June 8, 2020
L-2020-081
10 CFR 50.90

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

RE: Turkey Point Nuclear Plant, Unit 3 and 4
Docket Nos. 50-250 and 50-251
Renewed Facility Operating Licenses DPR-31 and DPR-41
Response to Request for Additional Information Regarding License Amendment Request 264, Adopt Emergency Action Level (EAL) Scheme Described in NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors"

References:

1. FPL letter L-2019-203, License Amendment Request 264, Adopt Emergency Action Level (EAL) Scheme Described in NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," dated December 6, 2019. [ML19343A373]
2. NRC email, "FINAL: Turkey Point Units 3 and 4 - Request for Additional Information Concerning Emergency Action Level Scheme Change (EPID L-2019-LLA-0271) [FPL: L-2019-203]" dated May 1, 2020.

Per Reference 1, and pursuant to 10 CPR Part 50.90, Florida Power & Light Company (FPL) submitted a request to amend to Renewed Facility Operating Licenses DPR-31 and DPR-41 for Turkey Point Nuclear Plant Units 3 and 4 (Turkey Point), respectively. The proposed license amendments revise the Turkey Point Emergency Plan by adopting the methodology for developing an Emergency Action Level (EAL) scheme described in Nuclear Energy Institute (NEI) 99-01, Revision 6, "Methodology for Development of Emergency Action Levels" (ADAMS Accession No. ML110240324).

Per Reference 2, the NRC notified FPL that the Staff determined additional information was needed to complete its review of the proposed amendments. Attachment 1 provides FPL's response to the additional information requested. Attachment 2 provides the marked-up version of the Turkey Point's Emergency Action Level Technical Bases Document incorporating conforming changes described in Attachment 1. Attachment 3 provides the re-typed version of the Emergency Action Level Technical Bases Document.

The response to the request for additional information provided does not alter the conclusions provided in Reference 1 that the proposed change does not involve a significant hazards consideration pursuant to 10 CFR 50.92, and that there are no significant environmental impacts associated with the proposed change.

This letter contains no new or revised regulatory commitments.

Should you have any questions regarding this submission, please contact Mr. Robert Hess, Turkey Point Licensing Manager, at 305-246-4112.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on the 8th day of June 2020.

B. Stamp

Brian Stamp
Site Director, Turkey Point Nuclear Plant

Attachments

cc: USNRC Regional Administrator, Region II
USNRC Project Manager, Turkey Point Nuclear Plant
USNRC Senior Resident Inspector, Turkey Point Nuclear Plant
Ms. Cindy Becker, Florida Department of Health

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (RAI)
LICENSE AMMENDMENT REQUEST 264
EMERGENCY ACTION LEVEL (EAL) SCHEME CHANGE

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RAI- #	Section IC/EAL	Question	PTN Response
1	RU1	The proposed EAL RU1.1 threshold values for unusual event classifications have substantially changed from the currently approved EAL threshold values for Turkey Point. Considering that the NEI 99-01, "Methodology for Development of Emergency Action Levels," Revision 5 (ADAMS Accession No. ML080450149), guidance for RU1.1 is similar to the guidance provided by NEI 99-01, Revision 6, the proposed changes in values should be justified. The NRC staff could not determine a valid reason for the setpoint changes based on the information provided in the proposed EAL scheme change. The threshold values for RU1.1 are intended to address a low-level radiological release that exceeds regulatory commitments for an extended time. Appendix A, "Basis for Radiological Effluent EALs," of NEI 99-01, Revision 5, Section A.4 discusses the usage of Offsite Dose Calculation Manual (ODCM) values as threshold values for RU1. This attachment is still applicable to NEI 99-01, Revision 6. Justify the proposed Turkey Point RU1.1 threshold values. This justification should include a discussion as to how the proposed RU1.1 values are reasonably close to a 2 times the radiation alarm setpoints, as calculated in the ODCM, for each of the proposed release points.	Refer to, EP-CALC-PTN-1901 "Radiological Effluent EAL Values," Attachment 1, RU1.1 Liquid Effluent EAL Calculations and Attachment 2, RU1.1 Gaseous Effluent EAL Calculations. [Note: EP-CALC-PTN-1901 was submitted as Attachment 4 to L-2019-203]. **Liquid** ODCM Control 2.2 limits for the concentration of radioactive liquid effluents released from the site to the unrestricted area are as follows: • Ten (10) times the concentrations specified in 10 CFR Part 20.1001-20.2401, Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases • 2.0E-04 µCi/ml total activity for dissolved or entrained noble gases The 10 CFR 20 Appendix B, Table 2, Column 2 unlisted radionuclide limit of 1E-8 µCi/ml is used as the most restrictive liquid effluent release value for an unknown mix. The site specific RU1.1 liquid effluent EAL threshold values equate to 2 times the ODCM limit. **Gaseous** ODCM Control 3.2 limits for the concentration of radioactive gaseous effluents at the site boundary are as follows: • Less than or equal to 500 mrem/yr to the total body

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			(Noble Gasses) • Less than or equal to 3000 mrem/yr to the skin (Noble Gasses) • Less than or equal to 1500 mrem/yr to any organ (I-131, I-133, tritium, and for all radionuclides in particulate form with half-lives greater than 8 days) ODCM setpoint calculations are based on the noble gas limits. Organ dose includes inhalation, ingestion and deposition pathways and are applied in unrestricted area site boundary effluent dose calculations used in the Annual Radioactive Effluent Release Report. Ingestion pathway bases are not compatible or directly comparable with short term event considerations and are not a significant contribution to the total dose (total body or skin dose limits from noble gas are the major exposure pathway). Thus, the organ dose limit is not applicable for EAL threshold determination. The gaseous source term is based upon the NUREG-1940 Table 1-6 noble gas fraction of activity available at shutdown. The site specific RU1.1 gaseous effluent EAL threshold values equate to 2 times the ODCM limit for the lesser of the total body or skin exposure pathways. The radiological effluent monitor setpoints are established to ensure the ODCM release rate limits are not exceeded.

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RAI- #	Section IC/EAL	Question	PTN Response
2	Table R-1	The proposed Table R-1, “Unit [1 or 2, as applicable] Effluent Monitor Classification Thresholds,” that is used for RA1.1, RS1.1, and RG1.1 have eliminated threshold values based on main steam line radiation monitors. FPL did not provide a justification that supports the removal of the main steam line and steam jet air ejector radiation monitor threshold values for RA1.1, RS1.1, and RG1.1. Justify the removal of the threshold values based on main steam line and steam jet air ejector radiation monitors from EALs RA1.1, RS1.1, and RG1.1.	Refer to EP-CALC-PTN-1901 “Radiological Effluent EAL Values,” Attachment 2, RU 1.1 Gaseous Effluent Calculations. There are two monitored gaseous effluent discharge points from PTN Units 3 and 4. The ODCM Section 3.0.B sources of gaseous effluent discharge to the environment and their applicable monitors are as follows: • Common: Plant Vent – R-14 and RAD-6304 • Unit 3: Spent Fuel Pit Vent – RAD-3-6418 The Steam Jet Air Ejector monitors are upstream of the Plant Vent monitor and thus are not used as separate EAL gaseous effluent threshold values. The main steam line radiation monitors are not effective in providing accurate effluent dose values. Any threshold values assigned to these monitors would not be effective in appropriately identifying any of the specified RA1.1, RS1.1 or RG1.1 threshold criteria in the absence of real time dose assessment. The main steam line radiation monitors are process monitors designed to detect gross fuel failures and not to assess potential offsite release dose rates.
3	Table R-1	The proposed Table R-1, have threshold values for RA1.1, RS1.1, and RG1.1 that have substantially changed from the current NRC approved threshold values. An explanation that supports the changes in values or changes in instrumentation was not provided. Explain the changes to the threshold values and the changes in instrumentation the for RA1, RS1, and RG1.	Refer to EP-CALC-PTN-1901 “Radiological Effluent EAL Values” Attachment 3, “RA1.1, RS1.1 and RG1.1 URI Gaseous Effluent EAL Calculations,” for the bases of the proposed RA1.1, RS1.1 and RG1.1 effluent thresholds. The RA1 threshold bases changed from NEI 99-01 Revision 5 (200 x ODCM limits) to Revision 6 (1% of the PAG dose rates at the site boundary).

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			The proposed RA1.1, RS1.1 and RG1.1 gaseous release EAL thresholds were developed using the PTN URI dose assessment model with the inputs as described in Section 2 of the referenced calculation. The current PTN radiological effluent EAL thresholds were derived based on the assumptions in the ODCM for calculating dose to the public. The current NUE and Alert EAL thresholds are based on 2-times the ODCM limit and 200-times the ODCM limit respectively.
4	RA2.1	The proposed threshold value for RA2.1 is not consistent with the guidance provided by NEI 99-01, Revision 6. FPL proposed replacing uncovery of irradiation fuel with imminent uncovery of irradiated fuel. FPL provided that the term "imminent" is consistent with the basis document. Although the term "imminent" is used in the basis document, it is used in reference to imminent damage rather than imminent uncovery. Justify the use of "imminent" in the threshold value for RA2.1. This discussion should address Turkey Point's ability to accurately determine whether irradiated fuel is uncovered or not as well as providing a clarification as to what "imminent" specifically means as applied to uncovery of irradiated fuel.	The term "imminent" as used in the generic AA2 bases applies to Example EAL #1 (RA2.1). The concern is that should irradiated fuel become uncovered, it will likely be damaged. Addition of the defined term "IMMINENT" to RA2.1 is consistent with the cited bases as well as the classification criteria provided in NEI 99-01 Revision 6 Section 5.5 "Classification of Imminent Conditions." Indication of potential uncovery of irradiated fuel will likely be based on direct visual observations of conditions that will lead to likely (imminent) uncovery of irradiated fuel rather than observation of actual uncovery. Once uncovered, such means of determining irradiated fuel uncovery would not be possible. Example EAL #2 (RA2.2) is based on the occurrence of actual damage to irradiated fuel. The specified radiation monitor thresholds in RA2.2 are intended to confirm and quantify the irradiated fuel damage that has already been determined to have occurred.

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RAI- #	Section IC/EAL	Question	PTN Response
5	CS1.2 CG1.1	The proposed Containment High Range Monitor threshold values for CS1.2 and CG1.1 have substantially changed from the current threshold values. An explanation that supports the changes in values was not provided. Explain the changes to Containment High Range Monitor threshold values for CS1.2 and CG1.1.	The current Containment High Range Monitor threshold values for CS1.2 and CG1.1 are based on estimates of containment radiation levels for different depths of water above the fuel in the refueling mode. These values are used as an alternative indication of core uncovery. The current CS1.2 threshold value conservatively utilized the calculated value associated with 5 ft. of water shielding above the core (8.7E+1 R/hr). The current CG1.1 threshold value conservatively utilized the calculated value associated with 3 ft of water shielding above the core (1.4E+3 R/hr). The value used in the proposed corresponding Revision 6 based EALs is the value calculated for 0 ft. of water shielding (9.4E+4 R/hr). This value is more appropriate given the intent of both CS1.2 and CG1.1 is to identify a radiation level indicative of actual core uncovery.
6	CU3.1	The proposed EAL CU3.1, contains the condition, "…due to the loss of RCS [reactor coolant system] cooling," which is not consistent with NEI 99-01, Revision 6. FPL provides that this wording is "consistent with the generic basis." This difference could result in potential misclassification for an event other than a loss of RCS cooling that leads to an unplanned RCS pressure increase. As this change could impact the timing of the declaration of CU3.1, this change could reasonably be considered as a deviation. Therefore, justify including "due to the loss of RCS cooling" to the threshold value for the proposed EAL CA3.1.	The proposed CU3.1 contained the added wording "… due to loss of decay heat removal capability." The wording *"…due to loss of decay heat removal capability"* has been deleted from CU3.1.
7	SA1.1	For EAL SA1.1, Table S-1, "AC [alternating current] Power Sources," appears to provide one offsite power source per unit. Considering that technical specification 3.8.1.1.a requires two offsite power sources. Describe how the required two offsite power sources per unit are reflected in Table S-1, and address how SA1.1 is accurately assessed regarding offsite power sources.	The two offsite power sources at PTN are the Unit 3 and 4 Startup transformers. Each transformer has a cross-connect breaker to the opposite Unit "A" 4 KV bus through a single breaker which is normally racked-out and locked. This configuration is per the design and is considered to meet the

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			Technical Specification requirements for off-site power sources. For EALs SU1.1 and SA1.1 the opposite Unit Startup Transformer is not credited under hot conditions (Modes 1 – 4) due to the racked-out and locked configuration and the associated time required to rack in the breaker and establish the cross-connect (> 15 min.). Steps are taken however to establish the breaker cross-connect to restore off-site power per EOPs.
8	SS1.1 SG1.1	FPL proposes to deviate from a standard EAL scheme by eliminating the site-specific restoration time from the threshold value for EAL SG 1.1. The NRC staff does agree that, as stated in the proposed basis discussion for EALs SS 1.1 and SG 1.1, "credit can be taken for any AC power source that has sufficient capability to operate equipment necessary maintain a safe shutdown condition, such as FLEX [Diverse and Flexible Mitigation Capability] generators." Sufficient justification was not provided to justify that the existence of FLEX equipment and appropriate procedures to use that equipment supports the removal of the "site-specific" time to restore AC power. Additionally, the basis discussion that credit can be taken for any AC power source does not appear to be reflected in the threshold values for SS 1.1 and SG 1.1. The NRC staff notes that Emergency Preparedness Frequently Asked Question 2015-015, "Consideration of listing site-specific power sources applicable for consideration for loss of power EALs," scope is limited to the identification of power sources and neither discusses or supports coping time changes. a. Explain what features, that are unique to Turkey Point, require a deviation from a standard EAL scheme or provide threshold values that are consistent with NEI 99-01, Revision 6, such that a general emergency would be declared for an extended loss of AC power concurrent with the inability to operate equipment necessary to maintain a safe shutdown condition. b. For SS 1.1 and SG 1.1, address the threshold values for EALs SS 1.1 and SG	The appropriateness of this deviation is not based on any unique design feature of PTN. The majority of the industry NEI 99-01, Revision 6 license submittals were made prior to full industry implementation of BDBEE and ELAP guidance. The justification for the proposed deviation to eliminate the SBO coping time criteria for AC power restoration from SG1.1 is not based on the existence or availability of FLEX equipment or the procedures directing use of FLEX equipment. The basis for the justification is the procedural guidance put in place as part of FLEX implementation for an Extended Loss of AC Power (ELAP). As stated in the deviation justifications submitted: In accordance with plant EOPs (3[4]-EOP-ECA-0.0], following a single unit loss of all AC power to the emergency buses, operators will declare an ELAP within 10 min. of failure of power restoration efforts (a total of ~30 to ~40 minutes from the initial loss of emergency bus power) and direct implementation of FLEX Support Guidelines, including the deployment of dedicated portable equipment and performance of DC load shedding**. Even if no AC emergency bus is energized, these actions will maintain or restore core cooling,**

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		1.1 that support crediting "…any AC power source that has sufficient capability to operate equipment necessary to maintain a safe shutdown condition, such as the FLEX generators."	**containment, and spent fuel pool cooling capabilities indefinitely**. Therefore, the underlying basis for the generic EAL coping time statement, that power must be restored to an AC emergency bus within the fixed amount of time specified in the Station Blackout Coping Analysis to avoid a severe challenge to one or more fission product barriers, is not valid for PTN. The SBO analyses and derived coping times were determined in accordance with 10 CFR 50.63 and Regulatory Guide 1.155. These analyses do not take credit for the current plant capabilities in place to mitigate the effects of an extended loss of AC power (ELAP) and are not appropriate criteria for escalation to a General Emergency when adequate core cooling is available. Escalation to the General Emergency should be based on actual indications of degraded core cooling during loss of AC power events. Based on previous industry experience with this proposed deviation, PTN has revised the proposed SG1.1 to read: *Loss of **all** offsite and **all** onsite AC power to 4KV emergency buses 3[4]A and 3[4]B* ***<u>AND EITHER</u>*** • *Long-term RCS heat removal capability is **not** likely to be established and maintained per procedure* • *CETs > 1200 ^{o}F* The associated bases have been revised to reflect this revision. This deviation is justified because, in accordance with plant Emergency Operating Procedures (EOPs), operators will

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			declare an extended loss of AC power (ELAP) within 60 min. of the loss of all AC power to the emergency buses and direct implementation of loss of AC power EOPs and associated support guidelines, including the establishment of extended core cooling strategies, deployment of dedicated portable equipment and performance of DC load shedding activities.
9	SU4.1	The proposed threshold value for EAL SU4.1 appear to apply to conditions where the technical specifications allow continued operation for 48 hours while the licensee makes attempts to restore either I-131 or Xe-133 concentrations to within the technical specification limits. The appropriateness of declaring a Notification of Unusual Event when the Technical Specification Limiting Condition for Operation (LCO) is met was not provided; especially when the LCO allows continued operation at full power for an extended time. Explain how EAL SU4.1 will be accurately declared for conditions which indicate a potential degradation of the level of safety of the plant that is consistent with the declaration of a Notification of Unusual Event emergency classification.	Proposed EAL SU4.1 has been revised to delete the 48-hour threshold values specified in Technical Specification LCO 3.4.8. The proposed revised SU4.1 wording: *"Sample analysis indicates reactor coolant activity > 60 µCi/gm dose equivalent I-131"*
10	SU6.1 SU6.2 SA6.1 SS6.1	The proposed Turkey Point basis discussion provides that a reactor shutdown is determined in accordance with applicable Emergency Operating Procedure (EOP) criteria. The Westinghouse nuclear power plant Reactor Trip or Safety Injection and the Response to Nuclear Power Generation/Anticipated Transient Without Scram (ATWS) EOPs typically provide that a successful reactor trip exists when all rods are inserted, and neutron flux is decreasing. Additionally, typical Critical Safety Function Status Trees provide that either a reactor power of greater than five percent or intermediate range power increasing is an indication that the reactor is not shutdown and that implementation of the Response to Nuclear Power Generation/ATWS procedure is required. Attachment 3, "Emergency Action Level Scheme Comparison Matrix," for SU6.1, SA6.1, and SS6.1 provides that the Turkey Point Critical Safety Function Status Tree	For the purposes of emergency classification, the PTN method used to determine the reactor is shutdown following a reactor trip is consistent with the plant EOPs. This method is based on reactor power indicating greater than that requiring entry into Critical Safety Function Status Trees (CSFST) Subcriticality Red Path (5%). This is also the power level that defines power operation in the Technical Specifications. Reactor power below 5% ensures that the heat load to available heat sinks is below post-trip decay heat level normally accommodated with AFW flow. This is the intended bases for the SU5, SA5 and SS5 ICs in NEI 99-01 Rev. 6. The negative intermediate range startup rate criteria

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		Subcriticality Red Path criteria defines a successful shutdown based on reactor power being less than 5 percent. As noted above, 5 percent is only one criterion that requires implementation of the Response to Nuclear Power Generation/ATWS procedure. The NRC staff notes that the reactor protective system is designed to place the reactor in a subcritical position. As such, relying solely on an indication of 5 percent power is not indicative of a failure of an automatic or manual trip failing to shut down the reactor. Explain how the SU6.1, SA6.1, and SS6.1 threshold value of 5 percent power is used to indicate that a reactor is shutdown when typical Westinghouse plant EOPs use all rods inserted and neutron flux decreasing in addition to reactor power.	serves only to confirm subcriticality signaling exit from FR-S.1. As specified in the generic developer's guidance, "Developers may include site-specific EOP criteria indicative of a successful reactor shutdown in an EAL statement, the Basis or both (e.g., a reactor power level)." Additionally, the generic NEI 99-01, Revision 6 bases states that a successful reactor trip results in a power level within the capability of decay heat removal systems (the basis for the CSFST Subcriticality Red Path entry condition). Therefore, the specified power levels are the site-specific indication of a successful reactor trip for emergency classification for those plants that implement WOG Emergency Response Guidelines (ERGs) and CSFSTs.

EMERGENCY ACTION LEVEL TECHNICAL BASES DOCUMENT (MARK-UP COPY)
(241 pages follow)

Emergency Action Level Technical Bases Document

	Print Name	Signature	Date
Prepared by:	Kelly Walker	Kelly Walker	6/6/20
Technical Reviewer:	ROBERT W. PELL	Robert W. Pell	6/8/20
Reviewer:	KEVIN O'HARE	[signature]	6/8/20
Approval:	KEVIN O'HARE	[signature]	6/8/20

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1.0 INTRODUCTION

This document provides an explanation and rationale for each Emergency Action Level (EAL) included in the NEI 99-1 Revision 6 EAL Upgrade Project for Turkey Point Nuclear Generating (PTN). It should be used to facilitate review of the PTN EALs and provide historical documentation for future reference. Decision-makers responsible for implementation of 0-EPIP-20101, Duties of Emergency Coordinator, may use this document as a technical reference in support of EAL interpretation. This information may assist the Emergency Coordinator (EC) 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 (e.g., the EC 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 Turkey Point Nuclear Generating Emergency Plan.

In 1992, the NRC endorsed NUMARC/NESP-007 “Methodology for Development of Emergency Action Levels” as an alternative guidance to the original Standard Review Plan and NUREG-0654 EAL schemes.

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 (ref. 4.1.1), PTN 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 a greater probability of barrier loss and reduced certainty of maintaining the barrier.

The primary fission product barriers are:

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

B. <u>Reactor Coolant System Barrier (RCS):</u> 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. <u>Containment Barrier (CTMT):</u> 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 Emergency Classification Level (ECL) from an 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 PTN EAL scheme includes the following features:

- Division of the EAL set into three broad groups:

- EALs applicable under any plant operational modes – This group would be reviewed by the EAL-user any time emergency classification is considered.
- EALs applicable only under hot operational 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 PTN EAL categories are aligned to and represent the NEI 99-01 "Recognition Categories." Subcategories are used in the PTN scheme as necessary to further divide the EALs of a category into logical sets of possible emergency classification thresholds. The PTN EAL categories and subcategories are listed below.

The primary tool for determining the emergency classification level is the EAL Classification Matrix. The user of the EAL Classification Matrix may (but is not required to) consult the EAL technical bases in order to obtain additional information concerning the EALs under classification consideration. The user should consult Section 3.0 and Attachment 1 of this document for such information.

EAL Groups, Categories and Subcategories

EAL Group/Category	EAL Subcategory
Any Operating Mode:	
R – Abnormal **R**ad Levels / Rad Effluent	1 – Radiological Effluent 2 – Irradiated Fuel Event 3 – Area Radiation Levels
H – **H**azards and Other Conditions Affecting Plant Safety	1 – Security 2 – Seismic Event 3 – Natural or Technological Hazard 4 – Fire 5 – Hazardous Gas 6 – Control Room Evacuation 7 – EC Judgment
E – Independent Spent Fuel Storage Installation (ISFSI)	1 – Confinement Boundary
Hot Conditions:	
S – System Malfunction	1 – Loss of Emergency AC Power 2 – Loss of Vital DC Power 3 – Loss of Control Room Indications 4 – RCS Activity 5 – RCS Leakage 6 – RTS Failure 7 – Loss of Communications 8 – Containment Failure 9 – Hazardous Event Affecting Safety Systems
F – **F**ission Product Barrier Degradation	None
Cold Conditions:	
C – **C**old Shutdown / Refueling System Malfunction	1 – RCS Level 2 – Loss of Emergency AC Power 3 – RCS Temperature 4 – Loss of Vital DC Power 5 – Loss of Communications 6 – Hazardous Event Affecting Safety Systems

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, E, F, H and S) and EAL subcategory. A summary explanation of each category and subcategory is given at the beginning of the technical bases discussions of the EALs included in the category. For each EAL, the following information is provided:

Category Letter & Title

Subcategory Number & Title

Initiating Condition (IC)

Site-specific description of the generic IC given in NEI 99-01 Rev. 6.

EAL Identifier (enclosed in rectangle)

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

1. First character (letter): Corresponds to the EAL category as described above (R, C, E, F, H or S)
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).
4. Fourth character (number): The numerical sequence of the EAL within the EAL subcategory. If the subcategory has only one EAL, it is given the number one (1).

Classification (enclosed in rectangle):

General Emergency (G), Site Area Emergency (S), Alert (A) or Unusual Event (U).

EAL (enclosed in rectangle)

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

Mode Applicability

One or more of the following plant operating conditions comprise the mode to which each EAL is applicable: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 – Hot Shutdown, 5 - Cold Shutdown, 6 - Refueling, DEF - Defueled, or All. (See Section 2.6 for operating mode definitions)

Definitions:

If the EAL wording contains a defined term, the definition of the term is included in this section. These definitions can also be found in Section 5.1.

Basis:

An EAL basis section that provides PTN-relevant information concerning the EAL as well as a description of the rationale for the EAL as provided in NEI 99-01 Rev. 6.

Reference(s):

Source documentation from which the EAL is derived

2.6 Operational Mode Applicability

MODE	K_{eff}	THERMAL POWER *	T_{AVG}
1. Power Operation	≥ 0.99	> 5%	≥ 350˚F
2. Startup	≥ 0.99	≤ 5%	≥ 350˚F
3. Hot Standby	< 0.99	0	≥ 350˚F
4. Hot Shutdown	< 0.99	0	> 200˚F & < 350˚F
5. Cold Shutdown	< 0.99	0	≤ 200˚F
6. Refueling **	≤ 0.95	0	≤ 140˚F
Defueled	NA	NA	NA – no fuel in reactor vessel

* Excluding Decay Heat

** Fuel in the reactor vessel with the vessel head closure bolts less than fully tensioned or with the head removed

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.

3.0 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

3.1 General Considerations

When making an emergency classification, the EC 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 Operational 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. 4.1.8).

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 (e.g., 15 minutes, 30 minutes, etc.), the EC 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 10CFR 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 (e.g., 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 (i.e., 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 (e.g., maintain the necessary expertise on-shift).

3.1.6 Emergency Coordinator (EC) 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 EC 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 EC 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 (i.e., 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 potentially classifiable 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. 4.1.8).

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 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 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 EC must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (i.e., a change in the ECL is IMMINENT). If, in the judgment of the EC, 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 Downgrading

An ECL may be downgraded when the event or condition that meets the highest IC and EAL no longer exists, and other site-specific downgrading requirements are met. If downgrading the ECL is deemed appropriate, the new ECL would then be based on a lower applicable IC(s) and EAL(s). The ECL may also simply be terminated.

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 scram the reactor followed by a successful manual scram.

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 (e.g., a few seconds to a few minutes). The following guidance should be applied to the classification of these conditions.

<u>EAL momentarily met during expected plant response</u> - In instances in which 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.

<u>EAL momentarily met but the condition is corrected prior to an emergency declaration</u> – 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. 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 EC 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 10CFR 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 Technical Specifications Table 1.2, Operational Modes

4.1.7 Turkey Point Unit 3 & 4 Offsite Dose Calculation Manual (ODCM)

4.1.8 NSIR/DPR-ISG-01 Interim Staff Guidance, Emergency Planning for Nuclear Power Plants

4.1.9 Turkey Point Plant Radiological Emergency Plan

4.1.10 Certificate of Compliance Appendix A NUHOMS HD System Generic Technical Specifications

4.1.11 UFSAR Chapter 9.5 Fuel Storage and Handling

4.1.12 0-ADM-051 Outage Risk Assessment and Control

4.2 Implementing

4.2.1 0-EPIP-20101, Duties of Emergency Coordinator

4.2.2 NEI 99-01 Rev. 6 to PTN EAL Comparison Matrix

4.2.3 PTN EAL Matrix

5.0 DEFINITIONS, ACRONYMS & ABBREVIATIONS

5.1 Definitions (ref. 4.1.1 except as noted)

Selected terms used in Initiating Condition, Emergency Action Level statements and EAL bases are set in all capital letters (e.g., 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 Protective Action Guideline exposure levels.

CONFINEMENT BOUNDARY

The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. As related to the PTN ISFSI, Confinement Boundary is defined as the NUHOMS Dry Shielding Canister (DSC) (ref. 4.1.10).

CONTAINMENT CLOSURE

The procedurally defined conditions or actions taken to secure containment and associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

Containment Closure requirements are specified in 0-ADM-051 Outage Risk Assessment and Control (ref. 4.1.12).

EMERGENCY ACTION LEVEL (EAL)

A pre-determined, site-specific, observable threshold for an INITIATING CONDITION that, when met or exceeded, places the plant in a given emergency classification level.

EMERGENCY CLASSIFICATION LEVEL (ECL)

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

- Unusual Event (UE)
- Alert
- Site Area Emergency (SAE)
- General Emergency (GE)

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 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.

FISSION PRODUCT BARRIER THRESHOLD

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

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 ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA PAG 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 PTN 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 PTN. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the OWNER CONTROLLED AREA).

HOSTILE FORCE

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 (e.g., 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.

INITIATING CONDITION (IC)

An event or condition that aligns with the definition of one of the four emergency classification levels by virtue of the potential or actual effects or consequences.

OWNER CONTROLLED AREA (OCA)

That portion of FPL property surrounding and including the Turkey Point Plant which is subject to limited access and control as deemed appropriate by FPL (ref. 4.1.9).

PROJECTILE

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

PROTECTED AREA

The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency (ref. 4.1.9).

REFUELING PATHWAY

Refueling cavity, fuel transfer canal, and spent fuel pit (SFP), but **not** including the reactor vessel, comprise the refueling pathway (ref. 4.1.11).

RUPTURED

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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 ACTION that results in intentional damage or malicious acts; (1) toward site personnel or equipment that could lead to the likely failure of or; (2) that prevent effective access to equipment needed for the protection of the public. **Any** releases are **not** expected to result in exposure levels which exceed EPA PAG exposure levels beyond the SITE BOUNDARY.

SITE BOUNDARY

That line beyond which the land or property is not owned, leased or otherwise controlled by PTN (ref. 4.1.7).

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

5.2 Abbreviations/Acronyms

°F ..... Degrees Fahrenheit
° ..... Degrees
AC ..... Alternating Current
AFW ..... Auxiliary Feedwater
AOP ..... Abnormal Operating Procedure
ARM ..... Area Radiation Monitor
ATWS ..... Anticipated Transient Without Scram
CDE ..... Committed Dose Equivalent
CET ..... Core Exit Thermocouple
CFR ..... Code of Federal Regulations
CIAS ..... Containment Isolation Actuation Signal
CPM ..... Counts Per Minute
CSFST ..... Critical Safety Function Status Checks
CTMT ..... Containment
CVI ..... Containment Ventilation Isolation System
DEF ..... Defueled
DBA ..... Design Basis Accident
DC ..... Direct Current
DG ..... Diesel Generator
EAL ..... Emergency Action Level
EC ..... Emergency Coordinator
ECCS ..... Emergency Core Cooling System
ECL ..... Emergency Classification Level
EOF ..... Emergency Operations Facility
EOP ..... Emergency Operating Procedure
EPA ..... Environmental Protection Agency
FAA ..... Federal Aviation Administration
FBI ..... Federal Bureau of Investigation
FC ..... Fuel Clad Barrier
FEMA ..... Federal Emergency Management Agency
FSAR ..... Final Safety Analysis Report
GE ..... General Emergency
GPM ..... Gallons Per Minute
HR ..... Heat Removal
Hr. ..... Hour
HSM ..... Horizontal Storage Module
IC ..... Initiating Condition

ICC .... Inadequate Core Cooling
ISFSI .... Independent Spent Fuel Storage Installation
K_{eff} .... Effective Neutron Multiplication Factor
LCO .... Limiting Condition of Operation
LER .... Licensee Event Report
LOCA .... Loss of Coolant Accident
LPSI .... Low Pressure Safety Injection
LRW .... Liquid Radwaste
LWR .... Light Water Reactor
MCB .... Main Control Board
MG .... Motor Generator
Min. .... Minute
MPH .... Miles Per Hour
mR, mRem, mrem, mREM .... milli-Roentgen Equivalent Man
MW .... Megawatt
NEI .... Nuclear Energy Institute
NEIC .... National Earthquake Information Center
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 .... Off-site Dose Calculation Manual
ORO .... Offsite Response Organization
PA .... Protected Area
PAG .... Protective Action Guideline
PORV .... Power Operated Relief Valve
PSIG .... Pounds per Square Inch Gauge
PTN .... Turkey Point Nuclear Generating
PTS .... Pressurized Thermal Shock
R .... Roentgen
RCS .... Reactor Coolant System
Rem, rem, REM .... Roentgen Equivalent Man
RTS .... Reactor Trip System
RVLMS .... Reactor Vessel Level Monitoring System
SBO .... Station Blackout

SCBA .... Self-Contained Breathing Apparatus
SFP .... Spent Fuel Pool
SG .... Steam Generator
SI .... Safety Injection
SIAS .... Safety Injection Actuation System
SM .... Shift Manager
SPDS .... Safety Parameter Display System
SRO .... Senior Reactor Operator
SRV .... Safety Relief Valve
TC (T/C) .... Thermocouple
TEDE .... Total Effective Dose Equivalent
TAF .... Top of Active Fuel
TS .... Technical Specifications
TSC .... Technical Support Center
UFSAR .... Updated Final Safety Analysis Report
USGS .... United States Geological Survey

6.0 PTN-TO-NEI 99-01 Rev. 6 EAL CROSS-REFERENCE

This cross-reference is provided to facilitate association and location of a PTN EAL within the NEI 99-01 IC/EAL identification scheme. Further information regarding the development of the PTN EALs based on the NEI guidance can be found in the EAL Comparison Matrix.

PTN	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
RU1.1	AU1	1
RU1.2	AU1	2
RU1.3	AU1	3
RU2.1	AU2	1
RA1.1	AA1	1
RA1.2	AA1	2
RA1.3	AA1	3
RA1.4	AA1	4
RA2.1	AA2	1
RA2.2	AA2	2
RA2.3	AA2	3
RA3.1	AA3	1
RA3.2	AA3	2
RS1.1	AS1	1
RS1.2	AS1	2
RS1.3	AS1	3
RS2.1	AS2	1
RG1.1	AG1	1
RG1.2	AG1	2
RG1.3	AG1	3
RG2.1	AG2	1

PTN	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
CU1.1	CU1	1
CU1.2	CU1	2
CU2.1	CU2	1
CU3.1	CU3	1
CU3.2	CU3	2
CU4.1	CU4	1
CU5.1	CU5	1, 2, 3
CA1.1	CA1	1
CA1.2	CA1	2
CA2.1	CA2	1
CA3.1	CA3	1, 2
CA6.1	CA6	1
CS1.1	CS1	1
CS1.2	CS1	2
CS1.3	CS1	3
CG1.1	CG1	1
CG1.2	CG1	2
EU1.1	EU1	1
FA1.1	FA1	1
FS1.1	FS1	1
FG1.1	FG1	1
HU1.1	HU1	1, 2, 3
HU2.1	HU2	1
HU3.1	HU3	1

PTN	NEI 99-01 Rev. 6	
EAL	IC	Example EAL
HU3.2	HU3	2
HU3.3	HU3	3
HU3.4	HU3	4
HU4.1	HU4	1
HU4.2	HU4	2
HU4.3	HU4	3
HU4.4	HU4	4
HU7.1	HU7	1
HA1.1	HA1	1, 2
HA5.1	HA5	1
HA6.1	HA6	1
HA7.1	HA7	1
HS1.1	HS1	1
HS6.1	HS6	1
HS7.1	HS7	1
HG7.1	HG7	1
SU1.1	SU1	1
SU3.1	SU2	1
SU4.1	SU3	1
SU5.1	SU4	1, 2, 3
SU6.1	SU5	1
SU6.2	SU5	2
SU7.1	SU6	1, 2, 3
SU8.1	SU7	1, 2

PTN	NEI 99-01 Rev. 6	
EAL	IC	Example EAL
SA1.1	SA1	1
SA3.1	SA2	1
SA6.1	SA5	1
SA9.1	SA9	1
SS1.1	SS1	1
SS2.1	SS8	1
SS6.1	SS5	1
SG1.1	SG1	1
SG2.1	SG8	1

7.0 ATTACHMENTS

7.1 Attachment 1, Emergency Action Level Technical Bases

7.2 Attachment 2, Safe Operation & Shutdown Areas Tables R-5 & H-2 Bases

<u>Category R – Abnormal Rad Levels / Rad Effluent</u>

EAL Group: ANY (EALs in this category are applicable to any plant condition, hot or cold.)

Many EALs are based on actual or potential degradation of fission product barriers because of the elevated potential for offsite radioactivity release. Degradation of fission product barriers though is not always apparent via non-radiological symptoms. Therefore, direct indication of elevated radiological effluents or area radiation levels are appropriate symptoms for emergency classification.

At lower levels, abnormal radioactivity releases may be indicative of a failure of containment systems or precursors to more significant releases. At higher release rates, offsite radiological conditions may result which require offsite protective actions. Elevated area radiation levels in plant may also be indicative of the failure of containment systems or preclude access to plant vital equipment necessary to ensure plant safety.

Events of this category pertain to the following subcategories:

1. <u>Radiological Effluent</u>

   Direct indication of effluent radiation monitoring systems provides a rapid assessment mechanism to determine releases in excess of classifiable limits. Projected offsite doses, actual offsite field measurements or measured release rates via sampling indicate doses or dose rates above classifiable limits.

2. <u>Irradiated Fuel Event</u>

   Conditions indicative of a loss of adequate shielding or damage to irradiated fuel may preclude access to vital plant areas or result in radiological releases that warrant emergency classification.

3. <u>Area Radiation Levels</u>

   Sustained general area radiation levels which may preclude access to areas requiring continuous occupancy also warrant emergency classification.

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RU1.1 Unusual Event

Reading on **any** Table R-1 effluent radiation monitor > column "UE" for ≥ 60 min. (Notes 1, 2, 3)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: 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.

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Plant Vent	RAD-6304	1.5E+01 µCi/cc	1.5E-00 µCi/cc	1.5E-01 µCi/cc	1.1E-02 µCi/cc
Gaseous	Spent Fuel Pool	RAD-3-6418	1.6E+03 µCi/cc	1.6E+02 µCi/cc	1.6E+01 µCi/cc	6.3E-01 µCi/cc
Gaseous	Spent Fuel Pool	U4 via RAD-6304	5.1E+02 µCi/cc	5.1E+01 µCi/cc	5.1E+00 µCi/cc	1.8E-01 µCi/cc
Liquid	Liquid Waste Discharge	R-18	N/A	N/A	N/A	1.8E+04 cpm
Liquid	S/G Blowdown	3-R-19	N/A	N/A	N/A	1.8E+04 cpm
Liquid	S/G Blowdown	4-R-19	N/A	N/A	N/A	1.8E+04 cpm

Mode Applicability:

All

Definition(s):

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.

Basis:

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

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.

This EAL addresses normally occurring continuous radioactivity releases from monitored gaseous or liquid effluent pathways (ref. 1, 2).

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

Reference(s):

1. Turkey Point Offsite Dose Calculation Manual (ODCM)
2. EP-CALC-PTN-1901 Radiological Effluent EAL Values
3. NEI 99-01 AU1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RU1.2 Unusual Event

Reading on **any** effluent radiation monitors > 2 x the alarm setpoint established by a current radioactivity discharge permit for ≥ 60 min. (Notes 1, 2, 3)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: 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.

Mode Applicability:

All

Definition(s):

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.

Basis:

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

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.

This EAL addresses radioactivity releases that cause effluent radiation monitor readings to exceed 2 times the limit established by a radioactivity discharge permit. Such releases are typically associated with planned batch releases from non-continuous release pathways (e.g., radwaste) (ref. 1).

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

Reference(s):

1. Turkey Point Offsite Dose Calculation Manual (ODCM)
2. NEI 99-01 AU1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RU1.3	**Unusual Event**
Sample analysis for a gaseous or liquid release indicates a concentration or release rate > 2 x ODCM limits for ≥ 60 min. (Notes 1, 2)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

None

Basis:

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

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

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

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

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

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

Reference(s):

1. Turkey Point Offsite Dose Calculation Manual (ODCM)
2. NEI 99-01 AU1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

RA1.1 Alert

Reading on **any** Table R-1 effluent radiation monitor > column "ALERT" for ≥ 15 min. (Notes 1, 2, 3, 4)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: 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.

Note 4 The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table R-1 Effluent Monitor Classification Thresholds

	Release Point	Monitor	GE	SAE	Alert	UE
Gaseous	Plant Vent	RAD-6304	1.5E+01 µCi/cc	1.5E-00 µCi/cc	1.5E-01 µCi/cc	1.1E-02 µCi/cc
	Spent Fuel Pool	RAD-3-6418	1.6E+03 µCi/cc	1.6E+02 µCi/cc	1.6E+01 µCi/cc	6.3E-01 µCi/cc
		U4 via RAD-6304	5.1E+02 µCi/cc	5.1E+01 µCi/cc	5.1E+00 µCi/cc	1.8E-01 µCi/cc
Liquid	Liquid Waste Discharge	R-18	N/A	N/A	N/A	1.8E+04 cpm
	S/G Blowdown	3-R-19	N/A	N/A	N/A	1.8E+04 cpm
		4-R-19	N/A	N/A	N/A	1.8E+04 cpm

Mode Applicability:

All

Definition(s):

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.

Basis:

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

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

The TEDE dose is set at 1% of the EPA PAG of 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.

The values of the gaseous effluent thresholds in Table R-1 represents 10% of the SAE values calculated in EP-CALC-PTN-1901 Radiological Effluent EAL Values (ref. 1).

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

Reference(s):

1. EP-CALC-PTN-1901 Radiological Effluent EAL Values
2. NEI 99-01 AA1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

RA1.2	**Alert**
Dose assessment using actual meteorology indicates doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)	

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

Basis:

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

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

The TEDE dose is set at 1% of the EPA PAG of 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.

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

Reference(s):

1. 0-EPIP-20125 Off-site Dose Assessment Using the Unified RASCAL Interface (URI)
2. 0-EPIP-20126 Off-site Dose Calculations – Manual Method
3. NEI 99-01 AA1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

RA1.3	**Alert**
Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY for 60 min. of exposure (Notes 1, 2)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

Basis:

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

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

The TEDE dose is set at 1% of the EPA PAG of 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.

This EAL is assessed per the ODCM (ref.1)

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

Reference(s):

1. Turkey Point Offsite Dose Calculation Manual (ODCM)
2. NEI 99-01 AA1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

RA1.4 Alert

Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:

- Closed window dose rates > 10 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 50 mrem for 60 min. of inhalation.

(Notes 1, 2)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

Basis:

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

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

The TEDE dose is set at 1% of the EPA PAG of 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.

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

Reference(s):

1. 0-EPIP-20129 Emergency Response Team - Radiological Monitoring

2. NEI 99-01 AA1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RS1.1 Site Area Emergency

Reading on **any** Table R-1 effluent radiation monitor > column "SAE" for ≥ 15 min. (Notes 1, 2, 3, 4)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: 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.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	**Plant Vent**	**RAD-6304**	1.5E+01 µCi/cc	1.5E-00 µCi/cc	1.5E-01 µCi/cc	1.1E-02 µCi/cc
	Spent Fuel Pool	**RAD-3-6418**	1.6E+03 µCi/cc	1.6E+02 µCi/cc	1.6E+01 µCi/cc	6.3E-01 µCi/cc
		U4 via RAD-6304	5.1E+02 µCi/cc	5.1E+01 µCi/cc	5.1E+00 µCi/cc	1.8E-01 µCi/cc
Liquid	**Liquid Waste Discharge**	**R-18**	N/A	N/A	N/A	1.8E+04 cpm
	S/G Blowdown	**3-R-19**	N/A	N/A	N/A	1.8E+04 cpm
		4-R-19	N/A	N/A	N/A	1.8E+04 cpm

Mode Applicability:

All

Definition(s):

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.

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.

Reference(s):

1. EP-CALC-PTN-1901 Radiological Effluent EAL Values
2. NEI 99-01 AS1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RS1.2	**Site Area Emergency**
Dose assessment using actual meteorology indicates doses > 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)	

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

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.

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

Reference(s):

1. 0-EPIP-20125 Off-site Dose Assessment Using the Unified RASCAL Interface (URI)
2. 0-EPIP-20126 Off-site Dose Calculations – Manual Method
3. NEI 99-01 AS1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RS1.3 Site Area Emergency

Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:

- Closed window dose rates > 100 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 500 mrem for 60 min. of inhalation.

(Notes 1, 2)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

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.

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

Reference(s):

1. 0-EPIP-20129 Emergency Response Team - Radiological Monitoring
2. NEI 99-01 AS1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RG1.1 General Emergency

Reading on **any** Table R-1 effluent radiation monitor > column "GE" for ≥ 15 min. (Notes 1, 2, 3, 4)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: 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.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	**Plant Vent**	**RAD-6304**	1.5E+01 µCi/cc	1.5E-00 µCi/cc	1.5E-01 µCi/cc	1.1E-02 µCi/cc
	Spent Fuel Pool	**RAD-3-6418**	1.6E+03 µCi/cc	1.6E+02 µCi/cc	1.6E+01 µCi/cc	6.3E-01 µCi/cc
		U4 via RAD-6304	5.1E+02 µCi/cc	5.1E+01 µCi/cc	5.1E+00 µCi/cc	1.8E-01 µCi/cc
Liquid	**Liquid Waste Discharge**	**R-18**	N/A	N/A	N/A	1.8E+04 cpm
	S/G Blowdown	**3-R-19**	N/A	N/A	N/A	1.8E+04 cpm
		4-R-19	N/A	N/A	N/A	1.8E+04 cpm

Mode Applicability:

All

Definition(s):

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.

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.

Reference(s):

1. EP-CALC-PTN-1901 Radiological Effluent EAL Values
2. NEI 99-01 AG1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RG1.2 General Emergency

Dose assessment using actual meteorology indicates doses > 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

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.

Reference(s):

1. 0-EPIP-20125 Off-site Dose Assessment Using the Unified RASCAL Interface (URI)
2. 0-EPIP-20126 Off-site Dose Calculations – Manual Method
3. NEI 99-01 AG1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RG1.3 General Emergency

Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:

- Closed window dose rates > 1,000 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 5,000 mrem for 60 min. of inhalation.

(Notes 1, 2)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

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.

Reference(s):

1. 0-EPIP-20129 Emergency Response Team - Radiological Monitoring
2. NEI 99-01 AG1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel

EAL:

RU2.1 Unusual Event

UNPLANNED water level drop in the REFUELING PATHWAY as indicated by **any** of the following:

- SFP or reactor cavity level instrument
- SFP or reactor cavity low level alarm
- Report of dropping level in SFP or reactor cavity

AND

UNPLANNED rise in corresponding area radiation levels as indicated by **any** Table R-2 radiation monitors

Table R-2 Refueling Area Radiation Monitors	
ARM #	**Description**
R-2[5]	Unit 3[4] Containment Operating Floor
R-7[8]	Unit 3[4] Spent Fuel Pit Canal Area
R-21[22]	Unit 3[4] Spent Fuel Pit North[South]

Mode Applicability:

All

Definition(s):

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

REFUELING PATHWAY- Refueling cavity, fuel transfer canal, and spent fuel pit (SFP), but **not** including the reactor vessel, comprise the refueling pathway.

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 (e.g., 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 specified area radiation monitors are those expected to see increase area radiation levels as a result of a loss of REFUELING PATHWAY inventory (ref. 1, 2). Increasing radiation indications on these monitors in the absence of indications of decreasing REFUELING PATHWAY level are not classifiable under this EAL.

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 Category C during the Cold Shutdown and Refueling modes.

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

Reference(s):

1. 3[4]-ONOP-033.1 Spent Fuel Pit (SFP) Cooling System Malfunction
2. 3[4]-ONOP-033.2 Refueling Cavity Seal Failure
3. NEI 99-01 AU2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.1	**Alert**
IMMINENT uncovery of irradiated fuel in the REFUELING PATHWAY	

Mode Applicability:

All

Definition(s):

CONFINEMENT BOUNDARY- The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. As related to the PTN ISFSI, Confinement Boundary is defined as the NUHOMS Dry Shielding Canister (DSC).

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.

REFUELING PATHWAY- Refueling cavity, fuel transfer canal, and spent fuel pit (SFP), but **not** including the reactor vessel, comprise the refueling pathway.

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 REFUELING PATHWAY. 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 EAL 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 Category R or C EALs.

This EAL escalates from RU2.1 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 (e.g., reports from personnel or camera images), as well as significant changes in water and radiation levels, or other plant parameters. Computational aids may also be used (e.g., a boil-off curve). Classification of an event using this EAL should be based on the totality of available indications, reports and observations.

While an area radiation monitor could detect an 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 with Category C during the Cold Shutdown and Refueling modes.

Reference(s):

1. NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.2 Alert

Damage to irradiated fuel resulting in a release of radioactivity

AND

VALID HIGH alarm on **any** of the following:

- **Any** Table R-2 area radiation monitors
- R-3[4]-11 or R-3[4]-12 Containment Atmosphere Process Radiation Monitor
- R-14 Plant Vent Gas Monitor

Table R-2 Refueling Area Radiation Monitors	
ARM #	**Description**
R-2[5]	Unit 3[4] Containment Operating Floor
R-7[8]	Unit 3[4] Spent Fuel Pit Canal Area
R-21[22]	Unit 3[4] Spent Fuel Pit North[South]

Mode Applicability:

All

Definition(s):

CONFINEMENT BOUNDARY- The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. As related to the PTN ISFSI, Confinement Boundary is defined as the NUHOMS Dry Shielding Canister (DSC).

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.

Basis:

The specified radiation monitors are those expected to see increased area radiation levels as a result of damage to irradiated fuel (ref. 1, 2, 3).

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

This EAL 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.

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

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

Reference(s):

1. 3[4]-ONOP-033.1 Spent Fuel Pit (SFP) Cooling System Malfunction
2. 3[4]-ONOP-033.2 Refueling Cavity Seal Failure
2. 3[4]-ONOP-033.3 Accidents Involving New or Spent Fuel
4. NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.3	**Alert**
Lowering of spent fuel pool level to 43 ft. (Level 2) on LI-3[4]-651A or LI-3[4]-651B	

Mode Applicability:

All

Definition(s):

None

Basis:

This EAL addresses events that have caused 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.

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.

Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication (LI-3[4]-651A and LI-3[4]-651B) capable of identifying normal level (Level 1), SFP level ~10 ft. above the top of the fuel racks (Level 2 - 42 ft. 11 in.) and SFP level at the top of the fuel racks (Level 3 – 33 ft. 11 in.) (ref. 1, 2). Level 2 has been rounded to 43 ft.

Reference(s):

1. EC-280522 Design Change Package PTN-3 (PTN-4) Spent Fuel Pool Level Instrument Per NRC Order EA-12-051
2. 3[4]-PMI-033.03A Spent Fuel Pool Level Instrumentation LE/LIT-3[4]-651A System Calibration Verification and Maintenance
3. NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Spent fuel pool level at the top of the fuel racks

EAL:

RS2.1	**Site Area Emergency**
Lowering of spent fuel pool level to 34 ft. (Level 3) on LI-3[4]-651A or LI-3[4]-651B	

Mode Applicability:

All

Definition(s):

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.

Basis:

This EAL 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.

Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication (LI-3[4]-651A and LI-3[4]-651B) capable of identifying normal level (Level 1), SFP level ~10 ft. above the top of the fuel racks (Level 2 - 42 ft. 11 in.) and SFP level at the top of the fuel racks (Level 3 – 33 ft. 11 in.) (ref. 1, 2). Level 3 has been rounded to 34 ft.

Reference(s):

1. EC-280522 Design Change Package PTN-3 (PTN-4) Spent Fuel Pool Level Instrument Per NRC Order EA-12-051
2. 3[4]-PMI-033.03A Spent Fuel Pool Level Instrumentation LE/LIT-3[4]-651A System Calibration Verification and Maintenance
3. NEI 99-01 AS2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Spent fuel pool level **cannot** be restored to at least the top of the fuel racks for 60 minutes or longer

EAL:

RG2.1	**General Emergency**
Spent fuel pool level **cannot** be restored to at least 34 ft. (Level 3) on LI-3[4]-651A or LI-3[4]-651B for ≥ 60 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded**.**

Mode Applicability:

All

Definition(s):

None

Basis:

This EAL 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 EALwould likely not be met until well after another General Emergency EAL was met; however, it is included to provide classification diversity.

Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication (LI-3[4]-651A and LI-3[4]-651B) capable of identifying normal level (Level 1), SFP level ~10 ft. above the top of the fuel racks (Level 2 - 42 ft. 11 in.) and SFP level at the top of the fuel racks (Level 3 – 33 ft. 11 in.) (ref. 1, 2). Level 3 has been rounded to 34 ft.

Reference(s):

1. EC-280522 Design Change Package PTN-3 (PTN-4) Spent Fuel Pool Level Instrument Per NRC Order EA-12-051
2. 3[4]-PMI-033.03A Spent Fuel Pool Level Instrumentation LE/LIT-3[4]-651A System Calibration Verification and Maintenance
3. NEI 99-01 AG2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 3 – Area Radiation Levels

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

EAL:

RA3.1 Alert

Dose rate > 15 mR/hr in **EITHER** of the following areas:

- Control Room
- Central Alarm Station

Mode Applicability:

All

Definition(s):

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 (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

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 Emergency Coordinator should consider the cause of the increased radiation levels and determine if another IC may be applicable.

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

Reference(s):

1. 0-ONOP-066 High Area Radiation Monitoring System Alarms
2. NEI 99-01 AA3

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 3 – Area Radiation Levels

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

EAL:

RA3.2 Alert

An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to **any** Table R-3 room or area (Note 5)

Note 5: 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.

Table R-3 Safe Operation & Shutdown Rooms/Areas	
Room/Area	**Mode(s)**
Auxiliary Building 18'	1, 2, 3, 4, 5
Turbine Building (**any** level)	1, 2, 3, 4, 5
Containment	4, 5
HHSI Pump, CSP Rooms	3
RHR Pump & HX Rooms	4
Rad Waste Building	1, 2, 3, 4, 5

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown, 5 – Cold Shutdown

Definition(s):

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 (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

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.

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 Emergency Coordinator should consider the cause of the increased radiation levels and determine if another IC may be applicable.

For RA3.2, 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 (e.g., 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 (i.e., entry is not required during the operating mode in effect at the time of the elevated radiation levels). For example, the plant is in Mode 1 when the radiation 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 (e.g., radiography, spent filter or resin transfer, etc.).
- The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or impede a required action.

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

If the equipment in the listed room or area was already inoperable, or out-of-service, before the event occurred, then no emergency should be declared since the event will have no adverse impact beyond that already allowed by Technical Specifications at the time of the event.

The list of plant rooms or areas with entry-related mode applicability identified specify those rooms or areas that contain equipment which require a manual/local action as specified in operating procedures used for normal plant operation, cooldown and shutdown. Rooms or areas in which actions of a contingent or emergency nature would be performed (e.g., an action to address an off-normal or emergency condition such as emergency repairs, corrective measures or emergency operations) are not included. In addition, the list specifies the plant mode(s) during which entry would be required for each room or area (ref. 1).

Reference(s):

1. Attachment 2 Safe Operation & Shutdown Areas Tables R-3 & H-2 Bases
2. NEI 99-01 AA3

Category C – Cold Shutdown / Refueling System Malfunction

EAL Group: Cold Conditions (RCS temperature ≤ 200ºF); EALs in this category are applicable only in one or more cold operating modes.

Category C EALs are directly associated with cold shutdown or refueling system safety functions. Given the variability of plant configurations (e.g., systems out-of-service for maintenance, containment open, reduced AC power redundancy, time since shutdown) during these periods, the consequences of any given initiating event can vary greatly. For example, a loss of decay heat removal capability that occurs at the end of an extended outage has less significance than a similar loss occurring during the first week after shutdown. Compounding these events is the likelihood that instrumentation necessary for assessment may also be inoperable. The cold shutdown and refueling system malfunction EALs are based on performance capability to the extent possible with consideration given to RCS integrity, CONTAINMENT CLOSURE, and fuel clad integrity for the applicable operating modes (5 - Cold Shutdown, 6 - Refueling, DEF – Defueled).

The events of this category pertain to the following subcategories:

1. RCS Level

RCS water level is directly related to the status of adequate core cooling and, therefore, fuel clad integrity.

2. Loss of Emergency AC Power

Loss of vital plant electrical power can compromise plant safety system operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of onsite and offsite power sources for 4KV emergency buses.

3. RCS Temperature

Uncontrolled or inadvertent temperature or pressure rises are indicative of a potential loss of safety functions.

4. Loss of Vital DC Power

Loss of emergency plant electrical power can compromise plant safety system operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of power to or degraded voltage on the 125V DC vital buses.

5. Loss of Communications

Certain events that degrade plant operator ability to effectively communicate with essential personnel within or external to the plant warrant emergency classification.

6. Hazardous Event Affecting Safety Systems

Certain hazardous natural and technological events may result in VISIBLE DAMAGE to or degraded performance of multiple safety system trains warranting classification.

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: UNPLANNED loss of RCS inventory

EAL:

CU1.1	**Unusual Event**
UNPLANNED loss of reactor coolant results in RCS water level less than a required lower limit for ≥ 15 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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.

Basis:

RCS water level less than a required lower limit is meant to be less than the lower end of the level control band being procedurally maintained for the current condition or evolution.

With the plant in Cold Shutdown, RCS water level is normally maintained within a pressurizer level control band (ref. 1). However, if RCS level is being controlled below the normal pressurizer level control band, or if level is being maintained in a designated band in the reactor vessel it is the inability to maintain level above the low end of the designated control band due to a loss of inventory resulting from a leak in the RCS that is the concern.

With the plant in Refueling mode, RCS water level is normally maintained at or above the reactor vessel flange (ref. 2).

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.

This EAL 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.

Continued loss of RCS inventory may result in escalation to the Alert emergency classification level via either IC CA1 or CA3.

Reference(s):

1. 3[4]-GOP-305 Hot Standby to Cold Shutdown
2. 3[4]-NOP-041.07 Draining the Reactor Coolant System
3. NEI 99-01 CU1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: UNPLANNED loss of RCS inventory

EAL:

CU1.2 Unusual Event

RCS water level **cannot** be monitored

AND EITHER:

- UNPLANNED increase in **any** Table C-1 sump or tank level due to a loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

Table C-1 Sumps/Tanks
• Containment Sump • #1 Waste Holdup Tank (DCS or Waste Boron Panel) • CVCS Holdup Tank (Waste Boron Panel) • RWST • RHR Sumps

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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

UNPLANNED-. A parameter changes 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.

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.

This EAL 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 (Table C-1) (ref. 1, 2). 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.

Reference(s):

1. 3[4]-ONOP-041.3 Excessive Reactor Coolant System Leakage
2. 3[4]-ONOP-041.8 Shutdown LOCA [Mode 5 OR 6]
3. NEI 99-01 CU1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Significant Loss of RCS inventory

EAL:

CA1.1	**Alert**
RCS water level < 23% on LIS-3[4]-6421 or LIS-3[4]-6423	

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

None

Basis:

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

For this EAL, a lowering of RCS water level below the minimum required for continued SI pump operation 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.

The minimum RCS level for continued RHR pump operation is 23% on RCS Draindown Level Instrumentation (LIS-3[4]-6421 or LIS-3[4]-6423) (ref. 1).

Although related, this EAL is concerned with the loss of RCS inventory and not the potential concurrent effects on systems needed for decay heat removal (e.g., loss of a Decay Heat Removal suction point). An increase in RCS temperature caused by a loss of decay heat removal capability is evaluated under IC CA3.

If RCS water level continues to lower, then escalation to Site Area Emergency would be via IC CS1.

Reference(s):

1. 3[4]-ONOP-050 Loss of RHR
2. NEI 99-01 CA1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Significant Loss of RCS inventory

EAL:

CA1.2 Alert

RCS water level **cannot** be monitored for ≥ 15 min. (Note 1)

AND EITHER

- UNPLANNED increase in **any** Table C-1 sump or tank level due to a loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table C-1 Sumps/Tanks
• Containment Sump • #1 Waste Holdup Tank (DCS or Waste Boron Panel) • CVCS Holdup Tank (Waste Boron Panel) • RWST • RHR Sumps

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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.

Basis:

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

For this EAL, 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 (Table C-1) (ref. 1, 2). 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.

Reference(s):

1. 3[4]-ONOP-041.3 Excessive Reactor Coolant System Leakage
2. 3[4]-ONOP-041.8 Shutdown LOCA [Mode 5 OR 6]
3. NEI 99-01 CA1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

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

EAL:

CS1.1	**Site Area Emergency**
RCS water level < 10% on LIS-3[4]-6421 or LIS-3[4]-6423	

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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.

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 RCS level. If RCS level cannot be restored, fuel damage is probable.

10% on RCS Draindown Level Instrumentation (LIS-3[4]-6421 or LIS-3[4]-6423) is the lowest RCS level that can be monitored in the cold condition and nominally corresponds to the bottom of the RCS hot leg (ref. 1).

This EAL addresses 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 ICs CG1 or RG1.

Reference(s):

1. Drawing 5613-J-815/ Drawing 5614-J-815
2. Plant Curve Book PCB-3-S5F09/ PCB-4-S5F09
3. NEI 99-01 CS1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

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

EAL:

CS1.2 Site Area Emergency

RCS level **cannot** be monitored for ≥ 30 min. (Note 1)

AND

Core uncovery is indicated by **any** of the following:

- UNPLANNED increase in **any** Table C-1 sump or tank level of sufficient magnitude to indicate core uncovery
- Visual observation of UNISOLABLE RCS leakage of sufficient magnitude to indicate core uncovery
- RAD-3[4]-6311B reading > 9.4E+04 R/hr (Refueling Mode)
- Erratic source range monitor indications

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table C-1 Sumps/Tanks
• Containment Sump • #1 Waste Holdup Tank (DCS or Waste Boron Panel) • CVCS Holdup Tank (Waste Boron Panel) • RWST • RHR Sumps

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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.

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.

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 level cannot be restored, fuel damage is probable.

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

The inability to monitor 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 (ref. 1, 2). 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 .

If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately identified. Visual observation of leakage from systems connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory.

In the Refueling mode, as water level in the reactor vessel lowers, the dose rate above the core will rise. The dose rate due to this core shine should result in on-scale indications on area radiation monitors. A reading > 9.4E+04 R/hr on RAD-3[4]-6311B Containment High Range Radiation Monitor (CHRRM) is indicative of RCS water level at the top of active fuel while in the Refueling mode. Of the two CHRRM channels RAD-6311B has the most reliable response to the core shine due to its location on the 58’ operating floor on both units (ref. 3).

Post-TMI accident studies indicated that the installed PWR nuclear instrumentation will operate erratically when the core is uncovered and that this should be used as a tool for making such determinations.

This EAL addresses 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

Reference(s):

1. 3[4]-ONOP-041.3 Excessive Reactor Coolant System Leakage

2. 3[4]-ONOP-041.8 Shutdown LOCA [Mode 5 OR 6]
3. DBD PTN NEI-99-01 Radiation Monitor Values Used in Recognition Categories R, F and C
4. NEI 99-01 CS1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

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

EAL:

CG1.1 General Emergency

RCS level **cannot** be monitored for ≥ 30 min. (Note 1)

AND

Core uncovery is indicated by **any** of the following:

- UNPLANNED increase in **any** Table C-1 sump or tank level of sufficient magnitude to indicate core uncovery
- Visual observation of UNISOLABLE RCS leakage of sufficient magnitude to indicate core uncovery
- RAD-3[4]-6311B reading > 9.4E+04 R/hr (Refueling Mode)
- Erratic source range monitor indications

AND

Any Containment Challenge indication, Table C-2

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 6: If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, declaration of a General Emergency is **not** required.

Table C-1 Sumps/Tanks
• Containment Sump • #1 Waste Holdup Tank (DCS or Waste Boron Panel) • CVCS Holdup Tank (Waste Boron Panel) • RWST • RHR Sumps

Table C-2 Containment Challenge Indications
• CONTAINMENT CLOSURE **not** established (Note 6) • CTMT hydrogen concentration > 4% • UNPLANNED increase in CTMT pressure

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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

Containment Closure requirements are specified in 0-ADM-051 Outage Risk Assessment and Control.

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.

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.

Basis:

This IC addresses the inability to restore and maintain RCS 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 level cannot be restored, fuel damage is probable.

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 (ref. 1, 3).

If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately

identified. Visual observation of leakage from systems connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory.

In the Refueling mode, as water level in the reactor vessel lowers, the dose rate above the core will rise. The dose rate due to this core shine should result in on-scale indications on area radiation monitors. A reading > 9.4E+04 R/hr on RAD-3[4]-6311B Containment High Range Radiation Monitor (CHRRM) is indicative of RCS water level at the top of active fuel while in the Refueling mode. Of the two CHRRM channels RAD-6311B has the most reliable response to the core shine due to its location on the 58’ operating floor on both units (ref. 3).

Post-TMI accident studies indicated that the installed PWR nuclear instrumentation will operate erratically when the core is uncovered and that this should be used as a tool for making such determinations.

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

Three conditions are associated with a challenge to containment’s capability to serve as an effective barrier to fission product release:

1. 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.
2. The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (i.e., at the lower deflagration limit of 4%). 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. However, containment monitoring and/or sampling should be performed to verify this assumption and a General Emergency declared if it is determined that hydrogen concentration has exceeded the minimum necessary to support a hydrogen burn (4%) (ref. 4). 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.
3. Any UNPLANNED rise in containment pressure in the Cold Shutdown or Refueling mode indicates a potential challenge of CONTAINMENT CLOSURE capability. UNPLANNED containment pressure rise indicates CONTAINMENT CLOSURE cannot

be assured and the containment cannot be relied upon as a barrier to fission product release.

This EAL addresses 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*.

Reference(s):

1. 3[4]-ONOP-041.3 Excessive Reactor Coolant System Leakage
2. 3[4]-ONOP-041.8 Shutdown LOCA [Mode 5 OR 6]
3. DBD PTN NEI-99-01 Radiation Monitor Values Used in Recognition Categories R, F and C
4. CA-3 Computational Aids Hydrogen Flammability in Containment
5. NEI 99-01 CG1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 2 – Loss of Emergency AC Power

Initiating Condition: Loss of **all but one** AC power source to emergency buses for 15 minutes or longer

EAL:

CU2.1 Unusual Event

AC power capability, Table C-3, to 4KV emergency buses 3[4]A and 3[4]B reduced to a single power source for ≥ 15 min. (Note 1)

AND

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

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table C-3 AC Power Sources
Offsite • Unit 3[4] Startup Transformer • Unit 3[4] C Bus Transformer • Unit 3[4] Opposite Unit Cross Tie • Unit 3[4] Auxiliary Transformer back fed via Main Transformer (if already aligned) **Onsite** • 3A[4A] Emergency Diesel Generator • 3B[4B] Emergency Diesel Generator • 3[4] D Bus SBO Cross Tie

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling, DEF - Defueled

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

Table C-3 provides a list of offsite and onsite AC electrical power sources credited for this EAL. Offsite AC power sources annotated "(if already aligned)" require more than 15 minutes to establish and therefore are only credited if the source was already aligned at the time of AC power loss (ref. 1, 2, 3).

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 (e.g., an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from the unit main generator.
- A loss of emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being fed or 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.

This cold condition EAL is equivalent to the hot condition EAL SA1.1.

Reference(s):

1. Technical Specifications Section 3.8.1.2 A. C. Sources Shutdown
2. UFSAR section 8.2.2 Station Electrical System
3. 3[4]-NOP-092.01 Main/Auxiliary Transformer Backfeed
4. NEI 99-01 CU2

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 2 – Loss of Emergency AC Power

Initiating Condition: Loss of **all** offsite and **all** onsite AC power to emergency buses for 15 minutes or longer

EAL:

CA2.1	**Alert**
Loss of **all** offsite and **all** onsite AC power to 4KV emergency buses 3[4]A and 3[4]B for ≥ 15 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling, DEF - Defueled

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

For this EAL credit can be taken for any AC power source that has sufficient capability to operate equipment necessary to maintain a safe shutdown condition, such as FLEX generators, provided it can be aligned within the 15 minute classification criteria.

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 ICs CS1 or RS1.

This cold condition EAL is equivalent to the hot condition EAL RS1.1.

Reference(s):

1. Technical Specifications Section 3.8.1.2 A. C. Sources Shutdown
2. UFSAR section 8.2.2 Station Electrical System
3. NEI 99-01 CU2

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED increase in RCS temperature

EAL:

CU3.1	**Unusual Event**
UNPLANNED increase in RCS temperature to > 200°F ~~due to loss of decay heat removal capability~~ (Note 14)	

Note 14: In the absence of reliable RCS temperature indication caused by the loss of decay heat removal capability, classification should be based on time to 200°F assuming a 12°F per minute heat-up rate (4°F per minute if the refueling cavity is flooded) when in Mode 6 or the RCS is not intact in Mode 5. If the RCS is intact, classification should be based on the RCS pressure rise criteria of CA3.1.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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

Containment Closure requirements are met when all of the following conditions exist:

- The equipment hatch is closed with a minimum of four bolts.
- All other penetrations are capable of being closed by a containment automatic isolation valve system or closed by manual valve or blind flanges.

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.

Basis:

In the absence of reliable RCS temperature indication caused by the loss of decay heat removal capability, classification should be based on time to 200°F assuming a 12°F per minute heat-up rate (4°F per minute if the refueling cavity is flooded) when in Mode 6 or the RCS is not intact in Mode 5 (ref. 1). If the RCS is intact, classification should be based on the RCS pressure rise criteria of CA3.1. Assumed RCS heat-up rates are specified per 3[4]-ONOP-050 Loss of RHR (ref. 2).

This EAL addresses an UNPLANNED increase in RCS temperature above the Technical Specification cold shutdown temperature limit and represents a potential degradation of the level of safety of the plant (ref. 1). If the RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the EC should also refer to EAL CA3.1.

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

This EAL 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 at or 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 (ref. 3).

Escalation to Alert would be via IC CA1 based on an inventory loss or IC CA3 based on exceeding plant configuration-specific time criteria.

Reference(s):

1. Technical Specifications Table 1.2, Operational Modes
2. 3[4]-ONOP-050 Loss of RHR
3. 0-ADM-051 Outage Risk Assessment and Control
4. NEI 99-01 CU3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED rise in RCS temperature

EAL:

CU3.2	**Unusual Event**
Loss of **all** RCS temperature and RCS water level indication for ≥ 15 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

5 - Cold Shutdown, 6- Refueling

Definition(s):

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

Containment Closure requirements are specified in 0-ADM-051 Outage Risk Assessment and Control.

Basis:

This EAL addresses the inability to determine RCS temperature and level, and 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 EC should also refer to EAL CA3.1.

This EAL 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.

Reference(s):

1. 0-ADM-051 Outage Risk Assessment and Control
2. NEI 99-01 CU3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: Inability to maintain plant in cold shutdown

EAL:

CA3.1 Alert

UNPLANNED rise in RCS temperature to > 200°F for > Table C-4 duration due to a loss of RCS cooling
(Notes 1, 12)

OR

UNPLANNED RCS pressure rise > 10 psig (does not apply to solid plant conditions)

Note 1: The EC should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

Note 12: If an RCS heat removal system is in operation within the applicable Table C-4 heat-up duration and RCS temperature is being reduced, the EAL is **not** applicable.

Note 14: In the absence of reliable RCS temperature indication caused by the loss of decay heat removal capability, classification should be based on time to 200°F assuming a 12°F per minute heat-up rate (4°F per minute if the refueling cavity is flooded) when in Mode 6 or the RCS is not intact in Mode 5. If the RCS is intact, classification should be based on the RCS pressure rise criteria of CA3.1.

Table C-4 RCS Heat-up Duration Thresholds

RCS Status	CONTAINMENT CLOSURE Status	Heat-up Duration
Intact **AND not** lowered inventory	N/A	60 min.
N**ot** intact **OR** lowered inventory	Established	20 min.
	Not established	0 min.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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

Containment Closure requirements are specified in 0-ADM-051 Outage Risk Assessment and Control.

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.

Basis:

In the absence of reliable RCS temperature indication caused by the loss of decay heat removal capability, classification should be based on time to 200°F assuming a 12°F per minute heat-up rate (4°F per minute if the refueling cavity is flooded) when in Mode 6 or the RCS is not intact in Mode 5 (ref. 1). If the RCS is intact, classification should be based on the RCS pressure rise criteria of this EAL. Assumed RCS heat-up rates are specified per 3[4]-ONOP-050 Loss of RHR (ref. 2).

The RCS is considered to be at lowered inventory when RCS level is less than or equal to 3 ft. below the reactor vessel flange with fuel in the reactor vessel (ref. 3).

This EAL 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 (e.g., 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 (i.e., 0 minutes). This is because 1) the evaporated reactor coolant may be released directly into the containment atmosphere and subsequently to the environment, and 2) there is reduced reactor coolant inventory above the top of irradiated fuel.

The RCS pressure rise threshold provides a pressure-based indication of RCS heat-up in the absence of RCS temperature monitoring capability.

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

Reference(s):

1. Technical Specifications Table 1.2, Operational Modes
2. 3[4]-ONOP-050 Loss of RHR
3. 0-ADM-051 Outage Risk Assessment and Control
4. NEI 99-01 CA3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 4 – Loss of Vital DC Power

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

EAL:

CU4.1	**Unusual Event**
Indicated voltage < 105 VDC on **any** two vital 125 VDC buses (3D01, 4D01, 3D23, 4D23) for ≥ 15 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis

The vital (Class 1E) 125 V DC power system consists of four physically and electrically separated buses – 3D01, 3D23, 4D01 and 4D23. Each bus has a 60 cell battery bank with an eight-hour rating, with a minimum operating voltage of 105 volts (ref. 1, 2, 3).

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 Category R.

This cold condition EAL is equivalent to the hot condition EAL SS2.1.

Reference(s):

1. UFSAR Section 8.2.2.3 DC Power Systems
2. 5610-003-DB-002 Vital AC/DC Component Design Requirements
3. Technical Specifications Section 3.8.2.2 D.C. Sources Shutdown
4. NEI 99-01 CU4

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 5 – Loss of Communications

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

EAL:

CU5.1 Unusual Event

Loss of **all** Table C-5 onsite communication methods

OR

Loss of **all** Table C-5 State and local agency communication methods

OR

Loss of **all** Table C-5 NRC communication methods

Table C-5 Communication Methods			
System	**Onsite**	**State/ Local**	**NRC**
Plant Radio System	X		
Commercial Telephone System	X	X	X
Plant Address (PA) System	X		
Federal Telephone System (ENS)			X
EMnet		X	
Hot Ring Down (HRD) Telephone System		X	

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling, DEF – Defueled

Definition(s):

None

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 State and local agencies and the NRC.

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

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

The second EAL condition addresses a total loss of the communications methods used to notify all State and local agencies of an emergency declaration. The State and local agencies referred to here are the State of Florida and affected local communities.

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

This cold condition EAL is equivalent to the hot condition EAL SU7.1.

Reference(s):

1. Turkey Point Plant Radiological Emergency Plan
2. NEI 99-01 CU5

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 6 – Hazardous Event Affecting Safety Systems

Initiating Condition: Hazardous event affecting SAFETY SYSTEMS needed for the current operating mode

EAL:

CA6.1 Alert

The occurrence of **any** Table C-6 hazardous event

AND

Event damage has caused indications of degraded performance on one train of a SAFETY SYSTEM needed for the current operating mode

AND EITHER:

- Event damage has caused indications of degraded performance to the second train of the SAFETY SYSTEM needed for the current operating mode
- Event damage has resulted in VISIBLE DAMAGE to the second train of the SAFETY SYSTEM needed for the current operating mode

(Notes 9, 10)

Note 9: If the affected SAFETY SYSTEM train was already inoperable or out of service before the hazardous event occurred, then emergency classification is **not** warranted.

Note 10: If the hazardous event **only** resulted in VISIBLE DAMAGE, with **no** indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is **not** warranted.

Table C-6 Hazardous Events
• Seismic event (earthquake) • Internal or external FLOODING event • High winds or tornado strike • FIRE • EXPLOSION • Other events with similar hazard characteristics as determined by the Shift Manager

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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 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.

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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

Basis:

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

Indications of degraded performance 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.

VISIBLE DAMAGE addresses damage to a SAFETY SYSTEM train that is not in service/operation and that potentially could cause performance issues. 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. This VISIBLE DAMAGE should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

An event affecting equipment common to two or more trains of a safety system (i.e., there are indications of degraded performance and/or VISIBLE DAMAGE affecting the common equipment) should be classified as an Alert under this EAL, as appropriate to the plant mode. By affecting the functionality of multiple trains of a safety system, the loss of the common equipment effectively meets the two-train impact criteria that underlie the EALs and bases.

An event affecting a single-train safety system (i.e., there are indications of degraded performance and/or VISIBLE DAMAGE affecting the one train) would not be classified under this EAL because the two-train impact criteria that underlie the EALs and bases would not be met. If an event affects a single-train safety system, then the emergency classification should be made based on plant parameters/symptoms meeting the EALs for another IC. Depending upon the circumstances, classification may also occur based on Shift Manager/EC judgement.

An event that affects two trains of a safety system (e.g., one train has indications of degraded performance and the other VISIBLE DAMAGE) that also has one or more additional trains should be classified as an Alert under this EAL, as appropriate to the plant mode. This approach maintains consistency with the two-train impact criteria that underlie the EALs and bases, and is warranted because the event was severe enough to affect the functionality of two trains of a safety system despite plant design criteria associated with system and system train separation and protection. Such an event may have caused other plant impacts that are not immediately apparent.

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

This cold condition EAL is equivalent to the hot condition EAL SA9.1.

Reference(s):

1. 0-EPIP-20106 Natural Emergencies
2. EP FAQ 2016-002
3. NEI 99-01 CA6

Category E – Independent Spent Fuel Storage Installation (ISFSI)

EAL Group: ANY (EALs in this category are applicable to any plant condition, hot or cold.)

An independent spent fuel storage installation (ISFSI) is a complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage. A significant amount of the radioactive material contained within a canister must escape its packaging and enter the biosphere for there to be a significant environmental effect resulting from an accident involving the dry storage of spent nuclear fuel.

A Notification of Unusual Event is declared on the basis of the occurrence of an event of sufficient magnitude that a loaded cask CONFINEMENT BOUNDARY is damaged or violated.

The PTN ISFSI is located wholly outside the PTN plant PROTECTED AREA. Any security event related to the ISFSI is classified under either ICs HU1 or HA1 security event related EALs.

Category: E - ISFSI

Subcategory: 1 - Confinement Boundary

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY

EAL:

EU1.1 Unusual Event

Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading on the surface of a loaded spent fuel cask (HSM) > **any** of the following:

- 1,600 mrem/hr on the HSM front bird screen
- 4 mrem/hr on the outside HSM door centerline
- 4 mrem/hr on the HSM end shield wall exterior

Mode Applicability:

All

Definition(s):

CONFINEMENT BOUNDARY- The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. As related to the PTN ISFSI, Confinement Boundary is defined as the NUHOMS Dry Shielding Canister (DSC).

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.

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 specified EAL threshold values correspond to 2 times the NUHOMS Horizontal Storage Module (HSM) technical specification external surface dose rate limits (ref. 1). 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.

Reference(s):

1. Certificate of Compliance Appendix A NUHOMS HD System Generic Technical Specifications Section 5.4 HSM-H Dose Rate Evaluation Program
2. NEI 99-01 E-HU1

Category F – Fission Product Barrier Degradation

EAL Group: Hot Conditions (RCS temperature > 200ºF); EALs in this category are applicable only in one or more hot operating modes.

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

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

B. Reactor Coolant System Barrier (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 Barrier (CTMT): 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 Emergency Classification Level (ECL) from an Alert to a Site Area Emergency or a General Emergency.

The EALs in this category require evaluation of the loss and potential loss thresholds listed in the fission product barrier matrix of Table F-1. “Loss” and “Potential Loss” signify the relative damage and threat of damage to the barrier. “Loss” means the barrier no longer assures containment of radioactive materials. “Potential Loss” means integrity of the barrier is threatened and could be lost if conditions continue to degrade. The number of barriers that are lost or potentially lost and the following criteria determine the appropriate emergency classification level:

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 third barrier

The logic used for emergency classification based on fission product barrier monitoring should reflect the following considerations:

- The Fuel Clad Barrier and the RCS Barrier are weighted more heavily than the Containment Barrier.

- Unusual Event ICs associated with RCS and Fuel Clad Barriers are addressed under System Malfunction ICs.
- For accident conditions involving a radiological release, evaluation of the fission product barrier thresholds will need to be performed in conjunction with dose assessments to ensure correct and timely escalation of the emergency classification. For example, an evaluation of the fission product barrier thresholds may result in a Site Area Emergency classification while a dose assessment may indicate that an EAL for General Emergency IC RG1 has been exceeded.
- The fission product barrier thresholds specified within a scheme reflect plant-specific PTN design and operating characteristics.
- As used in this category, the term RCS leakage encompasses not just those types defined in Technical Specifications but also includes the loss of RCS mass to any location– inside the containment, an interfacing system, or outside of the containment. The release of liquid or steam mass from the RCS due to the as-designed/expected operation of a relief valve is not considered to be RCS leakage.
- At the Site Area Emergency level, EAL users should maintain cognizance of how far present conditions are from meeting a threshold that would require a General Emergency declaration. For example, if the Fuel Clad and RCS fission product barriers were both lost, then there should be frequent assessments of containment radioactive inventory and integrity. Alternatively, if both the Fuel Clad and RCS fission product barriers were potentially lost, the EC would have more assurance that there was no immediate need to escalate to a General Emergency.

Category: Fission Product Barrier Degradation

Subcategory: N/A

Initiating Condition: **Any** loss or **any** potential loss of either Fuel Clad or RCS

EAL:

FA1.1	**Alert**
Any loss or **any** potential loss of **EITHER** Fuel Clad or RCS barrier (Table F-1)	

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

None

Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases and references.

At the Alert classification level, Fuel Clad and RCS barriers are weighted more heavily than the Containment barrier. Unlike the Containment barrier, loss or potential loss of either the Fuel Clad or RCS barrier may result in the relocation of radioactive materials or degradation of core cooling capability. Note that the loss or potential loss of Containment barrier in combination with loss or potential loss of either Fuel Clad or RCS barrier results in declaration of a Site Area Emergency under EAL FS1.1

Reference(s):

1. NEI 99-01 FA1

Category: Fission Product Barrier Degradation

Subcategory: N/A

Initiating Condition: Loss or potential loss of **any** two barriers

EAL:

FS1.1	**Site Area Emergency**
Loss or potential loss of **any** two barriers (Table F-1)	

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

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.

Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases and references.

At the Site Area Emergency classification level, each barrier is weighted equally. A Site Area Emergency is therefore appropriate for any combination of the following conditions:

- One barrier loss and a second barrier loss (i.e., loss - loss)
- One barrier loss and a second barrier potential loss (i.e., loss - potential loss)
- One barrier potential loss and a second barrier potential loss (i.e., potential loss - potential loss)

At the Site Area Emergency classification level, the ability to dynamically assess the proximity of present conditions with respect to the threshold for a General Emergency is important. For example, the existence of Fuel Clad and RCS Barrier loss thresholds in addition to offsite dose assessments would require continual assessments of radioactive inventory and Containment integrity in anticipation of reaching a General Emergency classification. Alternatively, if both Fuel Clad and RCS potential loss thresholds existed, the would have greater assurance that escalation to a General Emergency is less IMMINENT.

Reference(s):

1. NEI 99-01 FS1

Category: Fission Product Barrier Degradation

Subcategory: N/A

Initiating Condition: Loss of **any** two barriers and loss or potential loss of third barrier

EAL:

FG1.1 General Emergency

Loss of **any** two barriers

AND

Loss or potential loss of the third barrier (Table F-1)

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

None

Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases and references.

At the General Emergency classification level each barrier is weighted equally. A General Emergency is therefore appropriate for any combination of the following conditions:

- Loss of Fuel Clad, RCS and Containment Barriers
- Loss of Fuel Clad and RCS Barriers with potential loss of Containment Barrier
- Loss of RCS and Containment Barriers with potential loss of Fuel Clad Barrier
- Loss of Fuel Clad and Containment Barriers with potential loss of RCS Barrier

Reference(s):

1. NEI 99-01 FG1

Table F-1 Fission Product Barrier Threshold Matrix & Bases

Table F-1 lists the threshold conditions that define the Loss and Potential Loss of the three fission product barriers (Fuel Clad, Reactor Coolant System, and Containment). The table is structured so that each of the three barriers occupies adjacent columns. Each fission product barrier column is further divided into two columns; one for Loss thresholds and one for Potential Loss thresholds.

The first column of the table (to the left of the Fuel Clad Loss column) lists the categories (types) of fission product barrier thresholds. The fission product barrier categories are:

A. RCS or SG Tube Leakage
B. Inadequate Heat removal
C. CTMT Radiation / RCS Activity
D. CTMT Integrity or Bypass
E. EC Judgment

Each category occupies a row in Table F-1 thus forming a matrix defined by the categories. The intersection of each row with each Loss/Potential Loss column forms a cell in which one or more fission product barrier thresholds appear. If NEI 99-01 does not define a threshold for a barrier Loss/Potential Loss, the word “None” is entered in the cell.

Thresholds are assigned sequential numbers within each barrier column beginning with number one.

If a cell in Table F-1 contains more than one numbered threshold, each of the numbered thresholds, if exceeded, signifies a Loss or Potential Loss of the barrier. It is not necessary to exceed all of the thresholds in a category before declaring a barrier Loss/Potential Loss.

Subdivision of Table F-1 by category facilitates association of plant conditions to the applicable fission product barrier Loss and Potential Loss thresholds. This structure promotes a systematic approach to assessing the classification status of the fission product barriers.

When equipped with knowledge of plant conditions related to the fission product barriers, the EAL-user first scans down the category column of Table F-1, locates the likely category and then reads across the fission product barrier Loss and Potential Loss thresholds in that category to determine if a threshold has been exceeded. If a threshold has not been exceeded, the EAL-user proceeds to the next likely category and continues review of the thresholds in the new category

If the EAL-user determines that any threshold has been exceeded, by definition, the barrier is lost or potentially lost – even if multiple thresholds in the same barrier column are exceeded, only that one barrier is lost or potentially lost. The EAL-user must examine each of the three fission product barriers to determine if other barrier thresholds in the category are lost or potentially lost. For example, if containment radiation is sufficiently high, a Loss of the Fuel Clad and RCS Barriers and a Potential Loss of the Containment Barrier can occur. Barrier Losses and Potential Losses are then applied to the algorithms given in EALs FG1.1, FS1.1, and FA1.1 to determine the appropriate emergency classification.

Table F-1 Fission Product Barrier Threshold Matrix						
	Fuel Clad (FC) Barrier		Reactor Coolant System (RC) Barrier		Containment (CTMT) Barrier	
Category	**Loss**	**Potential Loss**	**Loss**	**Potential Loss**	**Loss**	**Potential Loss**
A **RCS or SG Tube Leakage**	None	None	1. An automatic or manual ECCS (SI) actuation required by **EITHER:** • UNISOLABLE RCS leakage • SG tube RUPTURE	1. UNISOLABLE RCS or SG tube leakage > 69 gpm 2. Integrity-RED Path conditions met	1. A leaking or RUPTURED SG is FAULTED outside of CTMT	None
B **Inadequate Heat Removal**	1. Core Cooling-RED Path conditions met	1. Core Cooling-ORANGE Path conditions met 2. Heat Sink-RED Path conditions met **AND** Heat sink is required	None	3. Heat Sink-RED Path conditions met **AND** Heat sink is required	None	1. Core Cooling-RED Path conditions met **AND** Restoration procedures **not** effective within 15 min. (Note 1)
C **CTMT Radiation / RCS Activity**	2. Containment High Range Radiation Monitor Rad-3[4]-6311A/B reading > 5.4E+03 R/hr 3. Coolant activity > 300 μCi/gm dose equivalent I-131	None	2. Containment Mezzanine Radiation Monitor RI-3[4]-1404B reading > 10 mR/hr	None	None	2. Containment High Range Radiation Monitor Rad-3[4]-6311A/B reading > 2.2E+04 R/hr
D **CTMT Integrity or Bypass**	None	None	None	None	2. CTMT isolation is required **AND EITHER:** • CTMT integrity has been lost based on EC judgment • UNISOLABLE pathway from CTMT atmosphere to the environment exists 3. Indications of RCS leakage outside of CTMT	3. Containment-RED Path conditions met 4. CTMT hydrogen concentration > 4% 5. CTMT pressure > 20 psig **AND** < one full train of depressurization equipment operating per design for ≥ 15 min. (Notes 1, 11)
E **EC Judgment**	4. **ANY** condition in the opinion of the EC that indicates Loss of the Fuel Clad Barrier	3. **ANY** condition in the opinion of the EC that indicates Potential Loss of the Fuel Clad Barrier	3. **ANY** condition in the opinion of the EC that indicates Loss of the RCS Barrier	4. **ANY** condition in the opinion of the EC that indicates Potential Loss of the RCS Barrier	4. **ANY** condition in the opinion of the EC that indicates Loss of the CTMT Barrier	6. **ANY** condition in the opinion of the EC that indicates Potential Loss of the CTMT Barrier

Barrier: Fuel Clad

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

None

Barrier: Fuel Clad

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

1. Core Cooling-RED Path conditions met

Definition(s):

None

Basis:

This condition indicates temperatures within the core are sufficient to cause significant superheating of reactor coolant (ref. 1).

Reference(s):

1. 3[4]-EOP-F-0 Critical Safety Function Status Trees CSF F-0.2 Core Cooling
2. NEI 99-01 Inadequate Heat Removal Loss 2.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

1. Core Cooling-ORANGE Path conditions met

Definition(s):

None

Basis:

This condition indicates temperatures withthin the core sufficient to allow the onset of heat-induced cladding damage (ref. 1).

Reference(s):

1. 3[4]-EOP-F-0 Critical Safety Function Status Trees CSF F-0.2 Core Cooling
2. NEI 99-01 Inadequate Heat Removal Loss 2.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

2. Heat Sink-RED Path conditions met

   AND

   Heat sink is required

Definition(s):

None

Basis:

In combination with RCS Potential Loss B.3, meeting this threshold results in a Site Area Emergency.

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (i.e., 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 B.3; 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.

The phrase “and heat sink required” precludes the need for classification for conditions in which RCS pressure is less than SG pressure or Heat Sink-RED path entry was created through operator action directed by an EOP. For example, FR-H.1 is entered from CSFST Heat Sink-Red. Step 1 tells the operator to determine if heat sink is required by checking that RCS pressure is greater than any non-faulted SG pressure and RCS T_{hot} is greater than 350ºF. If these conditions exist, Heat Sink is required. Otherwise, the operator is to either return to the procedure and step in effect or place RHR in service for heat removal. For large LOCA events inside the Containment, the SGs are moot because heat removal through the containment heat removal systems takes place. Therefore, Heat Sink Red should not be required and, should not be assessed for EAL classification because a LOCA event alone should not require higher than an Alert classification. (ref. 1, 2).

Reference(s):

1. 3[4]-EOP-F-0 Critical Safety Function Status Trees CSF F-0.3 Heat Sink
2. 3[4]-EOP-FR-H.1 Response to Loss of Secondary Heat Sink
3. NEI 99-01 Inadequate Heat Removal Fuel Clad Potential Loss 2.B

Barrier: Fuel Clad

Category: C. CTMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

2. Containment High Range Radiation Monitor Rad-3[4]-6311A/B reading > 5.4E+03 R/hr

Definition(s):

None

Basis:

Containment radiation monitor readings greater than the value shown indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the containment. The reading is derived assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with a concentration of ~5% clad failure into the containment atmosphere. Reactor coolant concentrations of this magnitude are several times larger than the maximum concentrations (including iodine spiking) allowed within Technical Specifications and are therefore indicative of fuel damage (ref. 1).

The radiation monitor reading in this threshold is higher than that specified for RCS Barrier Loss threshold C.2 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 ECL to a Site Area Emergency.

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

Reference(s):

1. PTN NEI-99-01 Radiation Monitor EAL Value Determination
2. NEI 99-01 CTMT Radiation / RCS Activity FC Loss 3.A

Barrier: Fuel Clad

Category: C. CTMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

3. Coolant activity > 300 µCi/gm dose equivalent I-131

Definition(s):

None

Basis:

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.

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

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

Reference(s):

1. NEI 99-01 CTMT Radiation / RCS Activity FC Loss 3.B

Barrier: Fuel Clad

Category: C. CTMT Radiation / RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

None

Barrier: Fuel Clad

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: E. EC Judgment

Degradation Threat: Loss

Threshold:

4. **Any** condition in the opinion of the EC that indicates loss of the Fuel Clad barrier

Definition(s):

None

Basis:

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

Reference(s):

1. NEI 99-01 Emergency Director Judgment Fuel Clad Loss 6.A

Barrier: Fuel Clad

Category: E. EC Judgment

Degradation Threat: Potential Loss

Threshold:

3. **Any** condition in the opinion of the EC that indicates potential loss of the Fuel Clad barrier

Definition(s):

None

Basis:

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

Reference(s):

1. NEI 99-01 Emergency Director Judgment Potential Fuel Clad Loss 6.A

Barrier: Reactor Coolant System

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Loss

Threshold:

1. An automatic or manual SI actuation required by **EITHER:**
   - UNISOLABLE RCS leakage
   - SG tube RUPTURE

Definition(s):

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

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

Basis:

This threshold is based on an UNISOLABLE RCS leak of sufficient size to require an automatic or manual actuation of the Emergency Core Cooling System (ECCS). 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 (i.e., 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 A.1 will also be met.

Reference(s):

1. 3[4]-EOP-E-1 Loss of Reactor or Secondary Coolant
2. 3[4]-EOP-E-3 Steam Generator Tube Rupture
3. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Loss 1.A

Barrier: Reactor Coolant System

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Potential Loss

Threshold:

1. UNISOLABLE RCS or SG tube leakage > 69 gpm

Definition(s):

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

Basis:

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 SI actuation has not occurred. The threshold is met when RCS leakage is determined to exceed 69 gpm excluding normal reductions in RCS inventory such as letdown and RCP seal leakoff (ref. 1, 2, 3).

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 (i.e., steam generator tube leakage) or outside of containment.

If the leaking steam generator (> 69 gpm) is also FAULTED outside of containment, the declaration escalates to a Site Area Emergency since the Containment Barrier Loss threshold A.1 will also be met.

Reference(s):

1. 3[4]-EOP-E-1 Loss of Reactor or Secondary Coolant
2. 3[4]-EOP-E-3 Steam Generator Tube Rupture
3. FSAR Table 9.2-2 Nominal Chemical and Volume Control System Performance
4. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Potential Loss 1.A

Barrier: Reactor Coolant System

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Potential Loss

Threshold:

2. Integrity-RED Path conditions met

Definition(s):

None

Basis:

The "Potential Loss" threshold is defined by the CSFST Integrity - RED path. CSFST Integrity - Red Path plant conditions and associated PTS Limit A indicates an extreme challenge to the safety function when plant parameters are to the left of the limit curve following excessive RCS cooldown under pressure (ref. 1, 2).

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 (i.e., hot and pressurized).

Reference(s):

1. 3[4]-EOP-F-0 Critical Safety Function Status Trees Enclosure 4 CSF F-0.4 Integrity
2. 3[4]-EOP-FR-P.1 Response to Imminent Pressurized Thermal Shock Condition
3. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Potential Loss 1.B

Barrier: Reactor Coolant System

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

3. Heat Sink-RED Path conditions met **AND** Heat sink is required

Definition(s):

None

Basis:

In combination with Fuel Clad Potential Loss B.1, meeting this threshold results in a Site Area Emergency.

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (i.e., 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 B.2; 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.

The phrase “and heat sink required” precludes the need for classification for conditions in which RCS pressure is less than SG pressure or Heat Sink-RED path entry was created through operator action directed by an EOP. For example, FR-H.1 is entered from CSFST Heat Sink-Red. Step 1 tells the operator to determine if heat sink is required by checking that RCS pressure is greater than any non-faulted SG pressure and RCS T_{hot} is greater than 350ºF. If these conditions exist, Heat Sink is required. Otherwise, the operator is to either return to the procedure and step in effect or place RHR in service for heat removal. For large LOCA events inside the Containment, the SGs are moot because heat removal through the containment heat removal systems takes place. Therefore, Heat Sink Red should not be required and, should not be assessed for EAL classification because a LOCA event alone should not require higher than an Alert classification. (ref. 1, 2).

Reference(s):

1. 3[4]-EOP-F-0 Critical Safety Function Status Trees CSF F-0.3 Heat Sink
2. 3[4]-EOP-FR-H.1 Response to Loss of Secondary Heat Sink
3. NEI 99-01 Inadequate Heat Removal RCS Potential Loss 2.B

Barrier: Reactor Coolant System

Category: C. CTMT Radiation/ RCS Activity

Degradation Threat: Loss

Threshold:

2. Containment Mezzanine Radiation Monitor RI-3[4]-1401B[1404B] reading > 10 mR/hr

Definition(s):

None

Basis:

A reading > the value shown is indicative of a breach in the RCS barrier (ref. 1).

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.2 since it indicates a loss of the RCS Barrier only.

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

Reference(s):

1. PTN NEI-99-01 Radiation Monitor EAL Value Determination
2. NEI 99-01 CMT Radiation / RCS Activity RCS Loss 3.A

Barrier: Reactor Coolant System

Category: C. CTMT Radiation/ RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: E. EC Judgment

Degradation Threat: Loss

Threshold:

3. **Any** condition in the opinion of the EC that indicates loss of the RCS barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that may be used by the EC in determining whether the RCS barrier is lost.

Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Loss 6.A

Barrier: Reactor Coolant System

Category: E. EC Judgment

Degradation Threat: Potential Loss

Threshold:

4. **Any** condition in the opinion of the EC that indicates potential loss of the RCS barrier

Definition(s):

None

Basis:

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

Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Potential Loss 6.A

Barrier: Containment

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

1. A leaking or RUPTURED SG is FAULTED outside of CTMT

Definition(s):

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.

RUPTURED - The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection.

Basis:

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 A.1and Loss A.1, 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 SU4 for the fuel clad barrier (i.e., RCS activity values) and IC SU5 for the RCS barrier (i.e., 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 (e.g., 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 (e.g., 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 SU5.1	Unusual Event per SU5.1
Requires operation of a standby charging (makeup) pump (*RCS Barrier Potential Loss*)	Site Area Emergency per FS1.1	Alert per FA1.1
Requires an automatic or manual ECCS (SIAS) actuation (*RCS Barrier Loss*)	Site Area Emergency per FS1.1	Alert per FA1.1

There is no Potential Loss threshold associated with RCS or SG Tube Leakage.

Reference(s):

1. NEI 99-01 RCS or SG Tube Leakage Containment Loss 1.A

Barrier: Containment

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Containment

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

None

Barrier: Containment

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

1. Core Cooling-RED path conditions met

   AND

   Restoration procedures **not** effective within 15 min. (Note 1)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Definition(s):

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.

Basis:

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 EC should escalate the emergency classification level to a General Emergency as soon as it is determined that the procedure(s) will not be effective.

Severe accident analyses (e.g., 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.

Reference(s):

1. 3[4]-EOP-F-0 Critical Safety Function Status Trees CSF F-0.2 Core Cooling
2. 3[4]-EOP-FR-C.1 Response to Inadequate Core Cooling
3. NEI 99-01 Inadequate Heat Removal Containment Potential Loss 2.A

Barrier: Containment

Category: C. CTMT Radiation/RCS Activity

Degradation Threat: Loss

Threshold:

None

Barrier: Containment

Category: C. CTMT Radiation/RCS Activity

Degradation Threat: Potential Loss

Threshold:

2. Containment High Range Radiation Monitor Rad-3[4]-6311A/B reading > 2.2E+04 R/hr

Definition(s):

None

Basis:

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 (ref. 1).

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.

Reference(s):

1. PTN NEI-99-01 Radiation Monitor EAL Value Determination
3. NEI 99-01 CMT Radiation / RCS Activity Containment Potential Loss 3.A

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

2. CTMT isolation (Phase A, B or CVI) is required

   AND EITHER:

   - CTMT integrity has been lost based on EC judgment
   - UNISOLABLE pathway from CTMT atmosphere to the environment exists

Definition(s):

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

Basis:

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Loss Threshold A.1.

These thresholds address a situation where containment isolation (Phase A, B or CVI) 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 bulleted thresholds. The threshold specifies "(Phase A, B or CVI)" as the site-specific isolation signals that initiate required containment isolations to preclude fission product release from the containment (ref. 1).

First Threshold – Containment integrity has been lost, i.e., 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 EC will assess this threshold using judgment, and with due consideration given to current plant conditions, and available operational and radiological data (e.g., containment pressure, readings on radiation monitors outside containment, operating status of containment pressure control equipment, etc.).

Refer to the middle piping run of Figure 1. 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 (e.g., 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 A ICs.

Second Threshold – 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 (e.g., 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 1. In this simplified example, the inboard and outboard isolation valves remained open after a containment isolation was required (i.e., 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 (i.e., 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 1. 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 developed a leak that allowed steam/water to enter the Auxiliary Building, then the second threshold 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 the first threshold 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 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 an enclosed system. These releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category R ICs.

Reference(s):

1. UFSAR Section 6.6 Containment Isolation
2. NEI 99-01 CMT Integrity or Bypass Containment Loss 4.A

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

3. Indications of RCS leakage outside of CTMT

Definition(s):

None

Basis:

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 A.1 to be met.

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Containment Loss Threshold A.1.

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 (i.e., 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.

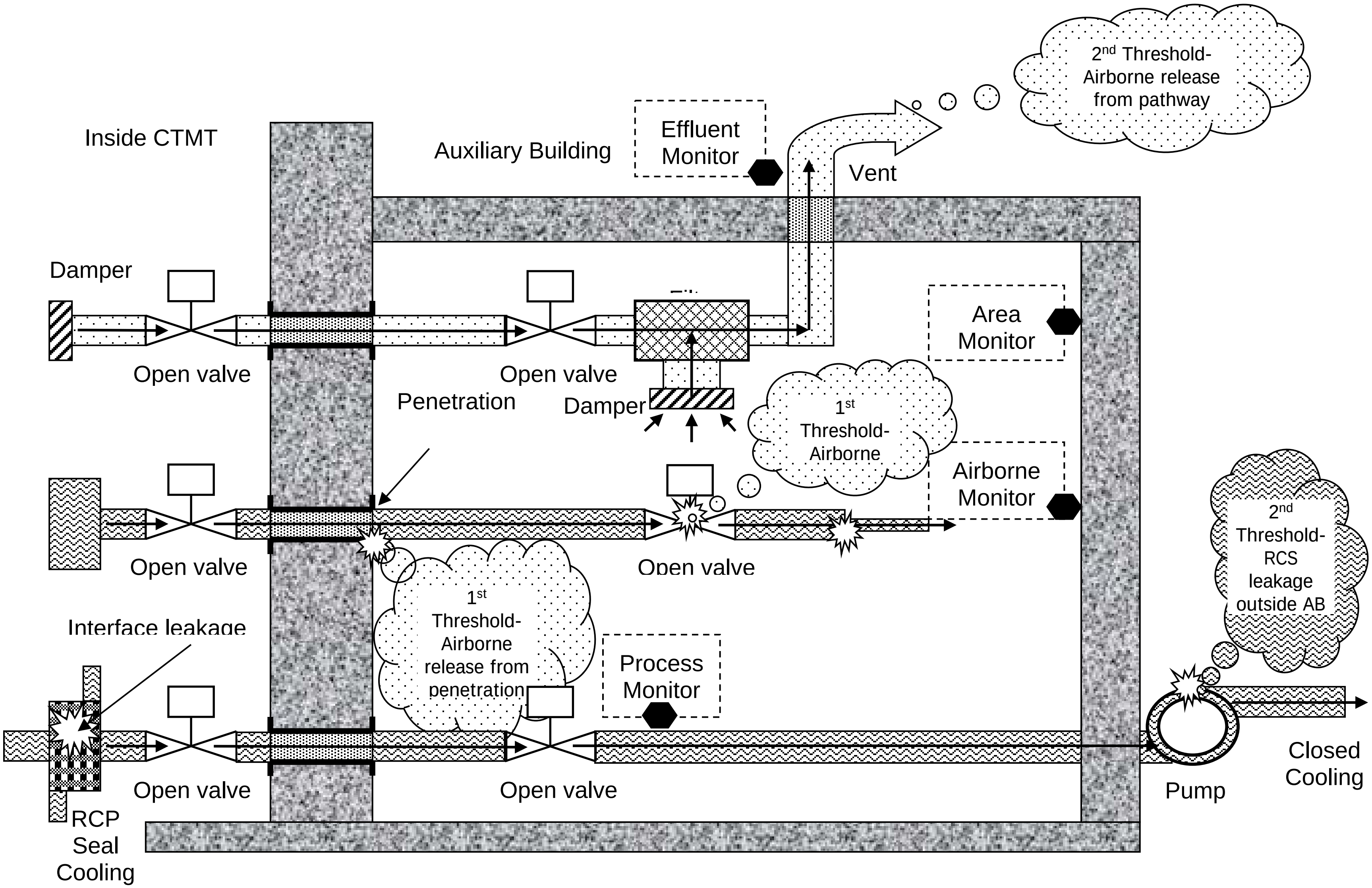
Unexpected elevated readings and alarms on radiation monitors with detectors outside containment should be corroborated with other available indications to confirm that the source is a loss of RCS mass outside of containment. If the fuel clad barrier has not been lost, radiation monitor readings outside 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 1. 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 containment loss threshold D.2 to be met as well.

Reference(s):

1. NEI 99-01 CMT Integrity or Bypass Containment Loss 4.B

Figure 1: Containment Integrity or Bypass Examples



Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

3. Containment-RED Path conditions met

Definition(s):

None

Basis:

If containment pressure exceeds the design pressure of 55 psig (ref. 1, 2), 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.

Reference(s):

1. 3[4]-EOP-F-0 Critical Safety Function Status Trees CSF F-0.5 Containment
2. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.A

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

4. CTMT hydrogen concentration > 4%

Definition(s):

None

Basis:

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

A containment hydrogen concentration of 4% conservatively represents the lowest threshold for flammability in the presence of oxygen (ref. 1).

Reference(s):

1. Computational Aids CA-3 Hydrogen Flammability In Containment
2. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.B

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

5. CTMT pressure > 20 psig with < one full train of CTMT heat removal systems operating per design for ≥ 15 min. (Notes 1, 11)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 11: One full train of CTMT heat removal systems consists of at least two Containment Coolers operating in conjunction with one Containment Spray Pump.

Definition(s):

None

Basis:

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 (ref. 1, 2). 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 (e.g., containment sprays and Containment Coolers but not including containment venting strategies) are either lost or performing in a degraded manner.

One full train of CTMT heat removal systems consists of at least two Containment Coolers operating in conjunction with one Containment Spray Pump (ref. 1, 2).

Reference(s):

1. UFSAR Section 6.3 Emergency Containment Cooling
2. UFSAR Section 6.4 Containment Spray System
3. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.C

Barrier: Containment

Category: E. EC Judgment

Degradation Threat: Loss

Threshold:

4. **Any** condition in the opinion of the EC that indicates loss of the CTMT barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that may be used by the EC in determining whether the containment barrier is lost.

Reference(s):

1. NEI 99-01 Emergency Director Judgment Containment Loss 6.A

Barrier: Containment

Category: E. EC Judgment

Degradation Threat: Potential Loss

Threshold:

6. **Any** condition in the opinion of the EC that indicates potential loss of the CTMT barrier

Definition(s):

None

Basis:

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

Reference(s):

1. NEI 99-01 Emergency Director Judgment Containment Potential Loss 6.A

Category H – Hazards and Other Conditions Affecting Plant Safety

EAL Group: ANY (EALs in this category are applicable to any plant condition, hot or cold.)

Hazards are non-plant, system-related events that can directly or indirectly affect plant operation, reactor plant safety or personnel safety.

1. Security

Unauthorized entry attempts into the PROTECTED AREA, bomb threats, sabotage attempts, and actual security compromises threatening loss of physical control of the plant.

2. Seismic Event

Natural events such as earthquakes have potential to cause plant structure or equipment damage of sufficient magnitude to threaten personnel or plant safety.

3. Natural or Technological Hazard

Other natural and non-naturally occurring events that can cause damage to plant facilities include tornados, FLOODING, hazardous material releases and events restricting site access warranting classification.

4. Fire

FIRES can pose significant hazards to personnel and reactor safety. Appropriate for classification are FIRES within the plant PROTECTED AREA or which may affect operability of equipment needed for safe shutdown.

5. Hazardous Gas

Toxic, corrosive, asphyxiant or flammable gas leaks can affect normal plant operations or preclude access to plant areas required to safely shutdown the plant.

6. Control Room Evacuation

Events that are indicative of loss of Control Room habitability. If the Control Room must be evacuated, additional support for monitoring and controlling plant functions is necessary through the emergency response facilities.

7. EC Judgment

The EALs defined in other categories specify the predetermined symptoms or events that are indicative of emergency or potential emergency conditions and thus warrant classification. While these EALs have been developed to address the full spectrum of possible emergency conditions which may warrant classification and subsequent implementation of the Emergency Plan, a provision for classification of emergencies based on operator/management experience and judgment is still necessary. The EALs of this category provide the EC the latitude to classify emergency conditions consistent with the established classification criteria based upon EC judgment.

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: Confirmed SECURITY CONDITION or threat

EAL:

HU1.1 **Unusual Event**
A SECURITY CONDITION that does **not** involve a HOSTILE ACTION as reported by PTN Security Shift Supervision
OR
Notification of a credible security threat directed at the site
OR
A validated notification from the NRC providing information of an aircraft threat

Mode Applicability:

All

Definition(s):

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 PTN 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 PTN. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the OWNER CONTROLLED AREA).

OWNER CONTROLLED AREA (OCA) - That portion of FPL property surrounding and including the Turkey Point Plant which is subject to limited access and control as deemed appropriate by FPL.

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

PROTECTED AREA **-** The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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 BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

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 and HS1.

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 Offsite Response Organizations.

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*.

The first threshold references the Security Shift Supervision 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.

The second threshold addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with SY-AA-102-1014 Threat Assessment and Reporting (ref. 2).

The third threshold 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 SY-AA-102-1014 Threat Assessment and Reporting (ref.2).

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 PTN Physical Security Plan (ref. 1).

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

Reference(s):

1. PTN Physical Security Plan
2. SY-AA-102-1014 Threat Assessment and Reporting
3. NEI 99-01 HU1

Category: H – Hazards

Subcategory: 1 – Security

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

EAL:

HA1.1	**Alert**
A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by PTN Security Shift Supervision **OR** A validated notification from NRC of an aircraft attack threat within 30 min. of the site	

Mode Applicability:

All

Definition(s):

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 PTN 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 PTN. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the OWNER CONTROLLED AREA).

HOSTILE FORCE - 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.

OWNER CONTROLLED AREA - That portion of FPL property surrounding and including the Turkey Point Plant which is subject to limited access and control as deemed appropriate by FPL.

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

PROTECTED AREA **-** The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

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 (e.g., evacuation, dispersal or sheltering). The Alert declaration will also heighten the awareness of Offsite Response Organizations (OROs), allowing them to be better prepared should it be necessary to consider further actions.

This EAL 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.

The first threshold is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA.

The second threshold 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 SY-AA-102-1014 Threat Assessment and Reporting (ref. 2).

The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may be provided by NORAD through the NRC.

In some cases, it may not be readily apparent if an aircraft impact within the OWNER CONTROLLED AREA was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate federal agency is intended to be NORAD, FBI, FAA or NRC. The emergency declaration, including one based on other ICs/EALs, should not be unduly delayed while awaiting notification by a Federal agency.

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 PTN Physical Security Plan (ref. 1).

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

Reference(s):

1. PTN Physical Security Plan
2. SY-AA-102-1014 Threat Assessment and Reporting
3. NEI 99-01 HA1

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: HOSTILE ACTION within the PROTECTED AREA

EAL:

HS1.1	**Site Area Emergency**
A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by PTN Security Shift Supervision	

Mode Applicability:

All

Definition(s):

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 PTN 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 PTN. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the OWNER CONTROLLED AREA).

HOSTILE FORCE - 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.

OWNER CONTROLLED AREA - That portion of FPL property surrounding and including the Turkey Point Plant which is subject to limited access and control as deemed appropriate by FPL.

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

PROTECTED AREA **-** The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

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 (ref. 1, 2).

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

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Site Area Emergency declaration will mobilize Offsite Response Organization (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 EAL does **not** apply to a HOSTILE ACTION directed at an ISFSI Protected Area located outside the 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 PTN Physical Security Plan (ref. 1).

Reference(s):

1. PTN Physical Security Plan
2. SY-AA-102-1014 Threat Assessment and Reporting
3. NEI 99-01 HS1

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 2 – Seismic Event

Initiating Condition: Seismic event greater than OBE levels

EAL:

HU2.1 Unusual Event

Control Room personnel feel an actual or potential seismic event

AND

The occurrence of a seismic event is confirmed in a manner deemed appropriate by the Shift Manager

Mode Applicability:

All

Definition(s):

None

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 (e.g., performs walk-downs and post-event inspections). Given the time necessary to perform walk-downs and inspections, and fully understand any impacts, this event represents a potential degradation of the level of safety of the plant.

Event verification with external sources should not be necessary during or following an OBE. Earthquakes of this magnitude should be readily felt by on-site personnel and recognized as a seismic event (e.g., lateral accelerations in excess of 0.05g). The Shift Manager or EC may seek external verification if deemed appropriate (e.g., a call to the U.S. Geological Survey (USGS), check internet news sources, etc.); however, the verification action must not preclude a timely emergency declaration.

For both Unit 3 and Unit 4, the OBE ground acceleration threshold is > 0.05g horizontal (ref.2).

The PTN Control Room does not have real time OBE exceedance alarms or indications. Seismic instruments record ground accelerations but must be subsequently analyzed to determine OBE exceedance (ref. 1, 3). Therefore, classification of seismic events at PTN is based on a felt earthquake confirmed in a manner deemed appropriate by the Shift Manager. The Shift Manager or Emergency Coordinator may seek external verification, such as the USGS, however the verification action must not preclude a timely emergency classification.

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

Reference(s):

1. 0-EPIP-20106 Natural Emergencies
2. USFSAR Section 2.9.4.6 Earthquake Design Basis
3. USFSAR Section 5A-5.0 Seismic Instrumentation
4. NEI 99-01 HU2

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.1	**Unusual Event**
A tornado strike within the PROTECTED AREA	

Mode Applicability:

All

Definition(s):

PROTECTED AREA - The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

Basis:

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

This EAL addresses a tornado striking (touching down) within the PROTECTED AREA.

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

If damage is confirmed visually or by other in-plant indications, the event may be escalated to an Alert under IC CA6 or SA9.

A tornado striking (touching down) within the PROTECTED AREA warrants declaration of an Unusual Event regardless of the measured wind speed at the meteorological tower. A tornado is defined as a violently rotating column of air in contact with the ground and extending from the base of a thunderstorm.

Reference(s):

1. 0-EPIP-20106 Natural Emergencies
2. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.2 Unusual Event

Internal room or area FLOODING of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode

Mode Applicability:

All

Definition(s):

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.

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

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

This EAL addresses FLOODING of a building room or area that results in operators isolating power to a SAFETY SYSTEM component due to water level or other wetting concerns. Classification is also required if the water level or related wetting causes an automatic isolation of a SAFETY SYSTEM component from its power source (e.g., a breaker or relay trip). To warrant classification, operability of the affected component must be required by Technical Specifications for the current operating mode (ref. 1, 2).

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

Refer to EAL CA6.1 or SA9.1 for internal flooding affecting more than one SAFETY SYSTEM train.

Reference(s):

1. UFSAR Section 5F.1 PTN Internal Flooding Protection
2. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.3	**Unusual Event**
Movement of personnel within the PROTECTED AREA is IMPEDED due to an event external to the PROTECTED AREA involving hazardous materials (e.g., an offsite chemical spill or toxic gas release)	

Mode Applicability:

All

Definition(s):

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 (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

PROTECTED AREA - The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

Basis:

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

This EAL This EAL addresses a hazardous materials event originating at a location outside the PROTECTED AREA and of sufficient magnitude to IMPEDE the movement of personnel within the PROTECTED AREA.

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

Reference(s):

1. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.4	**Unusual Event**
A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles (Note 7)	

Note 7: This EAL does **not** apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

Mode Applicability:

All

Definition(s):

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.

Basis:

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

This EAL 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 to 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.

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

Reference(s):

1. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

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

EAL:

HU4.1 Unusual Event

A FIRE is **not** extinguished within 15 min. of **any** of the following fire detection indications (Note 1):

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

AND

The FIRE is located within **any** Table H-1 area

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table H-1 PTN Fire Areas

- Containment Building
- Control Building
- Auxiliary Building
- Fuel Handling Building
- Turbine Building
- Emergency Diesel Generator Buildings
- Component Cooling Water (CCW) Area
- Intake Structure
- 4 KV Switchgear Rooms
- Main/Aux/Startup XFMRs
- Yard Areas:
  - RWSTs
  - PWSTs
  - CSTs
  - Unit 3 DOST
  - Air Compressors
  - Bus C

Mode Applicability:

All

Definition(s):

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.

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.

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.

The 15 minute requirement begins with a credible notification that a FIRE is occurring, or receipt of multiple VALID fire detection system alarms or field validation of a single fire alarm. The alarm is to be validated using available Control Room indications or alarms to prove that it is not spurious, or by reports from the field.

Table H-1 Fire Areas are those areas that contain equipment necessary for safe operation and shutdown of the plant (ref. 1, 2).

The intent of the 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (e.g., 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.

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

Reference(s):

1. UFSAR Section 5A-1.0 Design Bases of Structures, Systems and Equipment
2. 0-ONOP-016.20 Pre-Fire Plans
3. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

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

EAL:

HU4.2 Unusual Event
Receipt of a single fire alarm (i.e., **no** other indications of a FIRE)
AND
The fire alarm is indicating a FIRE within **any** Table H-1 area (excluding containment)
AND
The existence of a FIRE is **not** verified within 30 min. of alarm receipt (Notes 1, 13)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 13: A containment fire alarm is considered VALID upon receipt of multiple zones (more than one) actuated on the fire alarm panel.

Table H-1 PTN Fire Areas

- Containment Building
- Control Building
- Auxiliary Building
- Fuel Handling Building
- Turbine Building
- Emergency Diesel Generator Buildings
- Component Cooling Water (CCW) Area
- Intake Structure
- 4 KV Switchgear Rooms
- Main/Aux/Startup XFMRs
- Yard Areas:
  - RWSTs
  - PWSTs
  - CSTs
  - Unit 3 DOST
  - Air Compressors
  - Bus C

Mode Applicability:

All

Definition(s):

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.

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.

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.

The 30 minute requirement begins upon receipt of a single VALID fire detection system alarm (excluding containment). The alarm is to be validated using available Control Room indications or alarms to prove that it is not spurious, or by reports from the field. Actual field reports must be made within the 30 minute time limit or a classification must be made. If a fire is verified to be occurring by field report, classification shall be made based on EAL HU4.1, with the 15 minute requirement beginning with the verification of the fire by field report.

Table H-1 Fire Areas are those areas that contain equipment necessary for safe operation and shutdown of the plant (ref. 1, 2).

This EAL addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (i.e., proved or disproved) within 30-minutes of the alarm. Upon receipt, 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.

With regard to containment fire alarms, there is constant air movement in containment due to the operation of the containment ventilation system. The operating cooling units are drawing air to the units past the smoke detectors. It can be reasonably expected that a fire that burns for 15 minutes would produce sufficient products of combustion to cause fire detectors in multiple zones to alarm. Therefore a single containment fire alarm is not considered VALID.

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 HU4.1 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>Basis-Related Requirements from Appendix R: (It is recognized that PTN is a NFPA-805 Fire Program plant but the following Appendix R information supports the use of the 30 minute timing criteria based on a single fire alarm)</u>

Appendix R to 10 CFR 50, states in part:

(Note; While PTN is an NFP-805 plant, the following excerpt from 10CFR 50 Appendix R provides the bases for the acceptability of the use of a 30-minute validation time for a single fire zone alarm.)

> 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 HU4.2, 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.

Reference(s):

1. UFSAR Section 5A-1.0 Design Bases of Structures, Systems and Equipment
2. 0-ONOP-016.20 Pre-Fire Plans
3. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

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

EAL:

HU4.3	**Unusual Event**
A FIRE within the PROTECTED AREA **not** extinguished within 60 min. of the initial report, alarm or indication (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

All

Definition(s):

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

PROTECTED AREA - The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

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.

In addition to a FIRE addressed by EAL HU4.1 or HU4.2, a FIRE within the plant PROTECTED AREA not extinguished within 60-minutes may also potentially degrade the level of plant safety.

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

Reference(s):

1. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

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

EAL:

HU4.4	**Unusual Event**
A FIRE within the PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish	

Mode Applicability:

All

Definition(s):

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

PROTECTED AREA - The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

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.

If a FIRE within the plant PROTECTED AREA is of sufficient size to require a response by an offsite firefighting agency (e.g., a local town Fire Department), then the level of plant safety is potentially degraded. The dispatch of an offsite firefighting agency to the site requires an emergency declaration only if it is needed to actively support firefighting efforts because the fire is beyond the capability of the Fire Brigade to extinguish. Declaration is not necessary if the agency resources are placed on stand-by, or supporting post-extinguishment recovery or investigation actions.

The Shift Fire Brigade Advisor or Shift Fire Brigade Leader will assess whether the fire conditions warrant outside assistance (ref. 1).

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

Reference(s):

1. FP-AA-104-1003 Fire Response
2. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 5 – Hazardous Gases

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

EAL:

HA5.1 Alert

Release of a toxic, corrosive, asphyxiant or flammable gas into **any** Table H-2 room or area

AND

Entry into the room or area is prohibited or IMPEDED (Note 5)

Note 5: 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.

Table H-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	**Mode(s)**
Auxiliary Building 18'	1, 2, 3, 4, 5
Turbine Building (**any** level)	1, 2, 3, 4, 5
Containment	4, 5
HHSI Pump, CSP Rooms	3
RHR Pump & HX Rooms	4
Rad Waste Building	1, 2, 3, 4, 5

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown, 5 – Cold Shutdown

Definition(s):

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 (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

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 EC's judgment that the gas concentration in the affected room/area is sufficient to preclude or significantly IMPEDE procedurally required access. This judgment may be based on a variety of factors including an existing job hazard analysis, report of ill effects on personnel, advice from a subject matter expert or operating experience with the same or similar hazards. Access should be considered as IMPEDED if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is not routinely employed).

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

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the gaseous release). For example, the plant is in Mode 1 when the gaseous release occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The gas release is a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., fire suppression system testing).
- The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or IMPEDE a required action.
- If the equipment in the listed room or area was already inoperable, or out-of-service, before the event occurred, then no emergency should be declared since the event will have no adverse impact beyond that already allowed by Technical Specifications at the time of the event.

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. Steam can be an asphyxiant if present in sufficient concentration to reduce oxygen levels below normal.

This EAL does not apply to firefighting activities that generate smoke and 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.

Reference(s):

1. Attachment 2 Safe Operation & Shutdown Areas Tables R-3 & H-2 Bases
2. NEI 99-01 HA5

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 6 – Control Room Evacuation

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

EAL:

HA6.1	**Alert**
An event has resulted in the Control Room being evacuated	

Mode Applicability:

All

Definition(s):

None

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.

The Control Room is deemed to have been evacuated when the last licensed operator leaves the Control Room.

Escalation of the emergency classification level would be via IC HS6.

Reference(s):

1. 0-ONOP-105 Control Room Evacuation
2. NEI 99-01 HA6

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 6 – Control Room Evacuation

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

EAL:

HS6.1 Site Area Emergency

An event has resulted in the Control Room being evacuated

AND

Control of **any** of the following key safety functions is **not** re-established within 15 min. of the last licensed operator leaving the Control Room (Note 1):

- Reactivity (modes 1, 2 and 3 **only**)
- Core cooling
- RCS heat removal

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 - Hot Standby, 4 – Hot Shutdown, 5 – Cold Shutdown, 6 – Refueling

Definition(s):

None

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 EC judgment. The EC 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 remote safe shutdown location(s).

The Control Room is deemed to have been evacuated when the last licensed operator leaves the Control Room.

Establishment of the reactivity safety function is only applicable in Modes 1, 2 and 3. Sufficient shutdown margin has already been established once in modes 4, 5 and 6 (ref. 2).

Escalation of the emergency classification level would be via IC FG1 or CG1

Reference(s):

1. 0-ONOP-105 Control Room Evacuation
2. NRC EP FAQ 2015-014
3. NEI 99-01 HS6

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – EC Judgment

Initiating Condition: Other conditions existing that in the judgment of the EC warrant declaration of a Unusual Event

EAL:

HU7.1 Unusual Event

Other conditions exist which, in the judgment of the EC, 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.

Mode Applicability:

All

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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 EC to fall under the emergency classification level description for an Unusual Event.

Reference(s):

1. NEI 99-01 HU7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – EC Judgment

Initiating Condition: Other conditions exist that in the judgment of the EC warrant declaration of an Alert

EAL:

HA7.1	**Alert**

Other conditions exist which, in the judgment of the EC, 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.

Mode Applicability:

All

Definition(s):

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 PTN 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 PTN. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the OWNER CONTROLLED AREA).

OWNER CONTROLLED AREA - That portion of FPL property surrounding and including the Turkey Point Plant which is subject to limited access and control as deemed appropriate by FPL.

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

PROTECTED AREA - The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

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 EC to fall under the emergency classification level description for an Alert.

Reference(s):

1. NEI 99-01 HA7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – EC Judgment

Initiating Condition: Other conditions existing that in the judgment of the EC warrant declaration of a Site Area Emergency

EAL:

HS7.1	**Site Area Emergency**
Other conditions exist which, in the judgment of the EC, 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	

Mode Applicability:

All

Definition(s):

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 PTN 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 PTN. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the OWNER CONTROLLED AREA).

OWNER CONTROLLED AREA - That portion of FPL property surrounding and including the Turkey Point Plant which is subject to limited access and control as deemed appropriate by FPL.

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

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

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 EC to fall under the emergency classification level description for a SITE AREA EMERGENCY.

Reference(s):

1. NEI 99-01 HS7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – EC Judgment

Initiating Condition: Other conditions exist that in the judgment of the EC warrant declaration of a General Emergency

EAL:

HG7.1	**General Emergency**
Other conditions exist which, in the judgment of the EC, 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.	

Mode Applicability:

All

Definition(s):

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

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

HOSTILE ACTION - An act toward PTN 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 PTN. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the OWNER CONTROLLED AREA).

OWNER CONTROLLED AREA - That portion of FPL property surrounding and including the Turkey Point Plant which is subject to limited access and control as deemed appropriate by FPL.

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

PROTECTED AREA - The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

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 EC to fall under the emergency classification level description for a GENERAL EMERGENCY.

Reference(s):

1. NEI 99-01 HG7

Category S – System Malfunction

EAL Group: Hot Conditions (RCS temperature > 200ºF); EALs in this category are applicable only in one or more hot operating modes.

Numerous system-related equipment failure events that warrant emergency classification have been identified in this category. They may pose actual or potential threats to plant safety.

The events of this category pertain to the following subcategories:

1. Loss of Emergency AC Power

Loss of emergency plant electrical power can compromise plant safety system operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of onsite and offsite power sources for 4KV emergency buses.

2. Loss of Vital DC Power

Loss of emergency plant electrical power can compromise plant safety system operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of power to or degraded voltage on the 125V DC vital buses.

3. Loss of Control Room Indications

Certain events that degrade plant operator ability to effectively assess plant conditions within the plant warrant emergency classification. Losses of indicators are in this subcategory.

4. RCS Activity

During normal operation, reactor coolant fission product activity is very low. Small concentrations of fission products in the coolant are primarily from the fission of tramp uranium in the fuel clad or minor perforations in the clad itself. Any significant rise from these base-line levels (~1% clad failures) is indicative of fuel failures and is covered under the Fission Product Barrier Degradation category. However, lesser amounts of clad damage may result in coolant activity exceeding Technical Specification limits. These fission products will be circulated with the reactor coolant and can be detected by coolant sampling.

5. RCS Leakage

The reactor vessel provides a volume for the coolant that covers the reactor core. The reactor pressure vessel and associated pressure piping (reactor coolant system) together provide a barrier to limit the release of radioactive material should the reactor fuel clad integrity fail. Excessive RCS leakage greater than Technical Specification limits indicates potential pipe cracks that may propagate to an extent threatening fuel clad, RCS and containment integrity.

6. RTS Failure

This subcategory includes events related to failure of the Reactor Trip System (RTS) to initiate and complete reactor trips. In the plant licensing basis, postulated failures of the RTS to complete a reactor trip comprise a specific set of analyzed events referred to as Anticipated Transient Without Scram (ATWS) events. For EAL classification, however, ATWS is intended to mean any scram failure event that does not achieve reactor shutdown. If RTS actuation fails to properly result in reactor shutdown, positive control of reactivity is at risk and could cause a threat to fuel clad, RCS and containment integrity.

7. Loss of Communications

Certain events that degrade plant operator ability to effectively communicate with essential personnel within or external to the plant warrant emergency classification.

8. Containment Failure

Failure of containment isolation capability (under conditions in which the containment is not currently challenged) warrants emergency classification. Failure of containment pressure control capability also warrants emergency classification.

9. Hazardous Event Affecting Safety Systems

Various natural and technological events that result in degraded plant safety system train performance or significant VISIBLE DAMAGE warrant emergency classification under this subcategory.

Category: S – System Malfunction

Subcategory: 1 – Loss of Emergency AC Power

Initiating Condition: Loss of **all** offsite AC power capability to emergency buses for 15 minutes or longer

EAL:

SU1.1	**Unusual Event**
Loss of **all** offsite AC power capability, Table S-1, to 4KV emergency buses 3[4]A and 3[4]B for ≥ 15 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table S-1 AC Power Sources
Offsite • Unit 3[4] Startup Transformer **Onsite** • 3A[4A] Emergency Diesel Generator • 3B[4B] Emergency Diesel Generator

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

None

Basis:

Table S-1 provides a list of offsite AC electrical power sources credited for this EAL (ref. 1, 2, 3).

The two offsite power sources at PTN are the Unit 3 and 4 Startup transformers. Each transformer has a cross-connect breaker to the opposite Unit "A" 4 KV bus through a single breaker which is normally racked-out and locked. This configuration is per the design and is considered to meet the Technical Specification requirements for off-site power sources. For EALs SU1.1 and SA1.1 the opposite Unit Startup Transformer is not credited under hot conditions (Modes 1 – 4) due to the racked-out and locked configuration and the associated time required to rack in the breaker and establish the cross-connect (> 15 min.). Steps are taken however to establish the breaker cross-connect to restore off-site power per EOPs.

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.

Reference(s):

1. Technical Specifications Section 3.8.1 A. C. Sources
2. UFSAR section 8.2.2 Station Electrical System
3. NEI 99-01 SU1

Category: S – System Malfunction

Subcategory: 1 – Loss of Emergency AC Power

Initiating Condition: Loss of **all but one** AC power source to emergency buses for 15 minutes or longer

EAL:

SA1.1 Alert

AC power capability, Table S-1, to 4KV emergency buses 3[4]A and 3[4]B reduced to a single power source for ≥ 15 min. (Note 1)

AND

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

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table S-1 AC Power Sources
Offsite
• Unit 3[4] Startup Transformer
Onsite
• 3A[4A] Emergency Diesel Generator
• 3B[4B] Emergency Diesel Generator

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

Table S-1 provides a list of offsite and onsite AC electrical power sources credited for this EAL. (ref. 1, 2).

The two offsite power sources at PTN are the Unit 3 and 4 Startup transformers. Each transformer has a cross-connect breaker to the opposite Unit "A" 4 KV bus through a single breaker which is normally racked-out and locked. This configuration is per the design and is considered to meet the Technical Specification requirements for off-site power sources. For EALs SU1.1 and SA1.1 the opposite Unit Startup Transformer is not credited under hot conditions (Modes 1 – 4) due to the racked-out and locked configuration and the associated time required to rack in the breaker and establish the cross-connect (> 15 min.). Steps are taken however to establish the breaker cross-connect to restore off-site power per EOPs.

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 (e.g., an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being cross tied to the other unit .
- A loss of emergency power sources (e.g., onsite diesel generators and unit cross ties) with a single train of emergency buses being fed from an offsite power source.

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

Escalation of the emergency classification level would be via IC SS1.

This hot condition EAL is equivalent to the cold condition EAL CU2.1.

Reference(s):

1. Technical Specifications Section 3.8.1 A. C. Sources
2. UFSAR section 8.2.2 Station Electrical System
3. NEI 99-01 SA1

Category: S – System Malfunction

Subcategory: 1 – Loss of Emergency AC Power

Initiating Condition: Loss of **all** offsite power and **all** onsite AC power to emergency buses for 15 minutes or longer

EAL:

SS1.1	**Site Area Emergency**
Loss of **all** offsite and **all** onsite AC power to 4KV emergency buses 3[4]A and 3[4]B for ≥ 15 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

For this EAL credit can be taken for any AC power source that has sufficient capability to operate equipment necessary to maintain a safe shutdown condition, such as FLEX generators, provided it is already aligned or can be aligned within the 15 minute classification criteria (ref. 3).

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.

This hot condition EAL is equivalent to the cold condition EAL CA2.1.

Reference(s):

1. Technical Specifications Section 3.8.1 A. C. Sources
2. UFSAR section 8.2.2 Station Electrical System
3. BD-EOP-ECA-0.0 Loss of All AC Power
4. NEI 99-01 SS1

Category: S –System Malfunction

Subcategory: 1 – Loss of Vital AC Power

Initiating Condition: Prolonged loss of **all** offsite and **all** onsite AC power to emergency buses

EAL:

SG1.1 General Emergency

Loss of **all** offsite and **all** onsite AC power to 4KV emergency buses 3[4]A and 3[4]B

AND EITHER

- Long-term RCS heat removal capability is not likely to be established and maintained per procedure
- CETs > 1200ºF

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

For this EAL credit can be taken for any AC power source that has sufficient capability to operate equipment necessary to maintain a safe shutdown condition, such as FLEX generators (ref. 2, 3).

The EAL threshold is based on either of the following conditions due to a prolonged loss of all AC power to the emergency busses:

- The inability to establish and maintain long-term RCS heat removal capability per BD-EOP-ECA-0.0 Loss of All AC Power (ref. 3).
- Exceeding the degraded core cooling threshold based on Core Exit Thermocouple (CET) readings (> 1,200 °F). Core Damage Assessment uses a CET temperature of 750 °F - 1300 °F as the temperature indicative of a significantly damaged core (ref. 4). A

temperature of 1200 °F has been selected consistent with the Critical Safety Function Status Tree (CSFST) Core Cooling Red Path threshold (ref. 5).

This IC addresses a prolonged loss of all power sources to AC emergency buses that results in degraded core cooling. 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 eventually lead to a loss of one or more fission product barriers. In addition, fission product barrier monitoring capabilities may be degraded under these conditions.

For extended loss of emergency bus AC power events that do not result in a breach of the RCS barrier, this 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.

The EAL will 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.

Reference(s):

1. Technical Specifications Section 3.8.1 A. C. Sources
2. UFSAR section 8.2.2 Station Electrical System
3. BD-EOP-ECA-0.0 Loss of All AC Power
4. 0-EPIP-1302 Core Damage Assessment
5. 3[4]-EOP-F-0 Critical Safety Function Status Trees
6. NEI 99-01 SG1

Category: S – System Malfunction

Subcategory: 2 – Loss of Vital DC Power

Initiating Condition: Loss of **all** vital DC power for 15 minutes or longer

EAL:

SS2.1	**Site Area Emergency**
Indicated voltage < 105 VDC on **both** vital 125 VDC buses 3D01[4D01] and 3D23[4D23] for ≥ 15 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

The vital (Class 1E) 125 V DC power system consists of four physically and electrically separated buses – 3D01 and 3D23 (Unit 3) and 4D01 and 4D23 (Unit 4). Each bus has a 60 cell battery bank with an eight-hour rating, with a minimum operating voltage of 105 volts (ref. 1, 2, 3).

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 SG2.

This hot condition EAL equivalent of the cold condition EAL CU4.1.

Reference(s):

1. UFSAR Section 8.2.2.3 DC Power Systems

2. 5610-003-DB-002 Vital AC/DC Component Design Requirements
3. Technical Specifications Section 3.8.2. D.C. Sources
4. NEI 99-01 SS8

Category: S –System Malfunction

Subcategory: 2 – Loss of Vital DC Power

Initiating Condition: Loss of **all** emergency AC and vital DC power sources for 15 minutes or longer

EAL:

SG2.1 General Emergency

Loss of **all** offsite and **all** onsite AC power to 4KV emergency buses 3[4]A and 3[4]B ≥ 15 min. (Note 1)

AND

Indicated voltage < 105 VDC on **both** vital 125 VDC buses 3D01[4D01] and 3D23[4D23] for ≥ 15 min. (Note 1)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses a concurrent and prolonged loss of both emergency AC and vital DC power. A loss of all emergency 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 emergency AC and vital DC power will lead to multiple challenges to fission product barriers.

For this EAL credit can be taken for any AC power source that has sufficient capability to operate equipment necessary to maintain a safe shutdown condition, such as FLEX generators (ref. 3).

The vital (Class 1E) 125 V DC power system consists of four physically and electrically separated buses – 3D01 and 3D23 (Unit 3) and 4D01 and 4D23 (Unit 4). Each bus has a 60 cell battery bank with an eight-hour rating, with a minimum operating voltage of 105 volts (ref. 4, 5, 6).

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.

Reference(s):

1. Technical Specifications Section 3.8.1 A. C. Sources
2. UFSAR section 8.2.2 Station Electrical System
3. BD-EOP-ECA-0.0 Loss of All AC Power
4. UFSAR Section 8.2.2.3 DC Power Systems
5. 5610-003-DB-002 Vital AC/DC Component Design Requirements
6. Technical Specifications Section 3.8.2. D.C. Sources
7. NEI 99-01 SG8

Category: S – System Malfunction

Subcategory: 3 – Loss of Control Room Indications

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

EAL:

SU3.1	**Unusual Event**
An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • CET temperature • Level in at least one SG • Auxiliary feedwater flow to at least one SG

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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.

Basis:

Applicable safety system parameters are listed in Table S-2.

The Safety Assessment System (SAS) and Emergency Response Data Acquisition and Display System (ERDADS) serve as redundant indicators which may be utilized as compensatory measures in lieu of the Control Room indicators associated with safety functions (ref. 1).

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 RCS 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 SA3.

Reference(s):

1. UFSAR Appendix 7A Distributed Control System/Safety Assessment System/Emergency Response Data Acquisition and Display System
2. NEI 99-01 SU2

Category: S – System Malfunction

Subcategory: 3 – Loss of Control Room Indications

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

EAL:

SA3.1	**Alert**
An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1) **AND** **Any** significant transient is in progress, Table S-3	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • CET temperature • Level in at least one SG • Auxiliary feedwater flow to at least one SG

Table S-3 Significant Transients
• Automatic turbine runback > 25% thermal reactor power • Electrical load rejection > 25% full electrical load • Reactor Trip • SI actuation

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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.

Basis:

Applicable safety system parameters are listed in Table S-2.

Significant transients are listed in Table S-3.

The Safety Assessment System (SAS) and Emergency Response Data Acquisition and Display System (ERDADS) serve as redundant indicators which may be utilized as compensatory measures in lieu of the Control Room indicators associated with safety functions (ref. 1).

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 RCS 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 RS1

Reference(s):

1. UFSAR Appendix 7A Distributed Control System/Safety Assessment System/Emergency Response Data Acquisition and Display System
2. NEI 99-01 SA2

Category: S – System Malfunction

Subcategory: 4 – RCS Activity

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

EAL:

SU4.1 Unusual Event

Sample analysis indicates reactor coolant activity > 60 μCi/gm dose equivalent I-131

~~Sample analysis indicates that a reactor coolant activity value is > **any** of the following allowable limits:~~

- ~~60 μCi/gm dose equivalent I-131 instantaneous~~
- ~~0.25 μCi/gm dose equivalent I-131 for > 48 hours~~
- ~~447.7 μCi/gm dose equivalent Xe-133 for > 48 hours~~

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

None

Basis:

This IC addresses a reactor coolant activity value that exceeds an allowable limit specified in Technical Specifications (ref. 1, 2). 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.

Reference(s):

1. Technical Specification 3.4.8 RCS Specific Activity
2. 3[4]-ONOP-041.4 Excessive RCS Activity
3. NEI 99-01 SU3

Category: S – System Malfunction

Subcategory: 5 – RCS Leakage

Initiating Condition: RCS leakage for 15 minutes or longer

EAL:

SU5.1 Unusual Event

RCS unidentified or pressure boundary leakage > 10 gpm for ≥ 15 min.

OR

RCS identified leakage > 25 gpm for ≥ 15 min.

OR

Leakage from the RCS to a location outside containment > 25 gpm for ≥ 15 min.

(Note 1)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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

Basis:

Once the RCS leak rate has been quantified to be greater than the specified value, failure to isolate the leak within 15 minutes, or if known that the leak cannot be isolated within 15 minutes, from the time of leak rate quantification, requires immediate classification.

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

The first and second EAL conditions 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). The third condition addresses an RCS mass loss caused by an UNISOLABLE leak through an interfacing system. These conditions thus apply to leakage into the containment, a secondary-side system (e.g., steam generator tube leakage) or a location outside of containment.

The leak rate values for each condition were selected because they are usually observable with normal Control Room indications. Lesser values typically require time-consuming calculations to determine (e.g., a mass balance calculation). The first condition 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 (e.g., 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.

Reference(s):

1. Technical Specification Section 1.0 Definitions
2. Technical Specification 3.4.6 RCS Leakage
3. 3[4]-ONOP-041.3 Excessive RCS Leakage
4. 3[4]-ONOP-071.2 Steam Generator Tube Leakage
5. NEI 99-01 SU4

Category: S – System Malfunction

Subcategory: 6 – RTS Failure

Initiating Condition: Automatic or manual trip fails to shut down the reactor

EAL:

SU6.1 Unusual Event

An automatic trip did **not** shut down the reactor after **any** RPS setpoint is exceeded

AND

A subsequent automatic trip (RPS or AMSAC) or manual trip (reactor trip switches) is successful in shutting down the reactor as indicated by reactor power < 5% (Note 8)

Note 8: A manual trip 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.

Mode Applicability:

1 - Power Operation

Definition(s):

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.

Basis:

This EAL addresses a failure of the RPS to initiate or complete an automatic trip that results in a reactor shutdown, and either a subsequent operator manual action taken in the control room (reactor trip switches) 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 (e.g., initiate a manual reactor trip using the reactor trip switches). 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.

A manual action in the control room is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip using the reactor trip switches). This action does not include opening MG set feeder breakers or opening the reactor trip feeder breakers locally, 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 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 (ref. 3, 4).

Should a reactor trip signal be generated as a result of plant work (e.g., RTS 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 (e.g., assessment of test results), then this IC and the EALs are not applicable and no classification is warranted.

In the event that the operator identifies a reactor trip is IMMINENT and initiates a successful manual reactor trip before the automatic RPS trip setpoint is reached, no declaration is required. The successful manual trip of the reactor before it reaches its automatic trip setpoint or reactor trip signals caused by instrumentation channel failures do not lead to a potential fission product barrier loss. However, if subsequent manual reactor trip actions fail to shutdown the reactor, the event escalates to the Alert under EAL SA6.1.

Reference(s):

1. Technical Specification Table 1.2 Operational Modes
2. Technical Specification Table 3.3-1 Reactor Trip System Instrumentation
3. 3[4]-EOP-E-0 Reactor Trip or Safety Injection
4. 3[4]-EOP-FR-S.1 Response to Nuclear Power Generation/ATWS
5. NEI 99-01 SU5

Category: S – System Malfunction

Subcategory: 6 – RTS Failure

Initiating Condition: Automatic or manual trip fails to shut down the reactor

EAL:

SU6.2 Unusual Event

A manual trip (reactor trip switches) did **not** shut down the reactor

AND

A subsequent automatic trip (RPS or AMSAC) or manual trip action taken at the reactor console (reactor trip switches) is successful in shutting down the reactor as indicated by reactor power < 5% (Note 8)

Note 8: A manual trip 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.

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

This EAL addresses a failure of a 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.

If an initial manual reactor trip is unsuccessful, operators will promptly take manual action at another location in the control room or at other locations outside of the control room to shutdown the reactor (e.g., initiate a manual reactor trip by opening MG set feeder breakers or opening the reactor trip feeder breakers locally) (ref. 3). However, those actions are not credited as a successful manual reactor trip for this EAL.

Depending upon several factors, the initial 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 control room is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip using the reactor trip switches). This action does not include opening MG set feeder breakers, opening the reactor trip feeder breakers locally, manually driving in control rods or implementation of boron injection strategies.

The plant response to the failure of a 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. 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 (ref. 3, 4).

Reference(s):

1. Technical Specification Table 1.2 Operational Modes
2. Technical Specification Table 3.3-1 Reactor Trip System Instrumentation
3. 3[4]-EOP-E-0 Reactor Trip or Safety Injection
4. 3[4]-EOP-FR-S.1 Response to Nuclear Power Generation/ATWS
5. NEI 99-01 SU5

Category: S – System Malfunction

Subcategory: 2 – RTS Failure

Initiating Condition: Automatic or manual trip fails to shut down the reactor and subsequent manual actions taken in the control room are **not** successful in shutting down the reactor

EAL:

SA6.1 Alert

An automatic or manual trip (reactor trip switches) did **not** shut down the reactor

AND

Subsequent automatic (RPS or AMSAC) or manual trip actions (reactor trip switches) are **not** successful in shutting down the reactor as indicated by reactor power ≥ 5% (Note 8)

Note 8: A manual trip 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.

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

This EAL addresses a failure of the RPS to initiate or complete an automatic reactor trip or failure of a manual reactor trip that results in a reactor shutdown, and subsequent operator manual actions taken in the control room 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 in the control room is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip using the reactor trip switches). This action does not include opening MG set feeder breakers, opening the reactor trip feeder breakers locally, 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 outside the control room (opening MG set feeder breakers, opening the reactor trip feeder breakers locally).

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 shut down 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 SS6. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS6 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 (ref. 3, 4).

Reference(s):

1. Technical Specification Table 1.2 Operational Modes
2. Technical Specification Table 3.3-1 Reactor Trip System Instrumentation
3. 3[4]-EOP-E-0 Reactor Trip or Safety Injection
4. 3[4]-EOP-FR-S.1 Response to Nuclear Power Generation/ATWS
5. NEI 99-01 SA5

Category: S – System Malfunction

Subcategory: 2 – RTS Failure

Initiating Condition: Inability to shut down the reactor causing a challenge to core cooling or RCS heat removal

EAL:

SS6.1 Site Area Emergency

An automatic or manual trip did **not** shut down the reactor

AND

All actions taken to shut down the reactor are **not** successful as indicated by reactor power ≥ 5%

AND EITHER:

- CSFST Core Cooling-RED path conditions met
- CSFST Heat Sink-RED path conditions met

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

This EAL addresses a failure of the RPS to initiate or complete an automatic reactor trip or failure of a 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.

Reactor shutdown achieved by use of other trip actions such as opening supply breakers, emergency boration, or manually driving control rods are also credited as a successful manual trip provided reactor power can be reduced to less than 5% before indications of an extreme challenge to either core cooling or heat removal exist.

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 Category F ICs/EALs. This is appropriate in that the Category F ICs/EALs do not address the additional threat posed by a failure to shut down the reactor. The inclusion of this IC and EAL ensures the timely declaration of a Site Area Emergency in response to prolonged failure to shut down the reactor.

A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria (ref. 3, 4).

Indication that core cooling is extremely challenged is manifested by entry to Critical Safety Function Status Tree (CSFST) Core Cooling-RED path. Indication that heat removal is extremely challenged is manifested by entry to CSFST Heat Sink-RED path (ref. 5).

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

Reference(s):

1. Technical Specification Table 1.2 Operational Modes
2. Technical Specification Table 3.3-1 Reactor Trip System Instrumentation
3. 3[4]-EOP-E-0 Reactor Trip or Safety Injection
4. 3[4]-EOP-FR-S.1 Response to Nuclear Power Generation/ATWS
5. 3[4]-EOP-F-0 Critical Safety Function Status Trees
6. NEI 99-01 SS5

Category: S – System Malfunction

Subcategory: 7 – Loss of Communications

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

EAL:

SU7.1 Unusual Event

Loss of **all** Table S-4 onsite communication methods

OR

Loss of **all** Table S-4 State and local agency communication methods

OR

Loss of **all** Table S-4 NRC communication methods

Table S-4 Communication Methods			
System	**Onsite**	**State/ Local**	**NRC**
Plant Radio System	X		
Commercial Telephone System	X	X	X
Plant Address (PA) System	X		
Federal Telephone System (ENS)			X
EMnet		X	
Hot Ring Down (HRD) Telephone System		X	

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

None

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 State and local agencies and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (e.g., use of non-plant, privately owned equipment, relaying of on-

site information via individuals or multiple radio transmission points, individuals being sent to offsite locations, etc.).

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

The second EAL condition addresses a total loss of the communications methods used to notify all State and local agencies of an emergency declaration. The State and local agencies referred to here are the State of Florida and local communities.

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

This hot condition EAL is equivalent to the cold condition EAL CU5.1.

Reference(s):

1. Turkey Point Plant Radiological Emergency Plan
2. NEI 99-01 SU6

Category: S – System Malfunction

Subcategory: 8 – Containment Failure

Initiating Condition: Failure to isolate containment or loss of containment pressure control

EAL:

SU8.1 Unusual Event

Any penetration is **not** closed within 15 min. of a VALID CTMT isolation (Phase A, B or Containment Ventilation Isolation) actuation signal

OR

CTMT pressure > 20 psig with < one full train of CTMT heat removal systems operating per design for ≥ 15 min.

(Notes 1, 11)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 11: One full train of CTMT heat removal systems consists of at least two Containment Coolers operating in conjunction with one Containment Spray Pump.

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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.

Basis:

This EAL 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 the first condition, the containment isolation signal must be generated as the result on an off-normal/accident condition (e.g., 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.

The second condition 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 (ref. 1, 2).

One full train of CTMT heat removal systems consists of at least two Containment Coolers operating in conjunction with one Containment Spray Pump (ref. 1, 2).

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 (e.g., containment sprays or cooling 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.

Reference(s):

1. UFSAR Section 6.3 Emergency Containment Cooling
2. UFSAR Section 6.4 Containment Spray System
3. NEI 99-01 SU7

Category: S – System Malfunction

Subcategory: 9 – Hazardous Event Affecting Safety Systems

Initiating Condition: Hazardous event affecting SAFETY SYSTEMS needed for the current operating mode

EAL:

SA9.1 Alert

The occurrence of **any** Table S-5 hazardous event

AND

Event damage has caused indications of degraded performance on one train of a SAFETY SYSTEM needed for the current operating mode

AND EITHER:

- Event damage has caused indications of degraded performance to the second train of the SAFETY SYSTEM needed for the current operating mode
- Event damage has resulted in VISIBLE DAMAGE to the second train of the SAFETY SYSTEM needed for the current operating mode

(Notes 9, 10)

Note 9: If the affected SAFETY SYSTEM train was already inoperable or out of service before the hazardous event occurred, then emergency classification is **not** warranted.

Note 10: If the hazardous event **only** resulted in VISIBLE DAMAGE, with **no** indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is **not** warranted.

Table S-5 Hazardous Events
• Seismic event (earthquake) • Internal or external FLOODING event • High winds or tornado strike • FIRE • EXPLOSION • Other events with similar hazard characteristics as determined by the Shift Manager

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 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.

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 (as defined in 10CFR50.2):

> Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:
>
> (1) The integrity of the reactor coolant pressure boundary;
>
> (2) The capability to shut down the reactor and maintain it in a safe shutdown condition;
>
> (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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

Basis:

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

Indications of degraded performance 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.

VISIBLE DAMAGE addresses damage to a SAFETY SYSTEM train that is not in service/operation and that potentially could cause performance issues. 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. This VISIBLE DAMAGE should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

An event affecting equipment common to two or more trains of a safety system (i.e., there are indications of degraded performance and/or VISIBLE DAMAGE affecting the common equipment) should be classified as an Alert under this EAL, as appropriate to the plant mode. By affecting the functionality of multiple trains of a safety system, the loss of the common equipment effectively meets the two-train impact criteria that underlie the EALs and bases.

An event affecting a single-train safety system (i.e., there are indications of degraded performance and/or VISIBLE DAMAGE affecting the one train) would not be classified under this EAL because the two-train impact criteria that underlie the EALs and bases would not be met. If an event affects a single-train safety system, then the emergency classification should be made based on plant parameters/symptoms meeting the EALs for another IC. Depending upon the circumstances, classification may also occur based on Shift Manager/EC judgement.

An event that affects two trains of a safety system (e.g., one train has indications of degraded performance and the other VISIBLE DAMAGE) that also has one or more additional trains should be classified as an Alert under this EAL, as appropriate to the plant mode. This approach maintains consistency with the two-train impact criteria that underlie the EALs and bases, and is warranted because the event was severe enough to affect the functionality of two trains of a safety system despite plant design criteria associated with system and system train separation and protection. Such an event may have caused other plant impacts that are not immediately apparent.

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

This hot condition EAL is equivalent of the cold condition EAL CA6.1.

Reference(s):

1. 0-EPIP-20106 Natural Emergencies
2. EP FAQ 2016-002
3. NEI 99-01 SA9

Attachment 2 Safe Operation & Shutdown Rooms/Areas Tables R-3 & H-2 Bases

Background

NEI 99-01 Revision 6 ICs AA3 and HA5 prescribe declaration of an Alert based on impeded access to rooms or areas (due to either area radiation levels or hazardous gas concentrations) where equipment necessary for normal plant operations, cooldown or shutdown is located. These areas are intended to be plant operating mode dependent. Specifically the Developers Notes for AA3 and HA5 states:

The "site-specific list of plant rooms or areas with entry-related mode applicability identified" should specify those rooms or areas that contain equipment which require a manual/local action as specified in operating procedures used for normal plant operation, cooldown and shutdown. Do not include rooms or areas in which actions of a contingent or emergency nature would be performed (e.g., an action to address an off-normal or emergency condition such as emergency repairs, corrective measures or emergency operations). In addition, the list should specify the plant mode(s) during which entry would be required for each room or area.

The list should not include rooms or areas for which entry is required solely to perform actions of an administrative or record keeping nature (e.g., normal rounds or routine inspections).

Further, as specified in IC HA5:

The list need not include the Control Room if adequate engineered safety/design features are in place to preclude a Control Room evacuation due to the release of a hazardous gas. Such features may include, but are not limited to, capability to draw air from multiple air intakes at different and separate locations, inner and outer atmospheric boundaries, or the capability to acquire and maintain positive pressure within the Control Room envelope.

PTN Table R-3 and H-2 Bases

A review of PTN general operating procedures identified the following mode dependent in-plant locations where procedurally defined actions are required for normal plant operation, shutdown, and cool-down:

MODE 1 (Power Operation)
- Aux Building 18'
- Turbine Building (All levels)
- Rad Waste Building

MODE 2 (Startup)
- Aux Building 18'
- Turbine Building (All levels)
- Rad Waste Building

MODE 3 (Hot Standby)
- Aux Building 18'
- Turbine Building (All levels)
- Vital SWGR, LC, MCC rooms (TB)
- HHSI Pump, CSP rooms
- Rad Waste Building

MODE 4 (Hot Shutdown)
- Aux Building 18'
- Turbine Building (All levels)
- Vital SWGR, LC, MCC rooms (TB)
- Containment
- RHR Pump & Hx rooms
- Rad Waste Building
- Electrical Penetration rooms

Mode 5 (Cold Shutdown)
- Aux Building 18'
- Turbine Building (All levels)
- Vital SWGR, LC, MCC rooms (TB)
- Containment
- Rad Waste Building
- Electrical Penetration rooms

Procedures Reviewed

- 3(4)-GOP-103 Power Operation to Hot Standby
- 3(4)-GOP-305 Hot Standby to Cold Shutdown
- 3(4)-GOP-100 Fast Load Reduction

GOP-103, GOP-305, and GOP-100 have branching procedures to perform tasks to accomplish the steps in the General Procedure. These lower tier procedures are referenced in the General Procedures. All steps in the GPs were researched to provide input into these tables.

Control Room ventilation systems have adequate engineered safety/design features in place to preclude a Control Room evacuation due to the external release of a hazardous gas (UFSAR Section 7.7 Operating Control Stations and Section 9.9 Control Building Ventilation System). Therefore, the Control Room is not included in this assessment or in Table H-2. IC RA3 Example EAL #2 is adequately bounded by IC RA2 Example EAL #1. Therefore, the Control Room is not included in this assessment or in Table R-3.

Table R-3 & H-2 Results

Table R-3 & H-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	**Mode(s)**
Auxiliary Building 18'	1, 2, 3, 4, 5
Turbine Building (**any** level)	1, 2, 3, 4, 5
Containment	4, 5
HHSI Pump, CSP Rooms	3
RHR Pump & HX Rooms	4
Rad Waste Building	1, 2, 3, 4, 5

EMERGENCY ACTION LEVEL TECHNICAL BASES DOCUMENT (CLEAN COPY)
(241 pages follow)

Emergency Action Level Technical Bases Document

	Print Name	Signature	Date
Prepared by:	Kelly Walker	Kelly Walker	6/6/20
Technical Reviewer:	ROBERT W. PELL		6/8/20
Reviewer:	KEVIN O'HARE		6/8/20
Approval:	KEVIN O'HARE		6/8/20

Table of Contents

1.0 INTRODUCTION

This document provides an explanation and rationale for each Emergency Action Level (EAL) included in the NEI 99-1 Revision 6 EAL Upgrade Project for Turkey Point Nuclear Generating (PTN). It should be used to facilitate review of the PTN EALs and provide historical documentation for future reference. Decision-makers responsible for implementation of 0-EPIP-20101, Duties of Emergency Coordinator, may use this document as a technical reference in support of EAL interpretation. This information may assist the Emergency Coordinator (EC) 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 (e.g., the EC 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 Turkey Point Nuclear Generating Emergency Plan.

In 1992, the NRC endorsed NUMARC/NESP-007 “Methodology for Development of Emergency Action Levels” as an alternative guidance to the original Standard Review Plan and NUREG-0654 EAL schemes.

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 (ref. 4.1.1), PTN 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 a greater probability of barrier loss and reduced certainty of maintaining the barrier.

The primary fission product barriers are:

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

B. <u>Reactor Coolant System Barrier (RCS):</u> 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. <u>Containment Barrier (CTMT):</u> 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 Emergency Classification Level (ECL) from an 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 PTN EAL scheme includes the following features:

- Division of the EAL set into three broad groups:

    - EALs applicable under <u>any</u> plant operational modes – This group would be reviewed by the EAL-user any time emergency classification is considered.
    - EALs applicable only under <u>hot</u> operational 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 <u>cold</u> 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 PTN EAL categories are aligned to and represent the NEI 99-01 “Recognition Categories.” Subcategories are used in the PTN scheme as necessary to further divide the EALs of a category into logical sets of possible emergency classification thresholds. The PTN EAL categories and subcategories are listed below.

The primary tool for determining the emergency classification level is the EAL Classification Matrix. The user of the EAL Classification Matrix may (but is not required to) consult the EAL technical bases in order to obtain additional information concerning the EALs under classification consideration. The user should consult Section 3.0 and Attachment 1 of this document for such information.

EAL Groups, Categories and Subcategories

EAL Group/Category	EAL Subcategory
Any Operating Mode:	
R – Abnormal **R**ad Levels / Rad Effluent	1 – Radiological Effluent 2 – **I**rradiated Fuel Event 3 – Area Radiation Levels
H – **H**azards and Other Conditions Affecting Plant Safety	1 – Security 2 – Seismic Event 3 – Natural or Technological Hazard 4 – Fire 5 – Hazardous Gas 6 – Control Room Evacuation 7 – EC Judgment
E – Independent Spent Fuel Storage Installation (ISFSI)	1 – Confinement Boundary
Hot Conditions:	
S – System Malfunction	1 – Loss of Emergency AC Power 2 – Loss of Vital DC Power 3 – Loss of Control Room Indications 4 – RCS Activity 5 – RCS Leakage 6 – RTS Failure 7 – Loss of Communications 8 – Containment Failure 9 – Hazardous Event Affecting Safety Systems
F – **F**ission Product Barrier Degradation	None
Cold Conditions:	
C – **C**old Shutdown / Refueling System Malfunction	1 – RCS Level 2 – Loss of Emergency AC Power 3 – RCS Temperature 4 – Loss of Vital DC Power 5 – Loss of Communications 6 – Hazardous Event Affecting Safety Systems

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, E, F, H and S) and EAL subcategory. A summary explanation of each category and subcategory is given at the beginning of the technical bases discussions of the EALs included in the category. For each EAL, the following information is provided:

<u>Category Letter & Title</u>

<u>Subcategory Number & Title</u>

<u>Initiating Condition (IC)</u>

Site-specific description of the generic IC given in NEI 99-01 Rev. 6.

<u>EAL Identifier (enclosed in rectangle)</u>

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

1. First character (letter): Corresponds to the EAL category as described above (R, C, E, F, H or S)
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).
4. Fourth character (number): The numerical sequence of the EAL within the EAL subcategory. If the subcategory has only one EAL, it is given the number one (1).

<u>Classification (enclosed in rectangle):</u>

General Emergency (G), Site Area Emergency (S), Alert (A) or Unusual Event (U).

<u>EAL (enclosed in rectangle)</u>

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

Mode Applicability

One or more of the following plant operating conditions comprise the mode to which each EAL is applicable: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 – Hot Shutdown, 5 - Cold Shutdown, 6 - Refueling, DEF - Defueled, or All. (See Section 2.6 for operating mode definitions)

Definitions:

If the EAL wording contains a defined term, the definition of the term is included in this section. These definitions can also be found in Section 5.1.

Basis:

An EAL basis section that provides PTN-relevant information concerning the EAL as well as a description of the rationale for the EAL as provided in NEI 99-01 Rev. 6.

Reference(s):

Source documentation from which the EAL is derived

2.6 Operational Mode Applicability

MODE	K_{eff}	THERMAL POWER *	T_{AVG}
1. Power Operation	≥ 0.99	> 5%	≥ 350˚F
2. Startup	≥ 0.99	≤ 5%	≥ 350˚F
3. Hot Standby	< 0.99	0	≥ 350˚F
4. Hot Shutdown	< 0.99	0	> 200˚F & < 350˚F
5. Cold Shutdown	< 0.99	0	≤ 200˚F
6. Refueling **	≤ 0.95	0	≤ 140˚F
Defueled	NA	NA	NA – no fuel in reactor vessel

* Excluding Decay Heat

** Fuel in the reactor vessel with the vessel head closure bolts less than fully tensioned or with the head removed

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.

3.0 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

3.1 General Considerations

When making an emergency classification, the EC 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 Operational 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. 4.1.8).

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 (e.g., 15 minutes, 30 minutes, etc.), the EC 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 10CFR 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 (e.g., 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 (i.e., 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 (e.g., maintain the necessary expertise on-shift).

3.1.6 Emergency Coordinator (EC) 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 EC 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 EC 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 (i.e., 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 potentially classifiable 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. 4.1.8).

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 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 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 EC must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (i.e., a change in the ECL is IMMINENT). If, in the judgment of the EC, 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 Downgrading

An ECL may be downgraded when the event or condition that meets the highest IC and EAL no longer exists, and other site-specific downgrading requirements are met. If downgrading the ECL is deemed appropriate, the new ECL would then be based on a lower applicable IC(s) and EAL(s). The ECL may also simply be terminated.

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 scram the reactor followed by a successful manual scram.

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 (e.g., a few seconds to a few minutes). The following guidance should be applied to the classification of these conditions.

<u>EAL momentarily met during expected plant response</u> - In instances in which 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.

<u>EAL momentarily met but the condition is corrected prior to an emergency declaration</u> – 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. 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 EC 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 10CFR 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 Technical Specifications Table 1.2, Operational Modes
- 4.1.7 Turkey Point Unit 3 & 4 Offsite Dose Calculation Manual (ODCM)
- 4.1.8 NSIR/DPR-ISG-01 Interim Staff Guidance, Emergency Planning for Nuclear Power Plants
- 4.1.9 Turkey Point Plant Radiological Emergency Plan
- 4.1.10 Certificate of Compliance Appendix A NUHOMS HD System Generic Technical Specifications
- 4.1.11 UFSAR Chapter 9.5 Fuel Storage and Handling
- 4.1.12 0-ADM-051 Outage Risk Assessment and Control

4.2 Implementing

- 4.2.1 0-EPIP-20101, Duties of Emergency Coordinator
- 4.2.2 NEI 99-01 Rev. 6 to PTN EAL Comparison Matrix
- 4.2.3 PTN EAL Matrix

5.0 DEFINITIONS, ACRONYMS & ABBREVIATIONS

5.1 Definitions (ref. 4.1.1 except as noted)

Selected terms used in Initiating Condition, Emergency Action Level statements and EAL bases are set in all capital letters (e.g., 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 Protective Action Guideline exposure levels.

CONFINEMENT BOUNDARY

The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. As related to the PTN ISFSI, Confinement Boundary is defined as the NUHOMS Dry Shielding Canister (DSC) (ref. 4.1.10).

CONTAINMENT CLOSURE

The procedurally defined conditions or actions taken to secure containment and associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

Containment Closure requirements are specified in 0-ADM-051 Outage Risk Assessment and Control (ref. 4.1.12).

EMERGENCY ACTION LEVEL (EAL)

A pre-determined, site-specific, observable threshold for an INITIATING CONDITION that, when met or exceeded, places the plant in a given emergency classification level.

EMERGENCY CLASSIFICATION LEVEL (ECL)

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

- Unusual Event (UE)
- Alert
- Site Area Emergency (SAE)
- General Emergency (GE)

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 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.

FISSION PRODUCT BARRIER THRESHOLD

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

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 ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA PAG 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 PTN 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 PTN. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the OWNER CONTROLLED AREA).

HOSTILE FORCE

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 (e.g., 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.

INITIATING CONDITION (IC)

An event or condition that aligns with the definition of one of the four emergency classification levels by virtue of the potential or actual effects or consequences.

OWNER CONTROLLED AREA (OCA)

That portion of FPL property surrounding and including the Turkey Point Plant which is subject to limited access and control as deemed appropriate by FPL (ref. 4.1.9).

PROJECTILE

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

PROTECTED AREA

The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency (ref. 4.1.9).

REFUELING PATHWAY

Refueling cavity, fuel transfer canal, and spent fuel pit (SFP), but **not** including the reactor vessel, comprise the refueling pathway (ref. 4.1.11).

RUPTURED

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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 ACTION that results in intentional damage or malicious acts; (1) toward site personnel or equipment that could lead to the likely failure of or; (2) that prevent effective access to equipment needed for the protection of the public. **Any** releases are **not** expected to result in exposure levels which exceed EPA PAG exposure levels beyond the SITE BOUNDARY.

SITE BOUNDARY

That line beyond which the land or property is not owned, leased or otherwise controlled by PTN (ref. 4.1.7).

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

5.2 Abbreviations/Acronyms

°F .... Degrees Fahrenheit
° .... Degrees
AC .... Alternating Current
AFW .... Auxiliary Feedwater
AOP .... Abnormal Operating Procedure
ARM .... Area Radiation Monitor
ATWS .... Anticipated Transient Without Scram
CDE .... Committed Dose Equivalent
CET .... Core Exit Thermocouple
CFR .... Code of Federal Regulations
CIAS .... Containment Isolation Actuation Signal
CPM .... Counts Per Minute
CSFST .... Critical Safety Function Status Checks
CTMT .... Containment
CVI .... Containment Ventilation Isolation System
DEF .... Defueled
DBA .... Design Basis Accident
DC .... Direct Current
DG .... Diesel Generator
EAL .... Emergency Action Level
EC .... Emergency Coordinator
ECCS .... Emergency Core Cooling System
ECL .... Emergency Classification Level
EOF .... Emergency Operations Facility
EOP .... Emergency Operating Procedure
EPA .... Environmental Protection Agency
FAA .... Federal Aviation Administration
FBI .... Federal Bureau of Investigation
FC .... Fuel Clad Barrier
FEMA .... Federal Emergency Management Agency
FSAR .... Final Safety Analysis Report
GE .... General Emergency
GPM .... Gallons Per Minute
HR .... Heat Removal
Hr. .... Hour
HSM .... Horizontal Storage Module
IC .... Initiating Condition

ICC .... Inadequate Core Cooling
ISFSI........ Independent Spent Fuel Storage Installation
K_{eff} .... Effective Neutron Multiplication Factor
LCO .... Limiting Condition of Operation
LER .... Licensee Event Report
LOCA........ Loss of Coolant Accident
LPSI........ Low Pressure Safety Injection
LRW........ Liquid Radwaste
LWR........ Light Water Reactor
MCB........ Main Control Board
MG........ Motor Generator
Min........ Minute
MPH........ Miles Per Hour
mR, mRem, mrem, mREM .... milli-Roentgen Equivalent Man
MW .... Megawatt
NEI .... Nuclear Energy Institute
NEIC........ National Earthquake Information Center
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........ Off-site Dose Calculation Manual
ORO .... Offsite Response Organization
PA........ Protected Area
PAG........ Protective Action Guideline
PORV .... Power Operated Relief Valve
PSIG........ Pounds per Square Inch Gauge
PTN .... Turkey Point Nuclear Generating
PTS .... Pressurized Thermal Shock
R........ Roentgen
RCS........ Reactor Coolant System
Rem, rem, REM .... Roentgen Equivalent Man
RTS .... Reactor Trip System
RVLMS .... Reactor Vessel Level Monitoring System
SBO........ Station Blackout

SCBA .... Self-Contained Breathing Apparatus
SFP .... Spent Fuel Pool
SG .... Steam Generator
SI .... Safety Injection
SIAS .... Safety Injection Actuation System
SM .... Shift Manager
SPDS .... Safety Parameter Display System
SRO .... Senior Reactor Operator
SRV .... Safety Relief Valve
TC (T/C) .... Thermocouple
TEDE .... Total Effective Dose Equivalent
TAF .... Top of Active Fuel
TS .... Technical Specifications
TSC .... Technical Support Center
UFSAR .... Updated Final Safety Analysis Report
USGS .... United States Geological Survey

6.0 PTN-TO-NEI 99-01 Rev. 6 EAL CROSS-REFERENCE

This cross-reference is provided to facilitate association and location of a PTN EAL within the NEI 99-01 IC/EAL identification scheme. Further information regarding the development of the PTN EALs based on the NEI guidance can be found in the EAL Comparison Matrix.

PTN	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
RU1.1	AU1	1
RU1.2	AU1	2
RU1.3	AU1	3
RU2.1	AU2	1
RA1.1	AA1	1
RA1.2	AA1	2
RA1.3	AA1	3
RA1.4	AA1	4
RA2.1	AA2	1
RA2.2	AA2	2
RA2.3	AA2	3
RA3.1	AA3	1
RA3.2	AA3	2
RS1.1	AS1	1
RS1.2	AS1	2
RS1.3	AS1	3
RS2.1	AS2	1
RG1.1	AG1	1
RG1.2	AG1	2
RG1.3	AG1	3
RG2.1	AG2	1

PTN	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
CU1.1	CU1	1
CU1.2	CU1	2
CU2.1	CU2	1
CU3.1	CU3	1
CU3.2	CU3	2
CU4.1	CU4	1
CU5.1	CU5	1, 2, 3
CA1.1	CA1	1
CA1.2	CA1	2
CA2.1	CA2	1
CA3.1	CA3	1, 2
CA6.1	CA6	1
CS1.1	CS1	1
CS1.2	CS1	2
CS1.3	CS1	3
CG1.1	CG1	1
CG1.2	CG1	2
EU1.1	EU1	1
FA1.1	FA1	1
FS1.1	FS1	1
FG1.1	FG1	1
HU1.1	HU1	1, 2, 3
HU2.1	HU2	1
HU3.1	HU3	1

PTN	NEI 99-01 Rev. 6	
EAL	IC	Example EAL
HU3.2	HU3	2
HU3.3	HU3	3
HU3.4	HU3	4
HU4.1	HU4	1
HU4.2	HU4	2
HU4.3	HU4	3
HU4.4	HU4	4
HU7.1	HU7	1
HA1.1	HA1	1, 2
HA5.1	HA5	1
HA6.1	HA6	1
HA7.1	HA7	1
HS1.1	HS1	1
HS6.1	HS6	1
HS7.1	HS7	1
HG7.1	HG7	1
SU1.1	SU1	1
SU3.1	SU2	1
SU4.1	SU3	1
SU5.1	SU4	1, 2, 3
SU6.1	SU5	1
SU6.2	SU5	2
SU7.1	SU6	1, 2, 3
SU8.1	SU7	1, 2

PTN	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
SA1.1	SA1	1
SA3.1	SA2	1
SA6.1	SA5	1
SA9.1	SA9	1
SS1.1	SS1	1
SS2.1	SS8	1
SS6.1	SS5	1
SG1.1	SG1	1
SG2.1	SG8	1

7.0 ATTACHMENTS

7.1 Attachment 1, Emergency Action Level Technical Bases

7.2 Attachment 2, Safe Operation & Shutdown Areas Tables R-5 & H-2 Bases

<u>Category R – Abnormal Rad Levels / Rad Effluent</u>

EAL Group: ANY (EALs in this category are applicable to any plant condition, hot or cold.)

Many EALs are based on actual or potential degradation of fission product barriers because of the elevated potential for offsite radioactivity release. Degradation of fission product barriers though is not always apparent via non-radiological symptoms. Therefore, direct indication of elevated radiological effluents or area radiation levels are appropriate symptoms for emergency classification.

At lower levels, abnormal radioactivity releases may be indicative of a failure of containment systems or precursors to more significant releases. At higher release rates, offsite radiological conditions may result which require offsite protective actions. Elevated area radiation levels in plant may also be indicative of the failure of containment systems or preclude access to plant vital equipment necessary to ensure plant safety.

Events of this category pertain to the following subcategories:

1. <u>Radiological Effluent</u>

   Direct indication of effluent radiation monitoring systems provides a rapid assessment mechanism to determine releases in excess of classifiable limits. Projected offsite doses, actual offsite field measurements or measured release rates via sampling indicate doses or dose rates above classifiable limits.

2. <u>Irradiated Fuel Event</u>

   Conditions indicative of a loss of adequate shielding or damage to irradiated fuel may preclude access to vital plant areas or result in radiological releases that warrant emergency classification.

3. <u>Area Radiation Levels</u>

   Sustained general area radiation levels which may preclude access to areas requiring continuous occupancy also warrant emergency classification.

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RU1.1 Unusual Event

Reading on **any** Table R-1 effluent radiation monitor > column "UE" for ≥ 60 min. (Notes 1, 2, 3)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: 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.

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Plant Vent	RAD-6304	1.5E+01 µCi/cc	1.5E-00 µCi/cc	1.5E-01 µCi/cc	1.1E-02 µCi/cc
Gaseous	Spent Fuel Pool	RAD-3-6418	1.6E+03 µCi/cc	1.6E+02 µCi/cc	1.6E+01 µCi/cc	6.3E-01 µCi/cc
Gaseous	Spent Fuel Pool	U4 via RAD-6304	5.1E+02 µCi/cc	5.1E+01 µCi/cc	5.1E+00 µCi/cc	1.8E-01 µCi/cc
Liquid	Liquid Waste Discharge	R-18	N/A	N/A	N/A	1.8E+04 cpm
Liquid	S/G Blowdown	3-R-19	N/A	N/A	N/A	1.8E+04 cpm
Liquid	S/G Blowdown	4-R-19	N/A	N/A	N/A	1.8E+04 cpm

Mode Applicability:

All

Definition(s):

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.

Basis:

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

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.

This EAL addresses normally occurring continuous radioactivity releases from monitored gaseous or liquid effluent pathways (ref. 1, 2).

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

Reference(s):

1. Turkey Point Offsite Dose Calculation Manual (ODCM)
2. EP-CALC-PTN-1901 Radiological Effluent EAL Values
3. NEI 99-01 AU1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RU1.2	**Unusual Event**
Reading on **any** effluent radiation monitors > 2 x the alarm setpoint established by a current radioactivity discharge permit for ≥ 60 min. (Notes 1, 2, 3)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: 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.

Mode Applicability:

All

Definition(s):

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.

Basis:

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

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.

This EAL addresses radioactivity releases that cause effluent radiation monitor readings to exceed 2 times the limit established by a radioactivity discharge permit. Such releases are typically associated with planned batch releases from non-continuous release pathways (e.g., radwaste) (ref. 1).

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

Reference(s):

1. Turkey Point Offsite Dose Calculation Manual (ODCM)
2. NEI 99-01 AU1

Category:	R – Abnormal Rad Levels / Rad Effluent
Subcategory:	1 – Radiological Effluent
Initiating Condition:	Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer.

EAL:

RU1.3	**Unusual Event**
Sample analysis for a gaseous or liquid release indicates a concentration or release rate > 2 x ODCM limits for ≥ 60 min. (Notes 1, 2)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

None

Basis:

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

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

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

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

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

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

Reference(s):

1. Turkey Point Offsite Dose Calculation Manual (ODCM)
2. NEI 99-01 AU1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

RA1.1	**Alert**
Reading on **any** Table R-1 effluent radiation monitor > column "ALERT" for ≥ 15 min. (Notes 1, 2, 3, 4)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: 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.

Note 4 The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Plant Vent	RAD-6304	1.5E+01 µCi/cc	1.5E-00 µCi/cc	1.5E-01 µCi/cc	1.1E-02 µCi/cc
	Spent Fuel Pool	RAD-3-6418	1.6E+03 µCi/cc	1.6E+02 µCi/cc	1.6E+01 µCi/cc	6.3E-01 µCi/cc
		U4 via RAD-6304	5.1E+02 µCi/cc	5.1E+01 µCi/cc	5.1E+00 µCi/cc	1.8E-01 µCi/cc
Liquid	Liquid Waste Discharge	R-18	N/A	N/A	N/A	1.8E+04 cpm
	S/G Blowdown	3-R-19	N/A	N/A	N/A	1.8E+04 cpm
		4-R-19	N/A	N/A	N/A	1.8E+04 cpm

Mode Applicability:

All

Definition(s):

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.

Basis:

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

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

The TEDE dose is set at 1% of the EPA PAG of 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.

The values of the gaseous effluent thresholds in Table R-1 represents 10% of the SAE values calculated in EP-CALC-PTN-1901 Radiological Effluent EAL Values (ref. 1).

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

Reference(s):

1. EP-CALC-PTN-1901 Radiological Effluent EAL Values
2. NEI 99-01 AA1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

RA1.2	**Alert**
Dose assessment using actual meteorology indicates doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)	

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

Basis:

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

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

The TEDE dose is set at 1% of the EPA PAG of 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.

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

Reference(s):

1. 0-EPIP-20125 Off-site Dose Assessment Using the Unified RASCAL Interface (URI)
2. 0-EPIP-20126 Off-site Dose Calculations – Manual Method
3. NEI 99-01 AA1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

RA1.3 Alert

Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY for 60 min. of exposure (Notes 1, 2)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

Basis:

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

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

The TEDE dose is set at 1% of the EPA PAG of 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.

This EAL is assessed per the ODCM (ref.1)

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

Reference(s):

1. Turkey Point Offsite Dose Calculation Manual (ODCM)
2. NEI 99-01 AA1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

RA1.4 Alert

Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:

- Closed window dose rates > 10 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 50 mrem for 60 min. of inhalation.

(Notes 1, 2)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

Basis:

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

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

The TEDE dose is set at 1% of the EPA PAG of 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.

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

Reference(s):

1. 0-EPIP-20129 Emergency Response Team - Radiological Monitoring

2. NEI 99-01 AA1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RS1.1 Site Area Emergency

Reading on **any** Table R-1 effluent radiation monitor > column "SAE" for ≥ 15 min. (Notes 1, 2, 3, 4)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: 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.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table R-1 Effluent Monitor Classification Thresholds

	Release Point	Monitor	GE	SAE	Alert	UE
Gaseous	**Plant Vent**	**RAD-6304**	1.5E+01 µCi/cc	1.5E-00 µCi/cc	1.5E-01 µCi/cc	1.1E-02 µCi/cc
Gaseous	**Spent Fuel Pool**	**RAD-3-6418**	1.6E+03 µCi/cc	1.6E+02 µCi/cc	1.6E+01 µCi/cc	6.3E-01 µCi/cc
Gaseous	**Spent Fuel Pool**	**U4 via RAD-6304**	5.1E+02 µCi/cc	5.1E+01 µCi/cc	5.1E+00 µCi/cc	1.8E-01 µCi/cc
Liquid	**Liquid Waste Discharge**	**R-18**	N/A	N/A	N/A	1.8E+04 cpm
Liquid	**S/G Blowdown**	**3-R-19**	N/A	N/A	N/A	1.8E+04 cpm
Liquid	**S/G Blowdown**	**4-R-19**	N/A	N/A	N/A	1.8E+04 cpm

Mode Applicability:

All

Definition(s):

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.

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.

Reference(s):

1. EP-CALC-PTN-1901 Radiological Effluent EAL Values
2. NEI 99-01 AS1

Category:	R – Abnormal Rad Levels / Rad Effluent
Subcategory:	1 – Radiological Effluent
Initiating Condition:	Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE

EAL:

RS1.2 Site Area Emergency

Dose assessment using actual meteorology indicates doses > 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

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.

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

Reference(s):

1. 0-EPIP-20125 Off-site Dose Assessment Using the Unified RASCAL Interface (URI)
2. 0-EPIP-20126 Off-site Dose Calculations – Manual Method
3. NEI 99-01 AS1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RS1.3	**Site Area Emergency**

Field survey results indicate **<u>EITHER</u>** of the following at or beyond the SITE BOUNDARY:

- Closed window dose rates > 100 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 500 mrem for 60 min. of inhalation.

(Notes 1, 2)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

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.

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

Reference(s):

1. 0-EPIP-20129 Emergency Response Team - Radiological Monitoring
2. NEI 99-01 AS1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RG1.1	**General Emergency**
Reading on **any** Table R-1 effluent radiation monitor > column "GE" for ≥ 15 min. (Notes 1, 2, 3, 4)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: 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.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	**Plant Vent**	**RAD-6304**	1.5E+01 µCi/cc	1.5E-00 µCi/cc	1.5E-01 µCi/cc	1.1E-02 µCi/cc
Gaseous	**Spent Fuel Pool**	**RAD-3-6418**	1.6E+03 µCi/cc	1.6E+02 µCi/cc	1.6E+01 µCi/cc	6.3E-01 µCi/cc
Gaseous	**Spent Fuel Pool**	**U4 via RAD-6304**	5.1E+02 µCi/cc	5.1E+01 µCi/cc	5.1E+00 µCi/cc	1.8E-01 µCi/cc
Liquid	**Liquid Waste Discharge**	**R-18**	N/A	N/A	N/A	1.8E+04 cpm
Liquid	**S/G Blowdown**	**3-R-19**	N/A	N/A	N/A	1.8E+04 cpm
Liquid	**S/G Blowdown**	**4-R-19**	N/A	N/A	N/A	1.8E+04 cpm

Mode Applicability:

All

Definition(s):

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.

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.

Reference(s):

1. EP-CALC-PTN-1901 Radiological Effluent EAL Values
2. NEI 99-01 AG1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RG1.2 General Emergency

Dose assessment using actual meteorology indicates doses > 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

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.

Reference(s):

1. 0-EPIP-20125 Off-site Dose Assessment Using the Unified RASCAL Interface (URI)
2. 0-EPIP-20126 Off-site Dose Calculations – Manual Method
3. NEI 99-01 AG1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RG1.3 General Emergency

Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:

- Closed window dose rates > 1,000 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 5,000 mrem for 60 min. of inhalation.

(Notes 1, 2)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

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.

Reference(s):

1. 0-EPIP-20129 Emergency Response Team - Radiological Monitoring
2. NEI 99-01 AG1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel

EAL:

RU2.1 Unusual Event

UNPLANNED water level drop in the REFUELING PATHWAY as indicated by **any** of the following:

- SFP or reactor cavity level instrument
- SFP or reactor cavity low level alarm
- Report of dropping level in SFP or reactor cavity

AND

UNPLANNED rise in corresponding area radiation levels as indicated by **any** Table R-2 radiation monitors

Table R-2 Refueling Area Radiation Monitors

ARM #	Description
R-2[5]	Unit 3[4] Containment Operating Floor
R-7[8]	Unit 3[4] Spent Fuel Pit Canal Area
R-21[22]	Unit 3[4] Spent Fuel Pit North[South]

Mode Applicability:

All

Definition(s):

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

REFUELING PATHWAY- Refueling cavity, fuel transfer canal, and spent fuel pit (SFP), but **not** including the reactor vessel, comprise the refueling pathway.

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 (e.g., 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 specified area radiation monitors are those expected to see increase area radiation levels as a result of a loss of REFUELING PATHWAY inventory (ref. 1, 2). Increasing radiation indications on these monitors in the absence of indications of decreasing REFUELING PATHWAY level are not classifiable under this EAL.

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 Category C during the Cold Shutdown and Refueling modes.

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

Reference(s):

1. 3[4]-ONOP-033.1 Spent Fuel Pit (SFP) Cooling System Malfunction
2. 3[4]-ONOP-033.2 Refueling Cavity Seal Failure
3. NEI 99-01 AU2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.1	**Alert**
IMMINENT uncovery of irradiated fuel in the REFUELING PATHWAY	

Mode Applicability:

All

Definition(s):

CONFINEMENT BOUNDARY- The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. As related to the PTN ISFSI, Confinement Boundary is defined as the NUHOMS Dry Shielding Canister (DSC).

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.

REFUELING PATHWAY- Refueling cavity, fuel transfer canal, and spent fuel pit (SFP), but **not** including the reactor vessel, comprise the refueling pathway.

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 REFUELING PATHWAY. 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 EAL 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 Category R or C EALs.

This EAL escalates from RU2.1 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 (e.g., reports from personnel or camera images), as well as significant changes in water and radiation levels, or other plant parameters. Computational aids may also be used (e.g., a boil-off curve). Classification of an event using this EAL should be based on the totality of available indications, reports and observations.

While an area radiation monitor could detect an 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 with Category C during the Cold Shutdown and Refueling modes.

Reference(s):

1. NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.2 Alert

Damage to irradiated fuel resulting in a release of radioactivity

AND

VALID HIGH alarm on **any** of the following:

- **Any** Table R-2 area radiation monitors
- R-3[4]-11 or R-3[4]-12 Containment Atmosphere Process Radiation Monitor
- R-14 Plant Vent Gas Monitor

Table R-2 Refueling Area Radiation Monitors	
ARM #	**Description**
R-2[5]	Unit 3[4] Containment Operating Floor
R-7[8]	Unit 3[4] Spent Fuel Pit Canal Area
R-21[22]	Unit 3[4] Spent Fuel Pit North[South]

Mode Applicability:

All

Definition(s):

CONFINEMENT BOUNDARY- The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. As related to the PTN ISFSI, Confinement Boundary is defined as the NUHOMS Dry Shielding Canister (DSC).

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.

Basis:

The specified radiation monitors are those expected to see increased area radiation levels as a result of damage to irradiated fuel (ref. 1, 2, 3).

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

This EAL 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.

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

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

Reference(s):

1. 3[4]-ONOP-033.1 Spent Fuel Pit (SFP) Cooling System Malfunction
2. 3[4]-ONOP-033.2 Refueling Cavity Seal Failure
2. 3[4]-ONOP-033.3 Accidents Involving New or Spent Fuel
4. NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.3	**Alert**
Lowering of spent fuel pool level to 43 ft. (Level 2) on LI-3[4]-651A or LI-3[4]-651B	

Mode Applicability:

All

Definition(s):

None

Basis:

This EAL addresses events that have caused 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.

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.

Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication (LI-3[4]-651A and LI-3[4]-651B) capable of identifying normal level (Level 1), SFP level ~10 ft. above the top of the fuel racks (Level 2 - 42 ft. 11 in.) and SFP level at the top of the fuel racks (Level 3 – 33 ft. 11 in.) (ref. 1, 2). Level 2 has been rounded to 43 ft.

Reference(s):

1. EC-280522 Design Change Package PTN-3 (PTN-4) Spent Fuel Pool Level Instrument Per NRC Order EA-12-051
2. 3[4]-PMI-033.03A Spent Fuel Pool Level Instrumentation LE/LIT-3[4]-651A System Calibration Verification and Maintenance
3. NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Spent fuel pool level at the top of the fuel racks

EAL:

RS2.1	**Site Area Emergency**
Lowering of spent fuel pool level to 34 ft. (Level 3) on LI-3[4]-651A or LI-3[4]-651B	

Mode Applicability:

All

Definition(s):

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.

Basis:

This EAL 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.

Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication (LI-3[4]-651A and LI-3[4]-651B) capable of identifying normal level (Level 1), SFP level ~10 ft. above the top of the fuel racks (Level 2 - 42 ft. 11 in.) and SFP level at the top of the fuel racks (Level 3 – 33 ft. 11 in.) (ref. 1, 2). Level 3 has been rounded to 34 ft.

Reference(s):

1. EC-280522 Design Change Package PTN-3 (PTN-4) Spent Fuel Pool Level Instrument Per NRC Order EA-12-051
2. 3[4]-PMI-033.03A Spent Fuel Pool Level Instrumentation LE/LIT-3[4]-651A System Calibration Verification and Maintenance
3. NEI 99-01 AS2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Spent fuel pool level **cannot** be restored to at least the top of the fuel racks for 60 minutes or longer

EAL:

RG2.1	**General Emergency**
Spent fuel pool level **cannot** be restored to at least 34 ft. (Level 3) on LI-3[4]-651A or LI-3[4]-651B for ≥ 60 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded**.**

Mode Applicability:

All

Definition(s):

None

Basis:

This EAL 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 EALwould likely not be met until well after another General Emergency EAL was met; however, it is included to provide classification diversity.

Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication (LI-3[4]-651A and LI-3[4]-651B) capable of identifying normal level (Level 1), SFP level ~10 ft. above the top of the fuel racks (Level 2 - 42 ft. 11 in.) and SFP level at the top of the fuel racks (Level 3 – 33 ft. 11 in.) (ref. 1, 2). Level 3 has been rounded to 34 ft.

Reference(s):

1. EC-280522 Design Change Package PTN-3 (PTN-4) Spent Fuel Pool Level Instrument Per NRC Order EA-12-051
2. 3[4]-PMI-033.03A Spent Fuel Pool Level Instrumentation LE/LIT-3[4]-651A System Calibration Verification and Maintenance
3. NEI 99-01 AG2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 3 – Area Radiation Levels

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

EAL:

RA3.1 Alert

Dose rate > 15 mR/hr in **EITHER** of the following areas:

- Control Room
- Central Alarm Station

Mode Applicability:

All

Definition(s):

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 (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

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 Emergency Coordinator should consider the cause of the increased radiation levels and determine if another IC may be applicable.

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

Reference(s):

1. 0-ONOP-066 High Area Radiation Monitoring System Alarms
2. NEI 99-01 AA3

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 3 – Area Radiation Levels

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

EAL:

RA3.2 Alert

An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to **any** Table R-3 room or area (Note 5)

Note 5: 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.

Table R-3 Safe Operation & Shutdown Rooms/Areas	
Room/Area	**Mode(s)**
Auxiliary Building 18'	1, 2, 3, 4, 5
Turbine Building (**any** level)	1, 2, 3, 4, 5
Containment	4, 5
HHSI Pump, CSP Rooms	3
RHR Pump & HX Rooms	4
Rad Waste Building	1, 2, 3, 4, 5

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown, 5 – Cold Shutdown

Definition(s):

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 (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

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.

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 Emergency Coordinator should consider the cause of the increased radiation levels and determine if another IC may be applicable.

For RA3.2, 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 (e.g., 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 (i.e., entry is not required during the operating mode in effect at the time of the elevated radiation levels). For example, the plant is in Mode 1 when the radiation 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 (e.g., radiography, spent filter or resin transfer, etc.).
- The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or impede a required action.

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

If the equipment in the listed room or area was already inoperable, or out-of-service, before the event occurred, then no emergency should be declared since the event will have no adverse impact beyond that already allowed by Technical Specifications at the time of the event.

The list of plant rooms or areas with entry-related mode applicability identified specify those rooms or areas that contain equipment which require a manual/local action as specified in operating procedures used for normal plant operation, cooldown and shutdown. Rooms or areas in which actions of a contingent or emergency nature would be performed (e.g., an action to address an off-normal or emergency condition such as emergency repairs, corrective measures or emergency operations) are not included. In addition, the list specifies the plant mode(s) during which entry would be required for each room or area (ref. 1).

Reference(s):

1. Attachment 2 Safe Operation & Shutdown Areas Tables R-3 & H-2 Bases
2. NEI 99-01 AA3

Category C – Cold Shutdown / Refueling System Malfunction

EAL Group: Cold Conditions (RCS temperature ≤ 200ºF); EALs in this category are applicable only in one or more cold operating modes.

Category C EALs are directly associated with cold shutdown or refueling system safety functions. Given the variability of plant configurations (e.g., systems out-of-service for maintenance, containment open, reduced AC power redundancy, time since shutdown) during these periods, the consequences of any given initiating event can vary greatly. For example, a loss of decay heat removal capability that occurs at the end of an extended outage has less significance than a similar loss occurring during the first week after shutdown. Compounding these events is the likelihood that instrumentation necessary for assessment may also be inoperable. The cold shutdown and refueling system malfunction EALs are based on performance capability to the extent possible with consideration given to RCS integrity, CONTAINMENT CLOSURE, and fuel clad integrity for the applicable operating modes (5 - Cold Shutdown, 6 - Refueling, DEF – Defueled).

The events of this category pertain to the following subcategories:

1. RCS Level

RCS water level is directly related to the status of adequate core cooling and, therefore, fuel clad integrity.

2. Loss of Emergency AC Power

Loss of vital plant electrical power can compromise plant safety system operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of onsite and offsite power sources for 4KV emergency buses.

3. RCS Temperature

Uncontrolled or inadvertent temperature or pressure rises are indicative of a potential loss of safety functions.

4. Loss of Vital DC Power

Loss of emergency plant electrical power can compromise plant safety system operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of power to or degraded voltage on the 125V DC vital buses.

5. Loss of Communications

Certain events that degrade plant operator ability to effectively communicate with essential personnel within or external to the plant warrant emergency classification.

6. Hazardous Event Affecting Safety Systems

Certain hazardous natural and technological events may result in VISIBLE DAMAGE to or degraded performance of multiple safety system trains warranting classification.

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: UNPLANNED loss of RCS inventory

EAL:

CU1.1 Unusual Event

UNPLANNED loss of reactor coolant results in RCS water level less than a required lower limit for ≥ 15 min. (Note 1)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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.

Basis:

RCS water level less than a required lower limit is meant to be less than the lower end of the level control band being procedurally maintained for the current condition or evolution.

With the plant in Cold Shutdown, RCS water level is normally maintained within a pressurizer level control band (ref. 1). However, if RCS level is being controlled below the normal pressurizer level control band, or if level is being maintained in a designated band in the reactor vessel it is the inability to maintain level above the low end of the designated control band due to a loss of inventory resulting from a leak in the RCS that is the concern.

With the plant in Refueling mode, RCS water level is normally maintained at or above the reactor vessel flange (ref. 2).

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.

This EAL 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.

Continued loss of RCS inventory may result in escalation to the Alert emergency classification level via either IC CA1 or CA3.

Reference(s):

1. 3[4]-GOP-305 Hot Standby to Cold Shutdown
2. 3[4]-NOP-041.07 Draining the Reactor Coolant System
3. NEI 99-01 CU1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: UNPLANNED loss of RCS inventory

EAL:

CU1.2 Unusual Event

RCS water level **cannot** be monitored

AND EITHER:

- UNPLANNED increase in **any** Table C-1 sump or tank level due to a loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

Table C-1 Sumps/Tanks
• Containment Sump • #1 Waste Holdup Tank (DCS or Waste Boron Panel) • CVCS Holdup Tank (Waste Boron Panel) • RWST • RHR Sumps

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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

UNPLANNED-. A parameter changes 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.

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.

This EAL 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 (Table C-1) (ref. 1, 2). 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.

Reference(s):

1. 3[4]-ONOP-041.3 Excessive Reactor Coolant System Leakage
2. 3[4]-ONOP-041.8 Shutdown LOCA [Mode 5 OR 6]
3. NEI 99-01 CU1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Significant Loss of RCS inventory

EAL:

CA1.1	**Alert**
RCS water level < 23% on LIS-3[4]-6421 or LIS-3[4]-6423	

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

None

Basis:

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

For this EAL, a lowering of RCS water level below the minimum required for continued SI pump operation 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.

The minimum RCS level for continued RHR pump operation is 23% on RCS Draindown Level Instrumentation (LIS-3[4]-6421 or LIS-3[4]-6423) (ref. 1).

Although related, this EAL is concerned with the loss of RCS inventory and not the potential concurrent effects on systems needed for decay heat removal (e.g., loss of a Decay Heat Removal suction point). An increase in RCS temperature caused by a loss of decay heat removal capability is evaluated under IC CA3.

If RCS water level continues to lower, then escalation to Site Area Emergency would be via IC CS1.

Reference(s):

1. 3[4]-ONOP-050 Loss of RHR
2. NEI 99-01 CA1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Significant Loss of RCS inventory

EAL:

CA1.2 Alert

RCS water level **cannot** be monitored for ≥ 15 min. (Note 1)

AND EITHER

- UNPLANNED increase in **any** Table C-1 sump or tank level due to a loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table C-1 Sumps/Tanks
• Containment Sump • #1 Waste Holdup Tank (DCS or Waste Boron Panel) • CVCS Holdup Tank (Waste Boron Panel) • RWST • RHR Sumps

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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.

Basis:

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

For this EAL, 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 (Table C-1) (ref. 1, 2). 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.

Reference(s):

1. 3[4]-ONOP-041.3 Excessive Reactor Coolant System Leakage
2. 3[4]-ONOP-041.8 Shutdown LOCA [Mode 5 OR 6]
3. NEI 99-01 CA1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

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

EAL:

CS1.1	**Site Area Emergency**
RCS water level < 10% on LIS-3[4]-6421 or LIS-3[4]-6423	

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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.

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 RCS level. If RCS level cannot be restored, fuel damage is probable.

10% on RCS Draindown Level Instrumentation (LIS-3[4]-6421 or LIS-3[4]-6423) is the lowest RCS level that can be monitored in the cold condition and nominally corresponds to the bottom of the RCS hot leg (ref. 1).

This EAL addresses 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 ICs CG1 or RG1.

Reference(s):

1. Drawing 5613-J-815/ Drawing 5614-J-815
2. Plant Curve Book PCB-3-S5F09/ PCB-4-S5F09
3. NEI 99-01 CS1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

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

EAL:

CS1.2 Site Area Emergency

RCS level **cannot** be monitored for ≥ 30 min. (Note 1)

AND

Core uncovery is indicated by **any** of the following:

- UNPLANNED increase in **any** Table C-1 sump or tank level of sufficient magnitude to indicate core uncovery
- Visual observation of UNISOLABLE RCS leakage of sufficient magnitude to indicate core uncovery
- RAD-3[4]-6311B reading > 9.4E+04 R/hr (Refueling Mode)
- Erratic source range monitor indications

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table C-1 Sumps/Tanks
• Containment Sump • #1 Waste Holdup Tank (DCS or Waste Boron Panel) • CVCS Holdup Tank (Waste Boron Panel) • RWST • RHR Sumps

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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.

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.

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 level cannot be restored, fuel damage is probable.

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

The inability to monitor 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 (ref. 1, 2). 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 .

If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately identified. Visual observation of leakage from systems connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory.

In the Refueling mode, as water level in the reactor vessel lowers, the dose rate above the core will rise. The dose rate due to this core shine should result in on-scale indications on area radiation monitors. A reading > 9.4E+04 R/hr on RAD-3[4]-6311B Containment High Range Radiation Monitor (CHRRM) is indicative of RCS water level at the top of active fuel while in the Refueling mode. Of the two CHRRM channels RAD-6311B has the most reliable response to the core shine due to its location on the 58’ operating floor on both units (ref. 3).

Post-TMI accident studies indicated that the installed PWR nuclear instrumentation will operate erratically when the core is uncovered and that this should be used as a tool for making such determinations.

This EAL addresses 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

Reference(s):

1. 3[4]-ONOP-041.3 Excessive Reactor Coolant System Leakage

2. 3[4]-ONOP-041.8 Shutdown LOCA [Mode 5 OR 6]
3. DBD PTN NEI-99-01 Radiation Monitor Values Used in Recognition Categories R, F and C
4. NEI 99-01 CS1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

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

EAL:

CG1.1 General Emergency

RCS level **cannot** be monitored for ≥ 30 min. (Note 1)

AND

Core uncovery is indicated by **any** of the following:

- UNPLANNED increase in **any** Table C-1 sump or tank level of sufficient magnitude to indicate core uncovery
- Visual observation of UNISOLABLE RCS leakage of sufficient magnitude to indicate core uncovery
- RAD-3[4]-6311B reading > 9.4E+04 R/hr (Refueling Mode)
- Erratic source range monitor indications

AND

Any Containment Challenge indication, Table C-2

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 6: If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, declaration of a General Emergency is **not** required.

Table C-1 Sumps/Tanks
• Containment Sump • #1 Waste Holdup Tank (DCS or Waste Boron Panel) • CVCS Holdup Tank (Waste Boron Panel) • RWST • RHR Sumps

Table C-2 Containment Challenge Indications
• CONTAINMENT CLOSURE **not** established (Note 6) • CTMT hydrogen concentration > 4% • UNPLANNED increase in CTMT pressure

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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

Containment Closure requirements are specified in 0-ADM-051 Outage Risk Assessment and Control.

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.

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.

Basis:

This IC addresses the inability to restore and maintain RCS 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 level cannot be restored, fuel damage is probable.

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 (ref. 1, 3).

If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately

identified. Visual observation of leakage from systems connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory.

In the Refueling mode, as water level in the reactor vessel lowers, the dose rate above the core will rise. The dose rate due to this core shine should result in on-scale indications on area radiation monitors. A reading > 9.4E+04 R/hr on RAD-3[4]-6311B Containment High Range Radiation Monitor (CHRRM) is indicative of RCS water level at the top of active fuel while in the Refueling mode. Of the two CHRRM channels RAD-6311B has the most reliable response to the core shine due to its location on the 58’ operating floor on both units (ref. 3).

Post-TMI accident studies indicated that the installed PWR nuclear instrumentation will operate erratically when the core is uncovered and that this should be used as a tool for making such determinations.

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

Three conditions are associated with a challenge to containment’s capability to serve as an effective barrier to fission product release:

1. 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.
2. The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (i.e., at the lower deflagration limit of 4%). 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. However, containment monitoring and/or sampling should be performed to verify this assumption and a General Emergency declared if it is determined that hydrogen concentration has exceeded the minimum necessary to support a hydrogen burn (4%) (ref. 4). 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.
3. Any UNPLANNED rise in containment pressure in the Cold Shutdown or Refueling mode indicates a potential challenge of CONTAINMENT CLOSURE capability. UNPLANNED containment pressure rise indicates CONTAINMENT CLOSURE cannot

be assured and the containment cannot be relied upon as a barrier to fission product release.

This EAL addresses 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*.

Reference(s):

1. 3[4]-ONOP-041.3 Excessive Reactor Coolant System Leakage
2. 3[4]-ONOP-041.8 Shutdown LOCA [Mode 5 OR 6]
3. DBD PTN NEI-99-01 Radiation Monitor Values Used in Recognition Categories R, F and C
4. CA-3 Computational Aids Hydrogen Flammability in Containment
5. NEI 99-01 CG1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 2 – Loss of Emergency AC Power

Initiating Condition: Loss of **all but one** AC power source to emergency buses for 15 minutes or longer

EAL:

CU2.1 Unusual Event

AC power capability, Table C-3, to 4KV emergency buses 3[4]A and 3[4]B reduced to a single power source for ≥ 15 min. (Note 1)

AND

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

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table C-3 AC Power Sources
Offsite • Unit 3[4] Startup Transformer • Unit 3[4] C Bus Transformer • Unit 3[4] Opposite Unit Cross Tie • Unit 3[4] Auxiliary Transformer back fed via Main Transformer (if already aligned) **Onsite** • 3A[4A] Emergency Diesel Generator • 3B[4B] Emergency Diesel Generator • 3[4] D Bus SBO Cross Tie

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling, DEF - Defueled

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

Table C-3 provides a list of offsite and onsite AC electrical power sources credited for this EAL. Offsite AC power sources annotated "(if already aligned)" require more than 15 minutes to establish and therefore are only credited if the source was already aligned at the time of AC power loss (ref. 1, 2, 3).

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 (e.g., an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from the unit main generator.
- A loss of emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being fed or 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.

This cold condition EAL is equivalent to the hot condition EAL SA1.1.

Reference(s):

1. Technical Specifications Section 3.8.1.2 A. C. Sources Shutdown
2. UFSAR section 8.2.2 Station Electrical System
3. 3[4]-NOP-092.01 Main/Auxiliary Transformer Backfeed
4. NEI 99-01 CU2

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 2 – Loss of Emergency AC Power

Initiating Condition: Loss of **all** offsite and **all** onsite AC power to emergency buses for 15 minutes or longer

EAL:

CA2.1	**Alert**
Loss of **all** offsite and **all** onsite AC power to 4KV emergency buses 3[4]A and 3[4]B for ≥ 15 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling, DEF - Defueled

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

For this EAL credit can be taken for any AC power source that has sufficient capability to operate equipment necessary to maintain a safe shutdown condition, such as FLEX generators, provided it can be aligned within the 15 minute classification criteria.

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 ICs CS1 or RS1.

This cold condition EAL is equivalent to the hot condition EAL RS1.1.

Reference(s):

1. Technical Specifications Section 3.8.1.2 A. C. Sources Shutdown
2. UFSAR section 8.2.2 Station Electrical System
3. NEI 99-01 CU2

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED increase in RCS temperature

EAL:

CU3.1	**Unusual Event**
UNPLANNED increase in RCS temperature to > 200°F (Note 14)	

Note 14: In the absence of reliable RCS temperature indication caused by the loss of decay heat removal capability, classification should be based on time to 200°F assuming a 12°F per minute heat-up rate (4°F per minute if the refueling cavity is flooded) when in Mode 6 or the RCS is not intact in Mode 5. If the RCS is intact, classification should be based on the RCS pressure rise criteria of CA3.1.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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

Containment Closure requirements are met when all of the following conditions exist:

- The equipment hatch is closed with a minimum of four bolts.
- All other penetrations are capable of being closed by a containment automatic isolation valve system or closed by manual valve or blind flanges.

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.

Basis:

In the absence of reliable RCS temperature indication caused by the loss of decay heat removal capability, classification should be based on time to 200°F assuming a 12°F per minute heat-up rate (4°F per minute if the refueling cavity is flooded) when in Mode 6 or the RCS is not intact in Mode 5 (ref. 1). If the RCS is intact, classification should be based on the RCS pressure rise criteria of CA3.1. Assumed RCS heat-up rates are specified per 3[4]-ONOP-050 Loss of RHR (ref. 2).

This EAL addresses an UNPLANNED increase in RCS temperature above the Technical Specification cold shutdown temperature limit and represents a potential degradation of the level of safety of the plant (ref. 1). If the RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the EC should also refer to EAL CA3.1.

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

This EAL 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 at or 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 (ref. 3).

Escalation to Alert would be via IC CA1 based on an inventory loss or IC CA3 based on exceeding plant configuration-specific time criteria.

Reference(s):

1. Technical Specifications Table 1.2, Operational Modes
2. 3[4]-ONOP-050 Loss of RHR
3. 0-ADM-051 Outage Risk Assessment and Control
4. NEI 99-01 CU3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED rise in RCS temperature

EAL:

CU3.2	**Unusual Event**
Loss of **all** RCS temperature and RCS water level indication for ≥ 15 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

5 - Cold Shutdown, 6- Refueling

Definition(s):

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

Containment Closure requirements are specified in 0-ADM-051 Outage Risk Assessment and Control.

Basis:

This EAL addresses the inability to determine RCS temperature and level, and 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 EC should also refer to EAL CA3.1.

This EAL 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.

Reference(s):

1. 0-ADM-051 Outage Risk Assessment and Control
2. NEI 99-01 CU3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: Inability to maintain plant in cold shutdown

EAL:

CA3.1 Alert

UNPLANNED rise in RCS temperature to > 200°F for > Table C-4 duration due to a loss of RCS cooling
(Notes 1, 12)

OR

UNPLANNED RCS pressure rise > 10 psig (does not apply to solid plant conditions)

Note 1: The EC should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

Note 12: If an RCS heat removal system is in operation within the applicable Table C-4 heat-up duration and RCS temperature is being reduced, the EAL is **not** applicable.

Note 14: In the absence of reliable RCS temperature indication caused by the loss of decay heat removal capability, classification should be based on time to 200°F assuming a 12°F per minute heat-up rate (4°F per minute if the refueling cavity is flooded) when in Mode 6 or the RCS is not intact in Mode 5. If the RCS is intact, classification should be based on the RCS pressure rise criteria of CA3.1.

Table C-4 RCS Heat-up Duration Thresholds

RCS Status	CONTAINMENT CLOSURE Status	Heat-up Duration
Intact **AND** **not** lowered inventory	N/A	60 min.
Not intact **OR** lowered inventory	Established	20 min.
	Not established	0 min.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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

Containment Closure requirements are specified in 0-ADM-051 Outage Risk Assessment and Control.

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.

Basis:

In the absence of reliable RCS temperature indication caused by the loss of decay heat removal capability, classification should be based on time to 200°F assuming a 12°F per minute heat-up rate (4°F per minute if the refueling cavity is flooded) when in Mode 6 or the RCS is not intact in Mode 5 (ref. 1). If the RCS is intact, classification should be based on the RCS pressure rise criteria of this EAL. Assumed RCS heat-up rates are specified per 3[4]-ONOP-050 Loss of RHR (ref. 2).

The RCS is considered to be at lowered inventory when RCS level is less than or equal to 3 ft. below the reactor vessel flange with fuel in the reactor vessel (ref. 3).

This EAL 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 (e.g., 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 (i.e., 0 minutes). This is because 1) the evaporated reactor coolant may be released directly into the containment atmosphere and subsequently to the environment, and 2) there is reduced reactor coolant inventory above the top of irradiated fuel.

The RCS pressure rise threshold provides a pressure-based indication of RCS heat-up in the absence of RCS temperature monitoring capability.

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

Reference(s):

1. Technical Specifications Table 1.2, Operational Modes
2. 3[4]-ONOP-050 Loss of RHR
3. 0-ADM-051 Outage Risk Assessment and Control
4. NEI 99-01 CA3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 4 – Loss of Vital DC Power

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

EAL:

CU4.1	**Unusual Event**
Indicated voltage < 105 VDC on **any** two vital 125 VDC buses (3D01, 4D01, 3D23, 4D23) for ≥ 15 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis

The vital (Class 1E) 125 V DC power system consists of four physically and electrically separated buses – 3D01, 3D23, 4D01 and 4D23. Each bus has a 60 cell battery bank with an eight-hour rating, with a minimum operating voltage of 105 volts (ref. 1, 2, 3).

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 Category R.

This cold condition EAL is equivalent to the hot condition EAL SS2.1.

Reference(s):

1. UFSAR Section 8.2.2.3 DC Power Systems
2. 5610-003-DB-002 Vital AC/DC Component Design Requirements
3. Technical Specifications Section 3.8.2.2 D.C. Sources Shutdown
4. NEI 99-01 CU4

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 5 – Loss of Communications

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

EAL:

CU5.1 Unusual Event

Loss of **all** Table C-5 onsite communication methods

OR

Loss of **all** Table C-5 State and local agency communication methods

OR

Loss of **all** Table C-5 NRC communication methods

Table C-5 Communication Methods

System	Onsite	State/ Local	NRC
Plant Radio System	X		
Commercial Telephone System	X	X	X
Plant Address (PA) System	X		
Federal Telephone System (ENS)			X
EMnet		X	
Hot Ring Down (HRD) Telephone System		X	

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling, DEF – Defueled

Definition(s):

None

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 State and local agencies and the NRC.

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

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

The second EAL condition addresses a total loss of the communications methods used to notify all State and local agencies of an emergency declaration. The State and local agencies referred to here are the State of Florida and affected local communities.

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

This cold condition EAL is equivalent to the hot condition EAL SU7.1.

Reference(s):

1. Turkey Point Plant Radiological Emergency Plan
2. NEI 99-01 CU5

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 6 – Hazardous Event Affecting Safety Systems

Initiating Condition: Hazardous event affecting SAFETY SYSTEMS needed for the current operating mode

EAL:

CA6.1 Alert

The occurrence of **any** Table C-6 hazardous event

AND

Event damage has caused indications of degraded performance on one train of a SAFETY SYSTEM needed for the current operating mode

AND EITHER:

- Event damage has caused indications of degraded performance to the second train of the SAFETY SYSTEM needed for the current operating mode
- Event damage has resulted in VISIBLE DAMAGE to the second train of the SAFETY SYSTEM needed for the current operating mode

(Notes 9, 10)

Note 9: If the affected SAFETY SYSTEM train was already inoperable or out of service before the hazardous event occurred, then emergency classification is **not** warranted.

Note 10: If the hazardous event **only** resulted in VISIBLE DAMAGE, with **no** indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is **not** warranted.

Table C-6 Hazardous Events
• Seismic event (earthquake) • Internal or external FLOODING event • High winds or tornado strike • FIRE • EXPLOSION • Other events with similar hazard characteristics as determined by the Shift Manager

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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 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.

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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

Basis:

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

Indications of degraded performance 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.

VISIBLE DAMAGE addresses damage to a SAFETY SYSTEM train that is not in service/operation and that potentially could cause performance issues. 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. This VISIBLE DAMAGE should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

An event affecting equipment common to two or more trains of a safety system (i.e., there are indications of degraded performance and/or VISIBLE DAMAGE affecting the common equipment) should be classified as an Alert under this EAL, as appropriate to the plant mode. By affecting the functionality of multiple trains of a safety system, the loss of the common equipment effectively meets the two-train impact criteria that underlie the EALs and bases.

An event affecting a single-train safety system (i.e., there are indications of degraded performance and/or VISIBLE DAMAGE affecting the one train) would not be classified under this EAL because the two-train impact criteria that underlie the EALs and bases would not be met. If an event affects a single-train safety system, then the emergency classification should be made based on plant parameters/symptoms meeting the EALs for another IC. Depending upon the circumstances, classification may also occur based on Shift Manager/EC judgement.

An event that affects two trains of a safety system (e.g., one train has indications of degraded performance and the other VISIBLE DAMAGE) that also has one or more additional trains should be classified as an Alert under this EAL, as appropriate to the plant mode. This approach maintains consistency with the two-train impact criteria that underlie the EALs and bases, and is warranted because the event was severe enough to affect the functionality of two trains of a safety system despite plant design criteria associated with system and system train separation and protection. Such an event may have caused other plant impacts that are not immediately apparent.

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

This cold condition EAL is equivalent to the hot condition EAL SA9.1.

Reference(s):

1. 0-EPIP-20106 Natural Emergencies
2. EP FAQ 2016-002
3. NEI 99-01 CA6

Category E – Independent Spent Fuel Storage Installation (ISFSI)

EAL Group: ANY (EALs in this category are applicable to any plant condition, hot or cold.)

An independent spent fuel storage installation (ISFSI) is a complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage. A significant amount of the radioactive material contained within a canister must escape its packaging and enter the biosphere for there to be a significant environmental effect resulting from an accident involving the dry storage of spent nuclear fuel.

A Notification of Unusual Event is declared on the basis of the occurrence of an event of sufficient magnitude that a loaded cask CONFINEMENT BOUNDARY is damaged or violated.

The PTN ISFSI is located wholly outside the PTN plant PROTECTED AREA. Any security event related to the ISFSI is classified under either ICs HU1 or HA1 security event related EALs.

Category: E - ISFSI

Subcategory: 1 - Confinement Boundary

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY

EAL:

EU1.1 Unusual Event

Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading on the surface of a loaded spent fuel cask (HSM) > **any** of the following:

- 1,600 mrem/hr on the HSM front bird screen
- 4 mrem/hr on the outside HSM door centerline
- 4 mrem/hr on the HSM end shield wall exterior

Mode Applicability:

All

Definition(s):

CONFINEMENT BOUNDARY- The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. As related to the PTN ISFSI, Confinement Boundary is defined as the NUHOMS Dry Shielding Canister (DSC).

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.

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 specified EAL threshold values correspond to 2 times the NUHOMS Horizontal Storage Module (HSM) technical specification external surface dose rate limits (ref. 1). 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.

Reference(s):

1. Certificate of Compliance Appendix A NUHOMS HD System Generic Technical Specifications Section 5.4 HSM-H Dose Rate Evaluation Program
2. NEI 99-01 E-HU1

Category F – Fission Product Barrier Degradation

EAL Group: Hot Conditions (RCS temperature > 200ºF); EALs in this category are applicable only in one or more hot operating modes.

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

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

B. Reactor Coolant System Barrier (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 Barrier (CTMT): 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 Emergency Classification Level (ECL) from an Alert to a Site Area Emergency or a General Emergency.

The EALs in this category require evaluation of the loss and potential loss thresholds listed in the fission product barrier matrix of Table F-1. "Loss" and "Potential Loss" signify the relative damage and threat of damage to the barrier. "Loss" means the barrier no longer assures containment of radioactive materials. "Potential Loss" means integrity of the barrier is threatened and could be lost if conditions continue to degrade. The number of barriers that are lost or potentially lost and the following criteria determine the appropriate emergency classification level:

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 third barrier

The logic used for emergency classification based on fission product barrier monitoring should reflect the following considerations:

- The Fuel Clad Barrier and the RCS Barrier are weighted more heavily than the Containment Barrier.

- Unusual Event ICs associated with RCS and Fuel Clad Barriers are addressed under System Malfunction ICs.
- For accident conditions involving a radiological release, evaluation of the fission product barrier thresholds will need to be performed in conjunction with dose assessments to ensure correct and timely escalation of the emergency classification. For example, an evaluation of the fission product barrier thresholds may result in a Site Area Emergency classification while a dose assessment may indicate that an EAL for General Emergency IC RG1 has been exceeded.
- The fission product barrier thresholds specified within a scheme reflect plant-specific PTN design and operating characteristics.
- As used in this category, the term RCS leakage encompasses not just those types defined in Technical Specifications but also includes the loss of RCS mass to any location– inside the containment, an interfacing system, or outside of the containment. The release of liquid or steam mass from the RCS due to the as-designed/expected operation of a relief valve is not considered to be RCS leakage.
- At the Site Area Emergency level, EAL users should maintain cognizance of how far present conditions are from meeting a threshold that would require a General Emergency declaration. For example, if the Fuel Clad and RCS fission product barriers were both lost, then there should be frequent assessments of containment radioactive inventory and integrity. Alternatively, if both the Fuel Clad and RCS fission product barriers were potentially lost, the EC would have more assurance that there was no immediate need to escalate to a General Emergency.

Category: Fission Product Barrier Degradation

Subcategory: N/A

Initiating Condition: **Any** loss or **any** potential loss of either Fuel Clad or RCS

EAL:

FA1.1	**Alert**
Any loss or **any** potential loss of **EITHER** Fuel Clad or RCS barrier (Table F-1)	

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

None

Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases and references.

At the Alert classification level, Fuel Clad and RCS barriers are weighted more heavily than the Containment barrier. Unlike the Containment barrier, loss or potential loss of either the Fuel Clad or RCS barrier may result in the relocation of radioactive materials or degradation of core cooling capability. Note that the loss or potential loss of Containment barrier in combination with loss or potential loss of either Fuel Clad or RCS barrier results in declaration of a Site Area Emergency under EAL FS1.1

Reference(s):

1. NEI 99-01 FA1

Category: Fission Product Barrier Degradation

Subcategory: N/A

Initiating Condition: Loss or potential loss of **any** two barriers

EAL:

FS1.1	**Site Area Emergency**
Loss or potential loss of **any** two barriers (Table F-1)	

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

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.

Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases and references.

At the Site Area Emergency classification level, each barrier is weighted equally. A Site Area Emergency is therefore appropriate for any combination of the following conditions:

- One barrier loss and a second barrier loss (i.e., loss - loss)
- One barrier loss and a second barrier potential loss (i.e., loss - potential loss)
- One barrier potential loss and a second barrier potential loss (i.e., potential loss - potential loss)

At the Site Area Emergency classification level, the ability to dynamically assess the proximity of present conditions with respect to the threshold for a General Emergency is important. For example, the existence of Fuel Clad and RCS Barrier loss thresholds in addition to offsite dose assessments would require continual assessments of radioactive inventory and Containment integrity in anticipation of reaching a General Emergency classification. Alternatively, if both Fuel Clad and RCS potential loss thresholds existed, the would have greater assurance that escalation to a General Emergency is less IMMINENT.

Reference(s):

1. NEI 99-01 FS1

Category: Fission Product Barrier Degradation

Subcategory: N/A

Initiating Condition: Loss of **any** two barriers and loss or potential loss of third barrier

EAL:

FG1.1 General Emergency
Loss of **any** two barriers
AND
Loss or potential loss of the third barrier (Table F-1)

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

None

Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases and references.

At the General Emergency classification level each barrier is weighted equally. A General Emergency is therefore appropriate for any combination of the following conditions:

- Loss of Fuel Clad, RCS and Containment Barriers
- Loss of Fuel Clad and RCS Barriers with potential loss of Containment Barrier
- Loss of RCS and Containment Barriers with potential loss of Fuel Clad Barrier
- Loss of Fuel Clad and Containment Barriers with potential loss of RCS Barrier

Reference(s):

1. NEI 99-01 FG1

Table F-1 Fission Product Barrier Threshold Matrix & Bases

Table F-1 lists the threshold conditions that define the Loss and Potential Loss of the three fission product barriers (Fuel Clad, Reactor Coolant System, and Containment). The table is structured so that each of the three barriers occupies adjacent columns. Each fission product barrier column is further divided into two columns; one for Loss thresholds and one for Potential Loss thresholds.

The first column of the table (to the left of the Fuel Clad Loss column) lists the categories (types) of fission product barrier thresholds. The fission product barrier categories are:

A. RCS or SG Tube Leakage
B. Inadequate Heat removal
C. CTMT Radiation / RCS Activity
D. CTMT Integrity or Bypass
E. EC Judgment

Each category occupies a row in Table F-1 thus forming a matrix defined by the categories. The intersection of each row with each Loss/Potential Loss column forms a cell in which one or more fission product barrier thresholds appear. If NEI 99-01 does not define a threshold for a barrier Loss/Potential Loss, the word “None” is entered in the cell.

Thresholds are assigned sequential numbers within each barrier column beginning with number one.

If a cell in Table F-1 contains more than one numbered threshold, each of the numbered thresholds, if exceeded, signifies a Loss or Potential Loss of the barrier. It is not necessary to exceed all of the thresholds in a category before declaring a barrier Loss/Potential Loss.

Subdivision of Table F-1 by category facilitates association of plant conditions to the applicable fission product barrier Loss and Potential Loss thresholds. This structure promotes a systematic approach to assessing the classification status of the fission product barriers.

When equipped with knowledge of plant conditions related to the fission product barriers, the EAL-user first scans down the category column of Table F-1, locates the likely category and then reads across the fission product barrier Loss and Potential Loss thresholds in that category to determine if a threshold has been exceeded. If a threshold has not been exceeded, the EAL-user proceeds to the next likely category and continues review of the thresholds in the new category

If the EAL-user determines that any threshold has been exceeded, by definition, the barrier is lost or potentially lost – even if multiple thresholds in the same barrier column are exceeded, only that one barrier is lost or potentially lost. The EAL-user must examine each of the three fission product barriers to determine if other barrier thresholds in the category are lost or potentially lost. For example, if containment radiation is sufficiently high, a Loss of the Fuel Clad and RCS Barriers and a Potential Loss of the Containment Barrier can occur. Barrier Losses and Potential Losses are then applied to the algorithms given in EALs FG1.1, FS1.1, and FA1.1 to determine the appropriate emergency classification.

Table F-1 Fission Product Barrier Threshold Matrix

	Fuel Clad (FC) Barrier		Reactor Coolant System (RC) Barrier		Containment (CTMT) Barrier	
Category	**Loss**	**Potential Loss**	**Loss**	**Potential Loss**	**Loss**	**Potential Loss**
A **RCS or SG Tube Leakage**	None	None	1. An automatic or manual ECCS (SI) actuation required by **EITHER:** • UNISOLABLE RCS leakage • SG tube RUPTURE	1. UNISOLABLE RCS or SG tube leakage > 69 gpm 2. Integrity-RED Path conditions met	1. A leaking or RUPTURED SG is FAULTED outside of CTMT	None
B **Inadequate Heat Removal**	1. Core Cooling-RED Path conditions met	1. Core Cooling-ORANGE Path conditions met 2. Heat Sink-RED Path conditions met **AND** Heat sink is required	None	3. Heat Sink-RED Path conditions met **AND** Heat sink is required	None	1. Core Cooling-RED Path conditions met **AND** Restoration procedures **not** effective within 15 min. (Note 1)
C **CTMT Radiation / RCS Activity**	2. Containment High Range Radiation Monitor Rad-3[4]-6311A/B reading > 5.4E+03 R/hr 3. Coolant activity > 300 μCi/gm dose equivalent I-131	None	2. Containment Mezzanine Radiation Monitor RI-3[4]-1404B reading > 10 mR/hr	None	None	2. Containment High Range Radiation Monitor Rad-3[4]-6311A/B reading > 2.2E+04 R/hr
D **CTMT Integrity or Bypass**	None	None	None	None	2. CTMT isolation is required **AND EITHER:** • CTMT integrity has been lost based on EC judgment • UNISOLABLE pathway from CTMT atmosphere to the environment exists 3. Indications of RCS leakage outside of CTMT	3. Containment-RED Path conditions met 4. CTMT hydrogen concentration > 4% 5. CTMT pressure > 20 psig **AND** < one full train of depressurization equipment operating per design for ≥ 15 min. (Notes 1, 11)
E **EC Judgment**	4. **ANY** condition in the opinion of the EC that indicates Loss of the Fuel Clad Barrier	3. **ANY** condition in the opinion of the EC that indicates Potential Loss of the Fuel Clad Barrier	3. **ANY** condition in the opinion of the EC that indicates Loss of the RCS Barrier	4. **ANY** condition in the opinion of the EC that indicates Potential Loss of the RCS Barrier	4. **ANY** condition in the opinion of the EC that indicates Loss of the CTMT Barrier	6. **ANY** condition in the opinion of the EC that indicates Potential Loss of the CTMT Barrier

Barrier: Fuel Clad

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

None

Barrier: Fuel Clad

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

1. Core Cooling-RED Path conditions met

Definition(s):

None

Basis:

This condition indicates temperatures within the core are sufficient to cause significant superheating of reactor coolant (ref. 1).

Reference(s):

1. 3[4]-EOP-F-0 Critical Safety Function Status Trees CSF F-0.2 Core Cooling
2. NEI 99-01 Inadequate Heat Removal Loss 2.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

1. Core Cooling-ORANGE Path conditions met

Definition(s):

None

Basis:

This condition indicates temperatures withthin the core sufficient to allow the onset of heat-induced cladding damage (ref. 1).

Reference(s):

1. 3[4]-EOP-F-0 Critical Safety Function Status Trees CSF F-0.2 Core Cooling
2. NEI 99-01 Inadequate Heat Removal Loss 2.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

2. Heat Sink-RED Path conditions met **AND** Heat sink is required

Definition(s):

None

Basis:

In combination with RCS Potential Loss B.3, meeting this threshold results in a Site Area Emergency.

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (i.e., 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 B.3; 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.

The phrase "and heat sink required" precludes the need for classification for conditions in which RCS pressure is less than SG pressure or Heat Sink-RED path entry was created through operator action directed by an EOP. For example, FR-H.1 is entered from CSFST Heat Sink-Red. Step 1 tells the operator to determine if heat sink is required by checking that RCS pressure is greater than any non-faulted SG pressure and RCS T_{hot} is greater than 350ºF. If these conditions exist, Heat Sink is required. Otherwise, the operator is to either return to the procedure and step in effect or place RHR in service for heat removal. For large LOCA events inside the Containment, the SGs are moot because heat removal through the containment heat removal systems takes place. Therefore, Heat Sink Red should not be required and, should not be assessed for EAL classification because a LOCA event alone should not require higher than an Alert classification. (ref. 1, 2).

Reference(s):

1. 3[4]-EOP-F-0 Critical Safety Function Status Trees CSF F-0.3 Heat Sink
2. 3[4]-EOP-FR-H.1 Response to Loss of Secondary Heat Sink
3. NEI 99-01 Inadequate Heat Removal Fuel Clad Potential Loss 2.B

Barrier: Fuel Clad

Category: C. CTMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

2. Containment High Range Radiation Monitor Rad-3[4]-6311A/B reading > 5.4E+03 R/hr

Definition(s):

None

Basis:

Containment radiation monitor readings greater than the value shown indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the containment. The reading is derived assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with a concentration of ~5% clad failure into the containment atmosphere. Reactor coolant concentrations of this magnitude are several times larger than the maximum concentrations (including iodine spiking) allowed within Technical Specifications and are therefore indicative of fuel damage (ref. 1).

The radiation monitor reading in this threshold is higher than that specified for RCS Barrier Loss threshold C.2 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 ECL to a Site Area Emergency.

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

Reference(s):

1. PTN NEI-99-01 Radiation Monitor EAL Value Determination
2. NEI 99-01 CTMT Radiation / RCS Activity FC Loss 3.A

Barrier: Fuel Clad

Category: C. CTMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

3. Coolant activity > 300 µCi/gm dose equivalent I-131

Definition(s):

None

Basis:

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.

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

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

Reference(s):

1. NEI 99-01 CTMT Radiation / RCS Activity FC Loss 3.B

Barrier: Fuel Clad

Category: C. CTMT Radiation / RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

None

Barrier: Fuel Clad

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: E. EC Judgment

Degradation Threat: Loss

Threshold:

4. **Any** condition in the opinion of the EC that indicates loss of the Fuel Clad barrier

Definition(s):

None

Basis:

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

Reference(s):

1. NEI 99-01 Emergency Director Judgment Fuel Clad Loss 6.A

Barrier: Fuel Clad

Category: E. EC Judgment

Degradation Threat: Potential Loss

Threshold:

3. **Any** condition in the opinion of the EC that indicates potential loss of the Fuel Clad barrier

Definition(s):

None

Basis:

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

Reference(s):

1. NEI 99-01 Emergency Director Judgment Potential Fuel Clad Loss 6.A

Barrier: Reactor Coolant System

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Loss

Threshold:

1. An automatic or manual SI actuation required by **EITHER:**
   - UNISOLABLE RCS leakage
   - SG tube RUPTURE

Definition(s):

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

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

Basis:

This threshold is based on an UNISOLABLE RCS leak of sufficient size to require an automatic or manual actuation of the Emergency Core Cooling System (ECCS). 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 (i.e., 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 A.1 will also be met.

Reference(s):

1. 3[4]-EOP-E-1 Loss of Reactor or Secondary Coolant
2. 3[4]-EOP-E-3 Steam Generator Tube Rupture
3. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Loss 1.A

Barrier: Reactor Coolant System

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Potential Loss

Threshold:

1. UNISOLABLE RCS or SG tube leakage > 69 gpm

Definition(s):

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

Basis:

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 SI actuation has not occurred. The threshold is met when RCS leakage is determined to exceed 69 gpm excluding normal reductions in RCS inventory such as letdown and RCP seal leakoff (ref. 1, 2, 3).

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 (i.e., steam generator tube leakage) or outside of containment.

If the leaking steam generator (> 69 gpm) is also FAULTED outside of containment, the declaration escalates to a Site Area Emergency since the Containment Barrier Loss threshold A.1 will also be met.

Reference(s):

1. 3[4]-EOP-E-1 Loss of Reactor or Secondary Coolant
2. 3[4]-EOP-E-3 Steam Generator Tube Rupture
3. FSAR Table 9.2-2 Nominal Chemical and Volume Control System Performance
4. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Potential Loss 1.A

Barrier: Reactor Coolant System

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Potential Loss

Threshold:

2. Integrity-RED Path conditions met

Definition(s):

None

Basis:

The "Potential Loss" threshold is defined by the CSFST Integrity - RED path. CSFST Integrity - Red Path plant conditions and associated PTS Limit A indicates an extreme challenge to the safety function when plant parameters are to the left of the limit curve following excessive RCS cooldown under pressure (ref. 1, 2).

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 (i.e., hot and pressurized).

Reference(s):

1. 3[4]-EOP-F-0 Critical Safety Function Status Trees Enclosure 4 CSF F-0.4 Integrity
2. 3[4]-EOP-FR-P.1 Response to Imminent Pressurized Thermal Shock Condition
3. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Potential Loss 1.B

Barrier: Reactor Coolant System

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

3. Heat Sink-RED Path conditions met

   AND

   Heat sink is required

Definition(s):

None

Basis:

In combination with Fuel Clad Potential Loss B.1, meeting this threshold results in a Site Area Emergency.

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (i.e., 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 B.2; 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.

The phrase “and heat sink required” precludes the need for classification for conditions in which RCS pressure is less than SG pressure or Heat Sink-RED path entry was created through operator action directed by an EOP. For example, FR-H.1 is entered from CSFST Heat Sink-Red. Step 1 tells the operator to determine if heat sink is required by checking that RCS pressure is greater than any non-faulted SG pressure and RCS T_{hot} is greater than 350ºF. If these conditions exist, Heat Sink is required. Otherwise, the operator is to either return to the procedure and step in effect or place RHR in service for heat removal. For large LOCA events inside the Containment, the SGs are moot because heat removal through the containment heat removal systems takes place. Therefore, Heat Sink Red should not be required and, should not be assessed for EAL classification because a LOCA event alone should not require higher than an Alert classification. (ref. 1, 2).

Reference(s):

1. 3[4]-EOP-F-0 Critical Safety Function Status Trees CSF F-0.3 Heat Sink
2. 3[4]-EOP-FR-H.1 Response to Loss of Secondary Heat Sink
3. NEI 99-01 Inadequate Heat Removal RCS Potential Loss 2.B

Barrier: Reactor Coolant System

Category: C. CTMT Radiation/ RCS Activity

Degradation Threat: Loss

Threshold:

2. Containment Mezzanine Radiation Monitor RI-3[4]-1401B[1404B] reading > 10 mR/hr

Definition(s):

None

Basis:

A reading > the value shown is indicative of a breach in the RCS barrier (ref. 1).

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.2 since it indicates a loss of the RCS Barrier only.

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

Reference(s):

1. PTN NEI-99-01 Radiation Monitor EAL Value Determination
2. NEI 99-01 CMT Radiation / RCS Activity RCS Loss 3.A

Barrier: Reactor Coolant System

Category: C. CTMT Radiation/ RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: E. EC Judgment

Degradation Threat: Loss

Threshold:

3. **Any** condition in the opinion of the EC that indicates loss of the RCS barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that may be used by the EC in determining whether the RCS barrier is lost.

Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Loss 6.A

Barrier: Reactor Coolant System

Category: E. EC Judgment

Degradation Threat: Potential Loss

Threshold:

4. **Any** condition in the opinion of the EC that indicates potential loss of the RCS barrier

Definition(s):

None

Basis:

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

Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Potential Loss 6.A

Barrier: Containment

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

1. A leaking or RUPTURED SG is FAULTED outside of CTMT

Definition(s):

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.

RUPTURED - The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection.

Basis:

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 A.1and Loss A.1, 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 SU4 for the fuel clad barrier (i.e., RCS activity values) and IC SU5 for the RCS barrier (i.e., 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 (e.g., 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 (e.g., 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 SU5.1	Unusual Event per SU5.1
Requires operation of a standby charging (makeup) pump (*RCS Barrier Potential Loss*)	Site Area Emergency per FS1.1	Alert per FA1.1
Requires an automatic or manual ECCS (SIAS) actuation (*RCS Barrier Loss*)	Site Area Emergency per FS1.1	Alert per FA1.1

There is no Potential Loss threshold associated with RCS or SG Tube Leakage.

Reference(s):

1. NEI 99-01 RCS or SG Tube Leakage Containment Loss 1.A

Barrier: Containment

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Containment

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

None

Barrier: Containment

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

1. Core Cooling-RED path conditions met

   AND

   Restoration procedures **not** effective within 15 min. (Note 1)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Definition(s):

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.

Basis:

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 EC should escalate the emergency classification level to a General Emergency as soon as it is determined that the procedure(s) will not be effective.

Severe accident analyses (e.g., 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.

Reference(s):

1. 3[4]-EOP-F-0 Critical Safety Function Status Trees CSF F-0.2 Core Cooling
2. 3[4]-EOP-FR-C.1 Response to Inadequate Core Cooling
3. NEI 99-01 Inadequate Heat Removal Containment Potential Loss 2.A

Barrier: Containment

Category: C. CTMT Radiation/RCS Activity

Degradation Threat: Loss

Threshold:

None

Barrier: Containment

Category: C. CTMT Radiation/RCS Activity

Degradation Threat: Potential Loss

Threshold:

2. Containment High Range Radiation Monitor Rad-3[4]-6311A/B reading > 2.2E+04 R/hr

Definition(s):

None

<u>Basis:</u>

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 (ref. 1).

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.

Reference(s):

1. PTN NEI-99-01 Radiation Monitor EAL Value Determination
3. NEI 99-01 CMT Radiation / RCS Activity Containment Potential Loss 3.A

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

2. CTMT isolation (Phase A, B or CVI) is required

   AND EITHER:

   - CTMT integrity has been lost based on EC judgment
   - UNISOLABLE pathway from CTMT atmosphere to the environment exists

Definition(s):

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

Basis:

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Loss Threshold A.1.

These thresholds address a situation where containment isolation (Phase A, B or CVI) 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 bulleted thresholds. The threshold specifies "(Phase A, B or CVI)" as the site-specific isolation signals that initiate required containment isolations to preclude fission product release from the containment (ref. 1).

First Threshold – Containment integrity has been lost, i.e., 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 EC will assess this threshold using judgment, and with due consideration given to current plant conditions, and available operational and radiological data (e.g., containment pressure, readings on radiation monitors outside containment, operating status of containment pressure control equipment, etc.).

Refer to the middle piping run of Figure 1. 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 (e.g., 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 A ICs.

Second Threshold – 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 (e.g., 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 1. In this simplified example, the inboard and outboard isolation valves remained open after a containment isolation was required (i.e., 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 (i.e., 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 1. 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 developed a leak that allowed steam/water to enter the Auxiliary Building, then the second threshold 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 the first threshold 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 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 an enclosed system. These releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category R ICs.

Reference(s):

1. UFSAR Section 6.6 Containment Isolation
2. NEI 99-01 CMT Integrity or Bypass Containment Loss 4.A

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

3. Indications of RCS leakage outside of CTMT

Definition(s):

None

Basis:

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 A.1 to be met.

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Containment Loss Threshold A.1.

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 (i.e., 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.

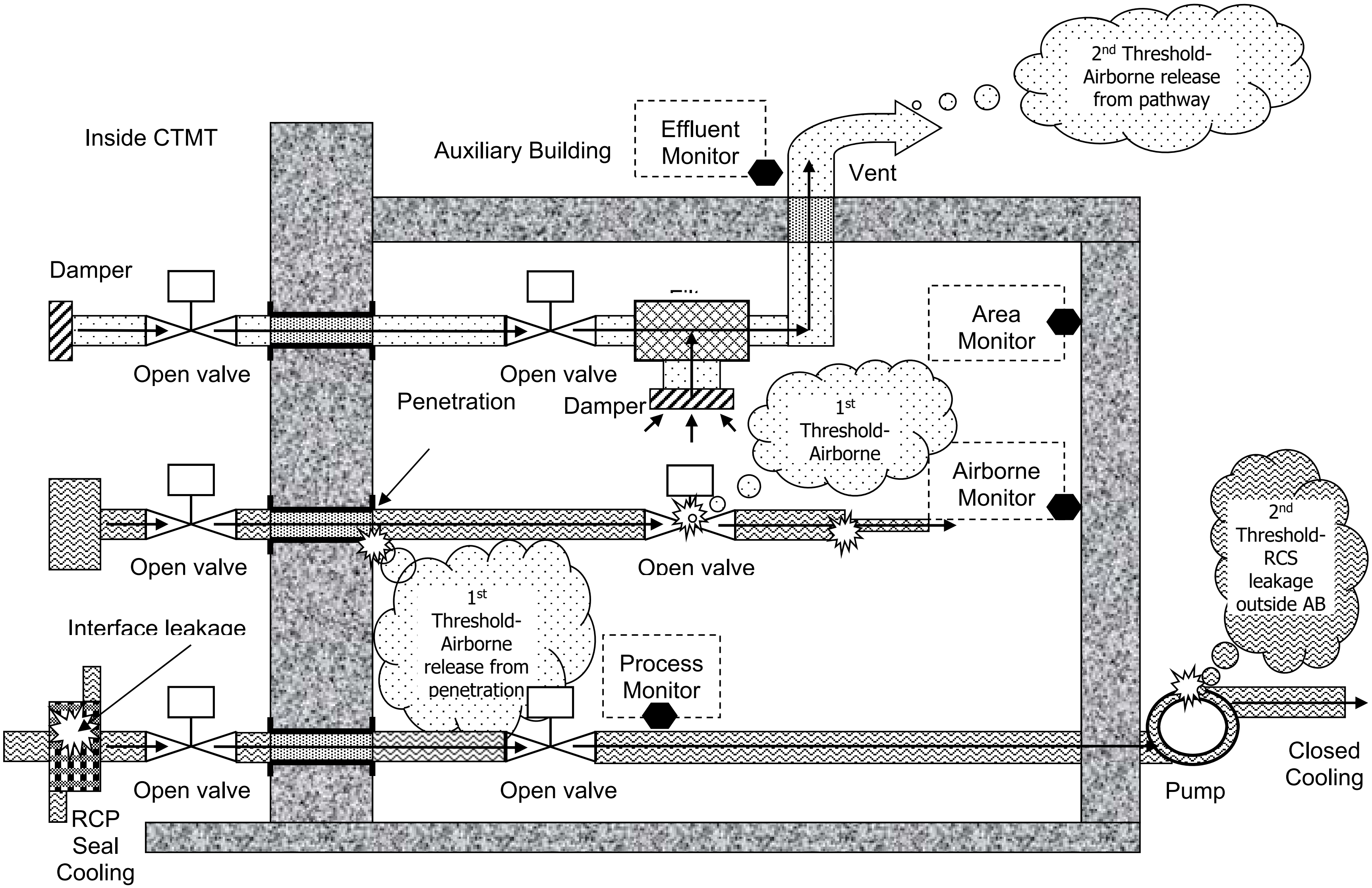
Unexpected elevated readings and alarms on radiation monitors with detectors outside containment should be corroborated with other available indications to confirm that the source is a loss of RCS mass outside of containment. If the fuel clad barrier has not been lost, radiation monitor readings outside 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 1. 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 containment loss threshold D.2 to be met as well.

Reference(s):

1. NEI 99-01 CMT Integrity or Bypass Containment Loss 4.B

Figure 1: Containment Integrity or Bypass Examples



Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

3. Containment-RED Path conditions met

Definition(s):

None

Basis:

If containment pressure exceeds the design pressure of 55 psig (ref. 1, 2), 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.

Reference(s):

1. 3[4]-EOP-F-0 Critical Safety Function Status Trees CSF F-0.5 Containment
2. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.A

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

4. CTMT hydrogen concentration > 4%

Definition(s):

None

Basis:

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

A containment hydrogen concentration of 4% conservatively represents the lowest threshold for flammability in the presence of oxygen (ref. 1).

Reference(s):

1. Computational Aids CA-3 Hydrogen Flammability In Containment
2. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.B

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

5. CTMT pressure > 20 psig with < one full train of CTMT heat removal systems operating per design for ≥ 15 min. (Notes 1, 11)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 11: One full train of CTMT heat removal systems consists of at least two Containment Coolers operating in conjunction with one Containment Spray Pump.

Definition(s):

None

Basis:

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 (ref. 1, 2). 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 (e.g., containment sprays and Containment Coolers but not including containment venting strategies) are either lost or performing in a degraded manner.

One full train of CTMT heat removal systems consists of at least two Containment Coolers operating in conjunction with one Containment Spray Pump (ref. 1, 2).

Reference(s):

1. UFSAR Section 6.3 Emergency Containment Cooling
2. UFSAR Section 6.4 Containment Spray System
3. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.C

Barrier: Containment

Category: E. EC Judgment

Degradation Threat: Loss

Threshold:

4. **Any** condition in the opinion of the EC that indicates loss of the CTMT barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that may be used by the EC in determining whether the containment barrier is lost.

Reference(s):

1. NEI 99-01 Emergency Director Judgment Containment Loss 6.A

Barrier: Containment

Category: E. EC Judgment

Degradation Threat: Potential Loss

Threshold:

6. **Any** condition in the opinion of the EC that indicates potential loss of the CTMT barrier

Definition(s):

None

Basis:

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

Reference(s):

1. NEI 99-01 Emergency Director Judgment Containment Potential Loss 6.A

Category H – Hazards and Other Conditions Affecting Plant Safety

EAL Group: ANY (EALs in this category are applicable to any plant condition, hot or cold.)

Hazards are non-plant, system-related events that can directly or indirectly affect plant operation, reactor plant safety or personnel safety.

1. Security

Unauthorized entry attempts into the PROTECTED AREA, bomb threats, sabotage attempts, and actual security compromises threatening loss of physical control of the plant.

2. Seismic Event

Natural events such as earthquakes have potential to cause plant structure or equipment damage of sufficient magnitude to threaten personnel or plant safety.

3. Natural or Technological Hazard

Other natural and non-naturally occurring events that can cause damage to plant facilities include tornados, FLOODING, hazardous material releases and events restricting site access warranting classification.

4. Fire

FIRES can pose significant hazards to personnel and reactor safety. Appropriate for classification are FIRES within the plant PROTECTED AREA or which may affect operability of equipment needed for safe shutdown.

5. Hazardous Gas

Toxic, corrosive, asphyxiant or flammable gas leaks can affect normal plant operations or preclude access to plant areas required to safely shutdown the plant.

6. Control Room Evacuation

Events that are indicative of loss of Control Room habitability. If the Control Room must be evacuated, additional support for monitoring and controlling plant functions is necessary through the emergency response facilities.

7. EC Judgment

The EALs defined in other categories specify the predetermined symptoms or events that are indicative of emergency or potential emergency conditions and thus warrant classification. While these EALs have been developed to address the full spectrum of possible emergency conditions which may warrant classification and subsequent implementation of the Emergency Plan, a provision for classification of emergencies based on operator/management experience and judgment is still necessary. The EALs of this category provide the EC the latitude to classify emergency conditions consistent with the established classification criteria based upon EC judgment.

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: Confirmed SECURITY CONDITION or threat

EAL:

HU1.1 Unusual Event

A SECURITY CONDITION that does **not** involve a HOSTILE ACTION as reported by PTN Security Shift Supervision

OR

Notification of a credible security threat directed at the site

OR

A validated notification from the NRC providing information of an aircraft threat

Mode Applicability:

All

Definition(s):

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 PTN 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 PTN. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the OWNER CONTROLLED AREA).

OWNER CONTROLLED AREA (OCA) - That portion of FPL property surrounding and including the Turkey Point Plant which is subject to limited access and control as deemed appropriate by FPL.

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

PROTECTED AREA **-** The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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 BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

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 and HS1.

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 Offsite Response Organizations.

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*.

The first threshold references the Security Shift Supervision 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.

The second threshold addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with SY-AA-102-1014 Threat Assessment and Reporting (ref. 2).

The third threshold 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 SY-AA-102-1014 Threat Assessment and Reporting (ref.2).

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 PTN Physical Security Plan (ref. 1).

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

Reference(s):

1. PTN Physical Security Plan
2. SY-AA-102-1014 Threat Assessment and Reporting
3. NEI 99-01 HU1

Category: H – Hazards

Subcategory: 1 – Security

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

EAL:

HA1.1 Alert

A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by PTN Security Shift Supervision

OR

A validated notification from NRC of an aircraft attack threat within 30 min. of the site

Mode Applicability:

All

Definition(s):

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 PTN 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 PTN. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the OWNER CONTROLLED AREA).

HOSTILE FORCE - 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.

OWNER CONTROLLED AREA - That portion of FPL property surrounding and including the Turkey Point Plant which is subject to limited access and control as deemed appropriate by FPL.

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

PROTECTED AREA **-** The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

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 (e.g., evacuation, dispersal or sheltering). The Alert declaration will also heighten the awareness of Offsite Response Organizations (OROs), allowing them to be better prepared should it be necessary to consider further actions.

This EAL 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.

The first threshold is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA.

The second threshold 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 SY-AA-102-1014 Threat Assessment and Reporting (ref. 2).

The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may be provided by NORAD through the NRC.

In some cases, it may not be readily apparent if an aircraft impact within the OWNER CONTROLLED AREA was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate federal agency is intended to be NORAD, FBI, FAA or NRC. The emergency declaration, including one based on other ICs/EALs, should not be unduly delayed while awaiting notification by a Federal agency.

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 PTN Physical Security Plan (ref. 1).

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

Reference(s):

1. PTN Physical Security Plan
2. SY-AA-102-1014 Threat Assessment and Reporting
3. NEI 99-01 HA1

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: HOSTILE ACTION within the PROTECTED AREA

EAL:

HS1.1	**Site Area Emergency**
A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by PTN Security Shift Supervision	

Mode Applicability:

All

Definition(s):

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 PTN 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 PTN. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the OWNER CONTROLLED AREA).

HOSTILE FORCE - 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.

OWNER CONTROLLED AREA - That portion of FPL property surrounding and including the Turkey Point Plant which is subject to limited access and control as deemed appropriate by FPL.

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

PROTECTED AREA **-** The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

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 (ref. 1, 2).

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

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Site Area Emergency declaration will mobilize Offsite Response Organization (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 EAL does **not** apply to a HOSTILE ACTION directed at an ISFSI Protected Area located outside the 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 PTN Physical Security Plan (ref. 1).

Reference(s):

1. PTN Physical Security Plan
2. SY-AA-102-1014 Threat Assessment and Reporting
3. NEI 99-01 HS1

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 2 – Seismic Event

Initiating Condition: Seismic event greater than OBE levels

EAL:

HU2.1	**Unusual Event**
Control Room personnel feel an actual or potential seismic event **<u>AND</u>** The occurrence of a seismic event is confirmed in a manner deemed appropriate by the Shift Manager	

Mode Applicability:

All

Definition(s):

None

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 (e.g., performs walk-downs and post-event inspections). Given the time necessary to perform walk-downs and inspections, and fully understand any impacts, this event represents a potential degradation of the level of safety of the plant.

Event verification with external sources should not be necessary during or following an OBE. Earthquakes of this magnitude should be readily felt by on-site personnel and recognized as a seismic event (e.g., lateral accelerations in excess of 0.05g). The Shift Manager or EC may seek external verification if deemed appropriate (e.g., a call to the U.S. Geological Survey (USGS), check internet news sources, etc.); however, the verification action must not preclude a timely emergency declaration.

For both Unit 3 and Unit 4, the OBE ground acceleration threshold is > 0.05g horizontal (ref.2).

The PTN Control Room does not have real time OBE exceedance alarms or indications. Seismic instruments record ground accelerations but must be subsequently analyzed to determine OBE exceedance (ref. 1, 3). Therefore, classification of seismic events at PTN is based on a felt earthquake confirmed in a manner deemed appropriate by the Shift Manager. The Shift Manager or Emergency Coordinator may seek external verification, such as the USGS, however the verification action must not preclude a timely emergency classification.

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

Reference(s):

1. 0-EPIP-20106 Natural Emergencies
2. USFSAR Section 2.9.4.6 Earthquake Design Basis
3. USFSAR Section 5A-5.0 Seismic Instrumentation
4. NEI 99-01 HU2

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.1	**Unusual Event**
A tornado strike within the PROTECTED AREA	

Mode Applicability:

All

Definition(s):

PROTECTED AREA - The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

Basis:

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

This EAL addresses a tornado striking (touching down) within the PROTECTED AREA.

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

If damage is confirmed visually or by other in-plant indications, the event may be escalated to an Alert under IC CA6 or SA9.

A tornado striking (touching down) within the PROTECTED AREA warrants declaration of an Unusual Event regardless of the measured wind speed at the meteorological tower. A tornado is defined as a violently rotating column of air in contact with the ground and extending from the base of a thunderstorm.

Reference(s):

1. 0-EPIP-20106 Natural Emergencies
2. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.2	**Unusual Event**
Internal room or area FLOODING of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode	

Mode Applicability:

All

Definition(s):

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.

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

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

This EAL addresses FLOODING of a building room or area that results in operators isolating power to a SAFETY SYSTEM component due to water level or other wetting concerns. Classification is also required if the water level or related wetting causes an automatic isolation of a SAFETY SYSTEM component from its power source (e.g., a breaker or relay trip). To warrant classification, operability of the affected component must be required by Technical Specifications for the current operating mode (ref. 1, 2).

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

Refer to EAL CA6.1 or SA9.1 for internal flooding affecting more than one SAFETY SYSTEM train.

Reference(s):

1. UFSAR Section 5F.1 PTN Internal Flooding Protection
2. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.3 Unusual Event

Movement of personnel within the PROTECTED AREA is IMPEDED due to an event external to the PROTECTED AREA involving hazardous materials (e.g., an offsite chemical spill or toxic gas release)

Mode Applicability:

All

Definition(s):

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 (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

PROTECTED AREA - The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

Basis:

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

This EAL This EAL addresses a hazardous materials event originating at a location outside the PROTECTED AREA and of sufficient magnitude to IMPEDE the movement of personnel within the PROTECTED AREA.

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

Reference(s):

1. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.4	**Unusual Event**
A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles (Note 7)	

Note 7: This EAL does **not** apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

Mode Applicability:

All

Definition(s):

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.

Basis:

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

This EAL 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 to 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.

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

Reference(s):

1. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

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

EAL:

HU4.1 Unusual Event

A FIRE is **not** extinguished within 15 min. of **any** of the following fire detection indications (Note 1):

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

AND

The FIRE is located within **any** Table H-1 area

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table H-1 PTN Fire Areas
• Containment Building • Control Building • Auxiliary Building • Fuel Handling Building • Turbine Building • Emergency Diesel Generator Buildings • Component Cooling Water (CCW) Area • Intake Structure • 4 KV Switchgear Rooms • Main/Aux/Startup XFMRs • Yard Areas: o RWSTs o PWSTs o CSTs o Unit 3 DOST o Air Compressors o Bus C

Mode Applicability:

All

Definition(s):

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.

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.

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.

The 15 minute requirement begins with a credible notification that a FIRE is occurring, or receipt of multiple VALID fire detection system alarms or field validation of a single fire alarm. The alarm is to be validated using available Control Room indications or alarms to prove that it is not spurious, or by reports from the field.

Table H-1 Fire Areas are those areas that contain equipment necessary for safe operation and shutdown of the plant (ref. 1, 2).

The intent of the 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (e.g., 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.

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

Reference(s):

1. UFSAR Section 5A-1.0 Design Bases of Structures, Systems and Equipment
2. 0-ONOP-016.20 Pre-Fire Plans
3. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

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

EAL:

HU4.2 Unusual Event

Receipt of a single fire alarm (i.e., **no** other indications of a FIRE)

AND

The fire alarm is indicating a FIRE within **any** Table H-1 area (excluding containment)

AND

The existence of a FIRE is **not** verified within 30 min. of alarm receipt (Notes 1, 13)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 13: A containment fire alarm is considered VALID upon receipt of multiple zones (more than one) actuated on the fire alarm panel.

Table H-1 PTN Fire Areas
• Containment Building • Control Building • Auxiliary Building • Fuel Handling Building • Turbine Building • Emergency Diesel Generator Buildings • Component Cooling Water (CCW) Area • Intake Structure • 4 KV Switchgear Rooms • Main/Aux/Startup XFMRs • Yard Areas: o RWSTs o PWSTs o CSTs o Unit 3 DOST o Air Compressors o Bus C

Mode Applicability:

All

Definition(s):

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.

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.

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.

The 30 minute requirement begins upon receipt of a single VALID fire detection system alarm (excluding containment). The alarm is to be validated using available Control Room indications or alarms to prove that it is not spurious, or by reports from the field. Actual field reports must be made within the 30 minute time limit or a classification must be made. If a fire is verified to be occurring by field report, classification shall be made based on EAL HU4.1, with the 15 minute requirement beginning with the verification of the fire by field report.

Table H-1 Fire Areas are those areas that contain equipment necessary for safe operation and shutdown of the plant (ref. 1, 2).

This EAL addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (i.e., proved or disproved) within 30-minutes of the alarm. Upon receipt, 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.

With regard to containment fire alarms, there is constant air movement in containment due to the operation of the containment ventilation system. The operating cooling units are drawing air to the units past the smoke detectors. It can be reasonably expected that a fire that burns for 15 minutes would produce sufficient products of combustion to cause fire detectors in multiple zones to alarm. Therefore a single containment fire alarm is not considered VALID.

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 HU4.1 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>Basis-Related Requirements from Appendix R: (It is recognized that PTN is a NFPA-805 Fire Program plant but the following Appendix R information supports the use of the 30 minute timing criteria based on a single fire alarm)</u>

Appendix R to 10 CFR 50, states in part:

(Note; While PTN is an NFP-805 plant, the following excerpt from 10CFR 50 Appendix R provides the bases for the acceptability of the use of a 30-minute validation time for a single fire zone alarm.)

> 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 HU4.2, 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.

Reference(s):

1. UFSAR Section 5A-1.0 Design Bases of Structures, Systems and Equipment
2. 0-ONOP-016.20 Pre-Fire Plans
3. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

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

EAL:

HU4.3	**Unusual Event**
A FIRE within the PROTECTED AREA **not** extinguished within 60 min. of the initial report, alarm or indication (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

All

Definition(s):

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

PROTECTED AREA - The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

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.

In addition to a FIRE addressed by EAL HU4.1 or HU4.2, a FIRE within the plant PROTECTED AREA not extinguished within 60-minutes may also potentially degrade the level of plant safety.

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

Reference(s):

1. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

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

EAL:

HU4.4	**Unusual Event**
A FIRE within the PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish	

Mode Applicability:

All

Definition(s):

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

PROTECTED AREA - The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

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.

If a FIRE within the plant PROTECTED AREA is of sufficient size to require a response by an offsite firefighting agency (e.g., a local town Fire Department), then the level of plant safety is potentially degraded. The dispatch of an offsite firefighting agency to the site requires an emergency declaration only if it is needed to actively support firefighting efforts because the fire is beyond the capability of the Fire Brigade to extinguish. Declaration is not necessary if the agency resources are placed on stand-by, or supporting post-extinguishment recovery or investigation actions.

The Shift Fire Brigade Advisor or Shift Fire Brigade Leader will assess whether the fire conditions warrant outside assistance (ref. 1).

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

Reference(s):

1. FP-AA-104-1003 Fire Response
2. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 5 – Hazardous Gases

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

EAL:

HA5.1 Alert

Release of a toxic, corrosive, asphyxiant or flammable gas into **any** Table H-2 room or area

AND

Entry into the room or area is prohibited or IMPEDED (Note 5)

Note 5: 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.

Table H-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	**Mode(s)**
Auxiliary Building 18'	1, 2, 3, 4, 5
Turbine Building (**any** level)	1, 2, 3, 4, 5
Containment	4, 5
HHSI Pump, CSP Rooms	3
RHR Pump & HX Rooms	4
Rad Waste Building	1, 2, 3, 4, 5

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown, 5 – Cold Shutdown

Definition(s):

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 (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

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 EC's judgment that the gas concentration in the affected room/area is sufficient to preclude or significantly IMPEDE procedurally required access. This judgment may be based on a variety of factors including an existing job hazard analysis, report of ill effects on personnel, advice from a subject matter expert or operating experience with the same or similar hazards. Access should be considered as IMPEDED if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is not routinely employed).

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

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the gaseous release). For example, the plant is in Mode 1 when the gaseous release occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The gas release is a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., fire suppression system testing).
- The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or IMPEDE a required action.
- If the equipment in the listed room or area was already inoperable, or out-of-service, before the event occurred, then no emergency should be declared since the event will have no adverse impact beyond that already allowed by Technical Specifications at the time of the event.

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. Steam can be an asphyxiant if present in sufficient concentration to reduce oxygen levels below normal.

This EAL does not apply to firefighting activities that generate smoke and 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.

Reference(s):

1. Attachment 2 Safe Operation & Shutdown Areas Tables R-3 & H-2 Bases
2. NEI 99-01 HA5

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 6 – Control Room Evacuation

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

EAL:

HA6.1	**Alert**
An event has resulted in the Control Room being evacuated	

Mode Applicability:

All

Definition(s):

None

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.

The Control Room is deemed to have been evacuated when the last licensed operator leaves the Control Room.

Escalation of the emergency classification level would be via IC HS6.

Reference(s):

1. 0-ONOP-105 Control Room Evacuation
2. NEI 99-01 HA6

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 6 – Control Room Evacuation

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

EAL:

HS6.1 Site Area Emergency

An event has resulted in the Control Room being evacuated

AND

Control of **any** of the following key safety functions is **not** re-established within 15 min. of the last licensed operator leaving the Control Room (Note 1):

- Reactivity (modes 1, 2 and 3 **only**)
- Core cooling
- RCS heat removal

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 - Hot Standby, 4 – Hot Shutdown, 5 – Cold Shutdown, 6 – Refueling

Definition(s):

None

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 EC judgment. The EC 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 remote safe shutdown location(s).

The Control Room is deemed to have been evacuated when the last licensed operator leaves the Control Room.

Establishment of the reactivity safety function is only applicable in Modes 1, 2 and 3. Sufficient shutdown margin has already been established once in modes 4, 5 and 6 (ref. 2).

Escalation of the emergency classification level would via IC FG1 or CG1

Reference(s):

1. 0-ONOP-105 Control Room Evacuation
2. NRC EP FAQ 2015-014
3. NEI 99-01 HS6

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – EC Judgment

Initiating Condition: Other conditions existing that in the judgment of the EC warrant declaration of a Unusual Event

EAL:

HU7.1 Unusual Event

Other conditions exist which, in the judgment of the EC, 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.

Mode Applicability:

All

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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 EC to fall under the emergency classification level description for an Unusual Event.

Reference(s):

1. NEI 99-01 HU7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – EC Judgment

Initiating Condition: Other conditions exist that in the judgment of the EC warrant declaration of an Alert

EAL:

HA7.1 Alert

Other conditions exist which, in the judgment of the EC, 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.

Mode Applicability:

All

Definition(s):

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 PTN 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 PTN. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the OWNER CONTROLLED AREA).

OWNER CONTROLLED AREA - That portion of FPL property surrounding and including the Turkey Point Plant which is subject to limited access and control as deemed appropriate by FPL.

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

PROTECTED AREA - The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

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 EC to fall under the emergency classification level description for an Alert.

Reference(s):

1. NEI 99-01 HA7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – EC Judgment

Initiating Condition: Other conditions existing that in the judgment of the EC warrant declaration of a Site Area Emergency

EAL:

HS7.1 Site Area Emergency

Other conditions exist which, in the judgment of the EC, 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

Mode Applicability:

All

Definition(s):

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 PTN 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 PTN. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the OWNER CONTROLLED AREA).

OWNER CONTROLLED AREA - That portion of FPL property surrounding and including the Turkey Point Plant which is subject to limited access and control as deemed appropriate by FPL.

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

SITE BOUNDARY - That line beyond which the land or property is not owned, leased or otherwise controlled by PTN.

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 EC to fall under the emergency classification level description for a SITE AREA EMERGENCY.

Reference(s):

1. NEI 99-01 HS7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – EC Judgment

Initiating Condition: Other conditions exist that in the judgment of the EC warrant declaration of a General Emergency

EAL:

HG7.1	**General Emergency**

Other conditions exist which, in the judgment of the EC, 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.

Mode Applicability:

All

Definition(s):

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

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

HOSTILE ACTION - An act toward PTN 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 PTN. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the OWNER CONTROLLED AREA).

OWNER CONTROLLED AREA - That portion of FPL property surrounding and including the Turkey Point Plant which is subject to limited access and control as deemed appropriate by FPL.

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

PROTECTED AREA - The area (within the OWNER CONTROLLED AREA) occupied by the nuclear units and associated equipment and facilities enclosed within the security perimeter fence. The area within which accountability of personnel is maintained in an emergency.

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 EC to fall under the emergency classification level description for a GENERAL EMERGENCY.

Reference(s):

1. NEI 99-01 HG7

Category S – System Malfunction

EAL Group: Hot Conditions (RCS temperature > 200ºF); EALs in this category are applicable only in one or more hot operating modes.

Numerous system-related equipment failure events that warrant emergency classification have been identified in this category. They may pose actual or potential threats to plant safety.

The events of this category pertain to the following subcategories:

1. Loss of Emergency AC Power

Loss of emergency plant electrical power can compromise plant safety system operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of onsite and offsite power sources for 4KV emergency buses.

2. Loss of Vital DC Power

Loss of emergency plant electrical power can compromise plant safety system operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of power to or degraded voltage on the 125V DC vital buses.

3. Loss of Control Room Indications

Certain events that degrade plant operator ability to effectively assess plant conditions within the plant warrant emergency classification. Losses of indicators are in this subcategory.

4. RCS Activity

During normal operation, reactor coolant fission product activity is very low. Small concentrations of fission products in the coolant are primarily from the fission of tramp uranium in the fuel clad or minor perforations in the clad itself. Any significant rise from these base-line levels (~1% clad failures) is indicative of fuel failures and is covered under the Fission Product Barrier Degradation category. However, lesser amounts of clad damage may result in coolant activity exceeding Technical Specification limits. These fission products will be circulated with the reactor coolant and can be detected by coolant sampling.

5. RCS Leakage

The reactor vessel provides a volume for the coolant that covers the reactor core. The reactor pressure vessel and associated pressure piping (reactor coolant system) together provide a barrier to limit the release of radioactive material should the reactor fuel clad integrity fail. Excessive RCS leakage greater than Technical Specification limits indicates potential pipe cracks that may propagate to an extent threatening fuel clad, RCS and containment integrity.

6. RTS Failure

This subcategory includes events related to failure of the Reactor Trip System (RTS) to initiate and complete reactor trips. In the plant licensing basis, postulated failures of the RTS to complete a reactor trip comprise a specific set of analyzed events referred to as Anticipated Transient Without Scram (ATWS) events. For EAL classification, however, ATWS is intended to mean any scram failure event that does not achieve reactor shutdown. If RTS actuation fails to properly result in reactor shutdown, positive control of reactivity is at risk and could cause a threat to fuel clad, RCS and containment integrity.

7. Loss of Communications

Certain events that degrade plant operator ability to effectively communicate with essential personnel within or external to the plant warrant emergency classification.

8. Containment Failure

Failure of containment isolation capability (under conditions in which the containment is not currently challenged) warrants emergency classification. Failure of containment pressure control capability also warrants emergency classification.

9. Hazardous Event Affecting Safety Systems

Various natural and technological events that result in degraded plant safety system train performance or significant VISIBLE DAMAGE warrant emergency classification under this subcategory.

Category: S – System Malfunction

Subcategory: 1 – Loss of Emergency AC Power

Initiating Condition: Loss of **all** offsite AC power capability to emergency buses for 15 minutes or longer

EAL:

SU1.1 Unusual Event
Loss of **all** offsite AC power capability, Table S-1, to 4KV emergency buses 3[4]A and 3[4]B for ≥ 15 min. (Note 1)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table S-1 AC Power Sources
Offsite • Unit 3[4] Startup Transformer **Onsite** • 3A[4A] Emergency Diesel Generator • 3B[4B] Emergency Diesel Generator

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

None

Basis:

Table S-1 provides a list of offsite AC electrical power sources credited for this EAL (ref. 1, 2, 3).

The two offsite power sources at PTN are the Unit 3 and 4 Startup transformers. Each transformer has a cross-connect breaker to the opposite Unit “A” 4 KV bus through a single breaker which is normally racked-out and locked. This configuration is per the design and is considered to meet the Technical Specification requirements for off-site power sources. For EALs SU1.1 and SA1.1 the opposite Unit Startup Transformer is not credited under hot conditions (Modes 1 – 4) due to the racked-out and locked configuration and the associated time required to rack in the breaker and establish the cross-connect (> 15 min.). Steps are taken however to establish the breaker cross-connect to restore off-site power per EOPs.

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.

Reference(s):

1. Technical Specifications Section 3.8.1 A. C. Sources
2. UFSAR section 8.2.2 Station Electrical System
3. NEI 99-01 SU1

Category: S – System Malfunction

Subcategory: 1 – Loss of Emergency AC Power

Initiating Condition: Loss of **all but one** AC power source to emergency buses for 15 minutes or longer

EAL:

SA1.1 Alert

AC power capability, Table S-1, to 4KV emergency buses 3[4]A and 3[4]B reduced to a single power source for ≥ 15 min. (Note 1)

AND

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

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table S-1 AC Power Sources
Offsite • Unit 3[4] Startup Transformer **Onsite** • 3A[4A] Emergency Diesel Generator • 3B[4B] Emergency Diesel Generator

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

Table S-1 provides a list of offsite and onsite AC electrical power sources credited for this EAL. (ref. 1, 2).

The two offsite power sources at PTN are the Unit 3 and 4 Startup transformers. Each transformer has a cross-connect breaker to the opposite Unit "A" 4 KV bus through a single breaker which is normally racked-out and locked. This configuration is per the design and is considered to meet the Technical Specification requirements for off-site power sources. For EALs SU1.1 and SA1.1 the opposite Unit Startup Transformer is not credited under hot conditions (Modes 1 – 4) due to the racked-out and locked configuration and the associated time required to rack in the breaker and establish the cross-connect (> 15 min.). Steps are taken however to establish the breaker cross-connect to restore off-site power per EOPs.

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 (e.g., an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being cross tied to the other unit.
- A loss of emergency power sources (e.g., onsite diesel generators and unit cross ties) with a single train of emergency buses being fed from an offsite power source.

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

Escalation of the emergency classification level would be via IC SS1.

This hot condition EAL is equivalent to the cold condition EAL CU2.1.

Reference(s):

1. Technical Specifications Section 3.8.1 A. C. Sources
2. UFSAR section 8.2.2 Station Electrical System
3. NEI 99-01 SA1

Category: S – System Malfunction

Subcategory: 1 – Loss of Emergency AC Power

Initiating Condition: Loss of **all** offsite power and **all** onsite AC power to emergency buses for 15 minutes or longer

EAL:

SS1.1	**Site Area Emergency**
Loss of **all** offsite and **all** onsite AC power to 4KV emergency buses 3[4]A and 3[4]B for ≥ 15 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

For this EAL credit can be taken for any AC power source that has sufficient capability to operate equipment necessary to maintain a safe shutdown condition, such as FLEX generators, provided it is already aligned or can be aligned within the 15 minute classification criteria (ref. 3).

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.

This hot condition EAL is equivalent to the cold condition EAL CA2.1.

Reference(s):

1. Technical Specifications Section 3.8.1 A. C. Sources
2. UFSAR section 8.2.2 Station Electrical System
3. BD-EOP-ECA-0.0 Loss of All AC Power
4. NEI 99-01 SS1

Category: S –System Malfunction

Subcategory: 1 – Loss of Vital AC Power

Initiating Condition: Prolonged loss of **all** offsite and **all** onsite AC power to emergency buses

EAL:

SG1.1	**General Emergency**

Loss of **all** offsite and **all** onsite AC power to 4KV emergency buses 3[4]A and 3[4]B

AND EITHER

- Long-term RCS heat removal capability is not likely to be established and maintained per procedure
- CETs > 1200ºF

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

For this EAL credit can be taken for any AC power source that has sufficient capability to operate equipment necessary to maintain a safe shutdown condition, such as FLEX generators (ref. 2, 3).

The EAL threshold is based on either of the following conditions due to a prolonged loss of all AC power to the emergency busses:

- The inability to establish and maintain long-term RCS heat removal capability per BD-EOP-ECA-0.0 Loss of All AC Power (ref. 3).
- Exceeding the degraded core cooling threshold based on Core Exit Thermocouple (CET) readings (> 1,200 °F). Core Damage Assessment uses a CET temperature of 750 °F - 1300 °F as the temperature indicative of a significantly damaged core (ref. 4). A

temperature of 1200 °F has been selected consistent with the Critical Safety Function Status Tree (CSFST) Core Cooling Red Path threshold (ref. 5).

This IC addresses a prolonged loss of all power sources to AC emergency buses that results in degraded core cooling. 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 eventually lead to a loss of one or more fission product barriers. In addition, fission product barrier monitoring capabilities may be degraded under these conditions.

For extended loss of emergency bus AC power events that do not result in a breach of the RCS barrier, this 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.

The EAL will 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.

Reference(s):

1. Technical Specifications Section 3.8.1 A. C. Sources
2. UFSAR section 8.2.2 Station Electrical System
3. BD-EOP-ECA-0.0 Loss of All AC Power
4. 0-EPIP-1302 Core Damage Assessment
5. 3[4]-EOP-F-0 Critical Safety Function Status Trees
6. NEI 99-01 SG1

Category: S – System Malfunction

Subcategory: 2 – Loss of Vital DC Power

Initiating Condition: Loss of **all** vital DC power for 15 minutes or longer

EAL:

SS2.1 Site Area Emergency
Indicated voltage < 105 VDC on **both** vital 125 VDC buses 3D01[4D01] and 3D23[4D23] for ≥ 15 min. (Note 1)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

The vital (Class 1E) 125 V DC power system consists of four physically and electrically separated buses – 3D01 and 3D23 (Unit 3) and 4D01 and 4D23 (Unit 4). Each bus has a 60 cell battery bank with an eight-hour rating, with a minimum operating voltage of 105 volts (ref. 1, 2, 3).

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 SG2.

This hot condition EAL equivalent of the cold condition EAL CU4.1.

Reference(s):

1. UFSAR Section 8.2.2.3 DC Power Systems

2. 5610-003-DB-002 Vital AC/DC Component Design Requirements
3. Technical Specifications Section 3.8.2. D.C. Sources
4. NEI 99-01 SS8

Category: S –System Malfunction

Subcategory: 2 – Loss of Vital DC Power

Initiating Condition: Loss of **all** emergency AC and vital DC power sources for 15 minutes or longer

EAL:

SG2.1 General Emergency
Loss of **all** offsite and **all** onsite AC power to 4KV emergency buses 3[4]A and 3[4]B ≥ 15 min. (Note 1)
AND
Indicated voltage < 105 VDC on **both** vital 125 VDC buses 3D01[4D01] and 3D23[4D23] for ≥ 15 min. (Note 1)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses a concurrent and prolonged loss of both emergency AC and vital DC power. A loss of all emergency 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 emergency AC and vital DC power will lead to multiple challenges to fission product barriers.

For this EAL credit can be taken for any AC power source that has sufficient capability to operate equipment necessary to maintain a safe shutdown condition, such as FLEX generators (ref. 3).

The vital (Class 1E) 125 V DC power system consists of four physically and electrically separated buses – 3D01 and 3D23 (Unit 3) and 4D01 and 4D23 (Unit 4). Each bus has a 60 cell battery bank with an eight-hour rating, with a minimum operating voltage of 105 volts (ref. 4, 5, 6).

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.

Reference(s):

1. Technical Specifications Section 3.8.1 A. C. Sources
2. UFSAR section 8.2.2 Station Electrical System
3. BD-EOP-ECA-0.0 Loss of All AC Power
4. UFSAR Section 8.2.2.3 DC Power Systems
5. 5610-003-DB-002 Vital AC/DC Component Design Requirements
6. Technical Specifications Section 3.8.2. D.C. Sources
7. NEI 99-01 SG8

Category: S – System Malfunction

Subcategory: 3 – Loss of Control Room Indications

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

EAL:

SU3.1	**Unusual Event**
An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)	

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • CET temperature • Level in at least one SG • Auxiliary feedwater flow to at least one SG

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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.

Basis:

Applicable safety system parameters are listed in Table S-2.

The Safety Assessment System (SAS) and Emergency Response Data Acquisition and Display System (ERDADS) serve as redundant indicators which may be utilized as compensatory measures in lieu of the Control Room indicators associated with safety functions (ref. 1).

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 RCS 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 SA3.

Reference(s):

1. UFSAR Appendix 7A Distributed Control System/Safety Assessment System/Emergency Response Data Acquisition and Display System
2. NEI 99-01 SU2

Category: S – System Malfunction

Subcategory: 3 – Loss of Control Room Indications

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

EAL:

SA3.1 Alert

An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)

AND

Any significant transient is in progress, Table S-3

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • CET temperature • Level in at least one SG • Auxiliary feedwater flow to at least one SG

Table S-3 Significant Transients
• Automatic turbine runback > 25% thermal reactor power • Electrical load rejection > 25% full electrical load • Reactor Trip • SI actuation

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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.

Basis:

Applicable safety system parameters are listed in Table S-2.

Significant transients are listed in Table S-3.

The Safety Assessment System (SAS) and Emergency Response Data Acquisition and Display System (ERDADS) serve as redundant indicators which may be utilized as compensatory measures in lieu of the Control Room indicators associated with safety functions (ref. 1).

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 RCS 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 RS1

Reference(s):

1. UFSAR Appendix 7A Distributed Control System/Safety Assessment System/Emergency Response Data Acquisition and Display System
2. NEI 99-01 SA2

Category: S – System Malfunction

Subcategory: 4 – RCS Activity

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

EAL:

SU4.1	**Unusual Event**
Sample analysis indicates reactor coolant activity > 60 μCi/gm dose equivalent I-131	
•	

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

None

Basis:

This IC addresses a reactor coolant activity value that exceeds an allowable limit specified in Technical Specifications (ref. 1, 2). 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.

Reference(s):

1. Technical Specification 3.4.8 RCS Specific Activity
2. 3[4]-ONOP-041.4 Excessive RCS Activity
3. NEI 99-01 SU3

Category: S – System Malfunction

Subcategory: 5 – RCS Leakage

Initiating Condition: RCS leakage for 15 minutes or longer

EAL:

SU5.1 Unusual Event

RCS unidentified or pressure boundary leakage > 10 gpm for ≥ 15 min.

OR

RCS identified leakage > 25 gpm for ≥ 15 min.

OR

Leakage from the RCS to a location outside containment > 25 gpm for ≥ 15 min.

(Note 1)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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

Basis:

Once the RCS leak rate has been quantified to be greater than the specified value, failure to isolate the leak within 15 minutes, or if known that the leak cannot be isolated within 15 minutes, from the time of leak rate quantification, requires immediate classification.

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

The first and second EAL conditions 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). The third condition addresses an RCS mass loss caused by an UNISOLABLE leak through an interfacing system. These conditions thus apply to leakage into the containment, a secondary-side system (e.g., steam generator tube leakage) or a location outside of containment.

The leak rate values for each condition were selected because they are usually observable with normal Control Room indications. Lesser values typically require time-consuming calculations to determine (e.g., a mass balance calculation). The first condition 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 (e.g., 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.

Reference(s):

1. Technical Specification Section 1.0 Definitions
2. Technical Specification 3.4.6 RCS Leakage
3. 3[4]-ONOP-041.3 Excessive RCS Leakage
4. 3[4]-ONOP-071.2 Steam Generator Tube Leakage
5. NEI 99-01 SU4

Category: S – System Malfunction

Subcategory: 6 – RTS Failure

Initiating Condition: Automatic or manual trip fails to shut down the reactor

EAL:

SU6.1 **Unusual Event**
An automatic trip did **not** shut down the reactor after **any** RPS setpoint is exceeded
AND
A subsequent automatic trip (RPS or AMSAC) or manual trip (reactor trip switches) is successful in shutting down the reactor as indicated by reactor power < 5% (Note 8)

Note 8: A manual trip 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.

Mode Applicability:

1 - Power Operation

Definition(s):

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.

Basis:

This EAL addresses a failure of the RPS to initiate or complete an automatic trip that results in a reactor shutdown, and either a subsequent operator manual action taken in the control room (reactor trip switches) 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 (e.g., initiate a manual reactor trip using the reactor trip switches). 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.

A manual action in the control room is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip using the reactor trip switches). This action does not include opening MG set feeder breakers or opening the reactor trip feeder breakers locally, 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 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 (ref. 3, 4).

Should a reactor trip signal be generated as a result of plant work (e.g., RTS 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 (e.g., assessment of test results), then this IC and the EALs are not applicable and no classification is warranted.

In the event that the operator identifies a reactor trip is IMMINENT and initiates a successful manual reactor trip before the automatic RPS trip setpoint is reached, no declaration is required. The successful manual trip of the reactor before it reaches its automatic trip setpoint or reactor trip signals caused by instrumentation channel failures do not lead to a potential fission product barrier loss. However, if subsequent manual reactor trip actions fail to shutdown the reactor, the event escalates to the Alert under EAL SA6.1.

Reference(s):

1. Technical Specification Table 1.2 Operational Modes
2. Technical Specification Table 3.3-1 Reactor Trip System Instrumentation
3. 3[4]-EOP-E-0 Reactor Trip or Safety Injection
4. 3[4]-EOP-FR-S.1 Response to Nuclear Power Generation/ATWS
5. NEI 99-01 SU5

Category: S – System Malfunction

Subcategory: 6 – RTS Failure

Initiating Condition: Automatic or manual trip fails to shut down the reactor

EAL:

SU6.2 Unusual Event
A manual trip (reactor trip switches) did **not** shut down the reactor
AND
A subsequent automatic trip (RPS or AMSAC) or manual trip action taken at the reactor console (reactor trip switches) is successful in shutting down the reactor as indicated by reactor power < 5% (Note 8)

Note 8: A manual trip 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.

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

This EAL addresses a failure of a 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.

If an initial manual reactor trip is unsuccessful, operators will promptly take manual action at another location in the control room or at other locations outside of the control room to shutdown the reactor (e.g., initiate a manual reactor trip by opening MG set feeder breakers or opening the reactor trip feeder breakers locally) (ref. 3). However, those actions are not credited as a successful manual reactor trip for this EAL.

Depending upon several factors, the initial 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 control room is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip using the reactor trip switches). This action does not include opening MG set feeder breakers, opening the reactor trip feeder breakers locally, manually driving in control rods or implementation of boron injection strategies.

The plant response to the failure of a 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. 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 (ref. 3, 4).

Reference(s):

1. Technical Specification Table 1.2 Operational Modes
2. Technical Specification Table 3.3-1 Reactor Trip System Instrumentation
3. 3[4]-EOP-E-0 Reactor Trip or Safety Injection
4. 3[4]-EOP-FR-S.1 Response to Nuclear Power Generation/ATWS
5. NEI 99-01 SU5

Category: S – System Malfunction

Subcategory: 2 – RTS Failure

Initiating Condition: Automatic or manual trip fails to shut down the reactor and subsequent manual actions taken in the control room are **not** successful in shutting down the reactor

EAL:

SA6.1 Alert

An automatic or manual trip (reactor trip switches) did **not** shut down the reactor

AND

Subsequent automatic (RPS or AMSAC) or manual trip actions (reactor trip switches) are **not** successful in shutting down the reactor as indicated by reactor power ≥ 5% (Note 8)

Note 8: A manual trip 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.

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

This EAL addresses a failure of the RPS to initiate or complete an automatic reactor trip or failure of a manual reactor trip that results in a reactor shutdown, and subsequent operator manual actions taken in the control room 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 in the control room is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip using the reactor trip switches). This action does not include opening MG set feeder breakers, opening the reactor trip feeder breakers locally, 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 outside the control room (opening MG set feeder breakers, opening the reactor trip feeder breakers locally).

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 shut down 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 SS6. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS6 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 (ref. 3, 4).

Reference(s):

1. Technical Specification Table 1.2 Operational Modes
2. Technical Specification Table 3.3-1 Reactor Trip System Instrumentation
3. 3[4]-EOP-E-0 Reactor Trip or Safety Injection
4. 3[4]-EOP-FR-S.1 Response to Nuclear Power Generation/ATWS
5. NEI 99-01 SA5

Category: S – System Malfunction

Subcategory: 2 – RTS Failure

Initiating Condition: Inability to shut down the reactor causing a challenge to core cooling or RCS heat removal

EAL:

SS6.1 Site Area Emergency

An automatic or manual trip did **not** shut down the reactor

AND

All actions taken to shut down the reactor are **not** successful as indicated by reactor power ≥ 5%

AND EITHER:

- CSFST Core Cooling-RED path conditions met
- CSFST Heat Sink-RED path conditions met

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

This EAL addresses a failure of the RPS to initiate or complete an automatic reactor trip or failure of a 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.

Reactor shutdown achieved by use of other trip actions such as opening supply breakers, emergency boration, or manually driving control rods are also credited as a successful manual trip provided reactor power can be reduced to less than 5% before indications of an extreme challenge to either core cooling or heat removal exist.

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 Category F ICs/EALs. This is appropriate in that the Category F ICs/EALs do not address the additional threat posed by a failure to shut down the reactor. The inclusion of this IC and EAL ensures the timely declaration of a Site Area Emergency in response to prolonged failure to shut down the reactor.

A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria (ref. 3, 4).

Indication that core cooling is extremely challenged is manifested by entry to Critical Safety Function Status Tree (CSFST) Core Cooling-RED path. Indication that heat removal is extremely challenged is manifested by entry to CSFST Heat Sink-RED path (ref. 5).

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

Reference(s):

1. Technical Specification Table 1.2 Operational Modes
2. Technical Specification Table 3.3-1 Reactor Trip System Instrumentation
3. 3[4]-EOP-E-0 Reactor Trip or Safety Injection
4. 3[4]-EOP-FR-S.1 Response to Nuclear Power Generation/ATWS
5. 3[4]-EOP-F-0 Critical Safety Function Status Trees
6. NEI 99-01 SS5

Category: S – System Malfunction

Subcategory: 7 – Loss of Communications

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

EAL:

SU7.1 Unusual Event

Loss of **all** Table S-4 onsite communication methods

OR

Loss of **all** Table S-4 State and local agency communication methods

OR

Loss of **all** Table S-4 NRC communication methods

Table S-4 Communication Methods

System	Onsite	State/ Local	NRC
Plant Radio System	X		
Commercial Telephone System	X	X	X
Plant Address (PA) System	X		
Federal Telephone System (ENS)			X
EMnet		X	
Hot Ring Down (HRD) Telephone System		X	

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

None

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 State and local agencies and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (e.g., use of non-plant, privately owned equipment, relaying of on-

site information via individuals or multiple radio transmission points, individuals being sent to offsite locations, etc.).

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

The second EAL condition addresses a total loss of the communications methods used to notify all State and local agencies of an emergency declaration. The State and local agencies referred to here are the State of Florida and local communities.

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

This hot condition EAL is equivalent to the cold condition EAL CU5.1.

Reference(s):

1. Turkey Point Plant Radiological Emergency Plan
2. NEI 99-01 SU6

Category: S – System Malfunction

Subcategory: 8 – Containment Failure

Initiating Condition: Failure to isolate containment or loss of containment pressure control

EAL:

SU8.1 Unusual Event

Any penetration is **not** closed within 15 min. of a VALID CTMT isolation (Phase A, B or Containment Ventilation Isolation) actuation signal

OR

CTMT pressure > 20 psig with < one full train of CTMT heat removal systems operating per design for ≥ 15 min.

(Notes 1, 11)

Note 1: The EC should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded.

Note 11: One full train of CTMT heat removal systems consists of at least two Containment Coolers operating in conjunction with one Containment Spray Pump.

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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.

Basis:

This EAL 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 the first condition, the containment isolation signal must be generated as the result on an off-normal/accident condition (e.g., 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.

The second condition 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 (ref. 1, 2).

One full train of CTMT heat removal systems consists of at least two Containment Coolers operating in conjunction with one Containment Spray Pump (ref. 1, 2).

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 (e.g., containment sprays or cooling 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.

Reference(s):

1. UFSAR Section 6.3 Emergency Containment Cooling
2. UFSAR Section 6.4 Containment Spray System
3. NEI 99-01 SU7

Category: S – System Malfunction

Subcategory: 9 – Hazardous Event Affecting Safety Systems

Initiating Condition: Hazardous event affecting SAFETY SYSTEMS needed for the current operating mode

EAL:

SA9.1 Alert

The occurrence of **any** Table S-5 hazardous event

AND

Event damage has caused indications of degraded performance on one train of a SAFETY SYSTEM needed for the current operating mode

AND EITHER:

- Event damage has caused indications of degraded performance to the second train of the SAFETY SYSTEM needed for the current operating mode
- Event damage has resulted in VISIBLE DAMAGE to the second train of the SAFETY SYSTEM needed for the current operating mode

(Notes 9, 10)

Note 9: If the affected SAFETY SYSTEM train was already inoperable or out of service before the hazardous event occurred, then emergency classification is **not** warranted.

Note 10: If the hazardous event **only** resulted in VISIBLE DAMAGE, with **no** indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is **not** warranted.

Table S-5 Hazardous Events
● Seismic event (earthquake) ● Internal or external FLOODING event ● High winds or tornado strike ● FIRE ● EXPLOSION ● Other events with similar hazard characteristics as determined by the Shift Manager

Mode Applicability:

1 – Power Operation, 2 – Startup, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

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 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.

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 (as defined in 10CFR50.2):

> Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:
>
> (1) The integrity of the reactor coolant pressure boundary;
>
> (2) The capability to shut down the reactor and maintain it in a safe shutdown condition;
>
> (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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

Basis:

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

Indications of degraded performance 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.

VISIBLE DAMAGE addresses damage to a SAFETY SYSTEM train that is not in service/operation and that potentially could cause performance issues. 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. This VISIBLE DAMAGE should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

An event affecting equipment common to two or more trains of a safety system (i.e., there are indications of degraded performance and/or VISIBLE DAMAGE affecting the common equipment) should be classified as an Alert under this EAL, as appropriate to the plant mode. By affecting the functionality of multiple trains of a safety system, the loss of the common equipment effectively meets the two-train impact criteria that underlie the EALs and bases.

An event affecting a single-train safety system (i.e., there are indications of degraded performance and/or VISIBLE DAMAGE affecting the one train) would not be classified under this EAL because the two-train impact criteria that underlie the EALs and bases would not be met. If an event affects a single-train safety system, then the emergency classification should be made based on plant parameters/symptoms meeting the EALs for another IC. Depending upon the circumstances, classification may also occur based on Shift Manager/EC judgement.

An event that affects two trains of a safety system (e.g., one train has indications of degraded performance and the other VISIBLE DAMAGE) that also has one or more additional trains should be classified as an Alert under this EAL, as appropriate to the plant mode. This approach maintains consistency with the two-train impact criteria that underlie the EALs and bases, and is warranted because the event was severe enough to affect the functionality of two trains of a safety system despite plant design criteria associated with system and system train separation and protection. Such an event may have caused other plant impacts that are not immediately apparent.

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

This hot condition EAL is equivalent of the cold condition EAL CA6.1.

Reference(s):

1. 0-EPIP-20106 Natural Emergencies
2. EP FAQ 2016-002
3. NEI 99-01 SA9

Background

NEI 99-01 Revision 6 ICs AA3 and HA5 prescribe declaration of an Alert based on impeded access to rooms or areas (due to either area radiation levels or hazardous gas concentrations) where equipment necessary for normal plant operations, cooldown or shutdown is located. These areas are intended to be plant operating mode dependent. Specifically the Developers Notes for AA3 and HA5 states:

The "site-specific list of plant rooms or areas with entry-related mode applicability identified" should specify those rooms or areas that contain equipment which require a manual/local action as specified in operating procedures used for normal plant operation, cooldown and shutdown. Do not include rooms or areas in which actions of a contingent or emergency nature would be performed (e.g., an action to address an off-normal or emergency condition such as emergency repairs, corrective measures or emergency operations). In addition, the list should specify the plant mode(s) during which entry would be required for each room or area.

The list should not include rooms or areas for which entry is required solely to perform actions of an administrative or record keeping nature (e.g., normal rounds or routine inspections).

Further, as specified in IC HA5:

The list need not include the Control Room if adequate engineered safety/design features are in place to preclude a Control Room evacuation due to the release of a hazardous gas. Such features may include, but are not limited to, capability to draw air from multiple air intakes at different and separate locations, inner and outer atmospheric boundaries, or the capability to acquire and maintain positive pressure within the Control Room envelope.

PTN Table R-3 and H-2 Bases

A review of PTN general operating procedures identified the following mode dependent in-plant locations where procedurally defined actions are required for normal plant operation, shutdown, and cool-down:

MODE 1 (Power Operation)
- Aux Building 18’
- Turbine Building (All levels)
- Rad Waste Building

MODE 2 (Startup)
- Aux Building 18’
- Turbine Building (All levels)
- Rad Waste Building

MODE 3 (Hot Standby)
- Aux Building 18’
- Turbine Building (All levels)
- Vital SWGR, LC, MCC rooms (TB)
- HHSI Pump, CSP rooms
- Rad Waste Building

MODE 4 (Hot Shutdown)
- Aux Building 18’
- Turbine Building (All levels)
- Vital SWGR, LC, MCC rooms (TB)
- Containment
- RHR Pump & Hx rooms
- Rad Waste Building
- Electrical Penetration rooms

Mode 5 (Cold Shutdown)
- Aux Building 18’
- Turbine Building (All levels)
- Vital SWGR, LC, MCC rooms (TB)
- Containment
- Rad Waste Building
- Electrical Penetration rooms

Procedures Reviewed

- 3(4)-GOP-103 Power Operation to Hot Standby
- 3(4)-GOP-305 Hot Standby to Cold Shutdown
- 3(4)-GOP-100 Fast Load Reduction

GOP-103, GOP-305, and GOP-100 have branching procedures to perform tasks to accomplish the steps in the General Procedure. These lower tier procedures are referenced in the General Procedures. All steps in the GPs were researched to provide input into these tables.

Control Room ventilation systems have adequate engineered safety/design features in place to preclude a Control Room evacuation due to the external release of a hazardous gas (UFSAR Section 7.7 Operating Control Stations and Section 9.9 Control Building Ventilation System). Therefore, the Control Room is not included in this assessment or in Table H-2. IC RA3 Example EAL #2 is adequately bounded by IC RA2 Example EAL #1. Therefore, the Control Room is not included in this assessment or in Table R-3.

Table R-3 & H-2 Results

Table R-3 & H-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	**Mode(s)**
Auxiliary Building 18'	1, 2, 3, 4, 5
Turbine Building (**any** level)	1, 2, 3, 4, 5
Containment	4, 5
HHSI Pump, CSP Rooms	3
RHR Pump & HX Rooms	4
Rad Waste Building	1, 2, 3, 4, 5