.g., Failure by a member of the Security Force to carry out an assigned/required duty, internal disturbances, loss/compromise of safeguards materials or strike actions).

INTRUSION into a VITAL AREA by a HOSTILE FORCE will escalate this event to a Site Area Emergency.

The Security Shift Supervisor is the designated person 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 Security Plan.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA2

Initiating Condition -- ALERT

Other conditions existing which in the judgment of the Emergency Coordinator/EOF Director warrant declaration of an Alert

Operating Mode Applicability: **All**

Emergency Action Level(s):

1. Other conditions exist which in the judgment of the Emergency Coordinator/EOF Director indicate that events are in process or have occurred which involve actual or likely potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

Basis:

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

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA3

Initiating Condition -- ALERT

Control Room evacuation has been initiated

Operating Mode Applicability: **All**

Emergency Action Level(s):

1. Entry into OP-901-502, Evacuation of Control Room & Subsequent Plant Shutdown.

Basis:

With the Control Room evacuated, additional support, monitoring and direction through the Technical Support Center and/or other emergency response facility is necessary. Inability to establish plant control from outside the Control Room will escalate this event to a Site Area Emergency.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA4

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(s):

1. FIRE or EXPLOSION in the Reactor Auxiliary Building, Containment or Cooling Tower Areas

AND

Affected system parameter indications show degraded performance or plant personnel report VISIBLE DAMAGE to permanent structures or equipment within the specified area.

Basis:

Site specific areas containing functions and systems required for safe shutdown of the plant are taken from the Waterford 3 Post-Fire Safe Shutdown Analysis, EC-F00-026 for this IC. These areas are reflected in FP-001-022, Design Change Fire Protection/Safe Shutdown Review.

This EAL addresses a FIRE / EXPLOSION and not the degradation in performance of affected systems. System degradation is addressed in the System Malfunction (S) EALs. The reference to damage of systems is used to identify the magnitude of the FIRE / EXPLOSION and to discriminate against minor FIREs / EXPLOSIONs. The reference to safety systems is included to discriminate against FIREs/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 / EXPLOSION was large enough to cause damage to these systems. Thus, the designation of a single train was intentional and is appropriate when the FIRE / EXPLOSION is large enough to affect more than one component.

This situation is not the same as removing equipment for maintenance that is covered by Technical Specifications. Removal of equipment for maintenance is a planned activity controlled in accordance with procedures and, as such, does not constitute a substantial degradation in the level of safety of the plant. A FIRE / EXPLOSION is an UNPLANNED activity and, as such, does constitute a substantial degradation in the level of safety of the plant. In this situation, an Alert classification is warranted.

The inclusion of a "report of VISIBLE DAMAGE" 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 occurrence of the EXPLOSION with reports of evidence of damage is sufficient for declaration. The declaration of an Alert and the activation of the Technical Support Center will provide the Emergency Coordinator/EOF Director with the resources needed to perform these damage assessments. The Emergency Coordinator/EOF Director also needs to consider any security aspects of the EXPLOSIONs, if applicable.

Escalation to a higher emergency class, if appropriate, will be based on System Malfunction (S), Fission Product Barrier Degradation (F), Abnormal Radiation Levels / Radiological Effluents (A), or Emergency Coordinator/EOF Director Judgment EALs (H...2).

HA5

Initiating Condition -- ALERT

Release of toxic or flammable gases within or contiguous to VITAL AREA which jeopardizes operation of systems required to maintain safe operations or establish or maintain safe shutdown.

Operating Mode Applicability: **All**

Emergency Action Level(s): (1 or 2)

1. Report or detection of toxic gases within or contiguous to VITAL AREA in concentrations that may result in an atmosphere IMMEDIATELY DANGEROUS TO LIFE AND HEALTH (IDLH).

OR

2. Report or detection of gases in concentration > LOWER FLAMMABILITY LIMIT within or contiguous to VITAL AREA.

Basis:

This IC is based on gases that affect the safe operation of the plant. These EALs apply to buildings and areas contiguous to plant VITAL AREAs or other significant buildings or areas. The intent of these EALs is not to include buildings (e.g., warehouses, MSB, Construction Support Building, etc.) or other areas that are not contiguous or immediately adjacent to plant VITAL AREAs. It is appropriate that increased monitoring be done to ascertain whether consequential damage has occurred.

EAL #1 is met if measurement of toxic gas concentration results in an atmosphere that is IDLH within a VITAL AREA or any area or building contiguous to a VITAL AREA. Exposure to an IDLH atmosphere will result in immediate harm to unprotected personnel, and would preclude access to any such affected areas.

EAL #2 is met when the flammable gas concentration in a VITAL AREA or any building or area contiguous to a VITAL AREA exceeds the LOWER FLAMMABILITY LIMIT. 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 addresses concentrations at which gases can ignite/support combustion. 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. Once it has been determined that an uncontrolled release is occurring, then sampling must be done to determine if the concentration of the released gas is within this range.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA5

Escalation to a higher emergency class, if appropriate, will be based on System Malfunction (S), Fission Product Barrier Degradation (F), Abnormal Rad Levels / Radioactive Effluent (A), or Emergency Coordinator/EOF Director Judgment EALs (H...2).

HA6

Initiating Condition -- ALERT

Natural and destructive phenomena affecting the plant VITAL AREA.

Operating Mode Applicability: **All**

Emergency Action Level(s): (1 or 2 or 3 or 4 or 5)

1 RED LIGHT on the seismic monitor panel indicates a VALID Seismic Event > Operating Basis Earthquake (OBE).

OR

2. Tornado or high winds > 100 mph within PROTECTED AREA boundary and resulting in VISIBLE DAMAGE to any of the following plant structures/equipment or Control Room indication of degraded performance of those systems.
   - Containment
   - Reactor Auxiliary Building
   - Turbine Building
   - Cooling Tower Areas

OR

3. Vehicle crash within PROTECTED AREA boundary and resulting in VISIBLE DAMAGE to any of the following plant structures or equipment therein or Control Room indication of degraded performance of those systems.
   - Containment
   - Reactor Auxiliary Building
   - Turbine Building
   - Cooling Tower Areas

OR

4. Turbine failure-generated missiles result in any VISIBLE DAMAGE to or penetration of any of the following plant areas.
   - Containment
   - Reactor Auxiliary Building
   - Cooling Tower Areas

OR

5. Uncontrolled flooding in the Reactor Auxiliary Building or Cooling Tower Areas that results in degraded safety system performance as indicated in the Control Room or that creates industrial safety hazards (e.g., electric shock) that preclude access necessary to operate or monitor safety equipment.

Basis:

These EALs escalate from the NOUE EALs in 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 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 to higher classifications occurs on the basis of other EALs (e.g., System Malfunction (S)).

EAL #1 is based on seismic events of a magnitude that can result in a plant VITAL AREA being subjected to forces beyond design limits, and thus damage may be assumed to have occurred to plant safety systems. See EPRI-sponsored "Guidelines for Nuclear Plant Response to an Earthquake", dated October 1989, for information on seismic event categories.

EAL #2 is based on based on the FSAR design basis 100 year recurrence interval projected wind velocity of 100 miles per hour. Wind loads of this magnitude can cause significant damage to site structures, and is well below the actual site design basis for Seismic Class One structures of 200 mph.

EAL #3 is intended to address crashes of **vehicle types large enough** to cause **significant damage** to plant structures containing functions and systems required for safe shutdown of the plant. Minor accidents involving smaller vehicles or golf carts where significant damage to site structures is not a concern or "fender bender" type accidents do **not** warrant declaration under this EAL.

EAL #4 is intended to address the threat to safety related equipment imposed by missiles generated by main turbine rotating component failures. The list of areas includes areas containing safety-related equipment, their controls, and their power supplies that a turbine missile is could penetrate. This EAL is, therefore, consistent with the definition of an ALERT in that if missiles have damaged or penetrated areas containing safety-related equipment the potential exists for substantial degradation of the level of safety of the plant.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA6

EAL #5 is intended to address the effect of internal flooding (OR external flooding that is of such magnitude that it affects the Reactor Auxiliary Building or Cooling Tower Areas) that has resulted in degraded performance of systems affected by the flooding, or has created industrial safety hazards (e.g., electrical shock) that preclude necessary access to operate or monitor safety equipment. The inability to operate or monitor safety equipment represents a potential for substantial degradation of the level of safety of the plant. This flooding may have been caused by internal events such as component failures, equipment misalignment, or outage activity mishaps. The areas include those areas that contain systems required for safe shutdown of the plant that are not designed to be wetted or submerged. Site specific areas containing functions and systems required for safe shutdown of the plant are taken from the Waterford 3 Post-Fire Safe Shutdown Analysis, EC-F00-026 for this EAL. These areas are reflected in FP-001-022, Design Change Fire Protection/Safe Shutdown Review. The Containment Building is not included in the EAL because of the guidance in the NEI 99-01 basis that this EAL applies to areas not designed to be wetted or submerged.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS1

Initiating Condition – SITE AREA EMERGENCY

Confirmed security event in a plant VITAL AREA

Operating Mode Applicability: **All**

Emergency Action Level(s): (1 or 2)

1. INTRUSION into the plant VITAL AREA by a HOSTILE FORCE.

OR

2. Other security events as determined from the Waterford 3 Safeguards Contingency Plan and reported by the Waterford 3 Security Shift Supervision.

Basis:

This class of security events represents an escalated threat to plant safety above that contained in the ALERT in that a HOSTILE FORCE has progressed from the PROTECTED AREA to the VITAL AREA.

Consideration should be given to the following types of events when evaluating an event against the criteria of the site specific Security Contingency Plan: SABOTAGE and HOSTAGE / EXTORTION. The Safeguards Contingency Plan identifies numerous events/conditions that constitute a threat/compromise to Waterford 3 security. Only those events that involve actual or likely major failures of plant functions needed for protection of the public need to be considered. A specific example would be an armed adversary that has gained entry into the VITAL AREA. The following events would not normally meet this requirement: Failure by a member of the Security Force to carry out an assigned/required duty, internal disturbances, loss/compromise of safeguards materials, or strike actions.

Loss of plant control would escalate this event to a GENERAL EMERGENCY.

The Security Shift Supervisor is the designated person 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 Security Plan.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS2

Initiating Condition – SITE AREA EMERGENCY

Other conditions existing which in the judgment of the
Emergency Coordinator/EOF Director warrant declaration of Site Area Emergency.

Operating Mode Applicability: **All**

Emergency Action Level(s):

1. Other conditions exist which in the judgment of the Emergency Coordinator/EOF Director indicate that events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the Exclusion Area Boundary.

Basis:

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

HS3

Initiating Condition – SITE AREA EMERGENCY

Control Room evacuation has been initiated and plant control cannot be established.

Operating Mode Applicability: **All**

Emergency Action Level(s):

1. Control Room evacuation has been initiated

AND

Control of the plant cannot be established in accordance with OP-901-502, Evacuation of Control Room & Subsequent Plant Shutdown within 15 minutes

Basis:

The Waterford 3 Post-Fire Safe Shutdown Analysis, EC-F00-026 provides the basis for these EALs.

Expeditious transfer of safety systems has not occurred but fission product barrier damage may not yet be indicated. The intent of this IC is to capture those events where control of the plant cannot be reestablished in a timely manner. The determination of whether or not control is established at the remote shutdown panel is based on Emergency Coordinator/EOF Director judgment. The Emergency Coordinator/EOF Director is expected to make a reasonable, informed judgment within 15 minutes that control of the plant from the remote shutdown panel has been established.

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 such as reactivity control (ability to shutdown the reactor and maintain it shutdown), RCS inventory (ability to cool the core), and decay heat removal (ability to maintain a heat sink).

Escalation of this event, if appropriate, would be by Fission Product Barrier Degradation (F), Abnormal Radiation Levels/Radiological Effluents (A), or Emergency Coordinator/EOF Director Judgment (H...2) EALs.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HG1

Initiating Condition – GENERAL EMERGENCY

Security event resulting in loss of physical control of the facility

Operating Mode Applicability: **All**

Emergency Action Level(s):

1. A HOSTILE FORCE has taken control of plant equipment such that plant personnel are unable to operate equipment required to maintain safety functions.

Basis:

This EAL encompasses conditions under which a HOSTILE FORCE has taken physical control of VITAL AREAs (containing vital equipment or controls of vital equipment) required to maintain safety functions **and** control of that equipment can **not** 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 decay heat removal (ability to maintain a heat sink). If control of the plant equipment necessary to maintain safety functions can be transferred to another location, then the above initiating condition is not met.

This EAL also applies to loss of physical control of spent fuel pool cooling systems **if** imminent fuel damage is likely (e.g., freshly off-loaded reactor core in pool).

Loss of physical control of the Control Room or LCP-43 (remote shutdown panel) capability alone may not prevent the ability to maintain safety functions per se. Design of the remote shutdown capability, the location of the transfer switches and areas of the plant where physical control has been lost should be taken into account.

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HG2

Initiating Condition – GENERAL EMERGENCY

Other conditions existing which in the judgment of the Emergency Coordinator/EOF Director warrant declaration of General Emergency.

Operating Mode Applicability: **All**

Emergency Action Level(s):

1. Other conditions exist which in the judgment of the Emergency Coordinator/EOF Director indicate that events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

Basis:

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

SYSTEM MALFUNCTION

SYSTEM MALFUNCTION

SU1

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Loss of all offsite power to essential busses > 15 minutes.

Operating Mode Applicability:

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

Emergency Action Level(s):

1. Loss of power to all unit auxiliary and startup transformers > 15 minutes.

AND

At least 'A' and 'B' emergency diesel generators supplying power to emergency busses.

Basis:

Prolonged loss of AC power reduces required redundancy and potentially degrades the level of safety of the plant by rendering the plant more vulnerable to a complete Loss of AC power (e.g., Station Blackout). Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Loss of all offsite power varies depending on the plant mode and source transformers. If the unit is back feeding via the unit Auxiliary Transformers and offsite power is lost, declaration of an Unusual Event is warranted.

SYSTEM MALFUNCTION

SU6

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

UNPLANNED loss of most or all safety system annunciation or indication in the Control Room > 15 minutes.

Operating Mode Applicability:

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

Emergency Action Level(s):

UNPLANNED loss of most or all annunciator cabinets C, D, H, K, M, N, SA, SB annunciators or indicators associated with safety systems > 15 minutes.

Basis:

This IC and its associated EAL are intended to recognize the difficulty associated with monitoring changing plant conditions without the use of a major portion of the annunciation or indication equipment.

Recognition of the availability of computer based indication equipment is considered (e.g., SPDS, plant computer, etc.).

Indicators associated with safety systems are those indicators for reactivity control, core cooling, maintaining reactor coolant system integrity or maintaining containment integrity.

Quantification of "Most" is arbitrary, however, it is estimated that if approximately **75%** of the safety system annunicators or indicators are lost, there is an increased risk that a degraded plant condition could go undetected.

It is not intended that Operations personnel perform a detailed count of the instrumentation lost, but use the value as a judgment threshold for determining the severity of plant conditions.

These EALs also recognize that redundant safety system indication powered from separate uninterruptible power supplies is provided. While failure of a large portion of annunciators is more likely than a failure of a large portion of indications, the concern is included in this EAL due to difficulty associated with assessment of plant conditions.

SYSTEM MALFUNCTION

SU6

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 Technical Specification. The initiation of a Technical Specification imposed plant shutdown related to the instrument loss will be reported via 10 CFR 50.72. If the shutdown is not in compliance with the Technical Specification action, then the UNUSUAL EVENT is based on SU6 "Inability to reach required shutdown within Technical Specification time limits."

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses. Due to the limited number of safety systems in operation during cold shutdown, refueling, and defueled modes, no EAL is indicated during these modes of operation.

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

SYSTEM MALFUNCTION

SU7

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

RCS Leakage.

Operating Mode Applicability:

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

Emergency Action Level(s): (1 or 2)

1. Unidentified or pressure boundary leakage > 10 gpm.

OR

2. Identified leakage > 25 gpm.

Basis:

This IC is included as an Unusual Event 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 10 gpm value for the unidentified and pressure boundary leakage was selected as it is observable with normal Control Room indications. Lesser values must generally be determined through time-consuming surveillance tests (e.g., mass balances). The EAL for identified leakage is set at a higher value due to the lesser significance of identified leakage in comparison to unidentified or pressure boundary leakage.

Escalation to the Alert level is via Fission Product Barrier Degradation (F) EALs.

SYSTEM MALFUNCTION

SU8

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

UNPLANNED loss of all onsite or offsite communications capabilities.

Operating Mode Applicability:

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

Emergency Action Level(s): (1 or 2)

1. Loss of all Table M1 onsite communications equipment affecting the ability to perform routine operations.

OR

2. Loss of all Table M2 offsite communications capability

Table M1 Onsite Communications Equipment
Plant radio system Plant paging system In-plant telephones Sound powered phones

Table M2 Offsite Communications Equipment
All telephone lines (commercial and microwave) Industrial Hot Line ENS Civil Defense Radios Operational Hotline

Basis:

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

The availability of one method of ordinary offsite communications is sufficient to inform State and local authorities of plant problems. This EAL is intended to be used only when extraordinary means (e.g., relaying of information from radio transmissions, individuals being sent to offsite locations, etc.) are being utilized to make communications possible.

SYSTEM MALFUNCTION

SU9

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Fuel clad degradation.

Operating Mode Applicability:

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

Emergency Action Level(s):

1. Reactor coolant sample activity value indicating fuel clad degradation > Technical Specification allowable limits.
   - >1.0 µCi/gm DEI

OR

   - >100/Ē µCi/gm

Basis:

This IC is included as an Unusual Event because it is considered to be a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. The EAL addresses coolant samples exceeding coolant Technical Specifications for iodine spike that are indicative of fuel clad integrity.
Escalation to the Alert level is via the Fission Product Barrier Degradation Monitoring (F) ICs. The companion to SU9 for the Cold Shutdown/Refueling modes is CU4.

A declaration of an Unusual Event is required whenever the RCS Dose Equivalent Iodine exceeds the Technical Specification 3.4.7a value without regard to the 48 hours allowed by the Technical Specification whether or not a plant shutdown has been initiated.

SYSTEM MALFUNCTION

SU10

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Inadvertent criticality.

Operating Mode Applicability: **Hot Standby (Mode 3)**
Hot Shutdown (Mode 4)

Emergency Action Level(s):

1. An UNPLANNED sustained positive startup rate observed on nuclear instrumentation.

Basis:

This IC addresses inadvertent criticality events. While the primary concern is criticality events that occur in Cold Shutdown or Refueling modes (NUREG 1449, Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States), the IC is applicable in other modes in which inadvertent criticalities are possible. This IC indicates a potential degradation of the level of safety of the plant, warranting an Unusual Event classification. This IC excludes inadvertent criticalities that occur during planned reactivity changes associated with reactor startups (e.g., criticality earlier than estimated). This IC corresponds to Cold Shutdown/Refueling CU7.

This condition can be identified using the startup rate meter. The term "sustained" is used in order to allow exclusion of expected short term positive startup rates from planned control rod movements (such as shutdown bank withdrawal). These short term positive startup rates are the result of the increase in neutron population due to subcritical multiplication.

Escalation would be by the Fission Product Barrier Matrix (F), as appropriate to the operating mode at the time of the event, or by Emergency Coordinator Judgment.

SYSTEM MALFUNCTION

SU11

Initiating Condition -- NOTIFICATION OF UNUSUAL EVENT

Inability to reach required shutdown within Technical Specification time limits.

Operating Mode Applicability:

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

Emergency Action Level(s):

1. Plant is not brought to required operating mode within Technical Specifications LCO Action Statement time

Basis:

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

SYSTEM MALFUNCTION

SA1

Initiating Condition -- ALERT

AC power capability to essential busses reduced to a single power source > 15 minutes such that any additional single failure would result in station blackout.

Operating Mode Applicability:

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

Emergency Action Level(s):

1. AC power capability to essential busses reduced to a single power source > 15 minutes.

AND

Any additional single failure will result in station blackout.

Basis:

This IC and its associated EAL is intended to provide an escalation from IC SU1. The condition indicated by this IC is the degradation of the offsite and onsite power systems such that any additional single failure would result in a station blackout. This condition could occur due to a loss of all offsite power with a concurrent failure of one emergency diesel generator to supply power to its emergency busses. Another related condition could be the loss of all offsite power **and** loss of the onsite emergency diesel generators with **only** one train of emergency busses being backfed from the unit main generator, **or** the loss of onsite emergency diesels with only one train of emergency busses being backfed from offsite power. The subsequent loss of this single power source would escalate the event to a Site Area Emergency in accordance with SS1, "Loss of All Offsite and Loss of All Onsite AC Power to Essential Busses."

When temporary emergency diesels (TEDs) are used to supplement onsite AC power for essential busses in the event diesels are lost, they are credited in this EAL. The EAL condition does not apply unless the TED also failed.

SYSTEM MALFUNCTION

SA3

Initiating Condition -- ALERT

Failure of Reactor Protection System instrumentation to complete or initiate an automatic reactor trip once a Reactor Protection System setpoint has been exceeded and manual trip was successful.

Operating Mode Applicability:

Power Operations (Mode 1)
Startup (Mode 2)
Hot Standby (Mode 3)

Emergency Action Level(s):

Indication(s) exist that indicate that the Reactor Protection System setpoint was exceeded and automatic trip did not occur and a successful manual trip occurred.

Basis:

This condition indicates failure of the automatic protection system to trip the reactor. This condition is more than a potential degradation of a safety system in that a front line automatic protection system did not function in response to a plant transient and thus the plant safety has been compromised, and design limits of the fuel may have been exceeded. An Alert is indicated because conditions exist that lead to potential loss of fuel clad or RCS. Reactor protection system setpoint being exceeded, rather than limiting safety system setpoint being exceeded, is specified here because failure of the automatic protection system is the issue. A manual trip is any set of actions by the reactor operator(s) at the **reactor control panel** which causes control rods to be rapidly inserted into the core and brings the reactor subcritical (e.g., reactor trip button, DRTS buttons). Failure of manual trip would escalate the event to a Site Area Emergency. Opening the A32 and B32 Bus Feeders to facilitate insertion of all CEAs requires declaration of a Site Area Emergency under SS2. If the RPS, Automatic Reactor trip, fails and a manual reactor trip is initiated, the EAL is satisfied and an Alert must be declared.

SYSTEM MALFUNCTION

SA6

Initiating Condition -- ALERT

UNPLANNED loss of most or all safety system annunciation or indication in the Control Room with either (1) a SIGNIFICANT TRANSIENT in progress, or (2) compensatory non-alarming indicators are unavailable.

Operating Mode Applicability:

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

Emergency Action Level(s):

1. UNPLANNED loss of most or all annunciator cabinets C, D, H, K, M, N, SA, SB annunciators or indicators associated with safety systems > 15 minutes.

AND

Either of the following (a or b):

a. SIGNIFICANT TRANSIENT is in progress.

OR

b. Compensatory non-alarming indications are unavailable.

Basis:

This IC and its associated EAL are intended to recognize the difficulty associated with monitoring changing plant conditions without the use of a major portion of the annunciation or indication equipment during a transient. Recognition of the availability of computer based indication equipment is considered (e.g., SPDS, plant computer, etc.) in this IC.

"Planned" loss of annunciators or indicators includes scheduled maintenance and testing activities.

Quantification of "Most" is arbitrary, however, it is estimated that if approximately **75%** of the safety system annunicators or indicators are lost, there is an increased risk that a degraded plant condition could go undetected.

Indicators associated with safety systems are those indicators for reactivity control, core cooling, maintaining reactor coolant system integrity or maintaining containment integrity.

It is **not** intended that Operators perform a detailed count of the instrumentation lost but use the value as a judgment threshold for determining the severity of the plant conditions. It is also not intended that the Shift Manager be tasked with making a judgment decision as to whether additional personnel are required to provide increased monitoring of system operation.

It is further recognized that redundant safety system indication powered from separate uninterruptible power supplies is provided. While failure of a large portion of annunciators is more likely than a failure of a large portion of indications, 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 is addressed by the specific Technical Specification. The initiation of a Technical Specification imposed plant shutdown related to the instrument loss will be reported via 10 CFR 50.72. If the shutdown is not in compliance with the Technical Specification action, then the UNUSUAL EVENT is based on SU6 "Inability to Reach Required Shutdown Within Technical Specification Limits."

"Compensatory non-alarming indications" in this context includes computer-based information such as SPDS, QSPDS, COLSS, etc. This includes all computer systems available for this use. If **both** a major portion of the annunciation system **and** all computer monitoring are unavailable, then the Alert is required.

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

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

SYSTEM MALFUNCTION

SS1

Initiating Condition -- SITE AREA EMERGENCY

Loss of all offsite power and loss of all onsite AC power to essential busses.

Operating Mode Applicability:

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

Emergency Action Level(s):

1. Loss of power to all unit auxiliary and startup transformers

AND

Failure of the 'A' and 'B' emergency diesel generators to supply power to emergency busses

AND

Failure to restore power to at least one emergency bus within 15 minutes from the time of loss of both offsite and onsite AC power.

Basis:

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

Escalation to General Emergency is via Fission Product Barrier Degradation (F) or SG1, "Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power."

Consideration should be given to operable loads necessary to remove decay heat or provide Reactor Vessel makeup capability when evaluating loss of AC power to essential busses. Even though an essential bus may be energized, if necessary loads (i.e., loads that if lost would inhibit decay heat removal capability or Reactor Vessel makeup capability) are not operable on the energized bus, then the bus should not be considered operable for this IC. If this bus was the only energized bus, then a Site Area Emergency in accordance with SS1 should be declared.

SYSTEM MALFUNCTION

SS1

Loss of all offsite power varies depending on the plant mode and source transformers. If the unit is back feeding via the unit Auxiliary Transformers and offsite power is lost in conjunction with loss of onsite AC power from the emergency diesel generators, then declaration of a Site Area Emergency is warranted.

When temporary emergency diesels (TEDs) are used to supplement onsite AC power for essential busses in the event diesels are lost, they are credited in this EAL. The EAL condition does not apply unless the TED also failed, provided the TED powers necessary loads as described above.

SYSTEM MALFUNCTION

SS3

Initiating Condition -- SITE AREA EMERGENCY

Failure of Reactor Protection System instrumentation to complete or initiate an automatic reactor trip once a Reactor Protection System setpoint has been exceeded and manual trip was NOT successful.

Operating Mode Applicability: **Power Operations (Mode 1)**
Startup (Mode 2)

Emergency Action Level(s):

Indication(s) exist that automatic and manual trip were not successful.

Basis:

Automatic and manual trip are not considered successful if action away from the **reactor control console** was required to trip the reactor. For example, opening the A32 and B32 Bus Feeders to facilitate insertion of all CEAs requires declaration of a Site Area Emergency.

Under these conditions, the reactor is producing more heat than the maximum decay heat load for which the safety systems are designed. A Site Area Emergency is indicated because conditions exist that lead to imminent loss or potential loss of both fuel clad and RCS. Although this may be viewed as redundant to the Fission Product Barrier Degradation (F) EALs, its inclusion is necessary to better assure timely recognition and emergency response. Escalation of this event to a General Emergency would be via Fission Product Barrier Degradation (FG1) or Emergency Coordinator/EOF Director Judgment EALs (HG2).

SYSTEM MALFUNCTION

SS4

Initiating Condition -- SITE AREA EMERGENCY

Loss of all vital DC power.

Operating Mode Applicability:

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

Emergency Action Level(s):

1. Loss of all Vital DC power based on bus voltage indications < 108 volts for > 15 minutes.

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. The minimum voltage necessary, based on plant design, is 105 volts; however, the lowest battery voltage attained on a loss of off site power at the end of the 4 hour period is 107.4 volts on the 'B' battery bank. 108 volts is used for the EAL indication because the Control Room instrumentation reads in 2 volt increments. Reference calculations ECE91-058, "Battery 3A-S "A Train" Calculation for Station Blackout "and ECE91-059, "Battery 3B-S "B Train" Calculation for Station Blackout."

Escalation to a General Emergency would occur by Abnormal Radiation Levels/Radiological Effluents (AG1), Fission Product Barrier Degradation (FG1), or Emergency Coordinator/EOF Director Judgment (HG2) EALs. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

SYSTEM MALFUNCTION

SS5

Initiating Condition -- SITE AREA EMERGENCY

Complete loss of heat removal capability.

Operating Mode Applicability:

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

Emergency Action Level(s):

1. Loss of core cooling and heat sink.

Basis:

This EAL addresses complete loss of functions, including ultimate heat sink, required to attain and maintain Hot Shutdown (Mode 4) with the reactor at pressure and temperature. Reactivity control is addressed in other EALs.

Under these conditions, there is an actual major failure of systems intended for protection of the public. Thus, declaration of a Site Area Emergency is warranted. Escalation to General Emergency would be via Abnormal Radiation Levels / Radiological Effluents (AG1), Emergency Coordinator/EOF Director Judgment (HG2), or Fission Product Barrier Degradation (FG1) EALs.

Steam Generator levels and natural circulation may be used as indicators because RCS temperatures in Mode 4 will be high enough to use Steam Generators as a heat sink. The inability to makeup to the RCS will prevent establishing or maintaining Hot Shutdown due to the inability to maintain adequate RCS inventory.

SYSTEM MALFUNCTION

SS6

Initiating Condition -- SITE AREA EMERGENCY

Inability to monitor a SIGNIFICANT TRANSIENT in progress.

Operating Mode Applicability:

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

Emergency Action Level(s):

1. a. Loss of most or all annunciator cabinets C, D, H, K, M, N, SA, SB annunciators associated with safety systems.

AND

b. Compensatory non-alarming indications are unavailable

AND

c. Indications needed to monitor safety functions (reactivity control, core cooling, maintaining reactor coolant system integrity or maintaining containment integrity) are unavailable

AND

d. SIGNIFICANT TRANSIENT in progress

Basis:

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

Waterford 3 has defined "most" for the first indicator in the EAL to be a loss of **75%** or more of annunciator cabinets C, D, H, K, M, N, SA, SB annunciators. Loss of these annunciator cabinet annunciators or instrumentation has been identified as having the greatest impact on normal operations and safe shutdown of the plant. It is **not** intended that Operations personnel perform a detailed count of the instrumentation lost, but use the value as a judgment threshold for determining the severity of plant conditions. It is also **not** intended that the Shift Manager be tasked with making a judgment decision as to whether additional personnel are required to provide increased monitoring of system operation.

"Compensatory non-alarming indications" in this context includes computer based information such as SPDS, QSPDS, COLSS, etc. This includes all computer systems available for this use.

Indicators associated with safety systems are those indicators for reactivity control, core cooling, maintaining reactor coolant system integrity or maintaining containment integrity. Indications needed to monitor safety functions necessary for protection of the public must include Control Room indications, computer generated indications and dedicated annunciation capability.

"Planned" and **"UNPLANNED"** actions are **not** differentiated since the loss of instrumentation of this magnitude is of such significance during a transient that the cause of the loss is not an ameliorating factor.

This event is required to be declared **regardless** of the length of time equipment is out of service and whether or not equipment is unavailable due to failure or planned maintenance or testing.

SYSTEM MALFUNCTION

SG1

Initiating Condition -- GENERAL EMERGENCY

Prolonged loss of all offsite power and prolonged loss of all onsite AC power to essential busses.

Operating Mode Applicability:

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

Emergency Action Level(s):

1. Loss of power to all unit auxiliary and startup transformers.

AND

Failure of both 'A' and 'B' emergency diesel generators to supply power to emergency busses.

AND

Either of the following: (a or b)

a. Restoration of at least one emergency bus within 4 hours is not likely

OR

b. FA1 entry conditions met.

Basis:

Loss of all AC power compromises all plant safety systems requiring electric power including Shutdown Cooling, ECCS, Containment Heat Removal and the Ultimate Heat Sink. Prolonged loss of all AC power will lead to loss of fuel clad, RCS, and containment.

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 General Emergency occurs as early as is appropriate, based on a reasonable assessment of the event trajectory. 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. The 4 hours to restore AC power is based the site blackout coping analysis performed in conformance with 10 CFR 50.63 and Regulatory Guide 1.155, "Station Blackout."

SYSTEM MALFUNCTION

SG1

Appropriate allowance for offsite emergency response, including evacuation of surrounding areas has been considered. Although this EAL may be viewed as redundant to the Fission Product Barrier Degradation (FG1) EALs, its inclusion is necessary to better assure timely recognition and emergency response.

When temporary emergency diesels (TEDs) are used to supplement onsite AC power for essential busses in the event diesels are lost, they are credited in this EAL.

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

1. Are there any present indications that core cooling is already degraded to the point that Loss or Potential Loss of Fission Product Barriers is imminent?

2. If there are no present indications of such core cooling degradation, then how likely is it that power can be restored in time to assure that a loss of two barriers with a potential loss of the third barrier can be prevented?

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

SYSTEM MALFUNCTION

SG3

Initiating Condition -- GENERAL EMERGENCY

Failure of the Reactor Protection System to complete an automatic trip and manual trip was NOT successful and there is indication of an extreme challenge to the ability to cool the core.

Operating Mode Applicability: **Power Operations (Mode 1)**
Startup (Mode 2)

Emergency Action Level(s):

1. Indications exist that automatic and manual trip were not successful.

AND

Either of the following: (a or b)

a. Indication(s) exists that core cooling is extremely challenged as indicated by CET temperatures at or approaching 1200° F

OR

b. Indication(s) exists that heat removal is extremely challenged as indicated by inability to maintain at least one steam generator > 50% wide range.

Basis:

Automatic and manual trip are **not** considered successful if action away from the **reactor control console** was required to trip the reactor. For example, opening the A32 and B32 Bus Feeders to facilitate insertion of all CEAs requires is **NOT** considered as a successful manual trip under this IC.

Under the conditions of this IC and its associated EALs, the efforts to bring the reactor subcritical have been unsuccessful and, as a result, the reactor is producing more heat than the maximum decay heat load for which the safety systems were designed. Although there are capabilities away from the reactor control console, such as emergency boration, the continuing temperature rise indicates that these capabilities are not effective. This situation could be a precursor for a core melt sequence.

SYSTEM MALFUNCTION

SG3

For Waterford 3, the extreme challenge to the ability to cool the core means that core exit thermocouple temperatures are at or approaching 1200 degrees F. Another consideration is the inability to initially remove heat during the early stages of this sequence. If feedwater flow is insufficient to remove the amount of heat required by design (SG level less than 50% Wide Range) from at least one steam generator, then an extreme challenge should be considered to exist. This level is taken from OP-902-002, Loss of Coolant Accident Recovery Procedure.

In the event either of these challenges exist at a time that the reactor has not been brought below the power associated with the safety system design (typically 3 to 5% power) a core melt sequence exists. In this situation, core degradation can occur rapidly. For this reason, the General Emergency declaration is intended to be anticipatory of the fission product barrier matrix declaration to permit maximum offsite intervention time.