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10 CFR 50.4
10 CFR 50.54(q)(5)
10 CFR 72.44(f)

RS-22-056

April 21, 2022

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

Quad Cities Nuclear Power Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: Constellation Radiological Emergency Plan Addendum Revision

In accordance with 10 CFR 50.4(b)(5), "*Emergency Plan and related submissions*," Constellation Energy Generation, LLC (CEG) is submitting the Emergency Plan Addendum revisions for Quad Cities Nuclear Power Station (Quad Cities) as listed in the table below.

Document	Revisions	Title
EP-AA-1006, Addendum 3	9	<i>Emergency Action Levels Quad Cities Station</i>

The changes to the Emergency Plan Addendum noted in the table were evaluated under the requirements of 10 CFR 50.54(q) and were determined not to result in a reduction in the effectiveness of the Emergency Plan for Quad Cities Station. This notification is being submitted within 30 days of implementation of the changes as required by 10 CFR 50.54(q)(5). The changes continue to meet the applicable emergency planning standards established in 10 CFR 50.47(b) and 10 CFR 50, Appendix E.

In addition, as required by 10 CFR 50.54(q)(5), Attachment 1 of this submittal includes a summary analysis of the changes to the Emergency Plan Addendum. This submittal also satisfies the reporting requirements associated with 10 CFR 72.44(f), which stipulates that within six months after any change is made to the Emergency Plan, the licensee shall submit a report containing a description of the changes to the Director, Division of Fuel Management, Office of Nuclear Material Safety and Safeguards.

A copy of the Emergency Plan Addendum revision and supporting change summary analysis are included in the attachments to this letter.

There are no regulatory commitments in this submittal.

If you have any questions or require additional information, please contact Amy Hambly at (630) 657-2808.

Respectfully,

Gullott, David M. Digitally signed by Gullott, David
M.
Date: 2022.04.21 12:48:29 -05'00'

David M. Gullott
Director, Licensing
Constellation Energy Generation, LLC

Attachments: 1) 10 CFR 50.54(q)(5) Procedure Change Summary Analysis
2) EP-AA-1006, Addendum 3, Revision 9, *"Emergency Action Levels for Quad Cities Station"*

cc: w/ Attachment 1 only
Regional Administrator - NRC Region III
Director, NRC Division of Spent Fuel Management, ONMSS
NRC Senior Resident Inspector – Quad Cities Station
NRC Project Manager, NRR – Quad Cities Station

Attachment 1

10 CFR 50.54(q)(5) Procedure Change Summary Analysis

I. Procedures/Titles

Constellation Energy Generation, LLC (CEG) has issued the Emergency Plan Addendum revision for Quad Cities Station (Quad Cities) as noted below.

- EP-AA-1006, Addendum 3, Revision 9, *"Emergency Action Levels for Quad Cities Station"*

II. Description of Procedures

EP-AA-1006, Addendum 3, describes the Emergency Action Levels (EALs) implemented at Quad Cities for entering Emergency Classification Levels (ECLs).

III. Description of Changes

This 50.54(q) is being performed for the following reasons:

- 1) To implement the revised Emergency Action Levels (EALs) based on implementation of Boiling Water Reactors Owners Group (BWROG) EPG/SAG Revision 4 guidance in the site's Emergency and Severe Accident procedures.

In June 2018, the Boiling Water Reactor Owners' Group (BWROG) issued Revision 4 of the Emergency Procedure and Severe Accident Guidelines (EPG/SAG). EPG/SAG Revision 4 contains procedural enhancements that address shutdown and refueling modes, insights from the March 2011 accident at Fukushima, better integration with other event mitigation procedures (FLEX and B.5.b), post-Fukushima regulatory requirements, and lessons learned from previous changes (e.g., training and implementation feedback). The EPG/SAG revision was developed by subject matter experts with backgrounds in BWR operations, engineering, training, risk assessment, severe accident analysis, human factors, emergency operating procedures (EOPs) and licensing.

Certain changes incorporated into EPG/SAG, Revision 4, impact the Emergency Action Level (EAL) development guidance found in NEI 99-01, Revision 6. EPFAQ 2019-004 identifies those impacts and provides recommended changes to maintain alignment between a plant's EOPs, SAGs, and approved EAL scheme.

The NRC completed their responses to EPFAQ 2019-004 on 7/18/2020. A summary is available as ADAMS Accession No. ML20238C050. The NRC concluded all the proposed changes would reasonably be considered a difference as provided by the guidance in RIS-2003-18, Supplement 2.

The following changes based on EPFAQ 2019-004 are applicable to Quad Cities Station.

a) With respect to the inability to determine RPV water level, the EALs for ICs CU1, CA1, CS1, and CG1 (Exelon CU6, CA6, CS6, and CG6) contain the phrase, “cannot be monitored” The associated bases state: If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. The EALs for ICs SU2 and SA2 (Exelon MU4, and MA4) contain the phrase, “inability to monitor one or more of the following parameters from within the Control Room” The associated bases state: As used in this EAL, an “inability to monitor” means that values for one or more of the listed parameters cannot be determined from within the Control Room. EPG/SAG, Revision 4, uses the phrase “cannot be determined ...” to address instances when operators cannot monitor a parameter by any means (e.g., “RPV water level cannot be determined,” “reactor power cannot be determined”). The NEI 99-01 terms “cannot be monitored” and “inability to monitor” are synonymous (i.e., functionally equivalent) with the EPG/SAG term “cannot be determined.”

As such, CU6, CA6, CS6, and CG6 will replace the term “cannot be monitored” with “cannot be determined” and MU4 and MA 4 will replace the term “inability to monitor” with “cannot be determined”. Also, in the Basis section of MU4 and MA4 the following sentence will be removed since it no longer applies.

“As used in this EAL, an “inability to monitor” means that values for any of the listed parameters cannot be determined from within the Control Room.”

The changes will be consistent with terminology used in EPG/SAG, Revision 4, Quad Cities’ EOPs and SAMGs, will improve consistency, and facilitate accurate and timely EAL assessments.

Since the proposed changes differ in wording but agree in meaning and intent of EAL, the proposed changes would reasonably be considered a difference as provided by the guidance in RIS-2003-18, Supplement 2.

“A difference is an EAL change where the basis scheme guidance differs in wording but agrees in meaning and intent, such that classification of an event would be the same, whether using the basis scheme guidance or the site-specific proposed EAL. Examples of differences include the use of site-specific terminology or administrative re-formatting of site-specific EALs.”

b) NEI 99-01, Revision 6, Technical Basis for Containment Barrier Potential Loss 2.A (Exelon CT2) provides that threshold values should be modified to agree with the site- specific terminology used to direct SAG entry as a result of inadequate core cooling. Quad Cities implemented EPG/SAG Revision 4 which provides a method to remove decay heat using FLEX equipment that could delay or eliminate the need for containment flooding and/or the need for containment venting. As such, using a threshold value based on either SAG entry or containment flooding is no longer appropriate. The BWROG proposed a Containment Barrier Potential Loss 2.A threshold value of “It cannot be determined that core debris will be retained in the RPV.” Considering that this threshold value reflects a SAG decision point

which indicates that decay heat removal is no longer effective and that the primary containment barrier could be challenged. This decision point is contained in Quad Cities Technical Support Guidelines (TSG). Although the EPG/SAG Revision 4 only discusses the threshold for Containment Barrier Potential Loss CT2, licensees that currently use “SAMP entry required” as the threshold value for Fuel Clad Barrier Loss 2.A (Exelon FC2.1) should also use “It cannot be determined that core debris will be retained in the RPV” as a threshold value for Fuel Clad Barrier Loss FC2.1. This will maintain the consistency of the NEI 99-01 Revision 6 scheme.

Both CT2 and FC2.1 threshold have been revised to reflect “It cannot be determined that core debris will be retained in the RPV”.

Since the proposed changes differ in wording but agree in meaning and intent of the EAL, the proposed changes would reasonably be considered a difference as provided by the guidance in RIS-2003-18, Supplement 2.

“A difference is an EAL change where the basis scheme guidance differs in wording but agrees in meaning and intent, such that classification of an event would be the same, whether using the basis scheme guidance or the site-specific proposed EAL. Examples of differences include the use of site-specific terminology or administrative re-formatting of site-specific EALs.”

c) NEI 99-01, Revision 6, Technical Basis for Containment Barrier Potential Loss 1.C (Exelon CT3.4) threshold value uses “site-specific explosive mixture” while the associated basis discussion provides for the lower flammability limit and the developer notes provide for deflagration limits and further provide that the threshold term of “explosive mixture” is synonymous with the EPG/SAG “deflagration limits.” Quad Cities’ EOPs and SAMGs have historically used deflagration limits. To ensure that the site’s EOP and SAMG terminology agrees with the Emergency Action Levels, EAL CT3.4 basis has been revised to reflect a discussion of deflagration limits and removes reference to explosive mixture and lower flammability limit.

“An elevated hydrogen concentration in the presence of oxygen may lead to a deflagration of the mixture inside the primary containment. The rapid burning of this mixture will lead to a pressure increase that could result in a loss of the primary containment barrier.”

This change differs in wording but agrees in meaning and intent of Containment Potential Loss threshold CT3.4, such that classification of the event would be the same. As such, the proposed changes would reasonably be considered a difference as provided by the guidance in RIS-2003-18, Supplement 2.

“A difference is an EAL change where the basis scheme guidance differs in wording but agrees in meaning and intent, such that classification of an event would be the same, whether using the basis scheme guidance or the site-specific proposed EAL. Examples of differences include the use of site-specific terminology or administrative re-formatting of site-specific EALs.”

These changes do not change the historical values of O2% and H2% for Quad Cities' Drywell.

2) EAL HU3.1 and 2 Basis is being enhanced to avoid confusion when determining the applicability of EAL #1 when entering it from EAL #2.

When a single fire alarm occurs in a Table H2 designated area a 30 min clock starts to determine the existence of a fire. If at any time a field verification of a fire is received, then EAL #1 is immediately applicable as stated in EAL #2 Basis:

"If an actual FIRE is verified by a report from the field, then EAL #1 is immediately applicable, and the emergency must be declared if the FIRE is not extinguished within 15-minutes of the report."

This is one of the bulleted items listed under EAL #1:

- *Field verification of a single fire alarm*

Entry into EAL #1 Based on a Field Verification of a Single Fire Alarm starts the 15 min clock to extinguish the fire. If the fire is not extinguished within 15 mins then HU3 should be declared.

EAL #1 Basis also states the following:

"For EAL assessment purposes, the emergency declaration clock starts at the time that the initial alarm, indication, or report was received, and not the time that a subsequent verification action was performed. Similarly, the fire duration clock also starts at the time of receipt of the initial alarms, indication or report."

It should not be construed that EAL #1 Basis is contradicting EAL #2 Basis such that the 15 min clock to extinguish the fire started when the initial single fire alarm was received. EAL #1 Basis reference to *"initial alarm, indication"* is with respect to the way that you entered EAL #1. The discussion in EAL #1 Basis about *"subsequent verification action"* is in reference to verifying the validity of the *"alarm, indications"* if the initial entry into EAL #1 is via this bulleted item.

- *Receipt of multiple (more than 1) fire alarms or indications*

In this case the 15 min clock to extinguish the fire starts from the time that the first of the multiple alarms or indications is received and not when it is verified that they are valid alarms and indications.

3) An enhancement HU3 Basis on when a new EAL clock should begin has been performed.

On October 16th, 2021, Dresden Station declared an Unusual Event for a fire in a Main Power Transformer lasting greater than 60 minutes in the site's Protected Area. As part of this event a review was performed to determine learnings and possible enhancements to assist decision makers in future similar events (IR 04454286 EP Critique/Lessons Learned from Unusual Event Declaration). This review determined that an enhancement to HU3 Basis, discussing when a new fire time clock would be applicable, would assist decision makers during events like the Dresden Transformer Fire.

It was determined that the following sentence would be added to the beginning of the HU3 Basis section.

“When it is determined a FIRE is extinguished, then any subsequent FIRE starts a new time clock.”

This change differs in wording but agrees in meaning and intent of HU3 Basis, such that classification of the event would be the same. As such, the proposed changes would reasonably be considered a difference as provided by the guidance in RIS-2003-18, Supplement 2.

“A difference is an EAL change where the basis scheme guidance differs in wording but agrees in meaning and intent, such that classification of an event would be the same, whether using the basis scheme guidance or the site-specific proposed EAL. Examples of differences include the use of site-specific terminology or administrative re-formatting of site-specific EALs.”

4) Quad Cities has created two EOPs that affect the EALs. These documents are referenced throughout the EALs in the basis reference section. These revisions are listed in the change section under Addendum B to this document. This is an administrative change to the EALs, revising or adding an appropriate reference to the Basis Reference Section of the EAL Basis does not alter the meaning or intent of the approved EAL. Additionally, the regulations and commitments to the NRC continue to be met. Therefore, this change would not result in a reduction of effectiveness of the Emergency Plan.

Description of How the Change Still Complies with Regulations

1) Certain changes incorporated into EPG/SAG, Revision 4, impact the Emergency Action Level (EAL) development guidance found in NEI 99-01, Revision 6. EPFAQ 2019-004 identifies those impacts and provides recommended changes to maintain alignment between a plant's EOPs, SAGs, and approved EAL scheme. The NRC completed their responses to EPFAQ 2019-004 on 7/18/2020. A summary is available as ADAMS Accession No. ML20238C050. Changes 1 – 13 of this 50.54q evaluation are based on EPFAQ 2019-004 and are applicable to Quad Cities station. All the proposed changes would reasonably be considered a difference as provided by the guidance in RIS-2003-18, Supplement 2.

“A difference is an EAL change where the basis scheme guidance differs in wording but agrees in meaning and intent, such that classification of an event would be the same, whether using the basis scheme guidance or the site-specific proposed EAL. Examples of differences include the use of site-specific terminology or administrative re-formatting of site-specific EALs.”

The changes agree in meaning and intent of the applicable EALs such that classification and timeliness of the event would be the same. Therefore, these changes would not result in a reduction of effectiveness of the Emergency Plan. Additionally, the regulations and commitments to the NRC continue to be met.

2 and 3) EAL HU3 Basis is being enhanced to avoid confusion when determining the applicability of EAL #1 when entering it from EAL #2. The change agrees in meaning and intent of the applicable EALs such that classification and timeliness of the event would be the same.

Also adding the following sentence to the beginning of the HU3 Basis section

“When it is determined a FIRE is extinguished, then any subsequent FIRE starts a new time clock.”

Differs in wording but agrees in meaning and intent of HU3 Basis, such that classification of the event would be the same.

As such, the proposed changes would reasonably be considered a difference as provided by the guidance in RIS-2003-18, Supplement 2.

“A difference is an EAL change where the basis scheme guidance differs in wording but agrees in meaning and intent, such that classification of an event would be the same, whether using the basis scheme guidance or the site-specific proposed EAL. Examples of differences include the use of site-specific terminology or administrative re-formatting of site-specific EALs.”

Therefore, these changes would not result in a reduction of effectiveness of the Emergency Plan. Additionally, the regulations and commitments to the NRC continue to be met.

4) Quad Cities has created two EOPs that affect the EALs. These documents are referenced throughout the EALs in the basis reference section. These revisions are listed in the change section under Addendum B to this document. This is an administrative change to the EALs, revising or adding an appropriate reference to the Basis Reference Section of the EAL Basis does not alter the meaning or intent of the approved EAL. Additionally, the regulations and commitments to the NRC continue to be met. Therefore, this change would not result in a reduction of effectiveness of the Emergency Plan.

Description of Why the Change is Not a Reduction in Effectiveness (RIE)

1) All the proposed changes would reasonably be considered a difference as provided by the guidance in RIS-2003-18, Supplement 2.

“A difference is an EAL change where the basis scheme guidance differs in wording but agrees in meaning and intent, such that classification of an event would be the same, whether using the basis scheme guidance or the site-specific proposed EAL. Examples of differences include the use of site-specific terminology or administrative re-formatting of site-specific EALs.”

The changes agree in meaning and intent of the applicable EALs such that classification and timeliness of the event would be the same. Therefore, these changes would not result in a reduction of effectiveness of the Emergency Plan. Additionally, the regulations and commitments to the NRC continue to be met.

2 and 3) The proposed change would reasonably be considered a difference as provided by the guidance in RIS-2003-18, Supplement 2.

“A difference is an EAL change where the basis scheme guidance differs in wording but agrees in meaning and intent, such that classification of an event would be the same, whether using the basis scheme guidance or the site specific proposed EAL. Examples of differences include the use of site-specific terminology or administrative re-formatting of site-specific EALs.”

Therefore, these changes would not result in a reduction of effectiveness of the Emergency Plan. Additionally, the regulations and commitments to the NRC continue to be met.

4) This is an administrative change to the EALs, revising or adding an appropriate reference to the Basis Reference Section of the EAL Basis does not alter the meaning or intent of the approved EAL. Additionally, the regulations and commitments to the NRC continue to be met. Therefore, this change would not result in a reduction of effectiveness of the Emergency Plan.

Attachment 2

**EP-AA-1006, Addendum 3, Revision 9, *"Emergency Action
Levels for Quad Cities Station"***

Emergency Plan Addendum Revision

CONSTELLATION

EMERGENCY ACTION LEVELS FOR QUAD CITIES STATION

[illegible]

Section 1: Classification of Emergencies

1.1 General

Section D of the Exelon Nuclear Standardized Emergency Plan divides the types of emergencies into four EMERGENCY CLASSIFICATION LEVELS (ECLs). The first four are the UNUSUAL EVENT (UE), ALERT, SITE AREA EMERGENCY (SAE), and GENERAL EMERGENCY (GE). These ECLs are entered by satisfying the Initiating Condition (IC) through meeting an Emergency Action Level (EAL) of the IC provided in this section of the Annex. The ECLs are escalated from least severe to most severe according to relative threat to the health and safety of the public and emergency workers. Depending on the severity of an event, prior to returning to a standard day-to-day organization, a state or phase called RECOVERY may be entered to provide dedicated resources and organization in support of restoration and communication activities following the termination of the emergency.

UNUSUAL EVENT (UE): 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 offsite response or monitoring are expected unless further degradation of safety systems occurs.

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 Protective Action Guideline exposure levels.

SITE AREA EMERGENCY (SAE): Events are in progress or have occurred which involve an 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 Protective Action Guideline exposure levels beyond the site boundary.

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 Protective Action Guideline exposure levels offsite for more than the immediate site area.

RECOVERY: Recovery can be considered as a phase of the emergency and is entered by meeting emergency termination criteria provided in EP-AA-111 Emergency Classification and Protective Action Recommendations.

EMERGENCY CLASSIFICATION LEVEL (ECL): One of a set of names or titles established by the US Nuclear Regulatory Commission (NRC) for grouping off-normal events or conditions according to (1) potential or actual effects or consequences, and (2) resulting onsite and offsite response actions. The emergency classification levels, in ascending order of severity, are:

- UNUSUAL EVENT (UE)
- ALERT
- SITE AREA EMERGENCY (SAE)
- GENERAL EMERGENCY (GE)

INITIATING CONDITION (IC): An event or condition that aligns with the definition of one of the four EMERGENCY CLASSIFICATION LEVELS by virtue of the potential or actual effects or consequences.

EMERGENCY ACTION LEVEL (EAL): A pre-determined, site-specific, observable threshold for an INITIATING CONDITION that, when met or exceeded, places the plant in a given EMERGENCY CLASSIFICATION LEVEL.

An emergency is classified by assessing plant conditions and comparing abnormal conditions to ICs and EALs.

Individuals responsible for the classification of events will refer to the Initiating Condition and EALs on the matrix of the appropriate station Standardized Emergency Plan Annex (this document). This matrix will contain ICs, EALs, Mode Applicability Designators, appropriate EAL numbering system, and additional guidance necessary to classify events. It may be provided as a user aid.

The matrix is set up in six Recognition Categories. The first is designated as "R" and relates to Abnormal Radiological Conditions / Abnormal Radiological Effluent Releases. The second is designated as "F" and relates to Fission Product Barrier Degradation. The third is designated as "M" and relates to hot condition System Malfunctions. The fourth is designated as "C" and relates to Cold Shutdown / Refueling System Malfunctions. The fifth is designated as "H" and relates to Hazards and Other Conditions Affecting Plant Safety. The sixth is designated "E-H" and relates to ISFSI Malfunctions.

The matrix is designed to provide an evaluation of the Initiating Conditions from the worst conditions (General Emergencies) on the left to the relatively less severe conditions on the right (Unusual Events). Evaluating conditions from left to right will reduce the possibility that an event will be under classified. All Recognition Categories should be reviewed for applicability prior to classification.

The Initiating Conditions are coded with a two letter and one number code. The first letter is the Recognition Category designator, the second letter is the Classification Level, “U” for (NOTIFICATION OF) UNUSUAL EVENT, “A” for ALERT, “S” for SITE AREA EMERGENCY and “G” for GENERAL EMERGENCY. The EAL number is a sequential number for that Recognition Category series. All ICs that are describing the severity of a common condition (series) will have the same number.

The EAL number may then be used to reference a corresponding page(s), which provides the basis information pertaining to the IC:

- EAL
- Mode Applicability
- Basis

Classification is not to be made without referencing, comparing and satisfying the specified Emergency Action Levels.

A list of definitions is provided as part of this document for terms having specific meaning to the EALs. Site specific definitions are provided for terms with the intent to be used for a particular IC/EAL and may not be applicable to other uses of that term at other sites, the Emergency Plan or procedures.

References are also included to documents that were used to develop the EALs.

References to the Emergency Director means the person in Command and Control as defined in the Emergency Plan. Classification of emergencies is a non-delegable responsibility of Command and Control for the onsite facilities with responsibility assigned to the Shift Emergency Director (Control Room Shift Manager) or the Station Emergency Director (Technical Support Center). Classification of emergencies remains the responsibility of the applicable onsite facility even after Command and Control is transferred to the Corporate Emergency Director (Emergency Operations Facility).

Although the majority of the EALs provide very specific thresholds, the Emergency Director 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 Director, an IMMINENT situation is at hand, the classification should be made as if the EAL has been exceeded. While this is particularly prudent at the higher ECL (as the early classification may provide for more effective implementation of protective measures), it is nonetheless applicable to all ECLs.

1.2 Classification, Instrumentation and Transient Events

Classifications are based on evaluation of each Unit. All classifications are to be based upon 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 is the need for timely assessment.

Indications used for monitoring and evaluation of plant conditions include the normally used instrumentation, backup or redundant instrumentation, and the use of other parameters that provide information that supports determination if an EAL has been reached. When an EAL refers to a specific instrument or indication that is determined to be inaccurate or unavailable, then alternate indications shall be used to monitor the specified condition.

During an event that results in changing parameters trending towards an EAL classification, and instrumentation that was available to monitor this parameter becomes unavailable or the parameter goes off scale, the parameter should be assumed to have been exceeded consistent with the trend and the classification made if there are no other direct or indirect means available to determine if the EAL has not been exceeded.

The assessment of some EALs is based on the results of analyses that are necessary to ascertain whether a specific EAL has been exceeded (e.g., dose assessments, chemistry sampling, RCS leak rate calculation, etc.); the EAL and/or the associated basis discussion will identify the necessary analysis. In these cases, the 15-minute declaration period starts with the availability of the analysis results that show the EAL to be exceeded (i.e., this is the time that the EAL information is first available).

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 site's Technical Specifications. Activities which cause the site to operate beyond that allowed by the site's Technical Specifications, planned or unplanned, may result in an EAL being met or exceeded. Planned evolutions to test, manipulate, repair, perform maintenance or modifications to systems and equipment that result in an EAL 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.

When two or more EALs are determined, declaration will be made on the highest classification level for the Unit. When both units are affected, the highest classification for the Station will be used for notification purposes and both Units' ECLs will be noted.

Concerning ECL Downgrading, Exelon Nuclear policy is that ECLs shall not be downgraded to a lower classification. Once declared, the event shall remain in effect until no Classification is warranted or until such time as conditions warrant classification to Recovery.

There may be cases in which a plant condition that exceeded an EAL 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, the guidance of NUREG-1022, Event Reporting Guidelines 10 CFR 50.72 and 50.73 and the Reportability Reference Manual, should be applied.

1.3 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 can be made, the declaration 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 Matrix EALs are applicable only to events that initiate in Hot Shutdown or higher.

If there is a change in Mode following an event declaration, any subsequent events involving EALs outside of the current declaration escalation path will be evaluated on the Mode of the plant at the time the subsequent events occur.

1.4 Emergency Director Judgment

Emergency Director (ED) Judgment EALs are provided in the Hazards and Other Condition Affecting Plant Safety section and on the Fission Product Barrier (FPB) Matrix. Both of the ED Judgment EALs have specific criteria for when they should be applied.

The Hazards Section ED Judgment EALs are intended to address unanticipated conditions which are not addressed explicitly by other EALs but warrant declaration of an emergency because conditions exist which are believed by the ED to fall under specific emergency classifications (UE, Alert, SAE or GE).

The FPB Matrix ED Judgment EALs are intended to include unanticipated conditions, which are not addressed explicitly by any of the other FPB threshold

values, but warrant determination because conditions exist that fall under the broader definition for a significant Loss or Potential Loss of the barrier (equal to or greater than the defined FPB threshold values).

1.5 Fission Product Barrier (FPB) Threshold

A fission product barrier threshold is a pre-determined, site-specific, observable threshold indicating the loss or potential loss of a fission product barrier.

FPB thresholds represent threats to the defense in depth design concept that precludes the release of radioactive fission products to the environment. This concept relies on multiple physical barriers, any one of which, if maintained intact, precludes the release of significant amounts of radioactive fission products to the environment. The primary FPBs are:

- Fuel Clad (FC)
- Reactor Coolant System (RCS)
- Containment (CT)

Upon determination that one or more FPB thresholds have been exceeded, the combination of barrier loss and/or potential loss thresholds is compared to the FPB IC/EAL criteria to determine the appropriate ECL.

In some accident sequences, the ICs and EALs presented in the Abnormal Radiation Levels/ Radiological Effluent (R) Recognition Category will be exceeded at the same time, or shortly after, the loss of one or more fission product barriers. This redundancy is intentional as the former ICs address radioactivity releases that result in certain offsite doses from whatever cause, including events that might not be fully encompassed by fission product barriers (e.g., spent fuel pool accidents, design containment leakage following a LOCA, etc.).

1.6 Fission Product Barrier Restoration

Fission Product Barriers are not treated the same as EAL threshold values. Conditions warranting declaration of the loss or potential loss of a FPB may occur resulting in a specific classification. The condition that caused the loss or potential loss declaration could be rectified as the result of Operator action, automatic actions, or designed plant response. Barriers will be considered re-established when there are direct verifiable indications (containment penetration or open valve has been isolated, coolant sample results, etc) that the barrier has been restored and is capable of mitigating future events.

The reestablishment of a FPB does not alter or lower the existing classification. Termination and entry into RECOVERY phase is still required for exiting the present classification. However the reestablishment of the barrier should be considered in determining future classifications should plant conditions or events change.

1.7 Definitions

CONFINEMENT BOUNDARY: The irradiated fuel dry storage cask barrier(s) between areas containing radioactive substances and the environment.

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

EXPLOSION: A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should not automatically be considered an explosion. Such events may require a post-event inspection to determine if the attributes of an explosion are present.

FIRE: Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do not constitute fire. Observation of flame is preferred but is NOT required if large quantities of smoke and heat are observed.

FISSION PRODUCT BARRIER (FPB) THRESHOLD: A pre-determined, site-specific, observable threshold indicating the loss or potential loss of a fission product barrier.

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 Nuclear Power Plant (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).

HOSTILE FORCE: Any 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: The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI): A complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage.

NORMAL LEVELS: As applied to radiological IC/EALs, the highest reading in the past twenty-four hours excluding the current peak value.

<u>OPERATING MODES</u>	<u>REACTOR MODE SWITCH POSITION</u>	<u>TEMP</u>
(1) Power Operation:	Run	N/A
(2) Startup:	Refuel ^(a) or Startup/Hot Standby	N/A
(3) Hot Shutdown ^(a) :	Shutdown	> 212° F
(4) Cold Shutdown ^(a) :	Shutdown	≤ 212° F
(5) Refueling ^(b) :	Shutdown or Refuel	N/A
(D) Defueled:	All reactor fuel removed from reactor pressure vessel (full core off load during refueling or extended outage).	

^(a) All reactor vessel head closure bolts fully tensioned.

^(b) One or more reactor vessel head closure bolts less than fully tensioned.

Hot Matrix – applies in modes (1), (2), and (3)

Cold Matrix – applies in modes (4), (5), and (D)

OWNER CONTROLLED AREA (OCA): The property associated with the station and owned by the company. Access is normally limited to persons entering for official business.

PROJECTILE: An object directed toward a Nuclear Power Plant (NPP) that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

REFUELING PATHWAY: all the cavities, tubes, canals and pools through which irradiated fuel may be moved or stored, but not including the reactor vessel below the flange.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

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: An open or breached system line that cannot be isolated, remotely or locally.

UNPLANNED: A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

VISIBLE DAMAGE: Damage to a SAFETY SYSTEM train that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected SAFETY SYSTEM train.

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						E-HU1	2-151

GENERAL EMERGENCY			SITE AREA EMERGENCY			ALERT			UNUSUAL EVENT			
Abnormal Rad Levels / Radiological Effluents												
Radiological Effluents	RG1 Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mRem TEDE or 5,000 mRem thyroid CDE.			RS1 Release of gaseous radioactivity resulting in offsite dose greater than 100 mRem TEDE or 500 mRem thyroid CDE.			RA1 Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE.			RU1 Any release of gaseous or liquid radioactivity to the environment greater than 2 times the ODCM for 60 minutes or longer.		
	<u>Emergency Action Level (EAL):</u>			<u>Emergency Action Level (EAL):</u>			<u>Emergency Action Level (EAL):</u>			<u>Emergency Action Level (EAL):</u>		
	Notes:			Notes:			Notes:			Notes:		
	<ul style="list-style-type: none">The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.			<ul style="list-style-type: none">The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.			<ul style="list-style-type: none">The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.			<ul style="list-style-type: none">The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes.Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.		
	1. The sum of readings on the Rx Bldg and Chimney SPINGs > 3.84 E+09 uCi/sec for ≥ 15 minutes (as determined by Control Room Panels or PPDS – Total Noble Gas Release Rate).			1. The sum of readings on the Rx Bldg and Chimney SPINGs > 3.84 E+08 uCi/sec for ≥ 15 minutes (as determined by Control Room Panels or PPDS – Total Noble Gas Release Rate).			1. The sum of readings on the Rx Bldg and Chimney SPINGs > 3.84 E+07 uCi/sec for ≥ 15 minutes (as determined by Control Room Panels or PPDS – Total Noble Gas Release Rate).			1. Reading on ANY of the following effluent monitors > 2 times alarm setpoint established by a current radioactive release discharge permit for ≥ 60 minutes .		
	OR			OR			OR			OR		
	2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of EITHER :			2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of EITHER :			2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of EITHER :			2. The sum of readings on the Rx Bldg and Chimney SPINGs > 4.38 E+05 uCi/sec for ≥ 60 minutes (as determined by Control Room Panels or PPDS – Total Noble Gas Release Rate).		
	a. > 1000 mRem TEDE			a. > 100 mRem TEDE			a. > 10 mRem TEDE			• Radwaste Effluent Monitor 1/2-1799-01		
	OR			OR			OR			OR		
	b. > 5000 mRem CDE Thyroid			b. > 500 mRem CDE Thyroid			b. > 50 mRem CDE Thyroid			• Discharge Permit specified monitor		
OR			OR			OR			OR			
3. Field survey results at or beyond the site boundary indicate EITHER :			3. Field survey results at or beyond the site boundary indicate EITHER :			3. Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than EITHER of the following at or beyond the site boundary			3. Confirmed sample analyses for gaseous or liquid releases indicate concentrations or release rates > 2 times ODCM Limit with a release duration of ≥ 60 minutes .			
a. Gamma (closed window) dose rates > 1000 mR/hr are expected to continue for ≥ 60 minutes .			a. Gamma (closed window) dose rates > 100 mR/hr are expected to continue for ≥ 60 minutes .			a. 10 mRem TEDE for 60 minutes of exposure						
OR			OR			OR						
b. Analyses of field survey samples indicate > 5000 mRem CDE Thyroid for 60 minutes of inhalation.			b. Analyses of field survey samples indicate > 500 mRem CDE Thyroid for 60 minutes of inhalation.			b. 50 mRem CDE Thyroid for 60 minutes of exposure						
OR			OR			OR						
						4. Field survey results at or beyond the site boundary indicate EITHER :						
						a. Gamma (closed window) dose rates > 10 mR/hr are expected to continue for ≥ 60 minutes .						
						OR						
						b. Analyses of field survey samples indicate > 50 mRem CDE Thyroid for 60 minutes of inhalation.						

Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D – Defueled

GENERAL EMERGENCY			SITE AREA EMERGENCY			ALERT			UNUSUAL EVENT																											
Abnormal Rad Levels / Radiological Effluents																																				
Radiological Effluents	<div>RG2</div> <div>Spent fuel pool level cannot be <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> restored to at least 0.60 ft. as indicated on LI-1(2)-1901-121 for 60 minutes or longer.</div> <div>Emergency Action Levels (EAL):</div> <div>Note: The Emergency Director should declare the General Emergency promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</div> <div>Spent fuel pool level cannot be restored to at least 0.60 ft. as indicated on LI-1(2)-1901-121 for 60 minutes or longer.</div>						<div>RS2</div> <div>Spent fuel pool level at <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> 0.60 ft. as indicated on LI-1(2)-1901-121.</div> <div>Emergency Action Level (EAL):</div> <div>Lowering of spent fuel pool level to 0.60 ft. as indicated on LI-1(2)-1901-121.</div>						<div>RA2</div> <div>Significant lowering of water <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> level above, or damage to, irradiated fuel.</div> <div>Emergency Action Level (EAL):</div> <div><div>1.</div><div>Uncovery of irradiated fuel in the REFUELING PATHWAY.</div></div> <div>OR</div> <div><div>2.</div><div>Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by ANY Table R1 Radiation Monitor reading >1000 mRem/hr.</div></div> <div>OR</div> <div><div>3.</div><div>Lowering of spent fuel pool level to 10.20 ft. as indicated on LI-1(2)-1901-121.</div></div>						<div>RU2</div> <div>Unplanned loss of water level <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> above irradiated fuel.</div> <div>Emergency Action Level (EAL):</div> <div><div>1.</div><div>a. UNPLANNED water level drop in the REFUELING PATHWAY as indicated by ANY of the following:<div><div>•</div><div>Refueling Cavity water level < 282 in. (Upper Wide range simulated signal).</div></div></div><div>OR</div><div><div>•</div><div>Spent Fuel Pool water level < 19 ft. above the fuel (< - 4 ft. indicated level).</div></div><div>OR</div><div><div>•</div><div>Indication or report of a drop in water level in the REFUELING PATHWAY.</div></div></div> <div>AND</div> <div>b. UNPLANNED Area Radiation Monitor reading rise on ANY radiation monitors in Table R1.</div>																	
	<div>Table R1</div> <div>Fuel Handling Incident Radiation Monitors</div> <div><div>•</div><div>1(2) 1705-16A Fuel Pool Rad Monitor</div></div> <div><div>•</div><div>1(2) 1705-16B Fuel Pool Rad Monitor</div></div>						<div>Table R2</div> <div>Areas Requiring Continuous Occupancy</div> <div><div>•</div><div>Main Control Room</div></div> <div><div>•</div><div>Central Alarm Station – (by survey)</div></div>																													
							<div>Table R3</div> <div>Areas with Entry Related Mode Applicability</div> <table><tr><th>Area</th><th>Unit</th><th>Entry Related Mode Applicability</th></tr><tr><td>Reactor Building</td><td></td><td rowspan="5">Mode 3 and 4</td></tr><tr><td><div><div>•</div><div>First Floor North Wall</div></div></td><td>1</td></tr><tr><td><div><div>•</div><div>Second Floor North Wall</div></div></td><td>1</td></tr><tr><td><div><div>•</div><div>First Floor South Wall</div></div></td><td>2</td></tr><tr><td><div><div>•</div><div>Second Floor South Wall</div></div></td><td>2</td></tr><tr><td>High Pressure Heater Bay</td><td>1 & 2</td><td rowspan="3">Mode 3</td></tr><tr><td>MSIV Room</td><td>1</td></tr><tr><td>Second Floor Turbine Bldg. N.E. Corner</td><td>2</td></tr></table>			Area	Unit	Entry Related Mode Applicability	Reactor Building		Mode 3 and 4	<div><div>•</div><div>First Floor North Wall</div></div>	1	<div><div>•</div><div>Second Floor North Wall</div></div>	1	<div><div>•</div><div>First Floor South Wall</div></div>	2	<div><div>•</div><div>Second Floor South Wall</div></div>	2	High Pressure Heater Bay	1 & 2	Mode 3	MSIV Room	1	Second Floor Turbine Bldg. N.E. Corner	2						
	Area	Unit	Entry Related Mode Applicability																																	
	Reactor Building		Mode 3 and 4																																	
	<div><div>•</div><div>First Floor North Wall</div></div>	1																																		
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	High Pressure Heater Bay	1 & 2	Mode 3																																	
MSIV Room	1																																			
Second Floor Turbine Bldg. N.E. Corner	2																																			
						<div>RA3</div> <div>Radiation levels that impede <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> access to equipment necessary for normal plant operations, cooldown or shutdown.</div> <div>Emergency Action Level (EAL):</div> <div>Note: If the equipment in the room or area listed in Table R3 was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted.</div> <div><div>1.</div><div>Dose rate > 15 mR/hr in ANY of the areas contained in Table R2.</div></div> <div>OR</div> <div><div>2.</div><div>An UNPLANNED event results in radiation levels that prohibit or significantly impede access to any of the areas contained in Table R3.</div></div>																														
									<div>RU3</div> <div>Reactor coolant activity greater <div><div>1</div><div>2</div><div>3</div></div> than Technical Specification allowable limits.</div> <div>Emergency Action Level (EAL):</div> <div><div>1.</div><div>Offgas system radiation monitor HI-HI alarm.</div></div> <div>OR</div> <div><div>2.</div><div>Specific coolant activity > 4.0 uCi/gm Dose equivalent I-131.</div></div>																											

HOT MATRIX		Fission Product Barrier Matrix				HOT MATRIX		
GENERAL EMERGENCY			SITE AREA EMERGENCY			ALERT		
FG1 Loss of any two barriers AND Loss or Potential Loss of third barrier. 123			FS1 Loss or Potential Loss of ANY two barriers. 123			FA1 ANY Loss or ANY Potential Loss of either Fuel Clad or RCS 123		
Sub-Category	FC – Fuel Clad		RC – Reactor Coolant System		CT - Containment			
	Loss	Potential Loss	Loss	Potential Loss	Loss	Potential Loss		
1. RCS Activity	Coolant activity > 300 uCi/gm Dose Equivalent I-131.	None	None	None	None	None		
2. RPV Water Level	1. It cannot be determined that core debris will be retained in the RPV.	2. RPV water level cannot be restored and maintained > -142 inches (TAF) OR 3. RPV water level cannot be determined.	1. RPV water level cannot be restored and maintained > -142 inches (TAF) OR 2. RPV water level cannot be determined.	None	None	It cannot be determined that core debris will be retained in the RPV.		
3. Primary Containment Pressure/Conditions	None	None	1. Drywell pressure >2.5 psig. AND 2. Drywell pressure rise is due to RCS leakage	None	1. UNPLANNED rapid drop in Drywell pressure following Drywell pressure rise. OR 2. Drywell pressure response not consistent with LOCA conditions.	3. Drywell pressure > 56 psig and rising. OR 4. a. Drywell or torus hydrogen concentration ≥ 6%. AND b. Drywell or torus oxygen concentration ≥ 5%. OR 5. Heat Capacity Limit (QGA 200, HCTL) exceeded.		
4.RCS Leak Rate	None	None	1. UNISOLABLE Main Steam Line (MSL), HPCI, Feedwater, RWCU or RCIC line break. OR 2. Emergency RPV Depressurization is required.	3. UNISOLABLE primary system leakage that results in EITHER of the following: a. Secondary Containment area temperature > QGA 300 Maximum Normal operating levels. OR b. Secondary Containment area radiation level > QGA 300 Maximum Normal operating level.	None	None		
5.Primary Containment Radiation	Drywell radiation monitor reading > 1.53 E+03 R/hr.	None	Drywell radiation monitor reading > 100R/hr (>1.00 E+02 R/hr).	None	None	Drywell radiation monitor reading > 1.99 E+04 R/hr		
6.Primary Containment Isolation Failure	None	None	None	None	1. UNISOLABLE direct downstream pathway to the environment exists after primary containment isolation signal. OR 2. Intentional Primary Containment venting/purging per EOPs or SAMGs due to accident conditions. OR 3. UNISOLABLE primary system leakage that results in EITHER of the following: a. Secondary Containment area temperature > QGA 300 Maximum Safe operating levels. OR b. Secondary Containment area radiation level > QGA 300 Maximum Safe operating levels.	None		
7. Emergency Director Judgment	1. Any condition in the opinion of the Emergency Director that indicates Loss of the Fuel Clad Barrier.	2. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the Fuel Clad Barrier.	1. Any condition in the opinion of the Emergency Director that indicates Loss of the RCS Barrier.	2. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the RCS Barrier.	1. Any condition in the opinion of the Emergency Director that indicates Loss of the Containment Barrier.	2. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the Containment Barrier.		

Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D – Defueled

HOT MATRIX

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT	
System Malfunction							
Loss of AC Power	<div><div>MG1</div><div>Prolonged loss of all offsite and all onsite AC power to emergency buses.</div><div><div>1</div><div>2</div><div>3</div></div></div> <div><div>Emergency Action Level (EAL):</div><div>Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</div></div> <div><div>1. a. Loss of ALL offsite and onsite AC power to unit ECCS busses.</div><div>AND</div><div>b. EITHER of the following:</div><div><div>• Restoration of at least one unit ECCS bus in < 4 hours is <u>not</u> likely.</div><div>OR</div><div>• RPV water level <u>cannot</u> be restored and maintained > -162 inches.</div></div></div>	<div><div>MS1</div><div>Loss of all Off-site and On-Site AC power to emergency busses for 15 minutes or longer.</div><div><div>1</div><div>2</div><div>3</div></div></div> <div><div>Emergency Action Level (EAL):</div><div>Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</div></div> <div><div>1. a. Loss of ALL offsite and onsite AC Power to unit ECCS busses.</div><div>AND</div><div>b. Failure to restore power to at least one unit ECCS bus in < 15 minutes from the time of loss of both offsite and onsite AC power.</div></div>	<div><div>MA1</div><div>Loss of all but one AC power source to emergency busses for 15 minutes or longer.</div><div><div>1</div><div>2</div><div>3</div></div></div> <div><div>Emergency Action Level (EAL):</div><div>Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</div></div> <div><div>1. a. AC power capability to unit ECCS buses reduced to only one of the following power sources for ≥ 15 minutes.</div><div><div>• Reserve auxiliary Transformer TR-12 (TR-22)</div><div>• Unit auxiliary transformer TR-11 (TR-21)</div><div>• Unit Emergency Diesel Generator</div><div>• Shared Emergency Diesel Generator</div><div>• Unit crosstie breakers</div></div><div>AND</div><div>b. ANY additional single power source failure will result in a loss of ALL AC power to SAFETY SYSTEMs.</div></div>	<div><div>MU1</div><div>Loss of all offsite AC power capability to emergency busses for 15 minutes or longer.</div><div><div>1</div><div>2</div><div>3</div></div></div> <div><div>Emergency Action Level (EAL):</div><div>Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</div></div> <div><div>Loss of ALL offsite AC power capability to unit ECCS buses for ≥ 15 minutes.</div></div>			
	<div><div>MG2</div><div>Loss of all AC and Vital DC power sources for 15 minutes or longer.</div><div><div>1</div><div>2</div><div>3</div></div></div> <div><div>Emergency Action Level (EAL):</div><div>Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</div></div> <div><div>1. a. Loss of ALL offsite and onsite AC power to unit ECCS busses.</div><div>AND</div><div>b. Voltage is < 105 VDC on unit 125 VDC battery busses #1 and #2.</div><div>AND</div><div>c. ALL AC and Vital DC power sources have been lost for ≥ 15 minutes.</div></div>	<div><div>MS2</div><div>Loss of all Vital DC power for 15 minutes or longer.</div><div><div>1</div><div>2</div><div>3</div></div></div> <div><div>Emergency Action Level (EAL):</div><div>Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</div></div> <div><div>Voltage is < 105 VDC on 125 VDC battery busses #1 and #2 for ≥ 15 minutes.</div></div>					

Modes:

1 – Power Operation

2 – Startup

3 – Hot Shutdown

4 – Cold Shutdown

5 – Refueling

D – Defueled

Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D – Defueled

HOT MATRIX

HOT MATRIX

HOT MATRIX

HOT MATRIX

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT	
System Malfunction							
RPS Failure		<div><div>MS3</div><div>Inability to shutdown the reactor <div>12</div> causing a challenge to core cooling or RCS heat removal.</div></div> <div>Emergency Action Level (EAL): 1. Automatic scram did not shutdown the reactor as indicated by Reactor Power > 5%. AND 2. All manual / ARI actions to shutdown the reactor have been unsuccessful as indicated by Reactor Power > 5%. AND 3. EITHER of the following conditions exist:<ul style="list-style-type: none">RPV water level cannot be restored and maintained > -162 inches.OR<ul style="list-style-type: none">Heat Capacity Limit (QGA 200, HCTL) exceeded.</div>	<div><div>MA3</div><div>Automatic or manual trip fails <div>12</div> to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor.</div></div> <div>Emergency Action Level (EAL): Note: A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies. 1. Automatic or manual scram did not shutdown the reactor as indicated by Reactor Power > 5%. AND 2. Manual / ARI actions taken at the reactor control consoles are not successful in shutting down the reactor as indicated by Reactor Power > 5%.</div>	<div><div>MU3</div><div>Automatic or manual trip fails <div>12</div> to shutdown the reactor.</div></div> <div>Emergency Action Level (EAL): Note: A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies. 1. a. Automatic scram did not shutdown the reactor as indicated by Reactor Power > 5%. AND b. Subsequent manual / ARI action taken at the reactor control consoles is successful in shutting down the reactor as indicated by Reactor Power ≤ 5%. OR 2. a. Manual scram did not shutdown the reactor as indicated by Reactor Power > 5%. AND b. EITHER of the following: 1. Subsequent manual / ARI action taken at the reactor control consoles is successful in shutting down the reactor as indicated by Reactor Power ≤ 5%. OR 2. Subsequent automatic scram / ARI is successful in shutting down the reactor as indicated by Reactor Power ≤ 5%.</div>			
	<div><div>Control Room Indications</div><div><div>Table M1 Control Room Parameters</div><div><ul style="list-style-type: none">Reactor PowerRPV Water LevelRPV PressureDrywell PressureTorus LevelTorus Temperature</div></div><div><div>Table M2 Significant Transients</div><div><ul style="list-style-type: none">Turbine TripReactor ScramECCS ActivationRecirc. Runback > 25% Reactor Power ChangeThermal Power oscillations > 10% Reactor Power Change</div></div></div>	<div><div>MA4</div><div>UNPLANNED loss of Control Room <div>123</div> indications for 15 minutes or longer with a significant transient in progress.</div></div> <div>Emergency Action Level (EAL): Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. ANY Table M1 parameter cannot be determined from within the Control Room for ≥ 15 minutes due to an UNPLANNED event. AND 2. ANY Table M2 transient in progress.</div>	<div><div>MU4</div><div>UNPLANNED loss of Control Room <div>123</div> indications for 15 minutes or longer.</div></div> <div>Emergency Action Level (EAL): Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. ANY Table M1 parameter cannot be determined from within the Control Room for ≥ 15 minutes due to an UNPLANNED event.</div>				

Modes:

1 – Power Operation

2 – Startup

3 – Hot Shutdown

4 – Cold Shutdown

5 – Refueling

D – Defueled

Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D – Defueled

HOT MATRIX

March 2022

HOT MATRIX

HOT MATRIX

HOT MATRIX

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT	
System Malfunction							
Hazard affects Safety System				<div><div>MA5</div><div>Hazardous event affecting a <div>123</div> SAFETY SYSTEM required for the current operating mode.</div></div> <div><div>Emergency Action Level (EAL):</div><div>Note:</div><div><div><div><div>This EAL is only applicable to SAFETY SYSTEMs having two (2) or more trains.</div><div>If the affected SAFETY SYSTEM train was already inoperable before the hazardous event occurred, then this emergency classification is not warranted.</div><div>If the hazardous event only resulted in VISIBLE DAMAGE, with no indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is not warranted.</div><div>If a hazardous event occurs and it is determined that the conditions of MA5 are not met, then assess the event via HU3, HU4, or HU6.</div></div></div><div><div>1. a. The occurrence of ANY of the following hazardous events:</div><div><div><div>Seismic event (earthquake)</div><div>Internal or external flooding event</div><div>High winds or tornado strike</div><div>FIRE</div><div>EXPLOSION</div><div>Other events with similar hazard characteristics as determined by the Shift Manager</div></div></div><div><div>AND</div><div>b. Event damage has caused indications of degraded performance to one train of a SAFETY SYSTEM required by Technical Specifications for the current operating mode.</div><div><div>AND</div><div>c. EITHER of the following:</div><div><div><div>Event damage has caused indications of degraded performance to a second train of the SAFETY SYSTEM required by Technical Specifications for the current operating mode.</div><div>OR</div><div>Event damage has resulted in VISIBLE DAMAGE to a second train of the SAFETY SYSTEM required by Technical Specifications for the current operating mode.</div></div></div></div></div></div></div></div>			

Modes:

1 – Power Operation

2 – Startup

3 – Hot Shutdown

4 – Cold Shutdown

5 – Refueling

D – Defueled

HOT MATRIX

HOT MATRIX

HOT MATRIX				HOT MATRIX																															
GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT																													
System Malfunction																																			
RCS Leak					<div>MU6 RCS leakage for 15 minutes or longer. <div>123</div></div> <div>Emergency Action Level (EAL):</div> <div>Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</div> <div>1. RCS unidentified or pressure boundary leakage in the Drywell > 10 gpm for ≥ 15 minutes</div> <div>OR</div> <div>2. RCS identified leakage in the Drywell >25 gpm for ≥ 15 minutes</div> <div>OR</div> <div>3. Leakage from the RCS to a location outside the Drywell >25 gpm for ≥ 15 minutes</div>																														
Communications					<div>Table M3 Communications Capability</div> <table><tr><th>System</th><th>Onsite</th><th>Offsite</th><th>NRC</th></tr><tr><td>Plant Radio</td><td>X</td><td></td><td></td></tr><tr><td>Plant Page</td><td>X</td><td></td><td></td></tr><tr><td>All telephone Lines (Commercial and microwave)</td><td>X</td><td>X</td><td>X</td></tr><tr><td>ENS</td><td></td><td>X</td><td>X</td></tr><tr><td>HPN</td><td></td><td>X</td><td>X</td></tr><tr><td>Satellite Phones</td><td></td><td>X</td><td>X</td></tr></table>			System	Onsite	Offsite	NRC	Plant Radio	X			Plant Page	X			All telephone Lines (Commercial and microwave)	X	X	X	ENS		X	X	HPN		X	X	Satellite Phones		X	X
	System	Onsite	Offsite	NRC																															
Plant Radio	X																																		
Plant Page	X																																		
All telephone Lines (Commercial and microwave)	X	X	X																																
ENS		X	X																																
HPN		X	X																																
Satellite Phones		X	X																																
					<div>MU7 Loss of all On-site or Off-site communication capabilities. <div>123</div></div> <div>Emergency Action Level (EAL):</div> <div>1. Loss of ALL Table M3 Onsite communications capability affecting the ability to perform routine operations.</div> <div>OR</div> <div>2. Loss of ALL Table M3 Offsite communication capability affecting the ability to perform offsite notifications.</div> <div>OR</div> <div>3. Loss of ALL Table M3 NRC communication capability affecting the ability to perform NRC notifications.</div>																														

Modes:

1 – Power Operation

2 – Startup

3 – Hot Shutdown

4 – Cold Shutdown

5 – Refueling

D - Defueled

HOT MATRIX

HOT MATRIX

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT	
Hazards and Other conditions Affecting Plant Safety							
Hostile Action		<div><div>HS1</div><div>HOSTILE ACTION within the PROTECTED AREA</div><div>12345D</div></div> <div><div>Emergency Action Level (EAL):</div><div>A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA.</div></div>		<div><div>HA1</div><div>HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes.</div><div>12345D</div></div> <div><div>Emergency Action Level (EAL):</div><div><div>1. A validated notification from NRC of an aircraft attack threat < 30 minutes of the site.</div><div>OR</div><div>2. Notification by the Security Force that a HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA.</div></div></div>		<div><div>HU1</div><div>Confirmed SECURITY CONDITION or threat.</div><div>12345D</div></div> <div><div>Emergency Action Level (EAL):</div><div><div>1. Notification of a credible security threat directed at the site as determined per SY-AA-101-132, Security Assessment and Response to Unusual Activities.</div><div>OR</div><div>2. A validated notification from the NRC providing information of an aircraft threat.</div><div>OR</div><div>3. Notification by the Security Force of a SECURITY CONDITION that does not involve a HOSTILE ACTION.</div></div></div>	
	<div><div>Table H1 Safety Functions</div><div><div><div>• Reactivity Control (ability to shutdown the reactor and keep it shut down)</div><div>• RPV Water Level (ability to cool the core)</div><div>• RCS Heat Removal (ability to maintain a heat sink)</div></div></div></div>	<div><div>HS2</div><div>Inability to control a key safety function from outside the Control Room</div><div>12345D</div></div> <div><div>Emergency Action Level (EAL):</div><div><div>Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</div><div>1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per<div><div>• QCARP 0050-01, SB-1-1 Injection with SSMP and Bringing the Unit to Cold Shutdown</div><div>OR</div><div>• QCARP 0050-02, SB-1-2 Injection with RCIC and Bringing the Unit to Cold Shutdown</div><div>OR</div><div>• QOA 0010-05, Plant Operation with the Control Room Inaccessible</div></div></div><div>AND</div><div>2. Control of ANY Table H1 key safety function is not reestablished in < 30 minutes.</div></div></div>	<div><div>HA2</div><div>Control Room evacuation resulting in transfer of plant control to alternate locations</div><div>12345D</div></div> <div><div>Emergency Action Level (EAL):</div><div><div>A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per<div><div>• QCARP 0050-01, SB-1-1 Injection with SSMP and Bringing the Unit to Cold Shutdown</div><div>OR</div><div>• QCARP 0050-02, SB-1-2 Injection with RCIC and Bringing the Unit to Cold Shutdown</div><div>OR</div><div>• QOA 0010-05, Plant Operation with the Control Room Inaccessible</div></div></div></div></div>				
Transfer of Plant Control							

Modes:

1 – Power Operation

2 – Startup

3 – Hot Shutdown

4 – Cold Shutdown

5 – Refueling

D – Defueled

HOT MATRIX

HOT MATRIX

HOT MATRIX

HOT MATRIX

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT					
Hazards and Other conditions Affecting Plant Safety											
Fire				<table><tr><th colspan="2">Table H2 Vital Areas</th></tr><tr><td colspan="2"><ul style="list-style-type: none">Reactor Building (when inerted the Drywell is exempt)Main Control Room EnvelopeUnit and Shared Emergency Diesel Generator Rooms4KV Switchgear AreaBattery RoomsRHR Service Water VaultsTurbine Building Cable TunnelCribhouse</td></tr></table>		Table H2 Vital Areas		<ul style="list-style-type: none">Reactor Building (when inerted the Drywell is exempt)Main Control Room EnvelopeUnit and Shared Emergency Diesel Generator Rooms4KV Switchgear AreaBattery RoomsRHR Service Water VaultsTurbine Building Cable TunnelCribhouse		<p>HU3 FIRE potentially degrading the level of safety of the plant. 12345D</p> <p><u>Emergency Action Level (EAL):</u></p> <p>Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</p> <p>Escalation of the emergency classification level would be via IC CA2 or MA5</p> <p>1. A FIRE in ANY Table H2 area is <u>not</u> extinguished in < 15 minutes of ANY of the following FIRE detection indications:</p> <ul style="list-style-type: none">Report from the field (i.e., visual observation)Receipt of multiple (more than 1) fire alarms or indicationsField verification of a single fire alarm <p>OR</p> <p>2. a. Receipt of a single fire alarm in ANY Table H2 area (i.e., no other indications of a FIRE). AND</p> <p>b. The existence of a FIRE is <u>not</u> verified in < 30 minutes of alarm receipt.</p> <p>OR</p> <p>3. A FIRE within the plant or ISFSI PROTECTED AREA not extinguished in < 60 minutes of the initial report, alarm or indication.</p> <p>OR</p> <p>4. A FIRE within the plant or ISFSI PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.</p>	
				Table H2 Vital Areas							
<ul style="list-style-type: none">Reactor Building (when inerted the Drywell is exempt)Main Control Room EnvelopeUnit and Shared Emergency Diesel Generator Rooms4KV Switchgear AreaBattery RoomsRHR Service Water VaultsTurbine Building Cable TunnelCribhouse											

Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D - Defueled

HOT MATRIX

HOT MATRIX

HOT MATRIX												HOT MATRIX												
GENERAL EMERGENCY						SITE AREA EMERGENCY						ALERT						UNUSUAL EVENT						
Hazards and Other conditions Affecting Plant Safety																								
Earthquake																			<div>HU4 Seismic event greater than OBE levels 12345D</div> <div>Emergency Action Level (EAL):</div> <div>Note: Escalation of the emergency classification level would be via IC CA2 or MA5</div> <div>For emergency classification if EAL 2 is not able to be confirmed, then the occurrence of a seismic event is confirmed in manner deemed appropriate by the Shift Manager or Emergency Director in ≤ 15 mins of the event.</div> <div>Seismic event as indicated by:</div> <div>1. Control Room personnel feel an actual or potential seismic event.</div> <div>AND</div> <div>2. ANY one of the following confirmed in ≤ 15 mins of the event:</div> <div><ul style="list-style-type: none">The earthquake resulted in Modified Mercalli Intensity (MMI) ≥ VI and occurred ≤ 3.5 miles of the plant.The earthquake was magnitude ≥ 6.0The earthquake was magnitude ≥ 5.0 and occurred ≤ 125 miles of the plant.</div>					
Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown												4 – Cold Shutdown 5 – Refueling D - Defueled												

HOT MATRIX

HOT MATRIX

HOT MATRIX

HOT MATRIX

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT	UNUSUAL EVENT																									
Hazards and Other conditions Affecting Plant Safety																														
Toxic Gas		<table><tr><th colspan="3">Table H3 Areas with Entry Related Mode Applicability</th></tr><tr><th>Area</th><th>Unit</th><th>Entry Related Mode Applicability</th></tr><tr><td>Reactor Building</td><td></td><td rowspan="5">Mode 3 and 4</td></tr><tr><td><ul style="list-style-type: none">First Floor North Wall</td><td>1</td></tr><tr><td><ul style="list-style-type: none">Second Floor North Wall</td><td>1</td></tr><tr><td><ul style="list-style-type: none">First Floor South Wall</td><td>2</td></tr><tr><td><ul style="list-style-type: none">Second Floor South Wall</td><td>2</td></tr><tr><td>High Pressure Heater Bay</td><td>1 & 2</td><td rowspan="3">Mode 3</td></tr><tr><td>MSIV Room</td><td>1</td></tr><tr><td>Second Floor Turbine Bldg. N.E. Corner</td><td>2</td></tr></table>			Table H3 Areas with Entry Related Mode Applicability			Area	Unit	Entry Related Mode Applicability	Reactor Building		Mode 3 and 4	<ul style="list-style-type: none">First Floor North Wall	1	<ul style="list-style-type: none">Second Floor North Wall	1	<ul style="list-style-type: none">First Floor South Wall	2	<ul style="list-style-type: none">Second Floor South Wall	2	High Pressure Heater Bay	1 & 2	Mode 3	MSIV Room	1	Second Floor Turbine Bldg. N.E. Corner	2	<div>HA5<div>Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown.</div><div>34</div></div> <div>Emergency Action Level (EAL):</div> <div>Note: If the equipment in the listed room or area was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted.</div> <div><div>1. Release of a toxic, corrosive, asphyxiant or flammable gas in ANY Table H3 area.</div><div>AND</div><div>2. Entry into the room or area is prohibited or impeded</div></div>	
		Table H3 Areas with Entry Related Mode Applicability																												
		Area	Unit	Entry Related Mode Applicability																										
		Reactor Building		Mode 3 and 4																										
		<ul style="list-style-type: none">First Floor North Wall	1																											
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		High Pressure Heater Bay	1 & 2	Mode 3																										
		MSIV Room	1																											
Second Floor Turbine Bldg. N.E. Corner	2																													
Hazardous Event					<div>HU6<div>Hazardous Event</div><div>12345D</div></div> <div>Emergency Action Level (EAL):</div> <div>Note: EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.</div> <div>Escalation of the emergency classification level would be via IC CA2 or MA5</div> <div><div>1. Tornado strike within the PROTECTED AREA.</div><div>OR</div><div>2. Internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode.</div><div>OR</div><div>3. Movement of personnel within the PROTECTED AREA is impeded due to an offsite event involving hazardous materials (e.g., an offsite chemical spill or toxic gas release).</div><div>OR</div><div>4. A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.</div><div>OR</div><div>5. Abnormal River level, as indicated by EITHER:<div><div>a. High river level > 594 ft.</div><div>OR</div><div>b. Report of substantial reduction in river level by site personnel and confirmation by the Corp. of Engineers that Dam #14 has failed.</div></div></div></div>																									

Modes:

1 – Power Operation

2 – Startup

3 – Hot Shutdown

4 – Cold Shutdown

5 – Refueling

D - Defueled

HOT MATRIX

HOT MATRIX

HOT MATRIX

HOT MATRIX

GENERAL EMERGENCY			SITE AREA EMERGENCY			ALERT			UNUSUAL EVENT			
Hazards and Other conditions Affecting Plant Safety												
Emergency Director Judgment	HG7 Other conditions exist which in the <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> judgment of the Emergency Director warrant declaration of a GENERAL EMERGENCY.			HS7 Other conditions exist which in the <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY.			HA7 Other conditions exist which in the <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> judgment of the Emergency Director warrant declaration of an ALERT.			HU7 Other conditions exist which in the <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> judgment of the Emergency Director warrant declaration of an UNUSUAL EVENT.		
	<u>Emergency Action Level (EAL):</u> Other conditions exist which in the judgment of the Emergency Director 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 Protective Action Guideline exposure levels offsite for more than the immediate site area.			<u>Emergency Action Level (EAL):</u> Other conditions exist which in the judgment of the Emergency Director 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 Protective Action Guideline exposure levels beyond the site boundary.			<u>Emergency Action Level (EAL):</u> Other conditions exist which, in the judgment of the Emergency Director, 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 Protective Action Guideline exposure levels.			<u>Emergency Action Level (EAL):</u> Other conditions exist which in the judgment of the Emergency Director 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 offsite response or monitoring are expected unless further degradation of safety systems occurs.		
Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D – Defueled												

Modes:

1 – Power Operation

2 – Startup

3 – Hot Shutdown

4 – Cold Shutdown

5 – Refueling

D – Defueled

HOT MATRIX

HOT MATRIX

HOT MATRIX								HOT MATRIX					
GENERAL EMERGENCY				SITE AREA EMERGENCY				ALERT			UNUSUAL EVENT		
ISFSI Malfunction													
ISFSI													<div><div>E-HU1</div><div>Damage to a loaded cask CONFINEMENT BOUNDARY.</div><div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div></div> <div><div>Emergency Action Level (EAL):</div></div> <div>Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading:</div> <div>1. HI-STORM (labeled as xxx-A2, or xxx-A3)</div> <div><div><div>> 40 mrem/hr</div><div>(gamma + neutron) on top of the spent fuel cask</div></div><div>OR</div><div><div>> 220 mrem/hr</div><div>(gamma + neutron) on the side of the spent fuel cask, excluding inlet and outlet ducts</div></div><div>OR</div><div>2. HI-STORM (labeled as xxx-A8.1)</div><div><div><div>> 60 mrem/hr</div><div>(gamma + neutron) on top of the spent fuel cask</div></div><div>OR</div><div><div>> 600 mrem/hr</div><div>(gamma + neutron) on the side of the spent fuel cask, excluding inlet and outlet ducts</div></div></div></div>
Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D - Defueled													

COLD SHUTDOWN / REFUELING MATRIX

GENERAL EMERGENCY			SITE AREA EMERGENCY			ALERT			UNUSUAL EVENT			
Abnormal Rad Levels / Radiological Effluents												
Radiological Effluents	<div>RG1</div> <div>Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mRem TEDE or 5,000 mRem thyroid CDE.</div> <div><div>12345D</div></div>			<div>RS1</div> <div>Release of gaseous radioactivity resulting in offsite dose greater than 100 mRem TEDE or 500 mRem thyroid CDE.</div> <div><div>12345D</div></div>			<div>RA1</div> <div>Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE.</div> <div><div>12345D</div></div>			<div>RU1</div> <div>Any release of gaseous or liquid radioactivity to the environment greater than 2 times the ODCM for 60 minutes or longer.</div> <div><div>12345D</div></div>		
	<u>Emergency Action Level (EAL):</u>			<u>Emergency Action Level (EAL):</u>			<u>Emergency Action Level (EAL):</u>			<u>Emergency Action Level (EAL):</u>		
	Notes:			Notes:			Notes:			Notes:		
	<ul style="list-style-type: none">The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.			<ul style="list-style-type: none">The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.			<ul style="list-style-type: none">The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.			<ul style="list-style-type: none">The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes.Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.		
	<div>1. The sum of readings on the Rx Bldg and Chimney SPINGs > 3.84 E+09 uCi/sec for ≥ 15 minutes (as determined by Control Room Panels or PPDS – Total Noble Gas Release Rate).</div> <div>OR</div> <div>2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of EITHER:<div><div>a. > 1000 mRem TEDE</div><div>OR</div><div>b. > 5000 mRem CDE Thyroid</div></div></div> <div>OR</div> <div>3. Field survey results at or beyond the site boundary indicate EITHER:<div><div>a. Gamma (closed window) dose rates >1000 mR/hr are expected to continue for ≥ 60 minutes.</div><div>OR</div><div>b. Analyses of field survey samples indicate > 5000 mRem CDE Thyroid for 60 minutes of inhalation.</div></div></div>			<div>1. The sum of readings on the Rx Bldg and Chimney SPINGs > 3.84 E+08 uCi/sec for ≥ 15 minutes (as determined by Control Room Panels or PPDS – Total Noble Gas Release Rate).</div> <div>OR</div> <div>2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of EITHER:<div><div>a. > 100 mRem TEDE</div><div>OR</div><div>b. > 500 mRem CDE Thyroid</div></div></div> <div>OR</div> <div>3. Field survey results at or beyond the site boundary indicate EITHER:<div><div>a. Gamma (closed window) dose rates >100 mR/hr are expected to continue for ≥ 60 minutes.</div><div>OR</div><div>b. Analyses of field survey samples indicate > 500 mRem CDE Thyroid for 60 minutes of inhalation.</div></div></div>			<div>1. The sum of readings on the Rx Bldg and Chimney SPINGs > 3.84 E+07 uCi/sec for ≥ 15 minutes (as determined by Control Room Panels or PPDS – Total Noble Gas Release Rate).</div> <div>OR</div> <div>2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of EITHER:<div><div>a. > 10 mRem TEDE</div><div>OR</div><div>b. > 50 mRem CDE Thyroid</div></div></div> <div>OR</div> <div>3. Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than EITHER of the following at or beyond the site boundary<div><div>a. 10 mRem TEDE for 60 minutes of exposure</div><div>OR</div><div>b. 50 mRem CDE Thyroid for 60 minutes of exposure</div></div></div> <div>OR</div> <div>4. Field survey results at or beyond the site boundary indicate EITHER:<div><div>a. Gamma (closed window) dose rates > 10 mR/hr are expected to continue for ≥ 60 minutes.</div><div>OR</div><div>b. Analyses of field survey samples indicate > 50 mRem CDE Thyroid for 60 minutes of inhalation.</div></div></div>			<div>1. Reading on ANY of the following effluent monitors > 2 times alarm setpoint established by a current radioactive release discharge permit for ≥ 60 minutes.<div><div>Radwaste Effluent Monitor 1/2-1799-01</div><div>OR</div><div>Discharge Permit specified monitor</div></div></div> <div>OR</div> <div>2. The sum of readings on the Rx Bldg and Chimney SPINGs > 4.38 E+05 uCi/sec for ≥ 60 minutes (as determined by Control Room Panels or PPDS – Total Noble Gas Release Rate).</div> <div>OR</div> <div>3. Confirmed sample analyses for gaseous or liquid releases indicate concentrations or release rates > 2 times ODCM Limit with a release duration of ≥ 60 minutes.</div>		
	Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D – Defueled			COLD SHUTDOWN / REFUELING MATRIX								

COLD SHUTDOWN / REFUELING MATRIX

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT																												
Abnormal Rad Levels / Radiological Effluents																																		
Radiological Effluents	<div><div><div><div>RG2</div><div>Spent fuel pool level cannot be <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> restored to at least 0.60 ft. as indicated on LI-1(2)-1901-121for 60 minutes or longer.</div></div></div><div><div>Emergency Action Levels (EAL):</div><div>Note: The Emergency Director should declare the General Emergency promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</div></div><div>Spent fuel pool level cannot be restored to at least 0.60 ft. as indicated on LI-1(2)-1901-121 for 60 minutes or longer.</div></div>	<div><div><div><div>RS2</div><div>Spent fuel pool level at <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> 0.60 ft. as indicated on LI-1(2)-1901-121.</div></div></div><div><div>Emergency Action Level (EAL):</div><div>Lowering of spent fuel pool level to 0.60 ft. as indicated on LI-1(2)-1901-121.</div></div><div><table><tr><th colspan="3">Table R2 Areas Requiring Continuous Occupancy</th></tr><tr><td colspan="3"><div><div>• Main Control Room</div><div>• Central Alarm Station – (by survey)</div></div></td></tr></table><table><tr><th colspan="3">Table R3 Areas with Entry Related Mode Applicability</th></tr><tr><th>Area</th><th>Unit</th><th>Entry Related Mode Applicability</th></tr><tr><td>Reactor Building</td><td></td><td rowspan="5">Mode 3 and 4</td></tr><tr><td><div>• First Floor North Wall</div></td><td>1</td></tr><tr><td><div>• Second Floor North Wall</div></td><td>1</td></tr><tr><td><div>• First Floor South Wall</div></td><td>2</td></tr><tr><td><div>• Second Floor South Wall</div></td><td>2</td></tr><tr><td>High Pressure Heater Bay</td><td>1 & 2</td><td rowspan="3">Mode 3</td></tr><tr><td>MSIV Room</td><td>1</td></tr><tr><td>Second Floor Turbine Bldg. N.E. Corner</td><td>2</td></tr></table></div></div>	Table R2 Areas Requiring Continuous Occupancy			<div><div>• Main Control Room</div><div>• Central Alarm Station – (by survey)</div></div>			Table R3 Areas with Entry Related Mode Applicability			Area	Unit	Entry Related Mode Applicability	Reactor Building		Mode 3 and 4	<div>• First Floor North Wall</div>	1	<div>• Second Floor North Wall</div>	1	<div>• First Floor South Wall</div>	2	<div>• Second Floor South Wall</div>	2	High Pressure Heater Bay	1 & 2	Mode 3	MSIV Room	1	Second Floor Turbine Bldg. N.E. Corner	2	<div><div><div><div>RA2</div><div>Significant lowering of water <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> level above, or damage to, irradiated fuel.</div></div></div><div><div>Emergency Action Level (EAL):</div><div>1. Uncovery of irradiated fuel in the REFUELING PATHWAY.<div>OR</div>2. Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by ANY Table R1 Radiation Monitor reading >1000 mRem/hr.<div>OR</div>3. Lowering of spent fuel pool level to 10.20 ft. as indicated on LI-1(2)-1901-121.</div></div></div> <div><div>RA3</div><div>Radiation levels that impede <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> access to equipment necessary for normal plant operations, cooldown or shutdown.</div></div> <div><div>Emergency Action Level (EAL):</div><div>Note: If the equipment in the room or area listed in Table R3 was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted</div><div>1. Dose rate > 15 mR/hr in ANY of the areas contained in Table R2.<div>OR</div>2. An UNPLANNED event results in radiation levels that prohibit or significantly impede access to any of the areas contained in Table R3.</div></div>	<div><div><div><div>RU2</div><div>Unplanned loss of water level <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> above irradiated fuel.</div></div></div><div><div>Emergency Action Level (EAL):</div><div>1. a. UNPLANNED water level drop in the REFUELING PATHWAY as indicated by ANY of the following:<div><div>• Refueling Cavity water level < 282 in. (Upper Wide range simulated signal).</div><div>OR</div><div>• Spent Fuel Pool water level < 19 ft. above the fuel (< -4 ft. indicated level).</div><div>OR</div><div>• Indication or report of a drop in water level in the REFUELING PATHWAY.</div></div><div>AND</div><div>b. UNPLANNED Area Radiation Monitor reading rise on ANY radiation monitors in Table R1.</div></div></div></div>
	Table R2 Areas Requiring Continuous Occupancy																																	
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Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D – Defueled

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT	
Cold Shutdown / Refueling System Malfunctions							
Loss of AC Power				CA1 Loss of all offsite and onsite AC power 45D to emergency busses for 15 minutes or longer. <u>Emergency Action Level (EAL):</u> Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. a. Loss of ALL offsite and onsite AC power to unit ECCS busses. AND b. Failure to restore power to at least one unit ECCS bus in < 15 minutes from the time of loss of both offsite and onsite AC power.		CU1 Loss of all but one AC power source 45D to emergency buses for 15 minutes or longer. <u>Emergency Action Level (EAL):</u> Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. a. AC power capability to unit ECCS buses reduced to only one of the following power sources for ≥ 15 minutes . <ul style="list-style-type: none">Reserve auxiliary Transformer TR-12 (TR-22)Unit auxiliary transformer TR-11 (TR-21)Unit Emergency Diesel GeneratorShared Emergency Diesel GeneratorUnit crosstie breakers AND b. ANY additional single power source failure will result in a loss of ALL AC power to SAFETY SYSTEMs.	

Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D – Defueled

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX									
GENERAL EMERGENCY			SITE AREA EMERGENCY			ALERT			UNUSUAL EVENT
Cold Shutdown / Refueling System Malfunctions									
Safety System						<div>CA2 Hazardous event affecting SAFETY SYSTEM required for the current operating mode. <div>45</div></div> <div>Emergency Action Level (EAL):</div> <div>Note:</div> <div><ul style="list-style-type: none">This EAL is only applicable to SAFETY SYSTEMs having two (2) or more trains.If the affected SAFETY SYSTEM train was already inoperable before the hazardous event occurred, then this emergency classification is not warranted.If the hazardous event only resulted in VISIBLE DAMAGE, with no indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is not warranted.If a hazardous event occurs and it is determined that the conditions of CA2 are not met, then assess the event via HU3, HU4, or HU6.</div> <div>1. a. The occurrence of ANY of the following hazardous events:<ul style="list-style-type: none">Seismic event (earthquake)Internal or external flooding eventHigh winds or tornado strikeFIREEXPLOSIONOther events with similar hazard characteristics as determined by the Shift Manager</div> <div>AND</div> <div>b. Event damage has caused indications of degraded performance to one train of a SAFETY SYSTEM required by Technical Specifications for the current operating mode.</div> <div>AND</div> <div>c. EITHER of the following:<ul style="list-style-type: none">Event damage has caused indications of degraded performance to a second train of the SAFETY SYSTEM required by Technical Specifications for the current operating mode.</div> <div>OR</div> <div><ul style="list-style-type: none">Event damage has resulted in VISIBLE DAMAGE to a second train of the SAFETY SYSTEM required by Technical Specifications for the current operating mode.</div>			
	Modes: 1 – Power Operation 2 – Startup		3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling			D - Defueled			
COLD SHUTDOWN / REFUELING MATRIX									

COLD SHUTDOWN / REFUELING MATRIX

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT																																	
Cold Shutdown / Refueling System Malfunctions																																							
DC Power						CU3	Loss of Vital DC power for 15 minutes or longer. <div>45</div> Emergency Action Level (EAL): Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. Voltage is < 105 VDC on required 125 VDC battery buses #1 and #2 for ≥ 15 minutes .																																
Communications				<table><tr><th colspan="4">Table C1 Communications Capability</th></tr><tr><th>System</th><th>Onsite</th><th>Offsite</th><th>NRC</th></tr><tr><td>Plant Radio</td><td>X</td><td></td><td></td></tr><tr><td>Plant Page</td><td>X</td><td></td><td></td></tr><tr><td>All telephone Lines (Commercial and microwave)</td><td>X</td><td>X</td><td>X</td></tr><tr><td>ENS</td><td></td><td>X</td><td>X</td></tr><tr><td>HPN</td><td></td><td>X</td><td>X</td></tr><tr><td>Satellite Phones</td><td></td><td>X</td><td>X</td></tr></table>	Table C1 Communications Capability				System	Onsite	Offsite	NRC	Plant Radio	X			Plant Page	X			All telephone Lines (Commercial and microwave)	X	X	X	ENS		X	X	HPN		X	X	Satellite Phones		X	X		CU4	Loss of all onsite or offsite communication capabilities. <div>45D</div> Emergency Action Level (EAL): 1. Loss of ALL Table C1 Onsite communications capability affecting the ability to perform routine operations. OR 2. Loss of ALL Table C1 Offsite communication capability affecting the ability to perform offsite notifications. OR 3. Loss of ALL Table C1 NRC communication capability affecting the ability to perform NRC notifications.
	Table C1 Communications Capability																																						
System	Onsite	Offsite	NRC																																				
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Heat Sink		<table><tr><th colspan="3">Table C2 RCS Heat-up Duration Thresholds</th></tr><tr><th>RCS Status</th><th>Containment Closure Status</th><th>Heat-up Duration</th></tr><tr><td>Intact</td><td>Not Applicable</td><td>60 minutes*</td></tr><tr><td rowspan="2">Not Intact</td><td>Established</td><td>20 minutes*</td></tr><tr><td>Not Established</td><td>0 minutes</td></tr><tr><td colspan="3">* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, then EAL Threshold #1 is not applicable.</td></tr></table>	Table C2 RCS Heat-up Duration Thresholds			RCS Status	Containment Closure Status	Heat-up Duration	Intact	Not Applicable	60 minutes*	Not Intact	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, then EAL Threshold #1 is not applicable.				CA5	Inability to maintain plant in cold shutdown <div>45</div> Emergency Action Levels (EAL): Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when heat removal function is available does not warrant classification. 1. UNPLANNED rise in RCS temperature > 212°F for > Table C2 duration . OR 2. UNPLANNED RCS pressure rise > 10 psig as a result of temperature rise.	CU5	UNPLANNED rise in RCS temperature. <div>45</div> Emergency Action Levels (EAL): Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when heat removal function is available does not warrant classification. 1. UNPLANNED rise in RCS temperature > 212°F . OR 2. Loss of the following for ≥ 15 minutes . <ul style="list-style-type: none">ALL RCS temperature indicationsANDALL RPV level indications															
	Table C2 RCS Heat-up Duration Thresholds																																						
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Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D - Defueled

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT					
Cold Shutdown / Refueling System Malfunctions											
RCS Leakage / Inventory	<div>CG6</div> <div>Loss of RPV inventory affecting fuel clad integrity with containment challenged.</div> <div>45</div>		<div>CS6</div> <div>Loss of RPV inventory affecting core decay heat removal capabilities.</div> <div>45</div>		<div>CA6</div> <div>Loss of RPV inventory</div> <div>45</div>		<div>CU6</div> <div>UNPLANNED loss of RPV inventory for 15 minutes or longer.</div> <div>45</div>				
	Emergency Action Level (EAL):		Emergency Action Level (EAL):		Emergency Action Level (EAL):		Emergency Action Level (EAL):				
	Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.		Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.		Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.		Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.				
	1. a. RPV Level < -142 inches (TAF) for ≥ 30 minutes. AND b. ANY Containment Challenge Indication (Table C4) OR		1. With CONTAINMENT CLOSURE not established, RPV level < -65 inches OR		1. Loss of RPV inventory as indicated by level < -59 inches. OR		1. UNPLANNED loss of reactor coolant results in the inability to restore and maintain RPV level to above the procedurally established lower limit for ≥ 15 minutes. OR				
	2. a. RPV level cannot be determined for ≥ 30 minutes. AND b. Core uncover is indicated by ANY of the following: <ul style="list-style-type: none">Table C3 indications of a sufficient magnitude to indicate core uncover. OR <ul style="list-style-type: none">Fuel Handling ARM 1(2)-1705-16A or B >3000 mR/hr. AND		2. With CONTAINMENT CLOSURE established, RPV level < -142 inches (TAF) OR		2. a. RPV level cannot be determined for ≥ 15 minutes. AND		2. a. RPV level cannot be determined. AND				
	c. ANY Containment Challenge Indication (Table C4)		3. a. RPV level cannot be determined for ≥ 30 minutes. AND b.Core uncover is indicated by ANY of the following: <ul style="list-style-type: none">Table C3 indications of a sufficient magnitude to indicate core uncover. OR <ul style="list-style-type: none">Fuel Handling ARM 1(2)-1705-16A or B >3000 mR/hr.		b. Loss of RPV inventory per Table C3 indications		b. Loss of RPV inventory per Table C3 indications.				
	<table><tr><th>Table C3 Indications of RCS Leakage</th></tr><tr><td><ul style="list-style-type: none">UNPLANNED floor or equipment sump level rise*UNPLANNED Torus level rise*UNPLANNED vessel make up rate riseObservation of leakage or inventory loss</td></tr><tr><td>*Rise in level is attributed to a loss of RPV inventory</td></tr></table>		Table C3 Indications of RCS Leakage	<ul style="list-style-type: none">UNPLANNED floor or equipment sump level rise*UNPLANNED Torus level rise*UNPLANNED vessel make up rate riseObservation of leakage or inventory loss	*Rise in level is attributed to a loss of RPV inventory						
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Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D – Defueled

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT	
Hazards and Other conditions Affecting Plant Safety							
Hostile Action		<div><div>HS1</div><div>HOSTILE ACTION within the PROTECTED AREA</div><div>12345D</div></div> <div><div>Emergency Action Level (EAL):</div><div>A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA.</div></div>	<div><div>HA1</div><div>HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes.</div><div>12345D</div></div> <div><div>Emergency Action Level (EAL):</div><div>1. A validated notification from NRC of an aircraft attack threat < 30 minutes from the site. OR 2. Notification by the Security Force that a HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA.</div></div>	<div><div>HU1</div><div>Confirmed SECURITY CONDITION or threat.</div><div>12345D</div></div> <div><div>Emergency Action Level (EAL):</div><div>1. Notification of a credible security threat directed at the site as determined per SY-AA-101-132, Security Assessment and Response to Unusual Activities. OR 2. A validated notification from the NRC providing information of an aircraft threat. OR 3. Notification by the Security Force of a SECURITY CONDITION that does not involve a HOSTILE ACTION.</div></div>			
	<div><div>Table H1 Safety Functions</div><div><div>• Reactivity Control (ability to shutdown the reactor and keep it shut down)</div><div>• RPV Water Level (ability to cool the core)</div><div>• RCS Heat Removal (ability to maintain a heat sink)</div></div></div>	<div><div>HS2</div><div>Inability to control a key safety function from outside the Control Room</div><div>12345D</div></div> <div><div>Emergency Action Level (EAL):</div><div><div>Note:</div><div>The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</div></div><div>1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per<div><div>• QCARP 0050-01, SB-1-1 Injection with SSMP and Bringing the Unit to Cold Shutdown</div><div>OR</div><div>• QCARP 0050-02, SB-1-2 Injection with RCIC and Bringing the Unit to Cold Shutdown</div><div>OR</div><div>• QOA 0010-05, Plant Operation with the Control Room Inaccessible</div></div></div><div>AND</div><div>2. Control of ANY Table H1 key safety function is not reestablished in < 30 minutes.</div></div>	<div><div>HA2</div><div>Control Room evacuation resulting in transfer of plant control to alternate locations</div><div>12345D</div></div> <div><div>Emergency Action Level (EAL):</div><div>A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per<div><div>• QCARP 0050-01, SB-1-1 Injection with SSMP and Bringing the Unit to Cold Shutdown</div><div>OR</div><div>• QCARP 0050-02, SB-1-2 Injection with RCIC and Bringing the Unit to Cold Shutdown</div><div>OR</div><div>• QOA 0010-05, Plant Operation with the Control Room Inaccessible</div></div></div></div>				

Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D – Defueled

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT					
Hazards and Other conditions Affecting Plant Safety											
Fire				<table><tr><th colspan="2">Table H2 Vital Areas</th></tr><tr><td colspan="2"><ul style="list-style-type: none">Reactor Building (when inerted the Drywell is exempt)Main Control Room EnvelopeUnit and Shared Emergency Diesel Generator Rooms4KV Switchgear AreaBattery RoomsRHR Service Water VaultsTurbine Building Cable TunnelCribhouse</td></tr></table>		Table H2 Vital Areas		<ul style="list-style-type: none">Reactor Building (when inerted the Drywell is exempt)Main Control Room EnvelopeUnit and Shared Emergency Diesel Generator Rooms4KV Switchgear AreaBattery RoomsRHR Service Water VaultsTurbine Building Cable TunnelCribhouse		<p>HU3 FIRE potentially degrading the level of safety of the plant. <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div></p> <p><u>Emergency Action Level (EAL):</u></p> <p>Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</p> <p>Escalation of the emergency classification level would be via IC CA2 or MA5</p> <p>1. A FIRE in ANY Table H2 area is <u>not</u> extinguished in < 15 minutes of ANY of the following FIRE detection indications:</p> <ul style="list-style-type: none">Report from the field (i.e., visual observation)Receipt of multiple (more than 1) fire alarms or indicationsField verification of a single fire alarm <p>OR</p> <p>2. a. Receipt of a single fire alarm in ANY Table H2 area (i.e., no other indications of a FIRE). AND b. The existence of a FIRE is <u>not</u> verified in < 30 minutes of alarm receipt.</p> <p>OR</p> <p>3. A FIRE within the plant or ISFSI PROTECTED AREA not extinguished in < 60 minutes of the initial report, alarm or indication.</p> <p>OR</p> <p>4. A FIRE within the plant or ISFSI PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.</p>	
				Table H2 Vital Areas							
<ul style="list-style-type: none">Reactor Building (when inerted the Drywell is exempt)Main Control Room EnvelopeUnit and Shared Emergency Diesel Generator Rooms4KV Switchgear AreaBattery RoomsRHR Service Water VaultsTurbine Building Cable TunnelCribhouse											

Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D – Defueled

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT	
Hazards and Other conditions Affecting Plant Safety							
Earthquake						<div>HU4 Seismic event greater than OBE levels 12345D</div> <div>Emergency Action Level (EAL):</div> <div>Note: Escalation of the emergency classification level would be via IC CA2 or MA5</div> <div>For emergency classification if EAL 2 is not able to be confirmed, then the occurrence of a seismic event is confirmed in manner deemed appropriate by the Shift Manager or Emergency Director in ≤ 15 mins of the event.</div> <div>Seismic event as indicated by:</div> <div>1. Control Room personnel feel an actual or potential seismic event.</div> <div>AND</div> <div>2. ANY one of the following confirmed in ≤ 15 mins of the event:</div> <div><div>The earthquake resulted in Modified Mercalli Intensity (MMI) ≥ VI and occurred ≤ 3.5 miles of the plant.</div><div>The earthquake was magnitude ≥ 6.0</div><div>The earthquake was magnitude ≥ 5.0 and occurred ≤ 125 miles of the plant.</div></div>	

Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D - Defueled

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT	UNUSUAL EVENT																									
Hazards and Other conditions Affecting Plant Safety																														
Toxic Gas		<table><tr><th colspan="3">Table H3 Areas with Entry Related Mode Applicability</th></tr><tr><th>Area</th><th>Unit</th><th>Entry Related Mode Applicability</th></tr><tr><td>Reactor Building</td><td></td><td rowspan="5">Mode 3 and 4</td></tr><tr><td><ul style="list-style-type: none">First Floor North Wall</td><td>1</td></tr><tr><td><ul style="list-style-type: none">Second Floor North Wall</td><td>1</td></tr><tr><td><ul style="list-style-type: none">First Floor South Wall</td><td>2</td></tr><tr><td><ul style="list-style-type: none">Second Floor South Wall</td><td>2</td></tr><tr><td>High Pressure Heater Bay</td><td>1 & 2</td><td rowspan="3">Mode 3</td></tr><tr><td>MSIV Room</td><td>1</td></tr><tr><td>Second Floor Turbine Bldg. N.E. Corner</td><td>2</td></tr></table>			Table H3 Areas with Entry Related Mode Applicability			Area	Unit	Entry Related Mode Applicability	Reactor Building		Mode 3 and 4	<ul style="list-style-type: none">First Floor North Wall	1	<ul style="list-style-type: none">Second Floor North Wall	1	<ul style="list-style-type: none">First Floor South Wall	2	<ul style="list-style-type: none">Second Floor South Wall	2	High Pressure Heater Bay	1 & 2	Mode 3	MSIV Room	1	Second Floor Turbine Bldg. N.E. Corner	2	<div>HA5<div>Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown.</div><div>34</div></div> <div>Emergency Action Level (EAL):</div> <div>Note: If the equipment in the listed room or area was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted.</div> <div><div>1. Release of a toxic, corrosive, asphyxiant or flammable gas in ANY Table H3 area.</div><div>AND</div><div>2. Entry into the room or area is prohibited or impeded</div></div>	
		Table H3 Areas with Entry Related Mode Applicability																												
		Area	Unit	Entry Related Mode Applicability																										
		Reactor Building		Mode 3 and 4																										
		<ul style="list-style-type: none">First Floor North Wall	1																											
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		High Pressure Heater Bay	1 & 2	Mode 3																										
		MSIV Room	1																											
Second Floor Turbine Bldg. N.E. Corner	2																													
Hazardous Event					<div>HU6<div>Hazardous Event</div><div>12345D</div></div> <div>Emergency Action Level (EAL):</div> <div>Note: EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.</div> <div>Escalation of the emergency classification level would be via IC CA2 or MA5</div> <div><div>1. Tornado strike within the PROTECTED AREA.</div><div>OR</div><div>2. Internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode.</div><div>OR</div><div>3. Movement of personnel within the PROTECTED AREA is impeded due to an offsite event involving hazardous materials (e.g., an offsite chemical spill or toxic gas release).</div><div>OR</div><div>4. A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.</div><div>OR</div><div>5. Abnormal River level, as indicated by EITHER:<div><div>a. High river level > 594 ft.</div><div>OR</div><div>b. Report of substantial reduction in river level by site personnel and confirmation by the Corp. of Engineers that Dam #14 has failed</div></div></div></div>																									

Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D - Defueled

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

GENERAL EMERGENCY			SITE AREA EMERGENCY			ALERT			UNUSUAL EVENT			
Hazards and Other conditions Affecting Plant Safety												
Emergency Director Judgment	HG7 Other conditions exist which in the <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> judgment of the Emergency Director warrant declaration of a GENERAL EMERGENCY.			HS7 Other conditions exist which in the <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY.			HA7 Other conditions exist which in the <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> judgment of the Emergency Director warrant declaration of an ALERT.			HU7 Other conditions exist which in the <div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>D</div></div> judgment of the Emergency Director warrant declaration of an UNUSUAL EVENT.		
	<u>Emergency Action Level (EAL):</u> Other conditions exist which in the judgment of the Emergency Director 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 Protective Action Guideline exposure levels offsite for more than the immediate site area.			<u>Emergency Action Level (EAL):</u> Other conditions exist which in the judgment of the Emergency Director 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 Protective Action Guideline exposure levels beyond the site boundary.			<u>Emergency Action Level (EAL):</u> Other conditions exist which, in the judgment of the Emergency Director, 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 Protective Action Guideline exposure levels.			<u>Emergency Action Level (EAL):</u> Other conditions exist which in the judgment of the Emergency Director 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 offsite response or monitoring are expected unless further degradation of safety systems occurs.		
Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D – Defueled												

Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D – Defueled

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

UNUSUAL EVENT		
HU7 Other conditions exist which in the <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> D judgment of the Emergency Director warrant declaration of an UNUSUAL EVENT.		
<u>Emergency Action Level (EAL):</u> Other conditions exist which in the judgment of the Emergency Director 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 offsite response or monitoring are expected unless further degradation of safety systems occurs.		

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

GENERAL EMERGENCY			SITE AREA EMERGENCY			ALERT			UNUSUAL EVENT		
ISFSI Malfunction											
ISFSI										<div><div>E-HU1</div><div>Damage to a loaded cask CONFINEMENT BOUNDARY.</div></div> <div><div>12345D</div></div> <div><div>Emergency Action Level (EAL):</div></div> <div>Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading:</div> <div><div>1. HI-STORM (labeled as xxx-A2, or xxx-A3)</div><div><div>> 40 mrem/hr (gamma + neutron) on top of the spent fuel cask</div><div>OR</div><div>> 220 mrem/hr (gamma + neutron) on the side of the spent fuel cask, excluding inlet and outlet ducts</div><div>OR</div></div><div>2. HI-STORM (labeled as xxx-A8.1)</div><div><div>> 60 mrem/hr (gamma + neutron) on top of the spent fuel cask</div><div>OR</div><div>> 600 mrem/hr (gamma + neutron) on the side of the spent fuel cask, excluding inlet and outlet ducts</div></div></div>	
	Modes: 1 – Power Operation 2 – Startup 3 – Hot Shutdown 4 – Cold Shutdown 5 – Refueling D - Defueled										

COLD SHUTDOWN / REFUELING MATRIX

COLD SHUTDOWN / REFUELING MATRIX

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RG1**Initiating Condition:**

Release of gaseous radioactivity resulting in offsite dose greater than 1000 mRem TEDE or 5000 mRem thyroid CDE.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):**Notes:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.
- Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.
- The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

1. The sum of readings on the Rx Bldg and Chimney SPINGs **> 3.84 E+09 uCi/sec** for **≥ 15 minutes** (as determined by Control Room Panels or PPDS – Total Noble Gas Release Rate).

OR

2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:

a. **> 1000 mRem TEDE**

OR

b. **> 5000 mRem CDE Thyroid**

OR

3. Field survey results at or beyond the site boundary indicate **EITHER**:

a. Gamma (closed window) dose rates **>1000 mR/hr** are expected to continue for **≥ 60 minutes**.

OR

b. Analyses of field survey samples indicate **> 5000 mRem CDE Thyroid** for **60 minutes** of inhalation.

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RG1 (cont)

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude will require implementation of protective actions for the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at the EPA PAG of 1000 mRem while the 5000 mRem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Basis Reference(s):

1. NEI 99-01 Rev 6, AG1
2. EP-AA-112-500 Emergency Environmental Monitoring
3. EP-EAL-0606 Revision 2, Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values Quad Cities Station
4. QGA 400 Radioactivity Release Control

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RS1**Initiating Condition:**

Release of gaseous radioactivity resulting in offsite dose greater than 100 mRem TEDE or 500 mRem thyroid CDE.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):**Notes:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.
- Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.
- The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

1. The sum of readings on the Rx Bldg and Chimney SPINGs **> 3.84 E+08 uCi/sec** for **≥ 15 minutes** (as determined by Control Room Panels or PPDS – Total Noble Gas Release Rate).

OR

2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:

a. **> 100 mRem TEDE**

OR

b. **> 500 mRem CDE Thyroid**

OR

3. Field survey results at or beyond the site boundary indicate **EITHER**:

a. Gamma (closed window) dose rates **>100 mR/hr** are expected to continue for **≥ 60 minutes**.

OR

b. Analyses of field survey samples indicate **> 500 mRem CDE Thyroid** for **60 minutes** of inhalation.

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RS1 (cont)

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 10% of the EPA PAG of 1000 mRem while the 500 mRem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Escalation of the emergency classification level would be via IC RG1.

Basis Reference(s):

1. NEI 99-01 Rev 6, AS1
2. EP-AA-112-500 Emergency Environmental Monitoring
3. EP-EAL-0606 Revision 2, Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values Quad Cities Station

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RA1**Initiating Condition:**

Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mRem TEDE or 50 mRem thyroid CDE.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):**Notes:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.
- Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.
- The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

1. The sum of readings on the Rx Bldg and Chimney SPINGs **> 3.84 E+07 uCi/sec** for **≥ 15 minutes** (as determined by Control Room Panels or PPDS – Total Noble Gas Release Rate).

OR

2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:

- a. **> 10 mRem TEDE**

OR

- b. **> 50 mRem CDE Thyroid**

OR

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RA1 (cont)

Emergency Action Level (EAL) (cont):

3. Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than **EITHER** of the following at or beyond the site boundary
 - a. **10 mRem TEDE for 60 minutes** of exposure
OR
 - b. **50 mRem CDE Thyroid for 60 minutes** of exposure
OR
4. Field survey results at or beyond the site boundary indicate **EITHER**:
 - a. Gamma (closed window) dose rates **> 10 mR/hr** are expected to continue for **≥ 60 minutes**.
OR
 - b. Analyses of field survey samples indicate **> 50 mRem CDE Thyroid for 60 minutes** of inhalation.

Basis:

This IC addresses a release of gaseous or liquid radioactivity that results in projected or actual offsite doses greater than or equal to 1% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the plant as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 1% of the EPA PAG of 1000 mRem while the 50 mRem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Escalation of the emergency classification level would be via IC RS1.

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RA1 (cont)**Basis Reference(s):**

1. NEI 99-01 Rev 6, AA1
2. CY-QC-120-729 Liquid Effluent Monitor Alarm Setpoints
3. CY-QC-120-737 Radioactive Liquid Discharge Batch Analysis
4. CY-QC-110-602 Radwaste System Sampling
5. QOP 2000-24, Discharging to the River from the River Discharge Tank using the Waste Surge Pump
6. QOP 2000-25, Discharging to the River from the River Discharge Tank using the River Discharge Pump
7. CY-QC-120-729, Liquid Effluent Alarm Setpoints
8. QCOA 1700-02, High Radiation detected on Eberline Radiation Monitoring System
9. QCAN 912-5 C-6, Radwaste High Rad.
10. QCAN 901(2)-3-G-1, Liquid Process Rad. Monitor High Radiation
11. CY-QC-120-735, Main Chimney & Reactor Vent Noble Gas Release Rate Action Levels
12. QCOA 1700-01, Abnormal Chimney Radiation
13. EP-EAL-0606 Revision 2, Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values Quad Cities Station
14. QGA 400 Radioactivity Release Control

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RU1**Initiating Condition:**

Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):**Notes:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes.
- Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

1. Reading on **ANY** of the following effluent monitors **> 2 times alarm setpoint** established by a current radioactive release discharge permit for **≥ 60 minutes**.

- Radwaste Effluent Monitor 1/2-1799-01

OR

- Discharge Permit specified monitor

OR

2. The sum of readings on the Rx Bldg and Chimney SPINGs **> 4.38 E+05 uCi/sec** for **≥ 60 minutes** (as determined by Control Room Panels or PPDS – Total Noble Gas Release Rate).

OR

3. Confirmed sample analyses for gaseous or liquid releases indicate concentrations or release rates **> 2 times ODCM Limit** with a release duration of **≥ 60 minutes**.

Basis:

This IC addresses a potential decrease in the level of safety of the plant as indicated by a low-level radiological release that exceeds regulatory commitments for an extended period of time (e.g., an uncontrolled release). It includes any gaseous or liquid radiological release, monitored or un-monitored, including those for which a radioactivity discharge permit is normally prepared.

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RU1 (cont)

Basis (cont):

Nuclear power plants incorporate design features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment is indicative of degradation in these features and/or controls.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

Releases should not be prorated or averaged. For example, a release exceeding 4 times release limits for 30 minutes does not meet the EAL.

EAL #1 Basis

This EAL addresses radioactivity releases that cause effluent radiation monitor readings to exceed 2 times the limit established by a radioactivity discharge permit. This EAL will typically be associated with planned batch releases from non-continuous release pathways (e.g., radwaste, waste gas).

The effluent monitors listed are those normally used for planned discharges. If a discharge is performed using a different flowpath or effluent monitor other than those listed (e.g., a portable or temporary effluent monitor), then the declaration criteria will be based on the monitor specified in the Discharge Permit.

EAL #2 Basis

This EAL addresses normally occurring continuous radioactivity releases from monitored gaseous effluent pathways.

EAL #3 Basis

This EAL addresses uncontrolled gaseous or liquid releases that are detected by sample analyses or environmental surveys, particularly on unmonitored pathways (e.g., spills of radioactive liquids into storm drains, heat exchanger leakage in river water systems, etc.).

Escalation of the emergency classification level would be via IC RA1.

Basis Reference(s):

1. NEI 99-01 Rev 6, AU1
2. CY-QC-120-729 Liquid Effluent Monitor Alarm Setpoints
3. CY-QC-120-737 Radioactive Liquid Discharge Batch Analysis
4. CY-QC-110-602 Radwaste System Sampling
5. EP-EAL-0606 Revision 2, Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values Quad Cities Station

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RG2**Initiating Condition:**

Spent fuel pool level cannot be restored to at least 0.60 ft. as indicated on LI-1(2)-1901-121 for 60 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):

Note: The Emergency Director should declare the General Emergency promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

Spent fuel pool level cannot be restored to at least **0.60 ft.** as indicated on LI-1(2)-1901-121 for **60 minutes** or longer.

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to a prolonged uncover of spent fuel. This condition will lead to fuel damage and a radiological release to the environment.

It is recognized that this IC would likely not be met until well after another General Emergency IC was met; however, it is included to provide classification diversity.

Basis Reference(s):

1. NEI 99-01 Rev 6, AG2

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RS2**Initiating Condition:**

Spent fuel pool level at 0.60 ft. as indicated on LI-1(2)-1901-121.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):

Lowering of spent fuel pool level to **0.60 ft.** as indicated on LI-1(2)-1901-121.

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to IMMINENT fuel damage. This condition entails major failures of plant functions needed for protection of the public and thus warrant a Site Area Emergency declaration.

It is recognized that this IC would likely not be met until well after another Site Area Emergency IC was met; however, it is included to provide classification diversity.

Escalation of the emergency classification level would be via IC RG1 or RG2.

Basis Reference(s):

1. NEI 99-01 Rev 6, AS2

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RA2**Initiating Condition:**

Significant lowering of water level above, or damage to, irradiated fuel.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):

1. Uncovery of irradiated fuel in the REFUELING PATHWAY.

OR

2. Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by **ANY** Table R1 Radiation Monitor reading **>1000 mRem/hr.**

OR

3. Lowering of spent fuel pool level to **10.20 ft.** as indicated on LI-1(2)-1901-121.

Table R1 Fuel Handling Incident Radiation Monitors
<ul style="list-style-type: none">• 1(2) 1705-16A Fuel Pool Rad Monitor• 1(2) 1705-16B Fuel Pool Rad Monitor

Basis:

REFUELING PATHWAY: all the cavities, tubes, canals and pools through which irradiated fuel may be moved or stored, but not including the reactor vessel below the flange.

IMMINENT: The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

CONFINEMENT BOUNDARY: The irradiated fuel dry storage cask barrier(s) between areas containing radioactive substances and the environment.

This IC addresses events that have caused IMMINENT or actual damage to an irradiated fuel assembly. These events present radiological safety challenges to plant personnel and are precursors to a release of radioactivity to the environment. As such, they represent an actual or potential substantial degradation of the level of safety of the plant.

This IC applies to irradiated fuel that is licensed for dry storage up to the point that the loaded storage cask is sealed. Once sealed, damage to a loaded cask causing loss of the CONFINEMENT BOUNDARY is classified in accordance with IC E-HU1.

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RA2 (cont)**Basis (cont):****EAL #1 Basis**

This EAL escalates from RU2 in that the loss of level, in the affected portion of the REFUELING PATHWAY, is of sufficient magnitude to have resulted in uncover of irradiated fuel. Indications of irradiated fuel uncover may include direct or indirect visual observation (e.g., reports from personnel or camera images), as well as significant changes in water and radiation levels, or other plant parameters. Computational aids may also be used (e.g., a boil-off curve). Classification of an event using this EAL should be based on the totality of available indications, reports and observations.

While an area radiation monitor could detect an rise in a dose rate due to a lowering of water level in some portion of the REFUELING PATHWAY, the reading may not be a reliable indication of whether or not the fuel is actually uncovered. To the degree possible, readings should be considered in combination with other available indications of inventory loss.

A drop in water level above irradiated fuel within the reactor vessel may be classified in accordance Recognition Category C during the Cold Shutdown and Refueling modes.

EAL #2 Basis

This EAL addresses a release of radioactive material caused by mechanical damage to irradiated fuel. Damaging events may include the dropping, bumping or binding of an assembly, or dropping a heavy load onto an assembly. A rise in readings on radiation monitors should be considered in conjunction with in-plant reports or observations of a potential fuel damaging event (e.g., a fuel handling accident).

EAL #3 Basis:

Spent fuel pool water level at this value is within the lower end of the level range necessary to prevent significant dose consequences from direct gamma radiation to personnel performing operations in the vicinity of the spent fuel pool. This condition reflects a significant loss of spent fuel pool water inventory and thus it is also a precursor to a loss of the ability to adequately cool the irradiated fuel assemblies stored in the pool.

Escalation of the emergency would be based on either Recognition Category R or C ICs.

Basis Reference(s):

1. NEI 99-01 Rev 6, AA2
2. QCOA 1900-01 Loss of Water Level in the Fuel Storage Pool or Reactor Cavity
3. QCAN 901(2)-3 B-1 Refuel Floor Hi Radiation
4. QCAN 901(2)-3 G-16/H-16 Fuel Pool Channel A/B Hi Radiation
5. QCIS 1700-07 Reactor Building Ventilation and Fuel Pool Radiation Monitoring Calibration and Functional Test

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RU2**Initiating Condition:**

UNPLANNED loss of water level above irradiated fuel.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):

1. a. UNPLANNED water level drop in the REFUELING PATHWAY as indicated by **ANY** of the following:

- Refueling Cavity water level < **282 in.** (Upper Wide range simulated signal).

OR

- Spent Fuel Pool water level < **19 ft.** above the fuel (< - **4 ft.** indicated level).

OR

- Indication or report of a drop in water level in the REFUELING PATHWAY.

AND

- b. UNPLANNED Area Radiation Monitor reading rise on **ANY** radiation monitors in Table R1.

Table R1
Fuel Handling Incident Radiation Monitors

- | |
|---|
| <ul style="list-style-type: none">• 1(2) 1705-16A Fuel Pool Rad Mon• 1(2) 1705-16B Fuel Pool Rad Mon |
|---|

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RU2 (cont)

Basis:

UNPLANNED: A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

REFUELING PATHWAY: all the cavities, tubes, canals and pools through which irradiated fuel may be moved or stored, but not including the reactor vessel below the flange.

This IC addresses a loss in water level above irradiated fuel sufficient to cause elevated radiation levels. This condition could be a precursor to a more serious event and is also indicative of a minor loss in the ability to control radiation levels within the plant. It is therefore a potential degradation in the level of safety of the plant.

A water level loss will be primarily determined by indications from available level instrumentation. Other sources of level indications may include reports from plant personnel (e.g., from a refueling crew) or video camera observations (if available) or from any other temporarily installed monitoring instrumentation. A significant drop in the water level may also cause an rise in the radiation levels of adjacent areas that can be detected by monitors in those locations.

The effects of planned evolutions should be considered. For example, a refueling bridge area radiation monitor reading may rise due to planned evolutions such as lifting of the reactor vessel head or movement of a fuel assembly. Note that this EAL is applicable only in cases where the elevated reading is due to an UNPLANNED loss of water level.

A drop in water level above irradiated fuel within the reactor vessel may be classified in accordance Recognition Category C during the Cold Shutdown and Refueling modes.

Escalation of the emergency classification level would be via IC RA2.

Basis Reference(s):

1. NEI 99-01 Rev 6, AU2
2. QCOP 0201-13 Reactor Level Upper Wide Range Reference Leg Extension Use and Control
3. Technical Specifications 3.7.8 Spent Fuel Storage Pool Water Level
4. Technical Specifications 3.9.6 Reactor Pressure Vessel (RPV) Water Level—Irradiated Fuel
5. QCAN 901(2)-4 B-24 FUEL POOL STORAGE HI/LO LEVEL
6. QCOA 1900-01 Loss of Water Level in the Fuel Storage Pool or Reactor Cavity

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS

RA3**Initiating Condition:**

Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):**Note:**

- If the equipment in the room or area listed in Table R3 was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted .

1. Dose rate > **15 mR/hr** in **ANY** of the following Table R2 areas:

Table R2 Areas Requiring Continuous Occupancy	
<ul style="list-style-type: none"> • Main Control Room • Central Alarm Station – (by survey) 	

OR

2. UNPLANNED event results in radiation levels that prohibit or significantly impede access to **ANY** of the following Table R3 plant rooms or areas:

Table R3 Areas with Entry Related Mode Applicability		
Area	Unit	Entry Related Mode Applicability
Reactor Building		Mode 3 and 4
• First Floor North Wall	1	
• Second Floor North Wall	1	
• First Floor South Wall	2	
• Second Floor South Wall	2	
High Pressure Heater Bay	1 & 2	Mode 3
MSIV Room	1	
Second Floor Turbine Bldg. N.E. Corner	2	

RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS
RA3 (cont)

Basis:

UNPLANNED: A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

This IC addresses elevated radiation levels in certain plant rooms/areas sufficient to preclude or impede personnel from performing actions necessary to transition the plant from normal plant operation to cooldown and shutdown as specified in normal plant procedures. As such, it represents an actual or potential substantial degradation of the level of safety of the plant. The Emergency Director should consider the cause of the increased radiation levels and determine if another IC may be applicable.

Assuming all plant equipment is operating as designed, normal operation is capable from the Main Control Room (MCR). The plant is also able to transition into a hot shutdown condition from the MCR, therefore Table R3 is a list of plant rooms or areas with entry-related mode applicability that contain equipment which require a manual/local action necessary to transition the plant from normal plant operation to cooldown and shutdown as specified in normal operating procedures (establish shutdown cooling), where if this action is not completed the plant would not be able to attain and maintain cold shutdown. This Table does not include rooms or areas for which entry is required solely to perform actions of an administrative or record keeping nature (e.g., normal rounds or routine inspections).

Rooms and areas listed in EAL #1 do not need to be included in EAL #2, including the Control Room.

For EAL #2, an Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect and the elevated radiation levels preclude the ability to place shutdown cooling in service. The emergency classification is not contingent upon whether entry is actually necessary at the time of the increased radiation levels. Access should be considered as impeded if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., installing temporary shielding beyond that required by procedures, requiring use of non-routine protective equipment, requesting an extension in dose limits beyond normal administrative limits).

An emergency declaration is not warranted if any of the following conditions apply.

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the elevated radiation levels). For example, the plant is in Mode 1 when the radiation rise occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The increased radiation levels are a result of a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., radiography, spent filter or resin transfer, etc.).

**RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS**

RA3 (cont)

Basis (cont):

- The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or impede a required action.

Escalation of the emergency classification level would be via Recognition Category R, C or F ICs.

Basis Reference(s):

1. NEI 99-01 Rev 6, AA3
2. QCOP 1800-1 Operation of ARM Indicator/Trip Units
3. UFSAR Section 3.2
4. General Arrangement Drawings M-5, 6, 8 and 10

**RECOGNITION CATEGORY
ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENTS**

RU3**Initiating Condition:**

Reactor coolant activity greater than Technical Specification allowable limits.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):

1. Offgas system radiation monitor **HI-HI** alarm.
OR
2. Specific coolant activity **> 4.0 uCi/gm** Dose equivalent I-131.

Basis:

This IC addresses a reactor coolant activity value that exceeds an allowable limit specified in Technical Specifications. This condition is a precursor to a more significant event and represents a potential degradation of the level of safety of the plant.

Conditions that cause the specified monitor to alarm that are not related to fuel clad degradation should not result in the declaration of an Unusual Event.

This EAL addresses site-specific radiation monitor readings that provide indication of a degradation of fuel clad integrity.

Escalation of the emergency classification level would be via ICs FA1 or the Recognition Category R ICs.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU3
2. Technical Specifications 3.4.6
3. Technical Specifications 3.7.6
4. QCAN 901(2)-3 C-2 OFF GAS HIGH-HIGH RADIATION

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

FG1**Initiating Condition:**

Loss of **ANY** Two Barriers AND Loss or Potential Loss of the third barrier.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):

Refer to Fission Product Barrier Loss and Potential Loss threshold values to determine barrier status.

Basis:

Fuel Cladding, RCS and Containment comprise the fission product barriers.

At the General Emergency classification level each barrier is weighted equally.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

FS1**Initiating Condition:**

Loss or Potential Loss of **ANY** two barriers.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):

Refer to Fission Product Barrier Loss and Potential Loss threshold values to determine barrier status.

Basis:

Fuel Cladding, RCS and Containment comprise the fission product barriers.

At the Site Area Emergency classification level, each barrier is weighted equally.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

FA1**Initiating Condition:**

ANY Loss or **ANY** Potential Loss of **EITHER** Fuel Clad or RCS.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):

Refer to Fission Product Barrier Loss and Potential Loss threshold values to determine barrier status.

Basis:

Fuel Cladding, RCS and Containment comprise the fission product barriers.

At the Alert classification level, Fuel Cladding and RCS barriers are weighted more heavily than the Containment barrier. Unlike the Containment barrier, loss or potential loss of either the Fuel Cladding or RCS barrier may result in the relocation of radioactive materials or degradation of core cooling capability. Note that the loss or potential loss of Containment barrier in combination with loss or potential loss of either Fuel Cladding or RCS barrier results in declaration of a Site Area Emergency under EAL FS1.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

FC1**Initiating Condition:**

RCS Activity

Operating Mode Applicability:

1, 2, 3

Fission Product Barrier (FPB) Threshold:LOSSCoolant activity > **300 uCi/gm** Dose Equivalent I-131.**Basis:**

This threshold indicates that RCS radioactivity concentration is greater than 300 $\mu\text{Ci/gm}$ dose equivalent I-131. Reactor coolant activity above this level is greater than that expected for iodine spikes and corresponds to an approximate range of 2% to 5% fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the Fuel Clad Barrier.

It is recognized that sample collection and analysis of reactor coolant with highly elevated activity levels could require several hours to complete. Nonetheless, a sample-related threshold is included as a backup to other indications.

There is no Potential Loss threshold associated with RCS Activity.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2
2. NF-AA-430, Failed Fuel Action Plan

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

FC2**Initiating Condition:**

RPV Water Level

Operating Mode Applicability:

1, 2, 3

Fission Product Barrier (FPB) Threshold:LOSS

1. It **cannot** be determined that core debris will be retained in the RPV.

POTENTIAL LOSS

2. RPV water level **cannot** be restored and maintained > **-142 inches** (TAF)

OR

3. RPV water level **cannot** be determined.

Basis:

RPV values are actual levels, not indicated levels. Therefore, they may need level compensation depending on conditions.

Loss Threshold #1 Basis

The Loss threshold value reflects a SAMG decision point which indicates that decay heat removal is no longer effective and that the fuel clad barrier is challenged, as discussed in Technical Support Guidelines. Since a site-specific RPV water level is not specified here, the Loss threshold phrase, is also applicable when RPV water level cannot be determined and core damage due to inadequate core cooling is believed to be occurring.

Potential Loss Threshold #2 and #3 Basis

This water level corresponds to the top of the active fuel and is used in the EOPs to indicate a challenge to core cooling.

The RPV water level threshold is the same as RCS Barrier RC2 Loss threshold. Thus, this threshold indicates a Potential Loss of the Fuel Clad barrier and a Loss of the RCS barrier that appropriately escalates the emergency classification level to a Site Area Emergency.

This threshold is considered to be exceeded when, as specified in the site-specific EOPs, RPV water level cannot be restored and maintained above the specified level following depressurization of the RPV (either manually, automatically or by failure of the RCS barrier) or when procedural guidance or a lack of low pressure RPV injection sources preclude Emergency RPV depressurization. EOPs allow the operator a wide choice of RPV injection sources to consider when restoring RPV water level to within prescribed limits. EOPs also specify depressurization of the RPV in order to facilitate RPV water level control with low-pressure injection sources. In some events, elevated

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

FC2 (cont)**Basis (cont):**

RPV pressure may prevent restoration of RPV water level until pressure drops below the shutoff heads of available injection sources. Therefore, this Fuel Clad barrier Potential Loss is met only after either: 1) the RPV has been depressurized, or required emergency RPV depressurization has been attempted, giving the operator an opportunity to assess the capability of low-pressure injection sources to restore RPV water level or 2) no low pressure RPV injection systems are available, precluding RPV depressurization in an attempt to minimize loss of RPV inventory.

The term "cannot be restored and maintained above" means the value of RPV water level is not able to be brought above the specified limit (top of active fuel). The determination requires an evaluation of system performance and availability in relation to the RPV water level value and trend. A threshold prescribing declaration when a threshold value *cannot* be restored and maintained above a specified limit does not require immediate action simply because the current value is below the top of active fuel, but does not permit extended operation below the limit; the threshold must be considered reached as soon as it is apparent that the top of active fuel cannot be attained.

Entry into the "Steam Cooling" leg of the EOP's would be an example of an inability to "restore and maintain" level above TAF resulting in this threshold being met.

In high-power ATWS/failure to scram events, EOPs may direct the operator to deliberately lower RPV water level in order to reduce reactor power. Although such action is a challenge to core cooling and the Fuel Clad barrier, the immediate need to reduce reactor power is the higher priority. For such events, ICs MA3 or MS3 will dictate the need for emergency classification.

Since the loss of ability to determine if adequate core cooling is being provided presents a significant challenge to the fuel clad barrier, a potential loss of the fuel clad barrier is specified.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2
2. QGA 100 RPV Control
3. QGA 101 RPV Control (ATWS)
4. QGA 500-4 RPV Flooding

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

FC5**Initiating Condition:**

Primary Containment Radiation

Operating Mode Applicability:

1, 2, 3

Fission Product Barrier (FPB) Threshold:LOSSDrywell radiation monitor reading > **1.53 E+03 R/hr.****Basis:**

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that reactor coolant activity equals 300 $\mu\text{Ci/gm}$ dose equivalent I-131. Reactor coolant activity above this level is greater than that expected for iodine spikes and corresponds to an approximate range of 2% to 5% fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the Fuel Clad Barrier.

The radiation monitor reading in this threshold is higher than that specified for RCS Barrier RC5 Loss Threshold since it indicates a loss of both the Fuel Clad Barrier and the RCS Barrier. Note that a combination of the two monitor readings appropriately escalates the emergency classification level to a Site Area Emergency.

There is no Potential Loss threshold associated with Primary Containment Radiation.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2
2. Core Damage Assessment Methodology (CDAM)

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

FC7**Initiating Condition:**

Emergency Director Judgment.

Operating Mode Applicability:

1, 2, 3

Fission Product Barrier (FPB) Threshold:**LOSS**

1. Any condition in the opinion of the Emergency Director that indicates Loss of the Fuel Clad Barrier.

POTENTIAL LOSS

2. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the Fuel Clad Barrier.

Basis:**Loss Threshold #1 Basis**

This threshold addresses any other factors that are to be used by the Emergency Director in determining whether the Fuel Clad Barrier is lost.

Potential Loss Threshold #2 Basis

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the Fuel Clad Barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

RC2**Initiating Condition:**

RPV Water Level

Operating Mode Applicability:

1, 2, 3

Fission Product Barrier (FPB) Threshold:LOSS

1. RPV water level **cannot** be restored and maintained > **-142 inches** (TAF)

OR

2. RPV water level **cannot** be determined.

Basis:

RPV values are actual levels, not indicated levels. Therefore, they may need level compensation depending on conditions.

This water level corresponds to the top of active fuel and is used in the EOPs to indicate challenge to core cooling.

The RPV water level threshold is the same as Fuel Clad Barrier FC2 Potential Loss threshold. Thus, this threshold indicates a Loss of the RCS barrier and Potential Loss of the Fuel Clad barrier and that appropriately escalates the emergency classification level to a Site Area Emergency.

This threshold is considered to be exceeded when, as specified in the site-specific EOPs, RPV water level cannot be restored and maintained above the specified level following depressurization of the RPV (either manually, automatically or by failure of the RCS barrier) or when procedural guidance or a lack of low pressure RPV injection sources preclude Emergency RPV depressurization. EOPs allow the operator a wide choice of RPV injection sources to consider when restoring RPV water level to within prescribed limits. EOPs also specify depressurization of the RPV in order to facilitate RPV water level control with low-pressure injection sources. In some events, elevated RPV pressure may prevent restoration of RPV water level until pressure drops below the shutoff heads of available injection sources. Therefore, this RCS barrier Loss is met only after either: 1) the RPV has been depressurized, or required emergency RPV depressurization has been attempted, giving the operator an opportunity to assess the capability of low-pressure injection sources to restore RPV water level or 2) no low pressure RPV injection systems are available, precluding RPV depressurization in an attempt to minimize loss of RPV inventory.

The term, "cannot be restored and maintained above," means the value of RPV water level is not able to be brought above the specified limit (top of active fuel). The determination requires an evaluation of system performance and availability in relation to the RPV water level value and trend. A threshold prescribing declaration when a threshold value *cannot* be restored and maintained above a specified limit does not require immediate action simply because the current value is below the top of active

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

RC2 (cont)**Basis (cont):**

fuel, but does not permit extended operation beyond the limit; the threshold must be considered reached as soon as it is apparent that the top of active fuel cannot be attained.

Entry into the "Steam Cooling" leg of the EOP's would be an example of an inability to "restore and maintain" level above TAF resulting in this threshold being met.

In high-power ATWS/failure to scram events, EOPs may direct the operator to deliberately lower RPV water level in order to reduce reactor power. Although such action is a challenge to core cooling and the Fuel Clad barrier, the immediate need to reduce reactor power is the higher priority. For such events, ICs MA3 or MS3 will dictate the need for emergency classification.

There is no RCS Potential Loss threshold associated with RPV Water Level.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2
2. QGA 100 RPV Control
3. QGA 500-4 RPV Flooding

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

RC3**Initiating Condition:**

Primary Containment Pressure

Operating Mode Applicability:

1, 2, 3

Fission Product Barrier (FPB) Threshold:LOSS1. Drywell pressure **>2.5 psig.****AND**

2. Drywell pressure rise is due to RCS leakage.

Basis:

The > 2.5 psig primary containment pressure is the Drywell high pressure setpoint which indicates a LOCA by automatically initiating ECCS.

The second threshold focuses the fission product barrier loss threshold on a failure of the RCS instead of the non-LOCA malfunctions that may adversely affect primary containment pressure. Pressures of this magnitude can be caused by non-LOCA events such as a loss of Drywell cooling or inability to control primary containment vent/purge.

There is no Potential Loss threshold associated with Primary Containment Pressure.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2
2. QGA 100 RPV Control
3. QGA 200 Primary Containment Control

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

RC4**Initiating Condition:**

RCS Leak Rate

Operating Mode Applicability:

1, 2, 3

Fission Product Barrier (FPB) Threshold:LOSS

1. UNISOLABLE Main Steam Line (MSL), HPCI, Feedwater, RWCU or RCIC line break.

OR

2. Emergency RPV Depressurization is required.

POTENTIAL LOSS3. UNISOLABLE primary system leakage that results in **EITHER** of the following:

- a. Secondary Containment area temperature > **QGA 300 Maximum Normal** operating levels.

OR

- b. Secondary Containment area radiation level > **QGA 300 Maximum Normal** operating level.

Basis:

UNISOLABLE: An open or breached system line that cannot be isolated, remotely or locally.

Failure to isolate the leak, within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

Classification of a system break over system leakage is based on information available to the Control Room from the event. Indications that should be considered are:

- Reports describing magnitude of steam or water release.
- Use of system high flow alarms / indications, if available,
- Significant changes in makeup requirements,
- Abnormal reactor water level changes in response to the event.

The use of the above indications provides the Control Room the bases to determine that the on going event is more significant than the indications that would be expected from system leakage and therefore should be considered a system break.

Loss Threshold #1 Basis

Large high-energy lines that rupture outside primary containment can discharge significant amounts of inventory and jeopardize the pressure-retaining capability of the RCS until they are isolated. If it is determined that the ruptured line cannot be promptly isolated, the RCS barrier Loss threshold is met.

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

RC4 (cont)**Basis (cont):****Loss Threshold #2 Basis**

Emergency RPV Depressurization in accordance with the EOPs is indicative of a loss of the RCS barrier. If Emergency RPV Depressurization is performed, the plant operators are directed to open safety relief valves (SRVs). Even though the RCS is being vented into the Torus, a Loss of the RCS barrier exists due to the diminished effectiveness of the RCS to retain fission products within its boundary.

Potential Loss Threshold #3 Basis

Potential loss of RCS based on primary system leakage outside the primary containment is determined from EOP temperature or radiation Max Normal Operating values in areas such as main steam line tunnel, RCIC, HPCI, etc., which indicate a direct path from the RCS to areas outside primary containment.

A Max Normal Operating value is the highest value of the identified parameter expected to occur during normal plant operating conditions with all directly associated support and control systems functioning properly.

The indicators reaching the threshold barriers and confirmed to be caused by RCS leakage from a primary system warrant an Alert classification. A primary system is defined to be the pipes, valves, and other equipment which connect directly to the RPV such that a reduction in RPV pressure will effect a decrease in the steam or water being discharged through an unisolated break in the system.

In general, multiple indications should be used to determine if a primary system is discharging outside Primary Containment. For example, a high area radiation condition does not necessarily indicate that a primary system is discharging into the Reactor Building since this may be caused by radiation shine from nearby steam lines or the movement of radioactive materials. Conversely, a high area radiation condition in conjunction with other indications (e.g. room flooding, high area temperatures, reports of steam in the Reactor Building, an unexpected rise in Feedwater flowrate, or unexpected Main Turbine Control Valve closure) may indicate that a primary system is discharging into the Reactor Building.

An UNISOLABLE leak which is indicated by Max Normal Operating values escalates to a Site Area Emergency when combined with Containment Barrier CT6 Loss Threshold #1 (after a containment isolation) and a General Emergency when the Fuel Clad Barrier criteria is also exceeded.

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

RC4 (cont)**Basis Reference(s):**

1. NEI 99-01 Rev 6, Table 9-F-2
2. M-13 Main steam piping
3. UFSAR 5.2.5
4. QCOA 0201-01 Rev 016, Increasing Drywell Pressure
5. QOA 900-4 A-17 900-4 A-17 Annunciator
6. QCOS 1600-07 Reactor Coolant Leakage In The Drywell
7. QGA 300 Secondary Containment Control

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

RC5**Initiating Condition:**

Primary Containment radiation

Operating Mode Applicability:

1, 2, 3

Fission Product Barrier (FPB) Threshold:

LOSS

Drywell radiation monitor reading > **100R/hr.**

Basis:

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that reactor coolant activity equals Technical Specification allowable limits. This value is lower than that specified for Fuel Clad Barrier FC5 Loss Threshold since it indicates a loss of the RCS Barrier only.

There is no Potential Loss threshold associated with Primary Containment Radiation.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2
2. Calc. EP-EAL-0611

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

RC7**Initiating Condition:**

Emergency Director Judgment.

Operating Mode Applicability:

1, 2, 3

Fission Product Barrier (FPB) Threshold:**LOSS**

1. Any condition in the opinion of the Emergency Director that indicates Loss of the RCS Barrier.

POTENTIAL LOSS

2. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the RCS Barrier.

Basis:**Loss Threshold #1 Basis**

This threshold addresses any other factors that are to be used by the Emergency Director in determining whether the RCS Barrier is lost.

Potential Loss Threshold #2 Basis

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the RCS Barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

CT2**Initiating Condition:**

RPV Water Level

Operating Mode Applicability:

1, 2, 3

Fission Product Barrier (FPB) Threshold:POTENTIAL LOSS

It **cannot** be determined that core debris will be retained in the RPV.

Basis:

The Potential Loss threshold is identical to the Fuel Clad Barrier FC2 Loss threshold RPV water level. The Potential Loss requirement for the threshold value reflects a SAMG decision point which indicates that decay heat removal is no longer effective and that the primary containment barrier could be challenged, as discussed in Technical Support Guidelines.

PRA studies indicate that the condition of this Potential Loss threshold could be a core melt sequence which, if not corrected, could lead to RPV failure and increased potential for primary containment failure. In conjunction with the RPV water level Loss thresholds in the Fuel Clad and RCS barrier columns, this threshold results in the declaration of a General Emergency.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2
2. QGA 100 RPV Control
3. QGA 101 RPV Control (ATWS)
4. QGA 500-4 RPV Flooding

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

CT3**Initiating Condition:**

Primary Containment Conditions

Operating Mode Applicability:

1, 2, 3

Fission Product Barrier (FPB) Threshold:LOSS

1. UNPLANNED rapid drop in Drywell pressure following Drywell pressure rise.

OR2. Drywell pressure response **not** consistent with LOCA conditions.POTENTIAL LOSS3. Drywell pressure > **56 psig** and rising.**OR**4. a. Drywell or torus hydrogen concentration $\geq 6\%$.**AND**b. Drywell or torus oxygen concentration $\geq 5\%$.**OR**

5. Heat Capacity Limit (QGA 200, HCTL) exceeded.

Basis:

UNPLANNED: A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Loss Threshold #1 and #2 Basis

Rapid UNPLANNED loss of primary containment pressure (i.e., not attributable to Drywell spray or condensation effects) following an initial pressure rise indicates a loss of primary containment integrity. Primary containment pressure should rise as a result of mass and energy release into the primary containment from a LOCA. Thus, primary containment pressure not increasing under these conditions indicates a loss of primary containment integrity.

These thresholds rely on operator recognition of an unexpected response for the condition and therefore a specific value is not assigned. The unexpected (UNPLANNED) response is important because it is the indicator for a containment bypass condition. A pressure suppression bypass path would **not** be an indication of a containment breach.

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

CT3 (cont)**Basis (cont):****Potential Loss Threshold #3 Basis**

The threshold pressure is the primary containment internal design pressure. Structural acceptance testing demonstrates the capability of the primary containment to resist pressures greater than the internal design pressure. A pressure of this magnitude is greater than those expected to result from any design basis accident and, thus, represent a Potential Loss of the Containment barrier.

Potential Loss Threshold #4 Basis

An elevated hydrogen concentration in the presence of oxygen may lead to a deflagration of the mixture inside the primary containment. The rapid burning of this mixture will lead to a pressure increase that could result in a loss of the primary Containment Barrier.

Potential Loss Threshold #5 Basis

The HCTL is a function of RPV pressure, Torus temperature and Torus water level. It is utilized to preclude failure of the containment and equipment in the containment necessary for the safe shutdown of the plant and therefore, the inability to maintain plant parameters below the limit constitutes a potential loss of containment.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2
2. UFSAR Fig. 6.2-16a
3. UFSAR Section 15.6
4. UFSAR 6.2.1.1
5. QGA 200, Primary Containment Control
6. Quad Cities PSTG Section 5, Primary Containment Control

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

CT5**Initiating Condition:**

Primary Containment Radiation

Operating Mode Applicability:

1, 2, 3

Fission Product Barrier (FPB) Threshold:POTENTIAL LOSS

Drywell radiation monitor reading > **1.99 E+04 R/hr.**

Basis:

There is no Loss threshold associated with Primary Containment Radiation.

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that 20% of the fuel cladding has failed. This level of fuel clad failure is well above that used to determine the analogous Fuel Clad Barrier Loss and RCS Barrier Loss thresholds.

NUREG-1228, *Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents*, indicates the fuel clad failure must be greater than approximately 20% in order for there to be a major release of radioactivity requiring offsite protective actions. For this condition to exist there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. It is therefore prudent to treat this condition as a potential loss of containment which would then escalate the emergency classification level to a General Emergency.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2
2. Core Damage Assessment Methodology (CDAM)

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

CT6**Initiating Condition:**

Primary Containment Isolation Failure

Operating Mode Applicability:

1, 2, 3

Fission Product Barrier (FPB) Threshold:LOSS

1. UNISOLABLE direct downstream pathway to the environment exists after primary containment isolation signal.
OR
2. Intentional Primary Containment venting/purging per EOPs or SAMGs due to accident conditions.
OR
3. UNISOLABLE primary system leakage that results in **EITHER** of the following:
 - a. Secondary Containment area temperature > **QGA 300, Maximum Safe** operating levels.
OR
 - b. Secondary Containment area radiation level > **QGA 300, Maximum Safe** operating levels.

Basis:

UNISOLABLE: An open or breached system line that cannot be isolated, remotely or locally.

Failure to isolate the leak, within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

These thresholds address incomplete containment isolation that allows an UNISOLABLE direct release to the environment.

Loss Threshold #1 Basis

The use of the modifier “direct” in defining the release path discriminates against release paths through interfacing liquid systems or minor release pathways, such as instrument lines, not protected by the Primary Containment Isolation System (PCIS). Leakage into a closed system is to be considered only if the closed system is breached and thereby creates a significant pathway to the environment. Examples include unisolable Main Steamline, HPCI or RCIC steamline breaks, unisolable RWCU system breaks, and unisolable containment atmosphere vent paths.

Examples of "downstream pathway to the environment" could be through the Turbine/Condenser, or direct release to the Turbine or Reactor Building.

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

CT6 (cont)**Basis (cont):**

The existence of a filter is not considered in the threshold assessment. Filters do not remove fission product noble gases. In addition, a filter could become ineffective due to iodine and/or particulate loading beyond design limits (i.e., retention ability has been exceeded) or water saturation from steam/high humidity in the release stream.

Following the leakage of RCS mass into primary containment and a rise in primary containment pressure, there may be minor radiological releases associated with allowable primary containment leakage through various penetrations or system components. Minor releases may also occur if a primary containment isolation valve(s) fails to close but the primary containment atmosphere escapes to an enclosed system. These releases do not constitute a loss or potential loss of primary containment but should be evaluated using the Recognition Category R ICs.

Loss Threshold #2 Basis

EOPs may direct primary containment isolation valve logic(s) to be intentionally bypassed, even if offsite radioactivity release rate limits will be exceeded. Under these conditions with a valid primary containment isolation signal, the containment should also be considered lost if primary containment venting is actually performed.

Intentional venting of primary containment for primary containment pressure or combustible gas control to the secondary containment and/or the environment is a Loss of the Containment. Venting for primary containment pressure control when not in an accident situation (e.g., to control pressure below the Drywell high pressure scram setpoint) does not meet the threshold condition.

Loss Threshold #3 Basis

The Max Safe Operating Temperature and the Max Safe Operating Radiation Level are each the highest value of these parameters at which neither: (1) equipment necessary for the safe shutdown of the plant will fail, nor (2) personnel access necessary for the safe shutdown of the plant will be precluded. EOPs utilize these temperatures and radiation levels to establish conditions under which RPV depressurization is required.

The temperatures and radiation levels should be confirmed to be caused by RCS leakage from a primary system. A primary system is defined to be the pipes, valves, and other equipment which connect directly to the RPV such that a reduction in RPV pressure will effect a decrease in the steam or water being discharged through an unisolated break in the system.

In general, multiple indications should be used to determine if a primary system is discharging outside Primary Containment. For example, a high area radiation condition does not necessarily indicate that a primary system is discharging into the Reactor Building since this may be caused by radiation shine from nearby steam lines or the movement of radioactive materials. Conversely, a high area radiation condition in conjunction with other indications (e.g. room flooding, high area temperatures, reports of steam in the Reactor Building, an unexpected rise in Feedwater flowrate, or unexpected

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

CT6 (cont)**Basis (cont):**

Main Turbine Control Valve closure) may indicate that a primary system is discharging into the Reactor Building.

In combination with RCS Barrier RC4 Potential Loss Threshold #3 this threshold would result in a Site Area Emergency.

In combination with RCS Barrier RC4 Potential Loss Threshold #3 this threshold would result in a Site Area Emergency.

There is no Potential Loss threshold associated with Primary Containment Isolation Failure.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2
2. QGA 200 Primary Containment Control
3. QGA 200-5 Hydrogen Control
4. QCOP 1600-13 Post-Accident Venting of the Primary Containment
5. QGA 300 Secondary Containment Control

**RECOGNITION CATEGORY
FISSION PRODUCT BARRIER DEGRADATION**

CT7**Initiating Condition:**

Emergency Director Judgment.

Operating Mode Applicability:

1, 2, 3

Fission Product Barrier (FPB) Threshold:**LOSS**

1. Any condition in the opinion of the Emergency Director that indicates Loss of the Containment Barrier.

POTENTIAL LOSS

2. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the Containment Barrier.

Basis:**Loss Threshold #1 Basis:**

This threshold addresses any other factors that are to be used by the Emergency Director in determining whether the Containment Barrier is lost.

Potential Loss Threshold #2 Basis:

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the Containment Barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-2

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MG1****Initiating Condition:**

Prolonged loss of all Off-site and all On-Site AC power to emergency busses.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. a. Loss of **ALL** offsite and onsite AC power to unit ECCS buses.

AND

b. **EITHER** of the following:

- Restoration of at least one unit ECCS bus in **< 1 hour is not** likely.

OR

- RPV water level **cannot** be restored and maintained **> -162 inches**.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

RPV values are actual levels, not indicated levels. Therefore, they may need level compensation depending on conditions. Compensated values may be used in accordance with the SAMG program.

This IC addresses a prolonged loss of all power sources to AC emergency buses. A loss of all AC power compromises the performance of all SAFETY SYSTEMs requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. A prolonged loss of these buses will lead to a loss of any fission product barriers. In addition, fission product barrier monitoring capabilities may be degraded under these conditions.

The EAL should require declaration of a General Emergency prior to meeting the thresholds for IC FG1. This will allow additional time for implementation of offsite protective actions.

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MG1 (cont)****Basis (cont):**

Escalation of the emergency classification from Site Area Emergency will occur if it is projected that power cannot be restored to at least one AC emergency bus by the end of the analyzed station blackout coping period. Beyond this time, plant responses and event trajectory are subject to greater uncertainty, and there is an increased likelihood of challenges to multiple fission product barriers.

The estimate for restoring at least one emergency bus should be based on a realistic appraisal of the situation. Mitigation actions with a low probability of success should not be used as a basis for delaying a classification upgrade. The goal is to maximize the time available to prepare for, and implement, protective actions for the public.

The EAL will also require a General Emergency declaration if the loss of AC power results in parameters that indicate an inability to adequately remove decay heat from the core.

Basis Reference(s):

1. NEI 99-01 Rev 6, SG1
2. UFSAR Figure 8.3-1
3. UFSAR Section 8.3
4. QCOA 6100-03 Loss of Offsite Power
5. QOP 6100-02 Restoring Reserve Auxiliary Transformer 12 To Service
6. QOP 6100-04 Restoring Reserve Auxiliary Transformer 22 To Service
7. QCOA 6100-04 Station Blackout
8. GE letter No. 92-38 from L.G. Knutson to Pat Donahue, dated April 7, 1992, "AC TURBINE LOADS SMALL TASK NO. QC107" (Station Blackout analysis)
9. QGA 100 RPV Control

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MS1****Initiating Condition:**

Loss of all offsite and all onsite AC power to emergency busses for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. a. Loss of **ALL** offsite and onsite AC Power to unit ECCS busses.

AND

b. Failure to restore power to at least one ECCS bus in **< 15 minutes** from the time of loss of both offsite and onsite AC power.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a total loss of AC power that compromises the performance of all SAFETY SYSTEMs requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. In addition, fission product barrier monitoring capabilities may be degraded under these conditions. This IC represents a condition that involves actual or likely major failures of plant functions needed for the protection of the public.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via ICs RG1, FG1 or MG1.

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MS1 (cont)****Basis Reference(s):**

1. NEI 99-01 Rev 6, SS1
2. UFSAR Figure 8.3-1
3. UFSAR Section 8.3
4. QCOA 6100-03 Loss of Offsite Power
5. QOP 6100-02 Restoring Reserve Auxiliary Transformer 12 To Service
6. QOP 6100-04 Restoring Reserve Auxiliary Transformer 22 To Service
7. QCOA 6100-04 Station Blackout
8. GE letter No. 92-38 from L.G. Knutson to Pat Donahue, dated April 7, 1992, "AC TURBINE LOADS SMALL TASK NO. QC107" (Station Blackout analysis)

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MA1****Initiating Condition:**

Loss of all but one AC power source to emergency buses for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
1. a. AC power capability to unit ECCS busses reduced to only one of the following power sources for **≥ 15 minutes**.
- Reserve auxiliary Transformer TR-12 (TR-22)
 - Unit Auxiliary Transformer TR-11 (TR-21)
 - Unit Emergency Diesel Generator
 - Shared Emergency Diesel Generator
 - Unit crosstie breakers

AND

- b. **ANY** additional single power source failure will result in a loss of **ALL** AC power to SAFETY SYSTEMs.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC describes a significant degradation of offsite and onsite AC power sources such that any additional single failure would result in a loss of all AC power to SAFETY SYSTEMs. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment. This IC provides an escalation path from IC MU1.

An “AC power source” is a source recognized in AOPs and EOPs, and capable of supplying required power to an emergency bus. Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of all but one emergency power source (e.g., an onsite diesel generator).

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MA1 (cont)****Basis (cont):**

- A loss of emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being fed from an offsite power source.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of power.

Escalation of the emergency classification level would be via IC MS1.

Basis Reference(s):

1. NEI 99-01 Rev 6, SA1
2. UFSAR Figure 8.3-1
3. UFSAR Section 8.3
4. QCOA 6100-03 Loss of Offsite Power
5. QOP 6100-02 Restoring Reserve Auxiliary Transformer 12 To Service
6. QOP 6100-04 Restoring Reserve Auxiliary Transformer 22 To Service
7. QCOA 6100-04 Station Blackout
8. GE letter No. 92-38 from L.G. Knutson to Pat Donahue, dated April 7, 1992, "AC TURBINE LOADS SMALL TASK NO. QC107" (Station Blackout analysis)

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MU1****Initiating Condition:**

Loss of all offsite AC power capability to emergency buses for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

Loss of **ALL** offsite AC power capability to unit ECCS busses for **≥ 15 minutes**.

Basis:

This IC addresses a prolonged loss of offsite power. The loss of offsite power sources renders the plant more vulnerable to a complete loss of power to AC emergency buses. This condition represents a potential reduction in the level of safety of the plant.

For emergency classification purposes, “capability” means that an offsite AC power source(s) is available to the emergency buses, whether or not the buses are powered from it. (e.g. unit cross-tie breakers)

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of offsite power.

Escalation of the emergency classification level would be via IC MA1.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU1
2. UFSAR Figure 8.3-1
3. UFSAR Section 8.3
4. QCOA 6100-03 Loss of Offsite Power
5. QOP 6100-02 Restoring Reserve Auxiliary Transformer 12 To Service
6. QOP 6100-04 Restoring Reserve Auxiliary Transformer 22 To Service
7. QCOA 6100-04 Station Blackout

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MG2****Initiating Condition:**

Loss of all AC and Vital DC power sources for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. a. Loss of **ALL** offsite and onsite AC power to unit ECCS busses.

AND

b. Voltage is **< 105 VDC** on 125 VDC battery busses #1 and #2.

AND

c. **ALL** AC and Vital DC power sources have been lost for **≥ 15 minutes**.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a concurrent and prolonged loss of both AC and Vital DC power. A loss of all AC power compromises the performance of all SAFETY SYSTEMs requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. A loss of Vital DC power compromises the ability to monitor and control SAFETY SYSTEMs. A sustained loss of both AC and DC power will lead to multiple challenges to fission product barriers.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses. The 15-minute emergency declaration clock begins at the point when all EALs are met.

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MG2 (cont)****Basis Reference(s):**

1. NEI 99-01 Rev 6, SG8
2. UFSAR Figure 8.3-1
3. UFSAR Section 8.3
4. QCOA 6100-03 Loss of Offsite Power
5. QOP 6100-02 Restoring Reserve Auxiliary Transformer 12 To Service
6. QOP 6100-04 Restoring Reserve Auxiliary Transformer 22 To Service
7. QCOA 6100-04 Station Blackout
8. GE letter No. 92-38 from L.G. Knutson to Pat Donahue, dated April 7, 1992, "AC TURBINE LOADS SMALL TASK NO. QC107" (Station Blackout analysis)
9. Technical Specifications 3.8.4 and B3.8.4
10. UFSAR Section 8.3.2
11. QOP 6900-02 125 VDC Electrical System
12. QCTS 0230-01 Unit One (Two) 125 VDC Service Test Normal or Alternate Battery

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MS2****Initiating Condition:**

Loss of all vital DC power for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

Voltage is **< 105 VDC** on 125 VDC battery busses #1 and #2 for **≥ 15 minutes**.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a loss of Vital DC power which compromises the ability to monitor and control SAFETY SYSTEMs. In modes above Cold Shutdown, this condition involves a major failure of plant functions needed for the protection of the public.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via ICs RG1, FG1 or MG2.

Basis Reference(s):

1. NEI 99-01 Rev 6, SS8
2. Technical Specifications 3.8.4 and B3.8.4
3. UFSAR Section 8.3.2
4. QOP 6900-02 125 VDC Electrical System
5. QCTS 0230-01 Unit One (Two) 125 VDC Service Test Normal or Alternate Battery

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MS3****Initiating Condition:**

Inability to shutdown the reactor causing a challenge to RPV water level or RCS heat removal.

Operating Mode Applicability:

1, 2

Emergency Action Level (EAL):

1. Automatic scram did **not** shutdown the reactor as indicated by Reactor Power > 5%.

AND

2. All manual / ARI actions to shutdown the reactor have been unsuccessful as indicated by Reactor Power > 5%.

AND

3. **EITHER** of the following conditions exist:

- RPV water level **cannot** be restored and maintained > -162 inches.

OR

- Heat Capacity Limit (QGA 200, HCTL) exceeded.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor scram that results in a reactor shutdown, all subsequent operator manual actions, both inside and outside the Control Room including driving in control rods and boron injection, are unsuccessful, and continued power generation is challenging the capability to adequately remove heat from the core and/or the RCS. This condition will lead to fuel damage if additional mitigation actions are unsuccessful and thus warrants the declaration of a Site Area Emergency.

In some instances, the emergency classification resulting from this IC/EAL may be higher than that resulting from an assessment of the plant responses and symptoms against the Recognition Category F ICs/EALs. This is appropriate in that the Recognition Category F ICs/EALs do not address the additional threat posed by a failure to shutdown the reactor. The inclusion of this IC and EAL ensures the timely declaration of a Site Area Emergency in response to prolonged failure to shutdown the reactor.

A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria.

RPV values are actual levels, not indicated levels. Therefore, they may need level compensation depending on conditions. Escalation of the emergency classification level would be via IC RG1 or FG1.

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MS3 (cont)****Basis Reference(s):**

1. NEI 99-01 Rev 6, SS5
2. QGA 100 RPV Control
3. QGA 101 RPV Control (ATWS)
4. QGA 200 Primary Containment Control

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MA3****Initiating Condition:**

Automatic or manual scram fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

Operating Mode Applicability:

1, 2

Emergency Action Level (EAL):**Note:**

- A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies.
1. Automatic or manual scram did **not** shutdown the reactor as indicated by Reactor Power > 5%.
- AND**
2. Manual / ARI actions taken at the Reactor Console are **not** successful in shutting down the reactor as indicated by Reactor Power > 5%.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor scram that results in a reactor shutdown, and subsequent operator manual actions taken at the reactor control consoles to shutdown the reactor are also unsuccessful. This condition represents an actual or potential substantial degradation of the level of safety of the plant. An emergency declaration is required even if the reactor is subsequently shutdown by an action taken away from the reactor control consoles since this event entails a significant failure of the RPS.

A manual action at the reactor control consoles is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor scram. This action does not include manually driving in control rods or implementation of boron injection strategies. If this action(s) is unsuccessful, operators would immediately pursue additional manual actions at locations away from the reactor control consoles (e.g., locally opening breakers). Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be “at the reactor control consoles”.

Taking the Reactor Mode Switch to **SHUTDOWN** is considered to be a manual scram action.

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MA3 (cont)****Basis (cont):**

The plant response to the failure of an automatic or manual reactor scram will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If the failure to shutdown the reactor is prolonged enough to cause a challenge to the RPV water level or RCS heat removal safety functions, the emergency classification level will escalate to a Site Area Emergency via IC MS3. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC MS3 or FS1, an Alert declaration is appropriate for this event.

It is recognized that plant responses or symptoms may also require an Alert declaration in accordance with the Recognition Category F ICs; however, this IC and EAL are included to ensure a timely emergency declaration.

A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria.

Basis Reference(s):

1. NEI 99-01 Rev 6, SA5
2. QGA 100 RPV Control
3. QGA 101 RPV Control (ATWS)

RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS

MU3

Initiating Condition:

Automatic or manual scram fails to shutdown the reactor.

Operating Mode Applicability:

1, 2

Emergency Action Level (EAL):**Note:**

- A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies.
1. a. Automatic scram did **not** shutdown the reactor as indicated by Reactor Power > 5%.
AND
b. Subsequent manual / ARI action taken at the Reactor Console is successful in shutting down the reactor as indicated by Reactor Power \leq 5%.
OR
 2. a. Manual scram did **not** shutdown the reactor as indicated by Reactor Power > 5%.
AND
b. **EITHER** of the following:
 1. Subsequent manual / ARI action taken at the Reactor Console is successful in shutting down the reactor as indicated by Reactor Power \leq 5%.
OR
 2. Subsequent automatic scram / ARI is successful in shutting down the reactor as indicated by Reactor Power \leq 5%.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor scram that results in a reactor shutdown, and either a subsequent operator manual action taken at the reactor control consoles or an automatic scram is successful in shutting down the reactor. This event is a precursor to a more significant condition and thus represents a potential degradation of the level of safety of the plant.

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MU3 (cont)****Basis (cont):****EAL #1 Basis**

Following the failure on an automatic reactor scram, operators will promptly initiate manual actions at the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor scram). If these manual actions are successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

EAL #2 Basis

If an initial manual reactor trip is unsuccessful, operators will promptly take manual action at another location(s) on the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor scram / ARI using a different switch). Depending upon several factors, the initial or subsequent effort to manually scram the reactor, or a concurrent plant condition, may lead to the generation of an automatic reactor scram signal. If a subsequent manual or automatic scram / ARI is successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

A manual action at the reactor control consoles is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor scram). This action does not include manually driving in control rods or implementation of boron injection strategies. Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be "at the reactor control consoles".

Taking the Reactor Mode Switch to Shutdown is considered to be a manual scram action.

The plant response to the failure of an automatic or manual reactor scram will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If subsequent operator manual actions taken at the reactor control consoles are also unsuccessful in shutting down the reactor, then the emergency classification level will escalate to an Alert via IC MA3. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC MA3 or FA1, an Unusual Event declaration is appropriate for this event.

A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria.

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MU3 (cont)****Basis (cont):**

Should a reactor scram signal be generated as a result of plant work (e.g., RPS setpoint testing), the following classification guidance should be applied.

- If the signal generated as a result of plant work causes a plant transient that creates a real condition that should have included an automatic reactor scram and the RPS fails to automatically shutdown the reactor, then this IC and the EALs are applicable, and should be evaluated.
- If the signal generated as a result of plant work does not cause a plant transient but should have generated an RPS scram signal and the scram failure is determined through other means (e.g., assessment of test results), then this IC and the EALs are not applicable and no classification is warranted.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU5
2. QGA 100 RPV Control
3. QGA 101 RPV Control (ATWS)
4. Technical Specifications Table 3.3.1.1-1
5. Technical Specification 3.3.1.3
6. Technical Specification Bases 3.3.1.1 and 3.3.1.3

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MA4****Initiating Condition:**

UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
1. **ANY** Table M1 parameter **cannot** be determined from within the Control Room for **≥ 15 minutes** due to an UNPLANNED event.

Table M1 Control Room Parameters

- Reactor Power
- RPV Water Level
- RPV Pressure
- Drywell Pressure
- Torus Level
- Torus Temperature

AND

2. **ANY** Table M2 transient in progress.

Table M2 Significant Transients

- Turbine Trip
- Reactor Scram
- ECCS Activation
- Recirc. Runback **> 25%** Reactor Power Change
- Thermal Power oscillations **> 10%** Reactor Power Change

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MA4 (cont)****Basis:**

UNPLANNED: A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses the difficulty associated with monitoring rapidly changing plant conditions during a transient without the ability to obtain SAFETY SYSTEM parameters from within the Control Room. During this condition, the margin to a potential fission product barrier challenge is reduced. It thus represents a potential substantial degradation in the level of safety of the plant.

This situation would require a loss of all of the Control Room sources for the given parameter(s). For example, the reactor power level cannot be determined from any analog, computer point, digital and recorder source within the Control Room.

An event involving a loss of plant indications, annunciators and/or display systems is evaluated in accordance with 10 CFR 50.72 (and associated guidance in NUREG-1022) to determine if an NRC event report is required. The event would be reported if it significantly impaired the capability to perform emergency assessments. In particular, emergency assessments necessary to implement abnormal operating procedures, emergency operating procedures, and emergency plan implementing procedures addressing emergency classification, accident assessment, or protective action decision-making.

This EAL is focused on a selected subset of plant parameters associated with the key safety functions of reactivity control, RPV water level and RCS heat removal. The loss of the ability to determine any of these parameters from within the Control Room is considered to be more significant than simply a reportable condition. In addition, if all indication sources for any of the listed parameters are lost, then the ability to determine the values of other SAFETY SYSTEM parameters may be impacted as well. For example, if the value for RPV water level cannot be determined from the indications and recorders on a main control board, the SPDS or the plant computer, the availability of other parameter values may be compromised as well.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level would be via ICs FS1 or IC RS1.

Basis Reference(s):

1. NEI 99-01 Rev 6, SA2

RECOGNITION CATEGORY SYSTEM MALFUNCTIONS

MU4

Initiating Condition:

UNPLANNED loss of Control Room indications for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):

Note:

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

ANY Table M1 parameter **cannot** be determined from within the Control Room for **≥ 15 minutes** due to an UNPLANNED event.

Table M1 Control Room Parameters
<ul style="list-style-type: none"> • Reactor Power • RPV Water Level • RPV Pressure • Drywell Pressure • Torus Level • Torus Temperature

Basis:

UNPLANNED: A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses the difficulty associated with monitoring normal plant conditions without the ability to obtain SAFETY SYSTEM parameters from within the Control Room. This condition is a precursor to a more significant event and represents a potential degradation in the level of safety of the plant.

This situation would require a loss of all of the Control Room sources for the given parameter(s). For example, the reactor power level cannot be determined from any analog, digital and recorder source within the Control Room.

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MU4 (cont)****Basis (cont):**

An event involving a loss of plant indications, annunciators and/or display systems is evaluated in accordance with 10 CFR 50.72 (and associated guidance in NUREG-1022) to determine if an NRC event report is required. The event would be reported if it significantly impaired the capability to perform emergency assessments. In particular, emergency assessments necessary to implement abnormal operating procedures, emergency operating procedures, and emergency plan implementing procedures addressing emergency classification, accident assessment, or protective action decision-making.

This EAL is focused on a selected subset of plant parameters associated with the key safety functions of reactivity control, core cooling and RCS heat removal. The loss of the ability to determine any of these parameters from within the Control Room is considered to be more significant than simply a reportable condition. In addition, if all indication sources for any of the listed parameters are lost, then the ability to determine the values of other SAFETY SYSTEM parameters may be impacted as well. For example, if the value for reactor vessel level cannot be determined from the indications and recorders on a main control board, the SPDS or the plant computer, the availability of other parameter values may be compromised as well.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level would be via IC MA4.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU2

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MA5****Initiating Condition:**

Hazardous event affecting a SAFETY SYSTEM required for the current operating mode.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):**Note:**

- This EAL is only applicable to SAFETY SYSTEMs having two (2) or more trains.
- If the affected SAFETY SYSTEM train was already inoperable before the hazardous event occurred, then this emergency classification is not warranted.
- If the hazardous event only resulted in VISIBLE DAMAGE, with no indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is not warranted.
- If a hazardous event occurs and it is determined that the conditions of MA5 are not met, then assess the event via HU3, HU4, or HU6.

1. a. The occurrence of **ANY** of the following hazardous events:

- Seismic event (earthquake)
- Internal or external flooding event
- High winds or tornado strike
- FIRE
- EXPLOSION
- Other events with similar hazard characteristics as determined by the Shift Manager

AND

- b. Event damage has caused indications of degraded performance to one train of a SAFETY SYSTEM required by Technical Specifications for the current operating mode.

AND

c. **EITHER** of the following:

- Event damage has caused indications of degraded performance to a second train of the SAFETY SYSTEM required by Technical Specifications for the current operating mode.

OR

- Event damage has resulted in VISIBLE DAMAGE to a second train of the SAFETY SYSTEM required by Technical Specifications for the current operating mode.

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MA5 (cont)****Basis:**

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.

EXPLOSION: A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should not automatically be considered an explosion. Such events may require a post-event inspection to determine if the attributes of an explosion are present.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

VISIBLE DAMAGE: Damage to a SAFETY SYSTEM train that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected SAFETY SYSTEM train.

This IC addresses a hazardous event that causes damage to SAFETY SYSTEMS required for the current operating mode, "required", i.e. required to be operable by Technical Specifications for the current operating mode. In order to provide the appropriate context for consideration of an Alert classification, the hazardous event must have caused indications of degraded performance in one train, and there must be either indications of performance issues with the second SAFETY SYSTEM train or VISIBLE DAMAGE to the second train such that the potential exists for this second SAFETY SYSTEM train to have performance issues. In other words, in order for this EAL to be classified, the hazardous event must occur, at least one SAFETY SYSTEM train must have indications of degraded performance, and the second SAFETY SYSTEM train must have indications of degraded performance or VISIBLE DAMAGE such that the potential exists for performance issues. Note that this second SAFETY SYSTEM train is from the same SAFETY SYSTEM that has degraded performance for criteria 1.b of this EAL; commercial nuclear power plants are designed to be able to support single system issues without compromising public health and safety from radiological events.

Indications of degraded performance address damage to a SAFETY SYSTEM train that is in operation since indications for it will be readily available. The indications of degraded performance should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

Operators will make a determination of VISIBLE DAMAGE based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage. This VISIBLE DAMAGE should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MA5 (cont)****Basis (cont):**

Escalation of the emergency classification level would be via IC FS1 or RS1.

If a hazardous event occurs and the EAL conditions of MA5 are not met then assess the event via HU3, HU4, or HU6.

Basis Reference(s):

1. NEI 99-01, Rev 6 SA9

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MU6****Initiating Condition:**

RCS leakage for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. RCS unidentified or pressure boundary leakage in the Drywell **> 10 gpm** for **≥ 15 minutes**.

OR

2. RCS identified leakage in the Drywell **>25 gpm** for **≥ 15 minutes**.

OR

3. Leakage from the RCS to a location outside the Drywell **>25 gpm** for **≥ 15 minutes**.

Basis:

UNISOLABLE: An open or breached system line that cannot be isolated, remotely or locally.

Failure to isolate the leak, within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

This IC addresses RCS leakage which may be a precursor to a more significant event. In this case, RCS leakage has been detected and operators, following applicable procedures, have been unable to promptly isolate the leak. This condition is considered to be a potential degradation of the level of safety of the plant.

EAL #1 and EAL #2 Basis

These EALs are focused on a loss of mass from the RCS due to "unidentified leakage", "pressure boundary leakage" or "identified leakage" (as these leakage types are defined in the plant Technical Specifications).

EAL #3 Basis

This EAL addresses a RCS mass loss caused by an UNISOLABLE leak through an interfacing system.

These EALs thus apply to leakage into the containment, a secondary-side system or a location outside of containment.

The leak rate values for each EAL were selected because they are usually observable with normal Control Room indications. Lesser values typically require time-consuming

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MU6 (cont)****Basis (cont):**

calculations to determine (e.g., a mass balance calculation). EAL #1 uses a lower value that reflects the greater significance of unidentified or pressure boundary leakage.

The release of mass from the RCS due to the as-designed/expected operation of any relief valve does not warrant an emergency classification.

A stuck-open Safety Relief Valve (SRV) or SRV leakage is not considered either identified or unidentified leakage by Technical Specifications and, therefore, is not applicable to this EAL.

The 15-minute threshold duration allows sufficient time for prompt operator actions to isolate the leakage, if possible.

Escalation of the emergency classification level would be via ICs of Recognition Category R or F.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU4
2. QCOS 1600-07 Reactor Coolant Leakage in the Drywell
3. Technical Specifications 3.4.4
4. UFSAR 5.2.5
5. QCOA 0201-01 Increasing Drywell Pressure

RECOGNITION CATEGORY SYSTEM MALFUNCTIONS

MU7

Initiating Condition:

Loss of all On-site or Off-site communications capabilities.

Operating Mode Applicability:

1, 2, 3

Emergency Action Level (EAL):

1. Loss of **ALL** Table M3 **Onsite** communications capability affecting the ability to perform routine operations.

OR

2. Loss of **ALL** Table M3 **Offsite** communication capability affecting the ability to perform offsite notifications.

OR

3. Loss of **ALL** Table M3 **NRC** communication capability affecting the ability to perform NRC notifications.

Table M3 Communications Capability			
System	Onsite	Offsite	NRC
Plant Radio	X		
Plant Page	X		
All telephone Lines (Commercial and microwave)	X	X	X
ENS		X	X
HPN		X	X
Satellite Phones		X	X

Basis:

This IC addresses a significant loss of on-site or offsite communications capabilities. While not a direct challenge to plant or personnel safety, this event warrants prompt notifications to Offsite Response Organizations (OROs) and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (e.g., use of non-plant, privately owned equipment, relaying of on-site information via individuals or multiple radio transmission points, individuals being sent to offsite locations, etc.).

**RECOGNITION CATEGORY
SYSTEM MALFUNCTIONS****MU7 (cont)****Basis (cont):****EAL #1 Basis**

This EAL addresses a total loss of the communications methods used in support of routine plant operations.

EAL #2 Basis

This EAL addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are listed in procedure EP-MW-114-100-F-01, Nuclear Accident Reporting System (NARS) Form.

EAL #3 Basis

This EAL addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU6
2. EP-MW-124-1001 Facilities Inventories and Equipment Tests
3. UFSAR Section 9.5.2

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

CA1**Initiating Condition:**

Loss of all offsite and all onsite AC power to emergency busses for 15 minutes or longer.

Operating Mode Applicability:

4, 5, D

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.
-
1. a. Loss of **ALL** offsite and onsite AC power to unit ECCS busses.
AND
b. Failure to restore power to at least one unit ECCS bus in **< 15 minutes** from the time of loss of both offsite and onsite AC power.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related

This IC addresses a total loss of AC power that compromises the performance of all SAFETY SYSTEMs requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as a Site Area Emergency because of the increased time available to restore an emergency bus to service. Additional time is available due to the reduced core decay heat load, and the lower temperatures and pressures in various plant systems. Thus, when in these modes, this condition represents an actual or potential substantial degradation of the level of safety of the plant.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via IC CS6 or RS1.

**RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

CA1 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, CA2
2. UFSAR Figure 8.3-1
3. UFSAR Section 8.3
4. QCOA 6100-03 Loss of Offsite Power
5. QOP 6100-02 Restoring Reserve Auxiliary Transformer 12 To Service
6. QOP 6100-04 Restoring Reserve Auxiliary Transformer 22 To Service
7. QCOA 6100-04 Station Blackout
8. GE letter No. 92-38 from L.G. Knutson to Pat Donahue, dated April 7, 1992, "ACTURBINE LOADS SMALL TASK NO. QC107" (Station Blackout analysis)

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

CU1**Initiating Condition:**

Loss of all but one AC power source to emergency buses for 15 minutes or longer.

Operating Mode Applicability:

4, 5, D

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.
1. a. AC power capability to unit ECCS busses reduced to only one of the following power sources for **≥ 15 minutes**.
- Reserve auxiliary Transformer TR-12 (TR-22)
 - Unit auxiliary transformer TR-11 (TR-21)
 - Unit Emergency Diesel Generator
 - Shared Emergency Diesel Generator
 - Unit crosstie breakers

AND

- b. **ANY** additional single power source failure will result in a loss of **ALL** AC power to SAFETY SYSTEMs.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC describes a significant degradation of offsite and onsite AC power sources such that any additional single failure would result in a loss of all AC power to SAFETY SYSTEMs. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as an Alert because of the increased time available to restore another power source to service. Additional time is available due to the reduced core decay heat load, and the lower temperatures and pressures in various plant systems. Thus, when in these modes, this condition is considered to be a potential degradation of the level of safety of the plant.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

CU1 (cont)

Basis (cont):

An “AC power source” is a source recognized in AOPs and EOPs, and capable of supplying required power to an emergency bus. Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of all but one emergency power source (e.g., an onsite diesel generator).
- A loss of emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being fed from an offsite power source.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of power.

The subsequent loss of the remaining single power source would escalate the event to an Alert in accordance with IC CA1.

Basis Reference(s):

1. NEI 99-01 Rev 6 CU2
2. UFSAR Figure 8.3-1
3. UFSAR Section 8.3
4. QCOA 6100-03 Loss of Offsite Power
5. QOP 6100-02 Restoring Reserve Auxiliary Transformer 12 To Service
6. QOP 6100-04 Restoring Reserve Auxiliary Transformer 22 To Service
7. QCOA 6100-04 Station Blackout
8. GE letter No. 92-38 from L.G. Knutson to Pat Donahue, dated April 7, 1992, “AC TURBINE LOADS SMALL TASK NO. QC107” (Station Blackout analysis)

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

CA2**Initiating Condition:**

Hazardous event affecting SAFETY SYSTEM required for the current operating mode.

Operating Mode Applicability:

4, 5

Emergency Action Level (EAL):**Note:**

- This EAL is only applicable to SAFETY SYSTEMs having two (2) or more trains.
- If the affected SAFETY SYSTEM train was already inoperable before the hazardous event occurred, then this emergency classification is not warranted.
- If the hazardous event only resulted in VISIBLE DAMAGE, with no indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is not warranted.
- If a hazardous event occurs and it is determined that the conditions of CA2 are not met, then assess the event via HU3, HU4, or HU6.

1. a. The occurrence of **ANY** of the following hazardous events:

- Seismic event (earthquake)
- Internal or external flooding event
- High winds or tornado strike
- FIRE
- EXPLOSION
- Other events with similar hazard characteristics as determined by the Shift Manager

AND

- b. Event damage has caused indications of degraded performance to one train of a SAFETY SYSTEM required by Technical Specifications for the current operating mode.

AND

c. **EITHER** of the following:

- Event damage has caused indications of degraded performance to a second train of the SAFETY SYSTEM required by Technical Specifications for the current operating mode.

OR

- Event damage has resulted in VISIBLE DAMAGE to a second train of the SAFETY SYSTEM required by Technical Specifications for the current operating mode.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
CA2 (cont)

Basis:

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.

EXPLOSION: A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should not automatically be considered an explosion. Such events may require a post-event inspection to determine if the attributes of an explosion are present.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

VISIBLE DAMAGE: Damage to a SAFETY SYSTEM train that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected SAFETY SYSTEM train.

This IC addresses a hazardous event that causes damage to SAFETY SYSTEMs required for the current operating mode, "required", i.e. required to be operable by Technical Specifications for the current operating mode. In order to provide the appropriate context for consideration of an Alert classification, the hazardous event must have caused indications of degraded performance in one train, and there must be either indications of performance issues with the second SAFETY SYSTEM train or VISIBLE DAMAGE to the second train such that the potential exists for this second SAFETY SYSTEM train to have performance issues. In other words, in order for this EAL to be classified, the hazardous event must occur, at least one SAFETY SYSTEM train must have indications of degraded performance, and the second SAFETY SYSTEM train must have indications of degraded performance or VISIBLE DAMAGE such that the potential exists for performance issues. Note that this second SAFETY SYSTEM train is from the same SAFETY SYSTEM that has degraded performance for criteria 1.b of this EAL; commercial nuclear power plants are designed to be able to support single system issues without compromising public health and safety from radiological events.

Indications of degraded performance address damage to a SAFETY SYSTEM train that is in operation since indications for it will be readily available. The indications of degraded performance should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

Operators will make a determination of VISIBLE DAMAGE based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage. This

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

CA2 (cont)

Basis (cont):

VISIBLE DAMAGE should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

Escalation of the emergency classification level would be via IC CS6 or RS1.

If the EAL conditions of MA5 are not met then assess the event via HU3, HU4, or HU6.

Basis Reference(s):

1. NEI 99-01 Rev 6, CA

**RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

CU3**Initiating Condition:**

Loss of Vital DC power for 15 minutes or longer.

Operating Mode Applicability:

4, 5

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

Voltage is **< 105 VDC** on required 125 VDC battery busses #1 and #2 for **≥ 15 minutes**.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a loss of Vital DC power which compromises the ability to monitor and control operable SAFETY SYSTEMs when the plant is in the cold shutdown or refueling mode. In these modes, the core decay heat load has been significantly reduced, and coolant system temperatures and pressures are lower; these conditions increase the time available to restore a vital DC bus to service. Thus, this condition is considered to be a potential degradation of the level of safety of the plant.

As used in this EAL, “required” means the Vital DC buses necessary to support operation of the in-service, or operable, train or trains of SAFETY SYSTEM equipment. For example, if Train A is out-of-service (inoperable) for scheduled outage maintenance work and Train B is in-service (operable), then a loss of Vital DC power affecting Train B would require the declaration of an Unusual Event. A loss of Vital DC power to Train A would not warrant an emergency classification.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Depending upon the event, escalation of the emergency classification level would be via IC CA6 or CA5, or an IC in Recognition Category R.

**RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

CU3 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, CU4
2. Technical Specifications 3.8.4 and B3.8.4
3. UFSAR Section 8.3.2
4. QOP 6900-02 125 VDC Electrical System
5. QCTS 0230-01 Unit One (Two) 125 VDC Service Test Normal or Alternate Battery

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

CU4**Initiating Condition:**

Loss of all onsite or offsite communications capabilities.

Operating Mode Applicability:

4, 5, D

Emergency Action Level (EAL):

1. Loss of **ALL** Table C1 **Onsite** communications capability affecting the ability to perform routine operations.
- OR**
2. Loss of **ALL** Table C1 **Offsite** communication capability affecting the ability to perform offsite notifications.
- OR**
3. Loss of **ALL** Table C1 **NRC** communication capability affecting the ability to perform NRC notifications.

Table C1 Communications Capability			
System	Onsite	Offsite	NRC
Plant Radio	X		
Plant Page	X		
All telephone Lines (Commercial and microwave)	X	X	X
ENS		X	X
HPN		X	X
Satellite Phones		X	X

Basis:

This IC addresses a significant loss of on-site or offsite communications capabilities. While not a direct challenge to plant or personnel safety, this event warrants prompt notifications to Outside Response Organizations (OROs) and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (e.g., use of non-plant, privately owned equipment, relaying of on-site information via individuals or multiple radio transmission points, individuals being sent to offsite locations, etc.).

EAL #1 Basis

Addresses a total loss of the communications methods used in support of routine plant operations.

**RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

CU4 (cont)

Basis (cont):**EAL #2 Basis**

Addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are listed in procedure EP-MW-114-100-F-01, Nuclear Accident Reporting System (NARS) Form.

EAL #3 Basis

Addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

Basis Reference(s):

1. NEI 99-01 Rev 6, CU5
2. EP-MW-124-1001 Facilities Inventories and Equipment Tests
3. UFSAR Section 9.5.2

**RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

CA5**Initiating Condition:**

Inability to maintain the plant in cold shutdown.

Operating Mode Applicability:

4, 5

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when heat removal function is available does not warrant classification.

1. UNPLANNED rise in RCS temperature > **212°F** for > **Table C2 duration**.

Table C2 RCS Heat-up Duration Thresholds		
RCS Status	Containment Closure Status	Heat-up Duration
Intact	Not Applicable	60 minutes*
Not Intact	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, then EAL #1 is not applicable.		

OR

2. UNPLANNED RPV pressure rise > **10 psig** as a result of temperature rise.

Basis:

UNPLANNED: A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

CONTAINMENT CLOSURE: The procedurally defined conditions or actions taken to secure containment (primary or secondary) and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

RCS is intact when the RCS pressure boundary is in its normal condition for the Cold Shutdown mode of operation (e.g. no freeze seals, or steam line nozzle plugs, etc.).

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
CA5 (cont)

Basis (cont):

This IC addresses conditions involving a loss of decay heat removal capability or an addition of heat to the RCS in excess of that which can currently be removed. Either condition represents an actual or potential substantial degradation of the level of safety of the plant.

A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when the heat removal function is available does not warrant a classification.

The RCS Heat-up Duration Thresholds table addresses a rise in RCS temperature when CONTAINMENT CLOSURE is established but the RCS is not intact. The 20-minute criterion was included to allow time for operator action to address the temperature rise.

The RCS Heat-up Duration Thresholds table also addresses a rise in RCS temperature with the RCS intact. The status of CONTAINMENT CLOSURE is not crucial in this condition since the intact RCS is providing a high pressure barrier to a fission product release. The 60-minute time frame should allow sufficient time to address the temperature rise without a substantial degradation in plant safety.

Finally, in the case where there is a rise in RCS temperature, the RCS is not intact, and CONTAINMENT CLOSURE is not established, no heat-up duration is allowed (i.e., 0 minutes). This is because 1) the evaporated reactor coolant may be released directly into the Containment atmosphere and subsequently to the environment, and 2) there is reduced reactor coolant inventory above the top of irradiated fuel.

EAL #2 provides a pressure-based indication of RCS heat-up.

Escalation of the emergency classification level would be via IC CS6 or RS1.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
CA5 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, CA3
2. Technical Specifications Table 1.1-1
3. Technical Specifications 3.6.1.1
4. Technical Specifications 3.6.4.1
5. OU-AA-103 Shutdown Safety
6. QCOA 1000-02 Loss of Shutdown Cooling
7. QGA 600 RPV Control
8. QGA 700 Refueling
9. QCGP 1-1 Normal Unit Startup
10. QCIS 0600-01 Unit One Division 1 Reactor Pressure 0 to 1200 psig Indication Calibration

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

CU5**Initiating Condition:**

UNPLANNED rise in RCS temperature

Operating Mode Applicability:

4, 5

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when heat removal function is available does not warrant classification.

1. UNPLANNED rise in RCS temperature > **212°F**.**OR**2. Loss of the following for **≥ 15 minutes**.

- **ALL** RCS temperature indications

AND

- **ALL** RPV water level indications

Basis:

UNPLANNED: A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

CONTAINMENT CLOSURE: The procedurally defined conditions or actions taken to secure containment (primary or secondary) and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

This IC addresses an UNPLANNED rise in RCS temperature above the Technical Specification cold shutdown temperature limit, or the inability to determine RCS temperature and level, represents a potential degradation of the level of safety of the plant. If the RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the Emergency Director should also refer to IC CA5.

RCS is intact when the RCS pressure boundary is in its normal condition for the Cold Shutdown mode of operation (e.g. no freeze seals, or steam line nozzle plugs, etc.).

A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when the heat removal function is available does not warrant a classification.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

CU5 (cont)

Basis (cont):

EAL #1 involves a loss of decay heat removal capability, or an addition of heat to the RCS in excess of that which can currently be removed, such that reactor coolant temperature cannot be maintained below the cold shutdown temperature limit specified in Technical Specifications. During this condition, there is no immediate threat of fuel damage because the core decay heat load has been reduced since the cessation of power operation.

During an outage, the level in the reactor vessel will normally be maintained above the reactor vessel flange. Refueling evolutions that lower water level below the reactor vessel flange are carefully planned and controlled. A loss of forced decay heat removal at reduced inventory may result in a rapid rise in reactor coolant temperature depending on the time after shutdown.

EAL #2 reflects a condition where there has been a significant loss of instrumentation capability necessary to monitor RCS conditions and operators would be unable to monitor key parameters necessary to assure core decay heat removal. During this condition, there is no immediate threat of fuel damage because the core decay heat load has been reduced since the cessation of power operation.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation to Alert would be via IC CA6 based on an inventory loss or IC CA5 based on exceeding plant configuration-specific time criteria.

Basis Reference(s):

1. NEI 99-01 Rev 6, CU3
2. Technical Specifications Table 1.1-1
3. QGA 600, RPV Control
4. QCOP 0201-02, Filling the Reactor Vessel and/or Reactor Cavity Using a Condensate Booster Pump via the Feedwater System
5. QCOP 0201-13, Reactor Vessel Upper Wide Range Reference Leg Extension Use and Control
6. QCOP 0201-14, Reactor Vessel Level Control Using a Local Pressure Gauge
7. QCOA 1000-02 Loss of Shutdown Cooling
8. QGA 700, Refueling

**RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

CG6**Initiating Condition:**

Loss of RPV inventory affecting fuel clad integrity with containment challenged.

Operating Mode Applicability:

4, 5

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- 1 a. RPV water level < **-142 inches** (TAF) for **≥ 30 minutes**.
 AND
 b. **ANY** Containment Challenge Indication (Table C4)
- OR**
2. a. RPV level **cannot** be determined for **≥ 30 minutes**.
 AND
 b. Core uncover is indicated by **ANY** of the following:
- Table C3 indications of a sufficient magnitude to indicate core uncover.
- OR**
- Fuel Handling ARM 1(2)-1705-16A or B **>3000 mR/hr**.
- AND**
- c. **ANY** Containment Challenge Indication (Table C4)

Table C3 Indications of RCS Leakage
<ul style="list-style-type: none"> • UNPLANNED floor or equipment sump level rise* • UNPLANNED Torus level rise* • UNPLANNED vessel make up rate rise • Observation of leakage or inventory loss
*Rise in level is attributed to a loss in RPV inventory

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
CG6 (cont)

Emergency Action Level (EAL) (cont):

Table C4 Containment Challenge Indications
<ul style="list-style-type: none">• Primary Containment Hydrogen Concentration $\geq 6\%$ and Oxygen $\geq 5\%$• UNPLANNED rise in containment pressure• CONTAINMENT CLOSURE <u>not</u> established*• ANY Secondary Containment radiation monitor > QGA 300, Maximum Safe operating level.
* if CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute core uncover time limit, then escalation to a General Emergency is not required.

Basis:

UNPLANNED: A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

IMMINENT: The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

CONTAINMENT CLOSURE: The procedurally defined conditions or actions taken to secure containment (primary or secondary for BWR) and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

This IC addresses the inability to restore and maintain reactor vessel level above the top of active fuel with containment challenged. This condition represents 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 Guidelines (PAG) exposure levels offsite for more than the immediate site area.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS/reactor vessel level cannot be restored, fuel damage is probable.

With CONTAINMENT CLOSURE not established, there is a high potential for a direct and unmonitored release of radioactivity to the environment. If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
CG6 (cont)

Basis (cont):

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (i.e., at the lower deflagration limit). A hydrogen burn will raise containment pressure and could result in collateral equipment damage leading to a loss of containment integrity. It therefore represents a challenge to Containment integrity.

In the early stages of a core uncover event, it is unlikely that hydrogen buildup due to a core uncover could result in an explosive gas mixture in containment. If all installed hydrogen gas monitors are out-of-service during an event leading to fuel cladding damage, it may not be possible to obtain a containment hydrogen gas concentration reading as ambient conditions within the containment will preclude personnel access. During periods when installed containment hydrogen gas monitors are out-of-service, operators may use the other listed indications to assess whether or not containment is challenged.

EAL #1 Basis

The 30-minute criterion is tied to a readily recognizable event start time (i.e., the total loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncover has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for performance of actions to terminate leakage, recover inventory control/makeup equipment and/or restore level monitoring.

The inability to monitor RPV water level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the RPV.

These EALs address concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG-1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

**RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

CG6 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, CG1
2. QGA 600, RPV Control
3. Technical Specifications 3.3.1
4. Technical Specifications 3.6.1.1
5. Technical Specifications 3.6.4.1
6. QGA-200-5, Hydrogen Control
7. UFSAR 6.2.1.1
8. QGA 300 Secondary Containment Control
9. EP-EAL-0501, Estimation Of Radiation Monitor Readings Indicating Core Uncovery During Refueling
10. QGA 700 Refueling

**RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

CS6**Initiating Condition:**

Loss of RPV inventory affecting core decay heat removal capability.

Operating Mode Applicability:

4, 5

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
1. With CONTAINMENT CLOSURE **not** established, RPV water level
< - 65 inches
OR
 2. With CONTAINMENT CLOSURE established, RPV water level **< - 142 inches**
(TAF).
OR
 3. a. RPV level **cannot** be determined for **≥ 30 minutes**.
AND
b. Core uncover is indicated by **ANY** of the following:
 - Table C3 indications of a sufficient magnitude to indicate core uncover.
- OR**
- Fuel Handling ARM 1(2)-1705-16A or B **>3000 mR/hr.**

Table C3 Indications of RCS Leakage

- | |
|--|
| <ul style="list-style-type: none"> • UNPLANNED floor or equipment sump level rise* • UNPLANNED Torus level rise* • UNPLANNED vessel make up rate rise • Observation of leakage or inventory loss |
| <p>*Rise in level is attributed to a loss in RPV inventory</p> |

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
CS6 (cont)

Basis:

UNPLANNED: A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

CONTAINMENT CLOSURE: The procedurally defined conditions or actions taken to secure containment (primary or secondary for BWR) and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

The lost inventory may be due to a RCS component failure, a loss of configuration control or prolonged boiling of reactor coolant. These conditions entail major failures of plant functions needed for protection of the public and thus warrant a Site Area Emergency declaration.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS/reactor vessel level cannot be restored, fuel damage is probable. Outage/shutdown contingency plans typically provide for re-establishing or verifying CONTAINMENT CLOSURE following a loss of heat removal or RCS inventory control functions. The difference in the specified RCS/reactor vessel levels of EALs 1.b and 2.b reflect the fact that with CONTAINMENT CLOSURE established, there is a lower probability of a fission product release to the environment.

In EAL #3.a, the 30-minute criterion is tied to a readily recognizable event start time (i.e., the total loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncover has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for performance of actions to terminate leakage, recover inventory control/makeup equipment and/or restore level monitoring.

The inability to monitor RPV water level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the RPV.

These EALs address concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG-1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Escalation of the emergency classification level would be via IC CG6 or RG1.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
CS6 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, CS1
2. Technical Specifications 3.3.5.1
3. Technical Specifications 3.6.1.1
4. Technical Specifications 3.6.4.1
5. QGA 600, RPV Control
6. Technical Specifications 3.3.1
7. Technical Specifications Table 3.3.3.1-1
8. Technical Specifications 3.3.5.1
9. QCOS 1600-07, Reactor Coolant Leakage in the Drywell
10. Technical Specifications 3.4.4
11. UFSAR 5.2.5
12. QCOA 0201-01, Increasing Drywell Pressure
13. QOA 900-4 A-17, Annunciator Response
14. QGA 700, Refueling

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

CA6**Initiating Condition:**

Loss of RPV inventory.

Operating Mode Applicability:

4, 5

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
1. Loss of RPV inventory as indicated by level < - **59 inches**.
- OR**
2. a. RPV level **cannot** be determined for **≥ 15 minutes**.
- AND**
- b. Loss of RPV inventory per Table C3 indications.

Table C3 Indications of RCS Leakage
<ul style="list-style-type: none"> • UNPLANNED floor or equipment sump level rise* • UNPLANNED Torus level rise* • UNPLANNED vessel make up rate rise • Observation of leakage or inventory loss
*Rise in level is attributed to a loss in RPV inventory

Basis:

UNPLANNED: A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

This IC addresses conditions that are precursors to a loss of the ability to adequately cool irradiated fuel (i.e., a precursor to a challenge to the fuel clad barrier). This condition represents a potential substantial reduction in the level of plant safety.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
CA6 (cont)

Basis (cont):**EAL #1 Basis**

A lowering of water level below -59 inches indicates that operator actions have not been successful in restoring and maintaining RPV water level. The heat-up rate of the coolant will rise as the available water inventory is reduced. A continuing decrease in water level will lead to core uncover.

Although related, EAL #1 is concerned with the loss of RCS inventory and not the potential concurrent effects on systems needed for decay heat removal (e.g., loss of a Residual Heat Removal suction point). An rise in RCS temperature caused by a loss of decay heat removal capability is evaluated under IC CA5.

EAL #2 Basis

The inability to monitor RPV water level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the RPV.

The 15-minute duration for the loss of level indication was chosen because it is half of the EAL duration specified in IC CS6

If the RPV water level continues to lower, then escalation to Site Area Emergency would be via IC CS6.

Basis Reference(s):

1. NEI 99-01 Rev 6, CA1
2. Technical Specifications 3.3.5.1
3. QCOS 1600-07, Reactor Coolant Leakage in the Drywell
4. Technical Specifications 3.4.4
5. UFSAR 5.2.5
6. QCOA 0201-01, Increasing Drywell Pressure
7. QOA 900-4 A-17, Annunciator Response
8. QGA 600 RPV Control
9. QCOP 0201-02, Filling the Reactor Vessel and/or Reactor Cavity Using a Condensate Booster Pump via the Feedwater System
10. QCOP 0201-13, Reactor Vessel Upper Wide Range Reference Leg Extension Use and Control
11. QCOP 0201-14, Reactor Vessel Level Control Using a Local Pressure Gauge
12. QGA 700 Refueling

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

CU6**Initiating Condition:**

UNPLANNED loss of RPV inventory for 15 minutes or longer.

Operating Mode Applicability:

4, 5

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
1. UNPLANNED loss of reactor coolant results in the inability to restore and maintain RPV water level to above the **procedurally established lower limit** for **≥ 15 minutes**.
- OR**
2. a. RPV level **cannot** be determined.
- AND**
- b. Loss of RPV inventory per Table C3 indications.

Table C3 Indications of RCS Leakage
<ul style="list-style-type: none">• UNPLANNED floor or equipment sump level rise*• UNPLANNED Torus level rise*• UNPLANNED vessel make up rate rise• Observation of leakage or inventory loss
*Rise in level is attributed to a loss in RPV inventory

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
CU6 (cont)

Basis:

UNPLANNED: A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

This IC addresses the inability to restore and maintain water level to a required minimum level (or the lower limit of a level band), or a loss of the ability to monitor RPV water level concurrent with indications of coolant leakage. Either of these conditions is considered to be a potential degradation of the level of safety of the plant.

The procedurally established lower limit is not an operational band established above the procedural limit to allow for operator action prior to exceeding the procedural limit, but it is the procedurally established lower limit.

Refueling evolutions that lower RCS water inventory are carefully planned and controlled. An UNPLANNED event that results in water level decreasing below a procedurally required limit warrants the declaration of an Unusual Event due to the reduced water inventory that is available to keep the core covered.

EAL #1 recognizes that the minimum required RPV water level can change several times during the course of a refueling outage as different plant configurations and system lineups are implemented. This EAL is met if the minimum level, specified for the current plant conditions, cannot be maintained for 15 minutes or longer. The minimum level is typically specified in the applicable operating procedure but may be specified in another controlling document.

The 15-minute threshold duration allows sufficient time for prompt operator actions to restore and maintain the expected water level. This criterion excludes transient conditions causing a brief lowering of water level.

EAL #2 addresses a condition where all means to determine RPV water level have been lost. In this condition, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the RPV.

Continued loss of RCS inventory may result in escalation to the Alert emergency classification level via either IC CA6 or CA5.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
CU6 (cont)

Basis Reference(s):

1. NEI 99-01, Rev. 6 CU1
2. Technical Specifications 3.3.5.1
3. Technical Specifications 3.4.4
4. UFSAR 5.2.5
5. QGA 600 RPV Control
6. QCOP 0201-02, Filling the Reactor Vessel and/or Reactor Cavity Using a Condensate Booster Pump via the Feedwater System
7. QCOP 0201-13, Reactor Vessel Upper Wide Range Reference Leg Extension Use and Control
8. QCOP 0201-14, Reactor Vessel Level Control Using a Local Pressure Gauge
9. QGA 700 Refueling

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS1**Initiating Condition:**

HOSTILE ACTION within the PROTECTED AREA.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):

A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA.

Basis:

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).

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

PROJECTILE: An object directed toward a NPP that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

HOSTILE FORCE: Any 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.

INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI): A complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage.

This IC addresses the occurrence of a HOSTILE ACTION within the PROTECTED AREA. This event will require rapid response and assistance due to the possibility for damage to plant equipment.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
HS1 (cont)

Basis (cont):

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Site Area Emergency declaration will mobilize ORO resources and have them available to develop and implement public protective actions in the unlikely event that the attack is successful in impairing multiple safety functions.

This IC does not apply to a HOSTILE ACTION directed at an ISFSI PROTECTED AREA located outside the plant PROTECTED AREA; such an attack should be assessed using IC HA1. It also does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR § 73.71 or 10 CFR § 50.72.

Escalation of the emergency classification level would be via IC RG1, RG2, FG1, CG1, or HG7.

Basis Reference(s):

1. NEI 99-01 Rev 6
2. Station Security Plan – Appendix C

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA1**Initiating Condition:**

HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):

1. A validated notification from NRC of an aircraft attack threat < **30 minutes** from the site.

OR

2. Notification by the Security Force that a HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA.

Basis:

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).

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

PROJECTILE: An object directed toward a NPP that could cause concern for its continued operability, reliability, or personnel safety.

OWNER CONTROLLED AREA (OCA): The property associated with the station and owned by the company. Access is normally limited to persons entering for official business.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

HOSTILE FORCE: Any 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.

This IC addresses the occurrence of a HOSTILE ACTION within the OWNER CONTROLLED AREA or notification of an aircraft attack threat. This event will require rapid response and assistance due to the possibility of the attack progressing to the PROTECTED AREA, or the need to prepare the plant and staff for a potential aircraft impact.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
HA1 (cont)

Basis (cont):

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Alert declaration will also heighten the awareness of Offsite Response Organizations, allowing them to be better prepared should it be necessary to consider further actions.

This IC does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR § 73.71 or 10 CFR § 50.72.

EAL #1 Basis

Addresses the threat from the impact of an aircraft on the plant, and the anticipated arrival time is within 30 minutes. The intent of this EAL is to ensure that threat-related notifications are made in a timely manner so that plant personnel and OROs are in a heightened state of readiness. This EAL is met when the threat-related information has been validated in accordance with QCOA 0010-20, Security Event.

EAL #2 Basis

Is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA. This includes any action directed against an ISFSI that is located outside the plant PROTECTED AREA.

The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may be provided by NORAD through the NRC.

In some cases, it may not be readily apparent if an aircraft impact within the OWNER CONTROLLED AREA was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate federal agency is intended to be NORAD, FBI, FAA or NRC. The emergency declaration, including one based on other ICs/EALs, should not be unduly delayed while awaiting notification by a Federal agency.

Escalation of the emergency classification level would be via IC HS1.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA1 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, HA1
2. Station Security Plan – Appendix C
3. QCOA 0010-20, Security Event (G.7.A, G.7.B, G.7.C, G.7.D, G.7.K)

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU1**Initiating Condition:**

Confirmed SECURITY CONDITION or threat.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):

1. Notification of a credible security threat directed at the site as determined per SY-AA-101-132, Security Assessment and Response to Unusual Activities.

OR

2. A validated notification from the NRC providing information of an aircraft threat.

OR

3. Notification by the Security Force of a SECURITY CONDITION that does not involve a HOSTILE ACTION.

Basis:

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

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

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).

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

PROJECTILE: An object directed toward a NPP that could cause concern for its continued operability, reliability, or personnel safety.

This IC addresses events that pose a threat to plant personnel or SAFETY SYSTEM equipment, and thus represent a potential degradation in the level of plant safety. Security events which do not meet one of these EALs are adequately addressed by the requirements of 10 CFR § 73.71 or 10 CFR § 50.72. Security events assessed as HOSTILE ACTIONS are classifiable under ICs HA1, and HS1.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU1 (cont)

Basis (cont):

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event. Classification of these events will initiate appropriate threat-related notifications to plant personnel and OROs.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

EAL #1 Basis

Addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with SY-AA-101-132.

EAL #2 Basis

Addresses the threat from the impact of an aircraft on the plant. The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may also be provided by NORAD through the NRC. Validation of the threat is performed in accordance with QCOA 0010-20, Security Event (G.7.A, G.7.B, G.7.C, G.7.D, G.7.K)

EAL #3 Basis

References Security Force because these are the individuals trained to confirm that a security event is occurring or has occurred. Training on security event confirmation and classification is controlled due to the nature of Safeguards and 10 CFR § 2.39 information.

Escalation of the emergency classification level would be via IC HA1.

Basis Reference(s):

1. NEI 99-01 Rev 6, HU1
2. SY-AA-101-132, Security Assessment and Response to Unusual Activities
3. Station Security Plan – Appendix C
4. NRC Safeguards Advisory 10/6/01
5. Letter from Mr. B. A. Boger (NRC) to Ms. Lynette Hendricks (NEI) dated 2/4/02
6. QCOA 0010-20, Security Event (G.7.A, G.7.B, G.7.C, G.7.D, G.7.K)

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS2**Initiating Condition:**

Inability to control a key safety function from outside the Control Room.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per
 - QCARP 0050-01, SB-1-1 Injection with SSMP and Bringing the Unit to Cold Shutdown
 - OR**
 - QCARP 0050-02, SB-1-2 Injection with RCIC and Bringing the Unit to Cold Shutdown
 - OR**
 - QOA 0010-05, Plant Operation with the Control Room Inaccessible
 - AND**
 2. Control of **ANY** Table H1 key safety function is not reestablished in **< 30 minutes**.

Table H1 Safety Functions
<ul style="list-style-type: none"> • Reactivity Control (ability to shut down the reactor and keep it shut down) • RPV Water Level (ability to cool the core) • RCS Heat Removal (ability to maintain heat sink)

Basis:

The time period to establish control of the plant starts when either:

- a. Control of the plant is no longer maintained in the Main Control Room
- OR**
- b. The last Operator has left the Main Control Room.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
HS2 (cont)

Basis (cont):

This IC addresses an evacuation of the Control Room that results in transfer of plant control to alternate locations, and the control of a key safety function cannot be reestablished in a timely manner. The failure to gain control of a key safety function following a transfer of plant control to alternate locations is a precursor to a challenge to any fission product barriers within a relatively short period of time.

The determination of whether or not “control” is established at the remote safe shutdown location(s) is based on Emergency Director judgment. The Emergency Director is expected to make a reasonable, informed judgment within 30 minutes whether or not the operating staff has control of key safety functions from the remote safe shutdown location(s).

Escalation of the emergency classification level would be via IC FG1 or CG6.

Basis Reference(s):

1. NEI 99-01, Rev 6 HS6
2. QOA 0010-05, Plant Operation with the Control Room Inaccessible
3. QCARP 0050-01, SB-1-1 Injection with SSMP and Bringing the Unit to Cold Shutdown
4. QCARP 0050-02, SB-1-1 Injection with RCIC and Bringing the Unit to Cold Shutdown

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA2**Initiating Condition:**

Control Room evacuation resulting in transfer of plant control to alternate locations.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):

A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per:

- QCARP 0050-01, SB-1-1 Injection with SSMP and Bringing the Unit to Cold Shutdown
- OR**
- QCARP 0050-02, SB-1-2 Injection with RCIC and Bringing the Unit to Cold Shutdown
- OR**
- QOA 0010-05, Plant Operation with the Control Room Inaccessible

Basis:

This IC addresses an evacuation of the Control Room that results in transfer of plant control to alternate locations outside the Control Room. The loss of the ability to control the plant from the Control Room is considered to be a potential substantial degradation in the level of plant safety.

Following a Control Room evacuation, control of the plant will be transferred to alternate shutdown locations. The necessity to control a plant shutdown from outside the Control Room, in addition to responding to the event that required the evacuation of the Control Room, will present challenges to plant operators and other on-shift personnel. Activation of the ERO and emergency response facilities will assist in responding to these challenges.

Escalation of the emergency classification level would be via IC HS2.

Basis Reference(s):

1. NEI 99-01, Rev 6 HA6
2. QOA 0010-05, Plant Operation with the Control Room Inaccessible
3. QCARP 0050-01, SB-1-1 Injection with SSMP and Bringing the Unit to Cold Shutdown
4. QCARP 0050-02, SB-1-1 Injection with RCIC and Bringing the Unit to Cold Shutdown

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU3**Initiating Condition:**

FIRE potentially degrading the level of safety of the plant.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):**Note:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
 - Escalation of the emergency classification level would be via IC CA2 or MA5
1. A FIRE in **ANY** Table H2 area is **not** extinguished in **< 15 minutes** of **ANY** of the following FIRE detection indications:
- Report from the field (i.e., visual observation)
 - Receipt of multiple (more than 1) fire alarms or indications
 - Field verification of a single fire alarm

Table H2 Vital Areas
<ul style="list-style-type: none"> • Reactor Building (when inerted the Drywell is exempt) • Main Control Room Envelope • Unit and Shared Emergency Diesel Generator Rooms • 4KV Switchgear Area • Battery Rooms • RHR Service Water Vaults • Turbine Building Cable Tunnel • Cribhouse

OR

2. a. Receipt of a single fire alarm in **ANY** Table H2 area (i.e., no other indications of a FIRE).

AND

- b. The existence of a FIRE is not verified in **< 30 minutes** of alarm receipt.

OR

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
HU3 (cont)

Emergency Action Level (EAL) (cont):

3. A FIRE within the plant or ISFSI PROTECTED AREA not extinguished in **< 60 minutes** of the initial report, alarm or indication.
- OR**
4. A FIRE within the plant or ISFSI PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.

Basis:

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.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI): A complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage.

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of safety of the plant.

When it is determined a FIRE is extinguished, then any subsequent FIRE starts a new time clock.

EAL #1 and #2 Basis

The intent of EAL #1 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (e.g., smoldering wastepaper basket).

In addition to alarms, other indications of a FIRE could be a drop in fire main pressure, automatic activation of a suppression system, etc. Upon receipt of multiple alarms/indications, operators will take prompt actions to confirm the validity of the alarms/indications. For EAL #1 assessment purposes, the emergency declaration clock and duration clock start at the time of receipt of the first of the multiple alarms/indications, and not the time that a subsequent verification action was performed.

With respect to EAL #1, upon receipt of a report from the field or field verification of a single alarm, operators will take prompt actions to confirm the validity of the report or field verification. For EAL #1 assessment purposes, the emergency declaration clock and fire duration clock start at the time that the report or field verification of a single alarm was received. With respect to field verification of a single alarm for EAL #1 assessment purposes the clock does not start when the single unverified alarm occurred.

EAL #2 addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (i.e., proved or disproved) within 30-minutes of the alarm. Upon receipt,

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU3 (cont)

Basis (cont):

operators will take prompt actions to confirm the validity of a single fire alarm. For EAL assessment purposes, the 30-minute clock starts at the time that the alarm was received, and not the time that a subsequent verification action was performed.

A single fire alarm, absent other indication(s) of a FIRE, may be indicative of equipment failure or a spurious activation, and not an actual FIRE. For this reason, additional time is allowed to verify the validity of the alarm. The 30-minute period is a reasonable amount of time to determine if an actual FIRE exists; however, after that time, and absent of information to the contrary, it is assumed that an actual FIRE is in progress and an emergency declaration is warranted.

With respect to EAL #2 if an actual FIRE is verified by a field verification report, then EAL #1 is immediately applicable, and the emergency must be declared if the FIRE is not extinguished within 15-minutes of the report. If the alarm is verified to be due to an equipment failure or a spurious activation, and this verification occurs within 30-minutes of the receipt of the alarm, then this EAL is not applicable and no emergency declaration is warranted.

EAL #3 Basis

In addition to a FIRE addressed by EAL #1 or EAL #2, a FIRE within the plant PROTECTED AREA not extinguished within 60-minutes may also potentially degrade the level of plant safety. This basis extends to a FIRE occurring within the PROTECTED AREA of an ISFSI located outside the plant PROTECTED AREA.

EAL #4 Basis

If a FIRE within the plant or ISFSI PROTECTED AREA is of sufficient size to require a response by an offsite firefighting agency (e.g., a local town Fire Department), then the level of plant safety is potentially degraded. The dispatch of an offsite firefighting agency to the site requires an emergency declaration only if it is needed to actively support firefighting efforts because the fire is beyond the capability of the Fire Brigade to extinguish. Declaration is not necessary if the agency resources are placed on stand-by, or supporting post-extinguishment recovery or investigation actions.

Basis-Related Requirements from Appendix R

Appendix R to 10 CFR 50, states in part:

Criterion 3 of Appendix A to this part specifies that "Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions."

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU3 (cont)

Basis (cont):

When considering the effects of fire, those systems associated with achieving and maintaining safe shutdown conditions assume major importance to safety because damage to them can lead to core damage resulting from loss of coolant through boil-off.

Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under post-fire conditions does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents.

In addition, Appendix R to 10 CFR 50, requires, among other considerations, the use of 1-hour fire barriers for the enclosure of cable and equipment and associated non-safety circuits of one redundant train (G.2.c). As used in EAL #2, the 30-minutes to verify a single alarm is well within this worst-case 1-hour time period.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA2 or HA3.

Basis Reference(s):

1. NEI 99-01, Rev 6 HU4
2. UFSAR Section 3.2

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU4**Initiating Condition:**

Seismic event greater than OBE levels.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):**Note:**

- Escalation of the emergency classification level would be via IC CA2 or MA5
- For emergency classification if EAL 2 is not able to be confirmed, then the occurrence of a seismic event is confirmed in manner deemed appropriate by the Shift Manager or Emergency Director in **≤ 15 mins** of the event.

Seismic event as indicated by:

1. Control Room personnel feel an actual or potential seismic event.

AND

2. **ANY** one of the following confirmed in **≤ 15 mins** of the event:

- The earthquake resulted in Modified Mercalli Intensity (MMI) **$\geq VI$** and occurred **≤ 3.5 miles** of the plant.
- The earthquake was magnitude **≥ 6.0**
- The earthquake was magnitude **≥ 5.0** and occurred **≤ 125 miles** of the plant.

Basis:

This IC addresses a seismic event that results in accelerations at the plant site greater than those specified for an Operating Basis Earthquake (OBE)¹. An earthquake greater than an OBE but less than a Safe Shutdown Earthquake (SSE)² should have no significant impact on safety-related systems, structures and components; however, some time may be required for the plant staff to ascertain the actual post-event condition of the plant (e.g., performs walk-downs and post-event inspections). Given the time necessary to perform walk-downs and inspections, and fully understand any impacts, this event represents a potential degradation of the level of safety of the plant.

¹ An OBE is vibratory ground motion for which those features of a nuclear power plant necessary for continued operation without undue risk to the health and safety of the public will remain functional.

² An SSE is vibratory ground motion for which certain (generally, safety-related) structures, systems, and components must be designed to remain functional.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
HU4 (cont)

Basis (cont):

Event verification with external sources should not be necessary during or following an OBE. Earthquakes of this magnitude should be readily felt by on-site personnel and recognized as a seismic event (e.g., typical lateral accelerations are in excess of 0.08g).

EAL #2 and the accompanying note is included to ensure that a declaration does not result from felt vibrations caused by a non-seismic source (e.g., a dropped load). The Shift Manager or Emergency Director may seek external verification if deemed appropriate (e.g., call to USGS, check internet source, etc.) however, the verification action must not preclude a timely emergency declaration. This EAL wording recognizes that it may cause the site to declare an Unusual Event while another site, similarly affected but with readily available OBE indications in the Control Room, may not.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA2 or MA5.

Basis Reference(s):

1. NEI 99-01, Rev 6 HU2
2. QCOA 0010-09, Earthquake
3. US NRC Reg. Guide 1.166, Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Earthquake Actions.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA5**Initiating Condition:**

Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability:

3, 4

Emergency Action Level (EAL):**Note:**

- If the equipment in the listed room or area was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted.

1. Release of a toxic, corrosive, asphyxiant or flammable gas in **ANY** Table H3 area.

Table H3 Areas with Entry Related Mode Applicability		
Area	Unit	Entry Related Mode Applicability
Reactor Building		Mode 3 and 4
• First Floor North Wall	1	
• Second Floor North Wall	1	
• First Floor South Wall	2	
• Second Floor South Wall	2	
High Pressure Heater Bay	1 & 2	Mode 3
MSIV Room	1	
Second Floor Turbine Bldg. N.E. Corner	2	

AND

2. Entry into the room or area is prohibited or impeded

Basis:

This IC addresses an event involving a release of a hazardous gas that precludes or impedes access to equipment necessary to transition the plant from normal plant operation to cooldown and shutdown as specified in normal plant procedures. This condition represents an actual or potential substantial degradation of the level of safety of the plant.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
HA5 (cont)

Basis (cont):

Assuming all plant equipment is operating as designed, normal operation is capable from the Main Control Room (MCR). The plant is also able to transition into a hot shutdown condition from the MCR, therefore Table H3 is a list of plant rooms or areas with entry-related mode applicability that contain equipment which require a manual/local action necessary to transition the plant from normal plant operation to cooldown and shutdown as specified in normal operating procedures (establish shutdown cooling), where if this action is not completed the plant would not be able to attain and maintain cold shutdown. This Table does not include rooms or areas for which entry is required solely to perform actions of an administrative or record keeping nature (e.g., normal rounds or routine inspections).

This Table does not include the Control Room since adequate engineered safety/design features are in place to preclude a Control Room evacuation due to the release of a hazardous gas.

An Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect and the gaseous release preclude the ability to place shutdown cooling in service. The emergency classification is not contingent upon whether entry is actually necessary at the time of the release.

Evaluation of the IC and EAL do not require atmospheric sampling; it only requires the Emergency Director's judgment that the gas concentration in the affected room/area is sufficient to preclude or significantly impede procedurally required access. This judgment may be based on a variety of factors including an existing job hazard analysis, report of ill effects on personnel, advice from a subject matter expert or operating experience with the same or similar hazards. Access should be considered as impeded if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is not routinely employed).

An emergency declaration is not warranted if any of the following conditions apply.

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the gaseous release). For example, the plant is in Mode 1 when the gaseous release occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The gas release is a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., fire suppression system testing).
- The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or impede a required action.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
HA5 (cont)

Basis (cont):

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.

This EAL does not apply to firefighting activities that generate smoke, that automatically or manually activate a fire suppression system in an area, or to intentional inerting of containment.

The Operating Mode Applicability of this EAL has been revised from All Modes to modes 3 and 4 due to the mode applicability of the areas of concern in Table H-3. In the future should the areas of concern in Table H-3 be revised then the Operating Mode Applicability of this EAL should be reevaluated.

Escalation of the emergency classification level would be via Recognition Category R, C or F ICs.

Basis Reference(s):

1. NEI 99-01, Rev 6 HA5
2. UFSAR Section 3.2
3. ACIT 660892-20, Station Halon Discharge IDLH Evaluation

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU6**Initiating Condition:**

Hazardous Event

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):**Note:**

- EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.
- Escalation of the emergency classification level would be via IC CA2 or MA5

1. Tornado strike within the PROTECTED AREA.

OR

2. Internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode.

OR

3. Movement of personnel within the PROTECTED AREA is impeded due to an offsite event involving hazardous materials (e.g., an offsite chemical spill or toxic gas release).

OR

4. A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.

OR

5. Abnormal River level, as indicated by **EITHER**:

- a. High river water level > **594 ft.**

OR

- b. Report of substantial reduction in river level by site personnel and confirmation by the Corp. of Engineers that Dam # 14 has failed.

Basis:

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
HU6 (cont)

Basis (cont):

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

EAL #1 Basis

Addresses a tornado striking (touching down) within the Protected Area.

EAL #2 Basis

Addresses flooding of a building room or area that results in operators isolating power to a SAFETY SYSTEM component due to water level or other wetting concerns. Classification is also required if the water level or related wetting causes an automatic isolation of a SAFETY SYSTEM component from its power source (e.g., a breaker or relay trip). To warrant classification, operability of the affected component must be required by Technical Specifications for the current operating mode.

EAL #3 Basis

Addresses a hazardous materials event originating at an offsite location and of sufficient magnitude to impede the movement of personnel within the PROTECTED AREA.

EAL #4 Basis

Addresses a hazardous event that causes an on-site impediment to vehicle movement and significant enough to prohibit the plant staff from accessing the site using personal vehicles. Examples of such an event include site flooding caused by a hurricane, heavy rains, up-river water releases, dam failure, etc., or an on-site train derailment blocking the access road.

This EAL is not intended apply to routine impediments such as fog, snow, ice, or vehicle breakdowns or accidents, but rather to more significant conditions such as the Hurricane Andrew strike on Turkey Point in 1992, the flooding around the Cooper Station during the Midwest floods of 1993, or the flooding around Ft. Calhoun Station in 2011.

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY
HU6 (cont)

Basis (cont):**EAL#5 Basis:**

The Design Flood elevation is 594.5 ft. el. (rounded down to 594 ft. el. MSL). This initial design flood elevation is equal to the plant grade of 594.5 ft. el. and any mode of operation is, therefore, possible without additional protective measures. The station design is such that if Lock and Dam No. 14 were to fail, the water level would recede in the intake bay to the point where it would be separated from the river. As the water level recedes in the intake bay, circulating water, service water and fire diesel pumps would become inoperable, leaving only RHRSW and DGCW available to shutdown the units. Use of the ultimate heat sink to shutdown the reactors requires the operation of portable diesel pumps with a total capacity of 5100 gpm to reverse the normal flow of makeup water. Makeup water would be provided from the river through the discharge piping and return to the river across the log boom in the intake bay.

Escalation of the emergency classification level would be based on ICs in Recognition Categories R, F, M, H or C.

Basis Reference(s):

1. NEI 99-01, Rev 6 HU3
2. UFSAR Section 3.2
3. QCTP 0130-11 Internal Flood Protection Program
4. Drawing FL-1 Flood Barriers
5. Quad Cities Nuclear Power Station Unit 1 and 2 Internal Flooding Analysis Note Book, July 1993 Final Draft, prepared by Individual Plant Evaluation Partnership (IPEP)

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HG7**Initiating Condition:**

Other conditions exist which in the judgment of the Emergency Director warrant declaration of a GENERAL EMERGENCY.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):

Other conditions exist which in the judgment of the Emergency Director 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 Protective Action Guideline exposure levels offsite for more than the immediate site area.

Basis:

IMMINENT: The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

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).

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

PROJECTILE: An object directed toward a NPP that could cause concern for its continued operability, reliability, or personnel safety.

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for a General Emergency.

Basis Reference(s):

1. NEI 99-01, Rev 6 HG7

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HS7**Initiating Condition:**

Other conditions exist which in the judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):

Other conditions exist which in the judgment of the Emergency Director 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 Protective Action Guideline exposure levels beyond the site boundary.

Basis:

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).

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

PROJECTILE: An object directed toward a NPP that could cause concern for its continued operability, reliability, or personnel safety.

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for a Site Area Emergency.

Basis Reference(s):

1. NEI 99-01, Rev 6 HS7

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HA7**Initiating Condition:**

Other conditions exist which in the judgment of the Emergency Director warrant declaration of an ALERT Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):

Other conditions exist which, in the judgment of the Emergency Director, 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 Protective Action Guideline exposure levels.

Basis:

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).

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

PROJECTILE: An object directed toward a NPP that could cause concern for its continued operability, reliability, or personnel safety.

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for an Alert.

Basis Reference(s):

1. NEI 99-01, Rev 6 HA7

RECOGNITION CATEGORY
HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

HU7**Initiating Condition:**

Other conditions exist which in the judgment of the Emergency Director warrant declaration of an UNUSUAL EVENT.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):

Other conditions exist which in the judgment of the Emergency Director 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 offsite response or monitoring are expected unless further degradation of safety systems occurs.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for an UNUSUAL EVENT.

Basis Reference(s):

1. NEI 99-01, Rev 6 HU7

**RECOGNITION CATEGORY
ISFSI MALFUNCTIONS****E-HU1****Initiating Condition**

Damage to a loaded cask CONFINEMENT BOUNDARY.

Operating Mode Applicability:

1, 2, 3, 4, 5, D

Emergency Action Level (EAL):

Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading:

1. HI-STORM (labeled as xxx-A2, or xxx-A3)

- **> 40 mrem/hr** (gamma + neutron) on top of the spent fuel cask

OR

- **> 220 mrem/hr** (gamma + neutron) on the side of the spent fuel cask, excluding inlet and outlet ducts

OR

2. HI-STORM (labeled as xxx-A8.1)

- **> 60 mrem/hr** (gamma + neutron) on top of the spent fuel cask

OR

- **> 600 mrem/hr** (gamma + neutron) on the side of the spent fuel cask, excluding inlet and outlet ducts

Basis:

CONFINEMENT BOUNDARY: The irradiated fuel dry storage cask barrier(s) between areas containing radioactive substances and the environment.

INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) : A complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage.

This IC addresses an event that results in damage to the CONFINEMENT BOUNDARY of a storage cask containing spent fuel. It applies to irradiated fuel that is licensed for dry storage beginning at the point that the loaded storage cask is sealed. The word cask, as used in this EAL, refers to the storage container in use at the site for dry storage of irradiated fuel. The issues of concern are the creation of a potential or actual release path to the environment, degradation of any fuel assemblies due to environmental factors, and configuration changes which could cause challenges in removing the cask or fuel from storage.

The existence of “damage” is determined by radiological survey. The technical specification multiple of “2 times”, which is also used in Recognition Category R IC RU1, is used here to distinguish between non-emergency and emergency conditions. The emphasis for this classification is the degradation in the level of safety of the spent fuel cask and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, the fact that the “on-contact” dose rate limit is exceeded may be determined based on measurement of a dose rate at some distance from the cask.

Security-related events for ISFSIs are covered under ICs HU1 and HA1.

**RECOGNITION CATEGORY
ISFSI MALFUNCTIONS**

E-HU1 (cont)

Basis Reference(s):

1. NEI 99-01, Rev 6 E-HU1
2. Certificate of Compliance No. 1014, Amendment No. 2, 3, and 8 Revision 1
Appendix A