Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-17-085

July 7, 2017

10 CFR 50.90
10 CFR 50 Appendix E

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

Browns Ferry Nuclear Plant, Units 1, 2, and 3
Renewed Facility Operating License Nos. DPR-33, DPR-52, and DPR-68
NRC Docket Nos. 50-259, 50-260, 50-296, and 72-052

Sequoyah Nuclear Plant, Units 1 and 2
Renewed Facility Operating License Nos. DPR-77 and DPR-79
NRC Docket Nos. 50-327, 50-328, and 72-034

Watts Bar Nuclear Plant, Units 1 and 2
Facility Operating License Nos. NPF-90 and NPF-96
NRC Docket Nos. 50-390, 50-391, and 72-1048

Subject: Tennessee Valley Authority Response to NRC Request for Additional Information Related to TVA Fleet License Amendment Request to Adopt NEI 99-01 Revision 6 Emergency Action Levels (CAC Nos. MF9054 through MF9060)

References:

1. Letter from TVA to NRC, CNL-16-013, "Tennessee Valley Authority License Amendment Request to Adopt Emergency Action Level Schemes Pursuant to NEI 99-01, Revision 6, 'Development of Emergency Action Levels for Non Passive Reactors,'" dated January 4, 2017 (ML17004A340)

2. Electronic mail from NRC to TVA, "Request for Additional Information Related to TVA Fleet LAR for EAL Change to Adopt NEI 99-01 Rev.6 (CAC NOS. MF9054 - MF9060)," dated May 23, 2017 (ML17150A079)

By letter dated January 4, 2017 (Reference 1), the Tennessee Valley Authority (TVA) submitted a License Amendment Request (LAR) to the Nuclear Regulatory Commission (NRC) requesting amendments to the Emergency Plans for the Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3; Sequoyah Nuclear Plant (SQN), Units 1 and 2; and Watts Bar Nuclear Plant (WBN), Units 1 and 2.

Specifically, the proposed changes involve revising the TVA Radiological Emergency Plan (REP) for the affected facilities to adopt the revised Emergency Action Level (EAL) schemes developed by the Nuclear Energy Institute (NEI) and described in NEI 99-01, Revision 6, *"Development of Emergency Action Levels for Non-Passive Reactors."*

In Reference 2, the NRC transmitted a Request for Additional Information (RAI) related to the TVA LAR. Enclosure 1 to this letter contains the TVA responses to the NRC RAI questions. Enclosures 2 through 4 contain revised copies of the proposed EAL program manual for BFN, SQN, and WBN, respectively, incorporating the changes resulting from the TVA RAI responses.

Consistent with the standards set forth in 10 CFR 50.92(c), TVA has determined that the additional information, as provided in this letter, does not affect the no significant hazards determination associated with the request provided in Reference 1.

There are no new regulatory commitments contained in this submittal. If you have any questions concerning this submittal, please contact Ed Schrull at (423) 751-3850.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 7th day of July 2017.

Sincerely,

Joseph W. Shea
Vice President - Nuclear Regulatory Affairs and Support Services

Enclosures:

1. TVA Response to NRC Request for Additional Information
2. Revised EAL Program Manual (Browns Ferry Nuclear Plant)
3. Revised EAL Program Manual (Sequoyah Nuclear Plant)
4. Revised EAL Program Manual (Watts Bar Nuclear Plant)

cc (Enclosures):
NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Browns Ferry Nuclear Plant
NRC Senior Resident Inspector - Sequoyah Nuclear Plant
NRC Senior Resident Inspector - Watts Bar Nuclear Plant
NRC Project Manager - Browns Ferry Nuclear Plant
NRC Project Manager - Sequoyah Nuclear Plant
NRC Project Manager - Watts Bar Nuclear Plant
State Health Officer, Alabama State Department of Public Health
Director, Division of Radiological Health - Tennessee State Department of Environment and Conservation

ENCLOSURE 1

TVA Response to NRC Request for Additional Information

NRC RAI-1 BFN, SQN, and WBN

Section 4.3 (Instrumentation Used for EALs) of the endorsed guidance states: "Scheme developers should ensure that specific values used as EAL setpoints are within the calibrated range of the referenced instrumentation." Although BFN, SQN, and WBN use the wording provided in endorsed guidance in their EAL basis documents, no indication is provided that the scheme developers did ensure that specific values used as EAL setpoints were within the calibrated range of the referenced instrumentation. For example, the proposed BFN, SQN, and WBN fission product barriers threshold values that are based on primary containment radiation use values such as: 90091 R/HR for BFN, 72.6 R/HR for SQN, and 265 R/HR for WBN. Additionally, the proposed SQN SU7 (2)(a) threshold value is a containment pressure that is greater than 2.81 PSIG.

Please confirm that all setpoints and indications used in the proposed BFN, SQN, and WBN EAL schemes are within the calibrated range(s) of the stated instrumentation and that the resolution of the instrumentation is appropriate for the setpoint/indication.

TVA Response

The Tennessee Valley Authority (TVA) has validated the setpoints and indications used in the proposed Browns Ferry Nuclear Plant (BFN), Sequoyah Nuclear Plant (SQN), and Watts Bar Nuclear Plant (WBN) Emergency Action Level (EAL) schemes and confirmed they are within the calibrated ranges of the applicable instrumentation. TVA also reviewed the resolution of the instrumentation to confirm appropriateness of the setpoint/indication values. Based on that review, TVA revised the following threshold values from the License Amendment Request (LAR) to ensure the values were easily identifiable and, as necessary, matched the significant digits of the digital instrument reading.

BFN fission product barrier primary containment radiation assessment values were revised as follows:

BFN	Fuel Clad Barrier Loss		Containment Barrier Potential Loss	
Monitor	LAR value (R/hr)	Revised Value (R/hr)	LAR value (R/hr)	Revised Value (R/hr)
1-RM-90-272A	2981	2.981E+03	90091	9.009E+04
1-RM-90-273A	2960	2.960E+03	89450	8.945E+04
2-RM-90-272A	2263	2.263E+03	68405	6.841E+04
2-RM-90-273A	2960	2.960E+03	89450	8.945E+04
3-RM-90-272A	2981	2.981E+03	90091	9.009E+04
3-RM-90-273A	2960	2.960E+03	89450	8.945E+04

WBN fission product barrier primary containment radiation assessment values were revised as follows:

WBN	Fuel Clad Barrier Loss		RCS Barrier		Containment Barrier Potential Loss	
Monitor	**LAR value (R/hr)**	**Revised Value (R/hr)**	**LAR value (R/hr)**	**Revised Value (R/hr)**	**LAR value (R/hr)**	**Revised Value (R/hr)**
1-RM-90-271,272	332	3.320E+02	98	9.800E+01	5600	5.600E+03
1-RM-90-273,274	265	2.650E+02	62	6.200E+01	4470	4.470E+03
2-RM-90-271,272	379	3.790E+02	119	1.190E+02	7160	7.160E+03
2-RM-90-273,274	252	2.520E+02	64	6.400E+01	4750	4.750E+03

In consideration of the question regarding SQN EAL SU7(2)(a), TVA revised both the SQN EAL SU7(2)(a) and SQN Fission Product Barrier Containment Barrier Potential Loss Threshold 4.C to use a containment pressure value of 2.8 psig. Although the setpoint for the Phase B automatic action is 2.81 psig, the value of 2.8 psig is more readable to operators and is used in other plant procedures, including Status Tree monitoring.

Considering the revisions described above, the setpoints and indications used in the proposed BFN, SQN, and WBN EAL schemes are within the calibrated ranges of the stated instrumentation and the resolution of the instrumentation is appropriate for the setpoint/indication.

NRC RAI-2 BFN, SQN, and WBN

The definitions contained in endorsed guidance for the General Emergency, Site Area Emergency, Alert and Notification of Unusual Event *[Unusual Event]* classification levels begin with "Events are in progress." The BFN, SQN, and WBN definitions in Appendix B for a General Emergency, Site Area Emergency, and Alert begin with "Events are in pro**c**ess." *[Emphasis added.]*

Please revise these definitions to reflect the definitions in the endorsed guidance or provide a justification for the difference.

TVA Response

TVA has revised the definitions for General Emergency, Site Area Emergency, Alert, and Unusual Event to match the "Events are in progress" wording from the endorsed NEI 99-01, Revision 6, guidance.

NRC RAI-3 BFN, SQN, and WBN

The proposed definition for the Owner Controlled Area is, "[t]he site property owned by or otherwise under the control of Site Security." Although Site Security does typically control the area that encompasses a NPP, Site Security does not typically own that property. The definition for the Owner Controlled Areas in endorsed guidance states, “The site property owned by, or otherwise under the control of the licensee.”

Please revise the definition of Owner Controlled Area to clearly reflect who owns the site property or provide a justification for the difference.

TVA Response

TVA has revised the site-specific definitions of Owner Controlled Area to accurately reflect site property ownership. TVA is the owner of the property. The revised definition of Owner Controlled Area for each site is “The TVA-owned site property under the control of Site Security.” TVA owns large amounts of property within the vicinity of the BFN, SQN, and WBN sites. It is appropriate to limit the classification of EAL Threshold HA1 hostile action events to those which are specifically directed at the nuclear site and would require a response from site security.

NRC RAI-4 WBN

In section 5.1, “Definitions,” there is no proposed definition for Emergency Classification Level for WBN. This definition is included in endorsed guidance and for BFN and SQN.

Please include a definition of Emergency Classification Level for WBN or provide a justification for the difference.

TVA Response

TVA has revised the WBN EAL Program Manual to include the definition for Emergency Classification Level consistent with the endorsed NEI 99-01, Revision 6, guidance.

NRC RAI-5 SQN, WBN

The proposed SQN and WBN EAL RG1 (1), RS1 (1) and RA1 (1) threshold values include steam generator radiation monitor setpoints. To determine a setpoint, the steam generator discharge radiation monitors assume a PORV is full open with a steam generator (SG) pressure of 1078.7 PSIA for SQN and 1199.7 for WBN. Assuming that a PORV was fully opened, SG pressure could lower substantially following an event. Additionally, a PORV may, or may not be, opened following a transient.

Please explain how the SG discharge radiation monitors can provide an accurate offsite dose indication without accounting for actual steam flow or consider removing the SG discharge radiation monitors from the SQN and WBN proposed EAL schemes.

TVA Response

The SQN and WBN Steam Generator (SG) discharge (Main Steam Line) radiation monitors provide important post-accident information during a postulated Steam Generator Tube

Rupture (SGTR) event. The SGTR is analyzed as a Design Basis Accident (DBA) in each plant's FSAR Chapter 15. The assumption to consider a fully open Power Operated Relief Valve (PORV) maximizes the potential mass release to the atmosphere for a SGTR event and is conservative with respect to calculating offsite radiological consequences.

The currently approved effluent radiation monitor EALs for SQN and WBN consider a fully open PORV for the SG discharge monitors. A footnote is included in the EAL effluent monitor table to warn users of this assumption. For example, SQN:

> *(1) These unit values are based on flow rates through one PORV of 890,000 lb/hr at 1078.7 psia with 0.25% carry over (0.9975 quality). Before using these values, ensure a release to the environment is ongoing (e.g., PORV).*

TVA has revised the proposed EALs RG1, RS1, and RA1 for SQN and WBN to include the footnote present in the current EALs. Inclusion of the footnote will ensure the SG discharge monitor values are not used for classification of an event that doesn't include a PORV release.

<u>NRC RAI-6 BFN</u>

The proposed BFN EAL RU1 (2) threshold value states, "0-SI-4.8.B.1.a.1 (Airborne Effluent Release Rate) results greater than Release Rate Fraction of 2.0 for 60 minutes or longer." Although it appears that this value would be 2 times the release limit established by the ODCM, the staff could not determine how the site emergency director could readily identify this condition.

Please explain what conditions will meet this threshold value and provide a justification that decision makers can make a timely and accurate assessment using the existing threshold value wording.

<u>TVA Response</u>

TVA has revised BFN EAL RU1(2) to include a list of monitors with thresholds for exceeding two times the Offsite Dose Calculations Manual (ODCM) gaseous release limits. Performance of the previously referenced procedure (0-SI-4.8.B.1.a.1) includes collecting building release rates and performing calculations considering ventilation release factors (fan status) to determine actual offsite releases. Including the monitor list in the EAL, rather than the procedure results, will allow assessment of the effluent releases in a timely and accurate manner.

<u>NRC RAI-7 BFN, SQN, and WBN</u>

The proposed BFN and WBN EAL RU2 (1)(a) does not provide a site specific indication that indicates that an unplanned water level drop has occurred or is occurring in the refueling pathway. SQN only provides a spent fuel pit level annunciator. Plants typically have one or more level indications that provide an indication of refueling pathway level. Although personnel observation is one indication that can be used, it should not be the only indication that is available.

Please provide level indications that could be used to indicate a water level drop in the refueling pathway that could be used in conjunction with a rise in radiation levels to support a timely and accurate assessment of RU2.

TVA Response

TVA has revised EAL RU2(1)(a) for BFN, SQN, and WBN to include additional level indications that could be used in conjunction with rising radiation levels to support timely and accurate classification. The following Threshold Values (TV) were added to RU2(1)(a):

BFN:

- Fuel Pool System Abnormal annunciator lit AND SFSP level less than 662' 8" as indicated by 1(2,3)-LI-078-0042 and 1(2,3)-LI-078-0043.

Justification: The referenced instruments are the Spent Fuel Storage Pool (SFSP) wide range level indications that provide remote indication of SFSP level from the Electric Board Rooms. The SFSP level of 662' 8" is equal to the alarm setpoint for the Fuel Pool System Abnormal annunciator. SFSP level of 662' 8" is an entry condition for Emergency Operating Instruction EOI-3 "Secondary Containment Control."

SQN:

- Spent Fuel Pit Level High-Low annunciator lit (M6-D3) AND SFP level less than 725' as indicated by 0-LI-78-43 and 0-LI-78-44.

Justification: The referenced instruments are the Spent Fuel Pit (SFP) wide range level indications that provide remote indication of SFP level from the 480V shutdown board rooms. The SFP level of 725' is lower than the 725' 11-1/2" low setpoint for the SFP Level High-Low alarm. An AOP-M.06 entry criterion is "Low SFP Level (below alarm setpoint of 725' 11.5") for reasons other than normal evaporative losses." The EAL threshold value of 725' provides margin for the operator to verify that the low SFP level is not due to normal evaporative losses.

WBN:

- SFP LEVEL HI/LO annunciator lit (128-A) AND SFP level less than 748' as indicated by 0-LI-78-42 and 0-LI-78-43.

Justification: The referenced instruments are the SFP wide range level indications that provide remote indication of SFP level from the 6.9kV shutdown board rooms. The SFP level of 748' is lower than the 748' 11-1/2" low setpoint for the SFP Level HI/LO alarm. WBN procedures direct operators to confirm whether water level is low due to evaporative losses. The EAL threshold value of 748' provides margin for the operator to verify that the low SFP level is not due to normal evaporative losses.

NRC RAI-8 BFN, SQN, and WBN

The proposed BFN, SQN and WBN EAL CG1, CS1, CA1, and CU1 threshold values appear to limit containment sumps as indications of RCS leakage. With RHR in use, sumps outside the containment may also provide an indication of RCS leakage. Endorsed guidance recommends entering any “site-specific sump and/or tank” levels that could be expected to increase if there were a loss of inventory as threshold values. Note: for CG1 and CS1, the level indications used to determine RCS leakage must also provide information that can be used to quantify RCS leakage as necessary to determine whether or not core uncovery has occurred.

Please consider revising the proposed SQN and WBN EAL CG1, CS1, CA1, and CU1 threshold values to provide indications of a loss of RCS inventory via the RHR system or provide justification why these indications would not be appropriate.

TVA Response

TVA has revised the BFN, SQN, and WBN EALs CG1, CS1, CA1, and CU1 to include additional sump or volume levels that could be expected to increase if there were a loss of inventory. For BFN, the additional volume is the RHR Pump room. For SQN and WBN, the additional sump is the Auxiliary Building Passive Sump.

Specific levels are not provided equating specific magnitudes of observed sump changes with core uncovery. As stated in the basis discussion for these EALs in the endorsed NEI 99-01, Revision 6, guidance, 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 RCS/RPV. It is expected that the assessment to determine whether leakage is indicative of core uncovery would consider these evaluations of potential sources, the rate of rising in the sumps, any reports available from visual observation, and other information available for operators to use in their best judgment.

NRC RAI-9 BFN

The proposed BFN EAL CG1 (2)(b) and CS1 (3)(b) radiation monitor tables provide for alarms on various radiation monitors. The endorsed guidance for CG1 and CS1 identify “site-specific radiation monitor[s]” and “site-specific value[s]” that are indicative of core uncovery. TVA has not provided information that could be used to verify that the high level alarms of the provided radiation monitors are indicative of core uncovery.

Please provide justification that supports BFN using the identified radiation monitor high level alarms as indication of core uncovery or provide radiation values that would be indicative of core uncovery for CG1 and CS1.

TVA Response

TVA has determined that the listed monitors are not appropriate to indicate core uncovery for BFN EALs CG1 and CS1. The listed monitors are utilized during shutdown modes to act as an engineered safeguard against the consequences of a refueling accident. In the event of a refueling accident involving fuel failures, the monitors would detect airborne fission products in the area of the fuel pool, refueling zone exhaust, or reactor building exhaust, and automatic actions would be initiated to establish secondary containment and control the control bay environment. There are no area radiation monitors at BFN installed to monitor and detect a core uncovery with no release of fission products from failed fuel.

TVA has revised the BFN EALs CG1(2)(b) and CS1(3)(b) to remove the table of radiation monitors. The NEI 99-01, Revision 6, guidance for EALs CG1 and CS1 states that for BWRs that do not have installed radiation monitors capable of indicating core uncovery, alternate site-specific level indications of core uncovery should be used if available. For BFN, assessment of RPV inventory for conditions where RPV level cannot be monitored is accomplished through monitoring of the sumps listed in the revised BFN EALs CG1(2)(b) and CS1(3)(b).

Additional change: Consistent with the assessment above that the reactor building exhaust and refueling zone exhaust monitors would not be impacted during a loss of water level event without failed fuel, TVA has revised BFN EAL RU2 to remove the exhaust monitors. For the revised BFN EAL RU2, monitor 1, 2, 3-RM-90-1A (Fuel Pool Floor) is retained.

NRC RAI-10 SQN, WBN

The proposed SQN and WBN EAL CG1 (1)(a) and CS1 (2)(b) threshold values use a level that corresponds to the less than bottom of the hot leg for thirty minutes vice the endorsed guidance value of “approximately the top of active fuel.” If RVLIS is available, a RVLIS indication that is approximately the top of active fuel should be used. If RVLIS was not available, then RCS level cannot be monitored and this condition should be assessed under EALs CG1 (2) or CS1 (3).

Please clarify the proposed SQN and WBN EAL CG1 (1)(a) and CS1 (2)(b) threshold values to be consistent with endorsed guidance or provide, justification that support this deviation from endorsed guidance.

TVA Response

TVA has revised SQN and WBN EALs CG1(1)(a) and CS1(2)(b) to realign the threshold values with the endorsed guidance. The threshold values now reference the Reactor Vessel Level Indicating System (RVLIS) static level of 64% (SQN) and 60% (WBN), which are equivalent to top of active fuel. This indication is only valid when RVLIS is available (MODE 5).

NRC RAI-11 SQN, WBN

The provided SQN and WBN EAL CG1 (2)(b) and CS1 (3)(b) radiation monitor tables provide for readings of greater than 9500 mR/hr on 1-, 2-RM-90-59 or 60 as threshold values. The endorsed guidance for CG1 and CS1 identify "site-specific radiation monitor[s]" and "site-specific value[s]" that are indicative of core uncovery. TVA has not provided information that could be used to verify that the readings on the identified monitors of greater than 9500 mR/hr are indicative of core uncovery.

Please provide justification that supports using readings of greater than 9500 mR/hr on 1, 2-RM-90-59 or 60 as an indication of core uncovery for CG1 and CS1. The endorsed guidance provides that if the estimated/calculated monitor reading is greater than approximately 110% of the highest accurate monitor reading, then developers may choose not to include the monitor as an indication and identify an alternate EAL threshold.

TVA Response

TVA has revised EALs CG1(2)(b) and CS1(3)(b) for SQN and WBN to remove the containment radiation monitors as an indication of core uncovery. For the referenced radiation monitors, TVA has not determined a specific value that would be equivalent to core uncovery. Monitor values for a core uncovery event would vary with core source term, decay time after shutdown, amount of shielding above the fuel in the vessel, and number of assemblies in the core.

Unlike stations of similar design (Westinghouse 4-loop ice condenser plants) with recently approved EAL schemes (ML16082A038, ML16083A208), SQN and WBN do not have permanently installed refueling bridge monitors that could more accurately detect core uncovery. Monitors 1,2-RM-90-59 and 60 at SQN and WBN are located in the containment upper compartments, i.e., farther away from the core, .

With the removal of these monitors from the EAL threshold values, assessment of core uncovery will be performed by detecting erratic source range monitor indications or unplanned rises in the Containment Sump, Containment Pit Sump, or Auxiliary Building Passive Sump.

NRC RAI-12 BFN

The provided BFN EAL CG1 Table C1, "Containment Challenge" uses an EOI-3 entry on low secondary containment delta pressure (DP) as the equivalent to containment closure not being established. Although a loss of containment closure could result in a low secondary containment DP, factors not directly related to a loss of containment closure could also result in EOI-3 entry conditions. Additionally, as provided, EOI-3 entry appears redundant to an "UNPLANNED rise in containment pressure" in that an unplanned rise in containment pressure would result in a low secondary containment DP.

Please clarify BFN EAL CG1 Table C1 “Containment Challenge” to be consistent with endorsed guidance or provide a more detailed explain as to why containment closure guidance is not applicable to BFN.

TVA Response

TVA has revised the BFN EAL CG1, Table C1, replacing the phrase “Entry into EOI-3 on low secondary containment DP” with “Secondary Containment not established.” The status of Secondary Containment is the site-specific terminology equivalent to the “Containment Closure” term used in the NEI 99-01, Revision 6, guidance. Therefore, this change realigns the BFN EAL CG1, Table C1, with the endorsed guidance.

NRC RAI-13 SQN, WBN

The proposed SQN and WBN EAL CS1 (1)(b) threshold values are at the centerline of the RCS loops when containment closure is not established which is not consistent with endorsed guidance which provides that if RVLIS is available, a level that is approximately 6 inches below the bottom of the hot leg should be used. If a licensee desires to use diverse level indications, then the lowest readable indication for diverse level indications is approximately the bottom of the hot leg.

Please clarify the proposed SQN and WBN EAL CS1 (1)(b) threshold values to align with endorsed guidance or provide justification for using the lowest readable level that would be based on diverse level indications which would typically be available during all outage conditions.

TVA Response

TVA has revised EAL CS1(1)(b) for SQN and WBN to reference the lowest readable level indication for the Mansell monitoring system, which is available during midloop, reduced inventory, and partial draindown to provide redundant wide range Reactor Coolant System (RCS) level indication. The Mansell system has two redundant channels. EAL CS1(1)(b) for SQN now references an elevation of 694’, which is approximately 2.5” above the bottom of the hot leg. EAL CS1(1)(b) for WBN now references an elevation of 716’ 8”, which is approximately 1.5” below the bottom of the hot leg.

NRC RAI-14 SQN, WBN

The proposed SQN and WBN EAL CA1 (1) threshold values are at the top of RCS hot leg which is not consistent with endorsed guidance. The endorsed guidance provides a minimum allowable level that supports operation of normally used decay heat removal systems. This level is typically approximately the middle of the hot leg.

Please clarify the proposed SQN and WBN EAL CA1 (1) threshold values to align with endorsed guidance or provide justification for using a level that is well above the level that would be an actual or potential substantial degradation of the level of safety of the plant.

TVA Response

TVA has revised the SQN and WBN EAL CA1(1) threshold values to align with the minimum allowable value that supports operation of normally used decay heat removal systems (i.e., the RHR system). For SQN, this value is 695' 6". For WBN, this value is 718' 6".

NRC RAI-15 BFN

The provided BFN EAL CA3 (1) threshold value (TV) refers to RCS and the associated Table C2, "Moderator Heat-up Duration Thresholds" uses the term "Moderator" vice "RCS." The basis discussion for CA3 uses RCS and moderator when referring to RCS. Using RCS in the TV and moderator in the associated table identification and mixing both terms in the basis discussion introduces an unnecessary human factor challenge to this EAL.

Please consider consistently using RCS for BFN EAL CA3 (1) to remove the human factor challenge and align with SQN and WBN or explain how using the two identified terms will not potentially result in a human factor challenge.

TVA Response

TVA has revised the TV and basis discussion for BFN EAL CA3 to use the term "moderator" to align with the site-specific terminology in Table C2 used when referring to moderator temperature. The acronym RCS remains for the other locations discussing the RCS status of "intact" or "not intact." The purpose of using the term "moderator" for discussions of moderator temperature is to avoid confusion with use of the "RCS" acronym used for discussing an "intact" or "not intact" RCS status.

NRC RAI-16 SQN, WBN

The provided SQN and WBN EAL CA3 (1) threshold value (TV) refers to "RCS **Reheat** Duration Thresholds" vice "RCS **Heat-up** Duration Thresholds" *[Emphasis added]* in the endorsed guidance. In addition to endorsed guidance, the deviations and differences matrix provided by TVA and the basis discussion for WBN CA3 uses the term Heat-up.

Please consider consistently using Heat-up for the SQN and WBN EAL CA3 (1) Table C-2 titles and associated basis discussions or explain how using the "Reheat" will not potentially present a human factor challenge.

TVA Response

TVA has revised EAL CA3(1) for SQN and WBN to use the term “Heat-up” in Table C-2 and the associated basis discussions in alignment with the endorsed guidance of NEI 99-01, Revision 6.

NRC RAI-17 BFN, SQN, and WBN

The ERO basis discussion for proposed BFN, SQN, and WBN EALs CA6 (1) and SA9 (1) states:

> *No emergency classification is required in response to a FIRE or EXPLOSION resulting from an equipment failure if the only safety system equipment affected by the event is that upon which the failure occurred. An emergency classification is required if a FIRE or EXPLOSION caused by an equipment failure damages other safety system equipment (that is, equipment that was not the source/location of the failure). For example, if a FIRE or EXPLOSION resulting from the failure of a piece of safety system equipment causes damage to the other train of the affected safety system or another safety system, then an emergency declaration is required in accordance with this IC and EAL.*
>
> *An equipment failure may have a cascading effect leading to a FIRE or EXPLOSION that causes damage to multiple individual components and subcomponents, all associated with one safety system train. For example, consider an electrical breaker failure that leads to a FIRE in both the breaker and an associated pump motor. This failure caused damage to components (that is, the breaker and the pump) as well as subcomponents (for example, the pump motor stator, windings, flywheel, bearings and electrical connections). The damage to individual components and subcomponents on the affected safety system should therefore be assessed collectively at the system train-level, that is, regardless of their number or location, if all the damaged components are on one safety system train, and no other safety system or system train has been affected, then no emergency declaration is required.*

The above basis discussion is not reflected in either the provided BFN, SQN, or WBN EALs CA6 (1) and SA9 (1) TVs or notes associated with BFN, SQN, and WBN EALs CA6 (1) and SA9 (1). Additionally, the basis discussion for the statement quoted above provides information that appears to only modify assessments based on a FIRE or EXPLOSION.

Please add a note to the threshold values for EALs CA6.1 and SA9.1 that clearly indicates that an emergency classification is required if a hazardous event, including a FIRE or EXPLOSION, caused by an equipment failure damages safety system equipment that was otherwise functional or operable, or explain how decision makers will be able to perform timely and accurate assessments of EALs CA6.1 or SA9.1. Note: EPFAQ 2016-002, “Clarification of Equipment Damage” can be referred to if desired.

Please modify the threshold value as needed to be consistent with the proposed basis document regarding when an Alert declaration should be made based on equipment damage as a result of a hazardous event. Note: EPFAQ 2016-002, "Clarification of Equipment Damage" can be referred to if desired.

Please revise the basis discussion as needed to address all hazardous events for BFN, SQN, and WBN EALs CA6 (1) and SA9 (1).

TVA Response

TVA has revised EALs CA6 and SA9 for BFN, SQN, and WBN to align with the proposed resolution of EPFAQ 2016-002 "Clarification of Equipment Damage." The text quoted in the RAI, which appeared to only modify assessments based on FIRE or EXPLOSION, has been removed from the basis discussion for each affected EAL. A note, as proposed in EPFAQ 2016-002, has been added to each affected EAL to clarify assessments relating to inoperable or out of service systems or components. This added note is not specific to FIRE or EXPLOSION events; it addresses all hazardous events.

Additionally, to fully align with the proposed resolution of EPFAQ 2016-002, TVA has revised the BFN, SQN, and WBN definition of VISIBLE DAMAGE to clarify assessment of events that affect only a single system or component and are therefore adequately controlled by Technical Specifications and Operating Procedures.

NRC RAI-18 BFN, SQN, and WBN

The ERO basis discussion for proposed BFN, SQN, and WBN EALs CA6 (1) and SA9 (1) states:

> *The emergency classification guidance provided above may also be used to assess damage caused by electrical arcing if no FIRE or EXPLOSION event is apparent.*

The above basis discussion is not reflected in either the provided BFN, SQN, or WBN EALs CA6 (1) and SA9 (1) TVs or notes associated with BFN, SQN, and WBN EALs CA6 (1) and SA9 (1). Additionally, the basis discussion for the statement quoted above provides information that appears to only modify declarations based on a FIRE or EXPLOSION. It appears the proposed BFN, SQN, and WBN EALs CA6 (1) and SA9 (1) are trying to address electrical arcing as a condition that is separate from a fire. Since the proposed definition of a fire, which is consistent with endorsed guidance, states, "Combustion characterized by heat and light," electrical fires are already included in BFN, SQN, and WBN EALs CA6 (1) and SA9 (1) threshold values. The addition of the above electrical arcing discussion could introduce a human factors challenge and result in inaccurate assessments.

Please clarify the discussion relating to electrical arcing from BFN, SQN, and WBN EALs CA6 (1) and SA9 (1) or revise the discussion as necessary to clarify that an electrical fire, which could be characterized by heat and light due to electrical arcing, should be assessed as a fire as defined in the provided EAL definition of a fire.

TVA Response

TVA has revised the basis discussions for BFN, SQN, and WBN EALs CA6(1) and SA9(1) to remove the paragraph discussing electrical arcing. The change realigns the TVA EAL basis discussion with the endorsed NEI 99-01, Revision 6, guidance. Because the proposed definition of a fire, which is consistent with endorsed guidance, states, "Combustion characterized by heat and light," electrical fires are already included in BFN, SQN, and WBN EALs CA6(1) and SA9(1) threshold values.

NRC RAI-19 BFN

The proposed BFN containment fission product barrier loss threshold 1A, for primary containment conditions threshold value states, "Drywell pressure greater than the PCPL curve." The PCPL curve appears to be a part of the BFN SAMG strategy and not part of the EOIs typically used by the on-shift operators. SAMGs are not typically implemented until the technical support center (TSC) is staffed. Additionally, it appears that a pressure limit of 55 PSIG would apply until the containment was substantially flooded. Flooding the containment per SAMGs would represent a containment barrier potential loss condition. The BFN EOIs appear to vent the primary containment when primary containment pressure reaches 55 PSIG. Additionally, the current BFN EAL use 55 PSIG as a primary containment threshold value.

Please clarify the proposed BFN Containment fission product barrier loss threshold 1 A, for primary containment conditions threshold value to use 55 PSIG vice the PCPL curve or provide a discussion that explains how the containment barrier would not be potentially lost when the primary containment was being intentionally vented due to a primary containment pressure at or above the BFN design containment pressure of 55 PSIG. Additionally, ensure the containment barrier threshold discussion is changed as required.

TVA Response

TVA has revised the BFN Containment fission product barrier Potential Loss threshold 1.A to reference a pressure limit of 55 psig. In addition, TVA has removed the discussion of the Primary Containment Pressure Limit (PCPL) curve. The pressure limit of 55 psig is equivalent to the PCPL limit for a containment that is not substantially flooded. TVA has also revised the containment barrier threshold discussion for Potential Loss 1.A to remove the sentence regarding the PCPL curve. The discussion now matches the text of the endorsed NEI 99-01, Revision 6, guidance.

NRC RAI-20 SQN, WBN

For the proposed SQN and WBN fuel clad and RCS fission product barriers, RED entry conditions for the heat sink CSFST are used as a threshold for a potential loss of these barriers. However, the endorsed guidance states:

In accordance with EOPs, there may be unusual accident conditions during which operators intentionally reduce the heat removal capability of the steam generators; during these conditions, classification using threshold is not warranted.

This guidance is included in the barrier threshold basis discussions; however, it is not included in the relevant barrier thresholds.

Please explain why the endorsed guidance concerning making classifications for heat sink conditions when operators intentionally reduce heat removal capability, in accordance with EOPs, is not included in the fission product barrier thresholds as this could result in an inaccurate EAL declaration, or revise accordingly.

TVA Response

TVA has added the phrase "(if heat sink required)" to the following SQN and WBN Fission Product Barrier Thresholds:

- Fuel Clad Barrier Potential Loss 2.B
- RCS Barrier Potential Loss 2.A

The changes clarify the assessment for heat sink conditions when operators may intentionally reduce heat removal capability.

NRC RAI-21 BFN

The proposed BFN EAL HU2 (1) includes the following threshold value:

Assessment by Unit 1 and Unit 2 Control Room personnel that an earthquake has occurred.

This threshold value could implies that BOTH the unit 1 and unit 2 control room personnel must perform an assessment to determine that an earthquake has occurred. This threshold value is not consistent with endorsed guidance. The proposed BFN EAL Program manual includes the following General Consideration relative to Valid Indications:

All emergency classification assessments shall be based upon valid indications, reports or conditions. A valid indication, report, or condition, is one that has been verified through appropriate means such that there is no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, verification could be accomplished through an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel.

Please explain why the above threshold value from the BFN EAL HU2 (1) is required and how it will be accurately and consistently performed in a timely manner.

TVA Response

TVA has revised BFN EAL HU2(1) to remove the requirement for assessment by Control Room personnel that an earthquake has occurred. A valid indication of alarm on Unit 1 Control Room Panel 1-XA-55-22C Window 6 is an appropriate standalone threshold value and ensures timeliness and accuracy of classification. With this indication and with the General Consideration regarding Valid Indications, no additional assessments are needed to determine that a seismic event greater than Operating Basis Earthquake (OBE) levels has occurred.

NRC RAI-22 SQN

The proposed SQN EAL HU2 (1) includes the following threshold value:

> *Seismic event greater than Operating Basis Earthquake (OBE) as indicated by Panel XA-55-15B alarm windows E-2 and D-1 activated*

Please explain how the activation of Panel XA-55-15B alarm windows E-2 and D-1 can be used to discriminate a seismic event that is greater than an OBE and a seismic event that is less than an OBE.

If the activation of Panel XA-55-15B alarm windows E-2 and D-1 cannot be used to accurately assess an OBE condition, then please explain how the seismic instrumentation at SQN can be used to perform a timely and accurate assessment of a seismic event or provide an alternate EAL threshold that is consistent with the developer notes provided in endorsed guidance.

TVA Response

SQN FSAR Section 3.7.4 describes how activation of Panel XA-55-15B alarm windows can be used to accurately assess an OBE condition at SQN. Annunciation of alarm window D-1 indicates that seismic motion in excess of 0.01g has been sensed. This annunciation informs the operator that a seismic event is being recorded on the seismic monitoring system. A central controller consisting of an industrial computer and custom software performs automatic analysis of the recorded data and makes a comparison to the SQN Operating Basis Earthquake (OBE) (i.e., 1/2 Safe Shutdown Earthquake) design basis response spectrum. If the event-analysis software indicates that the SQN OBE design basis response spectrum has been exceeded, annunciation will be received on alarm window E-2.

NRC RAI-23 SQN, WBN

The proposed SQN and WBN EAL HU2 basis discussions include the following example:

> *Earthquakes of this magnitude should be readily felt by on-site personnel and recognized as a seismic event (for example, typical lateral accelerations are in excess of 0.08g).*

Although this example is consistent with endorsed guidance, the guidance is intended to be an example that is replaced by site-specific values.

Please clarify the SQN and WBN HU2 basis discussions to reflect SQN and WBN values respectively.

TVA Response

TVA has revised the basis discussions for SQN and WBN EAL HU2 to remove the parenthetical example. Removal of the example is consistent with the approach taken for BFN EAL HU2. A site-specific example is not necessary for understanding of the statement that an earthquake of OBE magnitude should be readily felt by on-site personnel and recognized as a seismic event.

NRC RAI-24 BFN, SQN, and WBN

The areas listed in Table H-2, "Fire Areas," in the proposed BFN, SQN, and WBN EAL HU4 seem to be vague or too all-encompassing. The endorsed guidance states: "the "site-specific" list of plant room should specify these rooms or areas that contain SAFETY SYSTEM equipment."

Please explain if the listed areas are restricted to only the areas that contain equipment needed for safe operation, safe shutdown and safe cool-down, or revise accordingly consistent with endorsed guidance.

TVA Response

The BFN Table H2 fire areas are based on the BFN NFPA-805 fire area designation. The listed fire areas contain equipment associated with power production and emergency operations. The fire areas listed in Table H2 for SQN and WBN are based on Fire Safe Shutdown procedures, which are utilized to safely shut down the plant in the event of a plant fire that threatens safety functions.

A balance must be established between defining major plant structures containing safe shutdown equipment as fire areas versus a detailed list of areas for every safety system component location. The Table H2 lists of fire areas achieve that balance in support of timely and accurate emergency classification for the end-user. Therefore, fine tuning of these areas would not be beneficial.

NRC RAI-25 BFN

For SU4 (3), the proposed threshold value is 25 gpm. This is not consistent with SU4 (2) and is less than the BFN technical specification value.

Please clarify the proposed SU4 (2) threshold value of 30 gpm RCS leakage as a threshold value for SU4 (3) to eliminate a potential human factor challenge to timely and accurate assessment of SU4.

TVA Response

TVA has revised BFN EAL SU4(3) to reflect a leakage value of 30 gpm. The revised value matches the maximum Technical Specification identified leakage value of 30 gpm used in BFN SU4 Threshold (2).

Enclosure 2

Revised EAL Program Manual

(Browns Ferry Nuclear Plant)

Tennessee Valley Authority	RADIOLOGICAL EMERGENCY PLAN BFN EAL Program Manual	REP BFN EAL Program Manual REV. 0 Effective Date:

WRITTEN BY: ______________________ REVIEWED BY: ______________________ __________
Signature *Signature* *Date*

10 CFR 50.54(q)(3) ANALYSIS
REVIEWED BY: ______________________ __________
Signature *Date*

CONCURRENCES

Concurrence Signature	**Date**	**Concurrence Signature**	**Date**
BFN EP Manager ______________________	__________	BFN PORC Chairman ______________________	__________
Director Emergency Preparedness ______________________	__________		__________
	__________		

APPROVAL

APPROVED BY: ______________________ ______________________ __________
Signature *Title* *Organization* *Date*

1.0 PURPOSE

This document provides an explanation and rationale for each Emergency Action Level (EAL) included in the EAL Upgrade Project for Browns Ferry Nuclear Power Plant (BFN). It should be used to facilitate review of the BFN EALs and provide historical documentation for future reference. Decision-makers responsible for implementation of EPIP-1, "Emergency Plan Classification Logic," may use this document as a technical reference in support of EAL interpretation. This information may assist the Site Emergency Director (SED) in making classifications, particularly those involving judgment or multiple events. The basis information may also be useful in training and for explaining event classifications to off-site officials.

The expectation is that emergency classifications are to be made as soon as conditions are present and recognizable for the classification, but within 15 minutes or less in all cases of conditions present. Use of this document for assistance is not intended to delay the emergency classification.

Because the information in a basis document can affect emergency classification decision making (for example, the SED refers to it during an event), the NRC staff expects that changes to the basis document will be evaluated in accordance with the provisions of 10 CFR 50.54(q).

2.0 DISCUSSION

2.1 BACKGROUND

EALs are the plant-specific indications, conditions or instrument readings that are utilized to classify emergency conditions defined in the TVA Radiological Emergency Plan (REP).

In 1992, the NRC endorsed NUMARC/NESP-007 "Methodology for Development of Emergency Action Levels" as an alternative to NUREG-0654 EAL guidance.
NEI 99-01 (NUMARC/NESP-007) Revisions 4 and 5 were subsequently issued for industry implementation. Enhancements over earlier revisions included:

- Consolidating the system malfunction initiating conditions and example emergency action levels which address conditions that may be postulated to occur during plant shutdown conditions.
- Initiating conditions and example emergency action levels that fully address conditions that may be postulated to occur at permanently Defueled Stations and Independent Spent Fuel Storage Installations (ISFSIs).
- Simplifying the fission product barrier EAL threshold for a Site Area Emergency.

Subsequently, Revision 6 of NEI 99-01 has been issued which incorporates resolutions to numerous implementation issues including the NRC EAL Frequently Asked Questions (FAQs). Using NEI 99-01 Revision 6, "Methodology for the Development of Emergency Action Levels for Non-Passive Reactors," November 2012 (ADAMS Accession Number ML12326A805) (ref. 4.1.1), BFN conducted an EAL implementation upgrade project that produced the EALs discussed herein.

2.2 Fission Product Barriers

Fission product barrier 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.

Many of the EALs derived from the NEI methodology are fission product barrier threshold based. That is, the conditions that define the EALs are based upon thresholds that represent the loss or potential loss of one or more of the three fission product barriers. "Loss" and "Potential Loss" signify the relative damage and threat of damage to the barrier. A "Loss" threshold means the barrier no longer assures containment of radioactive materials. A "Potential Loss" threshold implies an increased probability of barrier loss and decreased certainty of maintaining the barrier. The primary fission product barriers are:

A. Fuel Clad (FC): The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.

B. Reactor Coolant System (RCS): The RCS Barrier includes the RCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.

C. Containment (CNTMT): The Containment Barrier includes the containment building and connections up to and including the outermost containment isolation valves. This barrier also includes the main steam, feedwater, and blowdown line extensions outside the containment building up to and including the outermost secondary side isolation valve. Containment Barrier thresholds are used as criteria for escalation of the ECL from Alert to a Site Area Emergency or a General Emergency

2.3 Fission Product Barrier Classification Criteria

The following criteria are the bases for event classification related to fission product barrier loss or potential loss:

<u>Alert:</u>
Any loss or any potential loss of either Fuel Clad or RCS barrier

<u>Site Area Emergency:</u>
Loss or potential loss of any two barriers

<u>General Emergency:</u>
Loss of any two barriers and loss or potential loss of the third barrier

2.4 EAL Organization

The BFN EAL scheme includes the following features:

- Division of the EAL set into three broad groups:
    - EALs applicable under any plant operating modes - This group would be reviewed by the EAL-user any time emergency classification is considered.
    - EALs applicable only under hot operating modes - This group would only be reviewed by the EAL-user when the plant is in Hot Shutdown, Hot Standby, Startup, or Power Operation mode.
    - EALs applicable only under cold operating modes - This group would only be reviewed by the EAL-user when the plant is in Cold Shutdown, Refueling or Defueled mode.
- The purpose of the groups is to avoid review of hot condition EALs when the plant is in a cold condition and avoid review of cold condition EALs when the plant is in a hot condition. This approach significantly minimizes the total number of EALs that must be reviewed by the EAL-user for a given plant condition, reduces EAL-user reading burden and, thereby, speeds identification of the EAL that applies to the emergency.
- Within each group, assignment of EALs to categories and subcategories:

Category and subcategory titles are selected to represent conditions that are operationally significant to the EAL-user. The BFN EAL categories are aligned to and represent the NEI 99-01"Recognition Categories." Subcategories are used in the BFN scheme as necessary to further divide the EALs of a category into logical sets of possible emergency classification thresholds. The BFN EAL categories and subcategories are listed below.

Table 1 - BFN EAL Groups, Categories and Subcategories

BFN EALs	
Category	**Subcategory**
Group: Any Operating Mode	
R - Abnormal Rad Levels/Rad Effluent	1 - Radiological Effluent 2 - Irradiated Fuel Event 3 - Area Radiation Levels
H - Hazards and Other Conditions Affecting	1 - Security 2 - Seismic Event 3 - Natural or Technological Hazard 4 - Fire 5 - Hazardous Gases 6 - Control Room Evacuation 7 - Emergency Director Judgment
E- ISFSI	1 - Confinement Boundary
Group: Hot Conditions	
S - System Malfunction	1 - Loss of Essential AC Power 2 - Loss of Vital DC Power 3 - Loss of Control Room Indications 4 - RCS Activity 5 - RCS Leakage 6 - RPS Failure 7 - Loss of Communications 8 - Containment Failure 9 - Hazardous Event Affecting Safety Systems
F - Fission Product Barrier	None
Group: Cold Conditions	
C - Cold Shutdown/Refueling System Malfunction	1 - RCS Level 2 - Loss of Essential AC Power 3 - RCS Temperature 4 - Loss of Vital DC Power 5 - Loss of Communications 6 - Hazardous Event Affecting Safety Systems

The primary tool for determining the emergency classification level is the EAL Classification Wallboard. The user of the EAL Classification Wallboard may (but is not required to) consult the EAL Technical Bases Document in order to obtain additional information concerning the EALs under classification consideration. The user should consult this document for such information.

2.5 Technical Bases Information

EAL technical bases are provided in Attachment 1 for each EAL according to EAL group (Any, Hot, Cold), EAL category (R, C, H, S**,** E and F) and EAL subcategory.

For each EAL, the following information is provided:

- Category Letter & Title
- Initiating Condition (IC)
- Operating Mode Applicability
- Site-specific EAL description of the generic IC given in NEI 99-01 Rev. 6.

Each EAL is assigned a unique identifier to support accurate communication of the emergency classification to onsite and offsite personnel. Three characters define each EAL identifier:

1. First character (letter): Corresponds to the EAL category as described above (R, C, H, S, E or F)
2. Second character (letter): The Emergency Classification Level (G, S**,** A or U)
   - G = General Emergency
   - S = Site Area Emergency
   - A = Alert
   - U = Unusual Event
3. Third character (number): Subcategory number within the given category. Subcategories are sequentially numbered beginning with the number one (1). If a category does not have a subcategory, this character is assigned the number one (1).

Exact wording of the EAL as it appears in the EAL Classification Matrix

Basis

A Plant-Specific basis section that provides BFN-relevant information concerning the EAL. This is followed by a Generic basis section that provides a description of the rationale for the EAL as provided in NEI 99-01 Rev. 6.

BFN Basis Reference(s)

Site-specific source documentation from which the EAL is derived.

2.6 Operating Mode Applicability (ref. 4.1.7)

1 Power Operation
Mode Switch in Run

2 Startup
Mode Switch in Startup/Hot Standby or Refuel (with all vessel head bolts fully tensioned)

3 Hot Shutdown
Mode Switch in Shutdown, Average Reactor Coolant Temperature >212 °F

4 Cold Shutdown
Mode Switch in Shutdown, Average Reactor Coolant Temperature ≤ 212 °F

5 Refueling
Mode Switch in Shutdown or Refuel, and one or more vessel head bolts less than fully tensioned.

D Defueled
All reactor fuel removed from reactor pressure vessel (full core off load during refueling or extended outage).

The plant operating mode that exists at the time that the event occurs (prior to any protective system or operator action being initiated in response to the condition) should be compared to the mode applicability of the EALs. If a lower or higher plant operating mode is reached before the emergency classification is made, the declaration shall be based on the mode that existed at the time the event occurred.

2.7 Unit Designation

The specific unit designator (1,2 or 3) is represented. For equipment or components that are common or non unit-specific the 0 designator is used. (Example 0-RM-XX represents a radiation monitor that is common to both units).

3.0 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

3.1 GENERAL CONSIDERATIONS

When making an emergency classification, the Site Emergency Director (SED) must consider all information having a bearing on the proper assessment of an Initiating Condition (IC)**.** This includes the Emergency Action Level (EAL) plus the associated Operating Mode Applicability, Notes, and the informing basis information. In the Recognition Category F matrices, EALs are based on loss or potential loss of Fission Product Barrier Thresholds.

3.1.1 Classification Timeliness

NRC regulations require the licensee to establish and maintain the capability to assess, classify, and declare an emergency condition within 15 minutes after the availability of indications to plant operators that an emergency action level has been exceeded and to promptly declare the emergency condition as soon as possible following identification of the appropriate emergency classification level. The NRC staff has provided guidance on implementing this requirement in NSIR/DPR-ISG-01, "Interim Staff Guidance, Emergency Planning for Nuclear Power Plants" (ref. 4.1.11).

3.1.2 Valid Indications

All emergency classification assessments shall be based upon valid indications, reports or conditions. A valid indication, report, or condition, is one that has been verified through appropriate means such that there is no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, verification could be accomplished through an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel.

An indication, report, or condition is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

3.1.3 Imminent Conditions

For ICs and EALs that have a stipulated time duration (for example, 15 minutes, 30 minutes, etc.), the Site Emergency Director (SED) should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition has exceeded, or will likely exceed, the applicable time. If an ongoing radiological release is detected and the release start time is unknown, it should be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

3.1.4 Planned vs. Unplanned Events

A planned work activity that results in an expected event or condition which meets or exceeds an EAL does not warrant an emergency declaration provided that: 1) the activity proceeds as planned, and 2) the plant remains within the limits imposed by the operating license. Such activities include planned work to test, manipulate, repair, maintain or modify a system or component. In these cases, the controls associated with the planning, preparation and execution of the work will ensure that compliance is maintained with all aspects of the operating license provided that the activity proceeds and concludes as expected. Events or conditions of this type may be subject to the reporting requirements of 10 § CFR 50.72 (ref. 4.1.4).

3.1.5 Classification Based on Analysis

The assessment of some EALs is based on the results of analyses that are necessary to ascertain whether a specific EAL threshold has been exceeded (for example, dose assessments, chemistry sampling, RCS leak rate calculation, etc.). For these EALs, the EAL wording 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 threshold to be exceeded (that is, this is the time that the EAL information is first available). The NRC expects licensees to establish the capability to initiate and complete EAL-related analyses within a reasonable period of time (for example, maintain the necessary expertise on-shift).

3.1.6 Site Emergency Director (SED) Judgment

While the EALs have been developed to address a full spectrum of possible events and conditions which may warrant emergency classification, a provision for classification based on operator/management experience and judgment is still necessary. The NEI 99-01 EAL scheme provides the Site Emergency Director (SED) with the ability to classify events and conditions based upon judgment using EALs that are consistent with the Emergency Classification Level (ECL) definitions (refer to Category H). The Site Emergency Director (SED) will need to determine if the effects or consequences of the event or condition reasonably meet or exceed a particular ECL definition. A similar provision is incorporated in the Fission Product Barrier Tables; judgment may be used to determine the status of a fission product barrier.

3.2 CLASSIFICATION METHODOLOGY

To make an emergency classification, the user will compare an event or condition (that is, the relevant plant indications and reports) to an EAL(s) and determine if the EAL has been met or exceeded. The evaluation of an EAL must be consistent with the related Operating Mode Applicability and Notes. If an EAL has been met or exceeded, the associated IC is likewise met, the emergency classification process "clock" starts, and the ECL must be declared in accordance with plant procedures no later than fifteen minutes after the process "clock" started.

When assessing an EAL that specifies a time duration for the off-normal condition, the "clock" for the EAL time duration runs concurrently with the emergency classification process "clock." For a full discussion of this timing requirement, refer to NSIR/DPR-ISG-01 (ref. 4.1.11).

3.2.1 Classification of Multiple Events and Conditions

When multiple emergency events or conditions are present, the user will identify all met or exceeded EALs. The highest applicable ECL identified during this review is declared. For example:

- If an Alert EAL and a Site Area Emergency EAL are met, whether at one unit or at two different units, a Site Area Emergency should be declared.

There is no "additive" effect from multiple EALs meeting the same ECL. For example:

- If two Alert EALs are met, whether at one unit or at two different units, an Alert should be declared.

Related guidance concerning classification of rapidly escalating events or conditions is provided in Regulatory Issue Summary (RIS) 2007-02, *Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events* (ref. 4.1.2).

3.2.2 Consideration of Mode Changes During Classification

The mode in effect at the time that an event or condition occurred, and prior to any plant or operator response, is the mode that determines whether or not an IC is applicable. If an event or condition occurs, and results in a mode change before the emergency is declared, the emergency classification level is still based on the mode that existed at the time that the event or condition was initiated (and not when it was declared). Once a different mode is reached, any new event or condition, not related to the original event or condition, requiring emergency classification should be evaluated against the ICs and EALs applicable to the operating mode at the time of the new event or condition.

For events that occur in Cold Shutdown or Refueling, escalation is via EALs that are applicable in the Cold Shutdown or Refueling modes, even if Hot Shutdown (or a higher mode) is entered during the subsequent plant response. In particular, the fission product barrier EALs are applicable only to events that initiate in the Hot Shutdown mode or higher.

3.2.3 Classification of Imminent Conditions

Although EALs provide specific thresholds, the Site Emergency Director (SED) must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (that is, a change in the ECL is IMMINENT). If, in the judgment of the Site Emergency Director (SED), meeting an EAL is IMMINENT, the emergency classification should be made as if the EAL has been met. While applicable to all emergency classification levels, this approach is particularly important at the higher emergency classification levels since it provides additional time for implementation of protective measures.

3.2.4 Emergency Classification Level Upgrading and Termination

Once a classification level is declared, no downgrade to a lower classification will be allowed. An ECL may be terminated when the event or condition that meets the highest IC and EAL no longer exists, and other site-specific termination requirements are met.

As noted above, guidance concerning classification of rapidly escalating events or conditions is provided in RIS 2007-02 (ref. 4.1.2).

3.2.5 Classification of Short-Lived Events

Event-based ICs and EALs define a variety of specific occurrences that have potential or actual safety significance. By their nature, some of these events may be short-lived and, thus, over before the emergency classification assessment can be completed. If an event occurs that meets or exceeds an EAL, the associated ECL must be declared regardless of its continued presence at the time of declaration. Examples of such events include an earthquake or a failure of the reactor protection system to automatically trip the reactor followed by a successful manual trip.

3.2.6 Classification of Transient Conditions

Many of the ICs and/or EALs employ time-based criteria. These criteria will require that the IC/EAL conditions be present for a defined period of time before an emergency declaration is warranted. In cases where no time-based criterion is specified, it is recognized that some transient conditions may cause an EAL to be met for a brief period of time (for example, a few seconds to a few minutes). The following guidance should be applied to the classification of these conditions.

EAL momentarily met during expected plant response - In instances where an EAL is briefly met during an expected (normal) plant response, an emergency declaration is not warranted provided that associated systems and components are operating as expected, and operator actions are performed in accordance with procedures.

EAL momentarily met but the condition is corrected prior to an emergency declaration - If an operator takes prompt manual action to address a condition, and the action is successful in correcting the condition prior to the emergency declaration, then the applicable EAL is not considered met and the associated emergency declaration is not required. For illustrative purposes, consider the following example:

> An ATWS occurs and the high pressure ECCS systems fail to automatically start. RCS level rapidly decreases and the plant enters an inadequate core cooling condition (a potential loss of both the fuel clad and RCS barriers). If an operator manually starts a high pressure ECCS system in accordance with an EOI step and clears the inadequate core

cooling condition prior to an emergency declaration, then the classification should be based on the ATWS only.

It is important to stress that the 15-minute emergency classification assessment period (process clock) is not a "grace period" during which a classification may be delayed to allow the performance of a corrective action that would obviate the need to classify the event. Emergency classification assessments must be deliberate and timely, with no undue delays. The provision discussed above addresses only those rapidly evolving situations when an operator is able to take a successful corrective action prior to the Site Emergency Director (SED) completing the review and steps necessary to make the emergency declaration. This provision is included to ensure that any public protective actions resulting from the emergency classification are truly warranted by the plant conditions.

3.2.7 After-the-Fact Discovery of an Emergency Event or Condition

In some cases, an EAL may be met but the emergency classification was not made at the time of the event or condition. This situation can occur when personnel discover that an event or condition existed which met an EAL, but no emergency was declared, and the event or condition no longer exists at the time of discovery. This may be due to the event or condition not being recognized at the time or an error that was made in the emergency classification process.

In these cases, no emergency declaration is warranted; however, the guidance contained in NUREG-1022 (ref. 4.1.3) is applicable. Specifically, the event should be reported to the NRC in accordance with 10 CFR § 50.72 (ref. 4.1.4) within one hour of the discovery of the undeclared event or condition. The licensee should also notify appropriate State and local agencies in accordance with the agreed upon arrangements.

3.2.8 Retraction of an Emergency Declaration

Guidance on the retraction of an emergency declaration reported to the NRC is discussed in NUREG-1022 (ref. 4.1.3).

4.0 REFERENCES

4.1 DEVELOPMENTAL

4.1.1 NEI 99-01 Revision 6, Methodology for the Development of Emergency Action Levels for Non-Passive Reactors, ADAMS Accession Number ML12326A805
4.1.2 RIS 2007-02 Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events, February 2, 2007.
4.1.3 NUREG-1022 Event Reporting Guidelines: 10CFR50.72 and 50.73
4.1.4 10 § CFR 50.72 Immediate Notification Requirements for Operating Nuclear Power Reactors
4.1.5 10 § CFR 50.73 License Event Report System
4.1.6 BFN FSAR Section 2.1.1 Site Location and Description
4.1.7 Technical Specifications Table 1.1-1 Modes
4.1.8 NSIR/DPR-ISG-01 Interim Staff Guidance, Emergency Planning for Nuclear Power Plants
4.1.9 BFN Offsite Dose Calculation Manual (ODCM)

4.2 IMPLEMENTING

4.2.1 EPIP-1, Emergency Plan Classification Logic
4.2.2 NEI 99-01 Rev. 6 to BFN EAL Comparison Matrix
4.2.3 BFN EAL Wallboard

5.0 DEFINITIONS, ACRONYMS & ABBREVIATIONS

5.1 DEFINITIONS (REF. 4.1.1 EXCEPT AS NOTED)

Selected terms used in Initiating Condition and Emergency Action Level statements are set in all capital letters (for example, ALL CAPS). These words are defined terms that have specific meanings as used in this document. The definitions of these terms are provided below.

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

CONFINEMENT BOUNDARY: Spent Fuel Storage Canister CONFINEMENT BOUNDARY consists of MPC shell, bottom base plate, MPC lid (including the vent and drain port cover plates), MPC closure ring, and associated welds.

CONTAINMENT CLOSURE: Containment condition where at least one integral barrier to the release of radioactive material is provided. Sufficient separation of the containment atmosphere from the outside environment is provided such that a barrier to the escape of radioactive material is reasonably expected to remain in place following a core melt accident.

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.

EPA PAGs: Environment Protection Agency Protective Action Guidelines. The EPA PAGs are expressed in terms of dose commitment: 1 Rem TEDE or 5 Rem CDE Thyroid. Actual or projected offsite exposures in excess of the EPA PAGs requires TVA to recommend protective actions for the general public to offsite planning agencies.

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

FLOODING: A condition where water is entering a room or area faster than installed equipment is capable of removal, resulting in a rise of water level within the room or area.

GENERAL EMERGENCY: 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 actions that result 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.

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

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

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

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.

IMPEDE(d): Personnel access to a room or area is hindered to an extent that extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (for example, requiring use of protective equipment, such as SCBAs, that is not routinely employed).

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.

OWNER CONTROLLED AREA: The TVA-owned site property under the control of Site Security.

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

PROTECTED AREA: The area which is encompassed by the security fence and to which access is controlled.

REFUELING PATHWAY: The reactor refueling cavity, spent fuel pool, or fuel transfer canal.

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.

SITE AREA EMERGENCY: 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 actions that result 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 Guidelines exposure levels beyond the site boundary.

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.

UNUSUAL EVENT: Events are in progress or have occurred which indicate a potential degradation in 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.

VALID: An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

VISIBLE DAMAGE: Damage to multiple components, or one or more structures, that are 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 components in the area. Events that result in visible damage to one component, and does not appear to affect other components, do not meet the intent of this definition as the failure of a single component, regardless of cause, is well within the operational controls provided by a licensee’s Technical Specifications and Operating Procedures. However, visible damage to more than one component does meet this definition, as well as visible damage to a structure.

5.2 ABBREVIATIONS/ACRONYMS

AC .... Alternating Current
AOI .... Abnormal Operating Instruction
APRM .... Average Power Range Meter
ARI .... Alternate Rod Insertion
ATWS .... Anticipated Transient Without Scram
BWR .... Boiling Water Reactor
CDE .... Committed Dose Equivalent
CFR .... Code of Federal Regulations
DBA .... Design Basis Accident
DC .... Direct Current
EAL .... Emergency Action Level
ECCS .... Emergency Core Cooling System
ECL .... Emergency Classification Level
EOF .... Emergency Operations Facility
EOI .... Emergency Operating Instruction
EPA .... Environmental Protection Agency
EPG .... Emergency Procedure Guideline
EPIP .... Emergency Plan Implementing Procedure
EPRI .... Electric Power Research Institute
FAA .... Federal Aviation Administration
FBI .... Federal Bureau of Investigation
FEMA .... Federal Emergency Management Agency
FSAR .... Final Safety Analysis Report
GE .... General Emergency
HCTL .... Heat Capacity Temperature Limit
HOO .... Headquarters Operations Officer
HPCI .... High Pressure Coolant Injection
IC .... Initiating Condition
ID .... Inside Diameter
IPEEE .... Individual Plant Examination of External Events (Generic Letter 88-20)
ISFSI .... Independent Spent Fuel Storage Installation
Keff .... Effective Neutron Multiplication Factor
LCO .... Limiting Condition of Operation
LOCA .... Loss of Coolant Accident
MCR .... Main Control Room
MSIV .... Main Steam Isolation Valve
MSL .... Main Steam Line
mR, mRem, mrem, mREM .... milli-Roentgen Equivalent Man
MW .... Megawatt
NEI .... Nuclear Energy Institute
NPP .... Nuclear Power Plant
NRC .... Nuclear Regulatory Commission
NSSS .... Nuclear Steam Supply System
NORAD .... North American Aerospace Defense Command
(NO)UE .... (Notification Of) Unusual Event
OBE .... Operating Basis Earthquake

OCA ..... Owner Controlled Area
ODCM ..... Offsite Dose Calculation Manual
ORO ..... Off-site Response Organization
PA ..... Protected Area
PAG ..... Protective Action Guideline
PCIS ..... Primary Containment Isolation System
PRA/PSA ..... Probabilistic Risk Assessment / Probabilistic Safety Assessment
PSIG ..... Pounds per Square Inch Gauge
R ..... Roentgen
RCIC ..... Reactor Core Isolation Cooling
RCS ..... Reactor Coolant System
Rem, rem, REM ..... Roentgen Equivalent Man
RPS ..... Reactor Protection System
RPV ..... Reactor Pressure Vessel
SAR ..... Safety Analysis Report
SBO ..... Station Blackout
SCBA ..... Self-Contained Breathing Apparatus
SED ..... Site Emergency Director
SPDS ..... Safety Parameter Display System
SRV ..... Safety Relief Valve
SRO ..... Senior Reactor Operator
TEDE ..... Total Effective Dose Equivalent
TAF ..... Top of Active Fuel
TSC ..... Technical Support Center
WRGERMS ..... Wide Range Gaseous Effluent Radiation Monitor System

ATTACHMENT 1 EAL Bases

RG1

ECL: General Emergency

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The SED should declare the General Emergency 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.
- 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) Reading on Stack Noble Gas (WRGERMS) greater than 5.9 X 10^{10} µCi/sec for 15 minutes or longer.

(2) Dose assessment using actual meteorology indicates doses greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the site boundary.

(3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:

- Closed window dose rates greater than 1,000 mR/hr expected to continue for 60 minutes or longer.
- Analyses of field survey samples indicate thyroid CDE greater than 5,000 mrem for one hour of inhalation.

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 1,000 mrem while the 5,000 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

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.

References
BFN Calculation MDQ0000902015000486
BFN ODCM
NEI 99-01 R6 AG1

RG2

ECL: General Emergency

Initiating Condition: Spent fuel pool level cannot be restored to at least 641′ 4″ for 60 minutes or longer.

Operating Mode Applicability: All

Emergency Action Levels:

Note: The Emergency Director should declare the General Emergency promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.

(1) Spent fuel pool level cannot be restored to at least 641′ 4″ 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 uncovery 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.

References

NRC EA-12-51 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation

Design Change Notice 71160 (Unit 2)

NEI 99-01 R6 AG2

RS1

ECL: Site Area Emergency

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The SED should declare the Site Area Emergency 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.
- 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) Reading on Stack Noble Gas (WRGERMS) greater than 5.9×10^9 µCi/sec for 15 minutes or longer.

(2) Dose assessment using actual meteorology indicates doses greater than 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the site boundary.

(3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:

- Closed window dose rates greater than 100 mR/hr expected to continue for 60 minutes or longer.
- Analyses of field survey samples indicate thyroid CDE greater than 500 mrem for one hour of inhalation.

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 1,000 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.

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.

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

References
BFN Calculation MDQ0000902015000486
BFN ODCM
NEI 99-01 R6 AS1

RS2

ECL: Site Area Emergency

Initiating Condition: Spent fuel pool level at 641′ 4″.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Lowering of spent fuel pool level to 641′ 4″.

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.

References
NRC EA-12-51 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
Design Change Notice 71160 (Unit 2)
NEI 99-01 R6 AS2

RA1

ECL: Alert

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: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Notes:

- The SED should declare the Alert 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.
- 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) Reading on Stack Noble Gas (WRGERMS) greater than 5.9×10^{8} µCi/sec for 15 minutes or longer.

(2) Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the site boundary.

(3) Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the site boundary for one hour of exposure.

(4) Field survey results indicate **EITHER** of the following at or beyond the site boundary:

- Closed window dose rates greater than 10 mR/hr expected to continue for 60 minutes or longer.
- Analyses of field survey samples indicate thyroid CDE greater than 50 mrem for one hour 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 (for example, 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 1,000 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.

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.

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

References
BFN Calculation MDQ0000902015000486
BFN ODCM
NEI 99-01 R6 AA1

RA2

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

(1) Uncovery of irradiated fuel in the REFUELING PATHWAY.

(2) Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by an alarm on **ANY** of the following radiation monitors:

1, 2, 3-RM-90-1A	Fuel Pool Floor
1, 2, 3-RM-90-250A	Reactor, Turbine, Refuel Exhaust
1, 2, 3-RM-90-142A	Reactor Zone Exhaust
1, 2, 3-RM-90-140A	Refueling Zone Exhaust

(3) Lowering of spent fuel pool level to 650′ 4″.

Basis:

This IC addresses events that have caused IMMINENT or actual damage to an irradiated fuel assembly, or a significant lowering of water level within the spent fuel pool. 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 EU1.

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

<u>EAL #1</u>

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 uncovery of irradiated fuel. Indications of irradiated fuel uncovery may include direct or indirect visual observation (for example, 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 (for example, 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 increase 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

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 (for example, a fuel handling accident).

EAL #3

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 assembles stored in the pool.

Escalation of the emergency classification level would be via ICs RS1 or RS2

References
BFN ARI 1, 2, 3 ARP-9-3A
NRC EA-12-51 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
Design Change Notice 71160 (Unit 2)
NEI 99-01 R6 AS2

RA3

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

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) Dose rate greater than 15 mR/hr in the Control Room.

(2) An UNPLANNED event results in radiation levels that prohibit or impede access to any Table H1 plant rooms or areas:

Table H1-Safe Operation & Shutdown Rooms/Areas				
Bldg. Elevation	Unit 1 Room/Area	Unit 2 Room/Area	Unit 3 Room/Area	Mode
Rx Bldg. 621	4KV Electric Bd. Room 1A	4KV Electric Bd. Room 2A	N/A	3,4,5
Rx Bldg. 593	N/A	N/A	480V RMOV Board Room 3A	3,4,5
	N/A	N/A	480V RMOV Board Room 3B	3,4,5

Basis:

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

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 at the time of the elevated radiation levels. 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 (for example, installing temporary shielding, 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 (that is, 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 increase 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 (for example, radiography, spent filter or resin transfer, etc.).
- The action for which room/area entry is required is of an administrative or record keeping nature (for example, 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.

References
NEI 99-01 R6 AA3

RU1

ECL: Unusual Event

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The SED should declare the Unusual Event promptly upon determining that 60 minutes 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.
- 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 Stack Noble Gas (WRGERMS) greater than 2.88×10^{7} µCi/sec for 60 minutes or longer.

(2) Reading on ANY of the following radiation monitors exceeding 2 times the Maximum Allowable Value for 60 minutes or longer.

Plant Radiation Monitoring System	2 times Maximum Allowable Value (2 x MAV)
Eberline Continuous Air Monitors (CAM) (RM-90-249, -250, 251, -252)	14,336 cps
GE Stack Gas Radiation Monitor (RM-90-147/148)	82,664 cpm
Offgas Post-Treatment Radiation Monitor (1,2,3-RM-90-265/266)	3.70E+07 cps
Offgas Pretreatment Radiation Monitor (1.2,3-RM-90-157)	5,096 mR/hr

(3) Sample analysis for a liquid release indicates a concentration or release rate greater than 20 times the Effluent Concentration Limit for 60 minutes or longer.

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 (for example, 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.

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.

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.

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

EAL #2 - 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 (for example, radwaste, waste gas).

EAL #3 - This EAL addresses uncontrolled liquid releases that are detected by sample analyses or environmental surveys, particularly on unmonitored pathways. For liquid releases, the ODCM limit is equal to 10 times the Effluent Concentration Limits (ECL) listed in 10 CFR Part 20 Appendix B, Table 2, Column 2.

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

References
BFN Calculation MDQ0000902015000486
BFN ODCM
0-TI-15
NEI 99-01 R6 AU1

RU2

ECL: Unusual Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel.

Operating Mode Applicability: All

Emergency Action Levels:

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

- Fuel Pool System Abnormal annunciator lit AND SFSP level less than 662’ 8” as indicated by 1(2,3)-LI-078-0042 and 1(2,3)-LI-078-0043.
- Visual personnel observation by plant personnel

AND

b. UNPLANNED rise in area radiation levels as indicated by the following radiation monitor.

1, 2, 3-RM-90-1A	Fuel Pool Floor

Basis:

This IC addresses a decrease 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 decrease will be primarily determined by indications from available level instrumentation. Other sources of level indications may include reports from plant personnel (for example, from a refueling crew) or video camera observations (if available). A significant drop in the water level may also cause an increase 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 increase 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 with Recognition Category C during the Cold Shutdown and Refueling modes.

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

References

BFN ARI 1, 2, 3 ARP-9-3A
NEI 99-01 R6 AU2

CG1

ECL: General Emergency

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

> **Note:** The SED should declare the General Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

(1) a. RPV level less than -162 inches for 30 minutes or longer.

AND

b. **ANY** indication from the Containment Challenge Table C1.

(2) a. RPV level cannot be monitored for 30 minutes or longer.

AND

b. Core uncovery is indicated by UNPLANNED rise in Drywell Floor Drain Sump, Suppression Pool, RHR Pump room, or other connected systems levels of sufficient magnitude to indicate core uncovery.

AND

c. **ANY** indication from the Containment Challenge Table C1.

Table C1 – Containment Challenge
▪ Secondary Containment not established *
▪ Drywell or Suppression Chamber Hydrogen concentration at or above 6% AND Oxygen concentration at or above 5%.
▪ UNPLANNED rise in containment pressure
▪ Any secondary containment radiation monitor reading above 1000 mrem/hr

* If secondary containment is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.

Basis:

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

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (that is, 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 uncovery event, it is unlikely that hydrogen buildup due to a core uncovery 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.

In EAL 2.a, the 30-minute criterion is tied to a readily recognizable event start time (that is, 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 uncovery has actually occurred (that is, 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 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*.

References

0-TI-394, Attachment 7
1, 2, 3, ARP-9-3A
NEI 99-01 R6 CG1

CS1

ECL: Site Area Emergency

Initiating Condition: Loss of RPV inventory affecting core decay heat removal capability.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2 or 3)

Note: The SED should declare the Site Area Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

(1) a. Secondary containment not established.

AND

b. RPV level less than -122 inches.

(2) a. Secondary containment established.

AND

b. RPV level less than -162 inches.

(3) a. RPV level cannot be monitored for 30 minutes or longer.

AND

b. Core uncovery is indicated by UNPLANNED rise in Drywell Floor Drain Sump, Suppression Pool, RHR Pump room, or other connected systems levels of sufficient magnitude to indicate core uncovery.

Basis:

This IC addresses a significant and prolonged loss of RPV inventory control and makeup capability leading to IMMINENT fuel damage. 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 provide for re-establishing or verifying secondary containment 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 secondary containment 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 (that is, 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 uncovery has actually occurred (that is, 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 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 CG1 or RG1.

References
0-TI-394, Attachment 7
1, 2, 3, ARP-9-3A
NEI 99-01 R6 CS1

CA1

ECL: Alert

Initiating Condition: Loss of RPV inventory.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of RPV inventory as indicated by level less than -45 inches.

(2) a. RPV level cannot be monitored for 15 minutes or longer

AND

b. UNPLANNED rise in Drywell Floor Drain Sump, Suppression Pool, RHR Pump room or other connected systems levels due to a loss of RPV inventory.

Basis:

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

For EAL #1, a lowering of water level below - 45 inches indicates that operator actions have not been successful in restoring and maintaining RPV water level. The heat-up rate of the coolant will increase as the available water inventory is reduced. A continuing decrease in water level will lead to core uncovery.

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 (for example, loss of a Residual Heat Removal suction point). An increase in RCS temperature caused by a loss of decay heat removal capability is evaluated under IC CA3.

For EAL #2, the inability to monitor RPV 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 CS1

If the RPV inventory level continues to lower, then escalation to Site Area Emergency would be via IC CS1.

References
0-TI-394, Attachment 7
NEI 99-01 R6 CA1

CA2

ECL: Alert

Initiating Condition: Loss of all offsite and all onsite AC power to applicable 4KV Shutdown Boards to a unit for 15 minutes or longer.

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of **ALL** offsite and **ALL** onsite AC Power to applicable 4 KV Shutdown Boards listed in Table E1for any unit for 15 minutes or longer.

Table E1 UNIT 4KV SHUTDOWN BOARD APPLICABILITY	
UNIT	APPLICABLE 4KV SHUTDOWN BOARDS
UNIT 1	A, B, C, and D
UNIT 2	A, B, C, and D
UNIT 3	3A, 3B, 3C, and 3D

Basis:

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 CS1 or RS1.

References
BFN Unit 1, 2, 3, Technical Specification Basis 3.8.1
BFN FSAR Chapter 8.10
NEI 99-01 R6 CA2

CA3

ECL: Alert

Initiating Condition: Inability to maintain the plant in cold shutdown.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

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

(1) UNPLANNED rise in moderator temperature to greater than 212°F for greater than the duration specified in Table C2.

Table C2-Moderator Heat-up Duration Thresholds		
RCS	**Secondary Containment**	**Heat-up Duration**
Not intact	Not Established	0 minutes
	Established	20 minutes*
Intact	N/A	60 minutes*
* If a heat removal system is in operation within this time frame and moderator temperature is being reduced, the EAL is not applicable.		

(2) UNPLANNED RPV pressure rise greater than 10 psig due to loss of decay heat removal capability.

Basis:

This IC addresses conditions involving a loss of decay heat removal capability or an addition of heat to the moderator 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 Moderator Heat-up Duration Thresholds table addresses an increase in moderator temperature when secondary containment is established but the RCS is not intact. The 20-minute criterion was included to allow time for operator action to address the temperature increase.

The Moderator Heat-up Duration Thresholds table also addresses an increase in moderator temperature with the RCS intact. The status of secondary containment 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 increase without a substantial degradation in plant safety.

Finally, in the case where there is an increase in moderator temperature, the RCS is not intact, and secondary containment is not established, no heat-up duration is allowed (that is, 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 CS1 or RS1.

References
BFN Unit 1, 2, 3 Technical Specification Table 1.1-1
NEI 99-01 R6 CA3

CA6

ECL: Alert

Initiating Condition: Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode.

Operating Mode Applicability: Cold Shutdown, Refueling

> **Note:** If the affected safety system (or component) was already inoperable or out of service before the event occurred, then no emergency classification is warranted as long as the damage was limited to this affected safety system or component.

Emergency Action Levels:

(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
- Wheeler Lake level exceeds or is predicted to exceed elevation 565 feet.
- Other events with similar hazard characteristics as determined by the Shift Manager

AND

b. **EITHER** of the following:

- Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode.
  OR
- The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode.

Basis:

This IC addresses a hazardous event that causes damage to a SAFETY SYSTEM, or a structure containing SAFETY SYSTEM components, needed for the current operating mode. This condition significantly reduces the margin to a loss or potential loss of a fission product barrier, and therefore represents an actual or potential substantial degradation of the level of safety of the plant.

EAL 1.b.1 addresses damage to a SAFETY SYSTEM train that is in service/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.

EAL 1.b.2 addresses damage to a SAFETY SYSTEM component that is not in service/operation or readily apparent through indications alone, or to a structure containing SAFETY SYSTEM components. Operators will make this determination 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.

Escalation of the emergency classification level would be via IC CS1 or RS1.

References
0-AOI-100-3
NEI 99-01 R6 CA6

CU1

ECL: Unusual Event

Initiating Condition: UNPLANNED loss of RPV inventory for 15 minutes or longer.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) UNPLANNED loss of reactor coolant results in RPV level less than a required lower limit for 15 minutes or longer.

(2) a. RPV level cannot be monitored.

AND

b. UNPLANNED rise in Drywell Floor Drain Sump, Suppression Pool, RHR Pump room or other connected systems levels.

Basis:

This IC addresses the inability to restore and maintain water level to a required minimum controlling level or a loss of the ability to monitor RPV 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.

Refueling evolutions that decrease 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 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 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 CA1 or CA3.

References
NEI 99-01 R6 CU1

CU2

ECL: Unusual Event

Initiating Condition: Loss of all but one AC power source to applicable 4 KV Shutdown Boards to a unit for 15 minutes or longer.

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. AC power capability to applicable 4 KV Shutdown Boards to a unit listed in Table E1 is reduced to a single power source for 15 minutes or longer.

Table E1-UNIT 4KV SHUTDOWN BOARD APPLICABILITY	
UNIT	APPLICABLE 4KV SHUTDOWN BOARDS
UNIT 1	A, B, C, and D
UNIT 2	A, B, C, and D
UNIT 3	3A, 3B, 3C, and 3D

AND

b. Any additional single power source failure will result in loss of all AC power to SAFETY SYSTEMS.

Basis:

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.

An “AC power source” is a source recognized in AOIs and EOIs, and capable of supplying required power to the 4KV Shutdown Boards. 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 (for example, an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (for example, onsite diesel generators) with a single train of 4KV Shutdown Boards being back-fed from the unit main generator.
- A loss of emergency power sources (for example, onsite diesel generators) with a single train

of 4KV Shutdown Boards being back-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 CA2.

References
BFN Unit 1, 2, 3, Technical Specification Basis 3.8.1
BFN FSAR Chapter 8.10
NEI 99-01 R6 CU2

CU3

ECL: Unusual Event

Initiating Condition: UNPLANNED rise in RCS temperature.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) UNPLANNED rise in RCS temperature to greater than 212°F.

(2) Loss of **ALL** RCS temperature and RPV level indication for 15 minutes or longer.

Basis:

This IC addresses an UNPLANNED increase 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 SED should also refer to IC CA3.

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

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 increase 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 CA1 based on an inventory loss or IC CA3 based on exceeding plant configuration-specific time criteria.

References
BFN Unit 1, 2, 3 Technical Specification Table 1.1-1
NEI 99-01 R6 CU3

CU4

ECL: Unusual Event

Initiating Condition: Loss of Vital DC power for 15 minutes or longer.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Less than 210 VDC bus voltage on unit-specific Technical Specification required 250VDC boards for 15 minutes or longer.

Basis:

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 CA1 or CA3, or an IC in Recognition Category R.

References
BFN EDQ024820020042
NEI 99-01 R6 CU4

CU5

ECL: Unusual Event

Initiating Condition: Loss of all onsite or offsite communications capabilities.

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels: (1 or 2 or 3)

(1) Loss of **ALL** Table C3 Onsite communications capability affecting the ability to perform routine operations.

(2) Loss of **ALL** Table C3 Offsite communication capability affecting the ability to perform offsite notifications.

(3) Loss of **ALL** Table C3 NRC communication capability affecting the ability to perform NRC notifications.

Table C3 Communications Capability			
System	Onsite	Offsite	NRC
Plant Radio	X		
Plant Page	X		
All Telephone Lines (Private and Commercial)	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 OROs and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (for example, 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 addresses a total loss of the communications methods used in support of routine plant operations.

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are Alabama EMA, Lauderdale County, Lawrence County, Limestone County, Madison County, and Morgan County.

EAL #3 addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

References
BFN FSAR Section 10.18
NEI 99-01 R6 CU5

EU1

ECL: Unusual Event

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Damage to a loaded canister CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading at the location specified in Table I1, ISFSI Dose Limits.

Table I1 - ISFSI Dose Limits			
	Cask Type		
	High Storm 100		Hi Storm FW
Location	COC 1014 Amendment 1	COC 1014 Amendment 5	COC 1032 Amendment 0
Top of the OVERPACK	20 mrem/hr ($\gamma + {}_0n^1$)	60 mrem/hr ($\gamma + {}_0n^1$)	60 mrem/hr ($\gamma + {}_0n^1$)
Side of the OVERPACK	100 mrem/hr ($\gamma + {}_0n^1$)	600 mrem/hr ($\gamma + {}_0n^1$)	600 mrem/hr ($\gamma + {}_0n^1$)
Inlet & Outlet Vent Ducts	90 mrem/hr ($\gamma + {}_0n^1$)		

Basis:

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 issues of concern are the creation of a potential or actual release path to the environment, degradation of one or more 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.

The BFN ISFSI utilizes two designs for dry spent fuel storage:

- HI-Storm 100 Cask System
- HI-Storm FW Cask System

The HI-STORM 100 Cask System (the cask) consists of the following components: (1) interchangeable multi-purpose canisters (MPCs), which contain the fuel; (2) a storage overpack (HI-STORM 100 or 100S), which contains the MPC during storage; and (3) a transfer cask (HI-TRAC), which contains the MPC during loading, unloading and transfer operations.

The MPC is the confinement system for the stored fuel. It is a welded, cylindrical canister with a honeycombed fuel basket, a baseplate, a lid, a closure ring, and the canister shell. It is made entirely of stainless steel except for the neutron absorbers and optional aluminum heat conduction elements. The canister shell, baseplate, lid, vent and drain port cover plates, and closure ring are the main confinement boundary components.

The HI-STORM FW MPC Storage System consists of the following components: (1) interchangeable multipurpose canisters (MPCs), which contain the fuel; (2) a storage overpack (HI-STORM FW), which contains the MPC during storage; and (3) a transfer cask (HI-TRAC VW), which contains the MPC during loading, unloading and transfer operations.

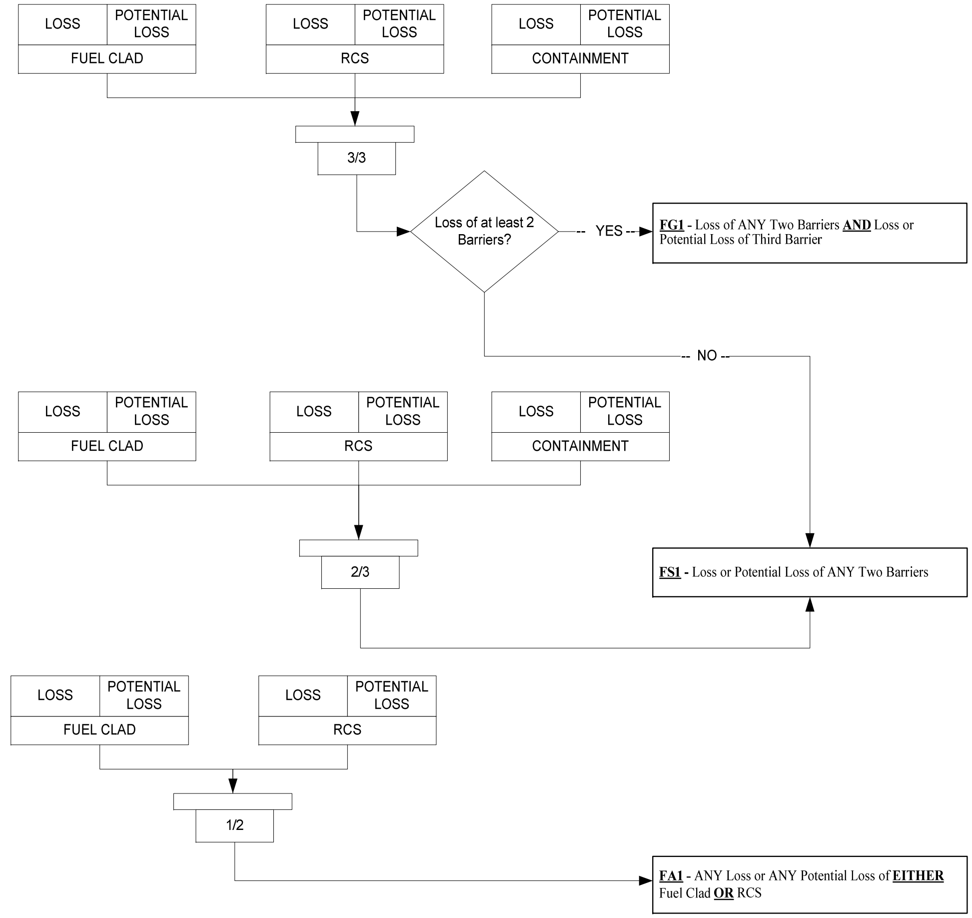
The MPC is the confinement system for the stored fuel. It is a welded, cylindrical canister with a honeycombed fuel basket, a baseplate, a lid, a closure ring, and the canister shell. All MPC components that may come into contact with spent fuel pool water or the ambient environment are made entirely of stainless steel or passivated aluminum/aluminum alloys. The canister shell, baseplate, lid, vent and drain port cover plates, and closure ring are the main confinement boundary components. All confinement boundary components are made entirely of stainless steel.

References

Certificate of Compliance 1014, Amendments 1, and 5
Certificate of Compliance 1032, Amendment 0
NEI 99-01, R6 E-HU1

1 FISSION PRODUCT BARRIER ICs/EALs

GENERAL EMERGENCY	
FG1	Loss of any two barriers and Loss or Potential Loss of the third barrier. *Op. Modes: Power Operation, Startup, Hot Shutdown*
SITE AREA EMERGENCY	
FS1	Loss or Potential Loss of any two barriers. *Op. Modes: Power Operation, Startup, Hot Shutdown*
ALERT	
FA1	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier. *Op. Modes: Power Operation, Startup, Hot Shutdown*



Fission Product Barrier Table

Thresholds for LOSS or POTENTIAL LOSS of Barriers

FG1 GENERAL EMERGENCY	FS1 SITE AREA EMERGENCY	FA1 ALERT
Loss of any two barriers and Loss or Potential Loss of the third barrier.	Loss or Potential Loss of any two barriers.	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
1. RCS Activity		**1. Primary Containment Pressure**		**1. Primary Containment Conditions**	
A. Primary coolant activity greater than 300 μCi/gm dose equivalent Iodine-131.	Not Applicable	A. Drywell pressure at or above 2.45 psig due to RPV leakage.	Not Applicable	A. UNPLANNED rapid drop in primary containment pressure following primary containment pressure rise. **OR** B. Primary containment pressure response not consistent with LOCA conditions.	A. Drywell pressure greater than 55 psig. **OR** B. H_2 greater than 6% AND O_2 greater than 5% exists inside primary containment **OR** C. HCTL exceeded.
2. RPV Water Level		**2. RPV Water Level**		**2. RPV Water Level**	
A. Primary containment flooding required.	A. RPV water level cannot be restored and maintained above -162 inches or cannot be determined.	A. RPV water level cannot be restored and maintained above -162 inches or cannot be determined.	Not Applicable	Not Applicable	A. Primary containment flooding required.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
3. Not Applicable		**3. RCS Leak Rate**		**3. Primary Containment Isolation Failure**	
Not Applicable	Not Applicable	A. UNISOLABLE Main Steamline OR Feedwater break resulting in exceeding the MSIV temperature isolation setpoint. **OR** B. Emergency RPV Depressurization.	A. UNISOLABLE primary system leakage that results in exceeding **EITHER** of the following: 1. Max <u>Normal</u> Operating Temperature **OR** 2. Max <u>Normal</u> Operating Area Radiation Level.	A. UNISOLABLE direct downstream pathway to the environment exists after primary containment isolation signal **OR** B. Intentional primary containment venting per EOIs **OR** C. UNISOLABLE primary system leakage that results in exceeding **EITHER** of the following: 1. Max <u>Safe</u> Operating Temperature. **OR** 2. Max <u>Safe</u> Operating Area Radiation Level.	Not Applicable

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
4. Primary Containment Radiation		**4. Primary Containment Radiation**		**4. Primary Containment Radiation**	
A. Primary containment radiation monitor reading greater than: **UNIT 1** 1-RM-90-272A >2.981E+03 R/HR 1-RM-90-273A >2.960E+03 R/HR **UNIT 2** 2-RM-90-272A >2.263E+03 R/HR 2-RM-90-273A >2.960E+03 R/HR **UNIT 3** 3-RM-90-272A >2.981E+03 R/HR 3-RM-90-273A >2.960E+03 R/HR	Not Applicable	A. Primary containment radiation monitor reading greater than 32 R/hr on **ANY** of the following: 1,2,3-RM-090-272A **OR** 1,2,3-RM-090-273A	Not Applicable	Not Applicable	A. Primary containment radiation monitor reading greater than: **UNIT 1** 1-RM-90-272A >9.009E+04 R/HR 1-RM-90-273A >8.945E+04 R/HR **UNIT 2** 2-RM-90-272A >6.841E+04 R/HR 2-RM-90-273A >8.945E+04 R/HR **UNIT 3** 3-RM-90-272A >9.009E+04 R/HR 3-RM-90-273A >8.945E+04 R/HR
5. Other Indications		**5. Other Indications**		**5. Other Indications**	
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
6. SED Judgment		**6. SED Judgment**		**6. SED Judgment**	
A. **ANY** condition in the opinion of the SED that indicates Loss of the Fuel Clad Barrier.	A. **ANY** condition in the opinion of the SED that indicates Potential Loss of the Fuel Clad Barrier.	A. **ANY** condition in the opinion of the SED that indicates Loss of the RCS Barrier.	A. **ANY** condition in the opinion of the SED that indicates Potential Loss of the RCS Barrier.	A. **ANY** condition in the opinion of the SED that indicates Loss of the Containment Barrier.	A. **ANY** condition in the opinion of the SED that indicates Potential Loss of the Containment Barrier.

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Basis Information For
Fission Product Barrier Table

FUEL CLAD BARRIER THRESHOLDS:

The Fuel Clad barrier consists of the zircalloy fuel bundle tubes that contain the fuel pellets.

1. RCS Activity

Loss 1.A

This threshold indicates that RCS radioactivity concentration is greater than 300 μCi/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.

There is no Potential Loss threshold associated with RCS Activity.

2. RPV Water Level

Loss 2.A

The Loss threshold represents the EOI requirement for primary containment flooding. This is identified in the BWROG EPGs/SAGs when the phrase, “Primary Containment Flooding Is Required," appears. Since a site-specific RPV water level is not specified here, the Loss threshold phrase, “Primary containment flooding required,” also accommodates the EOI need to flood the primary containment when RPV water level cannot be determined and core damage due to inadequate core cooling is believed to be occurring.

Potential Loss 2.A

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

The RPV water level threshold is the same as RCS barrier Loss threshold 2.A. 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 EOIs, RPV water 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. EOIs allow the operator a wide choice of RPV injection sources to consider when restoring RPV water level to within prescribed limits. EOIs 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 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.

In high-power ATWS/failure to scram events, EOIs may direct the operator to deliberately lower RPV water level to the top of active fuel in order to reduce reactor power. RPV water level is then controlled between the top of active fuel and the Minimum Steam Cooling RPV Water Level (MSCRWL). 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 SA5 or SS5 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.

3. Not Applicable (included for numbering consistency between barrier tables)

4. Primary Containment Radiation

<u>Loss 4.A</u>

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 μCi/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 Loss threshold 4.A 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.

5. Other Indications

Not Applicable

6. SED Judgment

Loss 6.A

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

Potential Loss 6.A

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

RCS BARRIER THRESHOLDS:

The RCS Barrier is the reactor coolant system pressure boundary and includes the RPV and all reactor coolant system piping up to and including the isolation valves.

1. Primary Containment Pressure

Loss 1.A

The 2.45 psig primary containment pressure is the drywell high pressure setpoint which indicates a LOCA by automatically initiating the ECCS or equivalent makeup system.

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

2. RPV Water Level

Loss 2.A

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

The RPV water level threshold is the same as Fuel Clad barrier Potential Loss threshold 2.A. 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 BFN EOIs, RPV water 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. EOIs allow the operator a wide choice of RPV injection sources to consider when restoring RPV water level to within prescribed limits. EOIs 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 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.

In high-power ATWS/failure to scram events, EOIs may direct the operator to deliberately lower RPV water level to the top of active fuel in order to reduce reactor power. RPV water level is then controlled between the top of active fuel and the Minimum Steam Cooling RPV Water Level (MSCRWL). 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 SA5 or SS5 will dictate the need for emergency classification.

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

3. RCS Leak Rate

Loss Threshold 3.A

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 from the Control Room, the RCS barrier Loss threshold is met.

Loss Threshold 3.B

Emergency RPV Depressurization in accordance with the EOIs 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) and keep them open. Even though the RCS is being vented into the suppression pool, 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.A

Potential loss of RCS based on primary system leakage outside the primary containment is determined from EOI 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.

An UNISOLABLE leak which is indicated by Max Normal Operating values escalates to a Site Area Emergency when combined with Containment Barrier Loss threshold 3.A (after a containment isolation) and a General Emergency when the Fuel Clad Barrier criteria is also exceeded.

4. Primary Containment Radiation

Loss 4.A

The Drywell High-Range Radiation Monitor (1, 2, 3-RM-090-0272A or 1,2,3-RM-090-0273A) reading of 32 R/hr is based on coolant activity at the Technical Specification limit of 3.2 µCi/gm 1-131.

The Drywell radiation level of 32 R/hr is derived as follows:
0-TI-88, Procedure for Estimation of the Extent of Core Damage under Accident Conditions, Figures 7-12 show Drywell High Range readings for 300 µCi/gm 1-131 released at T=0 for the RPV breached (this is equivalent to the Loss of RCS Barrier). The reading is approximately 3000 R/hr. Assuming a coolant activity of 3.2 µCi/gm 1-131 is ratioed the Drywell High Range Monitor reading is ((3.2 x 3000) ÷ 300) = 32.

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 Loss threshold 4.A since it indicates a loss of the RCS Barrier only.

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

5. Other Indications

Not Applicable

6. SED Judgment

Loss 6.A

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

Potential Loss 6.A

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

CONTAINMENT BARRIER THRESHOLDS:

The Primary Containment Barrier includes the drywell, the wetwell, their respective interconnecting paths, and other connections up to and including the outermost containment isolation valves. Containment Barrier thresholds are used as criteria for escalation of the ECL from Alert to a Site Area Emergency or a General Emergency.

1. Primary Containment Conditions

Loss 1.A and 1.B

Rapid UNPLANNED loss of primary containment pressure (that is, not attributable to drywell spray or condensation effects) following an initial pressure increase indicates a loss of primary containment integrity. Primary containment pressure should increase 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.

Potential Loss 1.A

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, represents a Potential Loss of the Containment barrier.

Potential Loss 1.B

If hydrogen concentration reaches or exceeds the lower flammability limit, as defined in plant EOIs, in an oxygen rich environment, a potentially explosive mixture exists. If the combustible mixture ignites inside the primary containment, loss of the Containment barrier could occur.

Potential Loss 1.C

The Heat Capacity Temperature Limit (HCTL) is the highest suppression pool temperature from which Emergency RPV Depressurization will not raise:

- Suppression chamber temperature above the maximum temperature capability of the suppression chamber and equipment within the suppression chamber which may be required to operate when the RPV is pressurized,

  OR

- Suppression chamber pressure above Primary Containment Pressure Limit A, while the rate of energy transfer from the RPV to the containment is greater than the capacity of the containment vent.

The HCTL is a function of RPV pressure, suppression pool temperature and suppression pool 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.

2. RPV Water Level

There is no Loss threshold associated with RPV Water Level.

Potential Loss 2.A

The Potential Loss threshold is identical to the Fuel Clad Loss RPV Water Level threshold 2.A. The Potential Loss requirement for Primary Containment Flooding indicates adequate core cooling cannot be restored and maintained and that core damage is possible. BWR EPGs/SAGs specify the conditions that require primary containment flooding. When primary containment flooding is required, the EPGs are exited and SAGs are entered. Entry into SAGs is a logical escalation in response to the inability to restore and maintain adequate core cooling.

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.

3. Primary Containment Isolation Failure

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

Loss 3.A

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).

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 (that is, 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 3.B

EOIs 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 (for example, to control pressure below the drywell high pressure scram setpoint) does not meet the threshold condition.

Loss 3.C

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. EOIs 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 combination with RCS potential loss 3.A this threshold would result in a Site Area Emergency.

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

4. Primary Containment Radiation

There is no Loss threshold associated with Primary Containment Radiation.

Potential Loss 4.A

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.

5. Other Indications

Not Applicable

6. SED Judgment

Loss 6.A

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

Potential Loss 6.A

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

References
BFN NDQ0090930050
0-TI-394, Attachment 7
0-TI-88
NEI 99-01 R6 Fission Product Barriers

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HG1

ECL: General Emergency

Initiating Condition: HOSTILE ACTION resulting in loss of physical control of the facility.

Operating Mode Applicability: All

Emergency Action Levels:

(1) a. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervisor.

AND

b. **EITHER** of the following has occurred:

1. **ANY** of the following safety functions cannot be controlled or maintained.

    - Reactivity control
    - RPV water level
    - RCS heat removal

    OR

2. Damage to spent fuel has occurred or is IMMINENT.

Basis:

This IC addresses an event in which a HOSTILE FORCE has taken physical control of the facility to the extent that the plant staff can no longer operate equipment necessary to maintain key safety functions. It also addresses a HOSTILE ACTION leading to a loss of physical control that results in actual or IMMINENT damage to spent fuel due to 1) damage to a spent fuel pool cooling system (for example, pumps, heat exchangers, controls, etc.) or, 2) loss of spent fuel pool integrity such that sufficient water level cannot be maintained.

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]*.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

References

BFN Physical Security Plan (safeguards)
NSDP-22, Security Contingency Events (restricted)
0-AOI-100-8, Security Event Response (restricted)
NEI 99-01 R6 HG1

HG7

ECL: General Emergency

Initiating Condition: Other conditions exist which in the judgment of the SED warrant declaration of a General Emergency.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Other conditions exist which in the judgment of the SED 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:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SED to fall under the emergency classification level description for a General Emergency.

References
NEI 99-01 R6 HG7

HS1

ECL: Site Area Emergency

Initiating Condition: HOSTILE ACTION within the PROTECTED AREA.

Operating Mode Applicability: All

Emergency Action Levels:

(1) A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervisor.

Basis:

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 are 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 (for example, 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.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level would be via IC HG1.

References
BFN Physical Security Plan (safeguards)
NSDP-22, Security Contingency Events (restricted)
0-AOI-100-8, Security Event Response (restricted)
NEI 99-01 R6 HS1

HS6

ECL: Site Area Emergency

Initiating Condition: Inability to control a key safety function from outside the Control Room.

Operating Mode Applicability: All

Emergency Action Levels:

> **Note:** The SED should declare the Site Area Emergency promptly upon determining that 20 minutes has been exceeded, or will likely be exceeded.

(1) a. An event has resulted in plant control being transferred from the Control Room to the Backup Control Panel.

AND

b. Control of **ANY** of the following key safety functions is not reestablished within 20 minutes.

- Reactivity control
- RPV water level
- RCS heat removal

Basis:

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 one or more fission product barriers within a relatively short period of time.

The 20 minute time period is based on time required for personnel to leave the control room, arrive at the appropriate backup control station, and take control of critical parameters before core uncovery or core damage has occurred. This timeframe has been projected within the Tennessee Valley Authority, Browns Ferry Nuclear Plant, Fire Protection Report. During execution of procedures and transfer of equipment control, the listed critical parameters may be considered as being controlled if the parameters can be verified as being maintained within safe value ranges by appropriate equipment and automatic initiation functions designed to control the parameter (example: HPCI auto initiated and raised RPV water level to a value above the initiation setpoint.).

The determination of whether or not “control” is established at the remote safe shutdown location(s) is based on SED judgment. The SED is expected to make a reasonable, informed judgment within 20 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 CG1.

References
AOI 1, 2, 3,-100-2, Control Room Abandonment
NEI 99-01 R6 HS6

HS7

ECL: Site Area Emergency

Initiating Condition: Other conditions exist which in the judgment of the SED warrant declaration of a Site Area Emergency.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Other conditions exist which in the judgment of the SED 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:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SED to fall under the emergency classification level description for a Site Area Emergency.

Reference
NEI 99-01 R6 HS7

HA1

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

(1) A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the Security Shift Supervisor.

(2) A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

Basis:

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.

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 (for example, 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 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.

EAL #2 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 plant procedures.

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 (that is, 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.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level would be via IC HS1.

References

BFN Physical Security Plan (safeguards)
NSDP-22, Security Contingency Events (restricted)
0-AOI-100-8, Security Event Response (restricted)
NEI 99-01 R6 HA1

HA5

ECL: Alert

Initiating Condition: Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability: All

Emergency Action Levels:

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) a. Release of a toxic, corrosive, asphyxiant or flammable gas into any of the Table H1 plant rooms or areas:

Table H1-Safe Operation & Shutdown Rooms/Areas				
Bldg. Elevation	Unit 1 Room/Area	Unit 2 Room/Area	Unit 3 Room/Area	Mode
Rx Bldg. 621	4KV Electric Bd. Room 1A	4KV Electric Bd. Room 2A	N/A	3,4,5
Rx Bldg. 593	N/A	N/A	480V RMOV Board Room 3A	3,4,5
	N/A	N/A	480V RMOV Board Room 3B	3,4,5

AND

b. 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 maintain normal plant operation, or required for a normal plant cooldown and shutdown. This condition represents an actual or potential substantial degradation of the level of safety of the plant.

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 at the time of the gaseous release. 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 SED’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 (for example, 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 (that is, 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 (for example, fire suppression system testing).
- The action for which room/area entry is required is of an administrative or record keeping nature (for example, 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.

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 automatically or manually activate a fire suppression system in an area, or to intentional inerting of containment.

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

References
NEI 99-01 R6 HA5

HA6

ECL: Alert

Initiating Condition: Control Room evacuation resulting in transfer of plant control to alternate locations.

Operating Mode Applicability: All

Emergency Action Levels:

(1) An event has resulted in plant control being transferred from the Control Room to the Backup Control Panel.

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 HS6.

References
AOI 1, 2, 3,-100-2, Control Room Abandonment
NEI 99-01 R6 HA6

HA7

ECL: Alert

Initiating Condition: Other conditions exist which in the judgment of the SED warrant declaration of an Alert.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Other conditions exist which, in the judgment of the SED, 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:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SED to fall under the emergency classification level description for an Alert.

References
NEI 99-01 R6 HA7

HU1

ECL: Unusual Event

Initiating Condition: Confirmed SECURITY CONDITION or threat.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

(1) A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the Security Shift Supervisor.

(2) Notification of a credible security threat directed at BFN.

(3) A validated notification from the NRC providing information of an aircraft threat.

Basis:

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, HS1 and HG1.

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 references the Security Shift Supervisor 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.

EAL #2 addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with plant procedures.

EAL #3 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 plant procedures.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level would be via IC HA1.

References
BFN Physical Security Plan (safeguards)
NSDP-22, Security Contingency Events (restricted)
0-AOI-100-8, Security Event Response (restricted)
NEI 99-01 R6 HU1

HU2

ECL: Unusual Event

Initiating Condition: Seismic event greater than OBE levels.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Seismic event greater than Operating Basis Earthquake (OBE) as indicated by:

- Unit 1 Control Room Panel 1-XA-55-22C Window 6, 1/2 SSE RESPONSE SPECTRUM EXCEEDED

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). An earthquake greater than an OBE but less than a Safe Shutdown Earthquake (SSE) 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 (for example, 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.

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. The Shift Manager or SED may seek external verification if deemed appropriate however, the verification action must not preclude a timely emergency declaration.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA6 or SA9.

References

1-ARP-9-22C
NEI 99-01 R6 HU2

HU3

ECL: Unusual Event

Initiating Condition: Hazardous event.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4 or 5)

Note: EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

(1) A tornado strike within the PROTECTED AREA.

(2) Internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component needed for the current operating mode.

(3) Movement of personnel within the PROTECTED AREA is impeded due to an offsite event involving hazardous materials (for example, an offsite chemical spill or toxic gas release).

(4) A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.

(5) Wheeler Lake is less than elevation 529 feet
OR
exceeds elevation 565 feet.

Basis:

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

EAL #1 addresses a tornado striking (touching down) within the Protected Area.

EAL #2 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 (for example, 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 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 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.

EAL #5 addresses the effects of low reservoir water level and external flooding. The volume of water corresponding to a lake level of 529 feet is adequate to shut the plant down and maintain the plant in a safe condition indefinitely. Elevation 565 feet corresponds to the elevation of the intake pumping station deck and access passages into most permanent plant structures.

Escalation of the emergency classification level would be based on ICs in Recognition Categories R, F, S or C.

References
0-AOI-100-3, Flood Above Elevation 558
BFN FSAR Chapter 2
NEI 99-01 R6 HU3

HU4

ECL: Unusual Event

Initiating Condition: FIRE potentially degrading the level of safety of the plant.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

> **Note:** The SED should declare the Unusual Event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

(1) a. A FIRE is NOT extinguished within 15-minutes of **ANY** of the following FIRE detection indications:

- Report from the field (that is, visual observation)
- Receipt of multiple (more than 1) fire alarms or indications
- Field verification of a single fire alarm

AND

b. The FIRE is located within **ANY** of the Table H2 plant rooms or areas.

(2) a. Receipt of a single fire alarm (that is, no other indications of a FIRE).

AND

b. The FIRE is located within **ANY** of the Table H2 plant rooms or areas.

AND

c. The existence of a FIRE is not verified within 30-minutes of alarm receipt.

(3) A FIRE within the plant PROTECTED AREA not extinguished within 60-minutes of the initial report, alarm or indication.

(4) A FIRE within the plant PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.

Table H2-Fire Areas	
Turbine Building	Cable Tunnel (Intake To Turbine Building)
Refuel Floor	Control Building
Reactor Building	Diesel Generator Bldgs.
Intake Pumping Station (IPS)	Radwaste Building

Basis:

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.

Table H2 Fire Areas are based on BFN Calculation MDQ099920110009 Rev. 6, NFPA 805 Transition Fire Area Designation, and BFN Drawing Series 47E217/218, NFPA 805 Operator

Actions. Table H2 Fire Areas contain equipment associated with power production and emergency operations.

EAL #1

The intent of the 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (for example, smoldering waste paper 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, operators will take prompt actions to confirm the validity of an initial fire alarm, indication, or report. 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 alarm, indication or report.

EAL #2

This EAL addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (that is, proved or disproved) within 30-minutes of the alarm. Upon receipt, 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 initial 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 information to the contrary, it is assumed that an actual FIRE is in progress.

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. 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

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.

EAL #4

If a FIRE within the plant PROTECTED AREA is of sufficient size to require a response by an offsite firefighting agency (for example, 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."
>
> 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 CA6 or SA9.

References

BFN Calculation MDQ099920110009 Rev. 6, NFPA 805 Transition - Fire Area Designation
BFN Drawing Series 47E217/218, NFPA 805 Operator Actions
NEI 99-01 R6 HU4

HU7

ECL: Unusual Event

Initiating Condition: Other conditions exist which in the judgment of the SED warrant declaration of a NOUE.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Other conditions exist which in the judgment of the SED 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 SED to fall under the emergency classification level description for a NOUE.

References
NEI 99-01 R6 HU7

SG1

ECL: General Emergency

Initiating Condition: Prolonged loss of all offsite and all onsite AC power to applicable 4KV Shutdown Boards to a unit.

Operating Mode Applicability: Power Operation, Startup, Hot Shutdown

Emergency Action Levels:

> **Note:** The SED should declare the General Emergency promptly upon determining that 4 hours has been exceeded, or will likely be exceeded.

(1) a. Loss of **ALL** offsite and **ALL** onsite AC power to applicable 4KV Shutdown Boards listed in Table E1 for any unit for 15 minutes or longer.

Table E1-UNIT 4KV SHUTDOWN BOARD APPLICABILITY	
UNIT	APPLICABLE 4KV SHUTDOWN BOARDS
UNIT 1	A, B, C, and D
UNIT 2	A, B, C, and D
UNIT 3	3A, 3B, 3C, and 3D

AND

b. **EITHER** of the following:

- Restoration of at least one Shutdown Board in less than 4 hours is not likely.
- Reactor vessel water level cannot be restored and maintained above -180 inches.

Basis:

This IC addresses a prolonged loss of all AC power sources to Shutdown Boards. 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 one or more 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.

Escalation of the emergency classification from Site Area Emergency will occur if it is projected that power cannot be restored to at least one Shutdown Board 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 Shutdown Board 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.

References

BFN Unit 1, 2, 3, Technical Specification Basis 3.8.1
BFN FSAR Chapter 8.10
0-TI-394, Attachment 7
NEI 99-01 R6 SG1

SG8

ECL: General Emergency

Initiating Condition: Loss of all unit specific AC and Vital DC power sources for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the General Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. Loss of **ALL** offsite and **ALL** onsite AC power to applicable 4KV Shutdown Boards listed in Table E1 for any unit for 15 minutes or longer.

Table E1-UNIT 4KV SHUTDOWN BOARD APPLICABILITY	
APPLICABLE UNIT	APPLICABLE 4KV SHUTDOWN BOARDS
UNIT 1	A, B, C, and D
UNIT 2	A, B, C, and D
UNIT 3	3A, 3B, 3C, and 3D

AND

b. Loss of **ALL** 250VDC power based on battery bus voltage indications < 210 VDC to **ALL** required Technical Specification 250VDC buses for 15 minutes or longer.

Basis:

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 both EAL thresholds are met.

References
BFN Unit 1, 2, 3, Technical Specification Basis 3.8.1
BFN FSAR Chapter 8.10
BFN EDQ024820020042
NEI 99-01 R6 SG8

SS1

ECL: Site Area Emergency

Initiating Condition: Loss of all offsite and all onsite AC power to applicable 4KV Shutdown Boards to a unit for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of **ALL** offsite and **ALL** onsite AC power to applicable 4KV Shutdown Boards as listed in Table E1 for any unit for 15 minutes or longer.

Table E1-UNIT 4KV SHUTDOWN BOARD APPLICABILITY	
UNIT	APPLICABLE 4KV SHUTDOWN BOARDS
UNIT 1	A, B, C, and D
UNIT 2	A, B, C, and D
UNIT 3	3A, 3B, 3C, and 3D

Basis:

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 SG1.

References
BFN Unit 1, 2, 3, Technical Specification Basis 3.8.1
BFN FSAR Chapter 8.10
NEI 99-01 R6 SS1

SS5

ECL: Site Area Emergency

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

Operating Mode Applicability: Power Operation

Emergency Action Levels:

(1) a. An automatic or manual scram did not shutdown the reactor.

AND

b. All manual actions to shutdown the reactor have been unsuccessful.

AND

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

- Suppression Pool temperature exceeds HCTL.
- Reactor water level can NOT be restored and maintained at or above -180 inches.

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 actions to manually shutdown the reactor 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 Instruction criteria.

Escalation of the emergency classification level would be via IC RG1 or FG1.

References
1, 2, 3-AOI-100-1, Reactor Scram
0-TI-394, Attachment 7
NEI 99-01 R6 SS5

SS8

ECL: Site Area Emergency

Initiating Condition: Loss of all Vital DC power for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Shutdown

Emergency Action Levels:

> **Note:** The SED should declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Less than 210 VDC bus voltage on **ALL** unit specific Technical Specification **required** 250VDC Buses for 15 minutes or longer.

Basis:

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 SG8.

References
BFN EDQ024820020042
NEI 99-01 R6 SG8

SA1

ECL: Alert

Initiating Condition: Loss of all but one AC power source to applicable 4KV Shutdown Boards to a unit for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. AC power capability to applicable 4KV Shutdown Boards listed in Table E1 for any unit is reduced to a single power source for 15 minutes or longer.

Table E1-UNIT 4KV SHUTDOWN BOARD APPLICABILITY	
UNIT	APPLICABLE 4KV SHUTDOWN BOARDS
UNIT 1	A, B, C, and D
UNIT 2	A, B, C, and D
UNIT 3	3A, 3B, 3C, and 3D

AND

b. Any additional single power source failure will result in a loss of all AC power to SAFETY SYSTEMS.

Basis:

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 SU1.

An “AC power source” is a source recognized in AOIs and EOIs, 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 (for example, an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (for example, onsite diesel generators) with a single train of emergency buses being back-fed from the unit main generator.
- A loss of emergency power sources (for example, onsite diesel generators) with a single train of emergency buses being back-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 SS1.

References

BFN Unit 1, 2, 3, Technical Specification Basis 3.8.1
BFN FSAR Chapter 8.10
NEI 99-01 R6 SA1

SA2

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. An UNPLANNED event results in the inability to monitor one or more of the following parameters from within the Control Room for 15 minutes or longer.

Reactor Power
RPV Water Level
RPV Pressure
Primary Containment Pressure
Suppression Pool Level
Suppression Pool Temperature

AND

b. **ANY** of the following transient events in progress.

- Automatic or manual runback greater than 25% thermal reactor power
- Electrical load rejection greater than 25% full electrical load
- Reactor scram
- ECCS initiation
- Thermal power oscillations greater than 10%

Basis:

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.

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. 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.

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 Instructions, Emergency Operating Instructions, 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 level and RCS heat removal. The loss of the ability to determine one or more 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 one or more 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.

References
NEI 99-01 R6 SA2

SA5

ECL: Alert

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: Power Operation

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.

Emergency Action Levels:

(1) a. An automatic or manual scram did not shutdown the reactor.

AND

b. Automatic ARI or Manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

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 (for example, 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 (for example, 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.

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 SS5. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS5 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 Instruction criteria.

References
1, 2, 3-AOI-100-1, Reactor Scram
NEI 99-01 R6 SA5

SA9

ECL: Alert

Initiating Condition: Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode.

Operating Mode Applicability: Power Operation, Startup, Hot Shutdown

> **Note:** If the affected safety system (or component) was already inoperable or out of service before the event occurred, then no emergency classification is warranted as long as the damage was limited to this affected safety system or component.

Emergency Action Levels:

(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
- Wheeler lake level greater than elevation 565 feet AND water entering permanent plant structures due to flooding
- Other events with similar hazard characteristics as determined by the Shift Manager

AND

b. **EITHER** of the following:

- Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode.
- The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode.

Basis:

This IC addresses a hazardous event that causes damage to a SAFETY SYSTEM, or a structure containing SAFETY SYSTEM components, needed for the current operating mode. This condition significantly reduces the margin to a loss or potential loss of a fission product barrier, and therefore represents an actual or potential substantial degradation of the level of safety of the plant.

EAL 1.b.1 addresses damage to a SAFETY SYSTEM train that is in service/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.

EAL 1.b.2 addresses damage to a SAFETY SYSTEM component that is not in service/operation or readily apparent through indications alone, or to a structure containing SAFETY SYSTEM components. Operators will make this determination 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.

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

SU1

ECL: Unusual Event

Initiating Condition: Loss of all offsite AC power capability to applicable 4KV Shutdown Boards to a unit for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of **ALL** offsite AC power capability to applicable 4KV Shutdown Boards as listed in Table E1 for any unit for 15 minutes or longer.

Table E1-UNIT 4KV SHUTDOWN BOARD APPLICABILITY	
UNIT	APPLICABLE 4KV SHUTDOWN BOARDS
UNIT 1	A, B, C, and D
UNIT 2	A, B, C, and D
UNIT 3	3A, 3B, 3C, and 3D

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 AC power to Shutdown Boards. 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 Shutdown Boards, whether or not the Shutdown Boards are powered from it.

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 SA1.

References
BFN Unit 1, 2, 3, Technical Specification Basis 3.8.1
BFN FSAR Chapter 8.10
NEI 99-01 R6 SU1

SU2

ECL: Unusual Event

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

Operating Mode Applicability: Power Operation, Startup, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. An UNPLANNED event results in the inability to monitor one or more of the following parameters from within the Control Room for 15 minutes or longer.

Reactor Power
RPV Water Level
RPV Pressure
Primary Containment Pressure
Suppression Pool Level
Suppression Pool Temperature

Basis:

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.

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. 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.

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 Instructions, Emergency Operating Instructions, 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 level and RCS heat removal. The loss of the ability to determine one or more 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 one or more 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 IC SA2.

References
NEI 99-01 R6 SU2

SU3

ECL: Unusual Event

Initiating Condition: Reactor coolant activity greater than Technical Specification allowable limits.

Operating Mode Applicability: Power Operation, Startup, Hot Shutdown

Emergency Action Levels:

(1) Sample analysis indicates that reactor coolant activity is greater than 26 μCi/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.

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

References
BFN 1, 2, 3, Technical Specification 3.4.6
1, 2, 3-ARP-9-3A
NEI 99-01 R6 SU3

SU4

ECL: Unusual Event

Initiating Condition: RCS leakage for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Unidentified or pressure boundary leakage greater than 10 gpm for 15 minutes or longer.

(2) Identified leakage greater than 30 gpm for 15 minutes or longer.

(3) Leakage from the RCS to a location outside containment greater than 30 gpm for 15 minutes or longer.

Basis:

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

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 calculations to determine (for example, 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 a 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.

References

BFN 1, 2, 3 Technical Specification 3.4.4
NEI 99-01 R6 SU4

SU5

ECL: Unusual Event

Initiating Condition: Automatic or manual scram fails to shutdown the reactor.

Operating Mode Applicability: Power Operation

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.

Emergency Action Levels: (1 or 2)

(1) a. An automatic scram did not shutdown the reactor.

AND

b. A subsequent automatic ARI or manual action taken at the reactor control consoles is successful in shutting down the reactor.

(2) a. A manual scram did not shutdown the reactor.

AND

b. **EITHER** of the following:

- A subsequent automatic ARI or manual action taken at the reactor control consoles is successful in shutting down the reactor.
- A subsequent automatic scram is successful in shutting down the reactor.

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.

Following the failure on an automatic reactor scram, operators will promptly initiate manual actions at the reactor control consoles to shutdown the reactor (for example, 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.

If an initial manual reactor scram is unsuccessful, operators will promptly take manual action at another location(s) on the reactor control consoles to shutdown the reactor. 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 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. 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 SA5. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC SA5 or FA1, an Unusual Event declaration is appropriate for this event.

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

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

- If the signal causes a plant transient 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 does not cause a plant transient and the scram failure is determined through other means (for example, assessment of test results), then this IC and the EALs are not applicable and no classification is warranted.

References

1, 2, 3-AOI-100-1, Reactor Scram
NEI 99-01 R6 SU5

SU6

ECL: Unusual Event

Initiating Condition: Loss of all onsite or offsite communications capabilities.

Operating Mode Applicability: Power Operation, Startup, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

(1) Loss of **ALL** Table C3 Onsite communications capability affecting the ability to perform routine operations.

(2) Loss of **ALL** Table C3 Offsite communication capability affecting the ability to perform offsite notifications.

(3) Loss of **ALL** Table C3 NRC communication capability affecting the ability to perform NRC notifications.

Table C3 Communications Capability			
System	Onsite	Offsite	NRC
Plant Radio	X		
Plant Page	X		
All Telephone Lines (Private and Commercial)	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 OROs and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (for example, 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 addresses a total loss of the communications methods used in support of routine plant operations.

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are Alabama EMA, Lauderdale County, Lawrence County, Limestone County, Madison County, and Morgan County..

EAL #3 addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

References
BFN FSAR Chapter 10.18
NEI 99-01 R6 SU6

Enclosure 3

Revised EAL Program Manual

(Sequoyah Nuclear Plant)

Tennessee Valley Authority	RADIOLOGICAL EMERGENCY PLAN SQN EAL Program Manual	REP SQN EAL Program Manual REV. 0 Effective Date:

WRITTEN BY: ______________________ REVIEWED BY: ______________________ __________

Signature *Signature* *Date*

10 CFR 50.54(q)(3) ANALYSIS REVIEWED BY: ______________________ __________

Signature *Date*

CONCURRENCES

Concurrence Signature	Date	Concurrence Signature	Date
SQN EP Manager ______________________	__________	SQN PORC Chairman ______________________	__________
Director Emergency Preparedness ______________________	__________		__________
	__________		

APPROVAL

APPROVED BY: ______________________ GM Support Services __________

Signature *Title* *Organization* *Date*

1.0 PURPOSE

This document provides an explanation and rationale for each Emergency Action Level (EAL) included in the EAL Upgrade Project for Sequoyah Nuclear Power Plant (SQN). It should be used to facilitate review of the SQN EALs and provide historical documentation for future reference. Decision-makers responsible for implementation of EPIP-1, "Emergency Plan Classification Logic," may use this document as a technical reference in support of EAL interpretation. This information may assist the Site Emergency Director (SED) in making classifications, particularly those involving judgment or multiple events. The basis information may also be useful in training and for explaining event classifications to off-site officials.

The expectation is that emergency classifications are to be made as soon as conditions are present and recognizable for the classification, but within 15 minutes or less in all cases of conditions present. Use of this document for assistance is not intended to delay the emergency classification.

Because the information in a basis document can affect emergency classification decision making (for example, the SED refers to it during an event), the NRC staff expects that changes to the basis document will be evaluated in accordance with the provisions of 10 CFR 50.54(q).

2.0 DISCUSSION

2.1 BACKGROUND

EALs are the plant-specific indications, conditions or instrument readings that are utilized to classify emergency conditions defined in the TVA Radiological Emergency Plan (REP).

In 1992, the NRC endorsed NUMARC/NESP-007 "Methodology for Development of Emergency Action Levels" as an alternative to NUREG-0654 EAL guidance.
NEI 99-01 (NUMARC/NESP-007) Revisions 4 and 5 were subsequently issued for industry implementation. Enhancements over earlier revisions included:

- Consolidating the system malfunction initiating conditions and example emergency action levels which address conditions that may be postulated to occur during plant shutdown conditions.
- Initiating conditions and example emergency action levels that fully address conditions that may be postulated to occur at permanently Defueled Stations and Independent Spent Fuel Storage Installations (ISFSIs).
- Simplifying the fission product barrier EAL threshold for a Site Area Emergency.

Subsequently, Revision 6 of NEI 99-01 has been issued which incorporates resolutions to numerous implementation issues including the NRC EAL Frequently Asked Questions (FAQs). Using NEI 99-01 Revision 6, "Methodology for the Development of Emergency Action Levels for Non-Passive Reactors," November 2012 (ADAMS Accession Number ML12326A805) (ref. 4.1.1), SQN conducted an EAL implementation upgrade project that produced the EALs discussed herein.

2.2 Fission Product Barriers

Fission product barrier 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.

Many of the EALs derived from the NEI methodology are fission product barrier threshold based. That is, the conditions that define the EALs are based upon thresholds that represent the loss or potential loss of one or more of the three fission product barriers. "Loss" and "Potential Loss" signify the relative damage and threat of damage to the barrier. A "Loss" threshold means the barrier no longer assures containment of radioactive materials. A "Potential Loss" threshold implies an increased probability of barrier loss and decreased certainty of maintaining the barrier. The primary fission product barriers are:

A. Fuel Clad (FC): The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.

B. Reactor Coolant System (RCS): The RCS Barrier includes the RCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.

C. Containment (CNTMT): The Containment Barrier includes the containment building and connections up to and including the outermost containment isolation valves. This barrier also includes the main steam, feedwater, and blowdown line extensions outside the containment building up to and including the outermost secondary side isolation valve. Containment Barrier thresholds are used as criteria for escalation of the ECL from Alert to a Site Area Emergency or a General Emergency

2.3 Fission Product Barrier Classification Criteria

The following criteria are the bases for event classification related to fission product barrier loss or potential loss:

Alert:
Any loss or any potential loss of either Fuel Clad or RCS barrier

Site Area Emergency:
Loss or potential loss of any two barriers

General Emergency:
Loss of any two barriers and loss or potential loss of the third barrier

2.4 EAL Organization

The SQN EAL scheme includes the following features:

- Division of the EAL set into three broad groups:

    - EALs applicable under any plant operating modes - This group would be reviewed by the EAL-user any time emergency classification is considered.

    - EALs applicable only under hot operating modes - This group would only be reviewed by the EAL-user when the plant is in Hot Shutdown, Hot Standby, Startup, or Power Operation mode.

    - EALs applicable only under cold operating modes - This group would only be reviewed by the EAL-user when the plant is in Cold Shutdown, Refueling or Defueled mode.

- The purpose of the groups is to avoid review of hot condition EALs when the plant is in a cold condition and avoid review of cold condition EALs when the plant is in a hot condition. This approach significantly minimizes the total number of EALs that must be reviewed by the EAL-user for a given plant condition, reduces EAL-user reading burden and, thereby, speeds identification of the EAL that applies to the emergency.

- Within each group, assignment of EALs to categories and subcategories:

Category and subcategory titles are selected to represent conditions that are operationally significant to the EAL-user. The SQN EAL categories are aligned to and represent the NEI 99-01"Recognition Categories." Subcategories are used in the SQN scheme as necessary to further divide the EALs of a category into logical sets of possible emergency classification thresholds. The SQN EAL categories and subcategories are listed below.

Table 1 - SQN EAL Groups, Categories and Subcategories

SQN EALs	
Category	**Subcategory**
Group: Any Operating Mode	
R - Abnormal Rad Levels/Rad Effluent	1 - Radiological Effluent 2 - Irradiated Fuel Event 3 - Area Radiation Levels
H - Hazards and Other Conditions Affecting	1 - Security 2 - Seismic Event 3 - Natural or Technological Hazard 4 - Fire 5 - Hazardous Gases 6 - Control Room Evacuation 7 - Emergency Director Judgment
E- ISFSI	1 - Confinement Boundary
Group: Hot Conditions	
S - System Malfunction	1 - Loss of Essential AC Power 2 - Loss of Vital DC Power 3 - Loss of Control Room Indications 4 - RCS Activity 5 - RCS Leakage 6 - RPS Failure 7 - Loss of Communications 8 - Containment Failure 9 - Hazardous Event Affecting Safety Systems
F - Fission Product Barrier	None
Group: Cold Conditions	
C - Cold Shutdown/Refueling System Malfunction	1 - RCS Level 2 - Loss of Essential AC Power 3 - RCS Temperature 4 - Loss of Vital DC Power 5 - Loss of Communications 6 - Hazardous Event Affecting Safety Systems

The primary tool for determining the emergency classification level is the EAL Classification Wallboard. The user of the EAL Classification Wallboard may (but is not required to) consult the EAL Technical Bases Document in order to obtain additional information concerning the EALs under classification consideration. The user should consult this document for such information.

2.5 Technical Bases Information

EAL technical bases are provided in Attachment 1 for each EAL according to EAL group (Any, Hot, Cold), EAL category (R, C, H, S**,** E and F) and EAL subcategory.

For each EAL, the following information is provided:

- Category Letter & Title
- Initiating Condition (IC)
- Operating Mode Applicability
- Site-specific EAL description of the generic IC given in NEI 99-01 Rev. 6.

Each EAL is assigned a unique identifier to support accurate communication of the emergency classification to onsite and offsite personnel. Three characters define each EAL identifier:

1. First character (letter): Corresponds to the EAL category as described above (R, C, H, S, E or F)
2. Second character (letter): The emergency classification (G, S**,** A or U)
    - G = General Emergency
    - S = Site Area Emergency
    - A = Alert
    - U = Unusual Event
3. Third character (number): Subcategory number within the given category. Subcategories are sequentially numbered beginning with the number one (1). If a category does not have a subcategory, this character is assigned the number one (1).

Exact wording of the EAL as it appears in the EAL Classification Matrix

Basis

A Plant-Specific basis section that provides SQN-relevant information concerning the EAL. This is followed by a Generic basis section that provides a description of the rationale for the EAL as provided in NEI 99-01 Rev. 6.

SQN Basis Reference(s)

Site-specific source documentation from which the EAL is derived.

2.6 Operating Mode Applicability (ref. 4.1.7)

1 Power Operation
Keff greater than or equal to 0.99 and reactor thermal power greater than 5%

2 Startup
Keff greater than or equal to 0.99 and reactor thermal power less than or equal to 5%

3 Hot Standby
Keff less than 0.99 and average coolant temperature greater than or equal to 350°F

4 Hot Shutdown
Keff less than 0.99 and average coolant temperature between 200°F and 350°F

5 Cold Shutdown
Keff less than 0.99 and average coolant temperature less than or equal to 200°F and all reactor vessel head closure bolts fully tensioned

6 Refueling
One or more reactor vessel head closure bolts are less than fully tensioned

D Defueled
All reactor fuel removed from reactor pressure vessel (full core off load during refueling or extended outage).

The plant operating mode that exists at the time that the event occurs (prior to any protective system or operator action being initiated in response to the condition) should be compared to the mode applicability of the EALs. If a lower or higher plant operating mode is reached before the emergency classification is made, the declaration shall be based on the mode that existed at the time the event occurred.

2.7 Unit Designation

The specific unit designator (1 or 2) is represented. For equipment or components that are common or non unit-specific the 0 designator is used. (Example 0-RE-XX represents a radiation monitor that is common to both units).

3.0 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

3.1 General Considerations

When making an emergency classification, the Site Emergency Director (SED) must consider all information having a bearing on the proper assessment of an Initiating Condition (IC). This includes the Emergency Action Level (EAL) plus the associated Operating Mode Applicability, Notes, and the informing basis information. In the Recognition Category F matrices, EALs are based on loss or potential loss of Fission Product Barrier Thresholds.

3.1.1 Classification Timeliness

NRC regulations require the licensee to establish and maintain the capability to assess, classify, and declare an emergency condition within 15 minutes after the availability of indications to plant operators that an emergency action level has been exceeded and to promptly declare the emergency condition as soon as possible following identification of the appropriate emergency classification level. The NRC staff has provided guidance on implementing this requirement in NSIR/DPR-ISG-01, "Interim Staff Guidance, Emergency Planning for Nuclear Power Plants" (ref. 4.1.11).

3.1.2 Valid Indications

All emergency classification assessments shall be based upon valid indications, reports or conditions. A valid indication, report, or condition is one that has been verified through appropriate means such that there is no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, verification could be accomplished through an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel.

An indication, report, or condition is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

3.1.3 Imminent Conditions

For ICs and EALs that have a stipulated time duration (for example, 15 minutes, 30 minutes, etc.), the Site Emergency Director (SED) should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition has exceeded, or will likely exceed, the applicable time. If an ongoing radiological release is detected and the release start time is unknown, it should be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

3.1.4 Planned vs. Unplanned Events

A planned work activity that results in an expected event or condition which meets or exceeds an EAL does not warrant an emergency declaration provided that: 1) the activity proceeds as planned, and 2) the plant remains within the limits imposed by the operating license. Such activities include planned work to test, manipulate, repair, maintain or modify a system or component. In these cases, the controls associated with the planning, preparation and execution of the work will ensure that compliance is maintained with all aspects of the operating license provided that the activity proceeds and concludes as expected. Events or conditions of this type may be subject to the reporting requirements of 10 § CFR 50.72 (ref. 4.1.4).

3.1.5 Classification Based on Analysis

The assessment of some EALs is based on the results of analyses that are necessary to ascertain whether a specific EAL threshold has been exceeded (for example, dose assessments, chemistry sampling, RCS leak rate calculation, etc.). For these EALs, the EAL wording 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 threshold to be exceeded (that is, this is the time that the EAL information is first available). The NRC expects licensees to establish the capability to initiate and complete EAL-related analyses within a reasonable period of time (for example, maintain the necessary expertise on-shift).

3.1.6 Site Emergency Director (SED) Judgment

While the EALs have been developed to address a full spectrum of possible events and conditions which may warrant emergency classification, a provision for classification based on operator/management experience and judgment is still necessary. The NEI 99-01 EAL scheme provides the Site Emergency Director (SED) with the ability to classify events and conditions based upon judgment using EALs that are consistent with the Emergency Classification Level (ECL) definitions (refer to Category H). The Site Emergency Director (SED) will need to determine if the effects or consequences of the event or condition reasonably meet or exceed a particular ECL definition. A similar provision is incorporated in the Fission Product Barrier Tables; judgment may be used to determine the status of a fission product barrier.

3.2 CLASSIFICATION METHODOLOGY

To make an emergency classification, the user will compare an event or condition (that is, the relevant plant indications and reports) to an EAL(s) and determine if the EAL has been met or exceeded. The evaluation of an EAL must be consistent with the related Operating Mode Applicability and Notes. If an EAL has been met or exceeded, the associated IC is likewise met, the emergency classification process "clock" starts, and the ECL must be declared in accordance with plant procedures no later than fifteen minutes after the process "clock" started.

When assessing an EAL that specifies a time duration for the off-normal condition, the "clock" for the EAL time duration runs concurrently with the emergency classification process "clock." For a full discussion of this timing requirement, refer to NSIR/DPR-ISG-01 (ref. 4.1.11).

3.2.1 Classification of Multiple Events and Conditions

When multiple emergency events or conditions are present, the user will identify all met or exceeded EALs. The highest applicable ECL identified during this review is declared. For example:

- If an Alert EAL and a Site Area Emergency EAL are met, whether at one unit or at two different units, a Site Area Emergency should be declared.

There is no "additive" effect from multiple EALs meeting the same ECL. For example:

- If two Alert EALs are met, whether at one unit or at two different units, an Alert should be declared.

Related guidance concerning classification of rapidly escalating events or conditions is provided in Regulatory Issue Summary (RIS) 2007-02, *Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events* (ref. 4.1.2).

3.2.2 Consideration of Mode Changes During Classification

The mode in effect at the time that an event or condition occurred, and prior to any plant or operator response, is the mode that determines whether or not an IC is applicable. If an event or condition occurs, and results in a mode change before the emergency is declared, the emergency classification level is still based on the mode that existed at the time that the event or condition was initiated (and not when it was declared). Once a different mode is reached, any new event or condition, not related to the original event or condition, requiring emergency classification should be evaluated against the ICs and EALs applicable to the operating mode at the time of the new event or condition.

For events that occur in Cold Shutdown or Refueling, escalation is via EALs that are applicable in the Cold Shutdown or Refueling modes, even if Hot Shutdown (or a higher mode) is entered during the subsequent plant response. In particular, the fission product barrier EALs are applicable only to events that initiate in the Hot Shutdown mode or higher.

3.2.3 Classification of Imminent Conditions

Although EALs provide specific thresholds, the Site Emergency Director (SED) must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (that is, a change in the ECL is IMMINENT). If, in the judgment of the Site Emergency Director (SED), meeting an EAL is IMMINENT, the emergency classification should be made as if the EAL has been met. While applicable to all emergency classification

levels, this approach is particularly important at the higher emergency classification levels since it provides additional
time for implementation of protective measures.

3.2.4 Emergency Classification Level Upgrading and Termination

Once a classification level is declared, no downgrade to a lower classification will be allowed. An ECL may be terminated when the event or condition that meets the highest IC and EAL no longer exists, and other site-specific termination requirements are met.

As noted above, guidance concerning classification of rapidly escalating events or conditions is provided in RIS 2007-02 (ref. 4.1.2).

3.2.5 Classification of Short-Lived Events

Event-based ICs and EALs define a variety of specific occurrences that have potential or actual safety significance. By their nature, some of these events may be short-lived and, thus, over before the emergency classification assessment can be completed. If an event occurs that meets or exceeds an EAL, the associated ECL must be declared regardless of its continued presence at the time of declaration. Examples of such events include an earthquake or a failure of the reactor protection system to automatically trip the reactor followed by a successful manual trip.

3.2.6 Classification of Transient Conditions

Many of the ICs and/or EALs employ time-based criteria. These criteria will require that the IC/EAL conditions be present for a defined period of time before an emergency declaration is warranted. In cases where no time-based criterion is specified, it is recognized that some transient conditions may cause an EAL to be met for a brief period of time (for example, a few seconds to a few minutes). The following guidance should be applied to the classification of these conditions.

EAL momentarily met during expected plant response - In instances where an EAL is briefly met during an expected (normal) plant response, an emergency declaration is not warranted provided that associated systems and components are operating as expected, and operator actions are performed in accordance with procedures.

EAL momentarily met but the condition is corrected prior to an emergency declaration - If an operator takes prompt manual action to address a condition, and the action is successful in correcting the condition prior to the emergency declaration, then the applicable EAL is not considered met and the associated emergency declaration is not required. For illustrative purposes, consider the following example:

> An ATWS occurs and the high pressure ECCS systems fail to automatically start. RCS level rapidly decreases and the plant enters an inadequate core cooling condition (a potential loss of both the fuel clad and RCS barriers). If an operator manually starts a high pressure ECCS system in accordance with an EOP step and clears the inadequate core

cooling condition prior to an emergency declaration, then the classification should be based on the ATWS only.

It is important to stress that the 15-minute emergency classification assessment period (process clock) is not a "grace period" during which a classification may be delayed to allow the performance of a corrective action that would obviate the need to classify the event. Emergency classification assessments must be deliberate and timely, with no undue delays. The provision discussed above addresses only those rapidly evolving situations when an operator is able to take a successful corrective action prior to the Site Emergency Director (SED) completing the review and steps necessary to make the emergency declaration. This provision is included to ensure that any public protective actions resulting from the emergency classification are truly warranted by the plant conditions.

3.2.7 After-the-Fact Discovery of an Emergency Event or Condition

In some cases, an EAL may be met but the emergency classification was not made at the time of the event or condition. This situation can occur when personnel discover that an event or condition existed which met an EAL, but no emergency was declared, and the event or condition no longer exists at the time of discovery. This may be due to the event or condition not being recognized at the time or an error that was made in the emergency classification process.

In these cases, no emergency declaration is warranted; however, the guidance contained in NUREG-1022 (ref. 4.1.3) is applicable. Specifically, the event should be reported to the NRC in accordance with 10 CFR § 50.72 (ref. 4.1.4) within one hour of the discovery of the undeclared event or condition. The licensee should also notify appropriate State and local agencies in accordance with the agreed upon arrangements.

3.2.8 Retraction of an Emergency Declaration

Guidance on the retraction of an emergency declaration reported to the NRC is discussed in NUREG-1022 (ref. 4.1.3).

4.0 REFERENCES

4.1 Developmental

- 4.1.1 NEI 99-01 Revision 6, Methodology for the Development of Emergency Action Levels for Non-Passive Reactors, ADAMS Accession Number ML12326A805
- 4.1.2 RIS 2007-02 Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events, February 2, 2007.
- 4.1.3 NUREG-1022 Event Reporting Guidelines: 10CFR50.72 and 50.73
- 4.1.4 10 § CFR 50.72 Immediate Notification Requirements for Operating Nuclear Power Reactors
- 4.1.5 10 § CFR 50.73 License Event Report System
- 4.1.6 SQN FSAR Section 2.1.1 Site Location and Description
- 4.1.7 Technical Specifications Table 1.1-1 Modes
- 4.1.8 NSIR/DPR-ISG-01 Interim Staff Guidance, Emergency Planning for Nuclear Power Plants
- 4.1.9 SQN Offsite Dose Calculation Manual (ODCM)

4.2 Implementing

- 4.2.1 EPIP-1, Emergency Plan Classification Logic
- 4.2.2 NEI 99-01 Rev. 6 to SQN EAL Comparison Matrix
- 4.2.3 SQN EAL Wallboard

5.0 DEFINITIONS, ACRONYMS & ABBREVIATIONS

5.1 DEFINITIONS (REF. 4.1.1 EXCEPT AS NOTED)

Selected terms used in Initiating Condition and Emergency Action Level statements are set in all capital letters (for example, ALL CAPS). These words are defined terms that have specific meanings as used in this document. The definitions of these terms are provided below.

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

CONFINEMENT BOUNDARY: Spent Fuel Storage Canister CONFINEMNT BOUNDARY consists of MPC shell, bottom base plate, MPC lid (including the vent and drain port cover plates), MPC closure ring, and associated welds.

CONTAINMENT CLOSURE: Containment condition where at least one integral barrier to the release of radioactive material is provided. Sufficient separation of the containment atmosphere from the outside environment is provided such that a barrier to the escape of radioactive material is reasonably expected to remain in place following a core melt accident.

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.

EPA PAGs: Environment Protection Agency Protective Action Guidelines. The EPA PAGs are expressed in terms of dose commitment: 1 Rem TEDE or 5 Rem CDE Thyroid. Actual or projected offsite exposures in excess of the EPA PAGs requires TVA to recommend protective actions for the general public to offsite planning agencies.

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.

FAULTED: The term applied to a steam generator that has a steam leak on the secondary side of sufficient size to cause an uncontrolled drop in steam generator pressure or the steam generator to become completely depressurized.

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

FLOODING: A condition where water is entering a room or area faster than installed equipment is capable of removal, resulting in a rise of water level within the room or area.

GENERAL EMERGENCY: 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 actions that result 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.

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

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

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

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.

IMPEDE(D): Personnel access to a room or area is hindered to an extent that extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (for example, requiring use of protective equipment, such as SCBAs, that is not routinely employed).

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.

OWNER CONTROLLED AREA: The TVA-owned site property under the control of Site Security.

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

PROTECTED AREA: The area which is encompassed by the security fence and to which access is controlled.

REFUELING PATHWAY: The reactor refueling cavity, spent fuel pool, or fuel transfer canal.

RUPTURE(D): The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection.

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.

SITE AREA EMERGENCY: 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 actions that result 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 Guidelines exposure levels beyond the site boundary.

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.

UNUSUAL EVENT: Events are in progress or have occurred which indicate a potential degradation in 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.

VALID: An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

VISIBLE DAMAGE: Damage to multiple components, or one or more structures, that are 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 components in the area. Events that result in visible damage to one component, and does not appear to affect other components, do not meet the intent of this definition as the failure of a single component, regardless of cause, is well within the operational controls provided by a licensee’s Technical Specifications and Operating Procedures. However, visible damage to more than one component does meet this definition, as well as visible damage to a structure.

5.2 Abbreviations/Acronyms

AC ... Alternating Current
AOP ... Abnormal Operating Procedure
ATWS ... Anticipated Transient Without Scram
CDE ... Committed Dose Equivalent
CFR ... Code of Federal Regulations
CTMT/CNMT ... Containment
CSF ... Critical Safety Function
CSFST ... Critical Safety Function Status Tree
DBA ... Design Basis Accident
DC ... Direct Current
EAL ... Emergency Action Level
ECCS ... Emergency Core Cooling System
ECL ... Emergency Classification Level
EOF ... Emergency Operations Facility
EOP ... Emergency Operating Procedure
EPA ... Environmental Protection Agency
EPG ... Emergency Procedure Guideline
EPIP ... Emergency Plan Implementing Procedure
EPRI ... Electric Power Research Institute
ERG ... Emergency Response Guideline
FAA ... Federal Aviation Administration
FBI ... Federal Bureau of Investigation
FEMA ... Federal Emergency Management Agency
FSAR ... Final Safety Analysis Report
GE ... General Emergency
HOO ... Headquarters Operations Officer
IC ... Initiating Condition
ID ... Inside Diameter
IPEEE ... Individual Plant Examination of External Events (Generic Letter 88-20)
ISFSI ... Independent Spent Fuel Storage Installation
Keff ... Effective Neutron Multiplication Factor
LCO ... Limiting Condition of Operation
LOCA ... Loss of Coolant Accident
MCR ... Main Control Room
MSIV ... Main Steam Isolation Valve
MSL ... Main Steam Line
mR, mRem, mrem, mREM ... milli-Roentgen Equivalent Man
MW ... Megawatt
NEI ... Nuclear Energy Institute
NPP ... Nuclear Power Plant
NRC ... Nuclear Regulatory Commission
NSSS ... Nuclear Steam Supply System
NORAD ... North American Aerospace Defense Command
NOUE ... (Notification Of) Unusual Event
OBE ... Operating Basis Earthquake
OCA ... Owner Controlled Area

ODCM..Offsite Dose Calculation Manual
ORO ....Off-site Response Organization
PA ....Protected Area
PAG...Protective Action Guideline
PRA/PSA ....Probabilistic Risk Assessment / Probabilistic Safety Assessment
PWR..Pressurized Water Reactor
PS .... Protection System
PSIG...Pounds per Square Inch Gauge
R... Roentgen
RCC...Reactor Control Console
RCS ....Reactor Coolant System
Rem, rem, REM ....Roentgen Equivalent Man
RETS...Radiological Effluent Technical Specifications
RPS ....Reactor Protection System
RPV...Reactor Pressure Vessel
RVLIS .... Reactor Vessel Level Instrumentation System
SAR.. Safety Analysis Report
SBO ....Station Blackout
SCBA .... Self-Contained Breathing Apparatus
SED ....Site Emergency Director
SG ....Steam Generator
SI .... Safety Injection
SPDS ....Safety Parameter Display System
SRO.. Senior Reactor Operator
TEDE ....Total Effective Dose Equivalent
TOAF ....Top of Active Fuel
TSC .... Technical Support Center
WOG .... Westinghouse Owners Group

ATTACHMENT 1 EAL Bases

RG1

ECL: General Emergency

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The SED should declare the General Emergency 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.
- 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) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Shield Building, 1,2-RM-90-400	1.34E+09 µCi/s
Steam Generator Discharge (Main Steam Line Monitors) 1,2-RM-90-421 thru -424[1]	4.68E+02 µCi/cc
Condenser Vacuum Exhaust, 1,2-RM-90-255/256	1.12E+06 mR/h

(1) These unit values are based on flow rates through one PORV of 890,000 lb/hr at 1078.7 psia with 0.25% carry over (0.9975 quality). Before using these values, ensure a release to the environment is ongoing (e.g., PORV).

(2) Dose assessment using actual meteorology indicates doses greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the site boundary.

(3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:

- Closed window dose rates greater than 1,000 mR/hr expected to continue for 60 minutes or longer.
- Analyses of field survey samples indicate thyroid CDE greater than 5,000 mrem for one hour of inhalation.

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 1,000 mrem while the 5,000 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

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.

References
SQN Calculation SQS520247
SQN ODCM
NEI 99-01 R6 AG1

RG2

ECL: General Emergency

Initiating Condition: Spent fuel pool level cannot be restored to at least 701.9′ for 60 minutes or longer.

Operating Mode Applicability: All

Emergency Action Levels:

Note:	The SED should declare the General Emergency promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.

(1) Spent fuel pool level cannot be restored to at least 701.9′ 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 uncovery 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.

References

NRC EA-12-51 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
SQN Design Change Notice D23195
NEI 99-01 R6 AG2

RS1

ECL: Site Area Emergency

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The SED should declare the Site Area Emergency 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.
- 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) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Shield Building, 1,2-RM-90-400	1.34E+08 μCi/s
Steam Generator Discharge (Main Steam Line Monitors) 1,2-RM-90-421 thru -424[(1)]	4.68E+01 μCi/cc
Condenser Vacuum Exhaust 1,2-RM-90-255/256	1.12E+05 mR/h

(1) These unit values are based on flow rates through one PORV of 890,000 lb/hr at 1078.7 psia with 0.25% carry over (0.9975 quality). Before using these values, ensure a release to the environment is ongoing (e.g., PORV).

(2) Dose assessment using actual meteorology indicates doses greater than 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the site boundary.

(3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:

- Closed window dose rates greater than 100 mR/hr expected to continue for 60 minutes or longer.
- Analyses of field survey samples indicate thyroid CDE greater than 500 mrem for one hour of inhalation.

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 1,000 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.

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.

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

References

SQN Calculation SQS520247
SQN ODCM
NEI 99-01 R6 AS1

RS2

ECL: Site Area Emergency

Initiating Condition: Spent fuel pool level at 701.9′.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Lowering of spent fuel pool level to 701.9′.

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.

References

NRC EA-12-51 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
SQN Design Change Notice D23195
NEI 99-01 R6 AS2

RA1

ECL: Alert

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: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Notes:

- The SED should declare the Alert 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.
- 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) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Shield Building, 1,2-RM-90-400	1.34E+07 µCi/s
Steam Generator Discharge (Main Steam Line Monitors)1,2-RM-90-421 thru -424[(1)]	4.68E+00 µCi/cc
Condenser Vacuum Exhaust 1,2-RM-90-255/256	1.12E+04 mR/h

(1) These unit values are based on flow rates through one PORV of 890,000 lb/hr at 1078.7 psia with 0.25% carry over (0.9975 quality). Before using these values, ensure a release to the environment is ongoing (e.g., PORV).

(2) Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the site boundary.

(3) Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the site boundary for one hour of exposure.

(4) Field survey results indicate **EITHER** of the following at or beyond the site boundary:

- Closed window dose rates greater than 10 mR/hr expected to continue for 60 minutes or longer.
- Analyses of field survey samples indicate thyroid CDE greater than 50 mrem for one hour 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 (for example, 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 1,000 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.

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.

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

References
SQN Calculation SQS520247
SQN ODCM
NEI 99-01 R6 AA1

RA2

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

(1) Uncovery of irradiated fuel in the REFUELING PATHWAY.

(2) Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by alarm or elevated reading on **ANY** of the following radiation monitors:

0-RM-90-101	Aux Building Vent Gas Monitor
0-RM-90-102	Fuel Pool Unit 2 Side
0-RM-90-103	Fuel Pool Unit 1 Side
1, 2-RM-90-130/131	Containment Purge Exhaust
1, 2-RM-90-112 A or B	Upper Containment, A-Particulate, B-Gas

(3) Lowering of spent fuel pool level to 710.9′.

Basis:

This IC addresses events that have caused IMMINENT or actual damage to an irradiated fuel assembly, or a significant lowering of water level within the spent fuel pool. 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.

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

<u>EAL #1</u>

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 uncovery of irradiated fuel. Indications of irradiated fuel uncovery may include direct or indirect visual observation (for example, 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 (for example, 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 increase 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

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 (for example, a fuel handling accident).

EAL #3

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 assembles stored in the pool.

Escalation of the emergency classification level would be via ICs RS1 or RS2.

References
0-AR-M12-A
NRC EA-12-51 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
SQN Design Change Notice D23195
NEI 99-01 R6 AA2

RA3

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

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) Dose rate greater than 15 mR/hr in **ANY** of the following areas requiring continuous occupancy:

- Control Room (RM-90-135)
- Central Alarm Station (by survey)

(2) An UNPLANNED event results in radiation levels that prohibit or impede access to any Table H1 plant rooms or areas:

Table H1 - Safe Operation & Shutdown Rooms/Areas		
Aux. BLDG./ Elevation	**Room**	**MODE**
Elev 749	480V Board Room 1A	3, 4, 5
	480V Board Room 1B	3, 4, 5
	480V Board Room 2A	3, 4, 5
	480V Board Room 2B	3, 4, 5
Elev 734	6.9 Kv and 480V SD Bd Room A	3, 4, 5
	6.9 Kv and 480V SD Bd Room B	3, 4, 5
Elev 690	1A RHR HX Room	3, 4, 5
	1B RHR HX Room	3, 4, 5
	2A RHR HX Room	3, 4, 5
	2B RHR HX Room	3, 4, 5
	CCS Pump Area	3, 4, 5
Elev 653	1A RHR Pump Room	3, 4, 5
	1B RHR Pump Room	3, 4, 5
	2A RHR Pump Room	3, 4, 5
	2B RHR Pump Room	3, 4, 5

Basis:

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

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 at the time of the elevated radiation levels. 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 (for example, installing temporary shielding, 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 (that is, 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 increase 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 (for example, radiography, spent filter or resin transfer, etc.).
- The action for which room/area entry is required is of an administrative or record keeping nature (for example, 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.

References
NEI 99-01 R6 AA3

RU1

ECL: Unusual Event

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The SED should declare the Unusual Event promptly upon determining that 60 minutes 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.
- 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** effluent radiation monitor greater than 2 times the ODCM limits for 60 minutes or longer:

Shield Building, 1,2-RM-90-400	4.90E+05 μCi/sec
Aux Building Vent, 0-RM-90-101B	1.03E+05 cpm
Service Building Vent, 0-RM-90-132B	2.62E+06 cpm
Condenser Vacuum Exhaust, 1,2-RM-90-255,256	4.10E+02 mr/hr
Radwaste Monitor 0-RM-90-122	1.74E+06 cpm
SGBD 1,2-RM-90-120, 121	1.27E+06 cpm
CNDS Demin 0-RM-90-225	1.65E+06 cpm
Turbine Building Sump 0-RM-90-212	2.92 E+03 cpm

(2) Reading on **ANY** effluent radiation monitor greater than 2 times the alarm setpoint established by a current Liquid/Gaseous Release Permit for 60 minutes or longer.

(3) Sample analysis for liquid release indicates a concentration or release rate greater than 20 times the Effluent Concentration Limit for 60 minutes or longer.

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 (for example, 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.

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.

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.

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

EAL #2 - 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 (for example, radwaste, waste gas).

EAL #3 - This EAL addresses uncontrolled gaseous or liquid releases that are detected by sample analyses or environmental surveys, particularly on unmonitored pathways (for example, 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.

References

SQN Calculation SQS520247
SQN ODCM
NEI 99-01 R6 AU1

RU2

ECL: Unusual Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel.

Operating Mode Applicability: All

Emergency Action Levels:

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

- Spent Fuel Pit Level High-Low annunciator lit (M6-D3) AND SFP level less than 725’ as indicated by 0-LI-78-43 and 0-LI-78-44
- Visual personnel observation by plant personnel

AND

b. UNPLANNED rise in area radiation levels as indicated by **ANY** of the following radiation monitors:

0-RM-90-101	Aux Building Vent Gas Monitor
0-RM-90-102	Fuel Pool Unit 2 Side
0-RM-90-103	Fuel Pool Unit 1 Side
1, 2-RM-90-130/131	Containment Purge Exhaust
1, 2-RM-90-112 A or B	Upper Containment, A-Particulate, B-Gas

Basis:

This IC addresses a decrease 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 decrease will be primarily determined by indications from available level instrumentation. Other sources of level indications may include reports from plant personnel (for example, from a refueling crew) or video camera observations (if available). A significant drop in the water level may also cause an increase 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 increase 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.

References
0-AR-M12-A
NEI 99-01 R6 AU2

CG1

ECL: General Emergency

Initiating Condition: Loss of RCS inventory affecting fuel clad integrity with containment challenged.

Operating Mode Applicability: Threshold Value (1): Cold Shutdown
Threshold Value (2): Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note:

The SED should declare the General Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

(1) a. RVLIS Static level less than 64% for 30 minutes or longer. (MODE 5)

AND

b. **ANY** indication from Containment Challenge Table C1.

(2) a. RCS level cannot be monitored for 30 minutes or longer.

AND

b. Core uncovery is indicated by **ANY** of the following:

- Erratic source range monitor indication
- UNPLANNED rise in Containment Sump, Containment Pit Sump, or Auxiliary Building Passive Sump levels of sufficient magnitude to indicate core uncovery

AND

c. **ANY** indication from Containment Challenge Table C1.

Containment Challenge Table C1
■ CONTAINMENT CLOSURE not established*
■ H_2 concentration greater than 4% by volume on H2AN-43-200 or 210
■ UNPLANNED rise in containment pressure

* If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.

Basis:

This IC addresses the inability to restore and maintain reactor vessel level above the top of active fuel with containment challenged. The RVLIS Static indication (applicable in MODE 5) of 64% is equivalent to the top of active fuel. 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 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.

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (that is, 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 uncovery event, it is unlikely that hydrogen buildup due to a core uncovery 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.

In EAL 2.b, the 30-minute criterion is tied to a readily recognizable event start time (that is, 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 uncovery has actually occurred (that is, 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 RCS 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 RCS.

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*.

References
1, 2-AR-M6-D
NEI 99-01 R6 CG1

CS1

ECL: Site Area Emergency

Initiating Condition: Loss of RCS inventory affecting core decay heat removal capability.

Operating Mode Applicability: Threshold Value (2): Cold Shutdown
Threshold Values (1), (3): Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2 or 3)

> **Note:** The SED should declare the Site Area Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

(1) a. CONTAINMENT CLOSURE not established.

AND

b. RCS level less than 694'.

(2) a. CONTAINMENT CLOSURE established.

AND

b. RVLIS Static level less than 64%. (MODE 5)

(3) a. RCS level cannot be monitored for 30 minutes or longer.

AND

b. Core uncovery is indicated by **ANY** of the following:

- Erratic source range monitor indication
- UNPLANNED rise in Containment Sump, Containment Pit Sump, or Auxiliary Building Passive Sump levels of sufficient magnitude to indicate core uncovery

Basis:

This IC addresses a significant and prolonged loss of RCS inventory control and makeup capability leading to IMMINENT fuel damage. 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. 694' is the lowest readable indication on the Mansell monitoring system and is approximately 2.5" above the bottom of the RCS Hot leg loop. The RVLIS Static indication (applicable in MODE 5) of 64% is equivalent to the top of active fuel.

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 (that is, 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 uncovery has actually occurred (that is, 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 RCS 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 RCS.

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 CG1 or RG1.

References
0-GO-13, Reactor Coolant System Drain and Fill Operations
1, 2-AR-M6-D
0-AR-M12-A
0-AR-M12-D
NEI 99-01 R6 CS1

CA1

ECL: Alert

Initiating Condition: Loss of RCS inventory.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of RCS inventory as indicated by level less than 695' 6".

(2) a. RCS level cannot be monitored for 15 minutes or longer

AND

b. UNPLANNED rise in Containment Sump, Containment Pit Sump, or Auxiliary Building Passive Sump levels due to a loss of RCS inventory.

Basis:

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

For EAL #1, a lowering of water level below 695' 6" indicates that operator actions have not been successful in restoring and maintaining RCS water level. The heat-up rate of the coolant will increase as the available water inventory is reduced. A continuing decrease in water level will lead to core uncovery.

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 (for example, loss of a Residual Heat Removal suction point). An increase in RCS temperature caused by a loss of decay heat removal capability is evaluated under IC CA3.

For EAL #2, the inability to monitor RCS 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 RCS.

The 15-minute duration for the loss of level indication was chosen because it is half of the EAL duration specified in IC CS1

If the RCS inventory level continues to lower, then escalation to Site Area Emergency would be via IC CS1.

References

0-GO-13,Reactor Coolant System Drain and Fill Operations
NEI 99-01 R6 CA1

CA2

ECL: Alert

Initiating Condition: Loss of all offsite and all onsite AC power to 6.9KV Shutdown Boards for 15 minutes or longer.

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of **ALL** offsite and **ALL** onsite AC Power to 1A and 1B 6.9KV Shutdown Boards **OR** 2A and 2B 6.9KV Shutdown Boards for 15 minutes or longer.

Basis:

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 CS1 or RS1.

References
SQN Unit 1, and 2 Technical Specification Basis 3.8.1
NEI 99-01 R6 CA2

CA3

ECL: Alert

Initiating Condition: Inability to maintain the plant in cold shutdown.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

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

(1) UNPLANNED rise in RCS temperature to greater than 200 °F for greater than the duration specified in Table C2.

Table C2-RCS Heat-up Duration Thresholds		
RCS Status	**Containment Closure Status**	**Heat-up Duration**
Not intact or in RCS Reduced Inventory	Not Established	0 minutes
	Established	20 minutes*
Intact (capable of being pressurized)	N/A	60 minutes*
* If RHR is in operation within this time frame and RCS temperature is being reduced, the EAL is not applicable.		

(2) UNPLANNED RCS pressure rise greater than 10 psig. (This Threshold does not apply during water-solid plant conditions.)

Basis:

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 an increase in RCS temperature when CONTAINMENT CLOSURE is established but the RCS is not intact, or RCS inventory is reduced. The 20-minute criterion was included to allow time for operator action to address the temperature increase.

The RCS Heat-up Duration Thresholds table also addresses an increase 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 increase without a substantial degradation in plant safety.

Finally, in the case where there is an increase in RCS temperature, the RCS is not intact or is at reduced inventory, and CONTAINMENT CLOSURE is not established, no heat-up duration is allowed (that is, 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 CS1 or RS1.

References
SQN Unit 1, and 2 Technical Specification Table 1.1-1
NEI 99-01 R6 CA3

CA6

ECL: Alert

Initiating Condition: Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode.

Operating Mode Applicability: Cold Shutdown, Refueling

Note: If the affected safety system (or component) was already inoperable or out of service before the event occurred, then no emergency classification is warranted as long as the damage was limited to this affected safety system or component.

Emergency Action Levels:

(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
- River reservoir level less than 670' as reported by River Operations
- River reservoir level at Stage II flood warning as reported by River Operations
- Other events with similar hazard characteristics as determined by the Shift Manager

AND

b. **EITHER** of the following:

- Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode.
- The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode.

Basis:

This IC addresses a hazardous event that causes damage to a SAFETY SYSTEM, or a structure containing SAFETY SYSTEM components, needed for the current operating mode. This condition significantly reduces the margin to a loss or potential loss of a fission product barrier, and therefore represents an actual or potential substantial degradation of the level of safety of the plant.

EAL 1.b.1st bullet addresses damage to a SAFETY SYSTEM train that is in service/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.

EAL 1.b.2nd bullet addresses damage to a SAFETY SYSTEM component that is not in service/operation or readily apparent through indications alone, or to a structure containing SAFETY SYSTEM components. Operators will make this determination 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.

Escalation of the emergency classification level would be via IC CS1 or RS1.

References
AOP-N.03, Flooding
NEI 99-01 R6 CA6

CU1

ECL: Unusual Event

Initiating Condition: UNPLANNED loss of RCS inventory for 15 minutes or longer.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) UNPLANNED loss of reactor coolant results in RCS level less than a required lower limit for 15 minutes or longer.

(2) a. RCS level cannot be monitored.

AND

b. UNPLANNED rise in Containment Sump, Containment Pit Sump, or Auxiliary Building Passive Sump levels.

Basis:

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 RCS 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.

Refueling evolutions that decrease 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 RCS 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 RCS 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 RCS.

Continued loss of RCS inventory may result in escalation to the Alert emergency classification level via either IC CA1 or CA3.

References
NEI 99-01 R6 CU1

CU2

ECL: Unusual Event

Initiating Condition: Loss of all but one AC power source to 6.9KV Shutdown Boards for 15 minutes or longer.

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. AC power capability to 1A and 1B 6.9KV Shutdown Boards **OR** 2A and 2B 6.9KV Shutdown Boards is reduced to a single power source for 15 minutes or longer.

AND

b. Any additional single power source failure will result in loss of all AC power to SAFETY SYSTEMS.

Basis:

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.

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 (for example, an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (for example, onsite diesel generators) with a single train of emergency buses being back-fed from the unit main generator.
- A loss of emergency power sources (for example, onsite diesel generators) with a single train of 6.9KV Shutdown Boards being back-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 CA2.

References
SQN Unit 1, and 2 Technical Specification Basis 3.8.1
NEI 99-01 R6 CU2

CU3

ECL: Unusual Event

Initiating Condition: UNPLANNED rise in RCS temperature.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) UNPLANNED rise in RCS temperature to greater than 200°F.

(2) Loss of **ALL** RCS temperature and RCS level indication for 15 minutes or longer.

Basis:

This IC addresses an UNPLANNED increase 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 SED should also refer to IC CA3.

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

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 increase 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 CA1 based on an inventory loss or IC CA3 based on exceeding plant configuration-specific time criteria.

References
SQN Unit 1, and 2 Technical Specification Table 1.1-1
NEI 99-01 R6 CU3

CU4

ECL: Unusual Event

Initiating Condition: Loss of Vital DC power for 15 minutes or longer.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

> **Note:** The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Indicated voltage is less than 105VDC on Technical Specification required 125VDC Vital Battery Boards:

- I and III for 15 minutes or longer.
  OR
- II and IV for 15 minutes or longer.

Basis:

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 CA1 or CA3, or an IC in Recognition Category R.

References
1,2-AR-M1-C
NEI 99-01 R6 CU4

CU5

ECL: Unusual Event

Initiating Condition: Loss of all onsite or offsite communications capabilities.

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels: (1 or 2 or 3)

1. Loss of **ALL** Table C3 Onsite communications capability affecting the ability to perform routine operations.

2. Loss of **ALL** Table C3 Offsite communication capability affecting the ability to perform offsite notifications.

3. Loss of **ALL** Table C3 NRC communication capability affecting the ability to perform NRC notifications.

Table C3 Communications Capability

System	Onsite	Offsite	NRC
Plant Radio	X		
Plant Page	X		
All telephone Lines (Private and Commercial)	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 OROs and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (for example, 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 addresses a total loss of the communications methods used in support of routine plant operations.

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are Tennessee EMA, Hamilton County, and Bradley County.

EAL #3 addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

References
SQN FSAR Section 9.5
NEI 99-01 R6 CU5

EU1

ECL: Unusual Event

Initiating Condition: Damage to a loaded canister CONFINEMENT BOUNDARY.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Damage to a loaded canister CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading at the location specified in Table I1-ISFSI Dose Limits.

Table I1- ISFSI Dose Limits				
	Cask Type			
	High Storm 100			Hi Storm FW
Location	COC 1014 Amendment 1	COC 1014 Amendment 2	COC 1014 Amendment 5	COC 1032 Amendment 0
Top of the OVERPACK	20 mrem/hr (γ + ${}_0n^1$)	40 mrem/hr (γ + ${}_0n^1$)	60 mrem/hr (γ + ${}_0n^1$)	60 mrem/hr (γ + ${}_0n^1$)
Side of the OVERPACK	100 mrem/hr (γ + ${}_0n^1$)	220 mrem/hr (γ + ${}_0n^1$)	600 mrem/hr (γ + ${}_0n^1$)	600 mrem/hr (γ + ${}_0n^1$)
Inlet & Outlet Vent Ducts	90 mrem/hr (γ + ${}_0n^1$)			

Basis:

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 issues of concern are the creation of a potential or actual release path to the environment, degradation of one or more 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.

The SQN ISFSI utilizes two designs for dry spent fuel storage:

- HI-Storm 100 Cask System
- HI-Storm FW Cask System

The HI-STORM 100 Cask System (the cask) consists of the following components: (1) interchangeable multi-purpose canisters (MPCs), which contain the fuel; (2) a storage overpack (HI-STORM 100 or 100S), |which contains the MPC during storage; and (3) a transfer cask (HI-TRAC), which contains the MPC during loading, unloading and transfer operations.

The MPC is the confinement system for the stored fuel. It is a welded, cylindrical canister with a honeycombed fuel basket, a baseplate, a lid, a closure ring, and the canister shell. It is made entirely of stainless steel except for the neutron absorbers and optional aluminum heat conduction elements. The canister shell, baseplate, lid, vent and drain port cover plates, and closure ring are the main confinement boundary components.

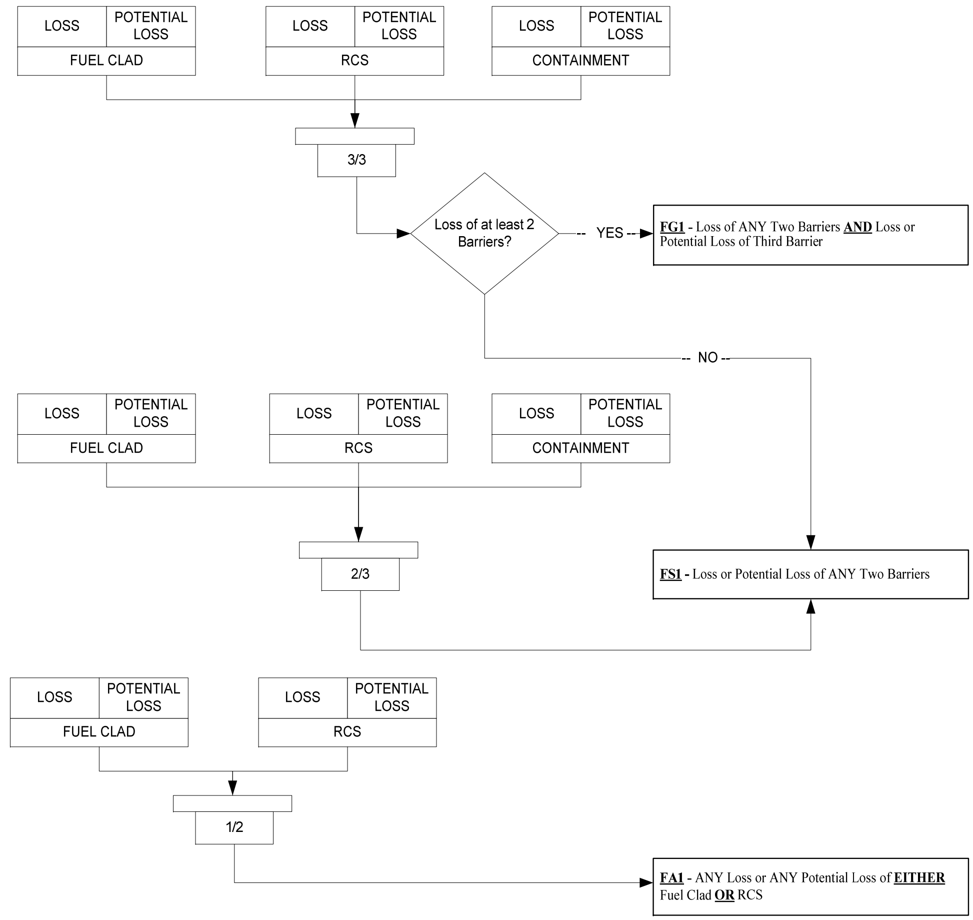
The HI-STORM FW MPC Storage System consists of the following components: (1) interchangeable multipurpose canisters (MPCs), which contain the fuel; (2) a storage overpack (HI-STORM FW), which contains the MPC during storage; and (3) a transfer cask (HI-TRAC VW), which contains the MPC during loading, unloading and transfer operations.

The MPC is the confinement system for the stored fuel. It is a welded, cylindrical canister with a honeycombed fuel basket, a baseplate, a lid, a closure ring, and the canister shell. All MPC components that may come into contact with spent fuel pool water or the ambient environment are made entirely of stainless steel or passivated aluminum/aluminum alloys. The canister shell, baseplate, lid, vent and drain port cover plates, and closure ring are the main confinement boundary components. All confinement boundary components are made entirely of stainless steel.

References
Certificate of Compliance 1014, Amendments 1, 2, and 5
Certificate of Compliance 1032, Amendment 0
NEI 99-01, R6 E-HU1

9. FISSION PRODUCT BARRIER ICs/EALs

GENERAL EMERGENCY	
FG1	Loss of any two barriers and Loss or Potential Loss of the third barrier. *Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown*
SITE AREA EMERGENCY	
FS1	Loss or Potential Loss of any two barriers. *Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown*
ALERT	
FA1	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier. *Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown*



Fission Product Barrier Table

Thresholds for LOSS or POTENTIAL LOSS of Barriers

FG1 GENERAL EMERGENCY	FS1 SITE AREA EMERGENCY	FA1 ALERT
Loss of any two barriers and Loss or Potential Loss of the third barrier.	Loss or Potential Loss of any two barriers.	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier.

Fuel Clad Barrier		**RCS Barrier**		**Containment Barrier**	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
1. RCS or SG Tube Leakage		**1. RCS or SG Tube Leakage**		**1. RCS or SG Tube Leakage**	
Not Applicable	A. Core Cooling CSF - ORANGE entry conditions met	A. An automatic or manual SI actuation is required by **EITHER** of the following: 1. UNISOLABLE RCS leakage **OR** 2. SG tube RUPTURE.	A. Operation of a standby charging pump is required by **EITHER** of the following: 1. UNISOLABLE RCS leakage **OR** 2. SG tube leakage. **OR** B. PTS CSF - RED entry conditions met	A. A leaking or RUPTURED SG is FAULTED outside of containment.	Not Applicable

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
2. Inadequate Heat Removal		**2. Inadequate Heat Removal**		**2. Inadequate Heat Removal**	
A. Core Cooling CSF - RED entry conditions met	A. Core Cooling CSF - ORANGE entry conditions met **OR** B. Heat Sink CSF - RED entry conditions met (if heat sink required)	Not Applicable	A. Heat Sink CSF - RED entry conditions met (if heat sink required)	Not Applicable	A. Core Cooling CSF - RED entry conditions met for 15 minutes or longer

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
3. RCS Activity / Containment Radiation		**3. RCS Activity / Containment Radiation**		**3. RCS Activity / Containment Radiation**	
A. Containment radiation monitor reading greater than : 2.5E+02 R/hr on RM-90-271A AND 2.5E+02 R/hr on RM-90-272A **OR** 1.5E+02 R/hr on RM-90-273A AND 2.1E+02 R/hr on RM-90-274A **OR** B. Coolant activity greater than 300 µCi/gm dose equivalent Iodine - 131.	Not Applicable	A. Containment radiation monitor reading greater than : 9.70E+01 R/hr on RM-90-271A AND 9.70E+01 R/hr on RM-90-272A **OR** 5.01E+01 R/hr on RM-90-273A AND 7.26E+01 R/hr on RM-90-274A	Not Applicable	Not Applicable Note: Containment Radiation Monitors are temperature sensitive and can be affected by temperature-induced currents. These monitors should be used for trending only for 2 minutes after a Steam Line Break or LOCA. Once 2 minutes has expired these monitors can be used for EAL determination.	A. Containment radiation monitor reading greater than 5.8E+03 R/hr on RM-90-271A AND 5.8E+03 R/hr on RM-90-272A **OR** 3.4E+03 R/hr on RM-90-273A AND 4.9E+03 R/hr on RM-90-274A

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
4. Containment Integrity or Bypass		**4. Containment Integrity or Bypass**		**4. Containment Integrity or Bypass**	
Not Applicable	Not Applicable	Not Applicable	Not Applicable	A. Containment isolation is required **AND** **EITHER** of the following: 1. Containment integrity has been lost based on SED judgment. **OR** 2. UNISOLABLE pathway from the containment to the environment exists. **OR** B. Indications of RCS leakage outside of containment.	A. Containment CSF - RED entry conditions met **OR** B. Cont H_2 greater than 4% by volume on H2AN-43-200 or 210 **OR** C. 1. Containment pressure greater than 2.8 PSIG (Phase B) **AND** 2. Less than one full train of Containment Spray is operating per design for 15 minutes or longer.
5. Other Indications		**5. Other Indications**		**5. Other Indications**	
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
6. SED Judgment		**6. SED Judgment**		**6. SED Judgment**	
A. **ANY** condition in the opinion of the SED that indicates Loss of the Fuel Clad Barrier.	A. **ANY** condition in the opinion of the SED that indicates Potential Loss of the Fuel Clad Barrier.	A. **ANY** condition in the opinion of the SED that indicates Loss of the RCS Barrier.	A. **ANY** condition in the opinion of the SED that indicates Potential Loss of the RCS Barrier.	A. **ANY** condition in the opinion of the SED that indicates Loss of the Containment Barrier.	A. **ANY** condition in the opinion of the SED that indicates Potential Loss of the Containment Barrier.

Basis Information For
Fission Product Barrier Table

FUEL CLAD BARRIER THRESHOLDS:

The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.

1. RCS or SG Tube Leakage

There is no Loss threshold associated with RCS or SG Tube Leakage.

Potential Loss 1.A

This reading indicates a reduction in reactor vessel water level sufficient to allow the onset of heat-induced cladding damage.

2. Inadequate Heat Removal

Loss 2.A

This reading indicates temperatures within the core are sufficient to cause significant superheating of reactor coolant.

Potential Loss 2.A

This reading indicates temperatures within the core are sufficient to allow the onset of heat-induced cladding damage.

Potential Loss 2.B

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (that is, loss of an effective secondary-side heat sink). This condition represents a potential loss of the Fuel Clad Barrier. In accordance with EOPs, there may be unusual accident conditions during which operators intentionally reduce the heat removal capability of the steam generators; during these conditions, classification using threshold is not warranted.

Meeting this threshold results in a Site Area Emergency because this threshold is identical to RCS Barrier Potential Loss threshold 2.A; both will be met. This condition warrants a Site Area Emergency declaration because inadequate RCS heat removal may result in fuel heat-up sufficient to damage the cladding and increase RCS pressure to the point where mass will be lost from the system.

3. RCS Activity / Containment Radiation

Loss 3.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals 300 μCi/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 Loss threshold 3.A 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.

<u>Loss 3.B</u>

This threshold indicates that RCS radioactivity concentration is greater than 300 μCi/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.

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

4. Containment Integrity or Bypass

Not Applicable (included for numbering consistency)

5. Other Indications

Not Applicable (included for numbering consistency)

6. SED Judgment

<u>Loss 6.A</u>

This threshold addresses any other factors that may be used by the SED in determining whether the Fuel Clad Barrier is lost.

<u>Potential Loss 6.A</u>

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

RCS BARRIER THRESHOLDS:

The RCS Barrier includes the RCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.

1. RCS or SG Tube Leakage

Loss 1.A

This threshold is based on an UNISOLABLE RCS leak of sufficient size to require an automatic or manual actuation of Safety Injection. This condition clearly represents a loss of the RCS Barrier.

This threshold is applicable to unidentified and pressure boundary leakage, as well as identified leakage. It is also applicable to UNISOLABLE RCS leakage through an interfacing system. The mass loss may be into any location – inside containment, to the secondary-side (that is, steam generator tube leakage) or outside of containment.

A steam generator with primary-to-secondary leakage of sufficient magnitude to require a safety injection is considered to be RUPTURED. If a RUPTURED steam generator is also FAULTED outside of containment, the declaration escalates to a Site Area Emergency since the Containment Barrier Loss threshold 1.A will also be met.

Potential Loss 1.A

This threshold is based on an UNISOLABLE RCS leak that results in the inability to maintain pressurizer level within specified limits by operation of a normally used charging pump, but an ECCS (SI) actuation has not occurred. The threshold is met when an operating procedure, or operating crew supervision, directs that a standby charging pump be placed in service to restore and maintain pressurizer level.

This threshold is applicable to unidentified and pressure boundary leakage, as well as identified leakage. It is also applicable to UNISOLABLE RCS leakage through an interfacing system. The mass loss may be into any location – inside containment, to the secondary-side (that is, steam generator tube leakage) or outside of containment.

This condition indicates an extreme challenge to the integrity of the RCS pressure boundary due to pressurized thermal shock – a transient that causes rapid RCS cooldown while the RCS is in Mode 3 or higher (that is, hot and pressurized).

2. Inadequate Heat Removal

There is no Loss threshold associated with Inadequate Heat Removal.

Potential Loss 2.A

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (that is, loss of an effective secondary-side heat sink). This condition represents a potential loss of the RCS Barrier. In accordance with EOPs, there may be unusual accident conditions during which operators intentionally reduce the heat removal capability of the steam generators; during these conditions, classification using threshold is not warranted.

Meeting this threshold results in a Site Area Emergency because this threshold is identical to Fuel Clad Barrier Potential Loss threshold 2.B; both will be met. This condition warrants a Site Area Emergency declaration because inadequate RCS heat removal may result in fuel heat-up sufficient to damage the cladding and increase RCS pressure to the point where mass will be lost from the system.

3. RCS Activity / Containment Radiation

Loss 3.A

The gamma dose rate resulting from a postulated loss of coolant accident (LOCA) is monitored by the containment high range monitors, RM-90-271 thru 274. RM-90-271 thru 274 are located inside containment. The detector range is approximately 1 to 1xE8 R/hr (logarithmic scale). Radiation Monitors RM-90-271 thru 274 provide a diverse means of measuring the containment for high level gamma radiation.

The value specified represents, based on core damage assessment procedure CECC-EPIP-19, Attachment 2, Figures 1 thru 3, the expected containment high range radiation monitor (RM-90-271 thru 274) response based on a LOCA, at T=0 after shutdown with no fuel failure and RCS Activity at 10% of the TS Limit.

The value is derived as follows:
CECC-EPIP-19, Attachment 2, Figures 1-3 Containment Radiation Level vs. Time for RCS Release at T=0 multiplied by a factor of 10.
The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals Technical Specification allowable limits. This value is lower than that specified for Fuel Clad Barrier Loss threshold C.1 since it indicates a loss of the RCS Barrier only.

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

4. Containment Integrity or Bypass

Not Applicable (included for numbering consistency)

5. Other Indications

Not Applicable (included for numbering consistency)

6. SED Judgment

Loss 6.A

This threshold addresses any other factors that may be used by the SED in determining whether the RCS Barrier is lost.

Potential Loss 6.A

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

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CONTAINMENT BARRIER THRESHOLDS:

The Containment Barrier includes the containment building and connections up to and including the outermost containment isolation valves. This barrier also includes the main steam, feedwater, and blowdown line extensions outside the containment building up to and including the outermost secondary side isolation valve. Containment Barrier thresholds are used as criteria for escalation of the ECL from Alert to a Site Area Emergency or a General Emergency.

1. RCS or SG Tube Leakage

<u>Loss 1.A</u>

This threshold addresses a leaking or RUPTURED Steam Generator (SG) that is also FAULTED outside of containment. The condition of the SG, whether leaking or RUPTURED, is determined in accordance with the thresholds for RCS Barrier Potential Loss 1.A and Loss 1.A, respectively. This condition represents a bypass of the containment barrier.

FAULTED is a defined term within the NEI 99-01 methodology; this determination is not necessarily dependent upon entry into, or diagnostic steps within, an EOP. For example, if the pressure in a steam generator is decreasing uncontrollably [part of the FAULTED definition] and the faulted steam generator isolation procedure is not entered because EOP user rules are dictating implementation of another procedure to address a higher priority condition, the steam generator is still considered FAULTED for emergency classification purposes.

The FAULTED criterion establishes an appropriate lower bound on the size of a steam release that may require an emergency classification. Steam releases of this size are readily observable with normal Control Room indications. The lower bound for this aspect of the containment barrier is analogous to the lower bound criteria specified in IC SU3 for the fuel clad barrier (that is, RCS activity values) and IC SU4 for the RCS barrier (that is, RCS leak rate values).

This threshold also applies to prolonged steam releases necessitated by operational considerations such as the forced steaming of a leaking or RUPTURED steam generator directly to atmosphere to cooldown the plant, or to drive an auxiliary feed water pump. These types of conditions will result in a significant and sustained release of radioactive steam to the environment (and are thus similar to a FAULTED condition). The inability to isolate the steam flow without an adverse effect on plant cooldown meets the intent of a loss of containment.

Steam releases associated with the expected operation of a SG power operated relief valve or safety relief valve do not meet the intent of this threshold. Such releases may occur intermittently for a short period of time following a reactor trip as operators process through emergency operating procedures to bring the plant to a stable condition and prepare to initiate a plant cooldown. Steam releases associated with the unexpected operation of a valve (for example, a stuck-open safety valve) do meet this threshold.

Following an SG tube leak or rupture, there may be minor radiological releases through a secondary-side system component (for example, air ejectors, gland seal exhausters, valve packing, etc.). These types of releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category R ICs.

The emergency classification levels resulting from primary-to-secondary leakage, with or without a steam release from the FAULTED SG, are summarized below.

	Affected SG is FAULTED Outside of Containment?	
P-to-S Leak Rate	**Yes**	**No**
Less than or equal to 25 gpm	No classification	No classification
Greater than 25 gpm	Unusual Event per SU4	Unusual Event per SU4
Requires operation of a standby charging pump (*RCS Barrier Potential Loss*)	Site Area Emergency per FS1	Alert per FA1
Requires an automatic or manual ECCS (SI) actuation (*RCS Barrier Loss*)	Site Area Emergency per FS1	Alert per FA1

There is no Potential Loss threshold associated with RCS or SG Tube Leakage.

2. Inadequate Heat Removal

There is no Loss threshold associated with Inadequate Heat Removal.

<u>Potential Loss 2.A</u>

This condition represents an IMMINENT core melt sequence which, if not corrected, could lead to vessel failure and an increased potential for containment failure. For this condition to occur there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. If implementation of a procedure(s) to restore adequate core cooling is not effective (successful) within 15 minutes, it is assumed that the event trajectory will likely lead to core melting and a subsequent challenge of the Containment Barrier.

The restoration procedure is considered “effective” if core exit thermocouple readings are decreasing and/or if reactor vessel level is increasing. Whether or not the procedure(s) will be effective should be apparent within 15 minutes. The SED should escalate the emergency classification level as soon as it is determined that the procedure(s) will not be effective.

Severe accident analyses (for example, NUREG-1150) have concluded that function restoration procedures can arrest core degradation in a significant fraction of core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it is appropriate to provide 15 minutes beyond the required entry point to determine if procedural actions can reverse the core melt sequence.

3. RCS Activity / Containment Radiation

There is no Loss threshold associated with RCS Activity / Containment Radiation.

Potential Loss 3.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the 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.

Containment Radiation Monitors are temperature sensitive and can be affected by temperature-induced currents. These monitors should be used for trending only for 2 minutes after a Steam Line Break or LOCA. Once 2 minutes has expired these monitors can be used for EAL determination.

4. Containment Integrity or Bypass

Loss 4.A

These thresholds address a situation where containment isolation is required and one of two conditions exists as discussed below. Users are reminded that there may be accident and release conditions that simultaneously meet both thresholds 4.A.1 and 4.A.2.

4.A.1 – Containment integrity has been lost, that is, the actual containment atmospheric leak rate likely exceeds that associated with allowable leakage (or sometimes referred to as design leakage). Following the release of RCS mass into containment, containment pressure will fluctuate based on a variety of factors; a loss of containment integrity condition may (or may not) be accompanied by a noticeable drop in containment pressure. Recognizing the inherent difficulties in determining a containment leak rate during accident conditions, it is expected that the SED will assess this threshold using judgment, and with due consideration given to current plant conditions, and available operational and radiological data (for example, containment pressure, readings on radiation monitors outside containment, operating status of containment pressure control equipment, etc.).

Refer to the middle piping run of Figure 9-F-4. Two simplified examples are provided. One is leakage from a penetration and the other is leakage from an in-service system valve. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure.

Another example would be a loss or potential loss of the RCS barrier, and the simultaneous occurrence of two FAULTED locations on a steam generator where one fault is located inside containment (for example, on a steam or feedwater line) and the other outside of containment. In this case, the associated steam line provides a pathway for the containment atmosphere to escape to an area outside the containment.

Following the leakage of RCS mass into containment and a rise in containment pressure, there may be minor radiological releases associated with allowable (design) containment leakage through various penetrations or system components. These releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category R ICs.

4.A.2 – Conditions are such that there is an UNISOLABLE pathway for the migration of radioactive material from the containment atmosphere to the environment. As used here, the term "environment" includes the atmosphere of a room or area, outside the containment, that may, in turn, communicate with the outside-the-plant atmosphere (for example, through discharge of a ventilation system or atmospheric leakage). Depending upon a variety of factors, this condition may or may not be accompanied by a noticeable drop in containment pressure.

Refer to the top piping run of Figure 9-F-4. In this simplified example, the inboard and outboard isolation valves remained open after a containment isolation was required (that is, containment isolation was not successful). There is now an UNISOLABLE pathway from the containment to the environment.

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 (that is, retention ability has been exceeded) or water saturation from steam/high humidity in the release stream.

Leakage between two interfacing liquid systems, by itself, does not meet this threshold.

Refer to the bottom piping run of Figure 9-F-4. In this simplified example, leakage in an RCP seal cooler is allowing radioactive material to enter the Auxiliary Building. The radioactivity would be detected by the Process Monitor. If there is no leakage from the closed water cooling system to the Auxiliary Building, then no threshold has been met. If the pump or system piping developed a leak that allowed steam/water to enter the Auxiliary Building, then threshold 4.B would be met. Depending upon radiation monitor locations and sensitivities, this leakage could be detected by any of the four monitors depicted in the figure and cause threshold 4.A.1 to be met as well.

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

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Loss Threshold 1.A.

<u>Loss 4.B</u>

Containment sump, temperature, pressure and/or radiation levels will increase if reactor coolant mass is leaking into the containment. If these parameters have not increased, then the reactor coolant mass may be leaking outside of containment (that is, a containment bypass sequence).

Increases in sump, temperature, pressure, flow and/or radiation level readings outside of the containment may indicate that the RCS mass is being lost outside of containment.

Unexpected elevated readings and alarms on radiation monitors with detectors outside containment should be corroborated with other available indications to confirm that the source is a loss of RCS mass outside of containment. If the fuel clad barrier has not been lost, radiation monitor readings outside of containment may not increase significantly; however, other unexpected changes in sump levels, area temperatures or pressures, flow rates, etc. should be sufficient to determine if RCS mass is being lost outside of the containment.

Refer to the middle piping run of Figure 9-F-4. In this simplified example, a leak has occurred at a reducer on a pipe carrying reactor coolant in the Auxiliary Building. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure and cause threshold 4.A.1 to be met as well.

To ensure proper escalation of the emergency classification, the RCS leakage outside of containment must be related to the mass loss that is causing the RCS Loss and/or Potential Loss threshold 1.A to be met.

<u>Potential Loss 4.A</u>

If containment pressure exceeds the design pressure, there exists a potential to lose the Containment Barrier. To reach this level, there must be an inadequate core cooling condition for an extended period of time; therefore, the RCS and Fuel Clad barriers would already be lost. Thus, this threshold is a discriminator between a Site Area Emergency and General Emergency since there is now a potential to lose the third barrier.

<u>Potential Loss 4.B</u>

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (that is, 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 potential loss of the Containment Barrier.

<u>Potential Loss 4.C</u>

This threshold describes a condition where containment pressure is greater than the setpoint at which containment energy (heat) removal systems are designed to automatically actuate, and less than one full train of equipment is capable of operating per design. The 15-minute criterion is included to allow operators time to manually start equipment that may not have automatically started, if possible. This threshold represents a potential loss of containment in that containment heat removal/depressurization systems (for example, containment sprays, ice condenser fans, etc., but not including containment venting strategies) are either lost or performing in a degraded manner.

5. Other Indications

Not Applicable (included for numbering consistency)

6. SED Judgment

Loss 6.A

This threshold addresses any other factors that may be used by the SED in determining whether the Containment Barrier is lost.

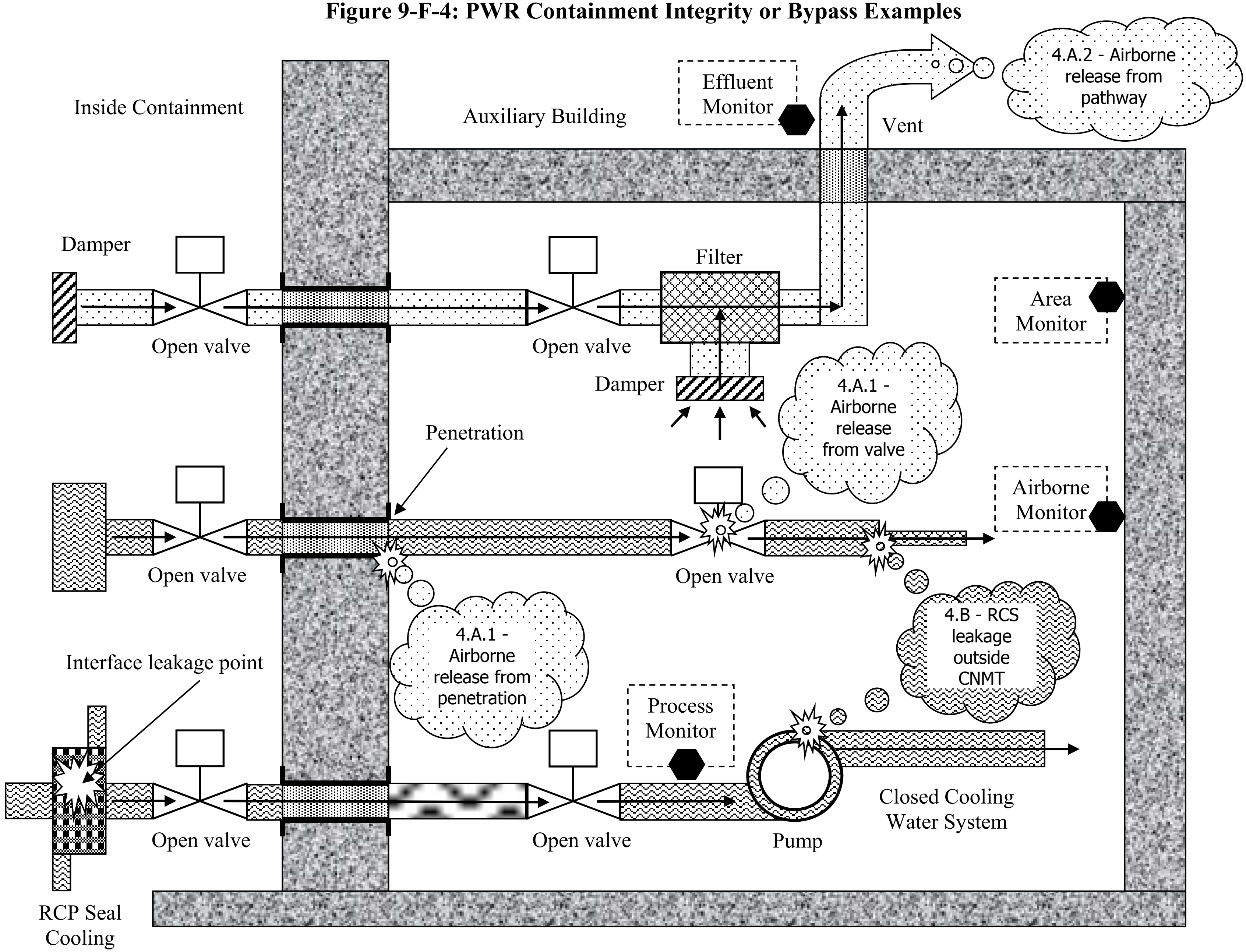
Potential Loss 6.A

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

References

1, 2-FR-0, Unit 1(2) Status Trees
SQN TIRPS193
NEI 99-01 R6 Fission Product Barriers

Figure 9-F-4: PWR Containment Integrity or Bypass Examples



HG1

ECL: General Emergency

Initiating Condition: HOSTILE ACTION resulting in loss of physical control of the facility.

Operating Mode Applicability: All

Emergency Action Levels:

(1) a. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervisor.

AND

b. **EITHER** of the following has occurred:

1. **ANY** of the following safety functions cannot be controlled or maintained.

- Reactivity control
- Core cooling
- RCS heat removal

OR

2. Damage to spent fuel has occurred or is IMMINENT.

Basis:

This IC addresses an event in which a HOSTILE FORCE has taken physical control of the facility to the extent that the plant staff can no longer operate equipment necessary to maintain key safety functions. It also addresses a HOSTILE ACTION leading to a loss of physical control that results in actual or IMMINENT damage to spent fuel due to 1) damage to a spent fuel pool cooling system (for example, pumps, heat exchangers, controls, etc.) or, 2) loss of spent fuel pool integrity such that sufficient water level cannot be maintained.

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]*.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

References
SQN Physical Security Plan (safeguards)
NSDP-22, Security Contingency Events (restricted)
AOP-T.01, Security Events (restricted)
NEI 99-01 R6 HG1

HG7

ECL: General Emergency

Initiating Condition: Other conditions exist which in the judgment of the SED warrant declaration of a General Emergency.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Other conditions exist which in the judgment of the SED 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:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SED to fall under the emergency classification level description for a General Emergency.

References

NEI 99-01 R6 HG7

HS1

ECL: Site Area Emergency

Initiating Condition: HOSTILE ACTION within the PROTECTED AREA.

Operating Mode Applicability: All

Emergency Action Levels:

(1) A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervisor.

Basis:

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]*.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (for example, 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 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.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level would be via IC HG1.

References
SQN Physical Security Plan (safeguards)
NSDP-22, Security Contingency Events (restricted)
AOP-T.01, Security Events (restricted)
NEI 99-01 R6 HS1

HS6

ECL: Site Area Emergency

Initiating Condition: Inability to control a key safety function from outside the Control Room.

Operating Mode Applicability: All

Emergency Action Levels:

Note: The SED should declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. An event has resulted in plant control being transferred from the Control Room to the Auxiliary Control Room.

AND

b. Control of **ANY** of the following key safety functions is not reestablished within 15 minutes.

- Reactivity control
- Core cooling
- RCS heat removal

Basis:

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 one or more 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 SED judgment. The SED is expected to make a reasonable, informed judgment within 15 minutes whether or not the operating staff has control of key safety functions from the Auxiliary Control Room.

Escalation of the emergency classification level would be via IC FG1 or CG1.

References
AOP-C.04, Shutdown From Auxiliary Control Room
NEI 99-01 R6 HS6

HS7

ECL: Site Area Emergency

Initiating Condition: Other conditions exist which in the judgment of the SED warrant declaration of a Site Area Emergency.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Other conditions exist which in the judgment of the SED 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:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SED to fall under the emergency classification level description for a Site Area Emergency.

Reference
NEI 99-01 R6 HS7

HA1

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

(1) A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the Security Shift Supervisor.

(2) A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

Basis:

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.

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 (for example, 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 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.

EAL #2 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 plant procedures.

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 (that is, 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.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level would be via IC HS1.

References

SQN Physical Security Plan (safeguards)
NSDP-22, Security Contingency Events (restricted)
AOP-T.01, Security Events (restricted)
NEI 99-01 R6 HA1

HA5

ECL: Alert

Initiating Condition: Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability: All

Emergency Action Levels:

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) a. Release of a toxic, corrosive, asphyxiant or flammable gas into any of the Table H1 plant rooms or areas:

Table H1 - Safe Operation & Shutdown Rooms/Areas		
Aux. BLDG./ Elevation	**Room**	**MODE**
Elev 749	480V Board Room 1A	3, 4, 5
	480V Board Room 1B	3, 4, 5
	480V Board Room 2A	3, 4, 5
	480V Board Room 2B	3, 4, 5
Elev 734	6.9 Kv and 480V SD Bd Room A	3, 4, 5
	6.9 Kv and 480V SD Bd Room B	3, 4, 5
Elev 690	1A RHR HX Room	3, 4, 5
	1B RHR HX Room	3, 4, 5
	2A RHR HX Room	3, 4, 5
	2B RHR HX Room	3, 4, 5
	CCS Pump Area	3, 4, 5
Elev 653	1A RHR Pump Room	3, 4, 5
	1B RHR Pump Room	3, 4, 5
	2A RHR Pump Room	3, 4, 5
	2B RHR Pump Room	3, 4, 5

AND

b. 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 maintain normal plant operation, or required for a normal plant cooldown and shutdown. This condition represents an actual or potential substantial degradation of the level of safety of the plant.

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 at the time of the gaseous release. 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 SED'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 (for example, 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 (that is, 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 (for example, fire suppression system testing).
- The action for which room/area entry is required is of an administrative or record keeping nature (for example, 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.

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 automatically or manually activate a fire suppression system in an area.

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

References
NEI 99-01 R6 HA5

HA6

ECL: Alert

Initiating Condition: Control Room evacuation resulting in transfer of plant control to alternate locations.

Operating Mode Applicability: All

Emergency Action Levels:

(1) An event has resulted in plant control being transferred from the Control Room to the Auxiliary Control Room .

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 HS6.

References
AOP-C.04, Shutdown From Auxiliary Control Room
NEI 99-01 R6 HA6

HA7

ECL: Alert

Initiating Condition: Other conditions exist which in the judgment of the SED warrant declaration of an Alert.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Other conditions exist which, in the judgment of the SED, 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:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SED to fall under the emergency classification level description for an Alert.

References
NEI 99-01 R6 HA7

HU1

ECL: Unusual Event

Initiating Condition: Confirmed SECURITY CONDITION or threat.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

(1) A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the Security Shift Supervisor.

(2) Notification of a credible security threat directed at SQN.

(3) A validated notification from the NRC providing information of an aircraft threat.

Basis:

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, HS1 and HG1.

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 references Security Shift Supervisor 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.

EAL #2 addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with plant procedures.

EAL #3 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 plant procedures.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level would be via IC HA1.

References
SQN Physical Security Plan (safeguards)
NSDP-22, Security Contingency Events (restricted)
AOP-T.01, Security Events (restricted)
NEI 99-01 R6 HU1

HU2

ECL: Unusual Event

Initiating Condition: Seismic event greater than OBE levels.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Seismic event greater than Operating Basis Earthquake (OBE) as indicated by Panel XA-55-15B alarm windows E-2 and D-1 activated.

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). An earthquake greater than an OBE but less than a Safe Shutdown Earthquake (SSE) 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 (for example, 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.

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. The Shift Manager or SED may seek external verification if deemed appropriate (for example, a call to the NATIONAL EARTHQUAKE CENTER, check internet news sources, etc.); however, the verification action must not preclude a timely emergency declaration.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA6 or SA9.

References
1-AR-M15-B
AOP-N.05, Earthquake
NEI 99-01 R6 HU2

HU3

ECL: Unusual Event

Initiating Condition: Hazardous event.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4 or 5 or 6)

Note: EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

(1) A tornado strike within the PROTECTED AREA.

(2) Internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component needed for the current operating mode.

(3) Movement of personnel within the PROTECTED AREA is impeded due to an offsite event involving hazardous materials (for example, an offsite chemical spill or toxic gas release).

(4) A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.

(5) River reservoir level < 674 feet as reported by River Operations

(6) River reservoir level is at Stage I Flood Warning as reported by River Operations.

Basis:

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

EAL #1 addresses a tornado striking (touching down) within the Protected Area.

EAL #2 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 (for example, 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 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 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.

EALs #5 and #6 address low (Technical Specification minimum) and high river water level that can be precursors of more serious events.

Escalation of the emergency classification level would be based on ICs in Recognition Categories A, F, S or C.

References
AOP-N.03, Flooding
SQN FSAR Chapter 2
NEI 99-01 R6 HU3

HU4

ECL: Unusual Event

Initiating Condition: FIRE potentially degrading the level of safety of the plant.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Note: The SED should declare the Unusual Event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

(1) a. A FIRE is NOT extinguished within 15-minutes of **ANY** of the following FIRE detection indications:

- Report from the field (that is, visual observation)
- Receipt of multiple (more than 1) fire alarms or indications
- Field verification of a single fire alarm

AND

b. The FIRE is located within **ANY** of the Table H2 plant rooms or areas:

(2) a. Receipt of a single fire alarm (that is, no other indications of a FIRE).

AND

b. The FIRE is located within **ANY** of the Table H2 plant rooms or areas:

AND

c. The existence of a FIRE is not verified within 30-minutes of alarm receipt.

(3) A FIRE within the plant PROTECTED AREA not extinguished within 60-minutes of the initial report, alarm or indication.

(4) A FIRE within the plant PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.

Table H2-Fire Areas	
Reactor Building	ERCW Pump House
Auxiliary Building	Control Building
Turbine Building	Diesel Generator Bldgs.

Basis:

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.

Table H2 Fire Areas are based on SQN Fire Protection Report, Volume III, and SQN Calculation SQS40127, Equipment Required for Safe Shutdown per 10CFR50 Appendix R. Table H2 Fire Areas include those structures containing functions and systems required for safe shutdown of the plant (SAFETY SYSTEMS).

<u>EAL #1</u>

The intent of the 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (for example, smoldering waste paper 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, operators will take prompt actions to confirm the validity of an initial fire alarm, indication, or report. 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 alarm, indication or report.

<u>EAL #2</u>

This EAL addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (that is, proved or disproved) within 30 minutes of the alarm. Upon receipt, 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 initial 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 information to the contrary, it is assumed that an actual FIRE is in progress.

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. 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.

<u>EAL #3</u>

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.

<u>EAL #4</u>

If a FIRE within the plant PROTECTED AREA is of sufficient size to require a response by an offsite firefighting agency (for example, 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."

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 CA6 or SA9.

References

SQN Fire Protection Report, Volume III
SQN Calculation SQS40127, Equipment Required for Safe Shutdown per 10CFR50 Appendix R
NEI 99-01 R6 HU4

HU7

ECL: Unusual Event

Initiating Condition: Other conditions exist which in the judgment of the SED warrant declaration of a NOUE.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Other conditions exist which in the judgment of the SED 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 SED to fall under the emergency classification level description for a NOUE.

References
NEI 99-01 R6 HU7

SG1

ECL: General Emergency

Initiating Condition: Prolonged loss of all offsite and all onsite AC power to 6.9KV Shutdown Boards.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the General Emergency promptly upon determining that 4 hours has been exceeded, or will likely be exceeded.

(1) a. Loss of **ALL** offsite and **ALL** onsite AC power to 1A and 1B 6.9KV Shutdown Boards <u>OR</u> 2A and 2B 6.9KV Shutdown Boards.

AND

b. **EITHER** of the following:

- Restoration of at least one AC emergency bus to the affected unit in less than 4 hours is not likely.
- Core Cooling CSF – RED

Basis:

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 one or more 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.

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.

References
SQN Unit 1, an 2 Technical Specification Basis 3.8.1
1,2-FR-0, Unit 1(2) Status Trees
NEI 99-01 R6 SG1

SG8

ECL: General Emergency

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the General Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. Loss of **ALL** offsite and **ALL** onsite AC power to 1A and 1B 6.9KV Shutdown Boards OR 2A and 2B 6.9KV Shutdown Boards for 15 minutes or longer.

AND

b. Indicated voltage is less than 105VDC on **ALL** 125VDC vital battery board buses I, II, III, and IV for 15 minutes or longer.

Basis:

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 both EAL thresholds are met.

References
SQN Unit 1, and 2 Technical Specification Basis 3.8.1
1, 2-AR-M1-C
NEI 99-01 R6 SG8

SS1

ECL: Site Area Emergency

Initiating Condition: Loss of all offsite and all onsite AC power to 6.9KV Shutdown Boards for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note:	The SED should declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of **ALL** offsite and **ALL** onsite AC power to 1A and 1B 6.9KV Shutdown Boards <u>OR</u> 2A and 2B 6.9KV Shutdown Boards for 15 minutes or longer.

Basis:

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 SG1.

References
SQN Unit 1, and 2 Technical Specification Basis 3.8.1
NEI 99-01 R6 SS1

SS5

ECL: Site Area Emergency

Initiating Condition: Inability to shutdown the reactor causing a challenge to core cooling or RCS heat removal.

Operating Mode Applicability: Power Operation

Emergency Action Levels:

(1) a. An automatic or manual trip did not shutdown the reactor.

AND

b. All manual actions to shutdown the reactor have been unsuccessful.

AND

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

- Core Cooling CSF - RED
- Heat Sink CSF - RED

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, all subsequent operator actions to manually shutdown the reactor 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.

Escalation of the emergency classification level would be via IC RG1 or FG1.

References
E-0, Reactor Trip or Safety Injection
1, 2-FR-0, Unit 1 (2) Safety Status Trees
NEI 99-01 R6 SS5

SS8

ECL: Site Area Emergency

Initiating Condition: Loss of all Vital DC power for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note:	The SED should declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Indicated voltage is less than 105VDC on **ALL** 125VDC vital battery board buses I, II, III, and IV for 15 minutes or longer.

Basis:

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 SG8.

References
1,2-AR-M1-C
NEI 99-01 R6 SS8

SA1

ECL: Alert

Initiating Condition: Loss of all but one AC power source to 6.9KV Shutdown Boards for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. AC power capability to 1A and 1B 6.9KV Shutdown Boards <u>OR</u> 2A and 2B 6.9KV Shutdown Boards is reduced to a single power source for 15 minutes or longer.

AND

b. Any additional single power source failure will result in a loss of all AC power to SAFETY SYSTEMS.

Basis:

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 SU1.

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 (for example, an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (for example, onsite diesel generators) with a single train of 6.9KV Shutdown Boards being back-fed from the unit main generator.
- A loss of emergency power sources (for example, onsite diesel generators) with a single train of 6.9KV Shutdown Boards being back-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 SS1.

References
SQN Unit 1, and 2 Technical Specification Basis 3.8.1
NEI 99-01 R6 SA1

SA2

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

> **Note:** The SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. An UNPLANNED event results in the inability to monitor one or more of the following parameters from within the Control Room for 15 minutes or longer.

Reactor Power
Pressurizer Level
RCS Pressure
Core Exit Temperature
Level in at least one steam generator
Steam Generator Auxiliary Feed Water Flow

AND

a. **ANY** of the following transient events in progress.

- Automatic or manual runback greater than 25% thermal reactor power
- Electrical load rejection greater than 25% full electrical load
- Reactor trip
- SI actuation

Basis:

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.

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. 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.

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 one or more 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 one or more 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 ICs FS1 or IC RS1.

References
NEI 99-01 R6 SA2

SA5

ECL: Alert

Initiating Condition: Automatic or manual trip fails to shutdown the reactor, and subsequent manual actions taken in the MCR are not successful in shutting down the reactor.

Operating Mode Applicability: Power Operation

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.

Emergency Action Levels:

(1) a. An automatic or manual trip did not shutdown the reactor.

AND

b. Manual actions taken in the MCR are not successful in shutting down the reactor.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, and subsequent operator manual actions taken in the MCR 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 MCR since this event entails a significant failure of the RPS.

A manual action in the MCR is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (for example, initiating a manual reactor trip). 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 MCR (for example, 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 "in the MCR".

The plant response to the failure of an automatic or manual reactor trip 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 core cooling or RCS heat removal safety functions, the emergency classification level will escalate to a Site Area Emergency via IC SS5. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS5 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.

References
1, 2-E-0, Reactor Trip or Safety Injection
NEI 99-01 R6 SA5

SA9

ECL: Alert

Initiating Condition: Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Note: If the affected safety system (or component) was already inoperable or out of service before the event occurred, then no emergency classification is warranted as long as the damage was limited to this affected safety system or component.

Emergency Action Levels:

(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
- River reservoir level less than 670 feet as reported by River Operations
- River reservoir level at Stage II flood warning as reported by River Operations
- Other events with similar hazard characteristics as determined by the Shift Manager

AND

b. **EITHER** of the following:

- Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode.
- The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode.

Basis:

This IC addresses a hazardous event that causes damage to a SAFETY SYSTEM, or a structure containing SAFETY SYSTEM components, needed for the current operating mode. This condition significantly reduces the margin to a loss or potential loss of a fission product barrier, and therefore represents an actual or potential substantial degradation of the level of safety of the plant.

EAL 1.b.1 addresses damage to a SAFETY SYSTEM train that is in service/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.

EAL 1.b.2 addresses damage to a SAFETY SYSTEM component that is not in service/operation or readily apparent through indications alone, or to a structure containing SAFETY SYSTEM components. Operators will make this determination 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.

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

References
AOP-N.03, Flooding
SQN FSAR Chapter 2
NEI 99-01 R6 SA9

SU1

ECL: Unusual Event

Initiating Condition: Loss of all offsite AC power capability to 6.9KV Shutdown Boards for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of **ALL** offsite AC power capability to 1A and 1B 6.9KV Shutdown Boards OR 2A and 2B 6.9KV Shutdown Boards for 15 minutes or longer.

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.

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 SA1.

References

SQN Unit 1, and 2 Technical Specification Basis 3.8.1
NEI 99-01 R6 SU1

SU2

ECL: Unusual Event

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. An UNPLANNED event results in the inability to monitor one or more of the following parameters from within the Control Room for 15 minutes or longer.

Reactor Power
Pressurizer Level
RCS Pressure
Core Exit Temperature
Level in at least one steam generator
Steam Generator Auxiliary Feed Water Flow

Basis:

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.

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. 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.

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 one or more 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 one or more 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 SA2.

References
NEI 99-01 R6 SU2

SU3

ECL: Unusual Event

Initiating Condition: Reactor coolant activity greater than Technical Specification allowable limits.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

(1) Radiochemistry analysis indicates (a or b or c)

a. Dose equivalent iodine (I-131) > 0.35 µCi/gm for > 48 hours.

b. Dose equivalent iodine (I-131) > 21.0 µCi/gm.

c. Dose equivalent xenon (Xe-133) > 1612.6 µCi/gm with Tave ≥ 500°F.

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.

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

References
SQN Unit 1, and 2 Technical Specification 3.4.16
NEI 99-01 R6 SU3

SU4

ECL: Unusual Event

Initiating Condition: RCS leakage for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) RCS unidentified or pressure boundary leakage greater than 10 gpm for 15 minutes or longer.

(2) RCS identified leakage greater than 25 gpm for 15 minutes or longer.

(3) Leakage from the RCS to a location outside containment greater than 25 gpm for 15 minutes or longer.

Basis:

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 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 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 (for example, steam generator tube leakage) 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 calculations to determine (for example, 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 a relief valve does not warrant an emergency classification. An emergency classification would be required if a mass loss is caused by a relief valve that is not functioning as designed/expected (for example, a relief valve sticks open and the line flow cannot be isolated).

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.

References
SQN Unit 1, and 2 Technical Specification 3.4.13
NEI 99-01 R6 SU4

SU5

ECL: Unusual Event

Initiating Condition: Automatic or manual trip fails to shutdown the reactor.

Operating Mode Applicability: Power Operation

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.

Emergency Action Levels: (1 or 2)

(1) a. An automatic trip did not shutdown the reactor.

AND

b. A subsequent manual action taken in the MCR is successful in shutting down the reactor.

(2) a. A manual trip did not shutdown the reactor.

AND

b. **EITHER** of the following:

- A subsequent manual action taken in the MCR is successful in shutting down the reactor.
- A subsequent automatic trip is successful in shutting down the reactor.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, and either a subsequent operator manual action taken in the MCR or an automatic trip 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.

Following the failure on an automatic reactor trip, operators will promptly initiate manual actions in the MCR to shutdown the reactor (for example, initiate a manual reactor trip). 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.

If an initial manual reactor trip is unsuccessful, operators will promptly take manual action at another location(s) in the MCR to shutdown the reactor (for example, initiate a manual reactor trip using a different switch). Depending upon several factors, the initial or subsequent effort to manually trip the reactor, or a concurrent plant condition, may lead to the generation of an automatic reactor trip signal. If a subsequent manual or automatic trip 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 in the MCR is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (for example, initiating a manual reactor trip). 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 “in the MCR”.

The plant response to the failure of an automatic or manual reactor trip 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 SA5. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC SA5 or FA1, an Unusual Event declaration is appropriate for this event.

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

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

- If the signal causes a plant transient that should have included an automatic reactor trip and the RPS fails to automatically shutdown the reactor, then this IC and the EALs are applicable, and should be evaluated.

- If the signal does not cause a plant transient and the trip failure is determined through other means (for example, assessment of test results), then this IC and the EALs are not applicable and no classification is warranted.

References

1, 2-E-0, Reactor Trip or Safety Injection
NEI 99-01 R6 SU5

SU6

ECL: Unusual Event

Initiating Condition: Loss of all onsite or offsite communications capabilities.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

1. Loss of **ALL** Table C3 Onsite communications capability affecting the ability to perform routine operations.

2. Loss of **ALL** Table C3 Offsite communication capability affecting the ability to perform offsite notifications.

3. Loss of **ALL** Table C3 NRC communication capability affecting the ability to perform NRC notifications.

Table C3-Communications Capability			
System	Onsite	Offsite	NRC
Plant Radio	X		
Plant Page	X		
All telephone Lines (Private and Commercial)	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 OROs and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (for example, 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 addresses a total loss of the communications methods used in support of routine plant operations.

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are Tennessee EMA, Hamilton County and Bradley County.

EAL #3 addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

References
SQN FSAR Chapter 9.5
NEI 99-01 R6 SU6

SU7

ECL: Unusual Event

Initiating Condition: Failure to isolate containment or loss of containment pressure control.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2)

(1) a. Failure of containment to isolate when required by an actuation signal.

AND

b. **ALL** required penetrations are not closed within 15 minutes of the actuation signal.

(2) a. Containment pressure greater than 2.8 PSIG (Phase B).

AND

b. Less than one full train of Containment Spray is operating per design for 15 minutes or longer.

Basis:

This IC addresses a failure of one or more containment penetrations to automatically isolate (close) when required by an actuation signal. It also addresses an event that results in high containment pressure with a concurrent failure of containment pressure control systems. Absent challenges to another fission product barrier, either condition represents potential degradation of the level of safety of the plant.

For EAL #1, the containment isolation signal must be generated as the result on an off-normal/accident condition (for example, a safety injection or high containment pressure); a failure resulting from testing or maintenance does not warrant classification. The determination of containment and penetration status – isolated or not isolated – should be made in accordance with the appropriate criteria contained in the plant AOPs and EOPs. The 15-minute criterion is included to allow operators time to manually isolate the required penetrations, if possible.

EAL #2 addresses a condition where containment pressure is greater than the setpoint at which containment energy (heat) removal systems are designed to automatically actuate, and less than one full train of equipment is capable of operating per design. The 15-minute criterion is included to allow operators time to manually start equipment that may not have automatically started, if possible. The inability to start the required equipment indicates that containment heat removal/depressurization systems (for example, containment sprays or ice condenser fans) are either lost or performing in a degraded manner.

This event would escalate to a Site Area Emergency in accordance with IC FS1 if there were a concurrent loss or potential loss of either the Fuel Clad or RCS fission product barriers.

References

FR-Z.1, High Containment Pressure

NEI 99-01 R6 SU7

Enclosure 4

Revised EAL Program Manual

(Watts Bar Nuclear Plant)

Tennessee Valley Authority	RADIOLOGICAL EMERGENCY PLAN WBN EAL Program Manual	REP WBN EAL Program Manual REV. 0
		Effective Date:

WRITTEN BY: ______________ REVIEWED BY: ______________ ______________
Signature *Signature* *Date*

10 CFR 50.54(q)(3) ANALYSIS
REVIEWED BY: ______________ ______________
Signature *Date*

CONCURRENCES

Concurrence Signature	Date	Concurrence Signature	Date
WBN EP Manager ______________	________	WBN PORC Chairman ______________	________
Director Emergency Preparedness ______________	________		________
	________		

APPROVAL

APPROVED BY: ______________ GM Support Services ______________
Signature *Title* *Organization* *Date*

1.0 PURPOSE

This document provides an explanation and rationale for each Emergency Action Level (EAL) included in the EAL Upgrade Project for Watts Bar Nuclear Power Plant (WBN). It should be used to facilitate review of the WBN EALs and provide historical documentation for future reference. Decision-makers responsible for implementation of EPIP-1, "Emergency Plan Classification Logic," may use this document as a technical reference in support of EAL interpretation. This information may assist the Site Emergency Director (SED) in making classifications, particularly those involving judgment or multiple events. The basis information may also be useful in training and for explaining event classifications to off-site officials.

The expectation is that emergency classifications are to be made as soon as conditions are present and recognizable for the classification, but within 15 minutes or less in all cases of conditions present. Use of this document for assistance is not intended to delay the emergency classification.

Because the information in a basis document can affect emergency classification decision making (for example, the SED refers to it during an event), the NRC staff expects that changes to the basis document will be evaluated in accordance with the provisions of 10 CFR 50.54(q).

2.0 DISCUSSION

2.1 BACKGROUND

EALs are the plant-specific indications, conditions or instrument readings that are utilized to classify emergency conditions defined in the TVA Radiological Emergency Plan (REP).

In 1992, the NRC endorsed NUMARC/NESP-007 "Methodology for Development of Emergency Action Levels" as an alternative to NUREG-0654 EAL guidance. NEI 99-01 (NUMARC/NESP-007) Revisions 4 and 5 were subsequently issued for industry implementation. Enhancements over earlier revisions included:

- Consolidating the system malfunction initiating conditions and example emergency action levels which address conditions that may be postulated to occur during plant shutdown conditions.
- Initiating conditions and example emergency action levels that fully address conditions that may be postulated to occur at permanently Defueled Stations and Independent Spent Fuel Storage Installations (ISFSIs).
- Simplifying the fission product barrier EAL threshold for a Site Area Emergency.

Subsequently, Revision 6 of NEI 99-01 has been issued which incorporates resolutions to numerous implementation issues including the NRC EAL Frequently Asked Questions (FAQs). Using NEI 99-01 Revision 6, "Methodology for the Development of Emergency Action Levels for Non-Passive Reactors," November 2012 (ADAMS Accession Number ML12326A805) (ref. 4.1.1), WBN conducted an EAL implementation upgrade project that produced the EALs discussed herein.

2.2 Fission Product Barriers

Fission product barrier 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.

Many of the EALs derived from the NEI methodology are fission product barrier threshold based. That is, the conditions that define the EALs are based upon thresholds that represent the loss or potential loss of one or more of the three fission product barriers. "Loss" and "Potential Loss" signify the relative damage and threat of damage to the barrier. A "Loss" threshold means the barrier no longer assures containment of radioactive materials. A "Potential Loss" threshold implies an increased probability of barrier loss and decreased certainty of maintaining the barrier. The primary fission product barriers are:

A. Fuel Clad (FC): The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.

B. Reactor Coolant System (RCS): The RCS Barrier includes the RCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.

C. Containment (CNTMT): The Containment Barrier includes the containment building and connections up to and including the outermost containment isolation valves. This barrier also includes the main steam, feedwater, and blowdown line extensions outside the containment building up to and including the outermost secondary side isolation valve. Containment Barrier thresholds are used as criteria for escalation of the ECL from Alert to a Site Area Emergency or a General Emergency

2.3 Fission Product Barrier Classification Criteria

The following criteria are the bases for event classification related to fission product barrier loss or potential loss:

<u>*Alert:*</u>
Any loss or any potential loss of either Fuel Clad or RCS barrier

<u>*Site Area Emergency:*</u>
Loss or potential loss of any two barriers

<u>*General Emergency:*</u>
Loss of any two barriers and loss or potential loss of the third barrier

2.4 EAL Organization

The WBN EAL scheme includes the following features:

- Division of the EAL set into three broad groups:
    - EALs applicable under any plant operating modes - This group would be reviewed by the EAL-user any time emergency classification is considered.
    - EALs applicable only under hot operating modes - This group would only be reviewed by the EAL-user when the plant is in Hot Shutdown, Hot Standby, Startup, or Power Operation mode.
    - EALs applicable only under cold operating modes - This group would only be reviewed by the EAL-user when the plant is in Cold Shutdown, Refueling or Defueled mode.
- The purpose of the groups is to avoid review of hot condition EALs when the plant is in a cold condition and avoid review of cold condition EALs when the plant is in a hot condition. This approach significantly minimizes the total number of EALs that must be reviewed by the EAL-user for a given plant condition, reduces EAL-user reading burden and, thereby, speeds identification of the EAL that applies to the emergency.
- Within each group, assignment of EALs to categories and subcategories:

Category and subcategory titles are selected to represent conditions that are operationally significant to the EAL-user. The WBN EAL categories are aligned to and represent the NEI 99-01"Recognition Categories." Subcategories are used in the WBN scheme as necessary to further divide the EALs of a category into logical sets of possible emergency classification thresholds. The WBN EAL categories and subcategories are listed below.

Table 1 - WBN EAL Groups, Categories and Subcategories

WBN EALs	
Category	**Subcategory**
Group: Any Operating Mode	
R - Abnormal Rad Levels/Rad Effluent	1 - Radiological Effluent 2 - Irradiated Fuel Event 3 - Area Radiation Levels
H - Hazards and Other Conditions Affecting	1 - Security 2 - Seismic Event 3 - Natural or Technological Hazard 4 - Fire 5 - Hazardous Gases 6 - Control Room Evacuation 7 - Emergency Director Judgment
E- ISFSI	1 - Confinement Boundary
Group: Hot Conditions	
S - System Malfunction	1 - Loss of Essential AC Power 2 - Loss of Vital DC Power 3 - Loss of Control Room Indications 4 - RCS Activity 5 - RCS Leakage 6 - RPS Failure 7 - Loss of Communications 8 - Containment Failure 9 - Hazardous Event Affecting Safety Systems
F - Fission Product Barrier	None
Group: Cold Conditions	
C - Cold Shutdown/Refueling System Malfunction	1 - RCS Level 2 - Loss of Essential AC Power 3 - RCS Temperature 4 - Loss of Vital DC Power 5 - Loss of Communications 6 - Hazardous Event Affecting Safety Systems

The primary tool for determining the emergency classification level is the EAL Classification Wallboard. The user of the EAL Classification Wallboard may (but is not required to) consult the EAL Technical Bases Document in order to obtain additional information concerning the EALs under classification consideration. The user should consult this document for such information.

2.5 Technical Bases Information

EAL technical bases are provided in Attachment 1 for each EAL according to EAL group (Any, Hot, Cold), EAL category (R, C, H, S, E and F) and EAL subcategory.

For each EAL, the following information is provided:

- Category Letter & Title
- Initiating Condition (IC)
- Operating Mode Applicability
- Site-specific EAL description of the generic IC given in NEI 99-01 Rev. 6.

Each EAL is assigned a unique identifier to support accurate communication of the emergency classification to onsite and offsite personnel. Three characters define each EAL identifier:

1. First character (letter): Corresponds to the EAL category as described above (R, C, H, S, E or F)
2. Second character (letter): The emergency classification (G, S, A or U)
   - G = General Emergency
   - S = Site Area Emergency
   - A = Alert
   - U = Unusual Event
3. Third character (number): Subcategory number within the given category. Subcategories are sequentially numbered beginning with the number one (1). If a category does not have a subcategory, this character is assigned the number one (1).

Exact wording of the EAL as it appears in the EAL Classification Matrix

Basis

A Plant-Specific basis section that provides WBN-relevant information concerning the EAL. This is followed by a Generic basis section that provides a description of the rationale for the EAL as provided in NEI 99-01 Rev. 6.

WBN Basis Reference(s)

Site-specific source documentation from which the EAL is derived.

2.6 Operating Mode Applicability (ref. 4.1.7)

1 Power Operation
Keff greater than or equal to 0.99 and reactor thermal power greater than 5%

2 Startup
Keff greater than or equal to 0.99 and reactor thermal power less than or equal to 5%

3 Hot Standby
Keff less than 0.99 and average coolant temperature greater than or equal to 350°F

4 Hot Shutdown
Keff less than 0.99 and average coolant temperature between 200°F and 350°F

5 Cold Shutdown
Keff less than 0.99 and average coolant temperature less than or equal to 200°F and all reactor vessel head closure bolts fully tensioned

6 Refueling
One or more reactor vessel head closure bolts are less than fully tensioned

D Defueled
All reactor fuel removed from reactor pressure vessel (full core off load during refueling or extended outage).

The plant operating mode that exists at the time that the event occurs (prior to any protective system or operator action being initiated in response to the condition) should be compared to the mode applicability of the EALs. If a lower or higher plant operating mode is reached before the emergency classification is made, the declaration shall be based on the mode that existed at the time the event occurred.

2.7 Unit Designation

The specific unit designator (1 or 2) is represented. For equipment or components that are common or non unit-specific the 0 designator is used. (Example 0-RE-XX represents a radiation monitor that is common to both units).

3.0 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

3.1 General Considerations

When making an emergency classification, the Site Emergency Director (SED) must consider all information having a bearing on the proper assessment of an Initiating Condition (IC)**.** This includes the Emergency Action Level (EAL) plus the associated Operating Mode Applicability, Notes, and the informing basis information. In the Recognition Category F matrices, EALs are based on loss or potential loss of Fission Product Barrier Thresholds.

3.1.1 Classification Timeliness

NRC regulations require the licensee to establish and maintain the capability to assess, classify, and declare an emergency condition within 15 minutes after the availability of indications to plant operators that an emergency action level has been exceeded and to promptly declare the emergency condition as soon as possible following identification of the appropriate emergency classification level. The NRC staff has provided guidance on implementing this requirement in NSIR/DPR-ISG-01, "Interim Staff Guidance, Emergency Planning for Nuclear Power Plants" (ref. 4.1.11).

3.1.2 Valid Indications

All emergency classification assessments shall be based upon valid indications, reports or conditions. A valid indication, report, or condition, is one that has been verified through appropriate means such that there is no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, verification could be accomplished through an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel.

An indication, report, or condition is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

3.1.3 Imminent Conditions

For ICs and EALs that have a stipulated time duration (for example, 15 minutes, 30 minutes, etc.), the Site Emergency Director (SED) should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition has exceeded, or will likely exceed, the applicable time. If an ongoing radiological release is detected and the release start time is unknown, it should be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

3.1.4 Planned vs. Unplanned Events

A planned work activity that results in an expected event or condition which meets or exceeds an EAL does not warrant an emergency declaration provided that: 1) the activity proceeds as planned, and 2) the plant remains within the limits imposed by the operating license. Such activities include planned work to test, manipulate, repair, maintain or modify a system or component. In these cases, the controls associated with the planning, preparation and execution of the work will ensure that compliance is maintained with all aspects of the operating license provided that the activity proceeds and concludes as expected. Events or conditions of this type may be subject to the reporting requirements of 10 § CFR 50.72 (ref. 4.1.4).

3.1.5 Classification Based on Analysis

The assessment of some EALs is based on the results of analyses that are necessary to ascertain whether a specific EAL threshold has been exceeded (for example, dose assessments, chemistry sampling, RCS leak rate calculation, etc.). For these EALs, the EAL wording 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 threshold to be exceeded (that is, this is the time that the EAL information is first available). The NRC expects licensees to establish the capability to initiate and complete EAL-related analyses within a reasonable period of time (for example, maintain the necessary expertise on-shift).

3.1.6 Site Emergency Director (SED) Judgment

While the EALs have been developed to address a full spectrum of possible events and conditions which may warrant emergency classification, a provision for classification based on operator/management experience and judgment is still necessary. The NEI 99-01 EAL scheme provides the Site Emergency Director (SED) with the ability to classify events and conditions based upon judgment using EALs that are consistent with the Emergency Classification Level (ECL) definitions (refer to Category H). The Site Emergency Director (SED) will need to determine if the effects or consequences of the event or condition reasonably meet or exceed a particular ECL definition. A similar provision is incorporated in the Fission Product Barrier Tables; judgment may be used to determine the status of a fission product barrier.

3.2 CLASSIFICATION METHODOLOGY

To make an emergency classification, the user will compare an event or condition (that is, the relevant plant indications and reports) to an EAL(s) and determine if the EAL has been met or exceeded. The evaluation of an EAL must be consistent with the related Operating Mode Applicability and Notes. If an EAL has been met or exceeded, the associated IC is likewise met, the emergency classification process "clock" starts, and the ECL must be declared in accordance with plant procedures no later than fifteen minutes after the process "clock" started.

When assessing an EAL that specifies a time duration for the off-normal condition, the "clock" for the EAL time duration runs concurrently with the emergency classification process "clock." For a full discussion of this timing requirement, refer to NSIR/DPR-ISG-01 (ref. 4.1.11).

3.2.1 Classification of Multiple Events and Conditions

When multiple emergency events or conditions are present, the user will identify all met or exceeded EALs. The highest applicable ECL identified during this review is declared. For example:

- If an Alert EAL and a Site Area Emergency EAL are met, whether at one unit or at two different units, a Site Area Emergency should be declared.

There is no "additive" effect from multiple EALs meeting the same ECL. For example:

- If two Alert EALs are met, whether at one unit or at two different units, an Alert should be declared.

Related guidance concerning classification of rapidly escalating events or conditions is provided in Regulatory Issue Summary (RIS) 2007-02, *Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events* (ref. 4.1.2).

3.2.2 Consideration of Mode Changes During Classification

The mode in effect at the time that an event or condition occurred, and prior to any plant or operator response, is the mode that determines whether or not an IC is applicable. If an event or condition occurs, and results in a mode change before the emergency is declared, the emergency classification level is still based on the mode that existed at the time that the event or condition was initiated (and not when it was declared). Once a different mode is reached, any new event or condition, not related to the original event or condition, requiring emergency classification should be evaluated against the ICs and EALs applicable to the operating mode at the time of the new event or condition.

For events that occur in Cold Shutdown or Refueling, escalation is via EALs that are applicable in the Cold Shutdown or Refueling modes, even if Hot Shutdown (or a higher mode) is entered during the subsequent plant response. In particular, the fission product barrier EALs are applicable only to events that initiate in the Hot Shutdown mode or higher.

3.2.3 Classification of Imminent Conditions

Although EALs provide specific thresholds, the Emergency Coordinator must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (that is, a change in the ECL is IMMINENT). If, in the judgment of the Emergency Coordinator, meeting an EAL is IMMINENT, the emergency classification should be made as if the EAL has been met. While applicable to all emergency classification levels, this

approach is particularly important at the higher emergency classification levels since it provides additional
time for implementation of protective measures.

3.2.4 Emergency Classification Level Upgrading and Termination

Once a classification level is declared, no downgrade to a lower classification will be allowed. An ECL may be terminated when the event or condition that meets the highest IC and EAL no longer exists, and other site-specific termination requirements are met.

As noted above, guidance concerning classification of rapidly escalating events or conditions is provided in RIS 2007-02 (ref. 4.1.2).

3.2.5 Classification of Short-Lived Events

Event-based ICs and EALs define a variety of specific occurrences that have potential or actual safety significance. By their nature, some of these events may be short-lived and, thus, over before the emergency classification assessment can be completed. If an event occurs that meets or exceeds an EAL, the associated ECL must be declared regardless of its continued presence at the time of declaration. Examples of such events include an earthquake or a failure of the reactor protection system to automatically trip the reactor followed by a successful manual trip.

3.2.6 Classification of Transient Conditions

Many of the ICs and/or EALs employ time-based criteria. These criteria will require that the IC/EAL conditions be present for a defined period of time before an emergency declaration is warranted. In cases where no time-based criterion is specified, it is recognized that some transient conditions may cause an EAL to be met for a brief period of time (for example, a few seconds to a few minutes). The following guidance should be applied to the classification of these conditions.

EAL momentarily met during expected plant response - In instances where an EAL is briefly met during an expected (normal) plant response, an emergency declaration is not warranted provided that associated systems and components are operating as expected, and operator actions are performed in accordance with procedures.

EAL momentarily met but the condition is corrected prior to an emergency declaration - If an operator takes prompt manual action to address a condition, and the action is successful in correcting the condition prior to the emergency declaration, then the applicable EAL is not considered met and the associated emergency declaration is not required. For illustrative purposes, consider the following example:

> An ATWS occurs and the high pressure ECCS systems fail to automatically start. RCS level rapidly decreases and the plant enters an inadequate core cooling condition (a potential loss of both the fuel clad and RCS barriers). If an operator manually starts a high pressure ECCS system in accordance with an EOP step and clears the inadequate core

cooling condition prior to an emergency declaration, then the classification should be based on the ATWS only.

It is important to stress that the 15-minute emergency classification assessment period (process clock) is not a "grace period" during which a classification may be delayed to allow the performance of a corrective action that would obviate the need to classify the event. Emergency classification assessments must be deliberate and timely, with no undue delays. The provision discussed above addresses only those rapidly evolving situations when an operator is able to take a successful corrective action prior to the Site Emergency Director (SED) completing the review and steps necessary to make the emergency declaration. This provision is included to ensure that any public protective actions resulting from the emergency classification are truly warranted by the plant conditions.

3.2.7 After-the-Fact Discovery of an Emergency Event or Condition

In some cases, an EAL may be met but the emergency classification was not made at the time of the event or condition. This situation can occur when personnel discover that an event or condition existed which met an EAL, but no emergency was declared, and the event or condition no longer exists at the time of discovery. This may be due to the event or condition not being recognized at the time or an error that was made in the emergency classification process.

In these cases, no emergency declaration is warranted; however, the guidance contained in NUREG-1022 (ref. 4.1.3) is applicable. Specifically, the event should be reported to the NRC in accordance with 10 CFR § 50.72 (ref. 4.1.4) within one hour of the discovery of the undeclared event or condition. The licensee should also notify appropriate State and local agencies in accordance with the agreed upon arrangements.

3.2.8 Retraction of an Emergency Declaration

Guidance on the retraction of an emergency declaration reported to the NRC is discussed in NUREG-1022 (ref. 4.1.3).

4.0 REFERENCES

4.1 DEVELOPMENTAL

4.1.1 NEI 99-01 Revision 6, Methodology for the Development of Emergency Action Levels for Non-Passive Reactors, ADAMS Accession Number ML12326A805
4.1.2 RIS 2007-02 Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events, February 2, 2007.
4.1.3 NUREG-1022 Event Reporting Guidelines: 10CFR50.72 and 50.73
4.1.4 10 § CFR 50.72 Immediate Notification Requirements for Operating Nuclear Power Reactors
4.1.5 10 § CFR 50.73 License Event Report System
4.1.6 WBN FSAR Section 2.1.1 Site Location and Description
4.1.7 Technical Specifications Table 1.1-1 Modes
4.1.8 NSIR/DPR-ISG-01 Interim Staff Guidance, Emergency Planning for Nuclear Power Plants
4.1.9 WBN Offsite Dose Calculation Manual (ODCM)

4.2 IMPLEMENTING

4.2.1 EPIP-1, Assessment of Emergency Action Levels, Emergency Classification and Plan Activation
4.2.2 NEI 99-01 Rev. 6 to WBN EAL Comparison Matrix
4.2.3 WBN EAL Wallboard

5.0 DEFINITIONS, ACRONYMS & ABBREVIATIONS

5.1 DEFINITIONS

Selected terms used in Initiating Condition and Emergency Action Level statements are set in all capital letters (for example, ALL CAPS). These words are defined terms that have specific meanings as used in this document. The definitions of these terms are provided below.

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

CONFINEMENT BOUNDARY: Spent Fuel Storage Canister CONFINEMENT BOUNDARY consists of MPC shell, bottom base plate, MPC lid (including the vent and drain port cover plates), MPC closure ring, and associated welds.

CONTAINMENT CLOSURE: Containment condition where at least one integral barrier to the release of radioactive material is provided. Sufficient separation of the containment atmosphere from the outside environment is provided such that a barrier to the escape of radioactive material is reasonably expected to remain in place following a core melt accident.

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.

EPA PAGs: Environment Protection Agency Protective Action Guidelines. The EPA PAGs are expressed in terms of dose commitment: 1 Rem TEDE or 5 Rem CDE Thyroid. Actual or projected offsite exposures in excess of the EPA PAGs requires TVA to recommend protective actions for the general public to offsite planning agencies.

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.

FAULTED: The term applied to a steam generator that has a steam leak on the secondary side of sufficient size to cause an uncontrolled drop in steam generator pressure or the steam generator to become completely depressurized.

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

FLOODING: A condition where water is entering a room or area faster than installed equipment is capable of removal, resulting in a rise of water level within the room or area.

GENERAL EMERGENCY: 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 actions that result 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.

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

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

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

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.

IMPEDE(d): Personnel access to a room or area is hindered to an extent that extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (for example, requiring use of protective equipment, such as SCBAs, that is not routinely employed).

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.

OWNER CONTROLLED AREA: The TVA-owned site property under the control of Site Security.

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

PROTECTED AREA: The area which is encompassed by the security fence and to which access is controlled.

REFUELING PATHWAY: The reactor refueling cavity, spent fuel pool, or fuel transfer canal.

RUPTURE(D): The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection.

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.

SITE AREA EMERGENCY: 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 actions that result 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 Guidelines exposure levels beyond the site boundary.

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.

UNUSUAL EVENT: Events are in progress or have occurred which indicate a potential degradation in 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.

VALID: An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

VISIBLE DAMAGE: Damage to multiple components, or one or more structures, that are 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 components in the area. Events that result in visible damage to one component, and does not appear to affect other components, do not meet the intent of this definition as the failure of a single component, regardless of cause, is well within the operational controls provided by a licensee’s Technical Specifications and Operating Procedures. However, visible damage to more than one component does meet this definition, as well as visible damage to a structure.

5.2 ABBREVIATIONS/ACRONYMS

AC .... Alternating Current
AOP........ Abnormal Operating Procedure
ATWS .... Anticipated Transient Without Scram
CDE........ Committed Dose Equivalent
CFR .... Code of Federal Regulations
CTMT/CNMT........ Containment
CSF .... Critical Safety Function
CSFST........ Critical Safety Function Status Tree
DBA .... Design Basis Accident
DC .... Direct Current
EAL........ Emergency Action Level
ECCS........ Emergency Core Cooling System
ECL .... Emergency Classification Level
EOF .... Emergency Operations Facility
EOP .... Emergency Operating Procedure
EPA .... Environmental Protection Agency
EPG .... Emergency Procedure Guideline
EPIP .... Emergency Plan Implementing Procedure
EPRI........ Electric Power Research Institute
ERG........ Emergency Response Guideline
FAA........ Federal Aviation Administration
FBI .... Federal Bureau of Investigation
FEMA .... Federal Emergency Management Agency
FSAR........ Final Safety Analysis Report
GE .... General Emergency
HOO........ Headquarters Operations Officer
IC........ Initiating Condition
ID .... Inside Diameter
IPEEE........ Individual Plant Examination of External Events (Generic Letter 88-20)
ISFSI .... Independent Spent Fuel Storage Installation
Keff .... Effective Neutron Multiplication Factor
LCO........ Limiting Condition of Operation
LOCA........ Loss of Coolant Accident
MCR........ Main Control Room
MSIV........ Main Steam Isolation Valve
MSL .... Main Steam Line
mR, mRem, mrem, mREM .... milli-Roentgen Equivalent Man
MW .... Megawatt
NEI........ Nuclear Energy Institute
NPP .... Nuclear Power Plant
NRC .... Nuclear Regulatory Commission
NSSS........ Nuclear Steam Supply System
NORAD .... North American Aerospace Defense Command
NOUE .... (Notification Of) Unusual Event
OBE........ Operating Basis Earthquake
OCA .... Owner Controlled Area

ODCM....................Offsite Dose Calculation Manual
ORO....................Off-site Response Organization
PA....................Protected Area
PAG....................Protective Action Guideline
PRA/PSA....................Probabilistic Risk Assessment / Probabilistic Safety Assessment
PWR....................Pressurized Water Reactor
PS....................Protection System
PSIG....................Pounds per Square Inch Gauge
R....................Roentgen
RCC....................Reactor Control Console
RCS....................Reactor Coolant System
Rem, rem, REM....................Roentgen Equivalent Man
RETS....................Radiological Effluent Technical Specifications
RPS....................Reactor Protection System
RPV....................Reactor Pressure Vessel
RVLIS....................Reactor Vessel Level Instrumentation System
SAR....................Safety Analysis Report
SBO....................Station Blackout
SCBA....................Self-Contained Breathing Apparatus
SED....................Site Emergency Director
SG....................Steam Generator
SI....................Safety Injection
SPDS....................Safety Parameter Display System
SRO....................Senior Reactor Operator
TEDE....................Total Effective Dose Equivalent
TOAF....................Top of Active Fuel
TSC....................Technical Support Center
WOG....................Westinghouse Owners Group

ATTACHMENT 1 EAL Bases

RG1

ECL: General Emergency

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The SED should declare the General Emergency 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.
- 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) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

UNIT 1	
Shield Building, 1-RM-90-400	1.85E+08 μCi/s
Condenser Vacuum Exhaust, 1-RM-90-256	5.06E+05 mR/hr
SG Discharge, 1-RM-90-421 thru -424[(1)]	6.05E+03 mR/hr
UNIT 2	
Shield Building, 2-RM-90-400	1.85E+08 μCi/s
Condenser Vacuum Exhaust, 2-RM-90-256	6.70E+05 mR/hr
SG Discharge, 2-RM-90-421 thru -424[(1)]	4.11E+03 mR/hr

(1) These unit values are based on flow rates through one PORV of 970,000 lb/hr at 1185 psig, 600 degrees F. Before using these values, ensure a release to the environment is ongoing (e.g., PORV)

OR

(2) Dose assessment using actual meteorology indicates doses greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the site boundary.

OR

(3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:

- Closed window dose rates greater than 1,000 mR/hr expected to continue for 60 minutes or longer.
- Analyses of field survey samples indicate thyroid CDE greater than 5,000 mrem for one hour of inhalation.

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 1,000 mrem while the 5,000 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

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.

References
WBN Calculation WBNTSR115
WBN ODCM
NEI 99-01 R6 AG1

RG2

ECL: General Emergency

Initiating Condition: Spent fuel pool level cannot be restored to at least724.94′ for 60 minutes or longer.

Operating Mode Applicability: All

Emergency Action Levels:

Note:

The SED should declare the General Emergency promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.

(1) Spent fuel pool level cannot be restored to at least 724.94′ 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 uncovery 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.

References

NRC EA-12-051 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
WBN Design Change Notice 59683
NEI 99-01 R6 AG2

RS1

ECL: Site Area Emergency

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The SED should declare the Site Area Emergency 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.
- 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) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

UNIT 1	
Shield Building, 1-RM-90-400	1.85E+07 μCi/s
Auxiliary Building, 0-RM-90-101B	4.45E+06 cpm
Condenser Vacuum Exhaust, 1-RM-90-256	5.06E+04 mR/hr
SG Discharge, 1-RM-90-421 thru -424(1)	6.05E+02 mR/hr
UNIT 2	
Shield Building, 2-RM-90-400	1.85E+07 μCi/s
Auxiliary Building, 0-RM-90-101B	4.45E+06 cpm
Condenser Vacuum Exhaust, 2-RM-90-256	6.70E+04 mR/hr
SG Discharge, 2-RM-90-421 thru -424(1)	4.11E+02 mR/hr

(1) These unit values are based on flow rates through one PORV of 970,000 lb/hr at 1185 psig, 600 degrees F. Before using these values, ensure a release to the environment is ongoing (e.g., PORV)

OR

(2) Dose assessment using actual meteorology indicates doses greater than 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the site boundary.

OR

(3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:

- Closed window dose rates greater than 100 mR/hr expected to continue for 60 minutes or longer.
- Analyses of field survey samples indicate thyroid CDE greater than 500 mrem for one hour of inhalation.

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 1,000 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.

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.

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

References
WBN Calculation WBNTSR115
WBN ODCM
NEI 99-01 R6 AS1

RS2

ECL: Site Area Emergency

Initiating Condition: Spent fuel pool level at 724.94′.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Lowering of spent fuel pool level to 724.94′.

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.

References

NRC EA-12-051 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
WBN Design Change Notice 59683
NEI 99-01 R6 AS2

RA1

ECL: Alert

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: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Notes:

- The SED should declare the Alert 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.
- 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) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

UNIT 1	
Shield Building, 1-RM-90-400	1.85E+06 μCi/s
Auxiliary Building, 0-RM-90-101B	4.45E+05 cpm
Condenser Vacuum Exhaust, 1-RM-90-255/256	5.06E+03 mR/hr
SG Discharge, 1-RM-90-421 thru -424(1)	6.05E+01 mR/hr
UNIT 2	
Shield Building, 2-RM-90-400	1.85E+06 μCi/s
Auxiliary Building, 0-RM-90-101B	4.45E+05 cpm
Condenser Vacuum Exhaust, 2-RM-90-255	7.00E+03 mR/hr
Condenser Vacuum Exhaust, 2-RM-90-256	7.17E+03 mR/hr
SG Discharge, 2-RM-90-421 thru -424(1)	4.39E+01 mR/hr

(1) These unit values are based on flow rates through one PORV of 970,000 lb/hr at 1185 psig, 600 degrees F. Before using these values, ensure a release to the environment is ongoing (e.g., PORV)

OR

(2) Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the site boundary.

(3) Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the site boundary for one hour of exposure.

OR

(4) Field survey results indicate **EITHER** of the following at or beyond the site boundary:

- Closed window dose rates greater than 10 mR/hr expected to continue for 60 minutes or longer.
- Analyses of field survey samples indicate thyroid CDE greater than 50 mrem for one hour 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 (for example, 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 1,000 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.

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.

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

References

WBN Calculation WBNTSR115
WBN ODCM
NEI 99-01 R6 AA1

RA2

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

(1) Uncovery of irradiated fuel in the REFUELING PATHWAY.

(2) Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by alarm or elevated reading on ANY of the following radiation monitors:

0-RM-90-101	Aux Building Vent Gas Monitor
0-RM-90-102	Fuel Pool Unit 2 Side
0-RM-90-103	Fuel Pool Unit 1 Side
1, 2-RM-90-130 or 131	Containment Purge Exhaust
1, 2-RM-90-112 A or B	Upper Containment, A-Particulate, B-Gas

(3) Lowering of spent fuel pool level to 734.44′.

Basis:

This IC addresses events that have caused IMMINENT or actual damage to an irradiated fuel assembly, or a significant lowering of water level within the spent fuel pool. 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 EU1.

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

<u>EAL #1</u>

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 uncovery of irradiated fuel. Indications of irradiated fuel uncovery may include direct or indirect visual observation (for example, 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 (for example, 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 increase 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

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 (for example, a fuel handling accident).

EAL #3

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 assembles stored in the pool.

Escalation of the emergency classification level would be via ICs RS1 or RS2.

References

0-ARI-180-187
NRC EA-12-051 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
WBN Design Change Notice 59683
NEI 99-01 R6 AA2

RA3

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

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) Dose rate greater than 15 mR/hr in **EITHER** of the following areas requiring continuous occupancy:

- Control Room (RM-90-135)
- Central Alarm Station (by survey)

OR

(2) An UNPLANNED event results in radiation levels that prohibit or impede access to any Table H1 plant rooms or areas:

Table H1 - Safe Operation & Shutdown Rooms/Areas		
Aux. BLDG./Elevation	**Room**	**MODE**
Elev 772	Electrical Board Room 1A	3, 4, 5
	Electrical Board Room 1B	3, 4, 5
	Electrical Board Room 2A	3, 4, 5
	Electrical Board Room 2B	3, 4, 5
Elev 757	6.9 KV and 480V SD Bd Room A	3, 4, 5
	6.9 KV and 480V SD Bd Room B	3, 4, 5
Elev 713	1A RHR HX Room	3, 4, 5
	1B RHR HX Room	3, 4, 5
	2A RHR HX Room	3, 4, 5
	2B RHR HX Room	3, 4, 5
	CCS Pump Area	3, 4, 5
Elev 692	1A RHR Pump Room	3, 4, 5
	1B RHR Pump Room	3, 4, 5
	2A RHR Pump Room	3, 4, 5
	2B RHR Pump Room	3, 4, 5

Basis:

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

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 at the time of the elevated radiation levels. 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 (for example, installing temporary shielding, 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 (that is, 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 increase 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 (for example, radiography, spent filter or resin transfer, etc.).
- The action for which room/area entry is required is of an administrative or record keeping nature (for example, 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.

References
NEI 99-01 R6 AA3

RU1

ECL: Unusual Event

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The SED should declare the Unusual Event promptly upon determining that 60 minutes 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.
- 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** Table R1 effluent radiation monitor greater than the listed values for 60 minutes or longer:

Table R1	
Gaseous Effluent	
Shield Building, 1,2-RM-90-400	1.98E+05 µCi/s
Auxiliary Building, 0-RM-90-101B	4.77E+04 cpm
Service Building, 0-RM-90-132B	1.09E+06 cpm
Condenser Vacuum Exhaust, 1-RM-90-255or 256	5.42E+02 mR/hr
Condenser Vacuum Exhaust, 2-RM-90-255	7.00E+02 mR/hr
Condenser Vacuum Exhaust, 2-RM-90-256	7.17E+02 mR/hr
Liquid Effluent – Cond Demin in use	
Radwaste Monitor, 0-RM-90-122	5.47E+05 cpm
SGBD, 1-RM-90-120 or 121	3.13E+05 cpm
SGBD, 2-RM-90-120 or 121	5.39E+05 cpm
Condensate Demin, 0-RM-90-225	5.47E+05 cpm
Turbine Bldg Sump, 0-RM-90-212	5.54E+03 cpm
Liquid Effluent – Cond Demin NOT in use, SGBD with Dilution	
Radwaste Monitor, 0-RM-90-122	1.70E+06 cpm
SGBD, 1-RM-90-120 or 121	9.74E+05 cpm
SGBD, 2-RM-90-120 or 121	1.25E+06 cpm
Condensate Demin, 0-RM-90-225	1.70E+06 cpm
Turbine Bldg Sump, 0-RM-90-212	1.65E+04 cpm
Liquid Effluent – S/G Blowdown – NO Treatment or Dilution	
Radwaste Monitor, 0-RM-90-122	5.80E+04 cpm
SGBD, 1-RM-90-120 or 121	5.80E+04 cpm
SGBD, 2-RM-90-120 or 121	2.43E+04 cpm
Condensate Demin, 0-RM-90-225	5.80E+04 cpm
Turbine Bldg Sump, 0-RM-90-212	7.44E+04 cpm

OR

(2) Reading on **ANY** effluent radiation monitor greater than 2 times the alarm setpoint established by a current Liquid/Gaseous Release Permit for 60 minutes or longer.

OR

(3) Sample analysis for liquid release indicates a concentration or release rate greater than 20 times the Effluent Concentration Limit for 60 minutes or longer.

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 (for example, 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.

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.

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.

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

EAL #2 - This EAL addresses radioactivity releases that cause effluent radiation monitor readings to exceed 2 times the limit established by a Liquid/Gaseous Release Permit. This EAL will be associated with planned batch releases from non-continuous release pathways (for example, radwaste, waste gas).

EAL #3 - This EAL addresses uncontrolled gaseous or liquid releases that are detected by sample analyses or environmental surveys, particularly on unmonitored pathways (for example, 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.

References

WBN Calculation WBNTSR115
WBN ODCM
NEI 99-01 R6 AU1

RU2

ECL: Unusual Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel.

Operating Mode Applicability: All

Emergency Action Levels:

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

- SFP LEVEL HI/LO annunciator lit (128-A) AND SFP level less than 748' as indicated by 0-LI-78-42 and 0-LI-78-43.
- Visual observation by plant personnel

AND

b. UNPLANNED rise in area radiation levels as indicated by **ANY** of the following radiation monitors.

0-RM-90-101	Aux Building Vent Gas Monitor
0-RM-90-102	Fuel Pool Unit 2 Side
0-RM-90-103	Fuel Pool Unit 1 Side
1, 2-RM-90-130 or 131	Containment Purge Exhaust
1, 2-RM-90-112 A or B	Upper Containment, A-Particulate, B-Gas

Basis:

This IC addresses a decrease 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 decrease will be primarily determined by indications from available level instrumentation such as Mansell water level, if installed. Other sources of level indications may include reports from plant personnel (for example, from a refueling crew) or video camera observations (if available). A significant drop in the water level may also cause an increase 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 increase 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.

References
0-ARI-180-187
NEI 99-01 R6 AU2

CG1

ECL: General Emergency

Initiating Condition: Loss of RCS inventory affecting fuel clad integrity with containment challenged.

Operating Mode Applicability: Threshold Value (1): Cold Shutdown
Threshold Value (2): Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note:

> The SED should declare the General Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

(1) a. RVLIS Static level less than 60% for 30 minutes or longer. (MODE 5)

AND

b. **ANY** indication from the Containment Challenge Table C1.

OR

(2) a. RCS level cannot be monitored for 30 minutes or longer.

AND

b. Core uncovery is indicated by **ANY** of the following:

- Erratic source range monitor indication
- UNPLANNED rise in the Containment Sump, Containment Pit Sump, or Auxiliary Building Passive Sump levels of sufficient magnitude to indicate core uncovery

AND

c. **ANY** indication from the Containment Challenge Table C1.

Containment Challenge Table C1
■ CONTAINMENT CLOSURE not established *
■ H_2 concentration greater than 4% volume on H2AN-43-200 or 210
■ UNPLANNED rise in containment pressure

* If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.

Basis:

This IC addresses the inability to restore and maintain reactor vessel level above the top of active fuel with containment challenged. The RVLIS Static indication (applicable in MODE 5) of 60% is equivalent to the top of active fuel. 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 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.

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (that is, 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 uncovery event, it is unlikely that hydrogen buildup due to a core uncovery 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.

In EAL 2.b, the 30-minute criterion is tied to a readily recognizable event start time (that is, 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 uncovery has actually occurred (that is, 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 RCS 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 RCS.

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*.

References
1-ARI-173-179
2-ARI-188-194
NEI 99-01 R6 CG1

CS1

ECL: Site Area Emergency

Initiating Condition: Loss of RCS inventory affecting core decay heat removal capability.

Operating Mode Applicability: Threshold Value (2): Cold Shutdown
Threshold Values (1), (3): Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2 or 3)

Note: The SED should declare the Site Area Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

(1) a. CONTAINMENT CLOSURE not established.

AND

b. RCS level less than 716’ 8”.

OR

(2) a. CONTAINMENT CLOSURE established.

AND

b. RVLIS Static level less than 60%. (MODE 5)

OR

(3) a. RCS level cannot be monitored for 30 minutes or longer.

AND

b. Core uncovery is indicated by **ANY** of the following:

- Erratic source range monitor indication
- UNPLANNED rise in the Containment Sump, Containment Pit Sump, or Auxiliary Building Passive Sump levels of sufficient magnitude to indicate core uncovery

Basis:

This IC addresses a significant and prolonged loss of RCS inventory control and makeup capability leading to IMMINENT fuel damage. 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. 716’ 8” is the lowest readable indication on the Mansell monitoring system and is approximately 1.5” below the bottom of the RCS Hot leg loop. The RVLIS Static indication (applicable in MODE 5) of 60% is equivalent to the top of active fuel.

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 (that is, 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 uncovery has actually occurred (that is, 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 RCS 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 RCS.

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 CG1 or RG1.

References
1, 2-GO-10, Reactor Coolant System Drain and Fill Operations
1-ARI-173-179
2-ARI-188-194
NEI 99-01 R6 CS1

CA1

ECL: Alert

Initiating Condition: Loss of RCS inventory.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of RCS inventory as indicated by level less than 718’ 6”.

OR

(2) a. RCS level cannot be monitored for 15 minutes or longer

AND

b. UNPLANNED rise in the Containment Sump, Containment Pit Sump, or Auxiliary Building Passive Sump levels due to a loss of RCS inventory.

Basis:

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

For EAL #1, a lowering of water level below 718’ 6” indicates that operator actions have not been successful in restoring and maintaining /RCS water level. The heat-up rate of the coolant will increase as the available water inventory is reduced. A continuing decrease in water level will lead to core uncovery.

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 (for example, loss of a Residual Heat Removal suction point). An increase in RCS temperature caused by a loss of decay heat removal capability is evaluated under IC CA3.

For EAL #2, the inability to monitor /RCS 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 /RCS.

The 15-minute duration for the loss of level indication was chosen because it is half of the EAL duration specified in IC CS1

If the RCS inventory level continues to lower, then escalation to Site Area Emergency would be via IC CS1.

References

1, 2-GO-10, Reactor Coolant System Drain and Fill Operations
NEI 99-01 R6 CA1

CA2

ECL: Alert

Initiating Condition: Loss of all offsite and all onsite AC power to 6.9KV Shutdown Boards for 15 minutes or longer.

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of **ALL** offsite and **ALL** onsite AC Power to 1A and 1B 6.9KV Shutdown Boards **OR** 2A and 2B 6.9KV Shutdown Boards for 15 minutes or longer.

Basis:

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 CS1 or RS1.

References

WBN Unit 1, and 2 Technical Specification Basis 3.8.1

NEI 99-01 R6 CA2

CA3

ECL: Alert

Initiating Condition: Inability to maintain the plant in cold shutdown.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

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

(1) UNPLANNED rise in RCS temperature to greater than 200 °F for greater than the duration specified in Table C2.

Table C2-RCS Heat-up Duration Thresholds		
RCS	**Containment Closure**	**Heat-up Duration**
Not intact or in RCS Reduced Inventory	Not Established	0 minutes*
	Established	20 minutes*
Intact (capable of being pressurized)	N/A	60 minutes*
* If RHR is in operation within this time frame and RCS temperature is being reduced, the EAL is not applicable.		

OR

(2) UNPLANNED RCS pressure rise greater than 10 psig. (This EAL Threshold does not apply during water-solid plant conditions.)

Basis:

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 an increase in RCS temperature when CONTAINMENT CLOSURE is established but the RCS is not intact, or RCS inventory is reduced (for example, mid-loop operation in PWRs). The 20-minute criterion was included to allow time for operator action to address the temperature increase.

The RCS Heat-up Duration Thresholds table also addresses an increase 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 increase without a substantial degradation in plant safety.

Finally, in the case where there is an increase in RCS temperature, the RCS is not intact or is at reduced inventory, and CONTAINMENT CLOSURE is not established, no heat-up duration is allowed (that is, 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 CS1 or RS1.

References
WBN Unit 1 and 2 Technical Specification Table 1.1-1
NEI 99-01 R6 CA3

CA6

ECL: Alert

Initiating Condition: Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode.

Operating Mode Applicability: Cold Shutdown, Refueling

Note: If the affected safety system (or component) was already inoperable or out of service before the event occurred, then no emergency classification is warranted as long as the damage was limited to this affected safety system or component.

Emergency Action Levels:

(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
- River reservoir level less than 666 feet as reported by River Operations
- River Reservoir level at Stage II flood warning as reported by River Operations
- Other events with similar hazard characteristics as determined by the Shift Manager

AND

b. **EITHER** of the following:

- Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode.
- The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode.

Basis:

This IC addresses a hazardous event that causes damage to a SAFETY SYSTEM, or a structure containing SAFETY SYSTEM components, needed for the current operating mode. This condition significantly reduces the margin to a loss or potential loss of a fission product barrier, and therefore represents an actual or potential substantial degradation of the level of safety of the plant.

EAL 1.b.1 addresses damage to a SAFETY SYSTEM train that is in service/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.

EAL 1.b.2 addresses damage to a SAFETY SYSTEM component that is not in service/operation or readily apparent through indications alone, or to a structure containing SAFETY SYSTEM components. Operators will make this determination 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.

Escalation of the emergency classification level would be via IC CS1 or RS1.

References

FSAR Chapter 2
0-AOI-7.01, Maximum Probable Flood
NEI 99-01 R6 CA6

CU1

ECL: Unusual Event

Initiating Condition: UNPLANNED loss of RCS inventory for 15 minutes or longer.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) UNPLANNED loss of reactor coolant results in RCS level less than the lower controlling limit for 15 minutes or longer.

OR

(2) a. RCS level cannot be monitored.

AND

b. UNPLANNED rise in the Containment Sump, Containment Pit Sump, or Auxiliary Building Passive Sump levels.

Basis:

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 RCS 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.

Refueling evolutions that decrease 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 RCS 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 RCS 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 RCS.

Continued loss of RCS inventory may result in escalation to the Alert emergency classification level via either IC CA1 or CA3.

References
NEI 99-01 R6 CU1

CU2

ECL: Unusual Event

Initiating Condition: Loss of all but one AC power source to 6.9KV Shutdown Boards for 15 minutes or longer.

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. AC power capability to 1A and 1B 6.9KV Shutdown Boards **OR** 2A and 2B 6.9KV Shutdown Boards is reduced to a single power source for 15 minutes or longer.

AND

b. Any additional single power source failure will result in loss of all AC power to SAFETY SYSTEMS.

Basis:

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.

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 (for example, an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (for example, onsite diesel generators) with a single train of 6.9KV Shutdown Boards being back-fed from the unit main generator.
- A loss of emergency power sources (for example, onsite diesel generators) with a single train of 6.9KV Shutdown Boards being back-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 CA2.

References
WBN Unit 1, and 2 Technical Specification Basis 3.8.1
NEI 99-01 R6 CU2

CU3

ECL: Unusual Event

Initiating Condition: UNPLANNED rise in RCS temperature.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) UNPLANNED rise in RCS temperature to greater than 200 °F.

OR

(2) Loss of **ALL** RCS temperature and RCS level indication for 15 minutes or longer.

Basis:

This IC addresses an UNPLANNED increase 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 SED should also refer to IC CA3.

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

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 increase 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 CA1 based on an inventory loss or IC CA3 based on exceeding plant configuration-specific time criteria.

References

WBN Unit 1, and 2 Technical Specification Table 1.1-1

NEI 99-01 R6 CU3

CU4

ECL: Unusual Event

Initiating Condition: Loss of Vital DC power for 15 minutes or longer.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Indicated voltage is less than 105VDC on Technical Specification <u>required</u> 125VDC Vital Battery Buses:

- I and III for 15 minutes or longer

  <u>OR</u>

- II and IV for 15 minutes or longer

Basis:

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 CA1 or CA3, or an IC in Recognition Category R.

References
1, 2-ARI-15-21
NEI 99-01 R6 CU4

CU5

ECL: Unusual Event

Initiating Condition: Loss of all onsite or offsite communications capabilities.

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels: (1 or 2 or 3)

1. Loss of **ALL** Table C3 Onsite communications capability affecting the ability to perform routine operations.

OR

2. Loss of **ALL** Table C3 Offsite communication capability affecting the ability to perform offsite notifications.

OR

3. Loss of **ALL** Table C3 NRC communication capability affecting the ability to perform NRC notifications.

Table C3-Communications Capability			
System	Onsite	Offsite	NRC
Plant Radio	X		
Plant Page	X		
All telephone Lines (Private and Commercial)	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 OROs and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (for example, 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 addresses a total loss of the communications methods used in support of routine plant operations.

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are Tennessee EMA, Rhea County, Meigs County and McMinn County.

EAL #3 addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

References
WBN FSAR Section 9.5
NEI 99-01 R6 CU5

EU1

ECL: Unusual Event

Initiating Condition: Damage to a loaded canister CONFINEMENT BOUNDARY.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Damage to a loaded canister CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading at the location specified in Table I1-ISFSI Dose Limits.

Table I1-ISFSI Dose Limits	
	Hi Storm FW
Location	COC 1032 Amendment 0
Top of the OVERPACK	60 mrem/hr ($\gamma + {}_0n^1$)
Side of the OVERPACK	600 mrem/hr ($\gamma + {}_0n^1$)

Basis:

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 issues of concern are the creation of a potential or actual release path to the environment, degradation of one or more 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.

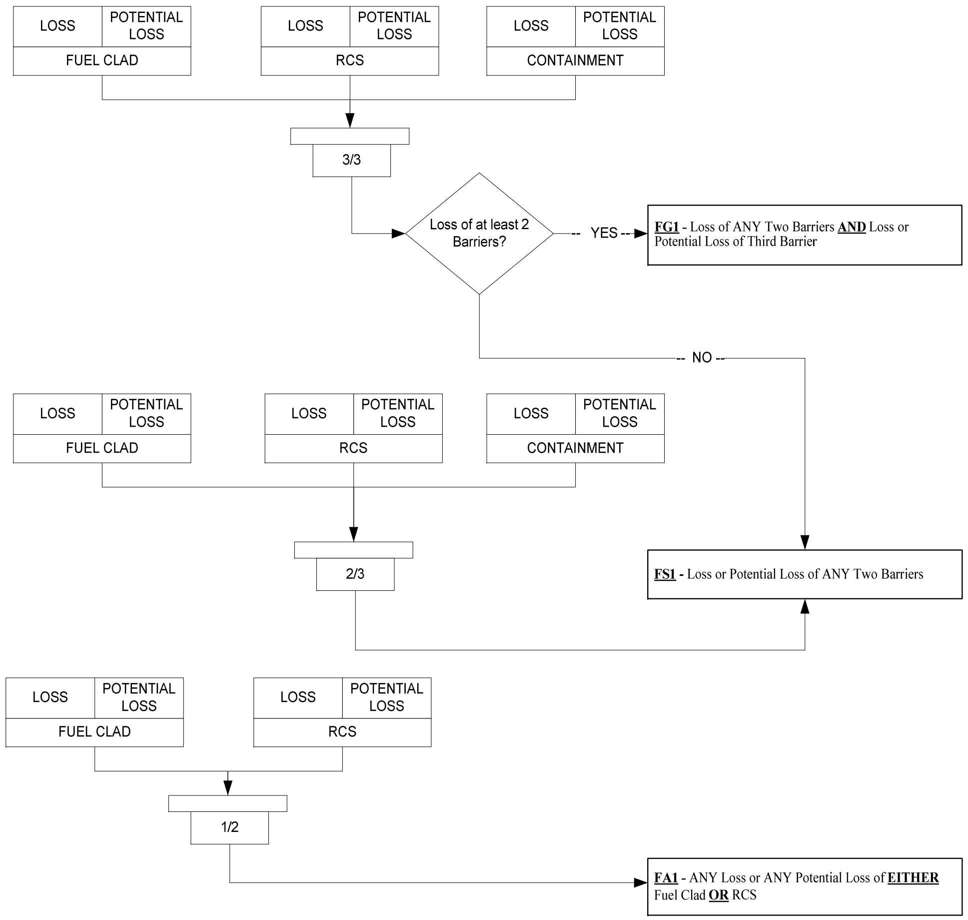
Security-related events for ISFSIs are covered under ICs HU1 and HA1.

The HI-STORM FW MPC Storage System consists of the following components: (1) interchangeable multipurpose canisters (MPCs), which contain the fuel; (2) a storage overpack (HI-STORM FW), which contains the MPC during storage; and (3) a transfer cask (HI-TRAC VW), which contains the MPC during loading, unloading and transfer operations.

The MPC is the confinement system for the stored fuel. It is a welded, cylindrical canister with a honeycombed fuel basket, a baseplate, a lid, a closure ring, and the canister shell. All MPC components that may come into contact with spent fuel pool water or the ambient environment are made entirely of stainless steel or passivated aluminum/aluminum alloys. The canister shell, baseplate, lid, vent and drain port cover plates, and closure ring are the main confinement boundary components. All confinement boundary components are made entirely of stainless steel.

References
Certificate of Compliance 1032, Amendment 0
NEI 99-01, R6 E-HU1

GENERAL EMERGENCY	
FG1	Loss of any two barriers and Loss or Potential Loss of the third barrier. *Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown*
SITE AREA EMERGENCY	
FS1	Loss or Potential Loss of any two barriers. *Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown*
ALERT	
FA1	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier. *Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown*



Fission Product Barrier Table

Thresholds for LOSS or POTENTIAL LOSS of Barriers

FG1 GENERAL EMERGENCY	FS1 SITE AREA EMERGENCY	FA1 ALERT
Loss of any two barriers and Loss or Potential Loss of the third barrier.	Loss or Potential Loss of any two barriers.	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
1. RCS or SG Tube Leakage		**1. RCS or SG Tube Leakage**		**1. RCS or SG Tube Leakage**	
Not Applicable	A. Core Cooling CSF - ORANGE entry conditions met.	A. An automatic or manual SI actuation is required by **EITHER** of the following: 1. UNISOLABLE RCS leakage **OR** 2. SG tube RUPTURE.	A. Operation of a standby charging pump is required by **EITHER** of the following: 1. UNISOLABLE RCS leakage **OR** 2. SG tube leakage. **OR** B. PTS CSF - RED entry conditions met.	A. A leaking or RUPTURED SG is FAULTED outside of containment.	Not Applicable

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
2. Inadequate Heat Removal		**2. Inadequate Heat Removal**		**2. Inadequate Heat Removal**	
A. Core Cooling CSF - RED entry conditions met.	A. Core Cooling CSF - ORANGE entry conditions met. **OR** B. Heat Sink CSF - RED entry conditions met (if heat sink required)	Not Applicable	A. Heat Sink CSF - RED entry conditions met (if heat sink required).	Not Applicable	A. Core Cooling CSF - RED entry conditions met for 15 minutes or longer.

Fuel Clad Barrier		**RCS Barrier**		**Containment Barrier**	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
3. RCS Activity / Containment Radiation		**3. RCS Activity / Containment Radiation**		**3. RCS Activity / Containment Radiation**	
A. Containment radiation monitor reading greater than: 3.320E+02 R/hr on 1-RM-90-271 or 272 **OR** 2.650E+02 R/hr on 1-RM-90-273 or 274 **OR** 3.790E+02 R/Hr on 2-RM-90-271 or 272 **OR** 2.520E+02 R/hr on 2-RM-90-273 or 274 **OR** B. Coolant activity greater than 300 µCi/gm dose equivalent Iodine - 131.	Not Applicable	A. Containment radiation monitor reading greater than: 9.800E+01 R/hr on 1-RM-90-271 or 272 **OR** 6.200E+01 R/hr on 1-RM-90-273 or 274 **OR** 1.190E+02 R/hr on 2-RM-90-271 or 272 **OR** 6.400E+01 R/hr on 2-RM-90-273 or 274A.	Not Applicable	Not Applicable **Note:** Containment High Range Radiation Monitors (HRRMs) are temperature sensitive and can be affected by both temperature induced currents and insulation resistance temperature effects. Following the initial increase in containment temperature the HRRM monitors can give erratic indication for up to 1 minute. Steady state temperature effects on cable insulation resistance for the HRRM signal cable is dependent on containment temperature and could result in a shift in monitor output indication. (**Caution: Should the containment air return fans not start, containment temperatures could remain elevated resulting in potential false HRRM indicated readings)**	A. Containment radiation monitor reading greater than: 5.600E+03 R/hr on 1-RM-90-271 or 272 **OR** 4.470E+03 R/hr on 1-RM-90-273 or 274 **OR** 7.160E+03 R/hr on 2-RM-90-271 or 272 **OR** 4.750E+03 R/hr on 2-RM-90-273 or 274

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
4. Containment Integrity or Bypass		**4. Containment Integrity or Bypass**		**4. Containment Integrity or Bypass**	
Not Applicable	Not Applicable	Not Applicable	Not Applicable	A. Containment isolation is required **AND** **EITHER** of the following: 1. Containment integrity has been lost based on SED judgment. **OR** 2. UNISOLABLE pathway from the containment to the environment exists. **OR** B. Indications of RCS leakage outside of containment.	A. Containment CSF - RED entry conditions met **OR** B. Containment H_2 greater than 4% by volume. **OR** C. 1. Containment pressure greater than 2.8 PSIG (Phase B) **AND** 2. Less than one full train of Containment Spray is operating per design for 15 minutes or longer.
5. Other Indications		**5. Other Indications**		**5. Other Indications**	
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Fuel Clad Barrier		**RCS Barrier**		**Containment Barrier**	
LOSS	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**	**LOSS**	**POTENTIAL LOSS**
6. SED Judgment		**6. SED Judgment**		**6. SED Judgment**	
A. **ANY** condition in the opinion of the SED that indicates Loss of the Fuel Clad Barrier.	A. **ANY** condition in the opinion of the SED that indicates Potential Loss of the Fuel Clad Barrier.	A. **ANY** condition in the opinion of the SED that indicates Loss of the RCS Barrier.	A. **ANY** condition in the opinion of the SED that indicates Potential Loss of the RCS Barrier.	A. **ANY** condition in the opinion of the SED that indicates Loss of the Containment Barrier.	A. **ANY** condition in the opinion of the SED that indicates Potential Loss of the Containment Barrier.

Basis Information For
Fission Product Barrier Table

FUEL CLAD BARRIER THRESHOLDS:

The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.

1. **RCS or SG Tube Leakage**

There is no Loss threshold associated with RCS or SG Tube Leakage.

Potential Loss 1.A

This reading indicates a reduction in reactor vessel water level sufficient to allow the onset of heat-induced cladding damage.

2. **Inadequate Heat Removal**

Loss 2.A

This reading indicates temperatures within the core are sufficient to cause significant superheating of reactor coolant.

Potential Loss 2.A

This reading indicates temperatures within the core are sufficient to allow the onset of heat-induced cladding damage.

Potential Loss 2.B

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (that is, loss of an effective secondary-side heat sink). This condition represents a potential loss of the Fuel Clad Barrier. In accordance with EOPs, there may be unusual accident conditions during which operators intentionally reduce the heat removal capability of the steam generators; during these conditions, classification using threshold is not warranted.

Meeting this threshold results in a Site Area Emergency because this threshold is identical to RCS Barrier Potential Loss threshold 2.A; both will be met. This condition warrants a Site Area Emergency declaration because inadequate RCS heat removal may result in fuel heat-up sufficient to damage the cladding and increase RCS pressure to the point where mass will be lost from the system.

3. **RCS Activity / Containment Radiation**

Loss 3.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals 300µCi/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 Loss threshold 3.A 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.

Loss 3.B

This threshold indicates that RCS radioactivity concentration is greater than 300 µCi/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.

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

Loss 3.B

Threshold values should be determined assuming RCS radioactivity concentration equals 300 µCi/gm dose equivalent I-131.

4. Containment Integrity or Bypass

Not Applicable (included for numbering consistency)

5. Other Indications

Not Applicable (included for numbering consistency)

6. SED Judgment

Loss 6.A

This threshold addresses any other factors that may be used by the SED in determining whether the Fuel Clad Barrier is lost.

Potential Loss 6.A

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

RCS BARRIER THRESHOLDS:

The RCS Barrier includes the RCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.

1. RCS or SG Tube Leakage

Loss 1.A

This threshold is based on an UNISOLABLE RCS leak of sufficient size to require an automatic or manual actuation of the Safety Injection. This condition clearly represents a loss of the RCS Barrier.

This threshold is applicable to unidentified and pressure boundary leakage, as well as identified leakage. It is also applicable to UNISOLABLE RCS leakage through an interfacing system. The mass loss may be into any location – inside containment, to the secondary-side (that is, steam generator tube leakage) or outside of containment.

A steam generator with primary-to-secondary leakage of sufficient magnitude to require a safety injection is considered to be RUPTURED. If a RUPTURED steam generator is also FAULTED outside of containment, the declaration escalates to a Site Area Emergency since the Containment Barrier Loss threshold 1.A will also be met.

Potential Loss 1.A

This threshold is based on an UNISOLABLE RCS leak that results in the inability to maintain pressurizer level within specified limits by operation of a normally used charging (makeup) pump, but an ECCS (SI) actuation has not occurred. The threshold is met when an operating procedure, or operating crew supervision, directs that a standby charging (makeup) pump be placed in service to restore and maintain pressurizer level.

This threshold is applicable to unidentified and pressure boundary leakage, as well as identified leakage. It is also applicable to UNISOLABLE RCS leakage through an interfacing system. The mass loss may be into any location – inside containment, to the secondary-side (that is, steam generator tube leakage) or outside of containment.

This condition indicates an extreme challenge to the integrity of the RCS pressure boundary due to pressurized thermal shock – a transient that causes rapid RCS cooldown while the RCS is in Mode 3 or higher (that is, hot and pressurized).

Potential Loss 1.B

This condition indicates an extreme challenge to the integrity of the RCS pressure boundary due to pressurized thermal shock – a transient that causes rapid RCS cooldown while the RCS is in Mode 3 or higher (that is, hot and pressurized).

2. Inadequate Heat Removal

There is no Loss threshold associated with Inadequate Heat Removal.

Potential Loss 2.A

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (that is, loss of an effective secondary-side heat sink). This condition represents a potential loss of the RCS Barrier. In accordance with EOPs, there may be unusual accident conditions during which operators intentionally reduce the heat removal capability of the steam generators; during these conditions, classification using threshold is not warranted.

Meeting this threshold results in a Site Area Emergency because this threshold is identical to Fuel Clad Barrier Potential Loss threshold 2.B; both will be met. This condition warrants a Site Area Emergency declaration because inadequate RCS heat removal may result in fuel heat-up sufficient to damage the cladding and increase RCS pressure to the point where mass will be lost from the system.

3. RCS Activity / Containment Radiation

Loss 3.A

The gamma dose rate resulting from a postulated loss of coolant accident (LOCA) is monitored by the containment high range monitors, RM-90-271 thru 274. RM-90-271 thru 274 are located inside containment. The detector range is approximately 1 to 1xE8 R/hr (logarithmic scale). Radiation Monitors RM-90-271 thru 274 provide a diverse means of measuring the containment for high level gamma radiation.

The value specified represents, based on core damage assessment procedure CECC-EPIP-19, Attachment 3, Figures 1 and 2, the expected containment high range radiation monitor (RM-90-271thru 274) response based on a LOCA, at T=0 after shutdown with no fuel failure and RCS Activity at 10% of the TS Limit.

The value is derived as follows:
CECC-EPIP-19, Attachment 3, Figures 1and 2, Containment Radiation Level vs. Time for RCS Release at T=0 multiplied by a factor of 10.

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals Technical Specification allowable limits. This value is lower than that specified for Fuel Clad Barrier Loss threshold C.1 since it indicates a loss of the RCS Barrier only.

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

4. Containment Integrity or Bypass

Not Applicable (included for numbering consistency)

5. Other Indications

Not Applicable (included for numbering consistency)

6. SED Judgment

Loss 6.A

This threshold addresses any other factors that may be used by the SED in determining whether the RCS Barrier is lost.

Potential Loss 6.A

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

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CONTAINMENT BARRIER THRESHOLDS:

The Containment Barrier includes the containment building and connections up to and including the outermost containment isolation valves. This barrier also includes the main steam, feedwater, and blowdown line extensions outside the containment building up to and including the outermost secondary side isolation valve. Containment Barrier thresholds are used as criteria for escalation of the ECL from Alert to a Site Area Emergency or a General Emergency.

1. RCS or SG Tube Leakage

Loss 1.A

This threshold addresses a leaking or RUPTURED Steam Generator (SG) that is also FAULTED outside of containment. The condition of the SG, whether leaking or RUPTURED, is determined in accordance with the thresholds for RCS Barrier Potential Loss 1.A and Loss 1.A, respectively. This condition represents a bypass of the containment barrier.

FAULTED is a defined term within the NEI 99-01 methodology; this determination is not necessarily dependent upon entry into, or diagnostic steps within, an EOP. For example, if the pressure in a steam generator is decreasing uncontrollably [*part of the FAULTED definition*] and the faulted steam generator isolation procedure is not entered because EOP user rules are dictating implementation of another procedure to address a higher priority condition, the steam generator is still considered FAULTED for emergency classification purposes.

The FAULTED criterion establishes an appropriate lower bound on the size of a steam release that may require an emergency classification. Steam releases of this size are readily observable with normal Control Room indications. The lower bound for this aspect of the containment barrier is analogous to the lower bound criteria specified in IC SU3 for the fuel clad barrier (that is, RCS activity values) and IC SU4 for the RCS barrier (that is, RCS leak rate values).

This threshold also applies to prolonged steam releases necessitated by operational considerations such as the forced steaming of a leaking or RUPTURED steam generator directly to atmosphere to cooldown the plant, or to drive an auxiliary (emergency) feed water pump. These types of conditions will result in a significant and sustained release of radioactive steam to the environment (and are thus similar to a FAULTED condition). The inability to isolate the steam flow without an adverse effect on plant cooldown meets the intent of a loss of containment.

Steam releases associated with the expected operation of a SG power operated relief valve or safety relief valve do not meet the intent of this threshold. Such releases may occur intermittently for a short period of time following a reactor trip as operators process through emergency operating procedures to bring the plant to a stable condition and prepare to initiate a plant cooldown. Steam releases associated with the unexpected operation of a valve (for example, a stuck-open safety valve) do meet this threshold.

Following an SG tube leak or rupture, there may be minor radiological releases through a secondary-side system component (for example, air ejectors, glad seal exhausters, valve packing, etc.). These types of releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category R ICs.

The emergency classification levels resulting from primary-to-secondary leakage, with or without a steam release from the FAULTED SG, are summarized below.

	Affected SG is FAULTED Outside of Containment?	
P-to-S Leak Rate	**Yes**	**No**
Less than or equal to 25 gpm	No classification	No classification
Greater than 25 gpm	Unusual Event per SU4	Unusual Event per SU4
Requires operation of a standby charging (makeup) pump (*RCS Barrier Potential Loss*)	Site Area Emergency per FS1	Alert per FA1
Requires an automatic or manual ECCS (SI) actuation (*RCS Barrier Loss*)	Site Area Emergency per FS1	Alert per FA1

There is no Potential Loss threshold associated with RCS or SG Tube Leakage.

2. Inadequate Heat Removal

There is no Loss threshold associated with Inadequate Heat Removal.

Potential Loss 2.A

This condition represents an IMMINENT core melt sequence which, if not corrected, could lead to vessel failure and an increased potential for containment failure. For this condition to occur, there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. If implementation of a procedure(s) to restore adequate core cooling is not effective (successful) within 15 minutes, it is assumed that the event trajectory will likely lead to core melting and a subsequent challenge of the Containment Barrier.

The restoration procedure is considered "effective" if core exit thermocouple readings are decreasing and/or if reactor vessel level is increasing. Whether or not the procedure(s) will be effective should be apparent within 15 minutes. The SED should escalate the emergency classification level as soon as it is determined that the procedure(s) will not be effective.

Severe accident analyses (for example, NUREG-1150) have concluded that function restoration procedures can arrest core degradation in a significant fraction of core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it is appropriate to provide 15 minutes beyond the required entry point to determine if procedural actions can reverse the core melt sequence.

3. RCS Activity / Containment Radiation

There is no Loss threshold associated with RCS Activity / Containment Radiation.

Potential Loss 3.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the 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.

Containment High Range Radiation Monitors (HRRMs) are temperature sensitive and can be affected by both temperature induced currents and insulation resistance temperature effects. Following the initial increase in containment temperature the HRRM monitors can give erratic indication for up to 1 minute. Steady state temperature effects on cable insulation resistance for the HRRM signal cable is dependent on containment temperature and could result in a shift in monitor output indication.

4. Containment Integrity or Bypass

Loss 4.A

These thresholds address a situation where containment isolation is required and one of two conditions exists as discussed below. Users are reminded that there may be accident and release conditions that simultaneously meet both thresholds 4.A.1 and 4.A.2.

4.A.1 – Containment integrity has been lost, that is, the actual containment atmospheric leak rate likely exceeds that associated with allowable leakage (or sometimes referred to as design leakage). Following the release of RCS mass into containment, containment pressure will fluctuate based on a variety of factors; a loss of containment integrity condition may (or may not) be accompanied by a noticeable drop in containment pressure. Recognizing the inherent difficulties in determining a containment leak rate during accident conditions, it is expected that the SED will assess this threshold using judgment, and with due consideration given to current plant conditions, and available operational and radiological data (for example, containment pressure, readings on radiation monitors outside containment, operating status of containment pressure control equipment, etc.).

Refer to the middle piping run of Figure 9-F-4. Two simplified examples are provided. One is leakage from a penetration and the other is leakage from an in-service system valve. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure.

Another example would be a loss or potential loss of the RCS barrier, and the simultaneous occurrence of two FAULTED locations on a steam generator where one fault is located inside containment (for example, on a steam or feedwater line) and the other outside of containment. In this case, the associated steam line provides a pathway for the containment atmosphere to escape to an area outside the containment.

Following the leakage of RCS mass into containment and a rise in containment pressure, there may be minor radiological releases associated with allowable (design) containment leakage through various penetrations or system components. These releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category R ICs.

4.A.2 – Conditions are such that there is an UNISOLABLE pathway for the migration of radioactive material from the containment atmosphere to the environment. As used here, the term "environment" includes the atmosphere of a room or area, outside the containment, that may, in turn, communicate with the outside-the-plant atmosphere (for example, through discharge of a ventilation system or atmospheric leakage). Depending upon a variety of factors, this condition may or may not be accompanied by a noticeable drop in containment pressure.

Refer to the top piping run of Figure 9-F-4. In this simplified example, the inboard and outboard isolation valves remained open after a containment isolation was required (that is, containment isolation was not successful). There is now an UNISOLABLE pathway from the containment to the environment.

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 (that is, retention ability has been exceeded) or water saturation from steam/high humidity in the release stream.

Leakage between two interfacing liquid systems, by itself, does not meet this threshold.

Refer to the bottom piping run of Figure 9-F-4. In this simplified example, leakage in an RCP seal cooler is allowing radioactive material to enter the Auxiliary Building. The radioactivity would be detected by the Process Monitor. If there is no leakage from the closed water cooling system to the Auxiliary Building, then no threshold has been met. If the pump or system piping developed a leak that allowed steam/water to enter the Auxiliary Building, then threshold 4.B would be met. Depending upon radiation monitor locations and sensitivities, this leakage could be detected by any of the four monitors depicted in the figure and cause threshold 4.A.1 to be met as well.

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

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Loss Threshold 1.A.

<u>Loss 4.B</u>

Containment sump, temperature, pressure and/or radiation levels will increase if reactor coolant mass is leaking into the containment. If these parameters have not increased, then the reactor coolant mass may be leaking outside of containment (that is, a containment bypass sequence).

Increases in sump, temperature, pressure, flow and/or radiation level readings outside of the containment may indicate that the RCS mass is being lost outside of containment.

Unexpected elevated readings and alarms on radiation monitors with detectors outside containment should be corroborated with other available indications to confirm that the source is a loss of RCS mass outside of containment. If the fuel clad barrier has not been lost, radiation monitor readings outside of containment may not increase significantly; however, other unexpected changes in sump levels, area temperatures or pressures, flow rates, etc. should be sufficient to determine if RCS mass is being lost outside of the containment.

Refer to the middle piping run of Figure 9-F-4. In this simplified example, a leak has occurred at a reducer on a pipe carrying reactor coolant in the Auxiliary Building. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure and cause threshold 4.A.1 to be met as well.

To ensure proper escalation of the emergency classification, the RCS leakage outside of containment must be related to the mass loss that is causing the RCS Loss and/or Potential Loss threshold 1.A to be met.

<u>Potential Loss 4.A</u>

If containment pressure exceeds the design pressure, there exists a potential to lose the Containment Barrier. To reach this level, there must be an inadequate core cooling condition for an extended period of time; therefore, the RCS and Fuel Clad barriers would already be lost. Thus, this threshold is a discriminator between a Site Area Emergency and General Emergency since there is now a potential to lose the third barrier.

<u>Potential Loss 4.B</u>

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (that is, 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 potential loss of the Containment Barrier.

<u>Potential Loss 4.C</u>

This threshold describes a condition where containment pressure is greater than the setpoint at which containment energy (heat) removal systems are designed to automatically actuate, and less than one full train of equipment is capable of operating per design. The 15-minute criterion is included to allow operators time to manually start equipment that may not have automatically started, if possible. This threshold represents a potential loss of containment in that containment heat removal/depressurization systems (for example, containment sprays, ice condenser fans, etc., but not including containment venting strategies) are either lost or performing in a degraded manner.

5. Other Indications

Not Applicable (included for numbering consistency)

6. SED Judgment

Loss 6.A

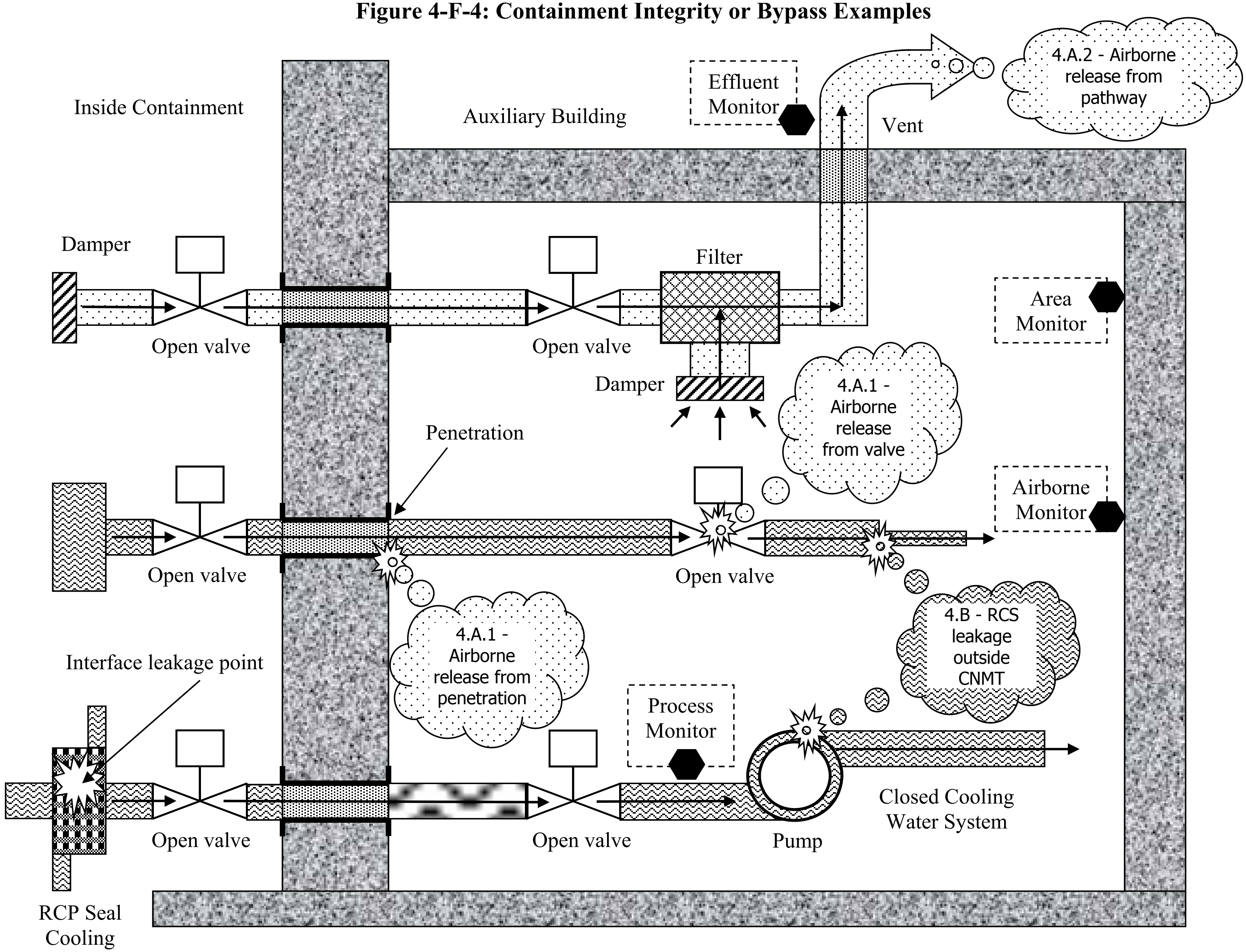
This threshold addresses any other factors that may be used by the SED in determining whether the Containment Barrier is lost.

Potential Loss 6.A

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

References
1, 2-FR-0, Status Trees
WBN TIRPS162
CECC-EPIP-19
NEI 99-01 R6 Fission Product Barriers

Figure 4-F-4: Containment Integrity or Bypass Examples



HG1

ECL: General Emergency

Initiating Condition: HOSTILE ACTION resulting in loss of physical control of the facility.

Operating Mode Applicability: All

Emergency Action Levels:

(1) a. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervisor.

AND

b. **EITHER** of the following has occurred:

1. **ANY** of the following safety functions cannot be controlled or maintained.
   - Reactivity control
   - Core cooling
   - RCS heat removal

OR

2. Damage to spent fuel has occurred or is IMMINENT.

Basis:

This IC addresses an event in which a HOSTILE FORCE has taken physical control of the facility to the extent that the plant staff can no longer operate equipment necessary to maintain key safety functions. It also addresses a HOSTILE ACTION leading to a loss of physical control that results in actual or IMMINENT damage to spent fuel due to 1) damage to a spent fuel pool cooling system (for example, pumps, heat exchangers, controls, etc.) or, 2) loss of spent fuel pool integrity such that sufficient water level cannot be maintained.

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]*.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

References

WBN Physical Security Plan (safeguards)
NSDP-22, Security Contingency Events (restricted)
AOI-42.01, Security Events(restricted)
NEI 99-01 R6 HG1

HG7

ECL: General Emergency

Initiating Condition: Other conditions exist which in the judgment of the SED warrant declaration of a General Emergency.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Other conditions exist which in the judgment of the SED 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:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SED to fall under the emergency classification level description for a General Emergency.

References
NEI 99-01 R6 HG7

HS1

ECL: Site Area Emergency

Initiating Condition: HOSTILE ACTION within the PROTECTED AREA.

Operating Mode Applicability: All

Emergency Action Levels:

(1) A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervisor.

Basis:

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]*.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (for example, 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 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.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level would be via IC HG1.

References

WBN Physical Security Plan (safeguards)
NSDP-22, Security Contingency Events (restricted)
AOI-42.01, Security Events(restricted)
NEI 99-01 R6 HS1

HS6

ECL: Site Area Emergency

Initiating Condition: Inability to control a key safety function from outside the Control Room.

Operating Mode Applicability: All

Emergency Action Levels:

Note: The SED should declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. An event has resulted in plant control being transferred from the Control Room to the Auxiliary Control Room.

AND

b. Control of **ANY** of the following key safety functions is not reestablished within 15 minutes.

- Reactivity control
- Core cooling
- RCS heat removal

Basis:

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 one or more 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 SED judgment. The SED is expected to make a reasonable, informed judgment within 15 minutes whether or not the operating staff has control of key safety functions from the Auxiliary Control Room.

Escalation of the emergency classification level would be via IC FG1 or CG1.

References
1, 2-AOI-27, Main Control Room Accessibility
NEI 99-01 R6 HS6

HS7

ECL: Site Area Emergency

Initiating Condition: Other conditions exist which in the judgment of the SED warrant declaration of a Site Area Emergency.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Other conditions exist which in the judgment of the SED 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:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SED to fall under the emergency classification level description for a Site Area Emergency.

Reference
NEI 99-01 R6 HS7

HA1

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

(1) A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the Security Shift Supervisor.

OR

(2) A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

Basis:

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.

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 (for example, 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 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.

EAL #2 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 site procedures.

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 (that is, 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.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level would be via IC HS1.

References

WBN Physical Security Plan (safeguards)
NSDP-22, Security Contingency Events (restricted)
AOI-42.01, Security Events(restricted)
NEI 99-01 R6 HA1

HA5

ECL: Alert

Initiating Condition: Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability: All

Emergency Action Levels:

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) a. Release of a toxic, corrosive, asphyxiant or flammable gas into any Table H1 plant rooms or areas:

Table H1 - Safe Operation & Shutdown Rooms/Areas		
Aux. BLDG./Elevation	**Room**	**MODE**
Elev 772	Electrical Board Room 1A	3, 4, 5
	Electrical Board Room 1B	3, 4, 5
	Electrical Board Room 2A	3, 4, 5
	Electrical Board Room 2B	3, 4, 5
Elev 757	6.9 KV and 480V SD Bd Room A	3, 4, 5
	6.9 KV and 480V SD Bd Room B	3, 4, 5
Elev 713	1A RHR HX Room	3, 4, 5
	1B RHR HX Room	3, 4, 5
	2A RHR HX Room	3, 4, 5
	2B RHR HX Room	3, 4, 5
	CCS Pump Area	3, 4, 5
Elev 692	1A RHR Pump Room	3, 4, 5
	1B RHR Pump Room	3, 4, 5
	2A RHR Pump Room	3, 4, 5
	2B RHR Pump Room	3, 4, 5

AND

b. 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 maintain normal plant operation, or required for a normal plant cooldown and shutdown. This condition represents an actual or potential substantial degradation of the level of safety of the plant.

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 at the time of the gaseous release. 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 SED'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 (for example, 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 (that is, 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 (for example, fire suppression system testing).
- The action for which room/area entry is required is of an administrative or record keeping nature (for example, 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.

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 automatically or manually activate a fire suppression system in an area.

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

References
Attachment 3 Safe Operation & Shutdown Rooms/Areas Tables Bases
NEI 99-01 R6 HA5

HA6

ECL: Alert

Initiating Condition: Control Room evacuation resulting in transfer of plant control to alternate locations.

Operating Mode Applicability: All

Emergency Action Levels:

(1) An event has resulted in plant control being transferred from the Control Room to the Auxiliary Control Room.

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 HS6.

References
1, 2-AOI-27, Main Control Room Accessibility
NEI 99-01 R6 HA6

HA7

ECL: Alert

Initiating Condition: Other conditions exist which in the judgment of the SED warrant declaration of an Alert.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Other conditions exist which, in the judgment of the SED, 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:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the SED to fall under the emergency classification level description for an Alert.

References
NEI 99-01 R6 HA7

HU1

ECL: Unusual Event

Initiating Condition: Confirmed SECURITY CONDITION or threat.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

(1) A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the Security Shift Supervisor.

OR

(2) Notification of a credible security threat directed at WBN.

OR

(3) A validated notification from the NRC providing information of an aircraft threat.

Basis:

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, HS1 and HG1.

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 references the Security Shift Supervisor 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.

EAL #2 addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with site procedures.

EAL #3 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 site procedures.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level would be via IC HA1.

References

WBN Physical Security Plan (safeguards)
NSDP-22, Security Contingency Events (restricted)
AOI-42.01, Security Events (restricted)
NEI 99-01 R6 HU1

HU2

ECL: Unusual Event

Initiating Condition: Seismic event greater than OBE levels.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Seismic event greater than Operating Basis Earthquake (OBE) as indicated by Alarm Window 166D, OBE SPECTRA EXCEEDED lit.

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). An earthquake greater than an OBE but less than a Safe Shutdown Earthquake (SSE) 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 (for example, 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.

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. The Shift Manager or SED may seek external verification if deemed appropriate (for example, a call to the USGS, check internet news sources, etc.); however, the verification action must not preclude a timely emergency declaration.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA6 or SA9.

References

0-ARI-166-172
1, 2-AOI-9, Earthquake
NEI 99-01 R6 HU2

HU3

ECL: Unusual Event

Initiating Condition: Hazardous event.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4 or 5 or 6)

Note: EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

(1) A tornado strike within the PROTECTED AREA.

(2) Internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component needed for the current operating mode.

(3) Movement of personnel within the PROTECTED AREA is impeded due to an offsite event involving hazardous materials (for example, an offsite chemical spill or toxic gas release).

(4) A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.

(5) River reservoir level ≤ 673 feet as reported by River Operations.

(6) River Reservoir level at Stage I Flood Warning as reported by River Operations.

Basis:

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

EAL #1 addresses a tornado striking (touching down) within the Protected Area.

EAL #2 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 (for example, 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 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 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.

EALs #5 and #6 address potential loss of heat sink or site flooding that can also be precursors of more serious events.

Escalation of the emergency classification level would be based on ICs in Recognition Categories A, F, S or C.

References

0-AOI-8, Tornado Watch or Warning
0-AOI-7.01, Maximum Probable Flood
WBN FSAR Chapter 2
NEI 99-01 R6 HU3

HU4

ECL: Unusual Event

Initiating Condition: FIRE potentially degrading the level of safety of the plant.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Note: The SED should declare the Unusual Event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

(1) a. A FIRE is NOT extinguished within 15-minutes of **ANY** of the following FIRE detection indications:
- Report from the field (that is, visual observation)
- Receipt of multiple (more than 1) fire alarms or indications
- Field verification of a single fire alarm

AND

b. The FIRE is located within **ANY** Table H2 plant areas.

OR

(2) a. Receipt of a single fire alarm (that is, no other indications of a FIRE).

AND

b. The FIRE is located within **ANY** Table H2 plant areas:

AND

c. The existence of a FIRE is not verified within 30-minutes of alarm receipt.

OR

(3) A FIRE within the plant PROTECTED AREA not extinguished within 60-minutes of the initial report, alarm or indication.

OR

(4) A FIRE within the plant PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.

Table H2-Fire Areas	
Reactor Building	IPS
Auxiliary Building	Control Building
Turbine Building	Diesel Generator Bldgs.

Basis:

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.

Table H2 Fire Areas are based on WBN Fire Protection Report, Volume III, WBN Calculation EDQ00099920090012, Unit 1 and 2 Appendix R Safe Shutdown Analysis, and WBN Calculation EDQ00099920090016, Appendix R-Units 1 & 2 Manual Action Requirements. Table H2 Fire Areas include those structures containing functions and systems required for safe shutdown of the plant (SAFETY SYSTEMS).

<u>EAL #1</u>

The intent of the 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (for example, smoldering waste paper 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, operators will take prompt actions to confirm the validity of an initial fire alarm, indication, or report. 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 alarm, indication or report.

<u>EAL #2</u>

This EAL addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (that is, proved or disproved) within 30-minutes of the alarm. Upon receipt, 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 initial 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 information to the contrary, it is assumed that an actual FIRE is in progress.

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. 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.

<u>EAL #3</u>

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.

EAL #4

If a FIRE within the plant PROTECTED AREA is of sufficient size to require a response by an offsite firefighting agency (for example, 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."
>
> 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 CA6 or SA9.

References
WBN Fire Protection Report, Volume III
WBN Calculation EDQ00099920090012, Unit 1 and 2 Appendix R Safe Shutdown Analysis,
WBN Calculation EDQ00099920090016, Appendix R-Units 1 & 2 Manual Action Requirements.
NEI 99-01 R6 HU4

HU7

ECL: Unusual Event

Initiating Condition: Other conditions exist which in the judgment of the SED warrant declaration of a UE.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Other conditions exist which in the judgment of the SED 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 SED to fall under the emergency classification level description for a NOUE.

References
NEI 99-01 R6 HU7

SG1

ECL: General Emergency

Initiating Condition: Prolonged loss of all offsite and all onsite AC power to 6.9KV Shutdown Boards.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the General Emergency promptly upon determining that 4 hours has been exceeded, or will likely be exceeded.

(1) a. Loss of **ALL** offsite and **ALL** onsite AC power to 1A and 1B 6.9KV Shutdown Boards **OR** 2A and 2B 6.9KV Shutdown Boards.

AND

b. **EITHER** of the following:

- Restoration of at least one AC emergency bus in less than 4 hours is not likely.
- Core Cooling CSF –RED

Basis:

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 one or more 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.

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.

References
WBN Unit 1, an 2 Technical Specification Basis 3.8.1
1,2-FR-0, Status Trees
NEI 99-01 R6 SG1

SG8

ECL: General Emergency

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the General Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. Loss of **ALL** offsite and **ALL** onsite AC power to 1A and 1B 6.9KV Shutdown Boards **OR** 2A and 2B 6.9KV Shutdown Boards for 15 minutes or longer.

AND

b. Indicated voltage is less than 105VDC on ALL 125VDC vital battery boards I, II, III, and IV for 15 minutes or longer.

Basis:

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 both EAL thresholds are met.

References

WBNN Unit 1, and 2 Technical Specification Basis 3.8.1
1, 2-AR-15-21
NEI 99-01 R6 SG8

SS1

ECL: Site Area Emergency

Initiating Condition: Loss of all offsite and all onsite AC power to 6.9KV Shutdown Boards for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

> **Note:** The SED should declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of **ALL** offsite and **ALL** onsite AC power to1A and 1B 6.9KV Shutdown Boards **OR** 2A and 2B 6.9KV Shutdown Boards for 15 minutes or longer.

Basis:

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 SG1.

References
WBN Unit 1, and 2 Technical Specification Basis 3.8.1
NEI 99-01 R6 SS1

SS5

ECL: Site Area Emergency

Initiating Condition: Inability to shutdown the reactor causing a challenge to core cooling or RCS heat removal.

Operating Mode Applicability: Power Operation

Emergency Action Levels:

(1) a. An automatic or manual trip did not shutdown the reactor.

AND

b. All manual actions to shutdown the reactor have been unsuccessful.

AND

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

- Core Cooling CSF - RED
- Heat Sink CSF - RED

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, all subsequent operator actions to manually shutdown the reactor 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.

Escalation of the emergency classification level would be via IC RG1 or FG1.

References

1, 2-E-0, Reactor Trip or Safety Injection
1, 2-FR-0, Safety Status Trees
NEI 99-01 R6 SS5

SS8

ECL: Site Area Emergency

Initiating Condition: Loss of all Vital DC power for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Indicated voltage is less than 105VDC on **ALL** 125VDC vital battery boards I, II, III, and IV for 15 minutes or longer.

Basis:

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 SG8.

Reference
1, 2-ARI-15-21
NEI 99-01 R6 SS8

SA1

ECL: Alert

Initiating Condition: Loss of all but one AC power source to 6.9KV Shutdown Boards for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. AC power capability to 1A and 1B 6.9KV Shutdown Boards **OR** 2A and 2B 6.9KV Shutdown Boards is reduced to a single power source for 15 minutes or longer.

AND

b. Any additional single power source failure will result in a loss of all AC power to SAFETY SYSTEMS.

Basis:

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 SU1.

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 (for example, an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (for example, onsite diesel generators) with a single train of 6.9KV Shutdown Boards being back-fed from the unit main generator.
- A loss of emergency power sources (for example, onsite diesel generators) with a single train of 6.9KV Shutdown Boards being back-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 SS1.

References

WBN Unit 1, and 2 Technical Specification Basis 3.8.1
NEI 99-01 R6 SA1

SA2

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

> **Note:** The SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. An UNPLANNED event results in the inability to monitor one or more of the following parameters from within the Control Room for 15 minutes or longer.

Reactor Power
Pressurizer Level
RCS Pressure
Core Exit Temperature
Level in at least one steam generator
Steam Generator Auxiliary Feed Water Flow

AND

b. **ANY** of the following transient events in progress:

- Automatic or manual runback greater than 25% thermal reactor power
- Electrical load rejection greater than 25% full electrical load
- Reactor trip
- SI actuation

Basis:

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.

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. 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.

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 one or more 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 one or more 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 ICs FS1 or IC RS1.

References
NEI 99-01 R6 SA2

SA5

ECL: Alert

Initiating Condition: Automatic or manual trip fails to shutdown the reactor, and subsequent manual actions taken in the MCR are not successful in shutting down the reactor.

Operating Mode Applicability: Power Operation

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.

Emergency Action Levels:

(1) a. An automatic or manual trip did not shutdown the reactor.

AND

b. Manual actions taken in the MCR are not successful in shutting down the reactor.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, and subsequent operator manual actions taken in the MCR 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 MCR since this event entails a significant failure of the RPS.

A manual action in the MCR is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (for example, initiating a manual reactor trip). 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 MCR (for example, 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”.

The plant response to the failure of an automatic or manual reactor trip 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 core cooling or RCS heat removal safety functions, the emergency classification level will escalate to a Site Area Emergency via IC SS5. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS5 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.

References
1, 2-E-0, Reactor Trip or Safety Injection
NEI 99-01 R6 SA5

SA9

ECL: Alert

Initiating Condition: Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

> **Note:** If the affected safety system (or component) was already inoperable or out of service before the event occurred, then no emergency classification is warranted as long as the damage was limited to this affected safety system or component.

Emergency Action Levels:

(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
- River reservoir level less than 666 feet as reported by River Operations
- River reservoir level at Stage II flood warning as reported by River Operations
- Other events with similar hazard characteristics as determined by the Shift Manager

AND

b. **EITHER** of the following:

- Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode.
- The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode.

Basis:

This IC addresses a hazardous event that causes damage to a SAFETY SYSTEM, or a structure containing SAFETY SYSTEM components, needed for the current operating mode. This condition significantly reduces the margin to a loss or potential loss of a fission product barrier, and therefore represents an actual or potential substantial degradation of the level of safety of the plant.

EAL 1.b.1 addresses damage to a SAFETY SYSTEM train that is in service/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.

EAL 1.b.2 addresses damage to a SAFETY SYSTEM component that is not in service/operation or readily apparent through indications alone, or to a structure containing SAFETY SYSTEM components. Operators will make this determination 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.

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

References
0-AOI-7.01, Maximum Probable Flood
WBN FSAR Chapter 2
NEI 99-01 R6 SA9

SU1

ECL: Unusual Event

Initiating Condition: Loss of all offsite AC power capability to 6.9KV Shutdown Boards for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of **ALL** offsite AC power capability to 1A and 1B 6.9KV Shutdown Boards **OR** 2A and 2B 6.9KV Shutdown Boards for 15 minutes or longer.

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.

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 SA1.

References
WBN Unit 1, and 2 Technical Specification Basis 3.8.1
NEI 99-01 R6 SU1

SU2

ECL: Unusual Event

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) a. An UNPLANNED event results in the inability to monitor one or more of the following parameters from within the Control Room for 15 minutes or longer.

Reactor Power
Pressurizer Level
RCS Pressure
Core Exit Temperature
Level in at least one steam generator
Steam Generator Auxiliary Feed Water Flow

Basis:

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.

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. 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.

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 one or more 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 one or more 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 SA2.

References
NEI 99-01 R6 SU2

SU3

ECL: Unusual Event

Initiating Condition: Reactor coolant activity greater than Technical Specification allowable limits.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

(1) Reactor coolant sample analysis results indicate **ANY** of the following:
- Dose Equivalent Iodine (I-131) greater than 0.265 μCi/gm for 48 hours or longer
- Dose Equivalent Iodine (I-131) greater than 14 μCi/gm
- RCS gross specific activity greater than 100/Ē μCi/gm

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.

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

References
WBN Unit 1, and 2 Technical Specification 3.4.16
NEI 99-01 R6 SU3

SU4

ECL: Unusual Event

Initiating Condition: RCS leakage for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

Note: The SED should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) RCS unidentified or pressure boundary leakage greater than 10 gpm for 15 minutes or longer.

OR

(2) RCS identified leakage greater than 25 gpm for 15 minutes or longer.

OR

(3) Leakage from the RCS to a location outside containment greater than 25 gpm for 15 minutes or longer.

Basis:

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 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 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 (for example, steam generator tube leakage in a PWR) 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 calculations to determine (for example, 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 a relief valve does not warrant an emergency classification. An emergency classification would be required if a mass loss is caused by a relief valve that is not functioning as designed/expected (for example, a relief valve sticks open and the line flow cannot be isolated).

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.

References
WBN Unit 1, and 2 Technical Specification 3.4.13
NEI 99-01 R6 SU4

SU5

ECL: Unusual Event

Initiating Condition: Automatic or manual trip fails to shutdown the reactor.

Operating Mode Applicability: Power Operation

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.

Emergency Action Levels: (1 or 2)

(1) a. An automatic trip did not shutdown the reactor.

AND

b. A subsequent manual action taken in the MCR is successful in shutting down the reactor.

(2) a. A manual trip did not shutdown the reactor.

AND

b. **EITHER** of the following:

- A subsequent manual action taken in the MCR is successful in shutting down the reactor.
- A subsequent automatic trip is successful in shutting down the reactor.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, and either a subsequent operator manual action taken at the reactor control consoles or an automatic trip 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.

Following the failure on an automatic reactor trip, operators will promptly initiate manual actions at the reactor control consoles to shutdown the reactor (for example, initiate a manual reactor trip). 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.

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 (for example, initiate a manual reactor trip) using a different switch). Depending upon several factors, the initial or subsequent effort to manually trip the reactor, or a concurrent plant condition, may lead to the generation of an automatic reactor trip signal. If a subsequent manual or automatic trip 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 (for example, initiating a manual reactor trip). 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”.

The plant response to the failure of an automatic or manual reactor trip 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 SA5. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC SA5 or FA1, an Unusual Event declaration is appropriate for this event.

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

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

- If the signal causes a plant transient that should have included an automatic reactor trip and the RPS fails to automatically shutdown the reactor, then this IC and the EALs are applicable, and should be evaluated.

- If the signal does not cause a plant transient and the trip failure is determined through other means (for example, assessment of test results), then this IC and the EALs are not applicable and no classification is warranted.

References

1, 2-E-0, Reactor Trip or Safety Injection
NEI 99-01 R6 SU5

SU6

ECL: Unusual Event

Initiating Condition: Loss of all onsite or offsite communications capabilities.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

1. Loss of **ALL** Table C3 Onsite communications capability affecting the ability to perform routine operations.

   OR

2. Loss of **ALL** Table C3 Offsite communication capability affecting the ability to perform offsite notifications.

   OR

3. Loss of **ALL** Table C3 NRC communication capability affecting the ability to perform NRC notifications.

Table C3-Communications Capability			
System	Onsite	Offsite	NRC
Plant Radio	X		
Plant Page	X		
All telephone Lines (Private and Commercial)	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 OROs and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (for example, 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 addresses a total loss of the communications methods used in support of routine plant operations.

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are Tennessee EMA, Rhea County, Meigs County and McMinn County.

EAL #3 addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

References
BFN FSAR Chapter 9.5
NEI 99-01 R6 SU6

SU7

ECL: Unusual Event

Initiating Condition: Failure to isolate containment or loss of containment pressure control.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2)

(1) a. Failure of containment to isolate when required by an actuation signal.

AND

b. **ALL** required penetrations are not closed within 15 minutes of the actuation signal.

(2) a. Containment pressure greater than 2.8 PSIG (Phase B).

AND

b. Less than one full train of Containment Spray is operating per design for 15 minutes or longer.

Basis:

This IC addresses a failure of one or more containment penetrations to automatically isolate (close) when required by an actuation signal. It also addresses an event that results in high containment pressure with a concurrent failure of containment pressure control systems. Absent challenges to another fission product barrier, either condition represents potential degradation of the level of safety of the plant.

For EAL #1, the containment isolation signal must be generated as the result on an off-normal/accident condition (for example, a safety injection or high containment pressure); a failure resulting from testing or maintenance does not warrant classification. The determination of containment and penetration status – isolated or not isolated – should be made in accordance with the appropriate criteria contained in the plant AOPs and EOPs. The 15-minute criterion is included to allow operators time to manually isolate the required penetrations, if possible.

EAL #2 addresses a condition where containment pressure is greater than the setpoint at which containment energy (heat) removal systems are designed to automatically actuate, and less than one full train of equipment is capable of operating per design. The 15-minute criterion is included to allow operators time to manually start equipment that may not have automatically started, if possible. The inability to start the required equipment indicates that containment heat removal/depressurization systems (for example, containment sprays or ice condenser fans) are either lost or performing in a degraded manner.

This event would escalate to a Site Area Emergency in accordance with IC FS1 if there were a concurrent loss or potential loss of either the Fuel Clad or RCS fission product barriers.

References

FR-Z.1, High Containment Pressure
NEI 99-01 R6 SU7